

Catalyst or Challenge?

COVID-19 Proved Denver Can Have
Clean Air. But Can We Keep It?

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COLORADO HEALTH INSTITUTE

Informing Policy. Advancing Health.

The lockdown during the coronavirus pandemic created an unintentional experiment in cleaning Denver’s air.

Stay-at-home orders kept people indoors much of this spring, in Colorado and around the world. With fewer people out and fewer cars on the roads, some amazing things happened. Wild goats took over empty streets in Wales and the Himalayas could be seen from famously polluted skies in Delhi, India. In Colorado, Denver had a momentary breath of fresh air as our infamous “brown cloud” poofed away. Traffic slowed to a trickle during Colorado’s month-long stay-at-home order from March 27 through April 27, only resuming normal levels in late May. Air pollution plummeted, revealing clearer views of the mountains than many people had ever seen.

Seeing is believing. Take a look at webcam footage of Denver before and during the stay-at-home order (Figure 1).

Air pollution — which is mostly comprised of nitrogen dioxide (NO₂) and fine particulate matter with a diameter less than 2.5 micrograms (fine particulate matter) PM 2.5 — is now the leading environmental cause of mortality world-wide, causing nearly 3 million premature deaths a year, 100,000 in the United States.² Put a different way, every two years, the world loses more people than the population of Colorado due to air pollution.

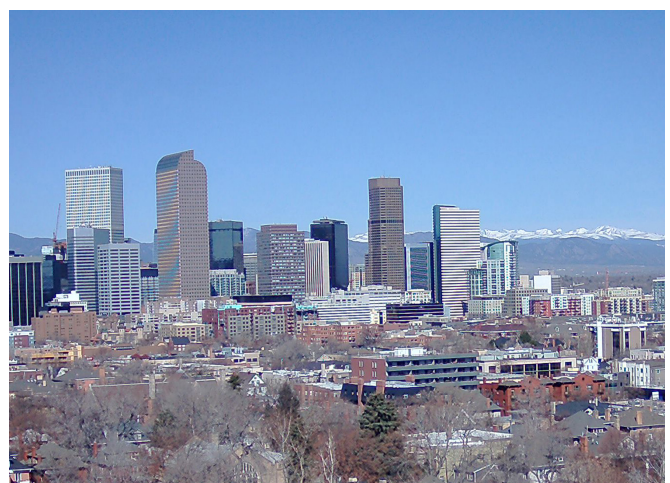
Key Takeaways

1. Health-harming air pollutant concentrations declined in Denver in 2020 during and just after the stay-at-home order.
2. Denver residents drove, walked, and took mass transit less during and immediately after the shut-down order.
3. Emergency measures taken during the pandemic cleaned Denver’s air, but the effects will be difficult to replicate.

Days of poor air quality can often be seen and felt in Denver. The Denver metro area ranks among the worst metropolitan areas in the U.S. for air pollution, particularly for ozone and particle pollution, which can irritate the lungs and exacerbate chronic health conditions.³ Poor air quality is also common in northern Colorado, particularly in Fort Collins, which ranks among the worst cities in the U.S. for ozone.⁴

The extreme change in behavior during the shut-down orders issued in response to the coronavirus gives us a unique opportunity to understand how pollution levels are impacted by large-scale

Figure 1. Images From Colorado Department of Public Health and Environment Streaming Webcam at 10 a.m. March 2, 2020 (Pre-Stay-at-Home) and at 10 a.m. April 6, 2020 (During Stay-at-Home)¹



behavioral change. The data clearly suggest that behavioral change was able to significantly improve air quality in the short term.

During the stay-at-home order, emissions declined due to drops in pollutants as people traveled less. Electricity use, another major contributor to emissions, also dropped significantly in March and April, according to a national analysis, likely because of the temporary closures of many businesses and because many Coloradans were working from home rather than in an office.⁵

But those behavioral changes were also linked to an economic recession, including unprecedented levels of unemployment and the permanent closure of many businesses.

This paper examines the changes in behavior and air quality during the stay-at-home order, with a focus on Denver, where air pollution is most intense and where most data are available. It asks: Could Colorado and the metro area replicate the improvements in air quality without a stay-at-home order? What actions are being taken in Colorado to improve air quality and protect our health, and what else should be considered?



A Note on Air Pollutant Monitoring

It is generally accepted that measurements from air quality reference stations are highly accurate, but they are not sufficiently location-specific. For example, key pollutants — such as NO₂ and PM 2.5 — can vary dramatically over short distances and time intervals, so a station may be capturing information about pollutants from a more distant location. The large size, maintenance requirements, and relatively high cost of equipment limits where and how many monitors can be installed.

Takeaway 1

Health-harming air pollutant concentrations declined in Denver in 2020 during and just after the stay-at-home order.

Colorado has a network of air pollution monitors throughout the state, many of which are in the Denver metro area. The following data come from air-testing instruments at a station in downtown Denver that measure concentrations of multiple pollutants.⁶

Just how much of a reduction in health-harming pollutants in Denver occurred during the stay-at-home order compared to previous years?

To understand this, the Colorado Health Institute compared concentration data for the following health-harming pollutants from February to May 2020 with averages from the last decade (2010 to 2019). The following pollutants were analyzed: nitrogen dioxide (NO₂), fine particulate matter (PM 2.5), sulfur dioxide (SO₂), and carbon monoxide (CO). These are called criteria pollutants, and their emissions are tracked and regulated under the Clean Air Act because of their harmful effect on human health.

Overall, monthly concentrations for all four of these criteria pollutants are lower in 2020 compared to the past decade. Colorado has also been “in attainment” for these pollutants since the 2010s, meaning that concentrations of these four pollutants have not exceeded National Ambient Air Quality Standards aimed at protecting public health and the environment set by the Clean Air Act in 1990. Colorado’s air has, overall, been getting cleaner over the past decade.

Levels of ozone, another criteria pollutant, have consistently been in non-attainment for the past decade and continue to be a problem in 2020. Ozone is created when chemicals and pollutants

in the air are “cooked” in the heat and sunlight. Ground ozone is at its highest levels in the summer, when temperatures reach into the upper 80s or higher.⁷ While the Denver metro area had over two dozen ozone action days in 2020 as of the time of this publication (16 in August), this pollutant is a problem almost entirely in the summer, so it was not analyzed in this paper, which focuses on March and April, when the stay-at-home order was in effect.

