



**Piera**  
S y s t e m s

What's in your Air?

# Air Pollution Affects Everyone



**US air quality remains 'very unhealthy' and 'hazardous' for millions of Americans, new report says**



MARKETS BUSINESS INVESTING TECH POLITICS CNBC TV WATCHLIST

**Amazon's top doctor on why air quality is the biggest workplace health challenge of this century**

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Causes lung cancer, alzheimer's, and cardiovascular diseases<sup>1</sup>

Allows Covid-19 and other respiratory diseases to spread faster<sup>2</sup>



Debilitates people with respiratory issues<sup>3</sup>

Severely reduces cognition affecting health & productivity<sup>4</sup>

Indoors 2-5X worse than Outdoors and as much as 100x<sup>5</sup>



Air pollution costs 8 million deaths/year, \$5 trillion in welfare costs, \$225B in lost income<sup>6</sup>

# The Problem

There has not been a cost-effective solution to detect the smallest particles

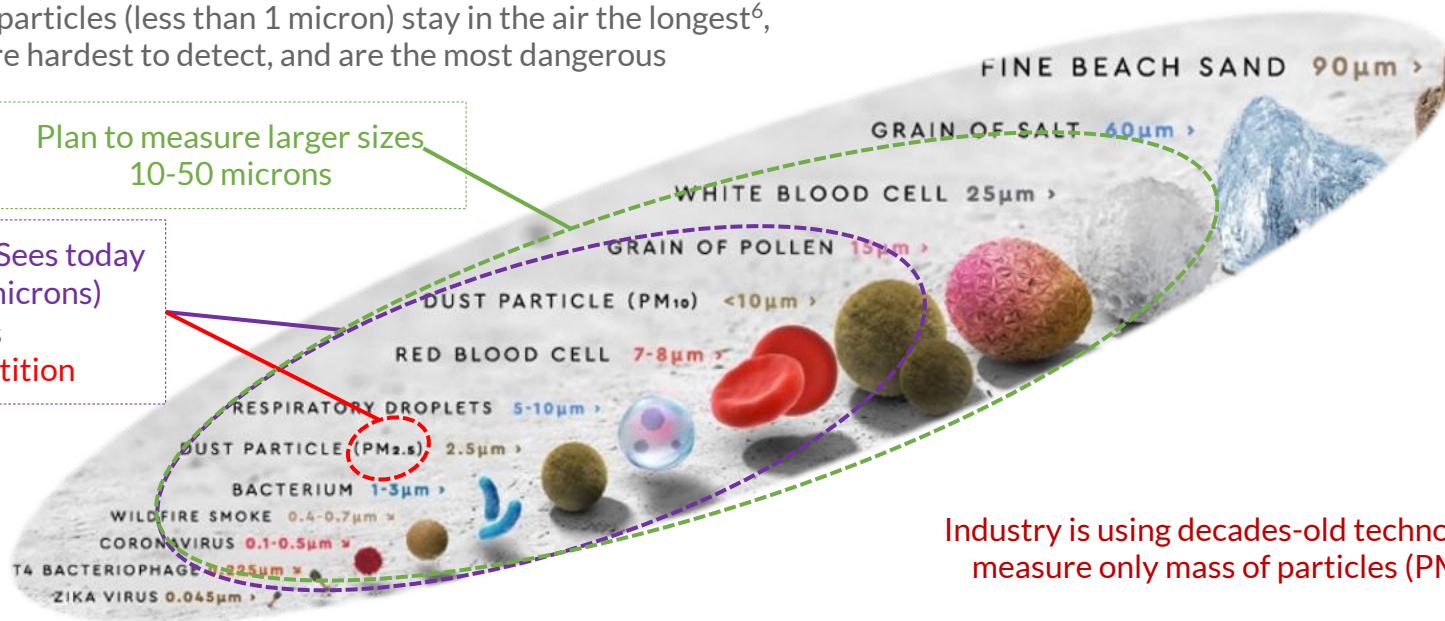
Smallest particles (less than 1 micron) stay in the air the longest<sup>6</sup>,  
are hardest to detect, and are the most dangerous

Plan to measure larger sizes  
10-50 microns

What Piera Sees today  
(0.1-10 microns)

