Launch Webinar

Challenge: Cleaner Indoor Air During Wildfires

March 4, 2021

Red Salmon Complex fire, CA, 2020

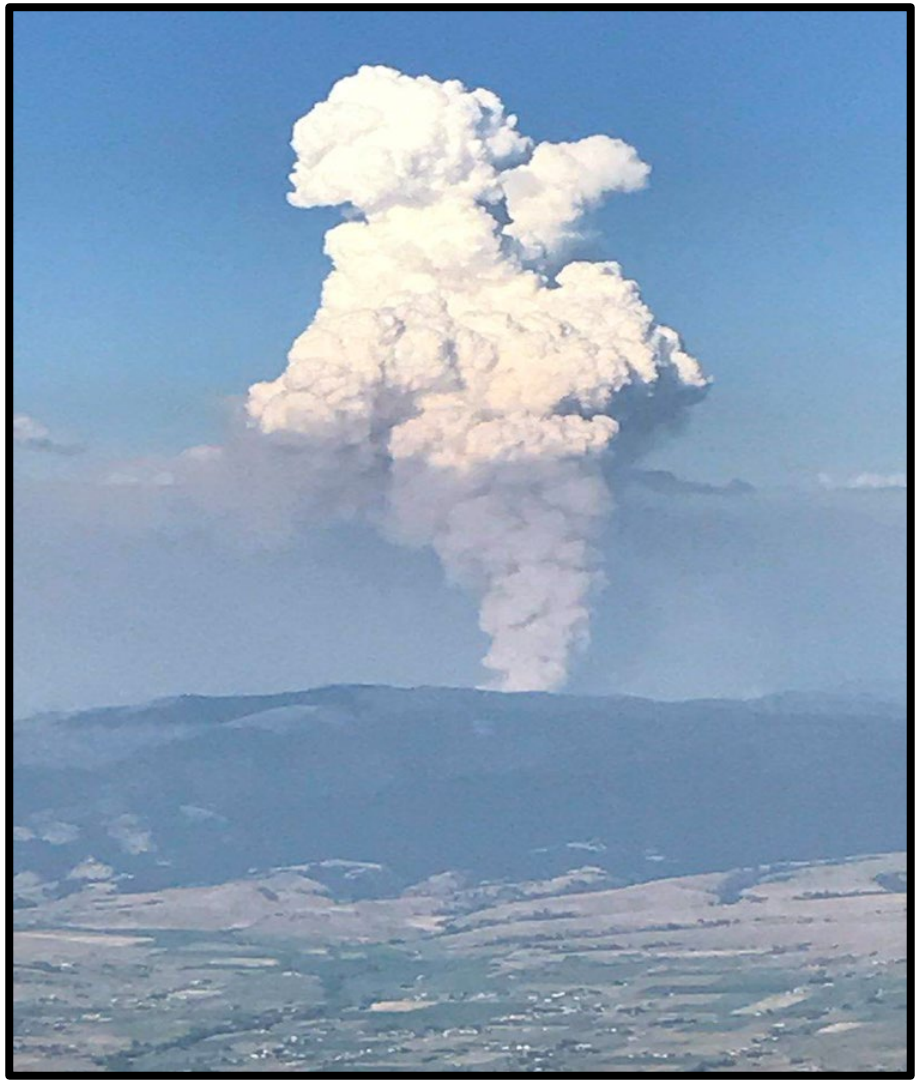
CHALLENGE:

Cleaner Indoor Air During Wildfires

Reduce Wildfire Smoke Exposure

Agenda

- Introduction and background
- Perspectives from partnering organizations
- Challenge details
- Questions

