

# Air Quality Community Action Network (AQ-CAN)

*2018 US Bloomberg Mayors Challenge Winner!*

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*Presented to Safety, Housing & Homelessness Committee*



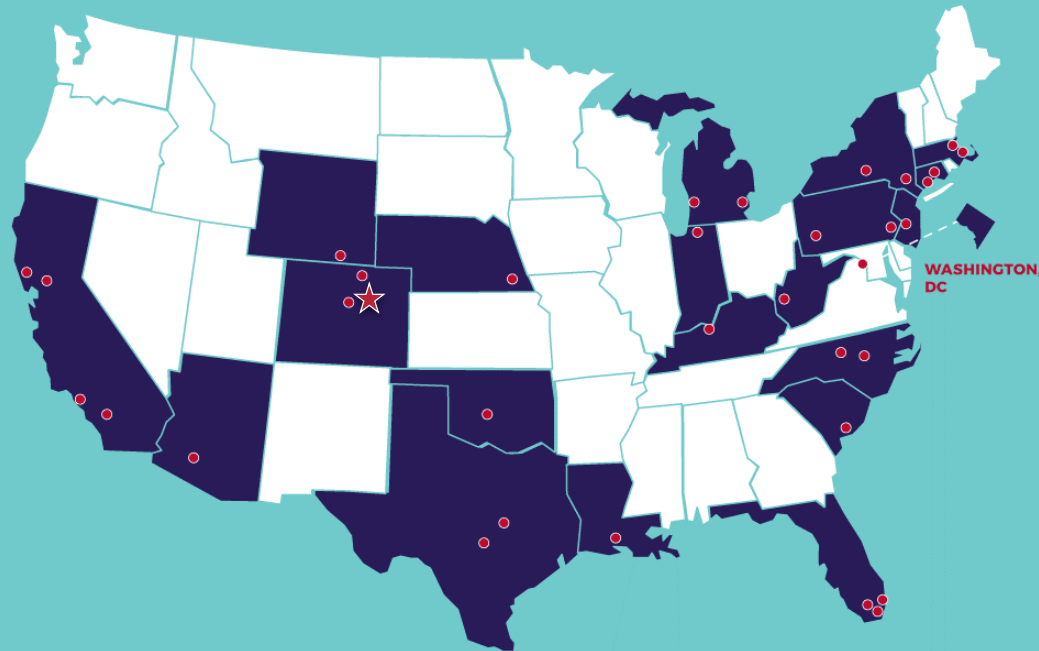
*Denver's Nationally Accredited Public Health Department*



# What Is Bloomberg Mayors Challenge?

The Mayors Challenge is a competition that encourages mayors and their teams to come up with bold, new ideas that have the potential to solve urban problems and improve quality of life. The program has run contests across the United States, Europe, Latin America and the Caribbean.

It's an initiative to help city leaders think big, be bold, and uncover inventive – and ultimately, shareable – ideas that tackle today's toughest problems.



# The Problem

Denver families spend an average of \$3,100 a year on asthma-related medical costs, resulting in more than \$30 million spent annually.

# The Idea

The City of Denver will use cutting-edge air pollution sensor technology to create a city-wide air quality monitoring program at public school buildings, resulting in better informed policy decisions using environmental, health, and economic data.

## WHAT MAYOR MICHAEL B. HANCOCK IS SAYING:

"Without local air-quality data paired with increased awareness and advocacy, children and their families will continue to develop chronic lung disease, miss school and work, struggle with increased healthcare costs, and experience decreased income-earning and career opportunities."

— Michael B. Hancock, Mayor of Denver, CO



# Test 1: Behavior Change (Anti-idling)



## *What we were testing...*

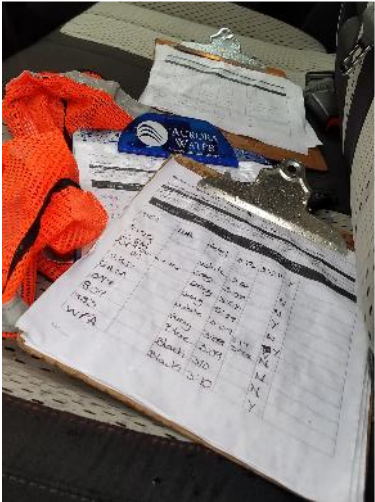
The most effective method of influencing idling of vehicles