VS

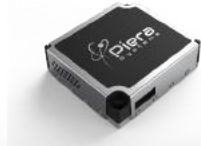
Competition



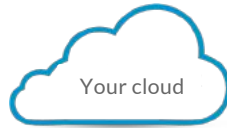
Industry is using decades-old technology to  
measure only mass of particles ( $\text{PM}_{2.5}$ )

# The Solution

Revolutionary technology that identifies 'What's In the Air' to provide actionable insights  
Instead of just telling you the Air is bad



Air Quality Monitors & Sensors  
deployed indoors & outdoors



Air quality data aggregated  
in the cloud



Software and Services provide  
alerts, insights, mitigation



Machine Learning models  
identify likely pollutants

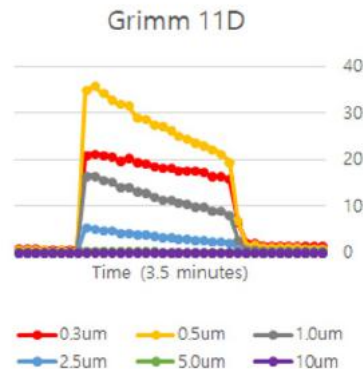
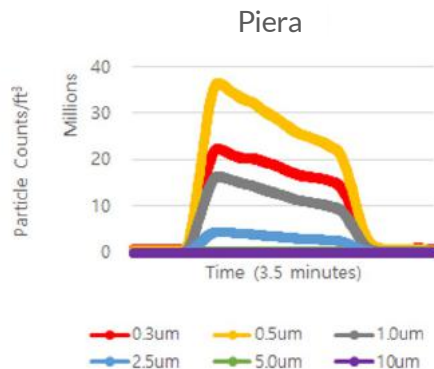
Accurately measure particles from 0.1-10 um as unique signatures,  
identifies pollutants at a scalable price  
Air Quality Monitoring Services

# Break-through Particle Sensing Technology

Reference Instrument quality at a fraction of the price

\$50 - \$350

\$22,000



Piera uses proprietary technology to truly distinguish different sized particles, also has ability to customize for specific size range

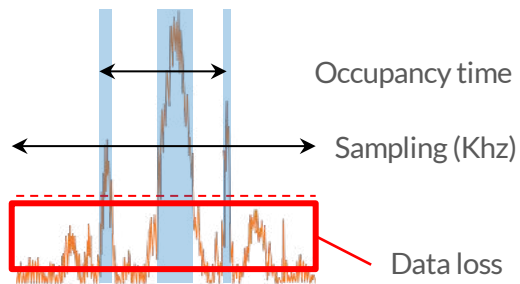
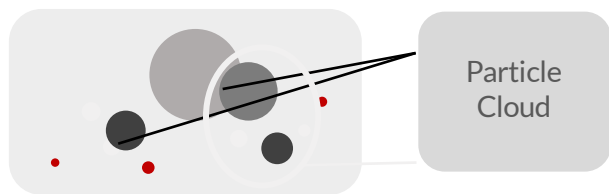
Only certified low-cost sensor that accurately counts particles and size in real-time