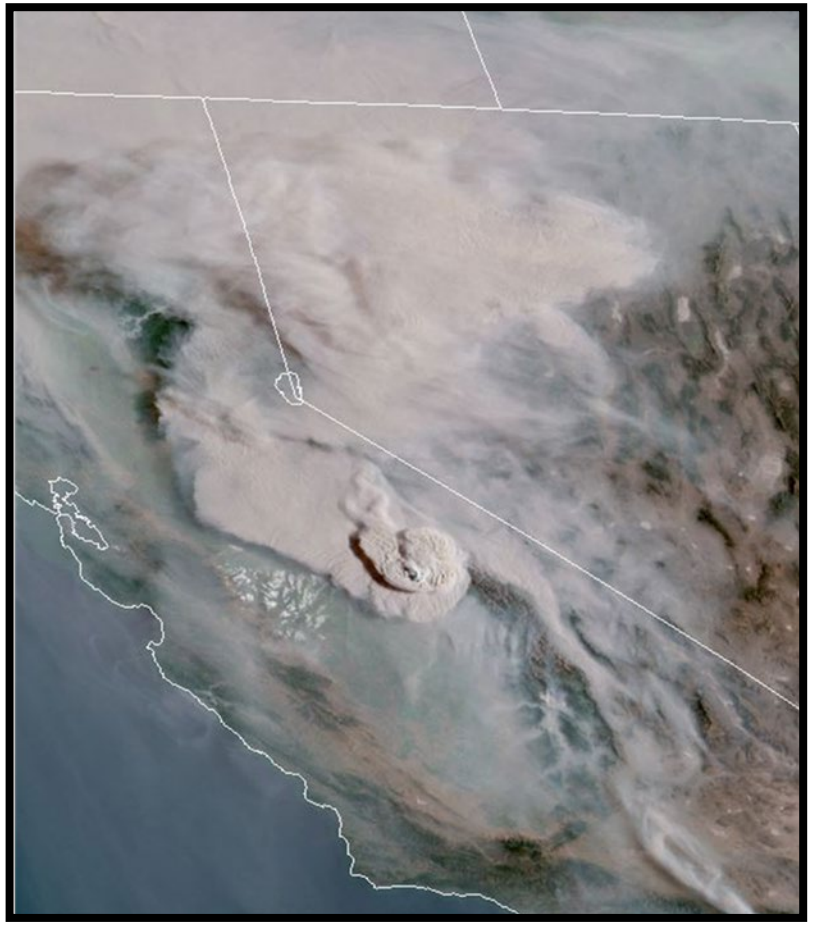


Goat Creek Fire, MT July 2017

Presenters

Slide presenters in order of appearance:

- Emily Snyder – US EPA's Office of Research and Development (ORD)
- Kathleen Stewart – US EPA Pacific Southwest Region (9)
- Molini Patel – US Department of State
- Lewis Radonovich – US National Institute for Occupational Safety and Health
- Brian McCaughey – Hoopa Valley Tribe
- Sarah Coefield – Missoula City/County Health Department (Montana)
- Jeff Williams –California Air Resource Board
- Adam Petrusky –Puget Sound Clean Air Agency (Washington)



September 9, 2020

Q&A additional Resources:

- Gail Robarge - US EPA's ORD (Cleaner Indoor Air During Wildfires Challenge Co-Lead)
- Amara Holder - US EPA's ORD (Expertise in generation and measurement of particulate matter)
- Denice Shaw - US EPA's ORD (EPA Challenge Lead)

What is the Problem?

- Magnitude and frequency of wildland fires are worsening
  - In 2020, a total of 56,914 wildfires burned 10,250,447 acres in the U.S.
  - The annual average acres burned was ~ 3 million acres greater in 2000-2019 than 1960-1999
- Many U.S. communities are exposed to wildland fire smoke for days, weeks, or even months
  - Some areas are impacted by multiple fires at the same time

Photo Credit: Drone View 7 KGO News

- Increased impact on urban areas
  - 10% of all land with housing is situated in the wildland-urban interface (WUI)

Particulate Matter is the Pollutant of Concern

- Wildfires generate airborne particulate matter that is < 2.5 microns in diameter (called $PM_{2.5}$)
- $PM_{2.5}$ causes a range of respiratory and cardiovascular health effects, especially in people with pre-existing conditions
- $PM_{2.5}$ concentrations from wildfires are variable

