Impact of Wildfire Smoke Events on Businesses, Non-Profits, and Public Sector Agencies in the Sacramento Region

Survey Summary

June 2021

Background & Methodology

Severe wildfires and the serious smoke impacts they bring have unfortunately become regularly occurring events, resulting in many days of poor air quality for those living in the Sacramento region. Businesses, government agencies, and other organizations can all take action to try to minimize health impacts on employees, customers, and clients from wildfire smoke events. In October 2019, the Sacramento Metropolitan Air Quality Management District (Air District) was tasked to develop a *Wildfire Smoke Air Pollution Emergency Plan* as a part of Assembly Bill 661 (McCarty). To make the plan as complete as possible, the Air District collaborated with Breathe California Sacramento Region (Breathe) and the Sacramento County Department of Public Health to gather information on the impact of wildfire smoke events experienced by local businesses. The Air District and Breathe worked with LPC Consulting Associates, Inc. (LPC) to create a survey tool to solicit information on:

1. Their experiences during previous wildfire smoke events,

2. Best practices businesses can implement on smoky days to help reduce smoke exposure for their employees and County residents, and

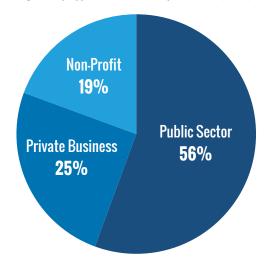3. What information is needed to help businesses respond during wildfire smoke events.

In May 2021, Breathe sent the online survey to 103 business organizations. The survey received a total of 50 responses, representing a 49 percent response rate.[1] The Air District plans to use the data gathered from the survey to help produce a useful plan that will help Sacramento County better respond during serious wildfire events. Below is a summary of key findings from the survey.

Key Findings

Respondent Characteristics

As shown in Figure 1, over half of survey respondents (56%) represented a public sector organization (including one school district), while a quarter of respondents (25%) were from a private business, and the remainder were from non-profit organizations (19%).

Figure 1 | Type of Business Represented (n=36)

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[1] Of the 50 responses, 27 responses were complete and 23 responses were partial. Data from the 23 partial responses is included in the key findings, if the question was answered.

The majority of respondents (83%) have employees that work in urban regions, while 42 percent have employees that work in suburban settings, and one quarter (25%) have employees working in rural settings. Respondents with employees working in rural regions were overwhelmingly private business respondents (56% of private business respondents), compared to only public sector agency respondents or non-profit organization respondents (15% and 14%, respectively). Over half (51%) of respondents' employees work in both indoor and outdoor settings, while 43 percent have employees working indoors only, and 29 percent have employees working in outdoor settings only. Over half of the private business respondents reported employees working mostly outdoors (56%), compared to 20 percent of public sector agency respondents or non-profit organization respondents (14%). Interestingly, 60 percent of public sector agency respondents reported that employees work both indoors and outdoors, compared to 43 percent of non-profit respondents, and 33 percent of private business respondents.[2]

Figure 2 below shows the business and industry types represented by 36 respondents, with government organizations representing the greatest number of respondents. The respondent who represented another type of business not listed reported that they are from a "property-based improvement district."
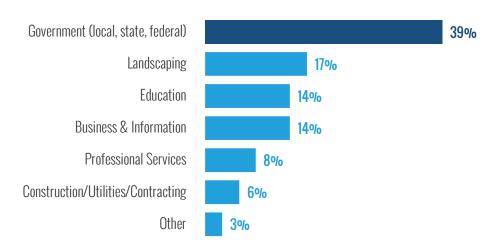
Figure 2 | Business or Industry Type Represented (n=36)

Impact of and Response to Wildfire Smoke Events

Respondents reported on their awareness of employees and clients being part of "sensitive groups," the impacts of wildfire smoke events on their business or organization, and how they have responded to previous wildfire smoke events.
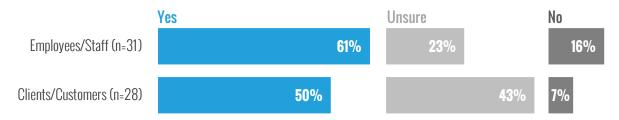
Survey respondents were asked if they were aware of any of their employees or clients that are members of "sensitive groups," which means more likely to experience severe health problems as a result of exposure to air pollution. This includes people who suffer from heart disease, pregnant individuals, those with respiratory or lung conditions, older adults, and youth. As shown in Figure 3 below, to their