## *How we tested...*

- Parent pledge sent home
- Anti-idling signage
- Active messaging\* – text & Facebook

## *What we learned...*

- Manual tracking is inefficient, unreliable, and unsustainable
- Schools do not have a standard or optimized pick-up/drop-off procedures



# Test 2: Stakeholder Buy-in

## What we were testing...

An effective method for gaining buy-in from school principals

## How we tested...

- Co-creative development – talking with the principals about what they care about.
- Incorporating direct feedback on prototypes

## What we learned...

- Principals do not have free time
- Communication must be short with big take-aways highlighted
- Include an easy to understand and follow, call to action



### Did You Know?

- Denver has the 8<sup>th</sup> worst air quality among major cities (American Lung Association)
- Only 53% of residents realize and understand the health and environmental impacts
- 11.2% of children that attended a Denver public school in 2016 have asthma (9,892 students)
- Annual asthma-related healthcare costs are \$3,100 per child

### Children have one chance to grow healthy lungs.

Air pollution harms everyone, but children are more susceptible to its acute and long term health effects, including decreased lung function, increased respiratory infections, and missed days of school. In fact, asthma is the leading cause of school absenteeism. While multiple factors influence a child's exposure to air pollution, schools are an ideal intervention point for education and empowerment.

### What's Our Vision?

To empower people and communities to decrease the health and financial burden of air pollution for Denver's most vulnerable residents...children!

As one of 35 Champion City finalists, Denver's Department of Public Health & Environment (DDPHE) is using the awarded \$100,000 grant to develop and implement a real-time, hyper-local air quality monitoring system at 10 Denver Public Schools (DPS) that will empower communities, families and schools to protect children's respiratory health.

Using the rich social networks of schools, we will also co design and deliver air quality and respiratory health education, behavioral interventions, and school based community to empower people and communities.



### What Can You Do?

- Be a force for change!
- Approve and support a pilot at your school
- Identify a school champion to partner with us to co-design programming to educate and influence positive behaviors