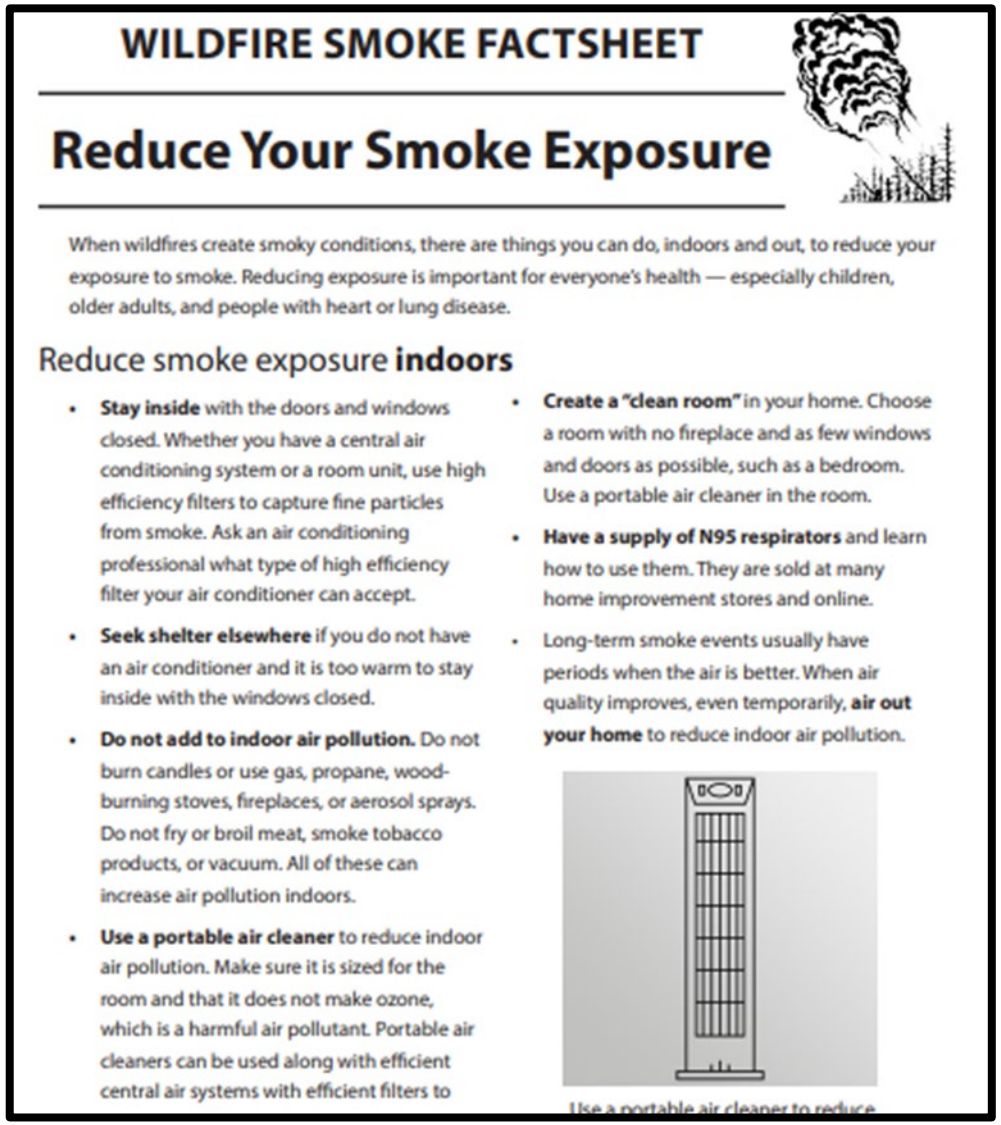
Air Quality Index for $PM_{2.5}$

AQI Category	Index Values	PM2.5 (µg/m³) 24-hour average
Good	0-50	0.0 - 12.0
Moderate	51-100	12.1 – 35.4
Unhealthy for Sensitive Groups	101-150	35.5 – 55.4
Unhealthy	151-200	55.5 – 150.4
Very Unhealthy	201-300	150.5 – 250.4
Hazardous	301-500	250.5 - 500

