



CARBON FREE DC



DEPARTMENT
OF ENERGY &
ENVIRONMENT

2045
STRATEGY

INTRODUCTION

“The urgency to combat climate change is clear. We must look beyond just preventing future harm to also address the interwoven climate and health crises we are living with today while creating opportunities for a more just and equitable future.”

— MAYOR MURIEL BOWSER

The District is experiencing the impacts of climate change today. At the same time, many residents face pressing social and economic challenges resulting from a legacy of government systems and policies that created and will perpetuate racial inequity until we transform them. The District has not wavered in our commitment to climate action, and as we adopt this strategy to become carbon neutral and climate resilient by 2045, we recognize that tackling climate change is part of a broader commitment to advance health, opportunity, prosperity, and equity for all District residents.

Slashing our carbon pollution will require both imagination and bold action, from reimagining our streets, to transforming how we power our homes and buildings. While a climate strategy alone will not solve the racial inequities at the heart of our city’s biggest challenges, the scale of change required offers new avenues to advance opportunity. The community’s vision has shaped the District’s approach to 2045 and will guide future climate action as we craft and implement solutions.

WHAT IS CARBON NEUTRALITY?

Like balancing a checkbook, being carbon neutral means in any given year, we cannot send more greenhouse gases into the atmosphere than we remove. The District’s work to cut emissions, will start with efficiency first—using fewer resources and wasting less—and then focus on using clean, renewable energy in our homes, buildings, and transportation systems. There is a lot we can do as a city, but we cannot eliminate carbon emissions by ourselves. Collaboration with our neighbors, our region, and the federal government will be an essential part of the District’s pathway to carbon neutrality by 2045.

Carbon neutrality is an essential goal because climate change is fueled by the total concentration of greenhouse gases in the atmosphere. If the District produces more than zero net emissions, it is contributing to the climate crisis by adding to the cumulative total of greenhouse gases. And while climate change sounds like something that will happen in the future, or that will happen somewhere else, the reality is that DC is already experiencing it: record-breaking heat waves and snowstorms, increased flooding, and destructive storms like the 2012 derecho. And we will continue to experience these climate-related impacts as the District becomes warmer, wetter, and wilder. To avoid the worst effects of climate change, we need global climate action, with leaders like the District doing our part to radically curtail our own emissions and start removing (if possible) greenhouse gases from the atmosphere.

District Climate and Energy Goals:

Carbon Neutral and Climate Resilient by 2045

60% ↓

Reduction in Emissions by 2030

50% ↓

Reduction in Per Capita Energy Use by 2032

50% ↑

Energy from Renewables by 2032

WHAT IS CARBON FREE DC?



The District has long been a leader in sustainability, climate, and energy planning. Carbon Free DC is a long-range strategy to guide future policymaking by:



Setting the vision by defining what it means to be a carbon neutral city by 2045

Charting a pathway by identifying the key milestones and actions necessary to achieve the goal of carbon neutrality by 2045

Guiding future conversations by turning community feedback into tools to incorporate equity into policy development

Generating ideas by highlighting possible policies and programs for further discussion as other city plans are implemented and updated

HOW DOES CARBON FREE DC RELATE TO OTHER DISTRICT PLANS?

The District has a suite of plans that detail targets and actions for specific sectors and policy areas. As these plans continue to be implemented and updated, this strategy will provide a guide for aligning those plans and actions with the key steps toward carbon neutrality.

Related DC Plans:

Climate Ready DC (CLIMATE)

Resilient DC (CLIMATE)

Clean Energy DC (CLIMATE, TRANSPORTATION, ENERGY)

moveDC (TRANSPORTATION)

Comprehensive Plan (BUILT ENVIRONMENT)

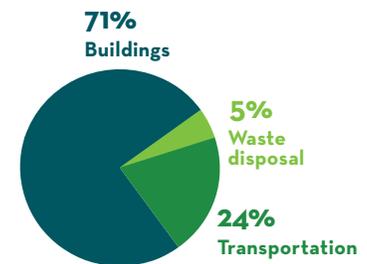
Housing Framework for Equity & Growth (BUILT ENVIRONMENT)

Zero Waste DC (FUTURE PLAN, WASTE)

Sustainable DC 2.0 (ALL)

CURRENT EMISSIONS

The biggest driver of emissions in the District is the energy we use to heat, cool, and power our buildings, accounting for 71% of total carbon emissions. Cars, trucks, and buses, along with emissions from generating the electricity that powers the Metrorail trains, DC streetcar, and electric DC Circulator buses, account for an additional 24%. Waste disposal and wastewater treatment combined account for the remaining 5% of annual emissions. In 2019, citywide greenhouse gas emissions from these sectors total more than 7.1 million metric tons of carbon dioxide equivalent (MMT_{CO2e}). Taking into account the energy and materials that go into producing and transporting our everyday supplies—from materials used to build our homes and pave our streets, to the food we eat and the cellphones we carry—the District's carbon footprint is even larger.



To reach carbon neutrality, the District must transform the drivers of emissions in each of these sectors—buildings, energy, transportation, and waste—focusing on ways to reduce wasted energy and use more clean, renewable power, while building a more resilient and livable city for all residents.



CARBON FREE DC PLANNING PROCESS: WHAT WE HEARD

This strategy is focused on carbon, but we know the District’s vision for every resident to have health, opportunity, prosperity, and equity goes far beyond climate action. The approach to this planning process centered community priorities. We first identified broad community goals and then looked for connections to the systems that we know must change to reach carbon neutrality, such as the energy used in our homes and transportation.

Building on the feedback from other citywide planning efforts, including Sustainable DC 2.0, the Comprehensive Plan, and the Housing Framework for Equity & Growth, we began with a foundation of community priorities around a livable, sustainable, and equitable city. Through a series of community

focus groups and a subsequent online survey, we asked residents to expand on those ideas, sharing their vision for 2045 and drawing on their lived experiences to identify the key challenges to overcome. The following priorities and challenges reflect what we heard from the community.

COMMUNITY PRIORITIES BY 2045:



Housing: Anyone living here today can still afford to live here, in quality, safe housing in vibrant, walkable neighborhoods across all eight wards.



Health: Residents' mental and physical wellness is not determined by where they live.



Transportation: Safe, reliable, convenient, accessible, and clean options serve all residents regardless of their home address, destination, physical abilities, or income.



Jobs: A green economy that affords all residents fair pay and livable wages.



Tools & Resources: Residents are prepared for the impacts of climate change and have the tools to combat the effects of climate change and to live green.

KEY CHALLENGES:



Affordability: The costs of living in the District are already too high for many residents and are rising, putting more pressure on low-income residents and residents of color to move out of the District.

Accessibility: For many residents, particularly in neighborhoods east of the Anacostia River, key services and amenities are not located within walking distance of their homes, and inconvenient or unreliable transportation makes it challenging and time consuming to meet their daily needs such as grocery shopping. For other residents, information either does not reach them on the channels they turn to, is not in their language, or may not be offered at a time they can participate, making services inaccessible.



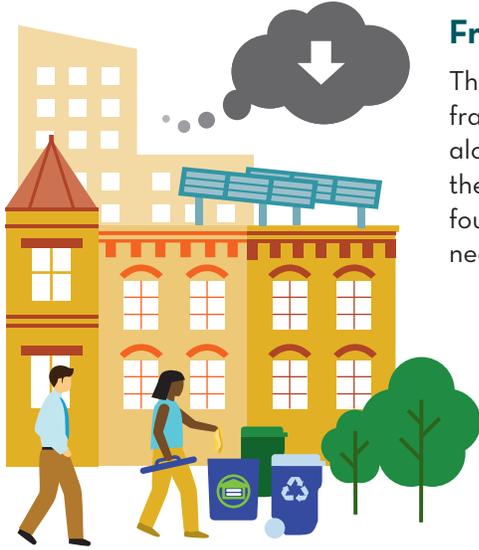
Health & Safety: Health inequities are stark and persistent. Many neighborhoods face a combination of threats, from poor indoor and outdoor air quality, to environmental hazards and neighborhood safety. The District's Health Equity Report documents the drivers and impacts of these inequities. Solving these problems requires pursuing health-focused initiatives in all policies and creating specific solutions targeting the communities most impacted.

