# THE AIR WE BREATHE

## A Community Conversation on Air Quality

March 6, 2019

**CENTER FOR PUBLIC DELIBERATION**
**COLORADO STATE UNIVERSITY**

Key Summary of Findings
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PUBLIC DELIBERATION
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## About the Center

The Colorado State University Center for Public Deliberation (CPD) serves as an impartial resource to the northern Colorado community. Working with students trained in small group facilitation, the CPD assists local government, schools, and community organizations by researching issues and developing useful background material, and then designing, facilitating, and reporting on innovative public events. The interpretations and conclusions contained in this publication have been produced by CPD associates without the input of partner organizations to maintain impartiality.

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# EXECUTIVE SUMMARY

## Event Overview

Together with officials from the City of Fort Collins Air Quality Program, the Center for Public Deliberation gathered fifty-nine Fort Collins residents to discuss strategies residents could take to improve air quality. In small, facilitated group discussions, participants discussed strategies related to indoor air quality, anti-idling programs, radon mitigation, lawn and garden equipment, wood smoke, and electric vehicles (EVs). After a brief informational presentation provided by representatives from the city's Air Quality Program, participants engaged in two rounds of discussion, choosing which topic they most wanted to discuss each round. They then identified the benefits of enacting changes to their behaviors in relation to that topic, generated lists of obstacles residents might face in implementing those strategies, and brainstormed solutions for overcoming those obstacles. After discussions, participants prioritized which topics the city should focus on moving forward and which obstacles most needed to be addressed. At the end of the forum, participants were asked to evaluate the quality of the forum and fill out postcards committing to continuing the conversation with a fellow community member or changing personal behaviors.

## Key Findings

Participants saw electric vehicle readiness and anti-idling programs as the most pressing issues for the city to address, followed by indoor air quality, radon mitigation and wood smoke (tied), and lawn and garden equipment.

### Electric Vehicle Readiness

Participants identified cost, access to charging stations, and limited range as some of the obstacles to purchasing EVs and suggested the need for more infrastructure to support EVs, including additional charging stations. They also said they lacked access to information about charging stations, incentive programs, and the overarching environmental impacts of EV use, charging, and production. They suggested improved infrastructure, greater investment in alternative transportation, and increased education and outreach as potential solutions.

### Anti-Idling Programs

Discussion participants saw weather and location as two of the most important obstacles to changing their idling habits. In voting and in discussions, education and awareness were also frequently mentioned as obstacles to change. Participants suggested increased signage and awareness campaigns as potential solutions, as well as increased use of alternative transportation, changes to existent infrastructure—such as timed lights and traffic circles, and changes to drive-through practices.

### Indoor Air Quality

Education and awareness emerged as the biggest obstacles to improving indoor air quality. Participants indicated that they were unaware of the poor quality of indoor air or of its potential health consequences. Similarly, they suggested residents may not know how to improve indoor air quality and were skeptical about the effectiveness of environmentally friendly cleaning products. Other identified obstacles included cost and convenience. Participants indicated that many of the personal changes would be easy to make but that business policy and public

awareness presented a larger dilemma. They suggested the city engage in public awareness campaigns related to indoor air quality and that businesses introduce fragrance-free policies.

## Radon Mitigation

Education and awareness were also the primary obstacles to radon mitigation. Participants indicated that residents likely lacked knowledge about what radon is, what its potential health effects are, and how it could be mitigated. They identified cost as another primary obstacle and noted that renters often lack the information or control to address this issue. Potential solutions included public education campaigns and increased access to credible information regarding radon as well as mandatory testing for radon by home sellers or regular testing and mandatory disclosure for homeowners and landlords. They also suggested increased incentive programs and greater access to free test kits as potential solutions.

## Wood Smoke

In voting, participants identified the difficulty of enforcement as the biggest obstacle for decreasing wood smoke. During table discussions, participants frequently mentioned cultural issues, questions or skepticism about the potential impacts of both burning wood and switching to gas, and the cost of switching to gas as some of the primary barriers. They also reported feeling uncomfortable asking neighbors to change their behaviors. Participants suggested public awareness campaigns as a potential solution, including information about how to talk to one's neighbors. They also suggested incentive programs for switching to gas or requiring residents to register their fires with the city.

## Lawn & Garden Equipment

Participants identified the reliance on gas-powered equipment by commercial landscapers as a barrier to diminishing the impact of lawn and garden equipment on air quality. Cultural norms, a lack of education about the environmental impacts, and the rapid rate of growth in Fort Collins were also mentioned as obstacles. Participants also frequently discussed regulations imposed by Homeowners Associations (HOAs) as a barrier to improvement and saw regulation as a key to overcoming these barriers, suggesting the city regulate HOAs ability to prevent less resource-intensive landscaping. They additionally mentioned ways that the community might pool resources, such as electric equipment lending programs operated either by the city or in neighborhoods. Finally, they suggested partnering with existent organizations to better publicize information about how to transition to less resource-intensive landscaping.

# BACKGROUND

## Air quality in the City of Fort Collins

Issues related to indoor and outdoor air quality can affect environmental sustainability and residents' health. Though a 2017 report indicated that Fort Collins has "significantly better" levels of carbon monoxide and particulate matter than national air quality standards, the city does not currently meet standards related to ozone, "a respiratory irritant which can cause inflammation of lung tissues and respiratory disease."[1] A 2017 survey or residents found that about 80% of respondents report good or excellent indoor and outdoor air quality in the city, but about 40% reported experiencing "unacceptable air quality" and slightly more than one-quarter of households report at least one member having respiratory problems.[2] That same survey showed that residents were supportive of initiatives to improve air quality but that a large majority report not knowing about some of the city's key initiatives.

The City has identified six factors that contribute to poor air quality and developed strategies that individuals can take to mitigate poor air quality. Below, we provide a summary of the information that was provided to participants at the forum about each of these factors and how residents may take action in relation to them.