Public Health Guidance for Wildfire Smoke

- Public health recommendations: stay indoors and shut windows and doors to reduce exposure to smoke
  - Infiltration of smoke indoors likely rises when outdoor concentrations rise
  - Without air conditioning, closing windows and doors may increase indoor temperatures to unsafe levels

- Air cleaners are recommended to reduce indoor smoke concentrations



WILDFIRE SMOKE FACTSHEET

Reduce Your Smoke Exposure

When wildfires create smoky conditions, there are things you can do, indoors and out, to reduce your exposure to smoke. Reducing exposure is important for everyone's health — especially children, older adults, and people with heart or lung disease.

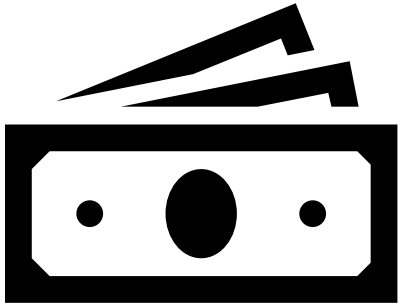
Reduce smoke exposure **indoors**

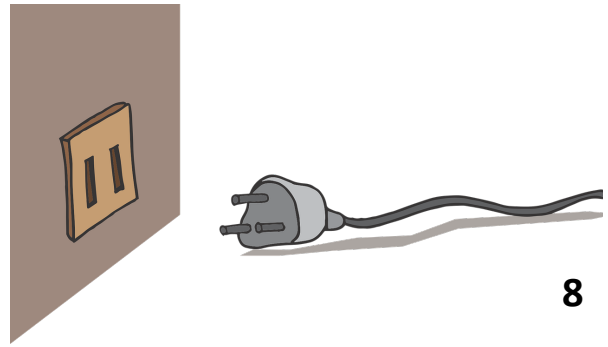
- **Stay inside** with the doors and windows closed. Whether you have a central air conditioning system or a room unit, use high efficiency filters to capture fine particles from smoke. Ask an air conditioning professional what type of high efficiency filter your air conditioner can accept.
- **Seek shelter elsewhere** if you do not have an air conditioner and it is too warm to stay inside with the windows closed.
- **Do not add to indoor air pollution.** Do not burn candles or use gas, propane, wood-burning stoves, fireplaces, or aerosol sprays. Do not fry or broil meat, smoke tobacco products, or vacuum. All of these can increase air pollution indoors.
- **Use a portable air cleaner** to reduce indoor air pollution. Make sure it is sized for the room and that it does not make ozone, which is a harmful air pollutant. Portable air cleaners can be used along with efficient central air systems with efficient filters to
- **Create a "clean room"** in your home. Choose a room with no fireplace and as few windows and doors as possible, such as a bedroom. Use a portable air cleaner in the room.
- **Have a supply of N95 respirators** and learn how to use them. They are sold at many home improvement stores and online.
- Long-term smoke events usually have periods when the air is better. When air quality improves, even temporarily, **air out your home** to reduce indoor air pollution.