Denver Struggles With Ozone

In 2019, U.S. Environmental Protection Agency (EPA) records show at least 265 days during which metro Denver residents inhaled poor air: 252 days of moderate air quality, 20 days of air unhealthy for sensitive people and two days when the air was unhealthy for all.⁸ While criteria pollutants like SO₂, CO, and NO₂ are not at concentrations that pose a significant problem, PM 2.5 is at dangerous levels in Denver. And ozone in the summer months continues to pose a health risk: The American Lung Association gave the Denver area an “F” grade for ozone pollution in 2019.⁹



Nitrogen Dioxide (NO₂)¹⁰

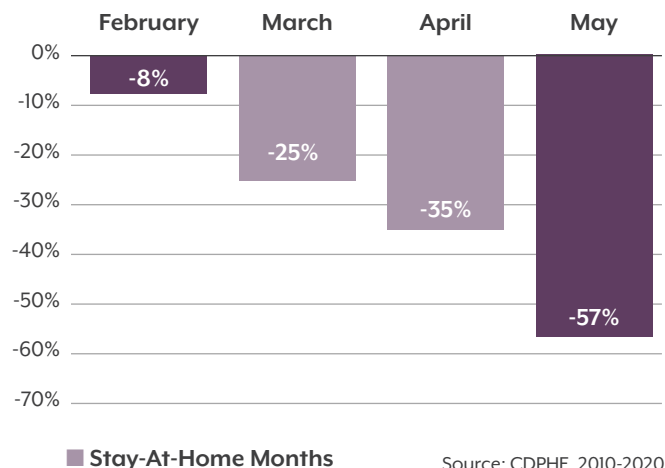
Source: Fuel burning in automobiles and power plants

Health effects: Irritation of respiratory system, eyes, and throat

NO₂, which is emitted from many common sources of pollution, is often used as a proxy for overall air pollution trends. During March and April, when the state’s stay-at-home order was in effect, the drop in NO₂ pollution was pronounced, with a 31% reduction in March compared to the average March concentration of the past decade. In April, there was an even greater reduction of 44%. This trend continued with a still greater reduction of 67% in May as Colorado transitioned to a “Safer at Home” policy, which continued to encourage social distancing, working from home, and less travel.

Figure 1. Nitrogen Dioxide Levels Dropped Significantly During the Stay-at-Home Months

Percent change of NO₂ monthly average concentrations in 2020 compared to 2010-2019 averages



Fine Particulate Matter (PM 2.5)¹¹

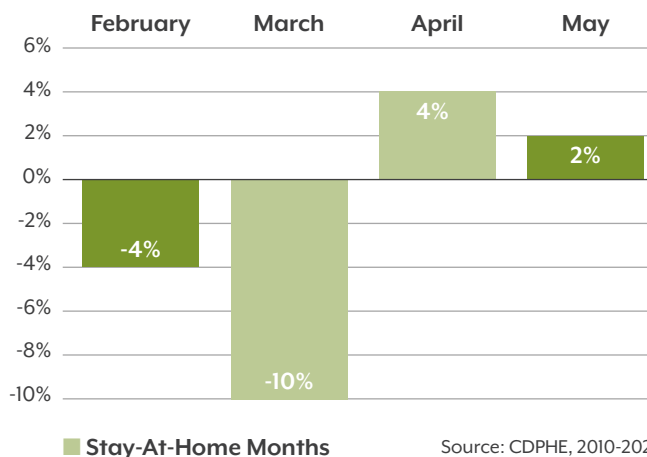
Sources: Automobiles, power plants, industry, agriculture, wildfires

Health effects: Irritation of respiratory system, cardiovascular complications, harm to central nervous system and reproductive functions, and long-term exposure can increase lung cancer mortality.

Compared to the average monthly concentrations of the last decade, PM 2.5 concentrations dipped 10% in March when the pandemic reached Colorado but appeared to return to levels similar to the 2010s in April and May. While traffic may have slowed in March and April, delivery trucks stayed on the roads to ensure goods were arriving to customers and stores, and power plants continued operating. Wildfires can also contribute to rising PM 2.5 levels.

Figure 2. Fine Particulate Matter (PM 2.5) Levels Dropped at the Start of the Stay-at-Home Order, Returned to Normal in April and May

Percent change of PM 2.5 monthly average concentrations in 2020, compared to 2010-2019 averages



Sulfur Dioxide (SO₂)¹²

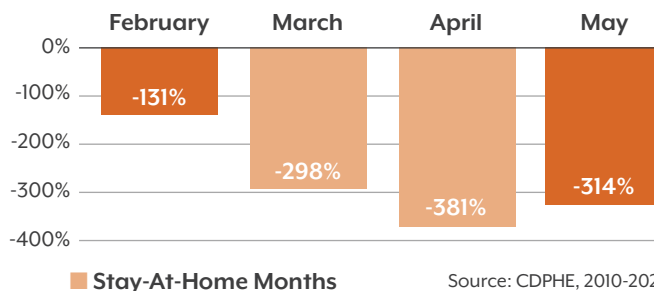
Sources: Coal power plants

Health effects: Impaired breathing, especially in people with respiratory diseases like asthma and chronic obstructive pulmonary disease (COPD).

Colorado has achieved significant declines in SO₂ concentrations over the last decade as many power plants shifted from coal to natural gas and renewable energy sources.¹³ The months when the stay-at-home order was in effect saw even more significant declines than prior to the pandemic.

Figure 3. Sulfur Dioxide Levels Dipped During the Stay-at-Home Order

Percent change of SO₂ monthly average concentrations in 2020, compared to 2010-2019 averages



Carbon Monoxide (CO)¹⁴

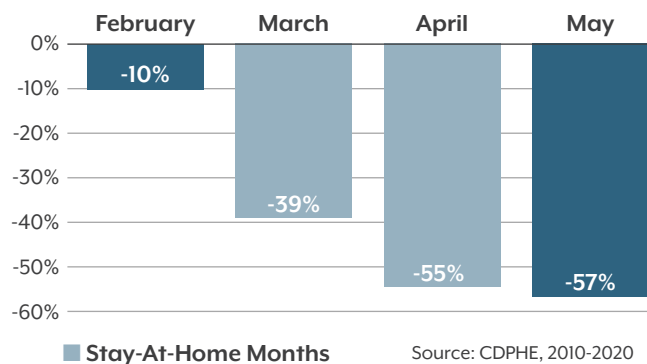
Sources: Automobiles, burning coal, wood, or oil, industrial smoke

Health effects: High levels can cause central nervous system issues and cardiovascular damage and block oxygen from entering the blood.