### Indoor Air Quality

Indoor air quality can be two to five times more polluted than outdoor air and most people spend 90% of their time inside. The elderly, young people, pregnant women, and people with allergies or respiratory ailments are often most affected by poor indoor air quality. The City offers a free Healthy Homes in-person or online indoor-air-quality assessment to learn how to eliminate exposure to pollutants and allergens. Actions residents can take include:

- Examining use and storage of cleaning and laundry products and toxic chemicals
- Ensuring that Heating Ventilation and Air Conditioning (HVAC) units are well maintained
- Addressing moisture problems, pests, and other contaminants
- Removing shoes at the door; dusting and vacuuming regularly
- Installing fire alarms and carbon monoxide detectors

### Anti-Idling

Idling is running the engine of a vehicle while not going anywhere, which can be bad for the air, our wallets, and cars. One minute of idling puts more carbon monoxide in the air than three packs of cigarettes, and the exhaust can be linked to serious health problems such as asthma and cardiac disease. The City has an anti-idling policy for City vehicles, provides anti-idling signs for schools and businesses, and offers letters to neighborhoods to reduce idling. Actions for residents include:

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[1] City of Fort Collins Environmental Services, "2017 Fort Collins Air Quality Report," City of Fort Collins, https://www.fcgov.com/airquality/files/aqreport_2017.pdf?1533548426

[2] National Research Center Inc, "City of Fort Collins Air Qualtiy, Climate and Recycling Survey 2017: Report of Results," City of Fort Collins, March 2017, https://www.fcgov.com/airquality/pdf/2017_EnvironmentalServices_Survey.pdf?1526312306

- Turning off the ignition if waiting more than 30 seconds
- Stopping idling at train stops and school drop-off zones
- Parking and going inside, instead of using drive through lanes
- Warming up engines by driving slowly, not idling

## Radon

Radon is an invisible, odorless, radioactive gas emitted during the natural decay of uranium in the soil. It is the second leading cause of lung cancer in the U.S. and 56% of Fort Collins homes tested between 2014-2018 had radon levels above the EPA recommended maximum level. Radon levels vary based on when a house was built and how it was maintained. The City offers low-cost short- and long-term test kits. Some actions for residents include:

- Testing for radon in homes
- Installing radon mitigation systems

## Lawn & Garden Equipment

Emissions from lawn and garden equipment contribute to high summer ground level ozone, a lung irritant. Electric equipment is cheaper to maintain than conventional equipment. The City hosts lawnmower exchange events as well as electric lawn and garden equipment rebates. Residents can take action by:

- Recycling gas-powered mowers and lawn equipment
- Buying or sharing electric mowers and lawn equipment

## Wood Smoke

Wood smoke is made up of small particles, which can be inhaled deep in your lungs. Smoke can get into neighboring homes through windows, air intake, and other leaks. Burning wood in a fire pit can lead to significant levels of smoke, and children, the elderly, and people with heart or respiratory problems are especially sensitive to wood smoke. The City provides outreach regarding smoke impacts, instates nuisance regulations for public areas, and incentivizes gas-fueled fire pits and fireplace options. Actions for residents include:

- Using gas-fueled rather than wood fire pits
- Using only dry, clean wood to limit smoke
- Talking to neighbors about any in-home smoke impacts
- Avoiding smoke in homes by shutting windows and doors, setting HVAC units to recirculate indoor air, and using high efficiency filters

## Electric Vehicle Readiness

Vehicles are one of the largest contributors to greenhouse gas emissions and emissions that cause ozone. Current electric vehicles (EVs) can travel 200 miles before needing a recharge and may be less expensive to maintain. The City is currently working to improve awareness of benefits and tax incentives for EVs, purchase more City fleet EVs, and make charging stations more accessible. Residents can increase EV use by:

- Buying and encouraging others to buy an EV
- Installing an EV charger in their home
- Encouraging employers to install an EV charging station or incentivize employee EV use

# METHODS

## What were the goals of the event?

### Purpose

The City of Fort Collins is developing strategies to address air quality in relation to six topics: indoor air quality, anti-idling programming, radon, lawn and garden equipment, wood smoke, and the use of electric vehicles. This forum was designed to allow a diverse cross-section of the public to discuss those strategies, think about how they might impact their own lives, identify potential obstacles to implementation, and prioritize where the city should focus their energy and resources.
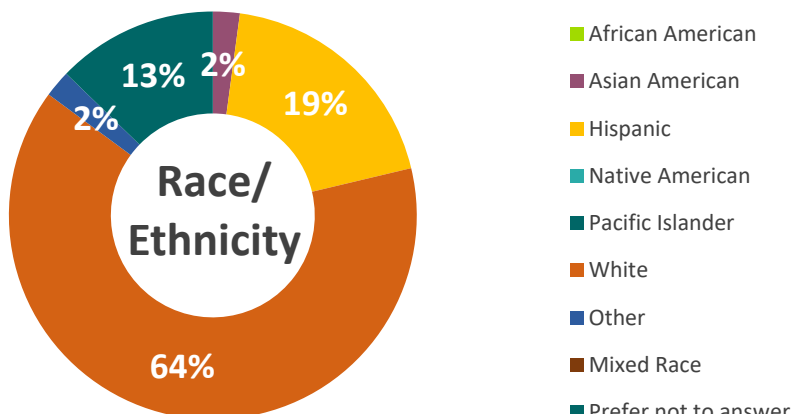


### Outcomes

- Opportunity for city residents to weigh in on specific policy proposals related to air quality
- Prioritization of which factors the city should address in relation to air quality
- Ranked list of the biggest obstacles participants foresee in relation to behavioral change for each factor
- Participant-generated solutions to overcome biggest obstacles

## Who was in the room?

Participants were recruited through targeted, network outreach to community partners and social media posts. Participants were incentivized to participate with a $30 grocery card and dinner and were informed that Spanish-language interpretation and translation would be available. In addition, a parallel process for young people was conducted. Ultimately, 59 residents attended the forum as well as nine children ranging in ages from two to twelve.

Efforts were made to recruit participants from communities of color and with income levels below the city average as these communities are most likely to live near and face the consequences of poor air quality. Of the 41 participants who provided information about their racial or ethnic background, 30 participants identified as white (64%), nine as Hispanic (29%), and two as other races.