Use a portable air cleaner to reduce

Better Solutions are Needed

- Current air cleaning technologies have limitations including:
  - High purchase, operation, and maintenance cost (Including cost for consumables, e.g., filters)
  - Unable to effectively cool the air
  - Can be noisy, which discourages use
  - Are dependent upon electrical power
    - During periods of power outages due to public safety power shut-offs or other causes
- These limitations inhibit widespread adoption of these cleaners





The Challenge - Shared Vision by Partnering Organizations

- Encourage the development of new, effective, low-cost approaches to clean fine particulate matter ($PM_{2.5}$) from indoor air, particularly high concentrations due to smoke events or high pollution episodes
- Approaches that provide cooling and can operate during a power outage are desirable

Federal Perspectives

Environmental Protection Agency

- Wildland fires can significantly impact air quality, and the EPA and States are responsible for programs and policies to achieve acceptable air quality
- Concern about public health impacts, and the limited options for reducing these impacts and related health equity issues
- Other EPA challenges have successfully stimulated the market to provide innovative solutions

Centers for Disease Control and Prevention (CDC) National Center for Environmental Health

- Preventing morbidity and mortality due to wildland fire smoke
- Developing information for public health officials and the general public so they can prepare for wildfire smoke events

Federal Perspectives

Department of State

- Severe air pollution at most overseas locations dictates the needs for mitigation measures, like air cleaners.
- DOS is seeking technologies that can be used by overseas personnel and family members

CDC's National Institute for Occupational Safety and Health

- Identifies and studies hazards in the workplace including indoor exposures to wildfire smoke
- Promotes the safety and health of workers through interventions and recommendations for prevention of workplace hazards like wildfire smoke

National Institute of Standards and Technology

- Develops measurement procedures and applies them to better understand contaminant transport, including wildfire smoke and air pollutants, in buildings
- Support industry efforts to economically improve environmental conditions in buildings

Tribal and Local Health Perspectives

Hoopa Valley Tribe

- During smoke events concentrations can be several hundred µg/m^3 and higher (at times exceeding 1,000 µg/m^3 during Red Salmon Complex fire)
- Many residents have to turn off their air conditioning to prevent infiltration of wildfire smoke
- Key need to understand what evidence-based practices communities and individuals can employ right now to reduce exposure and risk

Missoula City-County Health Department

- Wildfire season has become longer and more severe in our area
- The people who are most vulnerable to wildfire smoke are often the least visible
- Money drives decision making. Because of the cost, some people won't purchase a personal air cleaner

State Perspectives

California Air Resources Board and Oregon Health Authority

- Our people experience wildfire smoke every year, impacting health, with the threat increasing rapidly due to climate change.
- 2020 wildfire season was the worst in CA and OR history, with smoke very widespread, increasing respiratory and cardiovascular illness.
- In California and Oregon, electric utilities have used Public Safety Power Shut-offs (PSPS) to minimize the risk of fires caused by utility infrastructure in high fire risk areas during major weather events.
- Great interest in affordable ways to increase people's resilience to wildfire smoke

Local Air Agency Perspectives

Puget Sound Clean Air Agency

- Vision: All people and natural systems in our region have clean and healthy air, regardless of socio-economic status or geographic location.
- We want to do our part to protect the climate, including mitigating the effects of wildfire smoke
- We value innovation and excellence, and have encouraged new solutions to solve air pollution issues through crowdsourcing