Carbon monoxide, a harmful pollutant, exists at very low concentrations in Denver's air, well below the national standard. Still, monthly concentrations of CO were significantly lower in March and April and had an even lower monthly concentration in May than the previous decade's average, likely due to lower-than-normal driving levels in the beginning of May.

Figure 4. Carbon Monoxide Levels Dropped in March and Remained Low in April and May

Percent change of CO average concentrations in 2020, compared to 2010-2019 averages



Why Does This Matter?

Poor air threatens the health of Denver’s residents. People with respiratory diseases, older adults, and Black and Hispanic/Latinx people are among the communities that are particularly impacted.

A large body of evidence shows that short-term changes in air quality have an immediate impact on heart attacks, strokes, and emergency room visits from respiratory complications. All increase when air pollution spikes.¹⁵ Keeping criteria pollutant levels low means keeping our most vulnerable safe. Over 3.5 million people live in the Denver metro area — meaning that the majority of Coloradans live in the area with the worst air.

According to American Lung Association:¹⁶

- Over 307,000 people have asthma in the Denver area, nearly 60,000 of whom are children.
- Over 117,000 adults in the Denver area have COPD, a serious respiratory illness.
- 156,000 have cardiovascular disease.
- 464,000 are over 65.



Climate Change Connection – Colorado’s Richest Emit the Most

Households contributing the most carbon dioxide (CO₂) emissions (a main heat-trapping gas that causes global warming) tend to be among the most affluent. A recent study showed that an affluent ZIP code in Boulder County had the highest per capita emissions in country.²⁰ While CO₂ is not a criteria pollutant because it does not directly affect breathing, its role in climate change is significant.

All of these groups are high-risk populations whose health can be worsened through exposure to poor air.

The burden of air pollution is shared unevenly. Scientists and policymakers have long known that Black and Hispanic Americans tend to live in neighborhoods with more pollution of all kinds than white Americans due to a variety of reasons, including the fact that projects such as highways and industrial plants that were considered less desirable to live close to have often been located in or near these neighborhoods.¹⁷

Areas with high air pollution have been linked to higher COVID-19 mortality.¹⁸ A new study by Harvard University shows that COVID-19 death rates are higher for people in communities with long-term air pollution problems than for those who live in areas with cleaner air.¹⁹ So, while the pandemic provided a temporary solution for air pollution, years of pollution prior to the coronavirus may have intensified the pandemic in some communities.

Colorado’s Air Has Been Getting Cleaner the Past Decade

The stay-at-home period caused a dip in pollution, but Colorado’s overall pollutant levels have been on the decline during the past decade thanks to statewide clean air policies, increased monitoring and controls of oil and gas activity, newer cars replacing older ones, and transitions to wind and natural gas versus coal for power plants.

In 2010, Gov. Bill Ritter signed the Clean Air Clean Jobs Act (House Bill 1365), which had the support of the Colorado Public Utilities Commission (PUC), and Xcel Energy. This required coal-fired power plants to switch to natural gas over the next decade to significantly reduce pollutants like SO₂ and NO₂. In 2019, coal-fired power plants provided less than half (45%) of Colorado’s net energy generation, down from around 70% in 2010.²¹ Electricity from renewable sources more than doubled in that time period: It accounted for nearly a quarter of the state’s net generation in 2017, according to the U.S. Energy Information Administration.

Takeaway 2

Denver residents drove, walked, and took mass transit less during and immediately after the shut-down order.

From March 27 to April 27, Coloradans were required by an order from Gov. Jared Polis to stay at home unless traveling to work or for necessities like groceries, gas, and medical attention.

Mobility data from Apple’s Mobility Trends Report show how movement changed during the lockdown. These data show navigation requests for driving, walking, and mass transit. Data are collected from thousands of iPhone users’ daily navigation requests. While they are a good proxy for driving, walking and mass transit mobility, they do not capture all travel by all Coloradans. The baseline set by Apple for a “typical week” for driving, walking, and mass transit (buses and trains) was the week of January 13, 2020 (see Figure 5). This report focuses on data from Denver. Driving data are available for Colorado overall; walking and mass transit data are only available at the city and county level.

In March, the month the pandemic was first reported in Colorado, the frequency of driving, walking, and mass transit requests all declined, with mass transit seeing the most significant dip at 36% lower than the baseline. The biggest declines were in April, when driving dropped 48% compared to the baseline, mass transit plummeted to 70% below previous rates, and even walking dropped 45% below the baseline.

As Colorado transitioned to a less-restrictive “Safer at Home” policy on April 27, 2020, and easing of restrictions began in May, some Coloradans returned to work, and businesses and restaurants began to open in-person services. Driving and walking started to normalize over time, but mass transit activity remained significantly lower than normal, with even lower ridership in July than in March, when the pandemic started (see Figure 6). This drop in alternative transportation use presents a challenge to reducing emissions moving forward.

As people cut down on travel, they changed where they spent their time. Data from Google’s COVID-19 Community Mobility Report provide information about where people spent their time compared to a baseline on February 15. Overall, since the pandemic started, people are spending more time at home and in parks. Grocery stores and pharmacies saw an increase in activity in March

Figure 5. Average Percent Change in Walking, Driving and Mass Transit from Normal Activity

