Breathing Life Back into Cities

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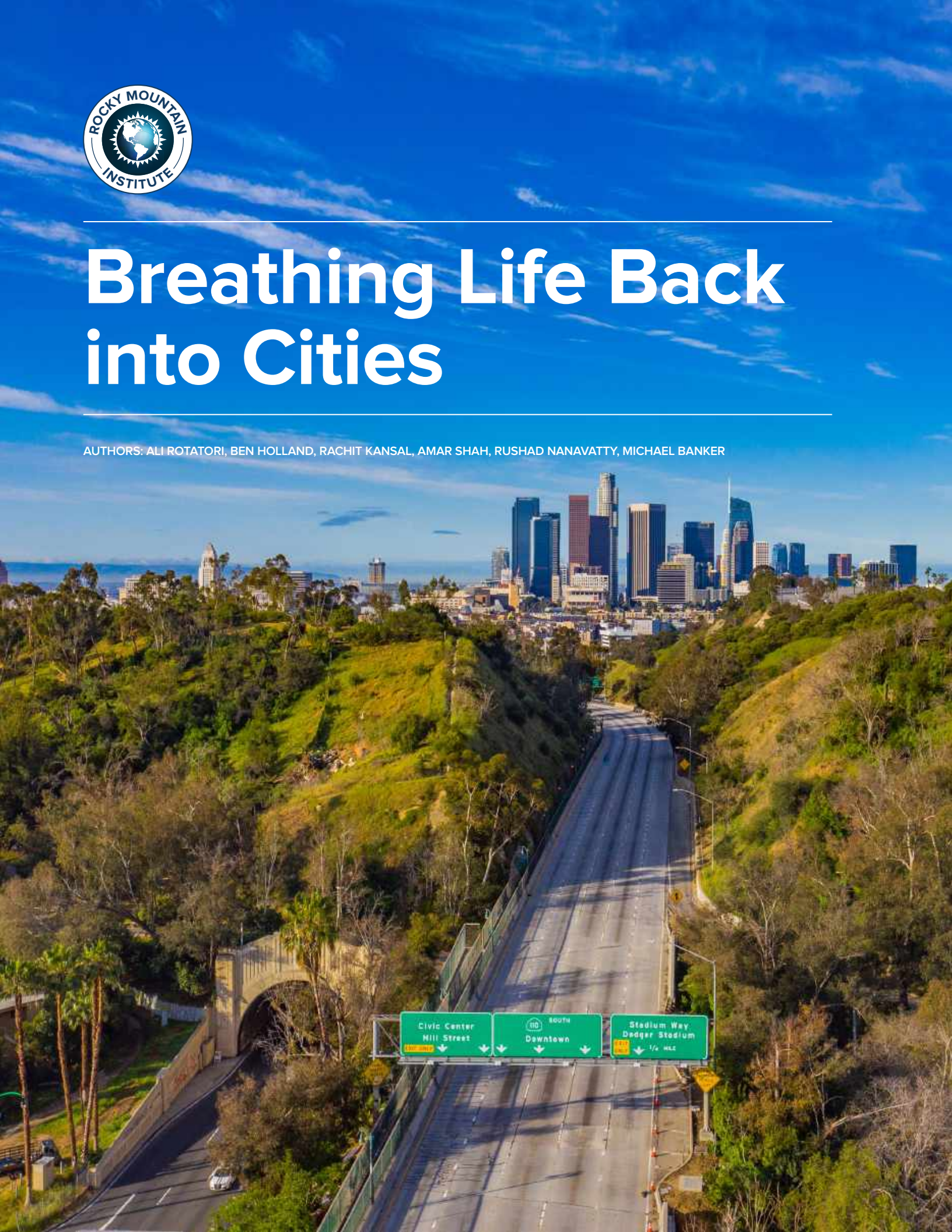

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About Us

ABOUT ROCKY MOUNTAIN INSTITUTE

Rocky Mountain Institute (RMI)—an independent nonprofit founded in 1982—transforms global energy use to create a clean, prosperous, and secure low-carbon future. It engages businesses, communities, institutions, and entrepreneurs to accelerate the adoption of market-based solutions that cost-effectively shift from fossil fuels to efficiency and renewables. RMI has offices in Basalt and Boulder, Colorado; New York City; the San Francisco Bay Area; Washington, D.C.; and Beijing.

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Executive Summary

For a few weeks, the COVID-19 lockdown slowed traffic and decreased emissions—revealing clear skies and vistas unlike anything cities have experienced in living memory. While people were confined to their homes, staring at the outdoors from their windows, these new views highlighted the continued pervasiveness of air pollution in the United States. And in late August, new research presented to the House Committee on Oversight and Reform revealed that the health impacts of air pollution **are twice as bad** as previously estimated.

Of particular relevance to the current pandemic, recent studies have shown that poor air quality amplifies the effects of COVID-19. A minute increase in exposure to particulate matter ($PM_{2.5}$) has been linked to a **significant increase in the COVID-19 death rate**. The tiny dimensions of these particles, no larger than 2.5 microns in diameter, mean they penetrate deep into the lungs and can pose serious health issues.

While air pollution is pervasive throughout the United States, it does not impact everyone equally. Race, more than income, has been linked to the unequal impact of particulate matter pollution. A 2018 US Environmental Protection Agency (EPA) study found that **Black Americans were exposed to 1.54 times more $PM_{2.5}$** than the rest of the population. People in poverty were 1.35 times more exposed and all non-Whites were 1.28 times more exposed.

Racial inequity and air pollution are both national issues, but meaningful change can start at the local level. The responsibility for setting and enforcing clean air standards has historically rested on a cooperative arrangement between the federal and state governments, with a focus on large, point source emissions (e.g., coal power plants, large factories, etc.). However, recent studies have revealed other key contributors to air quality that are well suited to oversight from local governments.