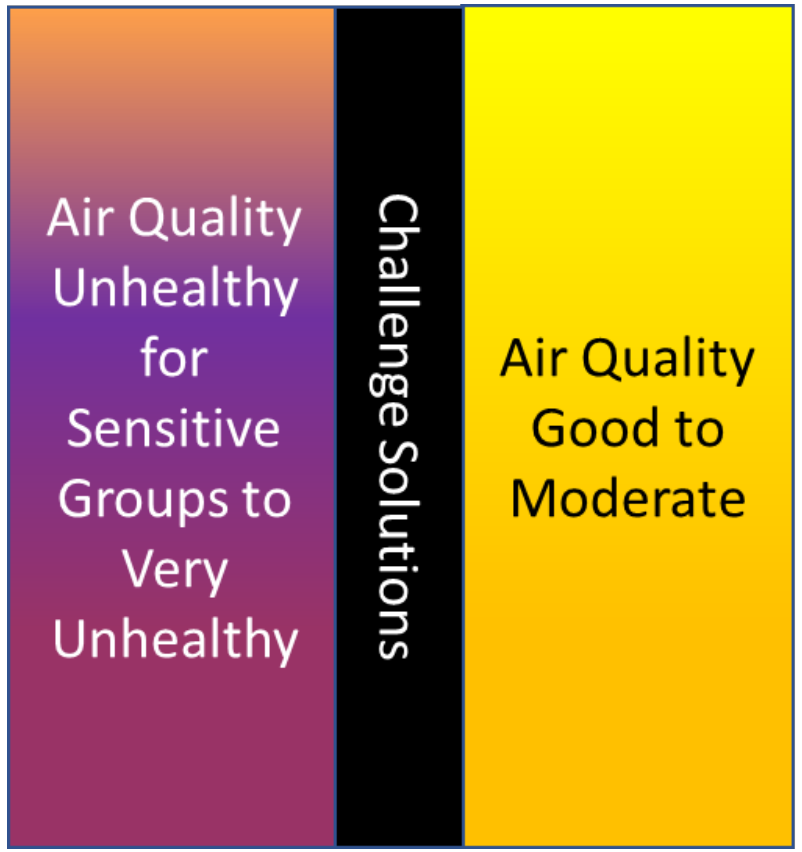
Lane Regional Air Protection Agency

- Wildfires within our state and wildfire smoke from California, Washington, Idaho impact our air quality
- Monitors local air quality in real time and link residents to resources on mitigating their exposure to smoke
- New affordable technologies which protect the vulnerable from wildfire smoke would have lasting positive impact on our communities

Challenge: Specifications to be Achieved

"Must Have" Criteria – $PM_{2.5}$ Reduction

- In a room of at least 150 square feet with eight-foot ceilings and $PM_{2.5}$ concentrations ranging from 35 – 300 micrograms per cubic meter ($\mu g/m^3$):
  - The solution should achieve greater than 80% reduction within one hour and maintain performance under real-word conditions
    - For example, maintains indoor reductions over sustained periods of time (several weeks) during high outdoor concentrations
  - If the solution is novel
    - Indoor air improvements may be more modest or take longer to achieve



More Specifications

Additional "Must Have" Criteria

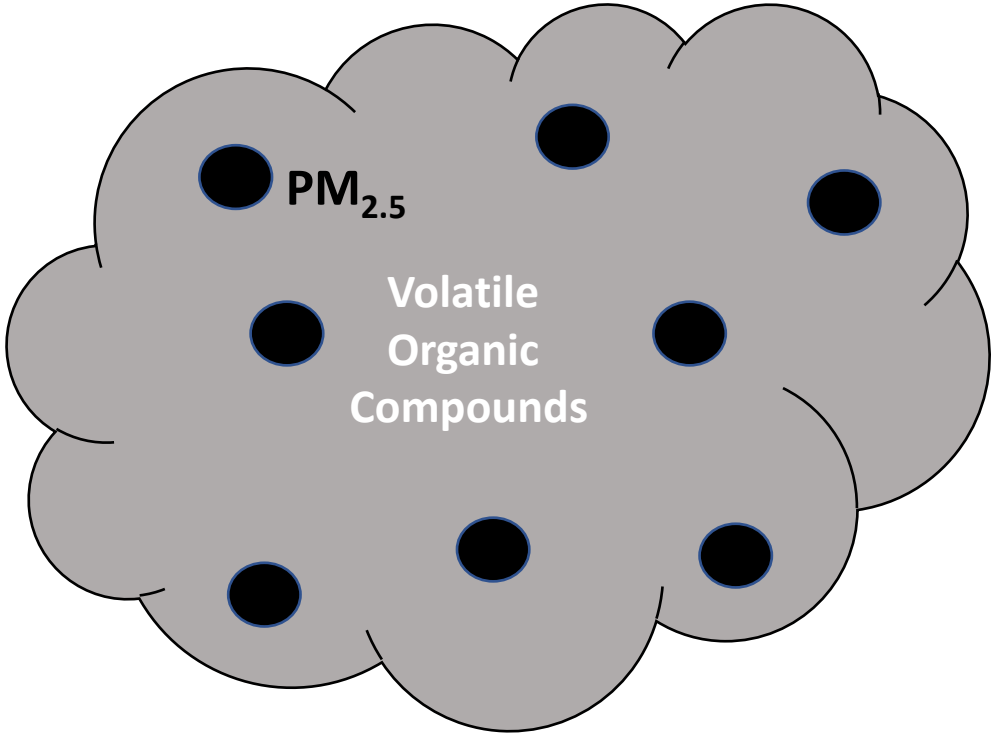
- Is low-cost (maximum of $100 per functional unit with all components) to purchase
- Operates at ≤ 45 decibels
- Is safe to operate continuously for weeks at a time