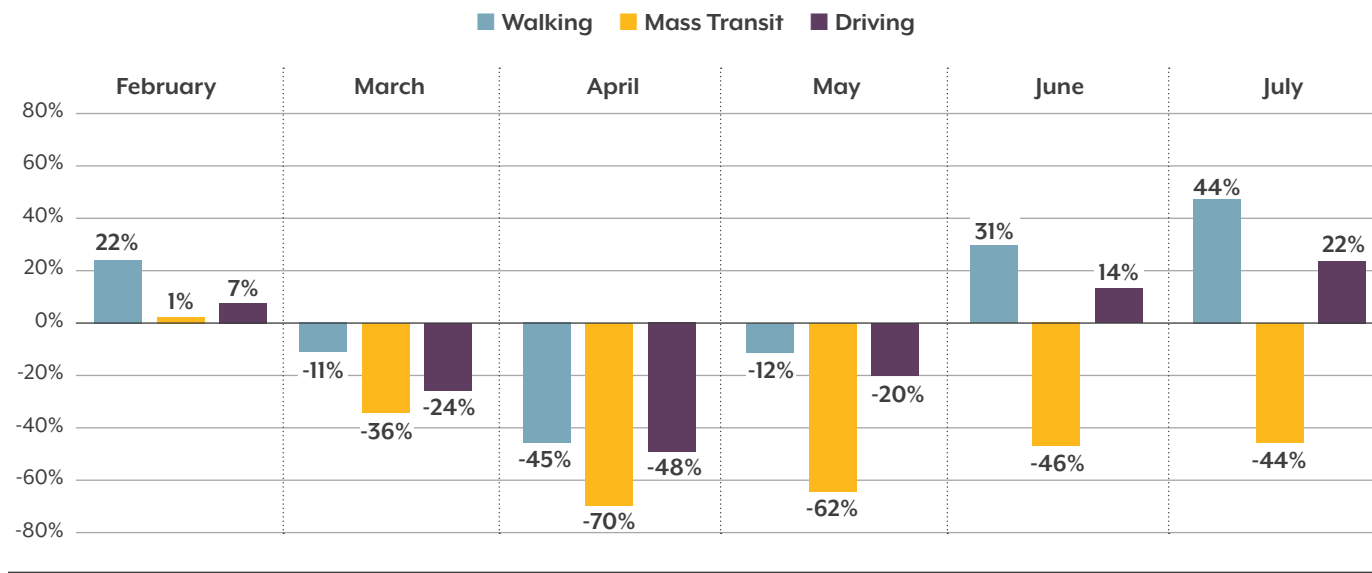
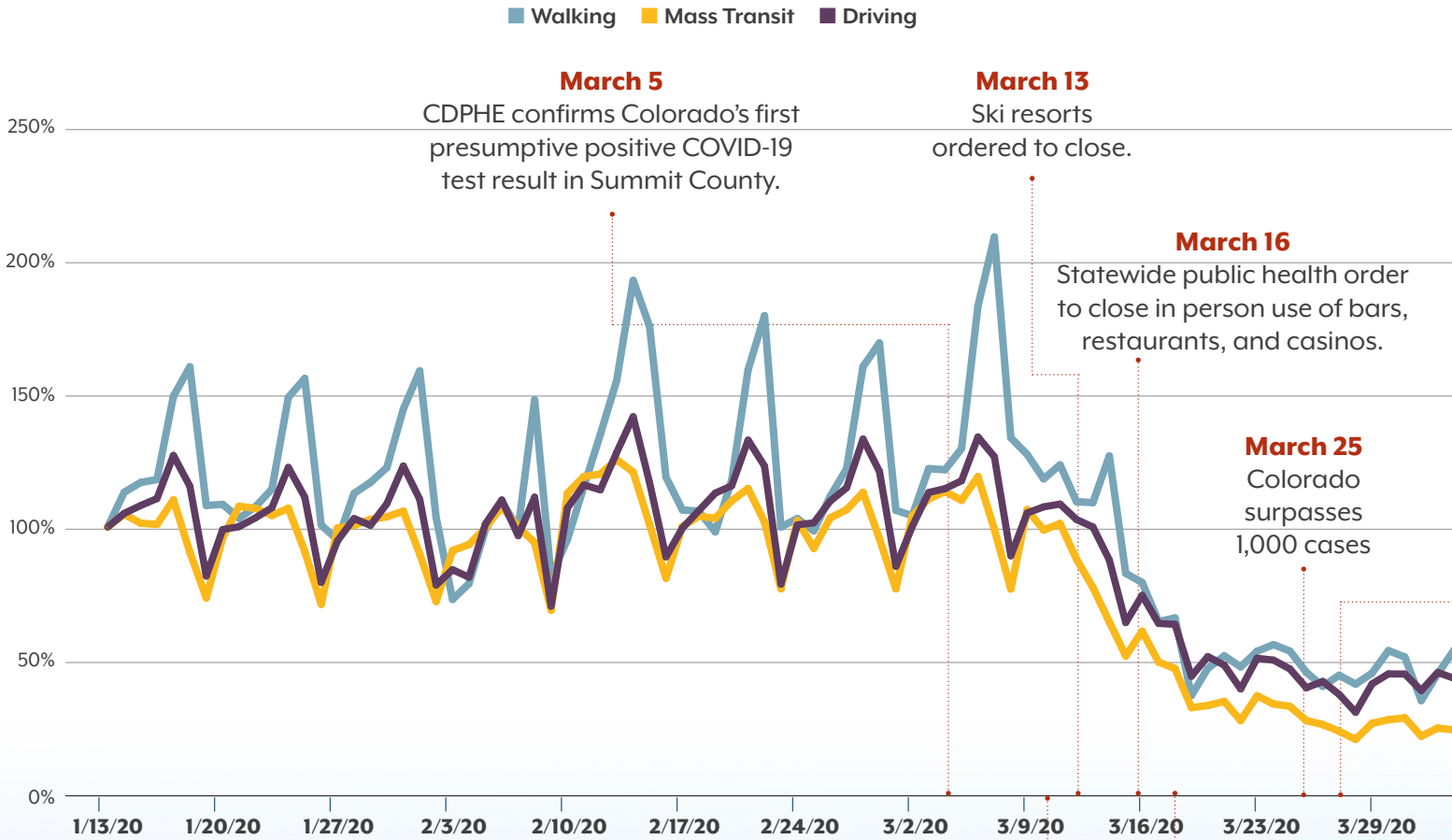


Figure 6. Daily Percent Change of Walking, Mass Transit, and Driving in Denver (100% is Baseline for Normal Activity)



March 5
CDPHE confirms Colorado's first presumptive positive COVID-19 test result in Summit County.

March 13
Ski resorts ordered to close.

March 16
Statewide public health order to close in person use of bars, restaurants, and casinos.

March 25
Colorado surpasses 1,000 cases

March 11
Gov. Jared Polis declares a statewide disaster emergency.
World Health Organization announces that the COVID-19 outbreak can be characterized as a pandemic.

March 18
Social distancing order prohibiting gatherings of more than 10 people goes into effect.
Polis signs executive order closing school buildings.