As the policymakers for their communities, local governments are managing a lot right now. At the same time, they are considering and planning for how their communities will recover from an economic, social, and public health perspective. **This report outlines four strategies that cities can implement, especially now as part of their recovery plans, to:**

- Improve air quality within city borders and beyond;
- Mitigate the impact of the recession by putting people back to work, restoring incomes, and reducing major household expenses; and
- Promote an equitable recovery by ensuring that both of the above objectives—improving air quality and household economic health—disproportionately benefit historically marginalized communities, including low-income communities and communities largely populated by Black, Indigenous, and people of color (BIPOC).

The following four strategies help cities advance these objectives:

1. Phase out the use of fossil fuels in residential and commercial buildings.
2. Improve access without relying on single-occupancy vehicles and accelerate vehicle electrification.
3. Invest in urban greening.
4. Engage utilities to clean up the grid.

The first three of these strategies can be implemented by local governments acting alone and can directly impact air quality within these communities. The last strategy focuses on ways cities can influence upstream emissions (such as those from utilities burning fossil fuels). This approach often benefits from collaboration with other cities or businesses.

All of these strategies have, and will continue to have, lasting utility and can be part of local government planning and actions for years to come. However, they have a heightened relevance currently, given the various health and economic benefits they can provide to help communities build back better.

Introduction: Cities and Air Quality

For a few weeks, the COVID-19 lockdown brought about an unexpected side effect: dramatically cleaner air and endless vistas unlike anything cities have experienced in living memory. It reminded all of us that, despite huge and ongoing progress in cutting air pollution in the United States since the Clean Air Act was enacted five decades ago, **nearly 150 million people living in America** still regularly breathe unsafe outdoor air. An economic downturn is not the sustainable solution to reduce emissions and pollution that we have been pushing for. As pollution and traffic levels **return to normal** in lockstep with much-needed economic recovery, there is an opportunity to accelerate important structural changes that can benefit both air quality and the economy, while these issues are still front of mind.

Research has shown that dirty air amplifies the devastating impacts of COVID-19. Preliminary results from a recent Harvard University study show that an increase of just one microgram of long-term exposure to particulate matter ($PM_{2.5}$) per cubic meter of air is **associated with a 15% increase in the COVID-19 death rate**.[i]

Another study done in Europe found that almost 80% of deaths across the 66 administrative regions of Italy, France, Spain, and Germany **occurred in the five regions with the highest concentrations of nitrogen dioxide (NO_2) pollution**. NO_2 is a toxic pollutant that can be harmful on its own but is also a precursor emission to PM and ozone. This increased susceptibility matters beyond COVID-19, as the medical community has acknowledged the likelihood of future respiratory-based pandemics.

It is important to highlight that Black Americans are exposed to higher levels of particulate matter air pollution than White Americans, regardless of wealth. A 2018 study published in the American Journal of Public Health found that **Black Americans were exposed to 1.54 times** more $PM_{2.5}$ than the rest of the population (people in poverty were 1.35 times more exposed and all non-Whites were 1.28 times more exposed).

Exposure to air pollution is already affecting future generations. In a study of over 32 million births, new research shows that **exposure to air pollution (PM and ozone) is associated with pre-term birth and low birth weight**. Those at highest risk are people with asthma and minority groups, especially Black mothers. We need to improve air quality not only to increase our resilience to future pandemics, but as a key objective in our fight for environmental justice. In particular, we need to address the historical racial inequities stemming from the energy sector.

Racism and air pollution are both national issues, but meaningful change can start at the local level. The responsibility for setting and enforcing clean air standards has historically rested on a cooperative arrangement between the federal and state governments, with a focus on large, point source emissions (e.g., coal power plants, large factories, etc.). However, recent studies have revealed other key contributors to air quality that are well suited to oversight from local governments.

Over 35% of the particulate matter air pollution in the United States comes from burning fuel in residential buildings and transportation. Given local government control over state emission standards, building codes, permitting, and transportation systems (including street access, parking, and public transit), local governments are uniquely positioned to monitor and improve local air quality.

In addition, while local governments may not have direct control over the power plants outside of their

[i] $PM_{2.5}$ are particles no larger than 2.5 microns in diameter, meaning **30 particles** could fit across the diameter of a single human hair. Particles of this size are uniquely damaging as their small size allows them to travel deep into human lungs.

boundaries, they are not without influence. First, they can follow legal avenues. For example, **New York City sued the EPA to address upwind pollution**. Second, cities have relationships with the utilities that are the sources of upwind pollution, be it the sellers of the gas to building owners or the owners of the fossil fuel power plants themselves. They can engage with the state regulators that oversee these utilities.

Cities—both individually and collectively—can leverage their position as large energy buyers to engage utilities and pressure them to clean up their grid mix. This is imperative, as many of the changes able to be made locally can only go so far if the utility continues to supply communities with dirty electricity. In addition, cities can push or partner with utilities to introduce or expand building electrification and housing upgrade programs that benefit disproportionately marginalized communities.

As cities begin to plan for their short- and long-term recovery from COVID-19, air quality is not the only issue with which they are grappling. However, cities can take several actions that improve air quality while also addressing historical inequities and preventing lasting negative economic impacts from the pandemic. In this report, we outline four key strategies that local governments can implement to:

- Improve air quality within city borders and beyond;
- Mitigate the impact of the recession by putting people back to work, restoring incomes, and reducing major household expenses; and
- Promote an equitable recovery by ensuring that both of the above objectives—improving air quality and household economic health—disproportionately benefit historically marginalized communities, including low-income communities and communities largely populated by Black, Indigenous, and people of color (BIPOC).

The following four strategies help cities advance these objectives:

1. **Phase Out the Use of Fossil Fuels in Residential and Commercial Buildings**
   There are **significant health and economic benefits** to electrifying the building sector. **Cities across the country** have implemented policies to require or incentivize all-electric new construction, and others are exploring policy to transition from gas to electric appliances in existing buildings.