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[2] Respondents could select multiple responses where employees typically work: indoors, outdoors, both indoors and outdoors.

knowledge, over three fifths of respondents (61%) employ individuals who are part of sensitive health groups, and half (50%) have clients in the same group. Respondents across all three organization types were unsure about whether some of their staff and/or clients were part of "sensitive groups," although public sector agency respondents were more likely to affirm that staff (71%) and clients (67%) were part of sensitive groups.

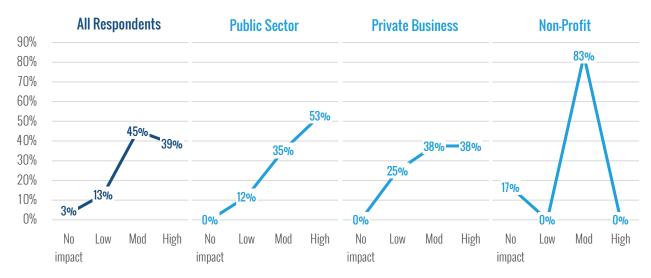**Figure 3 | Respondent Knowledge of Employee/Client Membership in "Sensitive Groups"**

To your knowledge, are any of your employees or clients members of "sensitive groups"?

When asked about the impact of recent wildfire smoke events on their organization, 39 percent reported the events had a "high impact," while 45 percent reported a moderate impact. The remaining reported low impact (13%) or no impact (3%). A greater proportion of public sector agency respondents reported a high impact (53%), compared to private business respondents (38%). No non-profit sector respondents rated the impact of recent wildfire smoke events as high impact, but the majority (83%) rated the impact as "moderate," as shown below in Figure 4.

Figure 4 | Impact of Recent Wildfire Smoke Events on Organizations

How would you rate the impact of recent wildfire smoke events on your organization?

The survey asked an open-ended question about how wildfire smoke events have impacted businesses. The evaluator coded responses into common categories, listed in the table below.

Table 1 | How Wildfire Smoke Events Impacted Business

Impact Category	# of responses
Cancel or Limit Outdoor Activity	8
Health Concerns	5
Purchase or Issue Masks and Protective Personal Equipment	3
School District Closure	3
Employee Communications	2
County Government	2
Air Quality Monitoring	1
Policy Review	1
None – Indoor Work with HVAC Filtration System	1
Perception of Region	1

Below are explanations and respondent comments for both the most common categories, and for those that are unique or potentially unclear.

Cancel or Limit Outdoor Activity & Health Concerns | The majority of impacts on businesses were due to limiting or cancelling outdoor activities, which either could not be moved indoors or had to be conducted on a much smaller scale indoors. This impact went hand-in-hand with health concerns, as some employees could not work due to health concerns. One respondent elaborated that because of the inability of some employees being unable to work "due to health problems such as heart disease and lung problems – as a small company, that puts a strain on the rest of the workers." One landscape contractor "worked through any smoke-filled days during the fires." Some purchased and distributed protective personal equipment (PPE), such as masks to employees. However, while having PPE was a good step, these did not eliminate concerns about employee respiratory health.

School District Closure | In addition to limiting recess and outdoor activity, some school districts had to close altogether, which leads to an unfortunate ripple effect. While they did not offer details on this ripple effect, they were most likely referring to after-school and supportive services, such as food and nutrition programs, parent programs, or after-school services. The wildfire smoke events had a "significant impact to our service and the supports we provide in our communities."

County Government| Two respondents stated that they were impacted as a local government entity, and had to respond to the impact of wildfire smoke event on the community. However, these respondents did not offer further detail about how their organizations were impacted.