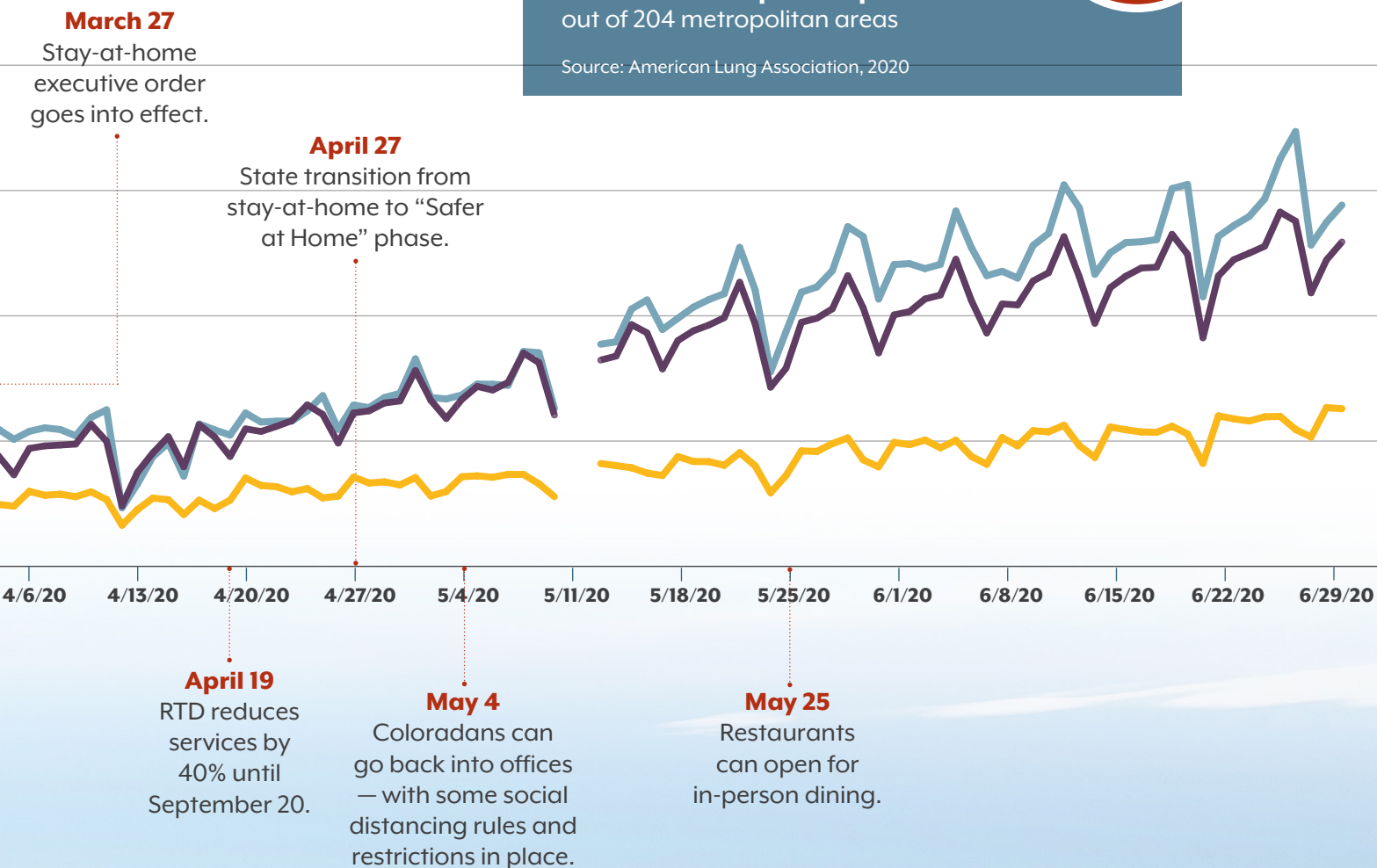
The Denver Metro Area ranks among the worst metropolitan areas for air pollution