Only low-cost sensor to achieve ISO 21501-4 (cleanroom standard) certification

# Custom Photon Counting Processor: PSC-1

3 US patents granted

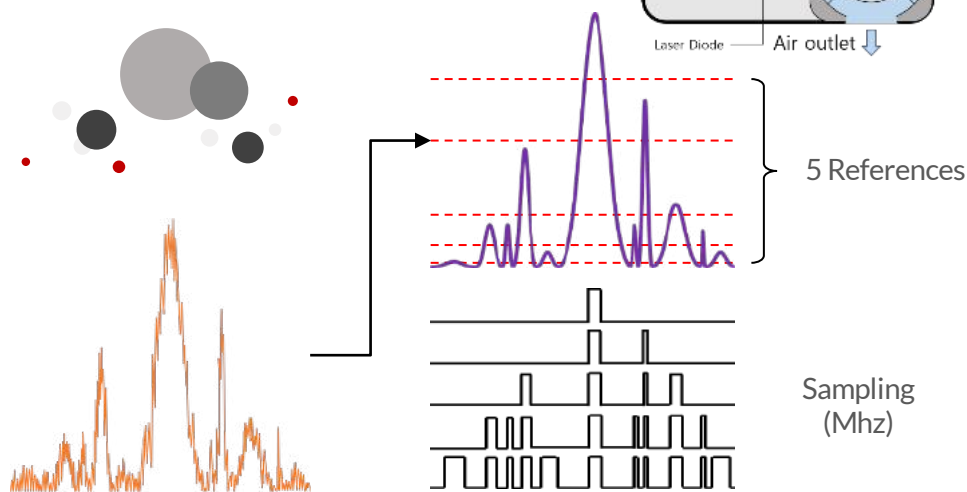
## Competition



Estimated Mass  
PM2.5 only

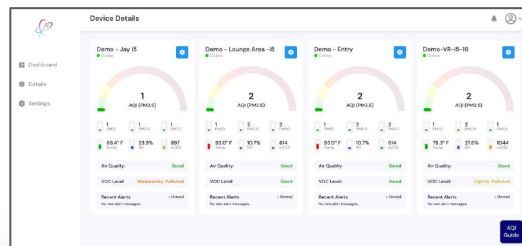


## Piera



Software-Defined bin sizes detect and  
count particles from 0.1-10 microns

# Products and Services



## Pollutant Models

- Licensable, subscription service provided by Piera
- Customer developed in partnership with Piera
- OTA updates

## SenseiAQ Software and Services

- Air quality monitoring subscription service
- Data and insights from SenseiAQ software
- Stand-alone application or connected to Piera MS Azure Cloud
- API for integration with third party applications
- Software updates

## Canaree Air Quality Monitors

- Easy to deploy in Smart Spaces, Hospitals, Schools, and other verticals
- Wireless Access Points (HPE/Aruba)

## IPS Particle Sensors

- Integration into air quality monitors, air purifiers, and HVAC equipment

# IPS: A Software Defined Sensor Family

IPS Family			Eval	Series 3		Series 5			Series 7	Series X	
			PEK	Piera-305	Piera-3100	Piera-525	Piera-5100	Piera-5500	Piera-7100	Piera-X7	Piera-X7U
# of Particle Bins			7	3	3	5	5	5	7	7	7
Dynamic Range	Binning Output in Mass Concentration (PM)	<0.1	X*	X		X			X	X	
		0.3	X	X		X			X		
		0.5	X	X		X	X		X		
		1.0	X		X	X	X	X	X		X
		2.5	X		X	X	X	X	X		
		5.0	X				X	X	X		
		10	X		X		X	X	X		
		50					X				
		100									
Features	Output in Particle Counts		X	X	X	X	X	X	X	X	X
	Serial Key for Networking		X			X	X	X	X	X	X
	Firmware Upload Capability		X			X	X	X	X	X	X
	Limited Programmability		X				X	X	X		
	Full Range Programmability									X	X
Release Date			Q3 2020	Q1 2021	Q1 2021	Q1 2021	Q1 2021	Q3 2021	Q4 2020	Q3 2022	Q4 2022
Pricing (\$) MOQ of 1,000			199	\$46.55	\$46.55	65	65	65	75	95	95