Race/Ethnicity

- 64% White
- 19% Hispanic
- 2% Other
- 2% Asian American
- 13% Pacific Islander

Legend:
- African American
- Asian American
- Hispanic
- Native American
- Pacific Islander
- White
- Other
- Mixed Race
- Prefer not to answer

Of the 45 who provided information about their level of education, 28 had a Bachelor's degree or higher (59%), six had attended some college or had an Associate's degree (13%), five were a high school graduate (11%), and three had not graduated from high school (6%). Participants ranged in age from 18-79, with a mean age of 46. Fifty-seven percent of respondents identified as women, 28% identified as men, and 4% identified as a gender other than man or woman with the remaining participants choosing not to provide this information.
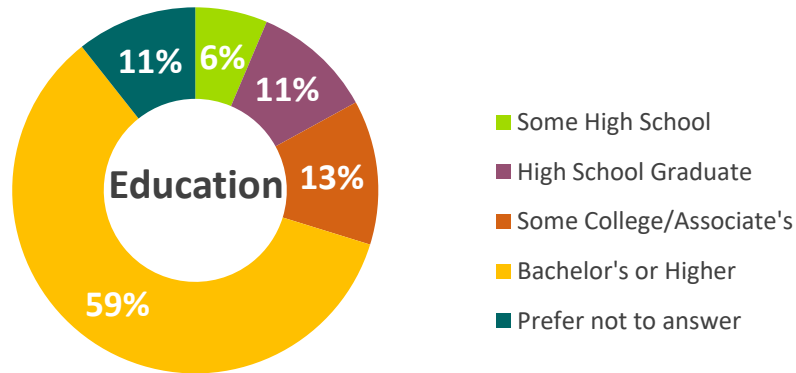


## What did the event look like?

The event took place at the Northside Aztlan Community Center on March 6, 2019 between 5:30-8:00pm. At the beginning of the forum, officials from the Center for Public Deliberation and the City of Fort Collins provided an informational presentation about the goal of the forum and air quality issues and efforts in Fort Collins. After presentations, participants could choose which of six topics they wanted to discuss: Indoor Air Quality, Car Idling, Radon, Lawn & Garden Equipment, Wood Smoke, or Electric Vehicles. At the beginning of their table discussions, participants were provided additional information about the topic that included strategies that they might take to improve air quality. They then engaged in 40 minutes of facilitated discussion about the benefits of implementing those strategies, the obstacles they and others might face in enacting them, and solutions that might help residents overcome those obstacles. During conversations, participants generated and voted on a list of obstacles they thought were most important for the city to address in relation to their topic. After the first round of discussions, participants selected a new topic to discuss for the second round of conversations. After both rounds of conversations, participants used electronic voting devices to prioritize the topics the city should focus on and the obstacles they had identified to the strategies related to each topic.

Separate programming was created to invite younger participants, ages two through fourteen, to think about and discuss air quality in their community. The young people participated in facilitated group discussions and hands-on activities that introduced them to concepts surrounding clean air and pollution. Younger participants sorted and colored pictures of clean and polluted air and discussed why the picture belonged in each category. The older participants generated their own list of factors inside and outside their homes that represent clean air and pollution. Participants than reconvened as a larger group to think about why air quality matters to them. They were provided with a paper cloud on which they identified one reason that air quality mattered to them. The remainder of the event

was spent making windchimes out of recycled tin cans. After the activities, young people were invited to take their clouds and windchimes home, to encourage young people to continue thinking about issues of air quality and to potentially spur conversations with their parents who had participated at the main event.

## Agenda

| Time | Section | Purpose |
|---|---|---|
| 6:00 – 6:25pm | Welcome Plenary: Introduction and Informational Presentations | Participants welcomed. Presentations about the purpose of the event, air quality, the night's agenda, and rules for discussion. |
| 6:25 – 7:00pm | Small-Group Discussions: Round 1 | Participants selected tables based on which topic they most wanted to discuss. During facilitated conversations, participants discussed the benefits and obstacles of strategies related to their chosen topic. Participants generated and voted on a list of obstacles related to those strategies and brainstormed potential solutions to the obstacles voted most important by the group. |
| 7:00 – 7:30pm | Small-Group Discussions: Round 2 | Participants chose a new table and topic and followed the same process as above. |
| 7:30 – 8:00pm | Closing Plenary: Voting & Debrief | Participants prioritized which topics the city should most focus on addressing and voted on the most important obstacles to address in relation to each strategy. They completed call to action postcards and closing surveys. |

## What information was collected?

### Table Notes.

The CPD assigned a trained student facilitator and notetaker to each table. Notetakers summarized each speaking turn for both facilitators and participants. These notes are not a transcript and do not reflect the conversation exactly as spoken. Notetakers do attempt, however, to capture the main ideas of each statement and record stories, opinions, and input provided by participants. Notetakers do not capture any personal identifiers.

### Recordings.

Conversations at each table were audio recorded. Recordings began after participants had introduced themselves. Because conversations may still contain identifying information, however, these recordings are only made accessible to university researchers with permission from the university's Institutional Review Board. When notetakers are not available for the event, these recordings are used after the event to create table notes.

## Electronic Voting.

Each participant was provided a voting keypad. Keypads allow participants to enter an anonymous response to a survey question. Responses can then be displayed in real time. This event asked participants to prioritize which of the factors were most important for city officials to address and obstacles related to each action item. By displaying the responses to these questions, attendees were able to get a sense of how other participants in the room understood this issue.

## Easel Notes.

The list of obstacles for each strategy and the solutions related to overcoming those obstacles generated at the individual tables were recorded on easels. After the forum, pictures of all easel notes were taken and uploaded to maintain a complete list of all obstacles and solutions as well as a record of how participants prioritized the obstacles during dot voting.

## Post-forum Surveys.

At the conclusion of the event, post-forum surveys were distributed to each participant. The post-survey collected information related to participant satisfaction with the forum, their feelings about its impact on their knowledge and understanding of the issue, and their sense of inclusion in the discussion.

# KEY FINDINGS

## Voting Results

At the end of the forum, participants were asked to prioritize the six factors developed by the city. Each participant was directed to select their top three choices in order of importance for the city to prioritize. The results are provided below, with Electric Vehicle Readiness receiving the most votes and Lawn and Garden Equipment receiving the least votes.