10th for high ozone days
out of 229 metropolitan areas

35th for 24-hour particle pollution
out of 216 metropolitan areas

46th for annual particle pollution
out of 204 metropolitan areas

Source: American Lung Association, 2020

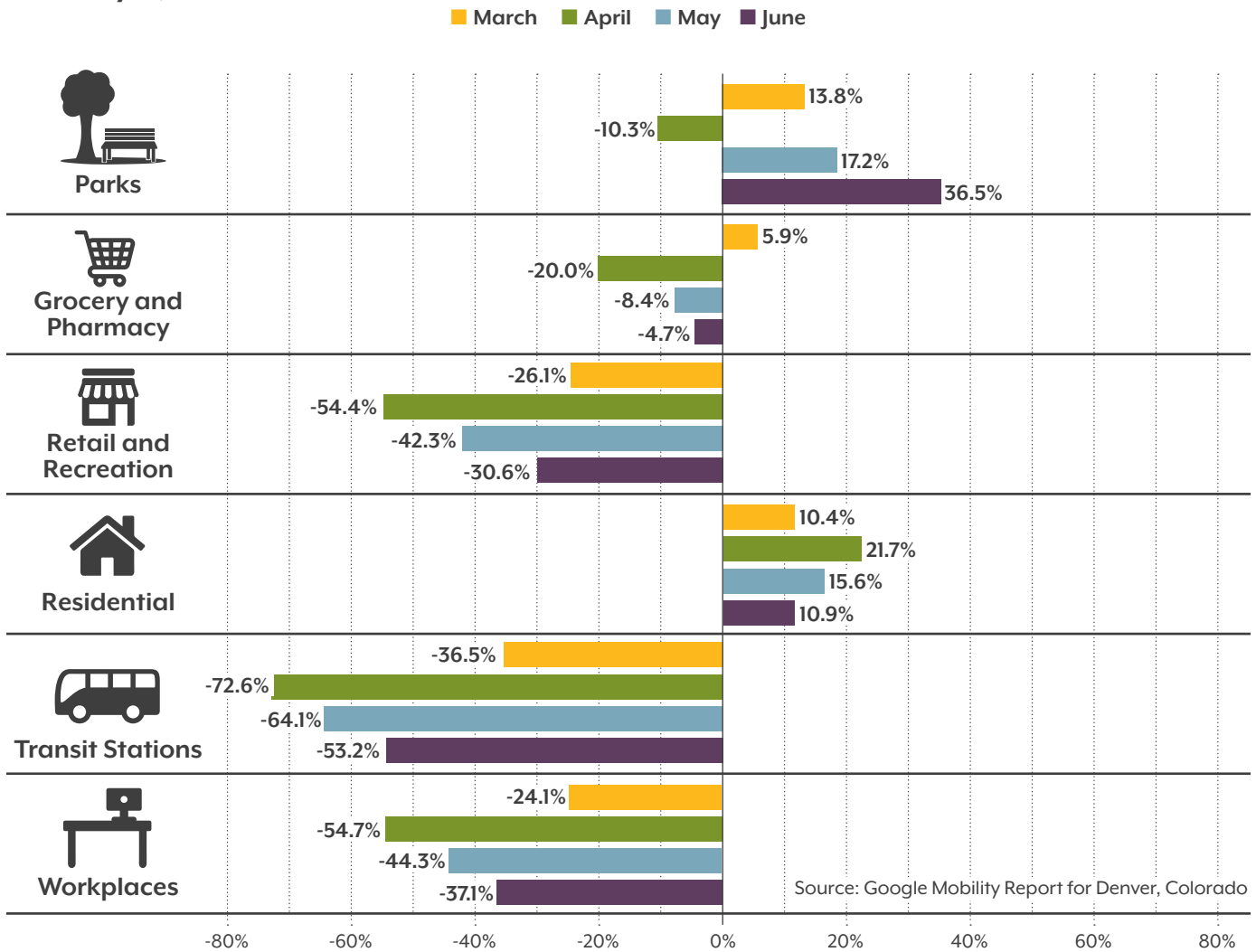


Source: Apple Mobility Trends Report, 2020

Note: Data for May 11-12 is not available and appear as blank in the chart.



Figure 7. Monthly Average Percent Changes of Where People Spent Time Compared to Baseline (February 15, 2020)

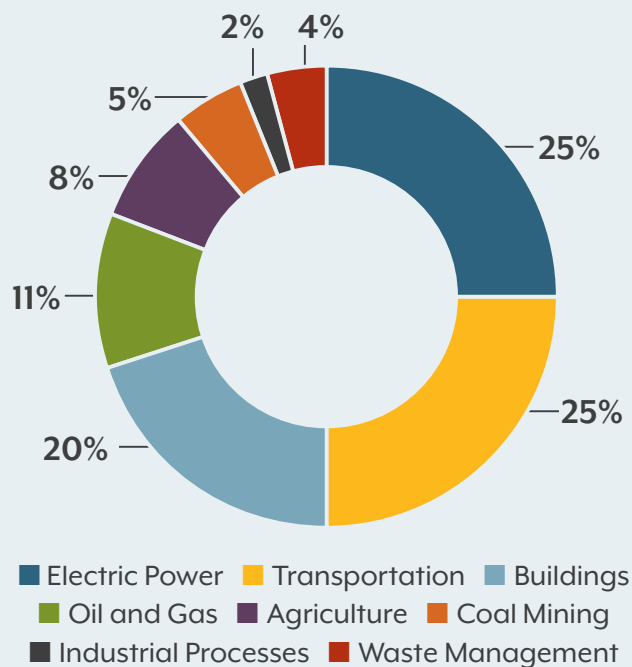


as people began buying supplies to prepare for the unknown. While people were more mobile in May, they still spent much of their time at home. Even as of June, people were spending more time at home, less time in retail and recreation locations like shops and gyms, and more time outdoors in parks.

The drop in mobility and change in where people were spending their time matters because transportation and electricity are both major contributors to air pollution. A study from researchers at the Massachusetts Institute of Technology (MIT) showed that there was a significant reduction in electricity use recorded across the country as cases of COVID-19 increased in March and April.²²



Figure 8. Major Sources of Emissions in Colorado



According to a CDPHE CO₂ emissions inventory in 2019, electricity generation and transportation (cars and trucks) each make up 25% of annual carbon emissions. Commercial and residential buildings like our homes contribute the third largest source of emissions at 20% – higher than oil and gas and coal mining. While this is an inventory of CO₂ emissions, it’s a good rough estimate of where some criteria pollutants come from, too. For example, transportation exhaust is also a major source of CO, NO₂, and PM 2.5 pollution. Electricity is 75% powered by the burning of fossil fuels, which are another significant source of criteria pollutants.

Source: CDPHE, 2019

Takeaway 3

Emergency measures taken during the pandemic cleaned Denver’s air, but the effects will be difficult to replicate.

In March and April 2020, people really did stay at home, driving less to offices and stores. That led to cleaner skies in Denver temporarily. But freezing the economy and asking people to never drive again are not realistic long-term solutions. Nevertheless, the pandemic has demonstrated something very important: Coordinated behavior change can clean our air.

Now is a good time to pause and reflect on what pragmatic solutions Coloradans can take to clean the air. What policies and other approaches can policymakers, government officials, and leaders in the community consider, and what is being considered to catalyze change? What challenges do those solutions present? What are the pathways to progress?



Solution 1: **Improve Options for Mobility (Mass Transit and Bike Lanes)**

Opportunity to Catalyze:

Getting more people to use alternative transportation like biking, taking transit, and walking results in less health-harming pollution in the air.

Challenges:

- **Social distancing and crowded public transportation.**

Since March, use of mass transit has dropped dramatically in Denver. As of August 31, 2020, use was half of its pre-pandemic level on January 13, while driving has all but returned to normal. People are hesitant to take public transportation during the pandemic, and the U.S. Centers for Disease Control and Prevention (CDC) recommends driving alone to work if possible – the exact opposite of what cities have recommended for years.

- ***The cost of public transportation in Denver is among the highest in the country.***

At the beginning of 2019, the Regional Transportation District (RTD) raised prices for bus and train tickets, making Denver the most expensive place to ride transit compared to similar cities.²³ RTD's adult fare is \$3, while the metro in Austin, Texas, for instance, costs \$1.25. RTD does offer discounts for children and those with incomes at or below 185% of the federal poverty level, but cost remains a barrier for many. According to the Colorado Department of Transportation (CDOT), RTD saw ridership decline 3% from 2010-2020, even prior to the pandemic, likely due to the fare increases and frustration with lack of routes and on-time performance.