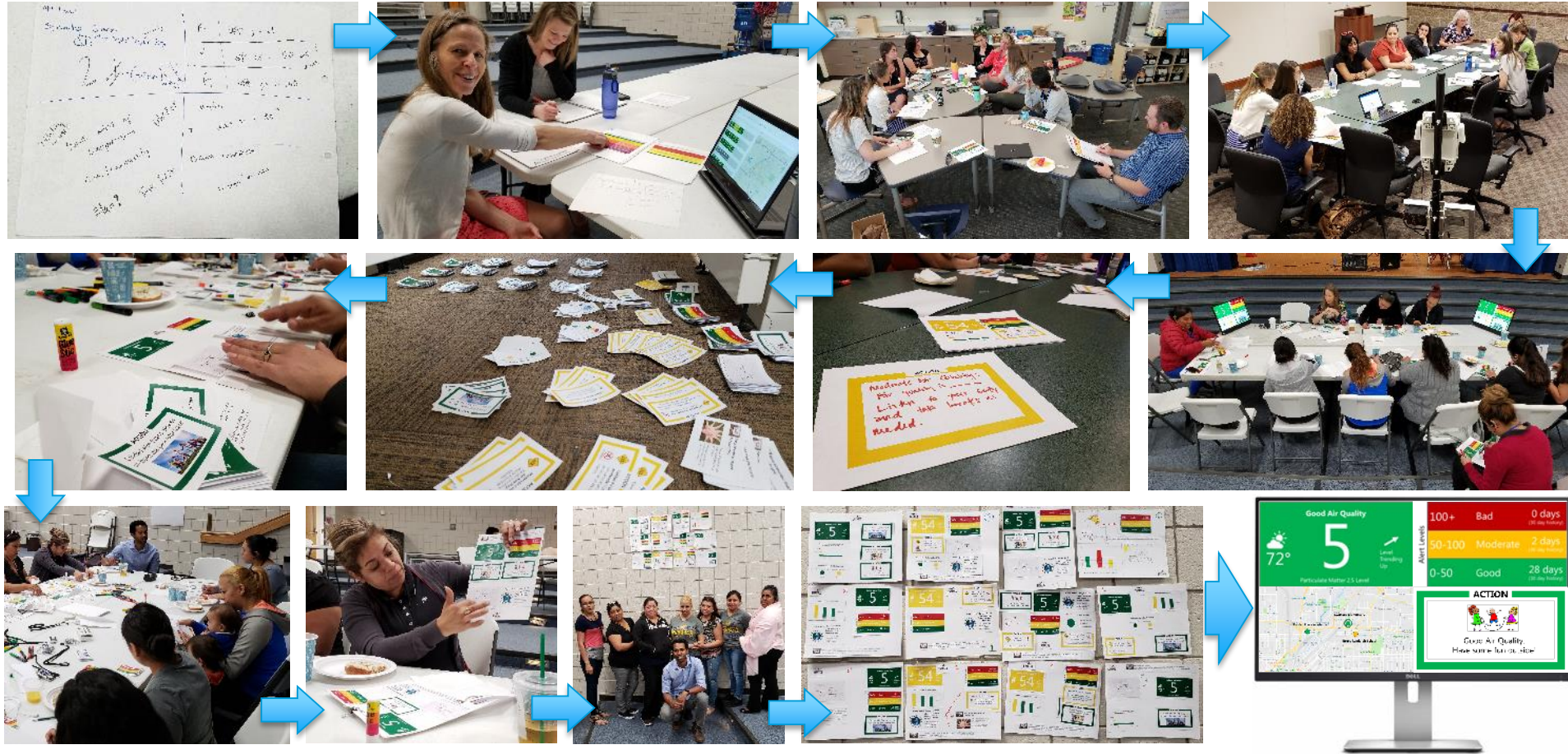
### For more information

Visit: [mayorschallenge.bloomberg.org](http://mayorschallenge.bloomberg.org)  