Jobs & Opportunity: Living wage jobs with benefits available to residents with all levels of education and experience are foundational to addressing the challenges above. Job training programs must also focus on job placement and offering a career ladder to benefit all. Transparency about who pays and who benefits from policies is key to advancing equity.



HOW COMMUNITY FEEDBACK SHAPED THIS STRATEGY

Articulating the ways Carbon Free DC departs from traditional climate planning as a result of centering community priorities was a key goal of the planning process. Some of the places where those choices are most evident are illustrated in the examples below.



Framing the Goals

This strategy identifies seven goals to achieve a carbon neutral future, framed to incorporate key community priorities. Carbon neutrality alone will not bring about the community's vision for 2045, but drawing the connections between community and climate goals lays a strong foundation for future conversations about how to center community needs in climate action policy.

Example: A goal focused exclusively on cutting carbon emissions from buildings and energy use might read: Homes and buildings are highly efficient and fossil fuel free.

Shifting the focus to reflect community priorities, Carbon Free DC's goals are more expansive, requiring more holistic approaches to policy and programs.

Homes and buildings are **highly-efficient, comfortable, resilient,** and **affordable** to operate. Homes and buildings are healthy and fossil fuel free.

Tracking Progress

The District has numerous goals and targets for sustainability, housing, and transportation from our existing plans. This strategy incorporates several new affordability targets and key indicators alongside more traditional climate and energy targets as one way to ensure a focus on residents' financial burden alongside climate action.

Example: The District measures greenhouse gas emissions annually, from energy used in buildings and transportation. While those indicators remain important, based on community feedback Carbon Free DC also includes indicators of affordability for housing, transportation, and utilities. Pairing traditional carbon metrics alongside measures for community priorities is one way to measure impact in ways that more closely reflect residents' lived experiences.

For example, strategies that target energy and water efficiency can both reduce utility costs and GHG emissions.

Creating more and affordable housing on a transit corridor could facilitate residents remaining in or moving to the District, without the cost or emissions from a personal vehicle.





Guiding Toward Equity

Residents shared many ideas about what it will take to realize their community vision for 2045. Those ideas and residents' questions about how a carbon neutral future would address current challenges in their daily lives informed the Guiding Questions for Community Conversations. The guide is a list of questions that can be used as a resource for conversations between community members and policymakers to advance the goal of prioritizing the needs of the community in future decisions.

Example: Beyond traditional questions about program costs and emissions reductions, Carbon Free DC prompts questions such as: How will this improve economic opportunity? Will this create and sustain living-wage jobs with benefits? Result in job placement, not just job training?

Shaping Key Actions and Policies:

The policy matrix incorporates themes around health, housing affordability, quality of housing, and cost and time burden to shape those future discussions, understanding this strategy is just the beginning of the conversation.

Example: Prioritizing electric vehicle transitions in communities overburdened by air pollution.

Develop a strategy to achieve deep energy retrofits in single-family homes and small multi-family residential buildings while preserving and expanding the affordability and availability of housing units.



BENEFITS OF A CARBON FREE DC

Shifting to a carbon free future will not solve all the challenges identified by the community. But the scale of transformation needed to achieve carbon neutrality—in the way we build and power our homes, move around the city and the region, and think about the materials we use and repurpose—offers many opportunities to advance core community values and begin to address key challenges in health and economic inequality.

Here are some examples of how District residents may benefit from these changes:

AT HOME:

Affordable Comfort, Healthy Heating & Cooling

Efficient electric heat pumps can provide heating and cooling with zero on-site pollution, keeping indoor air healthier to breathe.

High-performance construction, more insulation, and better windows can lower utility bills and make homes quieter and more comfortable.



IN YOUR NEIGHBORHOOD:

Safe and Accessible Streets, Cleaner Air

Community resilience hubs in each neighborhood will provide information, resources, and electricity even during a power outage.

Electric buses and cars, and fewer idling vehicles, will reduce noise and improve air quality, making it easier to breathe when walking or exercising outside.

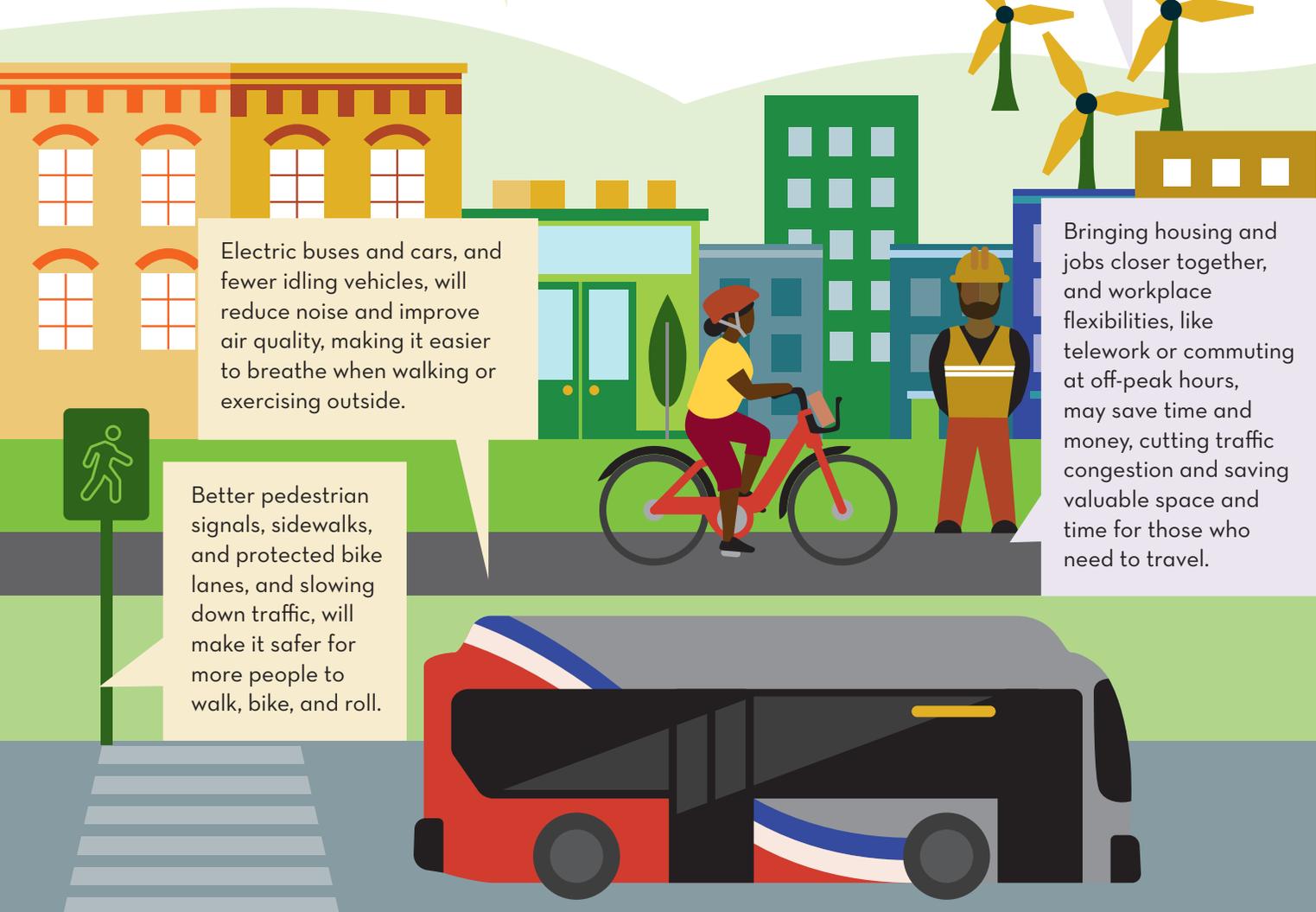
Better pedestrian signals, sidewalks, and protected bike lanes, and slowing down traffic, will make it safer for more people to walk, bike, and roll.