Pathway to Progress:

In 2017, the City and County of Denver put forth a Mobility Action Plan to give people better choices to get around. The plan states that Denver's population continues to grow, and 73% of Denver commuters drive alone. The Mobility Action Plan aims to reduce single occupancy vehicles by 50%, increasing the percentage of bike and pedestrian commuters to 15% and transit commuters to 15%.

Mass transit operators will need to ensure the safety of passengers and communicate it clearly. The CDC recommends trains and buses follow social distancing guidelines by implementing rear boarding, keeping seats six feet apart, allowing fewer riders per vehicle, and sanitizing the vehicles. RTD has taken measures to ensure proper social distancing and limit riders on buses and trains. Riders have been required to wear masks since April. Clear communication of these safety measures to the public may be a key to winning back riders.

- ***Decrease barriers to accessing alternative transportation.***

RTD suspended fare collection temporarily during the first months of the pandemic to maintain distancing between drivers and riders. Could fares be suspended for good? Passenger fares made up 14.4% of RTD's billion-dollar budget in 2019, while more than 60% of its funding came from sales taxes, according to the agency's most recent

annual report. The passenger fares could be made up in a small sales tax increase or through a variety of state or local tax schemes. Free service could bring back riders, especially while unemployment is at an all-time high and the COVID-19 economy continues to make life difficult.

Improving access to bikes and scooters for lower-income Denver residents and creating more bike-friendly streets can offer options for getting around that do not pollute the air. Like most American cities, Denver was built for cars. The pandemic could be catalyst to change that, as many cities are transforming their streets to include more bike lanes and pedestrian zones, with a shift toward getting cars off the roads. As part of the "Can Do Colorado" initiative, Denver agencies are offering a variety of grants for e-bikes and e-scooters for workers with low incomes.



Solution 2: Electrify the Vehicle Fleet

Opportunity to Catalyze:

Increase access to zero emissions vehicles (ZEVs) and charging stations that power them to reduce air pollution.

Challenges:

- ***ZEVs and charging stations are not widely available.***

ZEVs will replace gas-powered cars only if they become more available and affordable. Colorado has the seventh-highest rate of ZEV sales in the nation at 2.6%, which is double the national average.²⁴ Data from the Colorado Automobile Dealers Association also show that 77.7% of cars purchased by Coloradans are light trucks (pickups, sport utility vehicles, crossover utility vehicles, and vans). None of the ZEVs sold in 2018 were light trucks.

Charging station availability has often been a concern as well, as ZEV owners wanting to travel long distances must ensure they have stations where they can charge their cars.

ZEVs are expensive. The best-selling ZEV in Colorado is made by Tesla. The starting price for the cheapest Tesla is nearly \$40,000 — too expensive for most Coloradans. Tack on the recession and rising unemployment due to the pandemic, and price becomes a significant barrier to getting more clean cars on the road.

Pathway to Progress:

Between January 2015 and August 2020, the number of registered ZEVs in Colorado increased more than five-fold, surpassing 29,000 cars, and now there are 39 models to choose from in Colorado, up from 12 just two years ago.²⁵ While a significant increase, this is just 0.5% of the 5.3 million registered cars in Colorado.

Colorado became the 11th state (and first non-coastal state) to adopt a ZEV mandate in August 2019. This mandate requires at least 5% of an automaker's new car lineup to be electric vehicles by 2023 and more than 6% by 2025. The mandate creates more availability for a diverse variety of ZEVs to choose from, increasing choices for the majority of Coloradans who prefer SUVs.

The ZEV mandate is a small step in the right direction, but addressing the cost barrier is important as well. Colorado has historically provided tax credits up to \$5,000 on new electric vehicle purchases. This scaled back to \$4,000 this year and will drop to \$2,000 by 2023. Credits for electric trucks will scale back as well.

While ZEVs are expected to get cheaper over the next few years, studies show that tax credits and rebates on ZEVs increase sales by 5.3% for every \$1,000 of tax credits.²⁶ A \$4,000 credit in 2020 would translate to a 21.2% increase in sales. Maintaining tax credits will likely continue to boost ZEV sales, and as prices fall, tax credits will become less necessary over time. To make these vehicles more accessible, special tax credits for people with incomes below a certain level could be considered to encourage even further adoption of ZEVs and address inequities in access.

Vehicle charging stations continue to pop up in Denver and surrounding cities. But charging stations on remote highways are in short supply. Eight western states — Arizona, Colorado,

Idaho, Montana, Nevada, New Mexico, Utah and Wyoming — are devising a framework for creating an Intermountain West electric vehicle corridor. It's called the "Regional Electric Vehicle Plan for the West," or "REV West," and it is laying the groundwork for a multi-state solution to charging. This sort of collaboration is key to creating solutions that work for Colorado and the region to encourage ZEV adoption and reduce emissions.



Solution 3: Encourage Teleworking to Reduce Commuting

Opportunity to Catalyze:

Encourage teleworking and provide flexibility for workers and reduce emissions from commuting.

Challenge:

- *Not everyone can telework.*

While many Coloradans are working from home at least part-time, many others cannot work from home. Essential workers like health care providers, grocery store clerks, delivery drivers, janitors, and food servers do not have the privilege to work from home. According to the Bell Policy Center, slightly more than 20% of Colorado workers are essential workers.

- *Working from home can be challenging.*

Public health guidance encourages workers in Colorado to telecommute if possible. The rapid transition to teleworking may have initially felt like a temporary fix, but it is now being considered as a long-term solution for employers to give workers flexibility and reduce air pollution. However, working from home can present challenges to productivity, technology (WiFi, office set-up, bandwidth issues), social interaction and collaboration, and finding a balance between work and home life as they blend into one another. A national survey by Gensler Research Institute showed that only 12% of U.S. workers want to work from home full-time, while 44% prefer to work part-time from home and 44% prefer the office full-time.²⁷

Pathway to Progress:

Colorado already had the highest rate of people teleworking full-time in the country prior to COVID-19, at 6.9% compared to the national average of 2.6%.²⁸ Efforts to support, invest in, and foster flexible teleworking will be key to continuing its adoption in the long-term. That means ensuring employees have access to the technology they need to work (computers, good WiFi, etc.) and a clear, formalized teleworking policy that ensures flexibility, promotes productivity, and supports the mental health of workers who may feel isolated or lacking in social interaction. At the state level, it means expanding access to broadband in rural and underserved areas of the state where access to reliable, high-speed internet is sparse.