2. **Improve Access Without Relying on Single-Occupancy Vehicles and Accelerate Vehicle Electrification**
   Cities must employ a comprehensive approach to improving their transportation systems by prioritizing people over cars. Vehicle electrification is a vital and necessary strategy to reduce air pollution, and cities have the power to limit (or eliminate) the use of internal combustion vehicles, but it is insufficient on its own. We need to focus on a broad range of people-centric mobility solutions that enable equitable access to places of employment, healthcare, food, and recreation. Eliminating auto-centric policies and practices that benefit those most privileged will reap multiple equity, health, and environmental benefits.

3. **Invest in Urban Greening**
   Cities are beginning to realize the impact urban forests and wetlands can have on air quality, carbon sequestration, and water management. Cities like Columbus, Philadelphia, and San Francisco have added growth and maintenance of trees to their sustainability plans. They have also encouraged residents to get involved in city-run programs to add trees to their neighborhoods. Such greening strategies produce positive effects for quality of life, mental health, retail and economic performance, and property values. Urban greening also increases community resilience.

4. Engage utilities to clean up the grid: As large energy customers, municipalities are increasingly participating in public proceedings to influence utility programs and plans. Cities like **Atlanta**, **St. Petersburg**, **Indianapolis**, and **Boulder** have engaged their utilities or provided formal comments to state utility commissions to transform their electricity mix. This has included urging an increase in planned renewable capacity additions, developing **clean energy portfolios** as an alternative to existing uneconomic coal or new gas-fired power plants, and enhancing equitable access to clean energy programs.

   Cities can also play a key role in their state legislative processes to encourage the adoption of new strategies, like coal securitization and capital recycling—financial tools that allow for **uneconomic coal to be immediately retired** and replaced with renewables. This approach has the potential to lower people's electricity bills, increase utility returns, create new clean energy jobs, and provide funding for transition assistance to coal workforces.

The first three of these strategies can be implemented by cities acting alone and can have direct impact on air quality within these communities. The last strategy focuses on ways cities can influence upstream emissions—an approach that often benefits from collaboration with other cities or businesses.

All of these strategies have, and will continue to have, lasting utility and can be part of local government planning and actions for years to come. However, they have a heightened relevance currently, given the focus that COVID-19 and the economic downturn have put on recovery and increasing resilience for communities. Each of these strategies can provide multiple health and economic benefits that can contribute to stronger, more resilient communities.

We describe each of these strategies in detail below.

1. Transition to Clean Heating: Phase Out Fossil Fuel Use in Buildings

In a February 2020 **study of premature deaths related to combustion emissions**, MIT researchers found a surprise culprit: residential and commercial buildings. Buildings were the largest driver of premature deaths, surpassing traditionally regulated sectors like power generation and transportation. Fossil fuel combustion in buildings—primarily for space heating, water heating, and cooking—generated **11% of US nitrogen oxide (NOx) emissions** in 2017. New research also shows that gas stoves can **lead to pollution levels inside the home that would be illegal outdoors**.

One encouraging reality is that clean alternatives already exist. All-electric appliances—including air or ground source heat pumps, heat pump water heaters, and induction stoves—can improve air quality, both inside and outside.

If cities effectively target building electrification programs, they can ensure that the accompanying health benefits disproportionately accrue to BIPOC and low-income communities, **who experience greater exposure to air pollution and corresponding health burdens**. Building electrification also presents a massive opportunity for local job growth. A 2019 study estimated that large-scale building electrification efforts could support **100,000 construction, manufacturing, and energy jobs** in California alone.

Below are some key actions that cities can take to phase out fossil fuels in buildings.

1. Promote—or Better Still, Mandate—All-Electric New Construction

A vital first step to reducing air pollution from buildings is ensuring that new construction does not make the problem worse. Cities often control permitting and define codes for new buildings. They can apply a range of measures to drive installation of superior electric appliances instead of ones that burn fossil fuels. This includes building codes and bylaws requiring all-electric

new construction. Even in locations where codes are primarily controlled by the state, cities and counties may have the ability to adopt more advanced "reach codes." **More than 30 cities** have implemented these policies in late 2019 and early 2020, with similar measures under consideration across the country.

2. Commit To All-Electric Public Buildings

A key lever for change in cities is their own building footprints, including municipal offices, schools, and public housing. **Seattle, Pittsburgh, Los Angeles, and others** are already taking steps to reduce fossil fuel use in buildings. A coordinated strategy to electrify space heating, water heating, and cooking need not break the bank, particularly when coordinated with naturally occurring replacement cycles when equipment reaches its "end of life." A recent study found that if health and energy funding sources are braided together, nearly **$2 billion in annual funding could be unlocked to make homes and buildings healthier.**

3. Promote Equipment Replacement at End-Of-Life or in Conjunction With Weatherization Programs

Switching to electric equipment at "end of life" is a compelling strategy beyond municipal buildings. **Cities are considering policies** to drive adoption of electric equipment for existing residential and commercial buildings by using equipment replacement at "end of life" as a key trigger. Electrification of appliances can also be considered as part of low-income weatherization programs in tandem with building shell upgrades, air conditioner additions, or other improvements.

4. Work Directly With BIPOC and Low-Income Communities to Ensure an Equitable Transition

While the potential benefits are significant, thoughtful implementation is key to achieving equitable outcomes. Greenlining Institute's ***Equitable Building Electrification*** report and Emerald Cities Collaborative ***Building Electrification Equity Project*** report outline a number of important considerations for advancing equity, including community involvement in policy design and governance, equity impact assessments for energy cost burden and local jobs, and proactive investments to avoid perpetuating historical inequity in housing.

Our homes, schools, and workplaces clearly impact our health, and cities are uniquely well-positioned to tackle this issue.