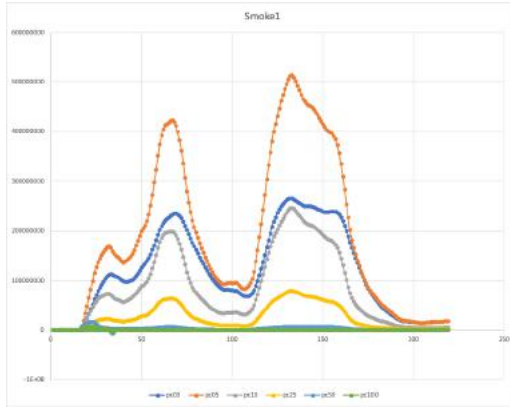


# Canāree Family of Devices

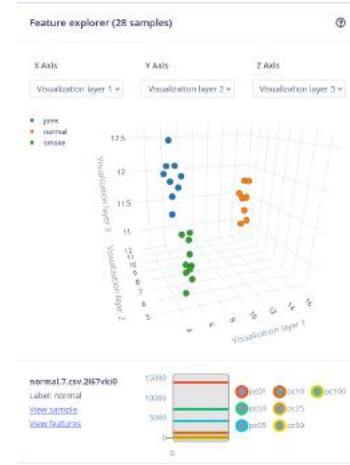


Canāree A1	Canāree I1	Canāree I5
<b>Plug-n-Play Air Quality Monitor</b> Measure particulates from PCs, mobile devices, and wireless access points USB powered Weight 42g	<b>Standalone Air Quality Monitor</b> Monitor particulates anywhere using WiFi, bluetooth, or ethernet & all features of A1 USB or external power Weight 42g	<b>Comprehensive Environmental Monitor</b> All features of I1 & temperature, pressure, humidity, & TVOCs USB or external power Weight 50g
Measure across entire PM range – PM0.1 to PM10 Built-in Vape/Smoke Detection Fully integrated with the cloud. Intuitive UI included Seamless integrations to BMS / BAS solutions Dimensions: 8.98cm x 6.13cm x 2.06cm Covers 100m <sup>2</sup> , 1,000ft <sup>2</sup>		

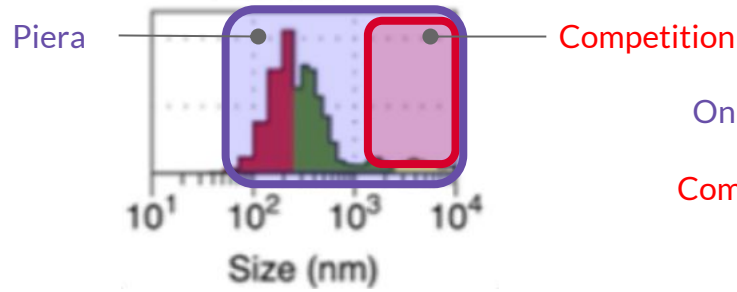
# Classifying Pollution Sources



Classification requires accurate particle count and size data, from multiple 'bins', over time



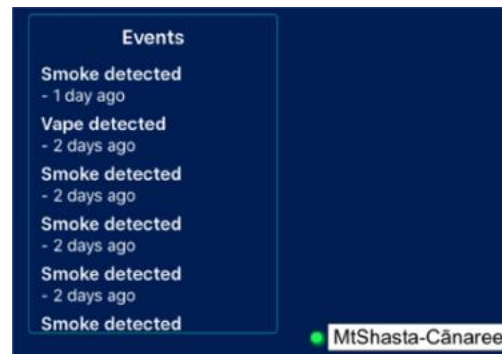
ML Model for Vape, Tobacco Smoke and Good Air



Only Piera can measure PM0.1-1.0  
with 7 distinct particle sizes  
Competition cannot classify particles