Perception of Region | Lastly, one survey respondent explained "wildfire smoke harms perception of the region more than anything in my line of work." While they did not specify their line of work, this respondent may be in travel and hospitality, marketing, real estate, or another type of business that is heavily impacted by others' perception of the Sacramento region.

Respondents also reported how they responded during previous wildfire smoke events, selecting all actions that applied from a multiple-choice list. Figure 5 below displays actions respondents took in reacting to wildfire smoke events. One respondent who marked "other" sent outdoor workers home with pay in cases where the air quality was unsafe, and their building management also implemented new filtration systems for indoor tenants. Another respondent that marked "other" stated that their standard operations stayed the same because all of their employees were working from home due to COVID.
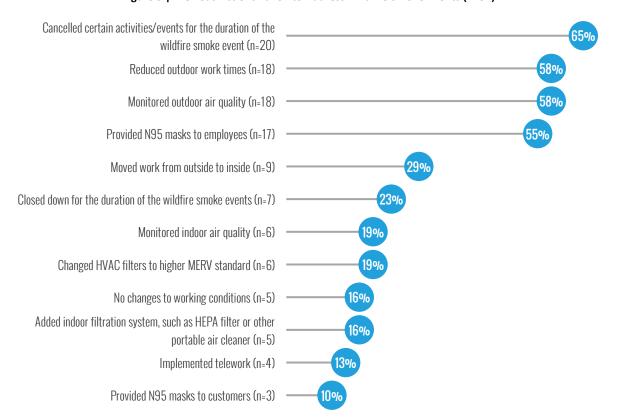
Figure 5 | Previous Actions Taken to Address Wildfire Smoke Events (n=31)

Action	Percentage
Cancelled certain activities/events for the duration of the wildfire smoke event (n=20)	65%
Reduced outdoor work times (n=18)	58%
Monitored outdoor air quality (n=18)	58%
Provided N95 masks to employees (n=17)	55%
Moved work from outside to inside (n=9)	29%
Closed down for the duration of the wildfire smoke events (n=7)	23%
Monitored indoor air quality (n=6)	19%
Changed HVAC filters to higher MERV standard (n=6)	19%
No changes to working conditions (n=5)	16%
Added indoor filtration system, such as HEPA filter or other portable air cleaner (n=5)	16%
Implemented telework (n=4)	13%
Provided N95 masks to customers (n=3)	10%

Organizations responded differently, depending on the type of organization (see right). The most common way private business respondents reported dealing with previous wildfire smoke events in the past was monitoring outdoor air quality (67%), more than non-profit or public sector respondents (43% and 45%, respectively). In contrast, public sector respondents (65%) most frequently reported canceling certain activities/events for the duration of the wildfire smoke event, compared to non-profit respondents (57%) or private business respondents (33%). Non-profit respondents (57%) also most reported reducing outdoor work times, compared to 50 percent of public sector agencies and 44 percent of private businesses.

Private Business | 67%
Cancelled certain activities/events for the duration of the wildfire smoke event

Public Sector | 65%
Cancelled certain activities/events for the duration of the wildfire smoke event

Non-Profit | 57%
Cancelled certain activities/events for the duration of the wildfire smoke event **OR** reduced outdoor work times

Knowledge of Regulations and Resources, Potential Business Practices

Knowledge of Regulations

Respondents reported on their level of knowledge, or the knowledge of someone in their organizations, around federal, state, or local regulations surrounding employee safety during wildfire smoke events. Thirty-one (31) respondents rated their knowledge on a five-point Likert scale ranging from "no knowledge" to "expert and can explain it to others." Just over one-tenth each (13%) either have no knowledge, can understand and describe regulations, or can understand and discuss regulations, respectively. Most respondents (39%) reported they can integrate this knowledge into practice, and the remaining 13 percent reported they are an expert and can explain to others (Figure 6).

Figure 6 | Knowledge of Regulations Surrounding Employee Safety During Wildfire Smoke Events

The greatest proportion of respondents (39%) believe they can integrate knowledge of regulations surrounding employee safety during wildfire smoke events into thier practice.