### What factors should the city prioritize?

1. Electric Vehicle Readiness (31%)
2. Anti-Idling Programs (24%)
3. Indoor Air Quality (22%)
4. Radon Mitigation & Wood Smoke (10% each)
6. Lawn and Garden Equipment (2%)

In addition to prioritizing the topics, participants were asked to vote on a list of obstacles for each topic. During their discussions, participants were asked to identify the biggest obstacles they and others might face if they tried to implement behavioral change in relation to each topic. These obstacles were used to develop a list of potential obstacles related to each factor. At the end of the forum, participants voted on which obstacles posed the biggest barriers to implementing change in relation to each topic. Results on these votes are provided below.

## Electric Vehicles
1. Cost of electric vehicles (41%)
2. Access to public charging stations (14%)
2. Lack of knowledge about electric vehicles (14%)
4. Lack of awareness about incentives (8%)
4. Lack of variety of electric vehicles (8%)
4. Range of electric vehicles (8%)
4. Political will for incentives or tax rebates (8%)
8. Home infrastructure (no votes but identified in discussion)

## Car Idling
1. Education (such as signs)/Lack of bilingual information (28%)
2. Cultural mindset (19%)
2. Lack of awareness campaigns (19%)
4. Convenience (15%)
4. Weather (15%)
6. Cost (4%)

### Indoor Air Quality
1. Awareness of the problem (53%)
2. Knowledge about available resources or potential action steps (30%)
3. Unclear labeling for "safe" v. "unsafe" products (11%)
4. Awareness of the impact of solutions (4%)
5. Cost of non-toxic products (1%)
6. Difficulty of making DIY cleaning supplies (no votes but identified during discussion)

### Wood Smoke
1. Enforcement issues/Hard to regulate (42%)
2. Neighborhood or cultural dynamics (24%)
3. Educational outreach (16%)
4. Defining "good" v. "bad" smoke (14%)
5. Building community support (4%)

### Radon
1. Lack of education about risks or access to health-related information (38%)
2. No required disclosure of radon levels (24%)
3. Lack of awareness (14%)
4. Costs (10%)
5. Landlord control (8%)
6. Lack of places to get information (6%)

### Lawn & Garden Equipment
1. Commercial landscapers and lawncare (31%)
2. Lack of education (20%)
3. Resistance to change (14%)
4. Unsustainable growth (12%)
4. Logistics of recycling and upgrading lawnmowers (12%)
6. Cost (6%)
7. Homeowner associations (4%)

## Discussion & Worksheet Themes

During table discussions, participants were asked to identify the biggest benefits they thought they and others might derive from implementing each option as well as the biggest obstacles they or others might face in implementing the proposed strategies. Finally, participants were asked to brainstorm potential solutions to the obstacles they identified as most pressing. In addition to these conversations, participants were provided with a worksheet on which they could record their thoughts about benefits, obstacles, and solutions related to the strategy under discussion. Key themes from the benefits, obstacles, and solutions segments of the discussions and worksheets are provided below, divided by topic.

### Benefits

Because the benefits of improving air quality identified by participants were largely the same across topics, the key benefits to improving air quality are summarized here rather than under

each topic heading. The most frequently mentioned benefits related to health, the environment, and public awareness as well as reduced costs associated with these changes.

Participants often noted that making these behavioral changes could improve their own health and the health of the wider population. Participants saw improvements to air quality as particularly beneficial to the elderly and children as well as to low-income households and those with respiratory problems or other illnesses resulting from or exacerbated by poor air quality. Similarly, participants often noted that these behavioral changes would lead to better environmental quality. Aside from improved health, residents saw reduction in pollution levels and progress towards the city's climate goals as potential benefits.

Participants also suggested that actions taken by individuals, organizations, or government would lead to increased awareness both about the factors that contribute to poor air quality and what residents might do to improve air quality.  Participants argued that increased education would lead to more effective implementation of behavioral changes by residents and cultural change that would encourage environmentally friendly practices and discourage practices that lead to poor air quality.

Finally, participants saw the potential for change to lead to greater affordability. Participants suggested that undertaking some of these actions on a wide scale may lead to more incentive and rebate programs down the road. Similarly, they suggested that as more people adopted environmentally friendly products, such as natural cleaning supplies, electric-powered lawn equipment, and electric vehicles, the availability of these products would likely increase, and costs would subsequently decrease.

Below, we discuss the obstacles and solutions that participants generated in relation to each topic.

## Electric Vehicles

### Obstacles

Participants frequently mentioned cost as one of the primary barriers to switching to electric vehicles (EVs). They worried about the initial cost of the car as well as costs related to charging and maintaining electric vehicles. Other participants worried about resale value of EVs. In line with this, participants frequently mentioned a lack of awareness about either the existence of incentive programs or how they functioned in practice. During these conversations, participants frequently indicated that tax rebate programs were confusing and that it prevented them from understanding how much the purchase would ultimately cost. Similarly, they suggested that many people lacked the resources to hire an accountant to help them understand these issues or how to best maximize rebates. Finally, some suggested that they were unwilling to trade in functioning gas-powered vehicles to purchase new electric ones.

Access to charging stations was also frequently mentioned as a barrier to implementation. Participants were unsure where charging stations in the city were located and said that they would need information about the location of charging stations state-wide and nationally. Some participants also indicated that home charging may be a problem, particularly for renters or those without a garage, and that not enough new developments were planning for home-charging

needs. In line with this, some participants had what they identified as "range anxiety." Though participants acknowledged that most trips were well within the range of current EVs, they worried about longer drives or commutes, such as commuting to and from Denver for work.

Participants also expressed concern about the potential environmental impacts of EVs. They questioned whether in-home or public charging stations that relied on fossil fuels for energy would truly offset the environmental benefits of switching to EVs. Some participants were also concerned about the environmental impact of EV production, particularly the sustainability of sourcing and manufacturing batteries.

Finally, participants saw culture as a barrier to adoption, noting that some community members would still want big or powerful vehicles, like trucks, even if they did not have a need for the engine power or hauling capacity. Similarly, participants at times saw the media as a potential barrier, with one table talking extensively about how stories about exploding batteries discouraged the public from seeing EVs as a viable option.