Ineligible Solutions

- Solutions should not generate any air pollutant (e.g., ozone)
- Do not submit a design based primarily on a box fan with commercially available filter attached

Desirable Characteristics

- Cools the room without drawing in smoky or polluted air
- Is sustainable to use
  - operating and maintenance costs are low
  - replacement parts are available/accessible
  - waste is minimized
- Uses a battery or other option for operation during power outage
- Reduces other pollutants, e.g., volatile organic compounds (VOCs)



Challenge Process

Up to five finalists to receive awards of up to $10,000 each from a total award pool of $50,000

Partial cash prizes of less than $10,000 may be considered for solutions that meet some, but not all, of the criteria.

Finalists may be invited to subsequent competition for prototype testing

(depends on the results of this Challenge and on the availability of funds)

The Challenge award will be contingent upon results of critical analysis and evaluation by the EPA and a judging panel

To receive an award, the Solvers will not need to transfer their exclusive intellectual property rights to EPA.

All official entries must be submitted via the InnoCentive website: https://innocentive.wazoku.com/#/challenge/6798f18f0fc24bdfb2ada12e7cec946c

Evaluation of Submissions

- Each submission will include a written proposal (may include a video and illustrations)
- After the Challenge submission deadline, submissions will be judged by a panel convened by EPA
- The panel will recommend winning solutions to EPA, and EPA will make final selections
- All persons or entities that submit a proposal will receive a high-level evaluation and be notified as to the status of their submission
- EPA decisions cannot be contested

Schedule and Awards

- **Feb 17, 2021** — Challenge launch
- **Mar 04, 2021** — Challenge info webinar
- **May 17, 2021** — Challenge submissions due
- **Late Summer** — Winners announced

Challenge Partners

Tribal Partner:

- **Brian McCaughey** – Hoopa Valley Tribe

State and Local Partners:

- **Jeff Williams** – California Air Resource Board
- **Merlyn Hough & Travis Knudsen** - Lane Regional Air Protection Agency (Oregon)
- **Sarah Coefield & Ben Schmidt** – Missoula City/County Health Department (Montana)
- **Carol Trenga** – Oregon Health Authority
- **Adam Petrusky & Joel Creswell** – Puget Sound Clean Air Agency (Washington)

Federal Partners:

- **Maria Mirabelli** – National Center for Environmental Health, US Centers for Disease Control and Prevention
- **Lewis Radonovich** – National Institute for Occupational Safety and Health, US Centers for Disease Control and Prevention
- **Molini Patel & Christopher Woolverton** – US Department of State
- **Alison Clune & Kathleen Stewart** – US EPA's Office of Air and Radiation and Region 9
- **Steven Emmerich** – US National Institute of Standards and Technology

Questions?