- **Support and invest in formalizing and normalizing teleworking.**

The Can Do Colorado Community Challenge has two efforts to encourage and support communities and their businesses' abilities to telework, while reducing air pollution. First, CDOT is offering micro grants up to \$5,000 for communities that promote telework best practices to reduce commuter traffic on local roads.

Second, the Denver Regional Council of Governments' initiative called "Telework Tomorrow" helps employers expand telework practices. It offers free resources and guidance, an implementation toolkit, and support for businesses to update or institute new telework policies.



Solution 4: **Transition from Fossil Fuels to Renewables for Electricity**

Opportunity to Catalyze:

In the absence of federal efforts to address climate change and improve air, Colorado has an opportunity to be a model for other states by transitioning to renewable energy generation.

Challenge:

- **The federal government is rolling back emissions regulations and environmental protections.**

President Donald Trump has pursued a deregulatory approach to energy development

and emissions regulation. In his first month in office, he issued an executive order that for every new regulation put in place, two had to be eliminated. Trump has long questioned the efficacy of renewable energy sources, suggested that wind turbines could cause cancer, and vocally advocated for coal as a source of power. Trump withdrew the United States from the Paris Agreement on climate change and replaced the Obama-era Clean Power Plan that aimed to reduce greenhouse emissions from power plants. As of August 2020, the Trump administration had taken 74 actions to weaken environmental protection.²⁹ One of those actions is a new fuel efficiency standard released in March 2020 that the Trump administration describes as "the largest deregulatory initiative of this administration." It calls for fuel economy and emission standards to increase by 1.5% annually, rather than 5%, curbing efforts to reduce emissions from gas-powered cars.

Pathway to Progress:

In direct contrast to the federal approaches to environmental protection and regulation, Polis has made environmental protection a cornerstone of his administration, vowing 100% renewable energy by 2040. The Can Do Colorado Community Challenge has set "Improving Air Quality" as one of its three major goals.

As Coloradans consider policies and actions to reduce air pollution and protect the public's health, higher targets for clean energy could be an opportunity to set an example for environmental action for the rest of the country during and after the pandemic.

- **Invest in renewable energy to power buildings.**

Colorado is a leader in renewable energy development, with investments in wind, solar, and other renewable energy resources. In 2004, the state passed the first voter-led renewable energy standard in the nation, requiring electricity utilities to obtain a percentage of their power from renewable energy sources. As powering buildings and generating electricity make up nearly half of emissions in Colorado, a significant transition to renewable energy is an opportunity to make the biggest impact on reducing emissions. Xcel

Energy, Colorado's largest electric utility, plans to be 80% carbon-free by 2030 and 100% carbon-free by 2050, with all energy coming from renewable sources. However, Xcel supplies just over half of Colorado's electricity. The rest comes from dozens of smaller suppliers, including rural electric cooperatives and city-owned utilities, which have not made the same commitment.³⁰

Recent advances in technology and cheaper manufacturing costs make renewable sources like wind and solar cost-effective. In fact, wind energy has become the cheapest option for utilities building new electric generation.³¹ Colorado's electricity from renewable sources has more than doubled since 2010 to 25% of net generation in 2019, led by increased wind and solar power.³²

- ***Build on existing climate policy to reflect pandemic considerations.***

Colorado's legislature passed a first of its kind "Climate Action Plan To Reduce Pollution" in 2019, making it the first state to put into statute both strong short-term and long-term goals for cutting climate pollution emissions and the regulations to achieve the goals. The goal is to cut climate pollution (relative to 2005 levels) by 90% by 2050, putting Colorado in line with Paris Agreement goals. Cutting climate pollution would also reduce other criteria air pollutants, since the same sources that produce carbon dioxide also produce health-harming emissions. As this law continues to go through rulemaking, it's imperative that the connection to COVID-19, air pollution, and mortality among disproportionately impacted communities is reflected.

Colorado also passed a first-of-its kind oil and gas regulation bill in 2019 with Senate Bill 181, which requires state regulators to put health and safety first when it comes to oil and gas extraction activities and gives local governments increased say over oil and gas development in their area. The bill also strengthened the Colorado Oil and Gas Conservation Commission by transitioning it from a voluntary board of seven members to a full-time five-member committee focused on regulating oil and gas development with a focus on protecting public health and the environment. A majority of the members have extensive public health and

environment backgrounds, a nod toward the direction the commission is taking.

- ***Expand monitoring of air pollution.***

To clean the air in Denver and the Front Range, a better understanding of emissions through expanded monitoring resources is needed. This summer, Colorado passed Senate Bill 204, aimed at enhancing the state's ability to improve air quality and protect public health and the environment by providing CDPHE's Air Pollution Control Division with new resources for monitoring, inspection, and enforcement. The law increases the capacity to monitor air pollution sources, resulting in informing better emissions reduction strategies, better tracking of oil and gas leaks, and advancing science and research through data collection.

Conclusion

The pandemic-driven clearing of Denver's brown cloud was temporary, but does it have it be? As the economy continues to open up, traffic returns to normal, and Coloradans' behavior starts to resemble life before the pandemic, there is an opportunity to consider what individual, community, and societal changes can ensure healthier, cleaner skies are with us for the long-term.

For the last decade, Colorado has been headed in the right direction for some – but not all – air pollutants. But the blue skies of spring 2020 were a reminder that there is room for significant improvement.

Looking ahead, employers, policymakers, and local leaders all have a role in reducing emissions. This might look like employers continuing to encourage hybrid or full-telecommuting, policymakers transitioning Colorado to renewable energy, and people retaining the healthy habits they might have developed during lockdown, such as walking and biking more and taking fewer unnecessary car trips.

Taking steps to clean Colorado's air will not be without challenges. But the pandemic and its aftermath have presented a unique time to pause, take a deep breath, and work through the challenges today so all Coloradans can breathe easier tomorrow.

Endnotes

- ¹ Images both pulled at same time of day (10 a.m.) and day of the week (Monday). Both clear days were clear weather-wise, with similar precipitation and wind. The images are used for illustrative purposes. Air pollution visibility is subject to changes in weather, wind, time of day, and emissions. https://www.colorado.gov/airquality/live_image.aspx
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