IN OUR REGION:

Green Jobs, Clean and Faster Commutes

Green jobs will be necessary in every sector of the economy, from businesses that create and sell green products, to construction workers and architects who build energy efficient housing, to operators and technicians to keep an all-electric fleet running.

Bringing housing and jobs closer together, and workplace flexibilities, like telework or commuting at off-peak hours, may save time and money, cutting traffic congestion and saving valuable space and time for those who need to travel.



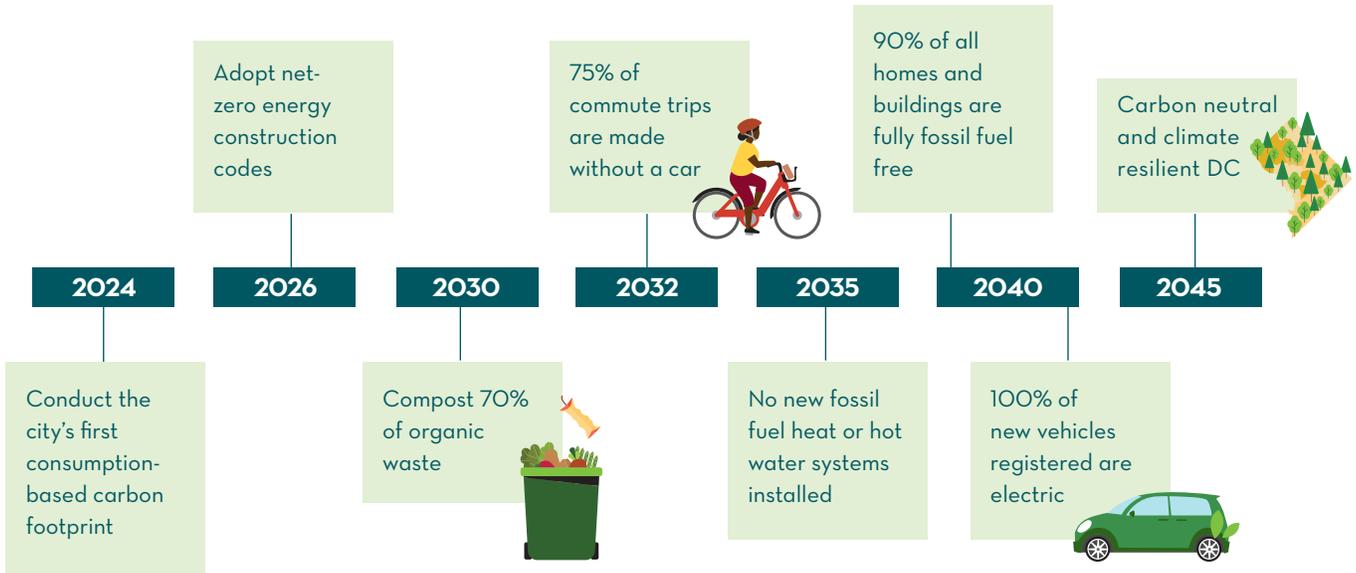


SUMMARY OF GOALS

The District’s 2045 vision is as much about building a healthy, resilient, and prosperous city as it is about reducing carbon emissions. To do both requires a wide range of strategies, from making housing more affordable, to building a local circular economy. The following seven goals describe the vision for the District by 2045:

- | | | | |
|---|---|---|---|
| 1 | Homes and buildings are highly efficient, comfortable, resilient, and affordable to operate. | 5 | Residents’ daily needs are a safe, comfortable, convenient walk, ride, or roll from their front door. |
| 2 | Homes and buildings are healthy and fossil fuel free. | 6 | Zero emission buses and vehicles move more people and freight with less noise and pollution. |
| 3 | Energy is clean, renewable, and resilient in the face of extreme weather. | 7 | A circular economy supports a zero waste DC and rewards low-carbon choices. |
| 4 | Quality housing in all eight wards provides housing security for current and future residents in vibrant, accessible neighborhoods. | | |

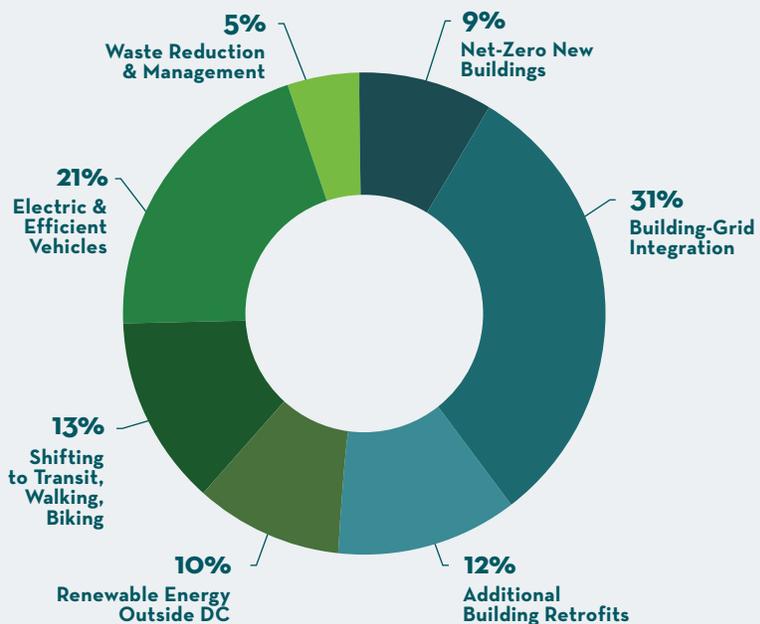
TIMELINE OF KEY MILESTONES



To achieve carbon neutrality, the District must make consistent, sustained progress from now until 2045. Within the next 10 years, we need to improve the energy performance of new and existing buildings, introduce municipal composting programs, and reduce passenger vehicle use for commuting. Within the next 20 years, we need to begin phasing out fossil gas and fuel oil systems from existing buildings and begin driving mostly electric – vehicles. Additionally, over the next 25 years, we need to eliminate fossil fuel use in existing buildings, ensure that all new vehicles registered in the District are electric, and divert nearly all waste from being buried or burned, by reusing, recycling, and composting.

RELATIVE IMPACT OF ACTIONS BY SECTOR

88% ↓
Citywide GHG reduction in 2045, from 2006



*exceeds 100% due to rounding



BUILDINGS & ENERGY

In 2045, homes and buildings should be healthy, comfortable, and affordable places to live and work. They should also be designed to weather the impacts of a warmer, wetter, and wilder climate. Achieving this vision will require deep energy efficiency coupled with renewable energy.

The Clean Energy DC plan identifies many of the steps in this transition: dramatically and systematically improving the efficiency of existing buildings, accelerating the transition to net-zero energy new construction, and powering all buildings with fossil fuel free energy from a modernized, responsive, and resilient local energy system. These core strategies are essential to meeting the 2045 target, even as we pursue

additional steps necessary to fully decarbonize. The following actions to cut emissions from buildings and energy systems, the largest driver of carbon citywide, build on this foundation while prioritizing affordability, health, and resilience for residents and neighborhoods. Taken together, the actions listed below will avoid more than 1.6 MMTCO₂e per year by 2045 (an estimated 61% of emissions reductions in this strategy).

