SHELBOURNE

Use Case

Aura

Measurements Summary

Shelbourne Report- Measurements Summary

High-level Scope of the Pilot:

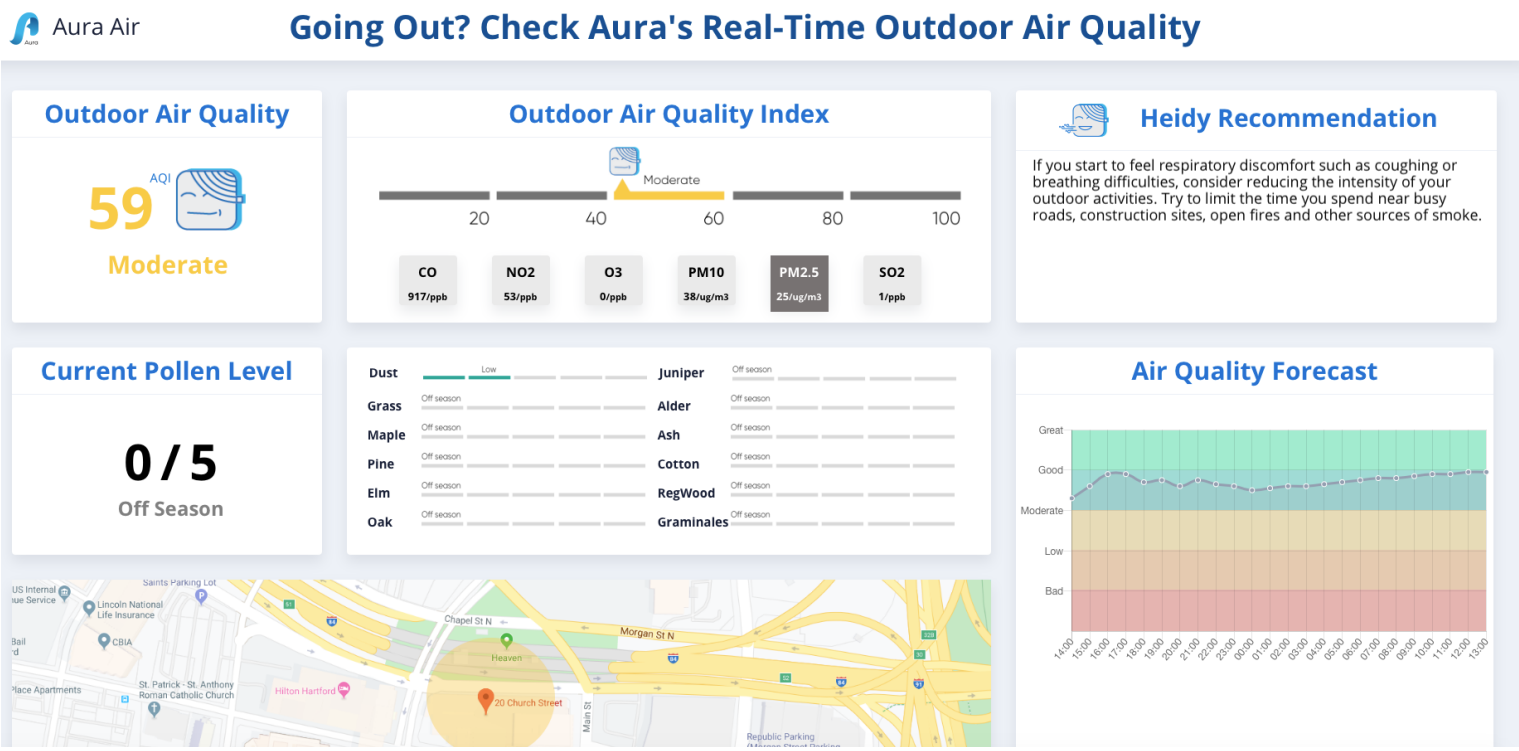
Provide a comprehensive solution for improving and managing the air quality in a conference room in 20 Church Street building, while increasing awareness of air quality in the entire building. The pilot will be executed through an interactive data-based approach providing recommendations for the property manager, tenants, and visitors.