## Solutions

Participants saw access to information as a potential solution to some of the concerns mentioned above. They requested more information about existent incentive programs and resources to help them interpret and calculate actual costs and that this information should be available in Spanish. Participants also suggested the city or other organizations could provide a regularly updated list about the types and ranges of currently available EVs and the location of charging stations. They also suggested better signage about the location of existent charging stations. Finally, participants at times suggested a need for information about how to understand maintenance needs and costs of EV ownership. Some suggested that a panel of current EV owners may help demystify questions regarding EVs and said that the city should better publicize its own switch to EVs to serve as an example for the wider community.

Participants also said that the city, apartment complexes, and businesses should install more charging stations. They suggested that businesses with multiple locations could install charging stations or that shopping centers or more public parking spaces be equipped with charging stations. One table suggested a program similar to the ones utilized by vacation rentals that would allow people to rent out their home charging stations to others.

Some participants identified other things the city might do, including incentives for businesses to buy EVs or fees for high emission vehicles that could be used to offset incentive programs or changes to transportation infrastructure. Participants, however, often saw the need to look towards larger-scale solutions, like working with state and national legislatures to change regulations related to emissions and EVs. Others suggested that the city should focus on a switch toward renewable energy production, such as solar or wind, to offset the energy used by EVs, or prioritize alternative modes of transportation that would reduce the number of cars on the road. The Spanish-language table was particularly interested in increased accessibility and safety on bike paths and public transportation.

## Car Idling

### Obstacles

Weather was one of the most frequent obstacles that participants identified during discussions as a reason that they or others might continue to idle. Participants were primarily concerned with this in relation to cold weather, noting that they turned on their cars to deice their windows or warm up the interior. A few, however, noted the need to cool down their cars in hot weather.

Participants often identified particular sites in which they idled as an obstacle to curbing their idling habits, namely drive throughs, schools, and trains. Some participants indicated they idled in these places due to lack of awareness, while others noted convenience or weather-related issues as the reasons they tended to idle in those locations. Other locations that participants identified as potential obstacles were stop lights and when searching for parking.

Some participants noted that a lack of awareness was one of the biggest obstacles to changing these habits, indicating that many residents may not understand the impact that idling can have on air quality or how changes to their transportation habits could improve it.

### Solutions

Participants came up with a number of solutions to discourage idling. One of the most frequent recommendations was an increase in signage and public awareness campaigns. Participants wanted signage in locations in which they were the most likely to idle, such as schools, drive throughs, and at train crossings. In addition, some participants mentioned public campaigns that would bring awareness to the consequences of idling. Finally, some participants recommended automated signage that could provide public indicators of air quality or track progress toward air quality targets.

Participants also identified changes to transportation systems as potential solutions. In particular, participants suggested improving the timing of lights or utilizing new technologies to better control the flow of traffic, replacing traditional intersections with traffic circles, or encouraging participants to adopt alternative transportation habits, such as carpooling, biking, or walking.

Some participants noted that newer cars automatically turn off the engine when stopped and suggested promoting or incentivizing these technologies. Finally, participants identified potential strategies businesses could utilize to discourage idling. These included changing drive-through policies, such as encouraging waiters to come to the car to take orders or moving to online ordering.

## Indoor Air Quality

### Obstacles

Education was frequently discussed as an obstacle for improving indoor air quality. Participants suggested that residents might not be aware of the importance of indoor air quality to health and the environment or aware of the factors that contribute to poor indoor air quality. Specifically, people frequently mentioned a lack of understanding about how products like cleaning supplies or perfumes may contribute to reduced air quality. Participants were particularly concerned about the effects of perfume or scented products in public places, with several participants mentioning these as asthma irritants but noting that few people understood how these products could negatively impact others.

Some participants also said that they or others might not know how to best implement strategies such as changes to their HVAC use or use of humidifiers. Participants were also skeptical of the impact of implementing some of these changes and of the effectiveness of environmentally friendly or homemade cleaning products.

Convenience was also an obstacle for some participants. Several participants said that taking their shoes off indoors or asking others to do so was inconvenient. Others mentioned inconveniences related to making homemade cleaning products or resealing purchased products, changing and recycling air filters, or opening windows in inclement weather.

Some participants raised accessibility as a potential obstacle, particularly for the elderly or for children, who may have trouble implementing strategies such as taking their shoes off indoors or implementing other strategies related to improving indoor air quality.

Finally, though cost was not thoroughly discussed during the table conversations, it was frequently raised as a potential obstacle on the worksheets, where participants said that they were less likely to implement strategies that had higher costs, such as making home improvements or purchasing environmentally friendly cleaning products.

### Solutions

Some participants thought that changing out household cleaning products would be the easiest strategy to implement to improve indoor air quality and others identified cost-free options, like removing shoes indoors, cleaning air filters, and opening windows as the easiest potential strategies.

Participants identified businesses as key to improving indoor air quality and raised ideas such as requiring fragrance-free policies in businesses and requiring more information about the potential impacts of household products.

Many participants said that the city could do more to raise awareness about problems related to indoor air quality, including public information campaigns, better information about how to access city resources like free home inspections, or utilizing utilities to monitor and report on indoor air quality.

## Radon

### Obstacles

The most frequently mentioned obstacles regarding radon mitigation related to awareness and education. Participants suggested that they and others may not know what radon is, what its potential effects are, and what can be done about it. Participants frequently discussed a lack of knowledge related to the potential health consequences of radon, including how serious the potential health effects are, what level of exposure is too much – both in terms of radon levels and length of time, and how credible the information regarding the potential effects of radon is. Participants also said that it was important for people to know that Colorado and Fort Collins are uniquely at risk for radon exposure. In addition, participants had a number of questions about how radon could be mitigated, such as how tests were conducted, where they could acquire test kits, and how long the results remain valid.

Another primary concern related to cost, both in relation to installing radon mitigation systems and in running those systems once they had been installed. Aside from being able to afford mitigation systems, participants said that it was difficult to find accurate information about how much installing and running mitigation systems costs, particularly for different types of installation requirements (i.e. installation fees for finished v. unfinished basements).

Participants also suggested that those who lived in rental properties often did not have information about existent radon levels or any opportunities or incentives to provide mitigation. Participants noted that this might be particularly problematic for basement rentals, which may have higher levels of radon than other types of rental properties.