2. Reduce Vehicular Pollution: Reduce Reliance on Single-Occupancy Vehicles and Accelerate Electrification

Over the past few months, **images of carless, pedestrian-dominated streets** generated a great deal of conversation on the internet and in countless articles from journalists. Many people got their first glimpse of how cities could look and how air quality could improve if they prioritized people over cars. However, as *Streetsblog* recently reported, **many cities in China** have already experienced a full rebound in traffic volumes.

Likewise, here in the United States, many cities are **already reporting pre-COVID-19 levels of congestion**. Satellite data further suggests that the **air pollution reductions may be quickly vanishing**. This is an important time to reimagine what transportation could look like and determine how cities can lock in these positive environmental developments while reopening and recovering from the economic downturn.

Cities can use the below strategies to promote more equitable access and lock in the pollution reduction that resulted from pandemic-induced lockdowns.

1. Improve Transit Service

Investments, policies, and practices that prioritize personal vehicle ownership in US cities and states continue to exacerbate racial, social, and economic inequities. Lower-income communities are inordinately burdened by the cost of vehicle ownership, which accounts for **an average of 30% of their household incomes**. Lower-income families are also **disproportionately dependent** on public transit, which has already been subject to dwindling investment and is now being hit hard by falling ridership and revenues as a result of COVID-19. The resulting deterioration in service quality, frequency, and coverage is hurting these

families the most. To alleviate these ills, cities and states must employ human-centric strategies that better connect people to places of employment, education, healthcare, food, and recreation.

Seattle is a strong example of an American city committed to improving transit service, frequency, and coverage for all. In 2018, the City of Seattle established a resolution on **racial equity and social justice** in its future transportation planning efforts. This followed a successful transit ballot initiative in 2016 to allocate $54 million in funding for **Sound Transit 3**, an expansion in public transit that will dramatically increase the availability and frequency of public transportation for thousands of households across the city.

The city has also prioritized end goals including making the city's light rail system five times longer than it is today, expanding into additional communities, increasing bus system reliability and speed, expanding train capacity on crowded lines, and improving pedestrian and bike access to transit stations. More people on public transit means lower tailpipe emissions.

2. End Discriminatory Land-Use, Zoning, and Transportation Planning Practices

Improving public transit alone is not enough. Land-use and zoning practices established many decades ago continue to segregate our communities and households from critical destinations and from each other. Many cities still bear the marks of racist zoning practices (like redlining) that continue to deprive some communities of the same amenities that are readily available for others.

On over **70% of residential land** in many American cities, it is illegal to build anything other than a detached single-family home. This is explicitly discriminatory. For example, 72% of residential land in the predominantly White, rich neighborhoods west of Rock Creek park in Washington, D.C., are single-family zoned. The cars these residents drive around the Beltway and in downtown D.C. pollute the air of lower-income families living in denser parts of the city and neighborhoods adjacent to highways. Given these patterns of land use, **White Americans breathe 17% less pollution than they make**, **while Black Americans breathe 56% more**.

Some cities and states are starting to reverse these retrograde policies. Last year, the **City of Minneapolis** voted to eliminate single-family zoning and instituted more flexible land-use policies. These allow for an increase in housing, density, and a diversity of uses that deliver better access to essential needs and improve the economics of public transit. Also last year, the State of Oregon passed legislation that eliminates single-family zoning in cities greater than 10,000 in population—legalizing, by right, duplexes in all residential areas. Since then, the City of Portland has gone a step further in legalizing four-plexes in residential areas and is also considering legalizing six-plexes and eight-plexes for affordable units. Other cities and states need to follow their lead.

Cities and states also need to move away from using "level of service" as their chief planning metric, which prioritizes vehicular speed as the objective. This leads to road expansions, increased traffic, and higher emissions. California's Senate Bills **743** and **375** are perhaps the best example of this—**the state now measures the success of transportation planning** by the extent to which it reduces vehicles miles traveled (VMT) and requires communities to come up with land-use policies that support VMT and pollution reduction. While having the right state policy represents the ideal, individual cities have the power to change these planning practices on their own—and in turn can create policy momentum at the state level.

3. Take Street Space Away From Cars and Give It To Pedestrians, Cyclists, and Transit

Over the past few years, **cities across the globe** have reclaimed street space for buses, pedestrians, cyclists, and, most recently, scooters.

Over a third of most cities' surface area is wide-open public space that takes the form of streets and parking. We can turn some of that space over to people, like the Dutch with their **woonerf** and the Spaniards with their **superblocks**. Just before the US outbreak of COVID-19, San Francisco made news for launching its car-free Market Street transformation, immediately **showing success** in moving high volumes of non-automobile traffic.

This activity is spreading beyond cosmopolitan enclaves and into a more mainstream practice, as cities across the globe are **establishing car-free "open streets"** for pedestrians and cyclists to move about with safe physical distancing. As cities begin to re-open their businesses and **traffic volumes return to their previous levels**, they can make at least some of these changes permanent.

And on streets where it is essential to maintain motorized transportation, cities can choose to prioritize public transit. Well before the pandemic, **New York City created a dedicated bus corridor**—at minimal expense—on one of the busiest thoroughfares in the country. If these measures are widespread and sustained, they could boost manufacturing and help the country build a competitive electric bus industry.

4. Implement And Enforce Transportation Demand Management (TDM) Policies

For years, companies have been using virtual meeting and teleconferencing technologies with mixed results. But the evidence clearly suggests

that most enterprises will have a threshold up to which **productivity increases with remote work** before it starts to diminish.

That threshold has likely increased over the last few months as companies and white-collar workers have become more comfortable with the technologies—and as the technology providers are in a position to improve their offerings (the share prices of Zoom and Slack have risen more than 300% and more than 50%, respectively, since February).

Cities can help sustain reductions in commuting traffic, congestion, and related pollution by implementing and enforcing comprehensive transportation demand management (TDM) policies. In addition to telework, for example, parking cash-out programs allow employees to exchange their parking spaces for an increase in pay. Companies could similarly provide bus passes and vouchers for mobility services like bikeshare or ride hailing.