No knowledge	Understand & Describe	Understand & Discuss	Can integrate into practice	Expert & can explain to others	Not sure
13%	13%	13%	39%	13%	10%

Potential Business Practices to Change or Institute

Survey respondents indicated which business practices they might be able to institute during a wildfire smoke event. The most frequent responses were providing N95 masks to employees, canceling certain activities or events, and reducing outdoor work times. Several respondents reported already taking these actions in the wildfire impact question asked earlier in the survey.

Figure 7 | Potential Business Practices to Institute (n=30) Compared to Actions Previously Taken (n=31)

Previously Taken   Potential

Practice	Previously Taken	Potential
Provide N95 masks to employees (n=22)	55%	73%
Cancel certain activities/events for the duration of the wildfire smoke event (n=21)	65%	70%
Reduce outdoor work times (n=20)	58%	67%
Monitor outdoor air quality (n=18)	58%	60%
Implement telework (n=15)	13%	50%
Monitor indoor air quality (n=15)	19%	50%
Move work from outside to inside (n=12)	29%	40%
Close down for the duration of the wildfire smoke events (n=11)	23%	37%
Add indoor filtration system, such as HEPA filter or other portable air cleaner (n=10)	16%	33%
Upgrade HVAC filters to higher MERV standard (n=9)	19%	30%
Provide N95 masks to customers (n=5)	10%	17%

While several comments referenced the cost and challenge in obtaining N95 masks, this potential response in the future was much more commonly reported (73%) than what respondents reported doing during past wildfire smoke events (55%). Again, potential business practices in response to wildfire smoke events differed between organization type. In the future, public sector respondents would be most likely to cancel certain activities/events for the duration of the wildfire smoke event (65%), compared to private business respondents (56%) or non-profit organization respondents (43%). Non-profit organizations will be most likely to provide N95 masks to employees (71%), as will private businesses (67%) and public sector agencies (55%). Private sector businesses may also continue to reduce outdoor work times (67%), as will public sector agencies (60%), compared to only 29 percent of non-profit organization respondents.

Challenges in Implementing Business Practices

Survey respondents were asked about potential challenges faced in implementing the business practices selected in the figure above. Below are some potential challenges named by survey respondents:

Potential Challenge	Respondent Description
Revenue, Productivity & Logistics	• Loss of revenue, income, or funding source. (The most frequently mentioned response) • Reduced productivity and effectiveness; reduced ability to do any outside portion of the job, or the entire job for outdoor workers such as maintenance and operations. • The ability to find an indoor space to move outdoor activities into. • Prioritizing profit: "upper management putting the safety and health of their employees over "work."
Supplies	• Acquiring N95 masks given the limited supply due to COVID.
Location/Rental Space	• Limited availability to make changes to a building and its HVAC or filtration systems because they are a renting tenant. • Potentially unsafe conditions at employee's residences: "depending on people's home environments, telework may not be as safe for air quality as coming to work, depending on the area impacted and quality of [the employee's] home HVAC [system]."
Information	• The need for a "science-based metric," and more guidance from Cal/OSHA.

Current Communication or Action Plans for Wildfire Smoke Events

Interestingly, almost half (47%) of respondents have a communication and action plan developed for wildfire smoke events. Just under one third (30%) did not know, one fifth (20%) do not have a plan, and three percent intend to develop one. Non-profit organization respondents were the most likely to affirm that they had a communication or action plan (60%), compared to public sector agency respondents (47%) or private business respondents (38%). However, this may be a function of who completed the survey. Over 41 percent of public sector agency respondents did not know if they had a plan, so agencies may have

47%

of respondents currently have a **Communication and Action Plan** for wildfire smoke events.

plans, but these respondents did not know about them. In addition to identifying a potential opportunity to support agencies to develop plans, this highlights an opening for employee education about plans that may already exist.