Finally, some participants discussed larger obstacles related to the lack of regulations around the oil and gas industry and fracking in particular. Participants said that drilling could create radon problems but that the city had little control about regulating those industries to prevent contamination.

### Solutions

As noted above, awareness was frequently mentioned as an obstacle for mitigating elevated radon levels, and participants suggested that both the city and the scientific community do more to communicate information about radon. Participants requested information from reliable sources about what radon is and what its potential health effects are, saying that this information tends to be most readily available from those who offer radon testing or mitigation systems and thus not as credible as information provided by government sources. Participants also requested

that this information be made available in Spanish and that the city engage in outreach regarding this topic to the Spanish-speaking community.

Participants frequently suggested increased testing or regulation as a potential solution. Some participants advocated for mandatory testing at the point of sale while others suggested requiring regular testing, such as every few years, for homeowners and landlords. Others said that landlords should be required to provide information about radon levels to potential and current renters. Finally, some suggested that the city should offer more free test kits or make them more widely available by offering them at multiple locations. Similarly, participants often identified incentive programs to mitigate the cost of testing for homeowners, landlords, and renters as a potential solution. Finally, some participants said that the city should advocate for changes to state laws that would require increased regulation of and treatment for elevated radon levels.

## Wood Smoke

### Obstacles

One of the primary reasons participants said that they or others would be reluctant to reduce wood smoke related to culture. For many participants, backyard woodfires represent an important element of culture and socializing in Northern Colorado and a representation of their connection to the outdoors. Some participants did not see gas fire pits as a viable alternative because of the cost required to install them and an inability for renters to replace inexpensive wood pits with gas ones.

Participants also had questions about the actual impact of wood smoke and the unintended consequences that might arise from a switch to gas. They raised questions including what distance from wood fire pits or smokers would be considered safe, how much inhalation was harmful, and what are the potential health consequences of inhalation. Questions about health consequences included the impact for those with respiratory issues, as well as how it might impact the wider public and what health consequences may occur in addition to respiratory problems. Others wondered how a switch from wood to gas would result in other types of resource use. Some participants mentioned heating their houses with wood stoves, particularly in the foothills and mountains, and were unsure whether a switch to gas or coal power could actually contribute to decreased air quality. Others suggested that similar switches to gas firepits and fireplaces might encourage an increase in fracking, and thus result in additional environmental harms.

Finally, participants worried about the viability of asking their neighbors to stop burning wood in their backyards. Participants mentioned neighbors being unresponsive to such requests and told stories of neighbors threatening violence when such requests had been made. Others said they were simply uncomfortable making these requests due to fear about how their neighbors might respond.

### Solutions

Most of the primary solutions generated by participants related to increasing education and awareness about the impact of wood burning. As with other topics, participants suggested installing public air quality monitors that would help alert the public to the larger problem. Others suggested informing the public about the accessibility of air quality information via mobile weather

apps. Participants also mentioned in-school education systems that would encourage children to talk with their families about the consequences of wood burning. Participant also suggested encouraging cultural changes or thinking about the problem from a neighborhood perspective. Participants said the city should educate residents about how best to talk to their neighbors or incentivize neighborhoods to host alternative gatherings to help build relationships that would allow them to feel comfortable having those conversations.

Finally, participants suggested particular policies that the city might implement, including incentive programs to help people make the switch from wood-burning to gas fire pits or requiring residents to register backyard fires, similar to the ways that parties are registered with the city. Participants also suggested that these registrations could be made public so that residents could be notified when a neighbor was planning on burning wood.

## Lawn & Garden Equipment
### Obstacles
One of the obstacles frequently discussed was the rapid pace of population growth and subsequent development in Fort Collins. Participants saw this as an obstacle for reducing reliance on gas-powered lawn equipment if the sustainability of landscape maintenance was not considered in development design. Along these lines, participants often identified obstacles related to membership in Homeowners Associations (HOA). Participants mentioned that some HOAs do not allow homeowners to reallot resource-intensive landscaping, such as grass lawns, with other types of landscaping, such as xeriscapes.

Cost was another obstacle that came up both in conversations and on participant worksheets. Participants suggested that purchasing electric equipment was more expensive. Additionally, participants discussed problems related to recycling gas-powered equipment. Some participants said that they did not know about recycling programs or that participating in them may be difficult for those who have trouble transporting old equipment, either due to ability or lack of access to a sufficiently sized vehicle.

Participants also saw commercial landscapers as a potential obstacle. They noted that commercial landscapers are likely responsible for a significant component of the pollution produced by gas-powered lawn equipment and that they lacked an incentive to switch to electric equipment.

Finally, participants saw awareness and culture as potential barriers to implementation. Some participants said they themselves were unaware of the impact that lawn equipment had on the environment and that there was a need to ensure that residents understood the issue pertains to not just lawn mowers but to other types of equipment such as snow and leaf blowers. Others noted that community members may value their lawns and landscapes for aesthetic or status reasons and that encouraging a switch required redefining what landscaping should look like.

### Solutions
Participants frequently discussed regulations as potential solutions to the obstacles discussed above. In particular, participants suggested that the city should intervene when HOAs prevented residents from adopting sustainable landscaping practices and that they should develop stricter regulations about new developments. Others said the city might regulate the types of plants that

residents could utilize in their landscaping, such as banning or promoting certain types of trees are a certain percentage of grass within one's landscape. Similarly, some participants suggested the need to increase enforcement of the Climate Action Plan writ large and argued that enforcement would provide a greater incentive than awareness campaigns and incentive programs.

Participants also frequently mentioned pooling resources as a potential solution. Some participants discussed incentivizing neighbors to purchase and share electric lawn equipment or that the city create lending programs for electric lawn equipment. Others said the city should provide incentives for commercial landscapers to switch to electric equipment or that recycling and rebate programs be expanded, including a larger number of drop off sites or a city service that would come to your house to collect old equipment for recycling.

Finally, participants suggested greater partnerships as the key to increasing education and awareness. Participants mentioned a number of currently existent resources, such as CSU extension and the Gardens on Spring Creek, as potential partners who could help to provide information about which plants are most sustainable and how resource-intensive landscaping impacts the environment.

# EVALUATION

## Post-Forum Survey

At the end of the event, participants were asked to complete surveys rating the quality of the process and its impact on how they understood issues related to air quality. 51 participants completed the post-forum survey. Their responses are summarized below.