BUILDINGS



1. Invest in efficient and healthy existing buildings

Most of the buildings that will be standing in 2045 already exist today, so investment is critical to make them highly efficient, healthy, and affordable to keep comfortable. The District has made significant progress with the Building Energy Performance Standard (BEPS) targeting large buildings. But to reach a carbon-free future, strategies that support deep upgrades in homes and smaller buildings are essential to ensuring all residents can enjoy the benefits of living and working in high-quality spaces that provide more comfort, better indoor air quality, and lower utility bills. Using less energy overall also makes a citywide transition to renewable energy easier and less costly. While building design and technology are important, strategies that arm residents with the tools and information needed to understand their energy use and learn to operate new systems that maximize affordability and efficiency are an essential part of the pathway. Policies that address the tension between valuable upgrades and long-term affordability, prioritizing investments that benefit residents who need it most, will be critical as we work to dramatically improve the performance of our buildings.



2. Preserve and upgrade existing housing

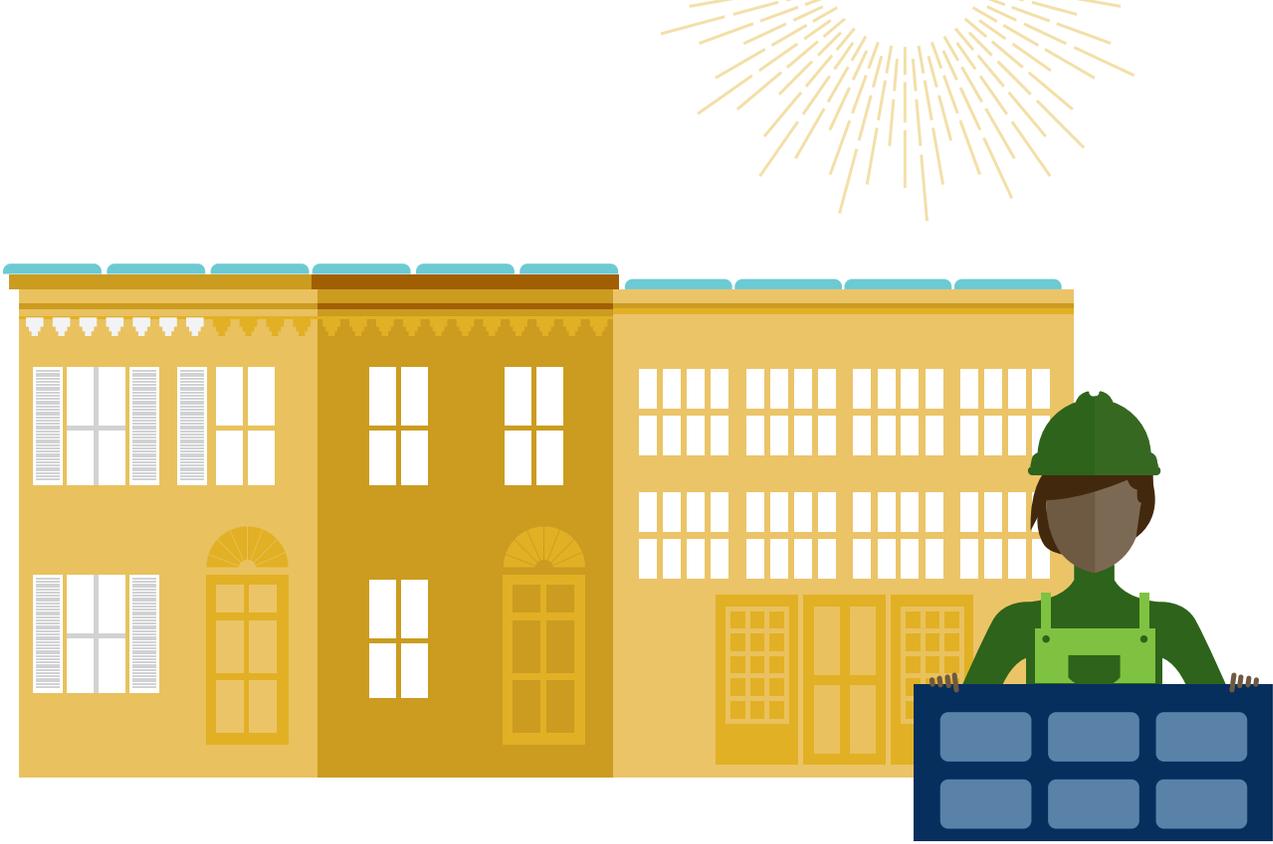
Housing is such a critical need for the District, therefore our pathway to 2045 must include strategies to preserve, rehabilitate, and modernize existing units. A commitment to ensuring all residents have safe and healthy homes guides the District's efforts to address environmental health threats, such as mold, lead, and carbon monoxide. It should also drive the next steps in addressing indoor air quality and making homes more resilient and affordable to heat and cool in the face of climate change. As we look to 2045, strategies that improve the quality of homes while simultaneously maintaining affordability are critical. This is possible by investing in holistic solutions like upfront incentives that enable critical upgrades without jeopardizing the long-term affordability of units. Strategies could

include coupling deep energy retrofits that combine efficiency, renewable energy, and storage, which will make buildings more affordable to operate in the long run, with funding and financing options that lower upfront costs. Preserving and upgrading existing units are already priorities in meeting the District's housing and health equity goals. By prioritizing rehabilitation over demolition, these strategies can cut both the energy used daily in homes and the carbon embodied in the materials needed to build them.



3. Accelerate net-zero energy, resilient new construction

In 2045, buildings should produce as much energy as they use, burn no fossil fuels, and be prepared to withstand future climate impacts. New construction is a prime opportunity to transform buildings into climate assets and lock in decades of carbon and energy savings. Clean Energy DC calls for net-zero energy construction codes by 2026, which will require buildings to be highly efficient and use renewable energy to meet their entire annual energy demand. Achieving this milestone, and encouraging buildings to meet it early, will cut emissions while building an experienced workforce ready and able to scale-up to meet growing demand. Integrating resilient design—which starts with maximizing passive heating and cooling—into these high-performance buildings supports long-term affordability and emissions reductions with the added benefit of making communities more prepared for the impacts of climate change. For example, a highly-efficient building with solar panels and battery storage—enough to run critical systems for a few days—provides a safe place for residents in an emergency and enables lower utility costs year-round. By encouraging “building-grid integration” that enables homes and buildings to respond to changing energy demands, we can improve the reliability of wind and solar power generation. By accounting for climate risk as we design and build, the District can deliver climate-ready community assets in every neighborhood that are more affordable to operate and more reliable in an emergency.



4. Phase out on-site fossil fuel combustion, starting with new construction

The District's buildings must be fossil fuel free by 2045 to achieve carbon neutrality. By designing new buildings to run without fossil fuels, and replacing old gas equipment—furnaces, boilers, hot water heaters, and kitchen appliances—with efficient electric systems, buildings can reduce emissions while improving air quality, indoors and out. Strategies that push new construction to be fossil fuel free, such as construction codes, and programs that help residents and buildings convert existing systems to zero-carbon alternatives will be key. Equity must guide new policies and programs during this critical transition. Prioritizing low-income customers is essential at every stage, both to ensure that compatible technologies—like heat pumps, electric water heaters, induction cooktops and battery storage systems—are accessible to all residents and affordable to operate, but also to guard against the District's least-resourced residents paying more as the city transitions away from fossil fuels. This will be an incremental transition that must start now to eliminate fossil fuel use by 2045.