Survey respondents also indicated which resources they have used to obtain information during wildfire smoke events. Figure 8 below lists the sources utilized by respondents and their businesses.
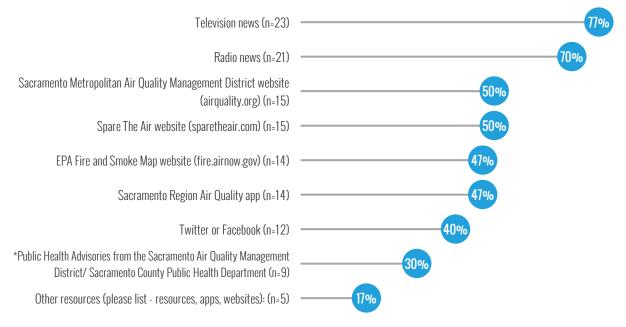
Figure 8 | Resources Used to Obtain Air Quality/Wildfire Information (n=30)

Television news (n=23) — 77%

Radio news (n=21) — 70%

Sacramento Metropolitan Air Quality Management District website (airquality.org) (n=15) — 50%

Spare The Air website (sparetheair.com) (n=15) — 50%

EPA Fire and Smoke Map website (fire.airnow.gov) (n=14) — 47%

Sacramento Region Air Quality app (n=14) — 47%

Twitter or Facebook (n=12) — 40%

*Public Health Advisories from the Sacramento Air Quality Management District/ Sacramento County Public Health Department (n=9) — 30%

Other resources (please list - resources, apps, websites): (n=5) — 17%

*usually through social media outlets

Three-quarters of public sector agency respondents (75%) reported using the Sacramento Metropolitan Air Quality Management District website (airquality.org), compared to non-profit respondents (57%) or private business respondents (44%). Non-profit organization respondents also reported using the Spare the Air website (sparetheair.com), as did a fair number of public sector agency respondents (65%) and private business respondents (44%). Overall, private business respondents were fairly evenly split between television and radio news, as well as city, county, and EPA websites. Only 22 percent of private business respondents reported referring to Public Health Advisories from the Sacramento Air Quality Management District/Sacramento County Public Health Department, usually through social media or other media outlets, compared to 43 percent of non-profit organization respondents or 50 percent of public sector agency respondents. Other resources listed include the Apple Weather App, which includes AQI, Weather Underground, other news websites, and Purpleair.com.

Recommended Actions Chart

Of 28 respondents, three quarters (75%) believe the Recommended Actions Chart will be helpful to them during a future wildfire smoke event, and 7 percent do not believe it will be helpful to them. The only respondents who believed the Recommended Action Chart would not be helpful represented public sector agencies, which may have their internal own guidance or requirements. Approximately 18 percent of all respondents believe the Chart could be helpful with some modifications. Those that recommended modifications suggested:

75%

of respondents believe the Recommended Actions Chart **will be helpful** to them.

Suggested Modifications to the Recommended Actions Chart

- Identifying controls for ozone versus particulate matter.
- Add in when it is recommended for sensitive groups to wear N95 masks, as well as all employees regardless of health status.
- Addressing commuting and work-related travel in transportation modes outside the car, such as walking or biking.

Potential Challenges to Utilizing or Following Chart

The survey asked respondents about potential challenges or barriers to adhering to recommendations listed in the Chart. Eighteen (18) respondents reported potential challenges, including the following:

Potential Challenge	Respondent Description
Additional Information	- Conducting emergency work with an AQI over 301. - Controls for ozone: "not many and far more poor ozone days than wildfire smoke [days]." - The need to monitor indoor air quality, or the inability to control indoor air quality because the landlord manages the HVAC system. - Consideration and information for cities outside of Sacramento: "This does not incorporate actions from any of the other cities aside from City of Sacramento. Businesses outside this jurisdictional boundary may believe actions do not pertain to them. The City of Sacramento should be responsible for customizing messaging within their jurisdictional boundary." - Specify timing of action implementation: "The chart does not indicate a duration of level needed before implementing actions. Are the values present for at least 1 hour, 12 hours, days? Or does reaching that level trigger the response - this element is unclear." - Specify definition of clean indoor air and "clean workspace": "Define clean air workspace when AQI levels in the valley are 250 and above for days on end."