Once again, the City of Seattle offers a useful example. **The TDM policy** it established in January 2020 requires companies with over 20 employees to assign a transportation coordinator to reduce drive-alone trips through a variety of measures. The program enforces these measures by charging employers $250 a day if they are out of compliance.

5. Discourage Use of Traditional-Fueled Vehicles by Implementing Zero Emissions Zones

City leaders should look to existing successes in eliminating high-polluting vehicles from their downtowns. Most notably, the City of London's Ultra Low Emission Zone (ULEZ) program has proven that city-led vehicle emissions policies can quickly improve public health. Personal vehicles that do not meet European emissions standards must pay a fee of approximately $15 per day to drive in these zones, which cover most of Central London.

Since starting its program in April of 2019, roadside nitrogen oxide pollution levels in London's ULEZ zones have **plummeted by over 30%**. Coupled with the city's congestion pricing program—which has reduced vehicle miles traveled by 15%—these policies have gone a long way toward cleaning the air of a city once notorious for its **lethal smog**.

These emissions restrictions need to apply to freight and package delivery in addition to passenger vehicles. E-commerce and package delivery services like Amazon, DoorDash, and Instacart are likely to see greater utilization coming out of this crisis. This will have major implications for air quality and congestion in our urban areas that have already struggled to accommodate the rise of package delivery.

Fortunately, there is a strong business case to transition to electric vehicles—**which typically offer lower total cost of ownership** for high-mileage delivery vans and trucks. Despite the economic advantages, system inertia seems to be limiting the rate of fleet conversion. Cities can help break through that inertia by requiring zero-emissions vehicles for e-commerce and delivery services.

6. Make It Easier to Deploy EV Charging Infrastructure

City governments have important roles to play in enabling the deployment of charging infrastructure. One strategy is for them to streamline permitting. "Soft costs" associated with permitting and siting mean that a charging station in one location **can cost twice as much** as an identical one in a different location. Another strategy would be for cities to institute building codes to require the installation of chargers at commercial and multi-family developments.

Cities need to work closely with their electric utilities to ensure an intelligent build-out. For example, **a smaller number of powerful fast**

chargers in heavily trafficked locations is better than a larger number of indiscriminately distributed slow chargers. By engaging in utility planning processes and regulatory proceedings, cities can also help ensure rational rate design and the elimination of often-prohibitive demand charges. Presently, **charging costs can range from zero to the equivalent of over $3 per gallon**.

Accelerating EV charging infrastructure deployment also translates into many different skilled jobs: electricians, construction workers, linepersons, and manufacturing workers installing the transformers, digging the trenches, laying down the wires, and making the hardware. A 2019 report from the Minnesota Department of Transportation found that implementing just 150 new EV charging stations would **generate $14.2 million in economic activity, including $4.6 million directly in labor income**. On the national scale, federal investment of $5 billion in EV charging stations would support approximately 65,000 jobs in the near term.

3. Use Natural Systems to Scrub Pollution: Invest in Urban Greening

Urban forestry can play a significant role in improving health, climate, and quality of life. Expanding the urban tree canopy can **reduce PM-related mortality** by up to 8.7% annually and electricity use in buildings by up to 4.8% annually. In addition to these air quality benefits, urban greening initiatives also help with stormwater management, flood protection, and aquifer replenishment; reduce vehicle crashes by "calming" traffic; increase property values; decrease the urban heat island effect; increase local biodiversity; and ultimately create a higher quality environment for city residents. While there is less open space within our urban areas, it's been estimated that urban reforestation initiatives in the United States could spur our cities to **plant 400 million trees**.

Cities can utilize the following methods to increase greenery in their densely populated landscapes.

1. Start with Simple "Green Screens"

Urban greening does not have to be a grand public works project. Something as simple as a row of street trees can provide a multitude of benefits. "Green screens"—simple barriers of greenery—can serve as a surprisingly effective shield from block-level vehicle pollutants. A study in London found that installing an ivy green screen between a playground and an adjacent traffic corridor **reduced children's exposure to NOx by 24% and PM10 (particulate matter 10 microns or less in diameter) by 38%**. These green screens also provide a noise barrier for parks and residential areas that are situated next to busy transit corridors.

2. Increase Plant Diversity on Unused Land with "Pocket Forests"

"Pocket forests"—inspired by the work of **Japanese botanist Akira Miyawaki**—are another simple, cheap, rapidly-implementable urban greening solution. These dense, diverse stands of trees and plants can occupy road and rail setbacks, traffic islands, abandoned lots, school

yards, or even roofs and bridges. Each pocket forest typically comprises over 30 species of native flora and serves as microcosms of native forests. They generate more quickly, attract more diversity, **sequester more carbon**, and scrub the air of more pollution than any manicured single-species plantation, such as a typical urban lawn. **IVN Nature Education** has helped communities establish over 100 pocket forests in the Netherlands since 2015 and aims to double that number by 2022.

3. Use Local, Small-Scale Urban Greening Projects to Directly Engage the Communities that Need it Most

Another advantage of an urban greening approach that emphasizes smaller-scale projects is that it affords broader community engagement. In the past, many greening strategies—often emphasizing park development—have tended to disproportionately favor higher-income neighborhoods or downtown commercial districts. Historically marginalized communities often lack sufficient tree canopy and are the worst affected by pollution. In addition, a new study from The Trust for Public Land found that parks serving majority non-White populations are **half the size and five times more crowded** than those serving majority White populations.

A similar trend was found for parks serving majority low-income households—these parks were both four times smaller and more crowded than those serving majority White populations. Any urban greening strategy should emphasize responding to the needs of these communities. Given the transit-dependence of these communities, they also stand to benefit the most from greenery and shade for their walking trips to and from bus stops and train stations. These projects can also **create new, sustained, and well-paying** local jobs for urban foresters, arborists, and tree trimmers.