Contact: [Michael.Opletree@denvergov.org](mailto:Michael.Opletree@denvergov.org)



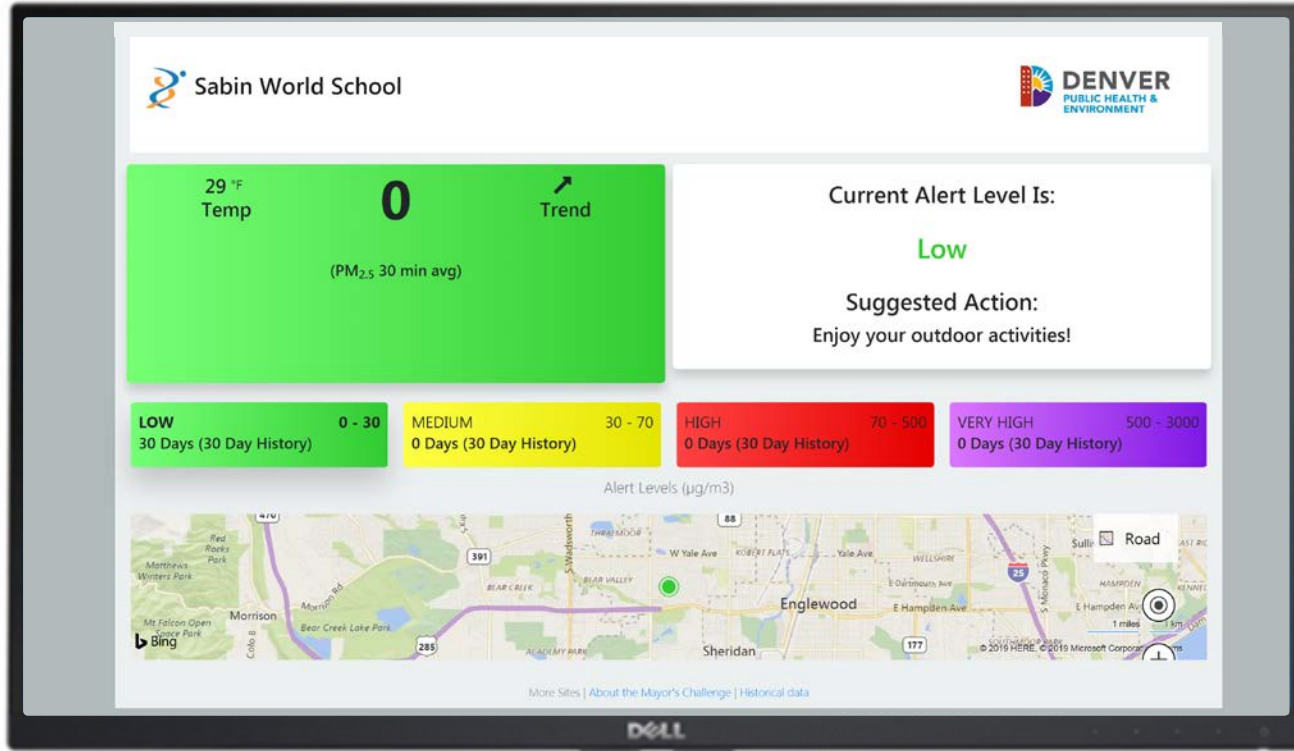
# Test 3: Data Communication (Dashboard Development)