5. Encourage zero carbon homes and buildings

The pathway to a zero-carbon future also includes addressing the impact of materials used to construct and operate buildings. Strategies targeting the design phase, to assess the carbon embodied in construction materials—particularly carbon-intensive products like concrete and steel—and minimize their usage, by design or by finding low-carbon alternatives, will become increasingly important. Going one step further, the District could also encourage planning for the end of a building's lifecycle, so structures are built in ways that support eventual deconstruction rather than demolition, to enable material reuse. At the systems level, as more technologies like heat pumps evolve to rely on refrigerants, the pathway to 2045 also requires strategies to ensure careful management and leak prevention while simultaneously encouraging a market shift toward green refrigerants. Together these strategies will further reduce the carbon footprint of already efficient construction.

ENERGY



1. Expand options for zero-carbon heating and cooling

There are already buildings in the District using alternative heating and cooling technologies compatible with zero-carbon fuels, including wastewater heat recovery and geoexchange, but more options are necessary to meet diverse needs citywide and accelerate the District's transition from fossil fuels. By expanding the options available for individual buildings and for district energy and neighborhood-scale systems, the District can cut emissions while increasing resilience to future shocks. A range of strategies, from addressing barriers to integration of these technologies into current projects, to piloting neighborhood-scale renewable energy microgrids, and even turning local food waste into biogas to meet specific high-heat processes, are needed. Some technologies are ready to scale-up today, while others will require a longer transition. To capitalize on natural investment opportunities in equipment lifecycles, development timelines, and infrastructure replacement plans, the District needs neighborhood-scale energy plans that outline a suite of options for clean, resilient, local power, and establish a pathway to decarbonize energy systems to ensure alignment with Carbon Free DC's 2045 goals. Together, these actions will support zero-carbon homes and buildings that are comfortable, affordable, and climate-ready.



2. Plan for resilience, with storage and more

As the District faces more frequent and intense storms, and longer, hotter heatwaves, ensuring residents have resilient, clean power is critical. Climate Ready DC established goals prioritizing resilient power for critical facilities and ensuring every resident is within walking distance to a community resilience hub where they can go for information, to stay cool or warm when the power is out, recharge a cell phone, or keep food and medication cold. Energy storage technology—such as solar panels with a battery—is key to supporting

all these needs. A first step is identifying where, when, and how storage resources can be encouraged and embedded into the planning and operations of the electric grid. This includes outlining a pathway to eliminate fossil fuels from back-up power systems to transition away from loud and polluting diesel technologies toward clean and renewable solutions. By prioritizing resources for critical facilities—like hospitals, fire stations, and telecommunication infrastructure—planning for neighborhood-scale resilience solutions, and piloting emerging technologies, the District can make our power system more resilient and reliable while cutting emissions. These solutions both increase the District's preparedness in an emergency, but also contribute to a more reliable, responsive, and affordable future when combined with other priorities to maximize energy efficiency and renewable generation.



3. Accelerate a 100% renewable electric grid

To date, the regional grid's transition away from coal-fired power plants has been the biggest driver of local carbon emissions reductions citywide. However, the grid will not be 100% renewable by 2045 if advancements continue at the current pace. The District has already taken important steps to encourage renewable generation within our grid region and we should continue to use our purchasing power to drive development of additional renewable sources that green the whole region's electricity supply. Clean Energy DC recommends providing carbon-free electricity for most customers by default and setting a maximum greenhouse gas intensity for electricity supplied to the District. Over the next 25 years, the District should continue to evaluate and exercise our options as an energy consumer to accelerate the rate at which our electricity gets cleaner, even as the District concentrates on using less energy overall and investing in local renewable generation.

TRANSPORTATION & LAND USE

More than 990,000 residents will call the District home in 2045. This is good news for carbon emissions, as city residents generate far fewer greenhouse gas emissions than people living outside urban centers, because denser housing and development and public transportation help reduce the amount of energy use required for daily living.

As the District and the region grow, there is an opportunity to reimagine an inclusive and sustainable city. Encouraging housing in all eight Wards and addressing affordability for renters and owners are key to accommodating incoming residents and providing homes for housing-insecure residents without displacing existing residents. The type of housing constructed or preserved, the cost of that housing, and where it is built influence the health, opportunity, and prosperity of the District and our residents. These considerations are also foundational to

meeting our climate goals: by making it easier for people to live in the city, especially close to transportation and commercial corridors, getting to work, school, and daily activities becomes easier and more convenient, and cuts travel times and pollution. Together, these strategies will result in more livable neighborhoods for all residents while reducing greenhouse gas emissions by approximately 690,000 MTCO_{2e} per year in 2045, an estimated 34% of emission reductions in this strategy.

LAND USE



1. Encourage housing citywide

Increasing the supply of quality housing is one important factor in ensuring all residents have a place to call home. Key steps to encourage equitable development throughout the city are supporting housing development where little has occurred, and enhancing transit-oriented development in neighborhoods that are already well-connected. Guided by the District's Comprehensive Plan, this could include increasing the intensity of land use to allow and encourage growth throughout the District, while also leveraging the draw of existing transit stations and corridors to support larger, efficient buildings that allow more residents to live in walkable, accessible communities. To achieve the District's vision for housing affordability, stimulating housing production must center around community needs, including opportunities for residents of all incomes to rent and own, and units that accommodate different household sizes and residents of all ages and abilities. With this focus, the District can retain and attract residents while helping the region grow sustainably.



2. Bring housing, jobs, and daily needs closer together

Too often, residents must live far away from their jobs or other amenities in order to afford to live comfortably. In the District's vision for 2045, more housing that is affordable and located in connected, walkable neighborhoods will allow residents to live closer to where they need to go, saving time and money. This will require approaching the connections between housing and transportation from both sides: bringing more housing to neighborhoods that are already commercial and transportation corridors through transit-oriented development and preservation, while simultaneously improving and increasing the coverage, speed, and reliability of the transportation network, particularly in areas underserved by transit. Providing residents with multiple travel options that don't require a car is central to the vision for a sustainable DC where an accessible, resilient transportation network improves health and cuts pollution.

TRANSPORTATION

To achieve our citywide mobility and climate goals, the District must redouble our efforts to enable and encourage more people to walk, bike, roll, and take transit for their daily needs. If we are to make active and public transportation options the default for most residents' daily trips, a top priority is to implement moveDC, the District's long-range transportation vision to ensure an accessible, safe, and enjoyable transportation network that serves all residents. Realizing this vision, and then ensuring the remaining vehicles on our roads are quiet and clean, is the District's pathway to a connected, convenient, and carbon-free transportation system.



1. Prioritize moving people, not cars

Enabling more residents to walk, bike, roll, and take public transit to reach their destination is the most efficient use of public space and energy. Currently, just over half of all commute trips are taken by bike, walking, or public transit. The District has a goal of shifting the way people move around the city such that 75% of commute trips are made without a car by 2032. To achieve a carbon-free future, this should be expanded to all trips, to curtail the total vehicle miles traveled both in the District and the region. As the region continues to grow, curbing vehicular traffic is the key to reducing roadway congestion and pollution and increasing safety. The District's moveDC commitments to building 25 miles of dedicated bus lanes, maintaining all sidewalks to a state of good repair, and ensuring 90% of residents live within a quarter mile of a Capital Bikeshare station are examples of current efforts that will support this transition. And there is more to do to ensure accessibility for all residents, regardless of when they need to travel, their income, or mobility level. This may include reducing costs for transit with free or reduced fares, expanding late night services, and providing options that meet the specific needs of historically under-resourced communities. For the District, making active and public transit options the most convenient, reliable, affordable, and safest ways to get around is foundational to becoming a carbon-free and even more livable city.