4. Replace Grey with Green to Fight Flooding

Besides the air pollution and carbon-mitigation benefits, replacing "grey with green," or concrete with plants and other greenery, would help over 700 American cities enhance climate resilience and mitigate water pollution. Specifically, they can help cities deal with "combined-sewer-overflow," a problem created when increased precipitation causes an overflow of wastewater—including untreated human and industrial waste, toxic materials, and debris—that is discharged directly into to streams, rivers, and lakes.

In cities where asphalt and concrete are replaced by more natural landscapes, urban greening solutions increase the amount of plant matter, penetrable ground, and soil available to absorb water. In China, **several pilot "sponge cities"** are increasing green areas to absorb, capture, filter, and reuse extra precipitation.

5. Explore Public-Private Partnerships to Scale Greening Projects

Finally, cities can find creative ways to fund these projects, including through public-private partnerships. The City of Austin implemented its **Great Streets Program** to incentivize local private developers to improve the quality of shared spaces downtown. In addition, the city set aside 30% of local parking meter revenue to fund private sector projects that involved adding vegetation downtown or expanding sidewalks to include room for trees.

4. Reduce Cross-Border Pollution: Engage Utilities to Clean up the Grid

While cities can take important steps to reduce local air pollution through the electrification of transport and buildings, they also need to engage with their utilities for the public health benefit of their citizens. While municipalities may have less direct control over the grid than they do over streets and buildings, they do still wield significant influence. Over 84% of the US population lives in urban areas, and local governments are often utilities' largest single customers.

A highly electrified city may reduce air pollution from point sources locally, but that is of limited, broader value if that city draws its electricity from dirty fossil fuel-powered plants. Pollutants know no boundaries. A recent study published in *Nature* found that on average, 41% to 53% of air-quality-related early deaths in a state **came from pollution generated outside that state**. In New York, for example, an estimated 60% of premature deaths in 2018 were attributable to pollution generated out of state.

As pointed out earlier, there are stark racial disparities tied to air pollution. A 2019 study that compared different populations' contribution to $PM_{2.5}$ with their ultimate exposure to air pollution found that Latino and Black American populations breathe **63% and 56% (respectively) more air pollution than they produce**, compared to non-Hispanic Whites who on average are exposed to 17% less pollution than they are responsible for. There have also been **many studies** over the past 20 years that show that BIPOC populations face **higher rates of asthma, lung disease, and other respiratory illnesses**, in part because they more commonly live close to coal refineries, gas plants, and other sites linked to major pollution.

Notably, new research completed by professor Drew Schindell and Duke University shows that the health benefits that could be achieved by moving away from fossil fuels would **more than pay for the energy transition itself**. Schindell testified to the House Committee on Oversight and Reform that "over the

next 50 years, keeping to the 2°C pathway would prevent roughly 4.5 million premature deaths, about 3.5 million hospitalizations and emergency room visits, and approximately 300 million lost workdays in the US." Translated into monetary value, these impacts amount to over "$700 billion per year in benefits to the US from improved health and labor alone, far more than the cost of the energy transition." This new research makes the health and economic cases for moving away from fossil fuels abundantly clear; we now need people to act on it.

Cities can push their utilities to clean up the grid in two ways:

1. Encourage the Retirement of Old, Uneconomic Coal Plants

As of 2018, coal was responsible for more than **65% of the power sector's carbon emissions**, more than **90% of the sector's sulfur dioxide (SO_2) emissions**, and **76% of its NOx emissions**. Not only is existing coal-powered electricity generation a major source of air pollution, it also places a significant economic burden on a city's citizens. Using utility-reported data from the **Federal Energy Regulatory Commission** and the **Energy Information Administration**, RMI analysis found that over 80% of US coal generation today is uneconomic. This means it costs more to keep a coal plant *running* than it would to replace a plant with *new* renewable energy generation.

At a time of unprecedented crisis, continuing to place a burden on citizens when cheaper and cleaner options for power exist no longer makes financial or moral sense. Not only are these burdens unnecessary, they fall **disproportionately on low-income households**, which have also been **more adversely affected** by both COVID-19 and the accompanying recession. Replacing existing coal plants with cheaper and cleaner options would not only reduce utility bills for all customers, but could also stimulate local jobs growth. This would be especially beneficial during a time of record unemployment.

Even though converting to clean power comes with numerous economic and health benefits, power grids in many parts of the country remain dirty. Further analysis reveals that **more than half of uneconomic coal-generated power today is concentrated in regulated utilities** (i.e., vertically integrated monopolies that are largely shielded from market forces, such as the falling cost of renewables).

Solutions to address this situation exist and have been gaining momentum in the past year. **Securitization**, a refinancing mechanism, can be used to immediately shut down coal plants and reinvest the money into new renewables. The result: day-one savings for citizens, an opportunity to reinvest capital for the utility, local jobs that result from that reinvestment, transition assistance for impacted workers and communities—and cleaner air for all.

After New Mexico recently enabled securitization through its **Energy Transition Act**, the Public Service Co. of New Mexico (PNM), filed to retire its San Juan coal plant early and replace it with low-cost renewables (e.g., the proposed Arroyo and Jicarilla Solar power purchase agreements range between $18 and $20 per AC megawatt-hour). As a result, the utility anticipates being able to **lower residential electricity bills by $7.10/month and deliver over $40 million in various forms of transition assistance**: job training, severance compensation, economic development assistance, and displaced worker assistance.

These benefits have driven significant recent interest in securitization. Three states—**Colorado**, **Montana**, and New Mexico—passed enabling legislation in the past year, bringing the total number of states enabling securitization to five. Similar legislation has been introduced in four other states—Kansas, Missouri, North Carolina, and Utah—with several more showing interest.