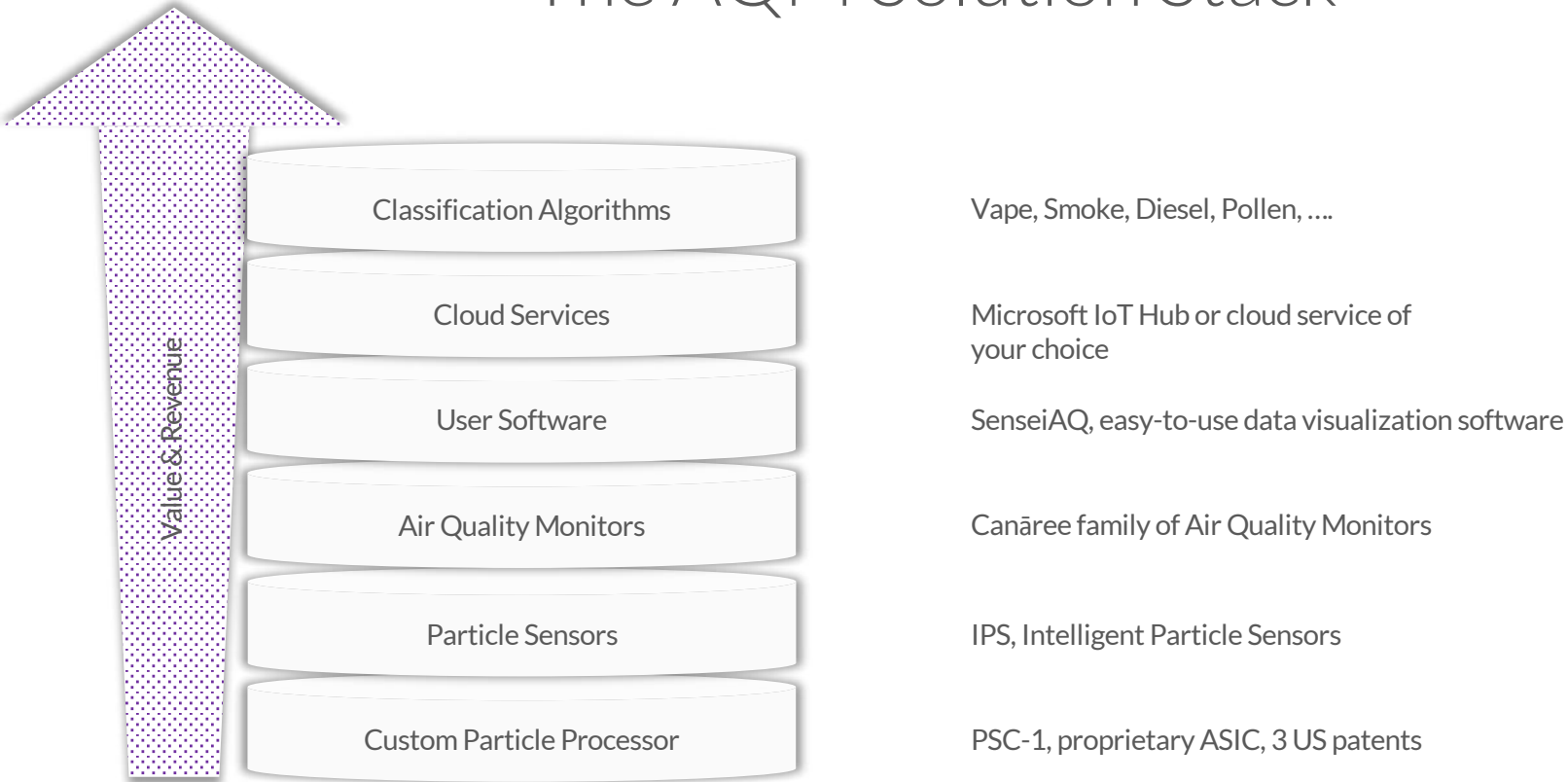
# Vape/Smoke Detection

- Highly accurate event detection; within 30 seconds
- Distinguishes smoke from vape with proprietary algorithms
- SenseiAQ displays events as they happen and logs them
- LED on Canaree flashes **red** for smoke and **purple** for vape