2. Shift to zero emission transportation, prioritizing buses and trucks

Following a shift in how we get around the city, the next step is to ensure that the vehicles left on the road produce zero emissions. By cutting air and noise pollution, electric vehicles will make it healthier and more enjoyable to be outside. As the District implements a roadmap to electrify transportation, the biggest benefits will come from prioritizing electric options to replace buses, trucks, and other vehicles that are high-capacity, high-mileage, and the most polluting, particularly those serving communities with the poorest air quality. Leading with District Government fleets, this includes continuing to electrify the DC Circulator buses, transitioning the school bus fleet, and piloting new technologies for heavy-duty vehicles like refuse trucks and street sweepers. Recognizing that a significant portion of the traffic on DC roads comes from out-of-state, the District's continued commitment to work collaboratively to drive electrification of buses and heavy-duty vehicles is key. For example, a coordinated regional effort should focus on ensuring an adequate and seamless charging network with infrastructure that is interoperable and flexible to adapt to evolving technologies and charging patterns. In parallel with electrifying on-road vehicles, the District should also evaluate strategies to phase out fossil fuels for off-road vehicles and equipment—from railways and waterborne vessels, to construction and landscaping equipment—to be fully aligned with a net-zero carbon 2045. With all these strategies together, all District residents can benefit from zero-emission technologies that make neighborhoods quieter and cleaner.

WASTE & EMBODIED CARBON

In 2045, a circular economy that prioritizes reusing, repairing, and repurposing materials—and recycling what remains—will enable the District to be a zero waste city. Achieving this goal will require the District to divert 80% of waste from landfills and incinerators by 2032.

Reducing the waste generated citywide—from businesses, offices, schools, and homes—is the most efficient and effective pathway to meeting this goal. By targeting waste at the source and meeting the District’s goal to cut the amount of waste generated per person 15%, we can reduce carbon and air emissions not only from hauling and disposal, but across products’ lifecycles. Taking the next step toward this goal, the District will quantify the city’s consumption-based carbon footprint by 2024 to include the carbon embodied in the things we buy. Yet quantifying those reductions should not delay action. We will first develop strategies targeting the most carbon-intensive waste streams, such as food waste, and begin purchasing low-carbon materials, goods, and services.



1. Reduce first to achieve Zero Waste

Reducing waste is the first priority in the waste management hierarchy and should be the central focus of the District’s first Zero Waste DC plan. Everyone has a role to play in a zero waste future. District Government can lead, both in piloting strategies to achieve reduction goals in offices, schools, and other facilities, and in deliberate procurement of materials to prevent waste from the start. Specific strategies for the city’s largest waste generators—commercial offices, restaurants, cafeterias, hotels—could deliver significant savings and spur innovation in reuse and recovery. And ensuring that residents have both the information and the necessary infrastructure to enable them to prevent and reduce waste will move us closer to realizing a shared vision for clean communities, parks, and waterways.



2. Focus on food and organics

While reducing the overall waste generated in the city is the ultimate goal, swift progress to shrink carbon-rich waste streams that are ripe for recovery should be a first step. Organic waste, including food, leaves, and yard waste should be a priority, as, according to a calendar year 2018 analysis, it

makes up approximately 20.1% of the District’s waste stream but 60% of citywide emissions from waste when sent to a landfill or incinerator. Addressing these sources could make a big difference to residents, the local economy, and the environment. For example, accelerating a comprehensive strategy to address food waste, from rescue to recovery, could feed food-insecure residents, create compost to enrich local soils, and even provide high-quality feedstocks for local carbon-free energy generation while saving 62,000 MTCO_{2e} by 2045.



3. Encourage recycling and reuse

The District has also seen the benefits of strategies that extend producer responsibility for materials throughout their entire lifecycle, moving from a cradle-to-grave system in which materials are sent to a landfill at the end of a products’ useful life to a closed loop system of recycling and reuse. True extended producer responsibility systems have the potential to incentivize the design of products with repair, reuse, and recyclability in mind. Building on the successes within the city and across the country, a zero waste strategy that employs all the tools available is essential to taking responsibility for our impact on the natural environment.



4. Incubate a local circular economy

Since the District’s waste goals were first established there has been a dramatic shift in how we think about discarded materials—not as trash, but as potentially valuable resources. Reusing, reimagining, and transforming waste as the foundation for creating new products and businesses are all key to building a local circular economy. This will require support to ensure that infrastructure, systems, and education all work together to build a pipeline, from collecting and separating waste into clean streams, to providing local business development opportunities that encourage repair and reuse. One starting place should be with the local building community, to ensure we reach the District’s Sustainable DC 2.0 target of reusing or recycling 50% of commercial construction waste by 2032. By collaborating with entrepreneurs, industries, and regional partners, there is tremendous opportunity to both grow the local economy and shrink our climate impact.



5. Assess and reduce embodied carbon

A next step in the District’s commitment to bold climate action is taking our first actions to assess and reduce the carbon embodied in the goods, services,

and activities on which the city runs. The food we eat, materials we use to build our homes and roads, devices that connect us, and energy that powers our daily lives all have an environmental footprint of their own. What we buy, and how much, triggers emissions elsewhere that are currently unaccounted for in the District’s assessment of our climate impact. As a starting point for addressing this impact, the District will undertake a baseline assessment of our consumption-based emissions, adopt interim reduction targets, and chart a pathway to achieving those goals. District Government can be a leader, both in achieving reductions within its own operations, and in piloting strategies that pave the way for collaboration with local businesses and institutions. Harnessing the power of government purchasing can directly reduce emissions and support the market for low-carbon products. From incorporating lifecycle carbon and recycled content minimums into specifications for environmental preferred purchasing, to adopting carbon standards for commonly procured carbon-intensive materials such as concrete, the District can align spending with sustainability and equity goals, rewarding products and businesses that grow the local green economy, improve the quality and nutrition of institutional food, and expand socially responsible businesses.

UNDERSTANDING CARBON



Embodied carbon refers to the emissions associated with the manufacturing, transport, and installation of construction materials. Reduce it by reusing and repurposing existing buildings, designing to limit carbon-intensive materials and incorporate low-carbon alternatives, and limiting construction waste.

*Embodied carbon will be responsible for almost half of global new construction emissions between today and 2045.



Operational carbon refers to emissions from the energy a building consumes, to provide heating, cooling, light, and power. Reduce it through energy efficiency and shifting to clean, renewable energy.



RESIDUAL EMISSIONS

With today’s available technologies and current regional and federal policies, the District will still emit approximately 1 million tons of carbon in 2045, largely from a regional electric grid that is not 100% renewable, remaining gas and diesel vehicles traveling in the District, and some specific industrial processes for treating wastewater.

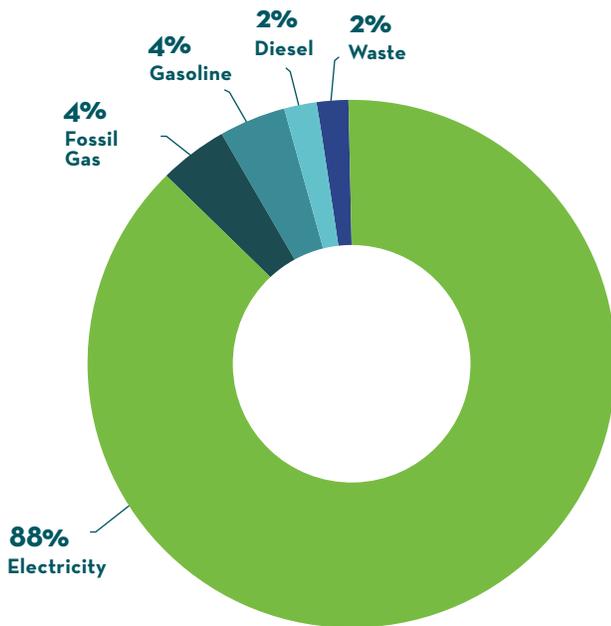
To eliminate these residual emissions, the District will need to:

- Regularly re-examine this remaining wedge in the coming years, as both technologies and policy solutions evolve, and update this strategy accordingly;
- Work regionally to support a renewable electric grid that provides carbon-free power to run our homes, buildings, and transit network; and
- Collaborate with local, regional, and federal partners to pursue carbon-free transportation options, from regional buses to passenger rail.