## Overall Satisfaction

Participants were asked to rate their overall satisfaction with the event ranging on a scale from very dissatisfied to very satisfied. The large majority of participants responded that they felt satisfied or very satisfied. Four participants stated they were neutral and three were very dissatisfied with the event overall.

### Overall Satisfaction
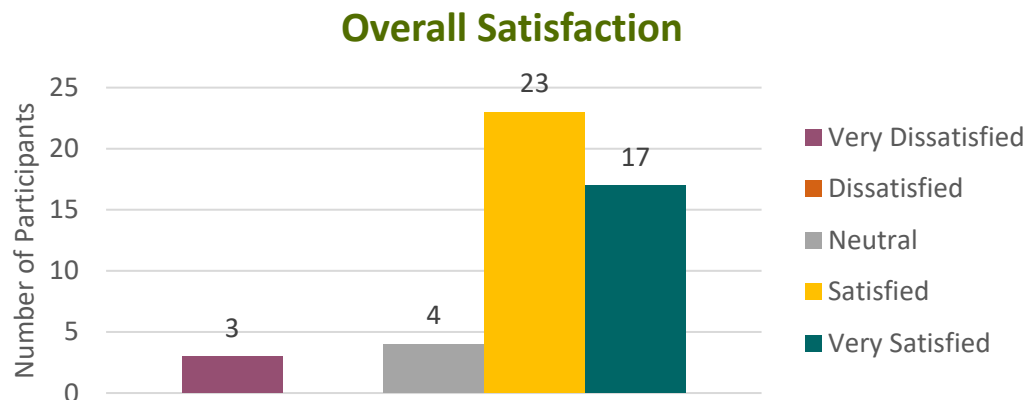


## Issue Learning and Opinion Change

Participants were asked to whether they had learned enough about air quality to have an informed opinion about the issue. The majority of respondents (40) said that they had probably or definitely learned enough, though three respondents were unsure and three said that they probably had not learned enough information about air quality to produce an informed opinion.

### Did you learn enough?
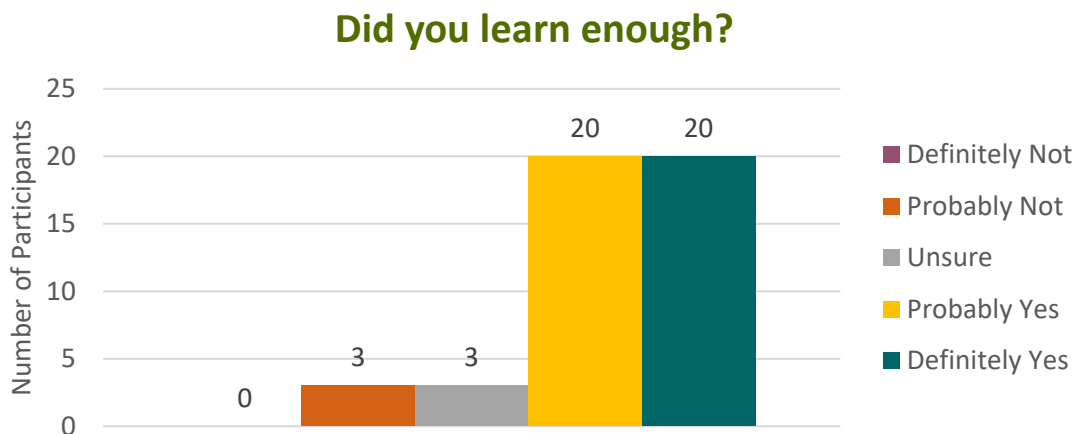
Participants were also asked if their opinion about the topic had changed as a result of their discussions during the forum. These responses ranged from "My views are entirely the same as before" to "My views changed completely." Almost all participants reported some level of opinion change, with only seven participants saying that their views remained entirely unchanged. Twenty-six respondents reported a low or moderate level of opinion change with 14 reporting a great deal or complete opinion change. Together with the information about participant learning, this question indicates that the large majority of participants learned new information at the forum and changed their opinions about air quality as a result.

## Opinion Change
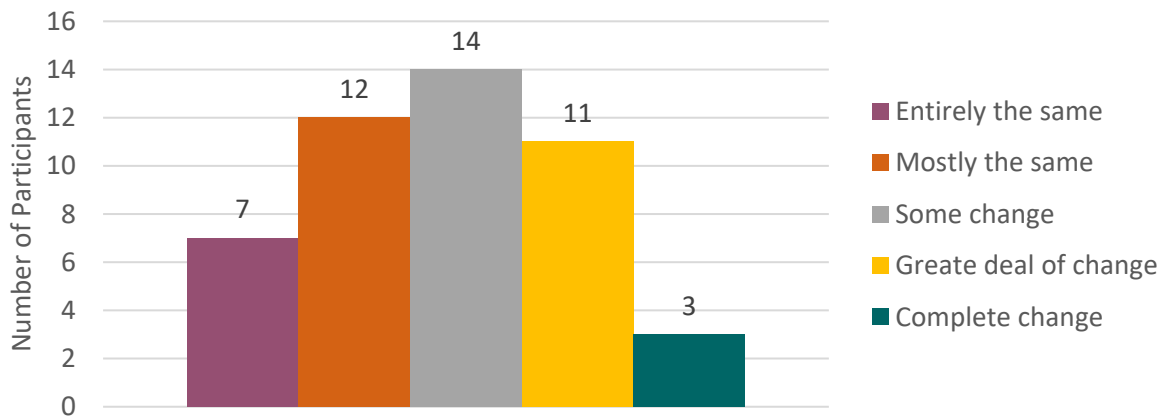


## Motivation to Take Action

Participants were additionally asked whether they were "more or less motivated to act" as a result of their discussions during the forum. This question was measured on a scale from "much less motivated to act than before" to "much more motivated to act than before." Most respondents indicated that they felt somewhat (20) or much more motivated (18) to act as a result of participation. Only one respondent stated that they were much less motivated and eight said they felt no change in motivation.