- Focus groups with nurses, teachers, and parents
- Collaborative element development



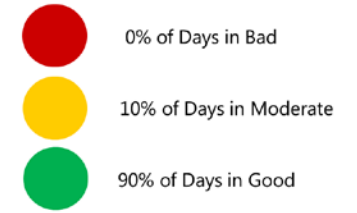
# Community Dashboard

- Near real time data
- Customizable tiles
- Various action prompts

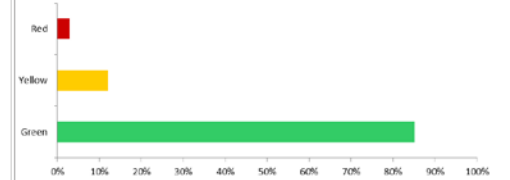


Particulate Matter 2.5 is so small that it can go into our lungs and then into our blood. When it enters our blood it can travel to places in our body like our heart and brain and cause damage.

## Air Quality During 2017/2018 School Year



## Percentage of Green, Yellow, and Red Days During 2017/2018 School Year



## Think Globally: Tip of the Day



### What Can I Do to Improve Air Quality?

Drive less! Instead, carpool, take the bus, ride your bike or walk.

## ACTION

Air quality today is good!  
Enjoy your time outside.



## PM<sub>2.5</sub> Level on this Date Last Year



Date: May 11<sup>th</sup>, 2017  
PM<sub>2.5</sub> Level: 30  
Alert Level: Good

## Air Quality Forecast

Today's Forecast



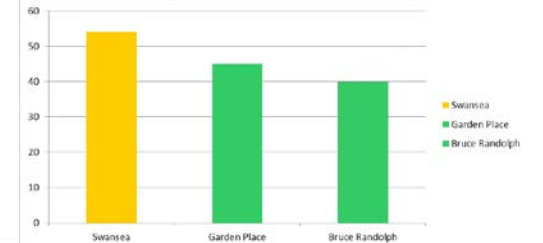
Good

Tomorrow's Forecast



Moderate

## PM<sub>2.5</sub> Levels at Nearby Schools



# Sensors

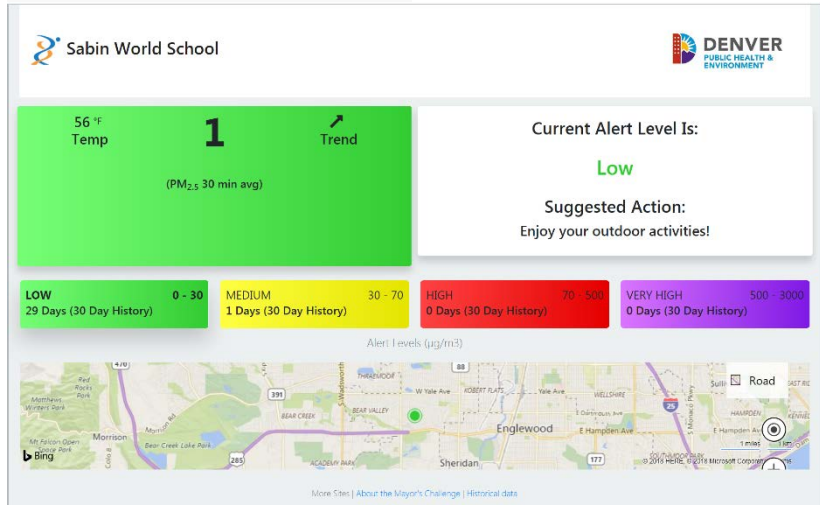
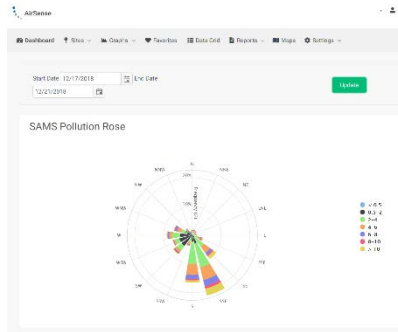
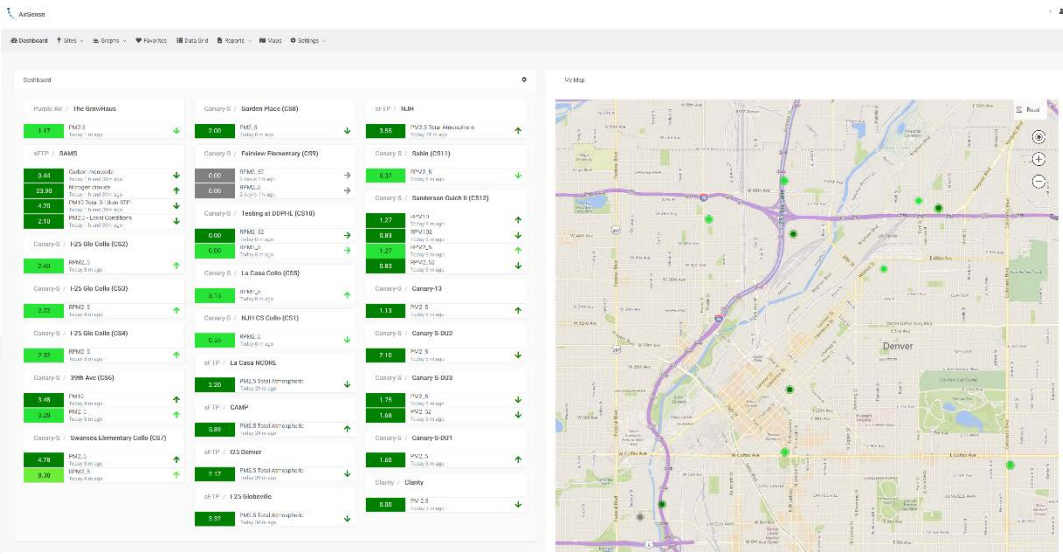
- Partnered with Colorado based Lunar Outpost to engineer sensors
  - Measurement: PM (currently Plantower PMS5003)
  - Pollutant focus: PM2.5
  - Meteorological measurement: Temp, RH, WS+WD\*
  - Battery, Solar, Cellular
  - External LED indicator
  - Platform agnostic