A lot will change over the next 25 years—some of which is probably still unimaginable right now.

This strategy shows a path to reducing emissions by 88% with the tools available today, with the hope that this is a conservative estimate, and that further reductions are made possible as the federal government, private industry, and other cities and states all work together on climate action. For example, achieving a 100% renewable regional electric grid—as has been proposed by the Biden Administration—could reduce these remaining emissions to just 130,000 MTCO_{2e} per year in 2045, a 98% reduction from 2006 emissions. By keeping our eyes on the horizon for technologies and policies that push beyond what the District can do alone, it may possible to get even closer to carbon neutrality than this modeling shows, by focusing on emissions reduction.

RESIDUAL EMISSIONS BY SOURCE IN 2045



What's Left in 2045

~1.1 - 1.25MMTCO₂e remaining, with modeling assuming:

- <100% electrification
- <100% electricity from renewable sources
- Zero Waste is 80% diversion

WHAT IS CARBON SEQUESTRATION?

Carbon sequestration is the process of capturing and storing carbon dioxide, removing it from the atmosphere. It is one method of reducing carbon in the atmosphere with the goal of reducing global climate change.

Trees, aquatic ecosystems, and even soils have the potential to store carbon. The District's goals to protect and restore the health of the natural environment are pillars of the Sustainable DC 2.0 plan, and important in adapting to the impacts of climate change, such as flooding and extreme heat. As work continues to grow the urban tree canopy, expand wetlands, improve parks and green spaces, and restore the health of our rivers, the District will look for opportunities to assess and enhance their potential as carbon stores. Together these solutions are important pieces of achieving the District's vision for a carbon neutral and climate resilient city by 2045.



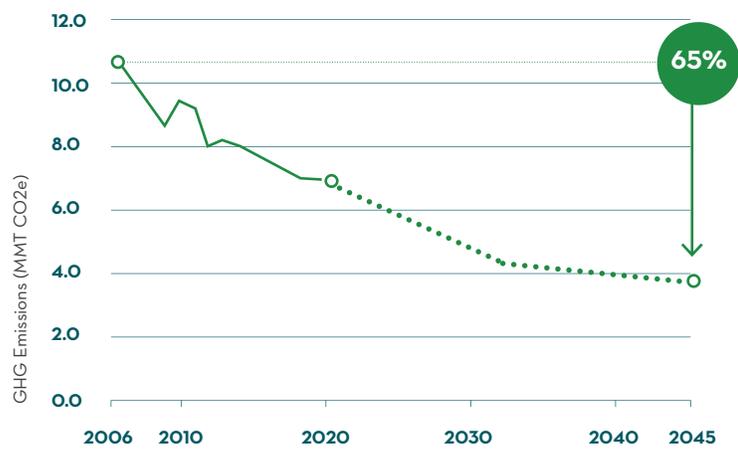


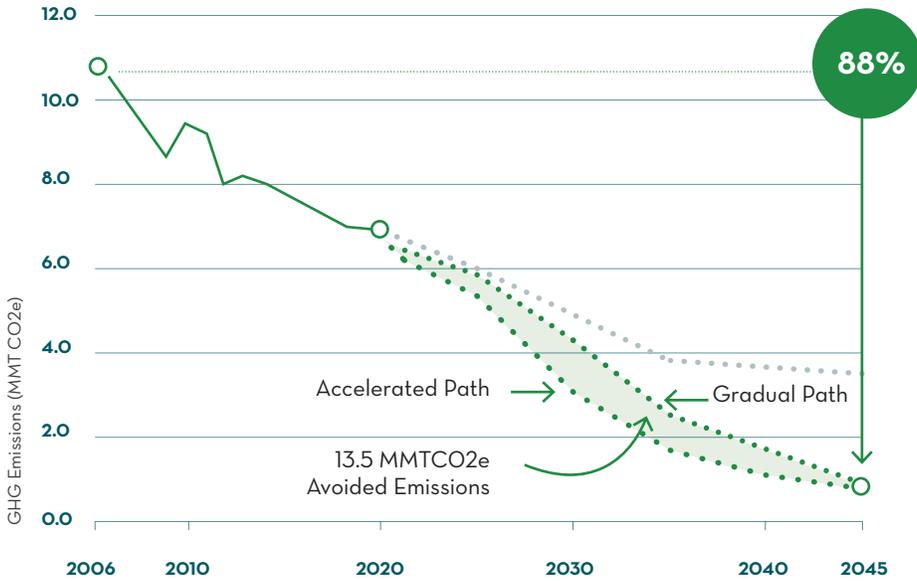
TRACKING PROGRESS

The District has already made tremendous progress toward carbon neutrality, cutting emissions by 31% since 2006. However, that still leaves more than 7 million metric tons of carbon emissions per year that we need to eliminate to achieve our target. This is roughly equal to the annual emissions of 1.2 million passenger vehicles.

Current Trajectory

If we stick with current plans, the District will meet our 60% emissions reduction goal by 2030. But without further action, reductions will level off and fall short of carbon neutrality by nearly 3.7 million MMTCO₂e in 2045..





Gradual Path

With a combination of strategies to address energy supply, building energy consumption, transportation emissions, and municipal waste and wastewater, the District could reduce our annual emissions by more than 88% from 2006 levels by 2045, to reach 1.25 MMTCO_{2e}. With more aggressive regional and federal targets for renewable energy generation, we could reach 0.7 MMTCO_{2e} with technologies available today.

Accelerated Path

The accelerated path to carbon neutrality reflects the urgency of the climate crisis, and the need to take immediate action. It includes the same set of strategies as the gradual path but implemented on an accelerated timeline. By acting quickly and aggressively, we can avoid nearly 13.5 MMTCO_{2e} in cumulative carbon emissions—roughly the same amount as the emissions from 34 fossil gas-fired power plants in one year. The accelerated path will also help us become stronger and more resilient, faster, so that we are adequately prepared for the heat waves, flooding, and storm events driven by climate change.



TRACKING PROGRESS: GOALS, TARGETS, AND INDICATORS

This strategy illustrates the actions necessary to achieve carbon neutrality. The District can accelerate our work on climate action by harnessing opportunities to leverage new investments, partnerships and regional collaborations to scale-up deep efficiency upgrades, boost transportation infrastructure and service improvements, and expedite our transition away from fossil fuels. The following indicators, in addition to the annual citywide greenhouse gas inventory, will help the District evaluate progress and identify when and where changes in policy and technology warrant revisiting and revising this strategy.

BUILDINGS & ENERGY

Goals 1 & 2: Homes and buildings are highly-efficient, comfortable, resilient, and affordable to operate. Homes and buildings are healthy and fossil fuel free.

MILESTONES & TARGETS:

1. Net-zero, fossil fuel free construction codes adopted by 2026

2. Climate Ready new construction by 2032

3. By 2035, no fossil fuel heat or hot water appliances installed

4. Limit energy burden to 3% for low- to moderate-income households and establish a target for utility burden (energy + water) by 2024

5. By 2045, the average home should be 60% more efficient than today, and buildings should be 70% more efficient

INDICATORS

1. Energy use intensity (EUI) by building type

2. Annual consumption of on-site fossil fuel (gas, fuel oil), residential v. non-residential

3. By 2035, no fossil fuel heat or hot water appliances installed

Goal 3: Energy is local, clean, renewable, and resilient in the face of extreme weather.