## Are you more or less motivated to act?
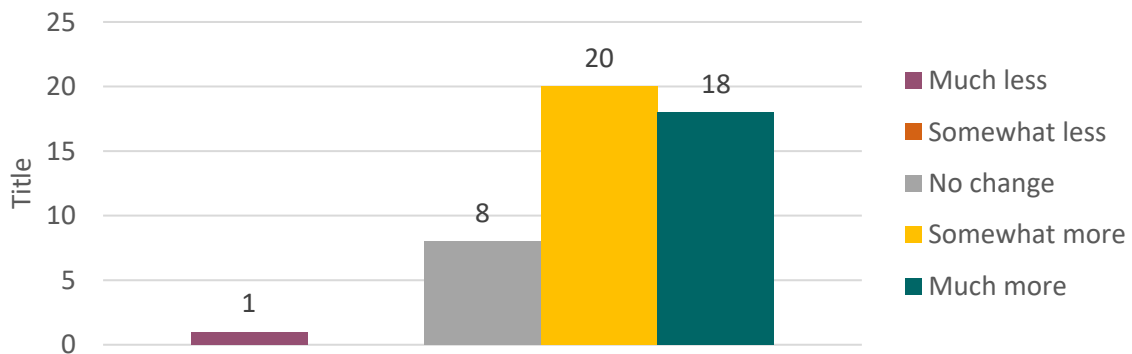
## Feelings of Inclusion in the Conversation

Finally, participants were asked a series of questions relating to their sense of inclusion in the conversation. Specifically, participants were asked how often they carefully considered views different than their own, felt respected by other participants, had trouble understanding the conversation, or felt pressure to agree with others.[3] These scores were averaged to create an overall score of participants' feelings of inclusion in the conversation. Most participants reported high levels of feeling included, with all but two participants selecting responses that equated to often or almost always feeling included in the conversation.

### Did you feel included in the conversation?
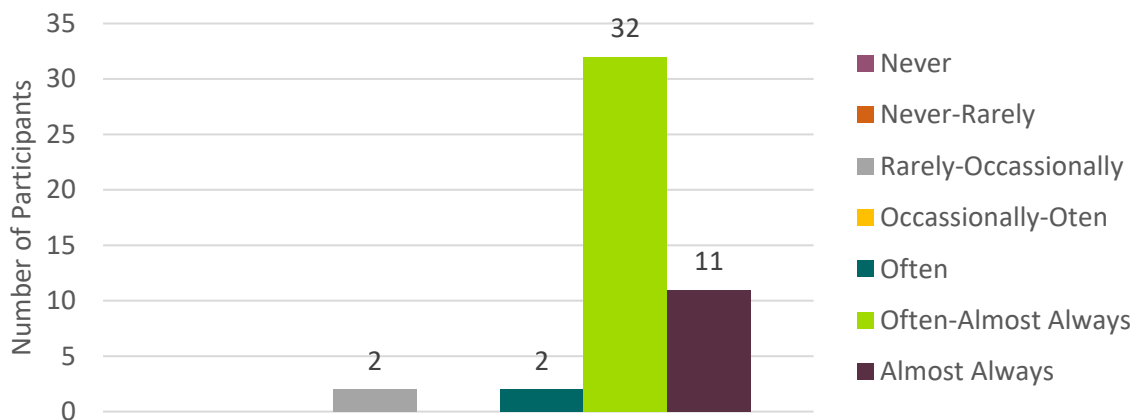


# Process Suggestions

The survey also gave participants the option of providing open-ended responses to two questions. The first asked for suggestions to improve future forums and the second allowed participants to provide any additional comments on the issue or process. Participants issue-related responses are included in the Key Findings section of this report. Here, we summarize some of their suggestions for improvement to the forum with an eye towards better meeting the needs and interests of community members at future engagement opportunities.

There were three overarching categories for improvement: (1) improvements to or increases in the materials and information provided, (2) ideas for better engaging a more diverse group of community members, and (3) logistical suggestions to make the event more beneficial for all participants.

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[3] Response options ranged from "Never" (1) to "Almost Always" (5). Negative items—feeling pressure to agree and having trouble understanding the conversation—were reverse coded to match the directionality of other scale items. These four items produced a highly reliable scale ($\alpha$ = .712, $M$ = 4.48, $SD$ = 2.15).

## Materials & Information Provided

A significant number of responses involved suggestions to improving the materials and information provided for the forum. These ranged from better explaining the information about and health impacts of each topic to providing access to additional resources after the discussion ends. Some participants suggested having take-home resources for individuals to utilize after they left the event, either providing the handouts used during the event or giving direction to online or other educational information that may not have been provided during the event. Several respondents mentioned a desire for more information about all aspects of air quality and details about what the City is currently doing to address the issue. One participant suggested a scrolling projector to look at during the forum that could provide information about current initiatives being created or implemented; another suggested links to information about action the City takes as a result of community participation.

Another theme was a desire for more engagement with forum participants and community residents about how to address air quality. One participant suggested getting community input on the topics they find most critical prior to the event so that those topics could be used for the basis of forum discussions. Others suggested looking at the bigger picture when considering solutions to these issues. In particular, participants wanted more discussion of the ways that businesses or organizations impact air quality, such as factors related to oil and gas production. This reflects findings from other forums in which participants express a desire to think about not only their individual impact but how the city might regulate or incentivize large-scale changes to how businesses, organizations, or the city operate.

## Who to Engage?

There were several suggestions from participants about how to better engage with diverse community members and resources. Individuals made suggestions about better involving certain businesses and organizations in discussions about air quality, specifically the administration of the Poudre School District and local employers. These respondents were particularly interested in the involvement of these organizations in relation to indoor air quality. Others made comments about getting more people involved in the discussions by encouraging more college students to attend and attracting communities outside of the city limits. Several individuals mentioned better involving the Latinx community, potentially by conducting a forum entirely in Spanish.

## Logistics

A few participants commented on logistical aspects of the forum including the need to improve the clarity of writing, the volume-level of speakers, and discomfort in the space. Respondents mentioned that due to the small size of the room and large number of people it became hot, stuffy, and sometimes hard to hear. Several responses mentioned having difficulty hearing either in their small groups or during the larger presentations. Some suggestions included better utilizing a microphone system for large group informational presentations, including fewer groups so less people are talking at once, and relying on facilitators to encourage people to speak up.