Website for the Challenge:

https://innocentive.wazoku.com/#/challenge/6798f18f0fc24bdfb2ada12e7cec946c

Technical questions:

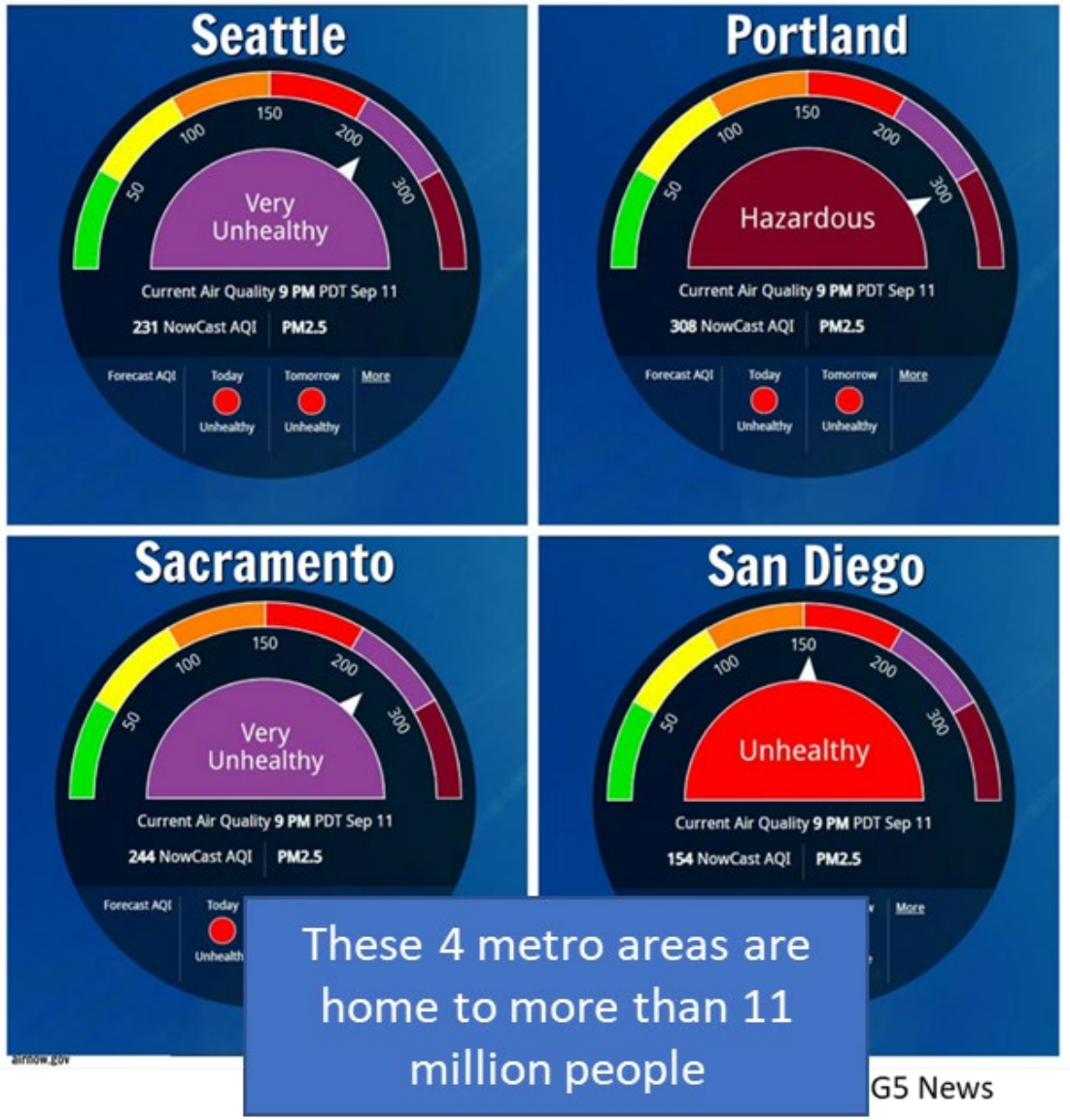
Use the “Messages” tab in the InnoCentive platform (this will appear after you accept the Challenge Specific Agreement)

Questions related to the platform use:

support@wazoku.com

Social media:

#CleanerIndoorAirChallenge



Credit: Seattle King News