MILESTONES & TARGETS:

1. 50% of energy consumed comes from clean, renewable sources

2. Establish a target for reducing peak demand

3. By 2035, no fossil fuel heat or hot water appliances installed

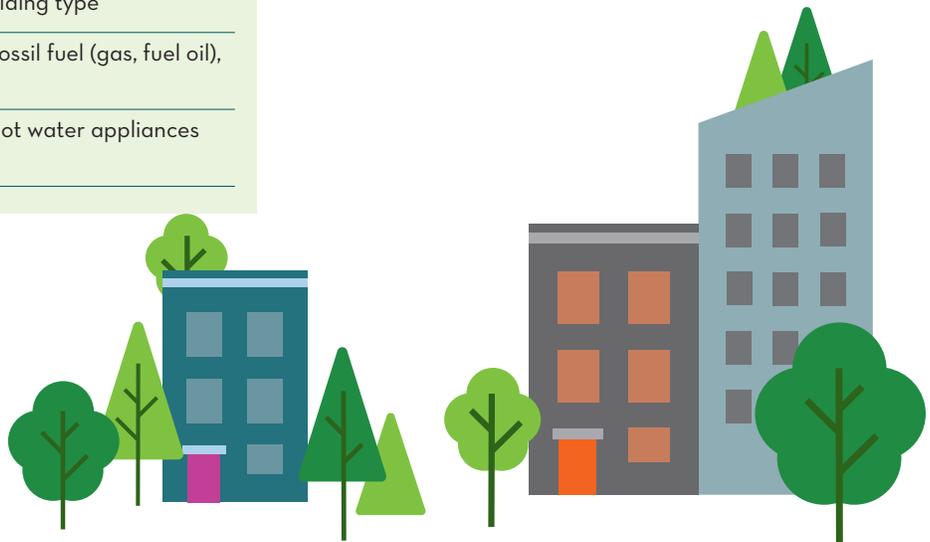
INDICATORS

1. Annual % of energy consumed from renewable sources

2. Annual peak demand (MW)

3. Installed storage capacity (MW)

4. Grid emissions factor



TRANSPORTATION & LAND USE

Goal 1: Quality housing in all eight wards provides housing security for current and future residents in vibrant, accessible neighborhoods.

MILESTONES & TARGETS:

1. 36,000 new housing units by 2025, including 12,000 affordable units
2. 2050, no less than 15% of housing is affordable, by planning area

INDICATORS:

1. Housing + Transportation cost burden (% income spent on housing + transportation), by income, race, neighborhood
2. # of total housing units, and # of dedicated affordable units (by income)

Goal 2: Residents' daily needs are a safe, comfortable, convenient walk, ride, or roll from their front door.

MILESTONES & TARGETS:

1. 75% of commute trips made without a car by 2032
2. Establish a target to reduce vehicle miles traveled in the District

INDICATORS:

1. Housing + Transportation cost burden (% income spent on housing + transportation), by income, race, neighborhood
2. Number of total housing units, and number of dedicated affordable units (by income)
3. % of population with proximity to high-quality transit, by neighborhood
4. Time-in-transit/commute length, by race, income, neighborhood

Goal 3: Zero emission buses and vehicles move more people and freight with less noise and pollution.

MILESTONES & TARGETS:

1. 100% of public buses will be zero-emission by 2045

2. New medium- to heavy-duty vehicles registered will be 100% zero emission by 2050, with 30% of new medium- to heavy-duty vehicles being zero emission by 2030
3. Reduce greenhouse gas emissions from transportation 60% by 2032

INDICATORS:

1. % of public fleet that is zero emission (by vehicle class: light-duty, buses, medium- to heavy-duty)
2. #/% EVs registered by vehicle class in the District annually
3. % Vehicle miles traveled (VMT) by zero-emission vehicles annually
4. Annual GHG emissions from transportation (MTCO_{2e} and % of citywide)

WASTE & EMBODIED CARBON

Goal 1: A circular economy supports a zero waste DC and supports low-carbon choices.

MILESTONES & TARGETS:

1. 15% reduction in per capita waste generated by 2032
2. 80% waste diversion by 2032
3. 50% commercial construction waste reused or recycled by 2032
4. By 2024, conduct a citywide consumption-based inventory
5. By 2024, establish embodied carbon reduction goal

INDICATORS

1. Annual tons MSW generated per capita
2. Citywide waste diversion rate
3. Waste characterization over time, including % organics
4. % construction and demolition waste diverted
5. Baseline consumption-based inventory footprint
6. Reduction in citywide carbon footprint over time, based on procurement data and policy requirements
7. % of consumption-based emissions associated with policies to target low-carbon procurement for District Government



CONTINUING THE CONVERSATION

This strategy is an overview of the big steps the District must take to reach our goal of becoming carbon neutral and climate resilient by 2045. To ensure that transition works to bring health, opportunity, and prosperity, and to focus on equity, the next steps are to continue these conversations in the daily work across District Government and with partners across the region and the country.

To guide this work, the following questions will help to keep a focus on equity—what it means to prioritize the needs and values of residents and communities most vulnerable to climate change—as we dive into deeper discussions around programming, services, investments, and policies.

GUIDING QUESTIONS TO PRIORITIZE EQUITY & ENVIRONMENTAL JUSTICE COMMUNITIES

	ADVANCING OPPORTUNITY	REDUCING HARM
How will this improve overall affordability?	<p>Will this:</p> <ul style="list-style-type: none"> Support affordable housing preservation? Expand supply of high-quality affordable housing? Increase housing security? Lower housing cost burden? 	<p>Will this:</p> <ul style="list-style-type: none"> Lower utility burden? Lower transportation cost burden? Address displacement and pressures of gentrification?
How will this improve health & safety?	<p>Will this:</p> <ul style="list-style-type: none"> Promote physical activity? Increase access to quality green spaces? Provide safe infrastructure that facilitates walking, biking? Increase access to quality, healthy foods? 	<p>Will this:</p> <ul style="list-style-type: none"> Improve indoor air quality and ventilation? Reduce environmental hazards at home, such as mold and lead? Improve outdoor air quality and reduce incidences of respiratory and cardiac problems? Improve residents' feeling of safety in their neighborhood or on transit? Reduce transportation injuries and fatalities?
How will this improve accessibility?	<p>Will this:</p> <ul style="list-style-type: none"> Bring daily needs and housing closer together? Expand transportation choices that meet a variety of needs—mobility, schedule? Improve transportation comfort and reliability? Support aging in place? 	<p>Will this:</p> <ul style="list-style-type: none"> Reduce time-in-transit burden?
How will this improve economic opportunity?	<p>Will this:</p> <ul style="list-style-type: none"> Create and sustain living-wage jobs with benefits? Result in job placement, not just job training? Open career pathways to youth and returning citizens? Prepare youth for careers upon leaving high school? Support innovation and growth for small businesses and entrepreneurs? 	<p>Will this:</p> <ul style="list-style-type: none"> Proactively support transition for at-risk jobs?
How will this improve resilience?	<p>Will this:</p> <ul style="list-style-type: none"> Increase resident resilience, especially in the event of a power outage, by improving thermal safety and indoor temperatures? Provide reliable back-up power for emergencies at critical facilities? Improve neighborhood-scale resilience by creating community spaces that are resilient and accessible? 	<p>Will this:</p> <ul style="list-style-type: none"> Address resilience and reliability for neighborhoods most vulnerable to climate change? Reduce the urban heat island?



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