Potential Challenge	Respondent Description
Productivity, Employees & Customers	• Employee acceptance/adherence, overall organization acceptance and monitoring, especially in organizations with multiple crews and departments spread out around the region. • Customer expectations for performance and execution, or "angry customers because we need to close down for the day, because we can't use led [sic] (leaf) blowers." • Protecting and reassuring staff: "Getting staff to work when minimal air quality is at level 2." • More information and consideration about the ripple effect of school closures: "public schools have multiple constituents who have varying needs for our open services [that we need] to be mindful about." • Having sufficient supply of N95 masks for all employees, and some N95 masks to not properly fit employees.

Additional Suggestions to Help Improve the Recommended Actions Chart
- More specified geographic information: "Does the recommended action apply to the entire county each time? Could there be pockets?"
- Make the ozone information its own chart and recommendations.
  - Another respondent echoed the same recommendation, but for different reasons: "Three different readings at the bottom are challenging for a lay person to follow. The average employee or business owner does not understand the differences, so a single metric would be easier to follow since that is what the media reports."
- Bring in Cal/OSHA review the chart.
- One respondent questioned whether indoor air monitoring is needed at the AQI 151-200 level and suggested switching this to 201 and above.

Additional Tools or Guidance Needed
Survey respondents listed additional tools or guidance that would be useful to their organization during a wildfire smoke event. One respondent reported that they have already shared additional needs "in meetings we attended." Additional tools that would be useful included:

Additional Tools/Guidance Needed to Support Organizations
- Flame-resistant N95 face coverings.
- An app that offers push notifications and alerts.
- Additional general guidance documents.
- Forecasting tools.
- An air quality dashboard with smoke-related information.
- Additional geographical data: "good air quality data per region so we don't have to close the entire district."

- More information for schools: "Specific guidance for students and when schools should close due to wildfire smoke."
- Additional information for those who use alternate modes of transportation: "Guidance and support to those dependent on transit, bike, and walk modes, especially to work, but in daily life, is critical for the highest levels of pollution."

Conclusion

Overall, the Impact of Wildfire Smoke Events on Businesses Survey provided valuable insight on how businesses have previously responded to wildfire smoke events, current practices and plans in place, and how businesses can utilize the Recommended Actions Chart along with other tools. The variety in respondents in the sample represent a diversity of business types with employees in multiple types of settings, and many are aware of both employees and clients who are part of sensitive health groups. Exploration of responses by business types provides multiple opportunities to prioritize specific needs among different organizations. Private businesses may have the most flexibility and resources to adjust and adapt during wildfire smoke events, though they may be less willing to cancel events or limit outdoor activity in order to maintain business operations and client relationships. For example, one private business respondent reported their challenge is "employee acceptance [and] customer expectations for performance." Although non-profit organizations may have more resource limitations to purchase equipment, they were more likely to report possibly providing N95 masks to staff rather than move operations indoors or cancel events. Finally, public sector agencies may have more jurisdictional considerations (e.g., agency adoption of the Recommended Actions Chart, procuring N95 masks for the entire workforce, inability to adjust a centralized HVAC), they may have the most flexibility to adapt by cancelling events or limiting work outdoors.

While survey respondents reported some knowledge of current regulations surrounding employee safety, less than half have communication and action plans established for wildfire smoke events. While cancelling events or restricting outdoor activities are actions taken in the past that may continue into the future, more respondents reported possibly providing N95 masks in the future. However, respondents foresee challenges in certain responses to wildfire smoke events, such as productivity leading to a decrease in revenue and client satisfaction.

Respondents also offered several suggestions to help improve the Recommended Actions Chart and make it more utilizable for businesses, including simplifying metrics, and adding more specific information for specific areas as well as school districts. Overall, a common theme was that respondents want clarity in terms of geographic coverage, duration of air quality before implementing action, and establishing one standard or source of information that everyone can refer to. The Sacramento Metropolitan Air Quality Management District can utilize this information to improve the Recommended Actions Chart and to develop guidance for businesses in the *Wildfire Smoke Air Pollution Emergency Plan.*