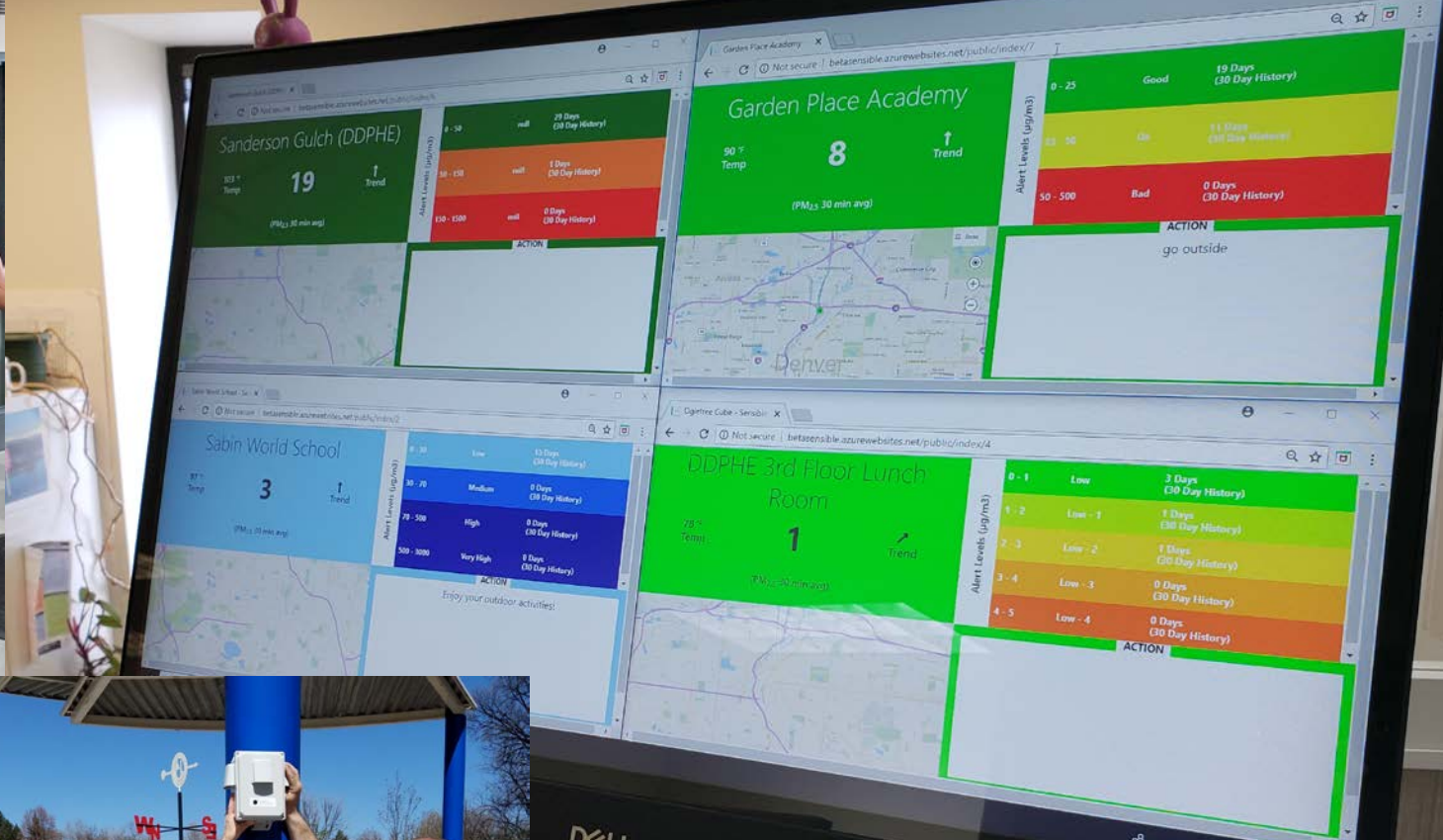
# AirSense Data Platform

- Working in conjunction with TD Environmental on AQ sensor specific platform
- Custom built for use by cities
- Sensor agnostic
- Real time analytics
- Real time dashboards for community
  - Alerts/messaging/data download
- Current data sets integrated for Denver:
  - Purple Air (public)
  - Lunar Outpost (Denver)
  - Clarity Node-S (Denver)
  - FEM Grimm/T640 (State of CO)
  - RM Young (Denver)
- API available for retrieval



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# What can schools do?

- **Individual**
  - *Pollution reduction*
    - Eg. Stop idling
  - *Exposure reduction*
    - Eg. using data to make decisions about outdoor activity
- **School Community**
  - *Pollution reduction*
    - Eg. Anti-idling campaign, low emissions events
  - *Exposure reduction*
    - Eg. using data to make decisions about outdoor activity
- **City & County of Denver**
  - *Pollution reduction*
    - Eg. Prioritize construction project near schools during non-school times

## MENU OF OPTIONS Air Quality Community Action Network (AQ-CAN)

The vision of AQ-CAN is to gather real-time, hyper-local air quality data and programming empowering communities, families, and schools to limit exposure and reduce pollution through behavior change, advocacy, and community engagement.