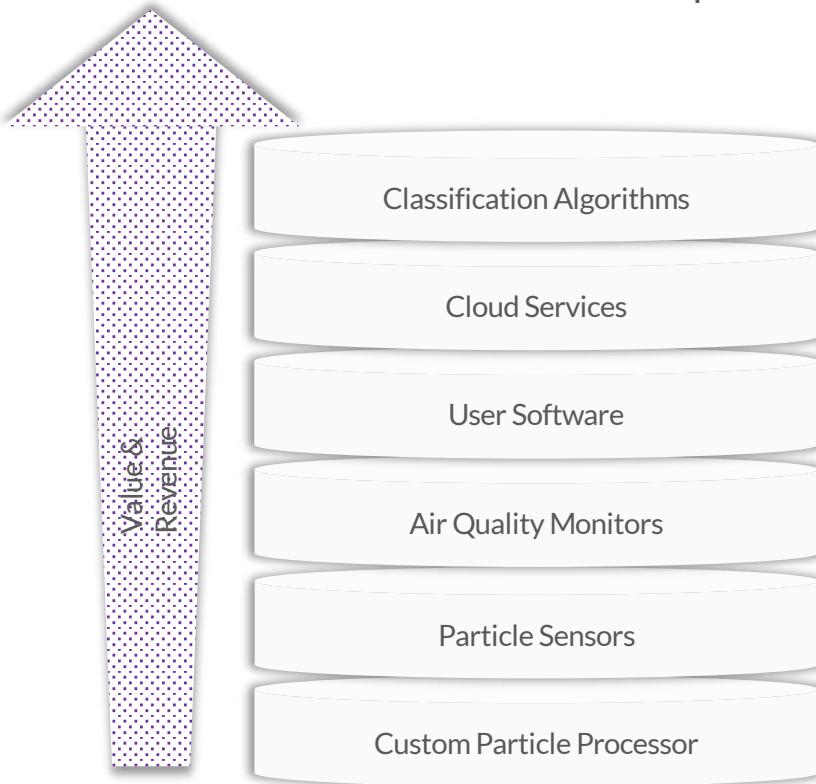


SenseiAQ Cloud Dashboard enables event detection from remote sensors

# The AQM Solution Stack



# The Competition



## Sensor Companies



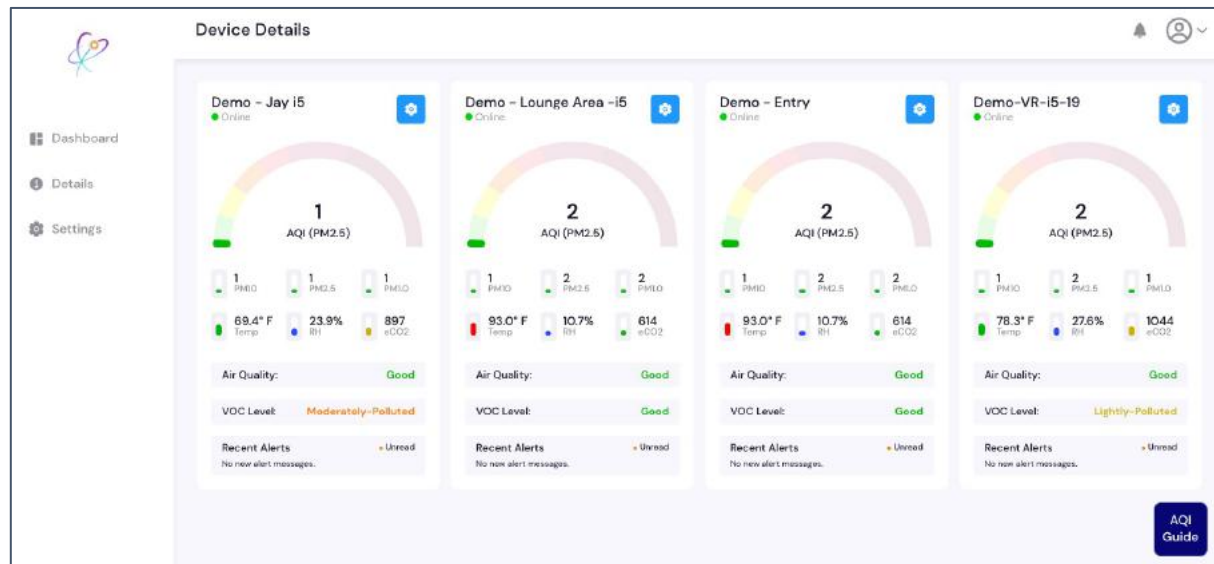
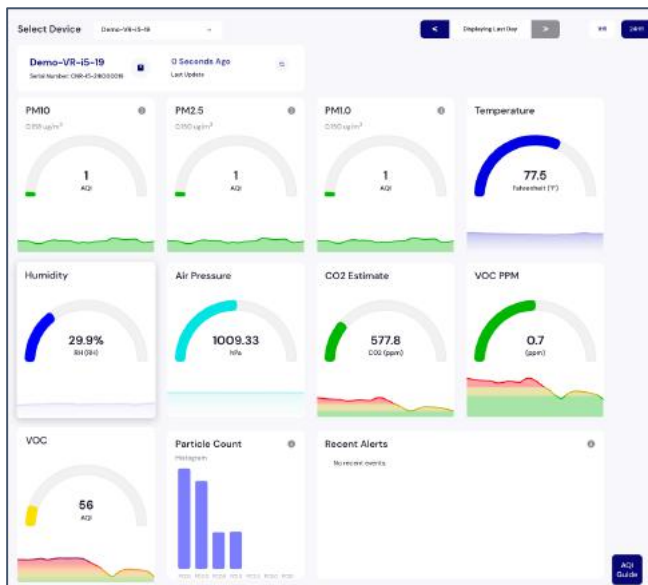
## AQM Companies