Cities can play an instrumental role in helping introduce and secure passage of the legislation by engaging with and lobbying state legislators, either individually or as a coalition. Once legislation is in place, cities can push for securitization and subsequent replacement by renewables by leveraging their buying power and relationship with their utility. This is often most effective when done in partnership with other local governments, advocacy organizations, corporations, and institutions. Cities should push to ensure that the biggest reductions in electricity rates go to low-income households, which, as established above, often face **three times more energy burden** than their non-low-income counterparts.

Cities can also help ensure that retired coal plants are not replaced by gas-powered plants (see below), which would continue to lock in emissions and pollution (albeit at a lower level) and further expose utility consumers (i.e., residents) to **"stranded cost"** risk a few years down the road.

Finally, the unnecessary burden that coal is placing on city residents is likely to be exacerbated in the coming months by the weakening financial position of many utilities. The COVID-19 crisis has led to declining commercial electricity demand, shifting load patterns, and unpaid utility bills. All of this could lead to rate increases for customers just as a recovery gets underway. If this happens, securitization's potential to lower costs, prevent rate increases, and provide much-needed financing for utilities would be even more valuable.

2. Ensure Utilities Build New Clean Generation, Not New Gas Generation

A 2019 RMI report found that clean energy portfolios (CEPs)—comprised of a web of solar, wind, energy storage, demand response, and energy efficiency projects—are able to **provide the same service and reliability as natural gas plants but at a lower cost**. Ninety percent of currently proposed new gas plant capacity in the United States would be more costly than equivalent CEPs. Furthermore, if the plants are built anyway, operating them would be uneconomical by 2035, well ahead of the ends of their planned lifetimes.

In addition to the economic risk of building new gas plants, every year they would also add 100 million tons of carbon dioxide and almost 150 thousand tons of NOx and PM into the atmosphere. At the same time, many of their customers are setting goals to do the opposite on emissions. By perpetuating the need for pipelines and upstream infrastructure to support gas generation, gas plants also contribute to the significant problem of fugitive methane emissions (a gas that is 84 times more potent than carbon dioxide over a 20-year timeframe).
As major utility customers, cities can play a key role in supporting clean energy portfolios as superior alternatives to gas in most circumstances. One key point of intervention is during integrated resource plan (IRP) processes when a utility files a report outlining how it will meet current and future electricity demand. There is usually a formal period for customers to submit comments to a state's utility regulatory commission. These comments are then considered by a commission as it approves or proposes changes to a utility's IRP. Colorado and Georgia offer two recent examples of effective IRP intervention by the cities of Boulder and Atlanta.

The City of Boulder submitted comments and testified in front of the Colorado Public Utilities Commission (PUC) in response to Xcel Energy's 2018 Electric Resource Plan. Boulder encouraged the Colorado PUC to require Xcel Energy to "enter into short-term power purchase agreements for natural gas generation, [to refuse Xcel's] acquisition of further natural gas facilities," and instead focus its acquisitions on wind, solar, and battery storage. The city's intervention—in collaboration with other communities, customers, and interest groups—led the Colorado PUC to approve the Colorado Energy Plan. This action will add nearly 2 gigawatts (GW) of new wind and solar and **retire two coal plants ten years early**.

In 2019, the City of Atlanta filed comments to the Georgia Public Service Commission (PSC), urging the PSC to require the utility to be more aggressive in its transition to renewable energy. After reviewing comments and testimony from Atlanta and many other local customers and advocacy groups, the Georgia PSC instructed Georgia Power to double the amount of renewable energy it had planned to procure over the next five years (from 1 GW to 2.2 GW) and procure 80 megawatts of battery storage. Daniel Tait, research and communications manager for the Energy and Policy Institute confirms that this increase can be attributed in part to the modeling and testimony that made it "increasingly clear how cost-competitive renewables and increasingly storage is in Georgia."

These types of interventions can be scaled across the United States. **Thirty-six states require their electric utilities** to update and file IRPs every two to three years. These opportunities are especially promising in cities located in the most heavily polluted grid regions or served by utilities with plans to build new uneconomic coal or gas plants. By combining data from the current grid mix of utilities, the most recent utility filings, and upcoming intervention opportunities, we identified three states where there is a significant near-term opportunity for cities to take action and have an impact:

- **North Carolina (Duke Energy)**
  Duke Energy is one of the largest utilities in the country, operating across six states. However, its operations in North Carolina stand out. While the utility has laid out a plan to close five of its seven operating coal plants by 2034, it has also stated that it would replace that generation primarily with gas plants. Duke's plans propose over 8 GW of new gas capacity to be built out between 2024 and 2033—the largest capacity of any utility in the United States.

  For the 2020 IRP, released in early September, the North Carolina Utilities Commission has **ordered Duke to include a more robust economic analysis** on options to replace the retired coal plants with generation from various combinations of natural gas, renewables, and storage. In a stakeholder meeting in June, they summarized the different scenario analyses they would be presenting in the 2020 IRP, and noted that **stakeholder feedback was incorporated** into these decisions. Given the focus of Duke's upcoming IRP, highlighting the potential for clean energy portfolios as the economically superior option could be particularly effective.

- **Florida (Florida Power and Light, Duke Energy Florida, and Tampa Electric)**
  Not only is Florida the second-dirtiest state (in terms of total generation by coal and gas plants), its three largest utilities are among the top ten utilities contributing to new natural gas buildout. Florida Power and Light, Duke Energy Florida, and Tampa Electric proposed a combined total of 3.6 GW of new gas in their 2019 IRPs. In Florida, **utilities must submit 10-year resource plans every April**. This means there are many consistent opportunities for customers to get involved and make sure utilities and regulators understand how increasing gas buildout is not in line with their sustainability and pollution reduction goals.

- **Tennessee (Tennessee Valley Authority)**
  TVA is among the top ten utilities both contributing to new natural gas buildout and still operating uneconomic coal plants. As part of its 20-year resource plans (submitted every four years), the utility develops a range of scenarios based upon market, technology, economic, and prioritization changes.