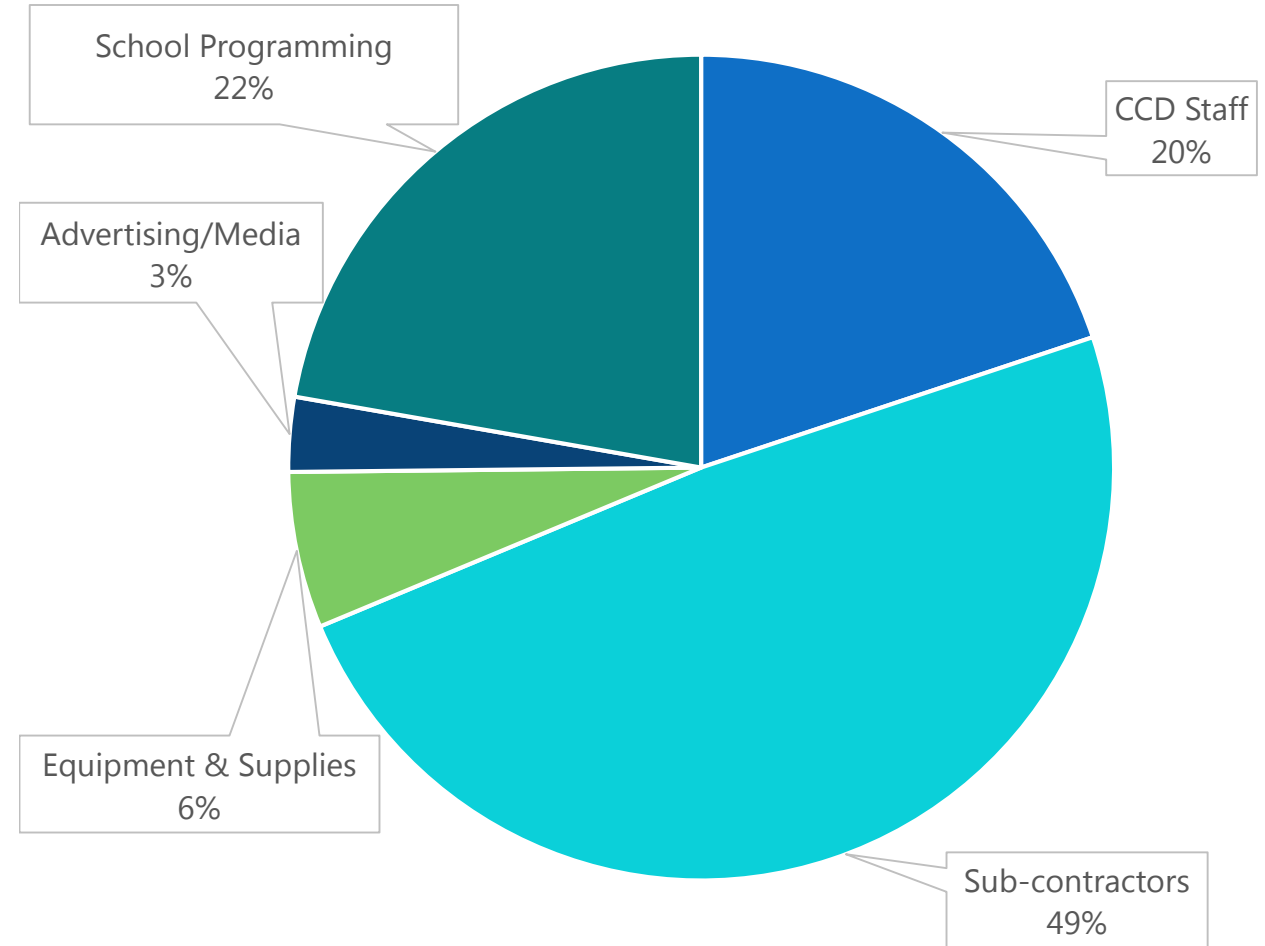


<input checked="" type="checkbox"/> Program	Description	Benefit	Commitment
<b>Foundational Programming</b>			
<input checked="" type="checkbox"/> Air Quality Sensor	Cutting-edge air pollution sensor technology will be installed on site to provide real-time hyper-local air quality data.		Time: Effort:
<input checked="" type="checkbox"/> Air Quality Dashboard Display	Electronic air quality dashboards will display real-time data from the sensor and will educate the school community and inform behavior change programs.		Time: Effort:
<input checked="" type="checkbox"/> School Nurse Toolkit	Visual health education tools and a tablet will be provided for school nurses to educate the school community on health awareness and education and collect data. Nurses will also be eligible to receive scholarships to a variety of conferences including the National Jewish Health Respiratory Institute Conference, National Association of School Nurses Conference, and more.		Time: Effort:
<input checked="" type="checkbox"/> Asthma Basics	All participants are encouraged to take a one-hour interactive online learning module designed to help people learn more about asthma. Developed by the American Lung Association, this program will teach participants to recognize and manage triggers, understand the value of an asthma action plan, and recognize and respond to a breathing emergency.		Time: Effort:
<b>Educational Programming</b>			
<input type="checkbox"/> AQTreks	AQTreks and the PAM give participants the ability to measure air pollution wherever their imagination takes them - from the top of a mountain to the boiler room of their school. AQTreks aims to connect people to their environment in a whole new way, as participants gain an in-depth understanding of the complex variables that affect air quality in and around their schools and communities.		Time: Effort:
<input type="checkbox"/> Exceptional event plan	Co-development of a plan for indoor activities during high pollution days. Activities would be active, or semi-active. Resources, monetary and/or physical, will be provided to the school to be able to support activities		Time: Effort:
<input type="checkbox"/> Air Actions	Student generated actions addressing local air quality problems with technology. Curriculum, technology and guidance to help kids formulate meaningful experiments and actions in addressing air quality concerns. Kits and materials will be provided to educators when requested.		Time: Effort:
<input type="checkbox"/> Kids Making Sense (Grades 5-12)	Kids Making Sense® is an exciting environmental education curriculum designed to Core Curriculum standards that teaches students about air quality and how to measure air pollution using hand-held sensors and mobile phones, empowering them to drive positive change in their communities. Kits and materials will be provided to educators when requested.		Time: Effort:
<input type="checkbox"/> Up in the Air (Grades K-5)	Up in the Air is an air pollution education program that provides elementary educators with inquiry-based, hands-on air pollution lessons. Kits and materials will be provided to educators when requested.		Time: Effort:
<input type="checkbox"/> Air Sensor Fair (participation)	Participate in a science fair focused air sensors and air sensor data. Teams will be assigned "Air Quality Coaches" with expertise in their area of focus after applications are submitted. The coaches will help scientifically validate the teams assumptions. Successful applicants will be given a sensor (if one is not currently installed at the school) as well as \$500 to put towards their project.		Time: Effort:
<input type="checkbox"/> Open Airways For Schools (Elementary)	Open Airways For Schools® is a school-based curriculum from the American Lung Association that educates and empowers children through a fun and interactive approach to asthma self-management. It teaches children with asthma ages 8 to 11 how to detect the warning signs of asthma, avoid their triggers and make decisions about their health.		Time: Effort:
<input type="checkbox"/> Clear Air Projects	National Jewish Health provides a variety of lesson plans developed to CSAP and Colorado Department of Education Standards for all grade levels. These program discuss air quality in connection to health, environmental ecosystem, energy consumption, economy, and quality of life.		Time: Effort:
<input type="checkbox"/> Indoor Air Quality in Schools Toolkit	This common-sense guidance is designed by the EPA to help schools prevent and solve the majority of indoor air problems with minimal cost and involvement. This guide will provide training for staff on indoor air quality management and tools to assess, communicate, and resolve indoor air quality issues.		Time: Effort:
<b>Direct Intervention Programming</b>			
	Student transport for school children who, chaperoned by two adults (a "Driver" leads and a "conductor"		Time: Effort:

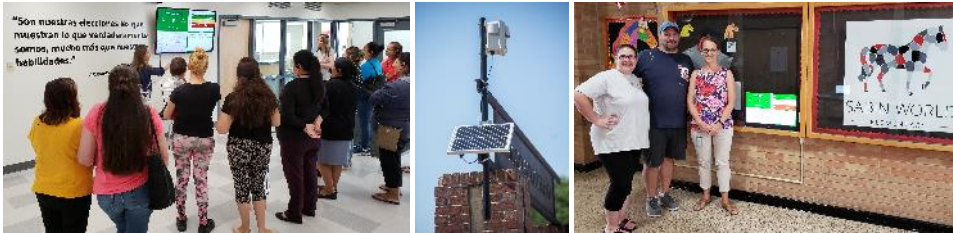
# Timeline & Budget

- Grant dates: January 1, 2019 – December 31, 2021 (3 years)
  - We'll be redoing our implementation plan in Feb/March and will likely try to get this changed a little bit to better align with the school year.
- 2 FTE for 3 years
- 2018 – 10 schools
- 2019 – 20 schools
- 2020 – 30 schools
- 2021 – 40 schools

## Budget Category Breakdown



# What's Next?!



Continue working with schools to identify air pollution patterns and put programs in place to reduce exposure and reduce local pollution sources

Continue refine the sensor technology and work with the data platform developer on ways to correct data utilizing regional reference instrumentation



Scale to encompass the schools within Denver that are most impacted by air pollution.

# Thanks to Collaborators!



## Bloomberg Philanthropies

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