Piera is the only company that can classify and identify pollutants



# SenseiAQ Software and Dashboard



[sensei.pierasystems.com](https://sensei.pierasystems.com)

# Our Customers

*"Your sensor is so powerful that it'd be a shame to use it just to control the range hood"*

- Chief Engineer, Faber Spa, Kitchen Appliance Maker

*"We have picked Piera as our long-term partner to attack a vastly untouched sector with a huge demand for robust industrial sensing technology"*

- CEO, Trolex, Mining and Industrial Solutions

*"Human health is directly correlated to sub-micron particles and Piera's sensors are a game-changer as this allows us to monitor air quality at an unprecedented scale"*

- VP, Build Equinox, HVAC equipment & Prof, Univ of Illinois – Urbana Champaign

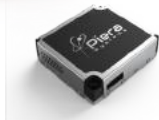
*"Air pollution is an enormous global health problem and our ability to combat it starts with accurately measuring it. We couldn't be more pleased with our collaboration with Piera and the quality of their particle sensors, We are now able to offer highly accurate outdoor air quality monitors while unlocking brand new applications."*

David Löwenbrand, CEO of Sensorbee.

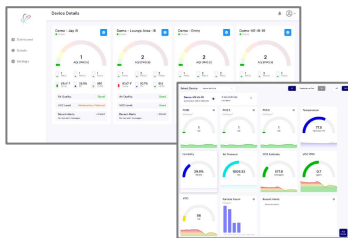
150+ evaluations by commercial, industrial, academic, and citizen scientist groups on 6 continents across a broad range of applications



# Smart Spaces optimize Energy, Health



- Monitor accurately report air quality data



- Inform derive insights, classify sources, remove



- Mitigate employ effective methods to clean the air



Act Now: Install Monitors and start gathering data  
before committing to ESG /ROI goals



# HVAC Systems need the Accuracy

**“... we found very strong correlation of submicron particulates with occupancy, unlike larger particles (>1micron) that did not correlate with occupancy.”**

**“Some fraction of these small particulates are respiratory, and our experiment showed that we could reduce their concentration through both increased fresh air ventilation and improved filtration (MERV13).”**

**“... we think today's standards are half of what they should be ...”**

**“Air cleaning products require in-situ monitoring and control”**

# Certifications, Standards

## Challenge: Indoor Air Quality Test Standards

LEED – Building and its services not health of occupants

WELL – is for People, not prescriptive, audits,

RESET – Focused on Air: A, B, C Grade Monitors

ASTM D8405-1 Certification by AQ-SPEC

ISO 21501-4 Standard for Calibrating Optical Particle Sensors



## Solution

Indoor Air Quality Metrics based on EPA PM 2.5, 10 MC

Most sources of indoor emissions are PM <1.0

Canaree meets WELL, RESET Grade A specs at low cost

[ISO 21501-4 complete](#), ASTM D8405-21 underway.



# ROI for Improving Air Quality

- Improved IAQ for healthier, more productive employees
- Improved Employee Health = \$34 per sq. m
- Improved Staff productivity => \$410 per sq. m
- Possible ROI = 120 %



Increased Indoor  
Air Quality



Healthier Employees,  
Reduced Absenteeism



Increase in  
Productivity

## Indoor Air Quality Matters



People spend  
more than **80%**  
of their time indoors



Indoor Air Quality  
is **2 to 5 x worse**  
than outdoor air quality



Indoor air pollution  
is ranked as one of EPA's  
**TOP 5 environmental  
risks** to public health



**50%** of illness are  
caused by aggravated  
indoor air pollution

[Source: 75F](#)



An aerial photograph showing a dense, vibrant green forest that meets a calm body of water. The water is a clear, light blue color, and the forest is composed of many small, rounded tree canopies. The shoreline is irregular, with the forest following the curve of the water.

No more guessing, know exactly ‘What’s in your Air’

- Most accurate, affordable sensors and air quality monitors

Gain Insight into your Air Quality

- Fine, Very-Fine and Ultrafine particle data needed to identify sources

Let’s partner on new possibilities

- Our disruptive technology empowers new markets and applications
- [www.pierasystems.com](http://www.pierasystems.com)