  In the scenarios from **TVA's 2019 IRP**, it proposed between 2 and 18 GW of new gas plants and between 3 and 14 GW of new solar. This represents a wide range of outcomes, and cities can help encourage TVA to follow the scenarios which specifically promote accelerated decarbonization and renewables deployment. These are described in the IRP as "driven by a strong push to curb greenhouse gas emissions due to concern over climate change," and incenting "renewables at all scales…to meet growing or existing consumer demand for renewable energy."

Cities do not have to make the move to clean electricity alone—in fact, the outcome is stronger working with others. As clean energy commitments continue to become more mainstream, cities can partner with corporations, universities, and other institutions to fight for these changes. Luckily, there are already many avenues to do so:

- The **Urban Sustainability Directors Network** (USDN) holds that "peer exchange and collaboration between local government sustainability leaders catalyze the creation and implementation of urban sustainability solutions." It also supports regional networks that collaborate on state, utility, and regional policy issues. Recently, a network of USDN cities in Florida supported by the Southeast Sustainability Directors Network engaged with Duke Energy and helped shape its new **Clean Energy Connect program**, which was filed on July 1. Through facilitated meetings, the cities

communicated their priorities and program needs, which led Duke to amend the implementation plan to include an extended enrollment period for local governments and an increased capacity allocation restricted to low-income residents.

- The **Renewable Energy Buyers Alliance** (REBA) is a membership organization that represents the largest non-utility buyers of renewables in the United States. It, too, promotes peer learning and collaboration as core strategies to achieve its vision of every buyer having a "viable, expedient, and cost-effective pathway" to procure renewable energy. REBA does this through educating renewable energy buyers as well as engaging on policy and market innovation.

- The **American Cities Climate Challenge Renewables Accelerator**, co-led by RMI and World Resources Institute, works with both of these organizations, as well as over 100 cities, on renewable energy procurement and policy and regulatory engagement. The Renewables Accelerator website highlights the best tools and resources available for advancing renewables, provides step-by-step processes for various forms of renewable energy procurement, and documents renewable energy transactions and engagements efforts by local governments via an extensive tracking tool.

The Renewables Accelerator team also supports regional groups focused on procurement and policy engagement. In 2019 the team worked with the Virginia Energy and Sustainability Peer Network (VESPN) to educate its 20 member cities on the current renewable energy procurement options available in the state and build alignment on their vision for the future of Virginia's energy market.

Conclusion: Why Cities?

Nearly half of the US population lives in counties with unhealthy levels of ozone or particle pollution—and this number has increased over the past two years. According to multiple new studies, air pollution causes between **100,000** and **250,000** annual premature deaths in the United States, making exposure to air pollution the greatest environmental health risk factor for early death.

The COVID-19 pandemic has allowed people to see the impacts of air pollution on their cities. As stay-at-home orders went into effect around the country and the economy slowed down dramatically, beautifully clear blue skies, unlike anything many had seen before, were revealed throughout the country. Around the same time, research emerged showing that the pollution that normally obscures those views has impacts on people's health that lead to increased mortality in COVID-19 patients.

This situation has reignited a conversation around air quality and has helped elucidate the disparities that the impacts of air pollution have on BIPOC communities in the United States. The American Lung Association's 2020 report found that **57% of people of color live in communities with at least one failing grade for ozone or particle pollution. This is in contrast to only 38% of Whites**.

Premature deaths due to air pollution are **steadily increasing**. Meanwhile, the federal government is actually halting or rolling back regulations on monitoring and limiting air pollution. In April 2020, the **head of the EPA announced** he would not approve a regulatory action to tighten restrictions on $PM_{2.5}$ that was being developed. In July 2020, the EPA also **ruled to retain the current ozone standard** of 70 parts per billion (ppb) over an eight-hour period.

This contradicts a growing body of scientific evidence in which public health experts say **the standard should be no higher than 60 ppb** to safeguard health. This is consistent with this administration's record.

Over the past 3.5 years, it has initiated the **roll back of 95 environmental regulations**, 25 of which pertain to air pollution and emissions.

Although this assault on environmental and health protections is dispiriting, as we've seen on many other fronts, subnational actors can step up to fill the gaps left by federal regulations and inaction. At the beginning of the pandemic, cities and states took the initial decisive actions to slow the spread, and many of those cities and states continue to be the leaders in controlling the pandemic.

Through the **We Are Still In** coalition, almost 4,000 cities, states, and businesses, representing almost 70% of the US economy and more than half the population, have committed to reducing their greenhouse gas emissions. And the **America's Pledge** initiative has shown that these efforts are helping the country continue to make progress on the United States' Paris Agreement goals, even as the federal government has withdrawn its commitment.

In fact, new analysis from the **American Cities Climate Challenge Renewables Accelerator** shows that cities are leading the way on the transition to a carbon-free energy future. Since 2015, **US cities have signed 335 renewable energy deals** totaling 8.28 GW—roughly the same as the collective electric generation capacity in **Alaska, Hawaii, Rhode Island, and Vermont**.

There is no question that cities have been grappling with a lot recently. However, as the front line for their communities, people are looking at their local governments for action and solutions. As local governments try to wrap their heads around the recovery and changes needed to promote a healthy, prosperous, and more equitable future, they need efficient and effective solutions. As we explored in this report there are numerous steps cities can take to:

- Improve air quality within city borders and beyond;
- Mitigate the impact of the recession by putting people back to work, restoring incomes, and reducing major household expenses; and
- Promote an equitable recovery by ensuring that both of the above objectives—improving air quality and household economic health—disproportionately benefit historically marginalized communities, including low-income communities and communities largely populated by Black, Indigenous, and people of color.

While these problems will need to be addressed on state, regional, and national levels, the strategies highlighted in this report will help cities begin the evolution to build a cleaner, greener, and more equitable future.

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