Pilot's Schedule:

Phase 1:
Measurement:
Since November 19th at 12:30 PM, the device was installed in Shelbourne's conference room without air purification and disinfection capabilities. We measured the following parameters: VOC, CO2, PM 2.5, PM10, temperature, humidity and AQI, to provide a comprehensive report.

Shelbourne Report- Measurements Summary

Phase 2:
Measurement and Treatment:
Since December 2nd at 5:00 PM, the device was installed with the purification and disinfection components. In addition, we placed a display screen in the lobby with real-time air quality measurements and recommendations.



Key Parameters and their Health Effect:

VOC's

Volatile organic compounds are compounds that easily become vapours or gases. They are released from burning fuel such as gasoline, wood, coal or natural gas. They are also released from many consumer products such as cigarettes, solvents, paints, glues, wood preservatives, cleaners, disinfectants, air fresheners, building materials, pesticides and more. Formaldehyde, ethanol, toluene, and benzene are just a few examples of VOC's. Not all VOC's are harmful, but a large number of them are. Some of the health effects of VOC's are short-term such as irritation of the eyes, headaches, and dizziness. Others have long term effects such as fatigue, loss of coordination, liver and kidney damage and even cancer.

CO2

Carbon dioxide is a colorless gas that is naturally present in the earth's atmosphere. It is produced by all the organisms on earth that perform respiration. It is an essential gas for life on earth since plants use it for photosynthesis. However, in high concentration that can often occur in indoor environments, it can have harmful effects that may include headaches, dizziness, restlessness, tingling or pins/needles feeling, difficulty breathing, sweating, tiredness, and increased heart rate. That's why it is important to monitor its levels in indoor environments.

PM 2.5 and PM 10

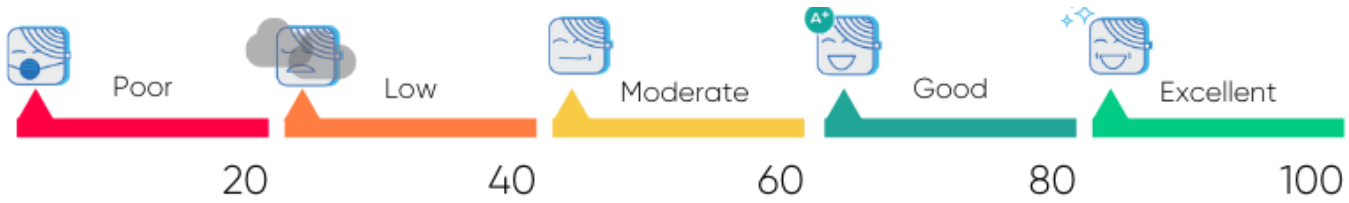
Particulate matter (PM) or also known as atmospheric aerosol particles are microscopic solid or liquid matter suspended in the atmosphere of Earth. These particles include coarse particles with a diameter of 10 μm or less (PM10) and fine particles with a diameter of 2.5 μm or less (PM2.5). PM10 includes particles as dust, pollen, and mold. PM2.5 includes particles such as combustion particles, organic compounds, metals, bacteria and more. The effects of inhaling particulate matter that has been widely studied in humans and animals include asthma, lung cancer, respiratory diseases, cardiovascular disease, premature delivery, birth defects, low birth weight and premature death.

Indoor Air Quality Standards

AQI

An air quality index (AQI) is used by government agencies to communicate to the public how polluted the air currently is or how polluted it is forecast to become. Different countries have their own air quality index, corresponding to different national air quality standards.

Aura air quality index (AQI) was developed based on academic research, national AQIs, and other important considerations.
The AOI scale goes from 0='poor' to 100='excellent' with 5 color-coded categorise of equal lengths, as you can see below:



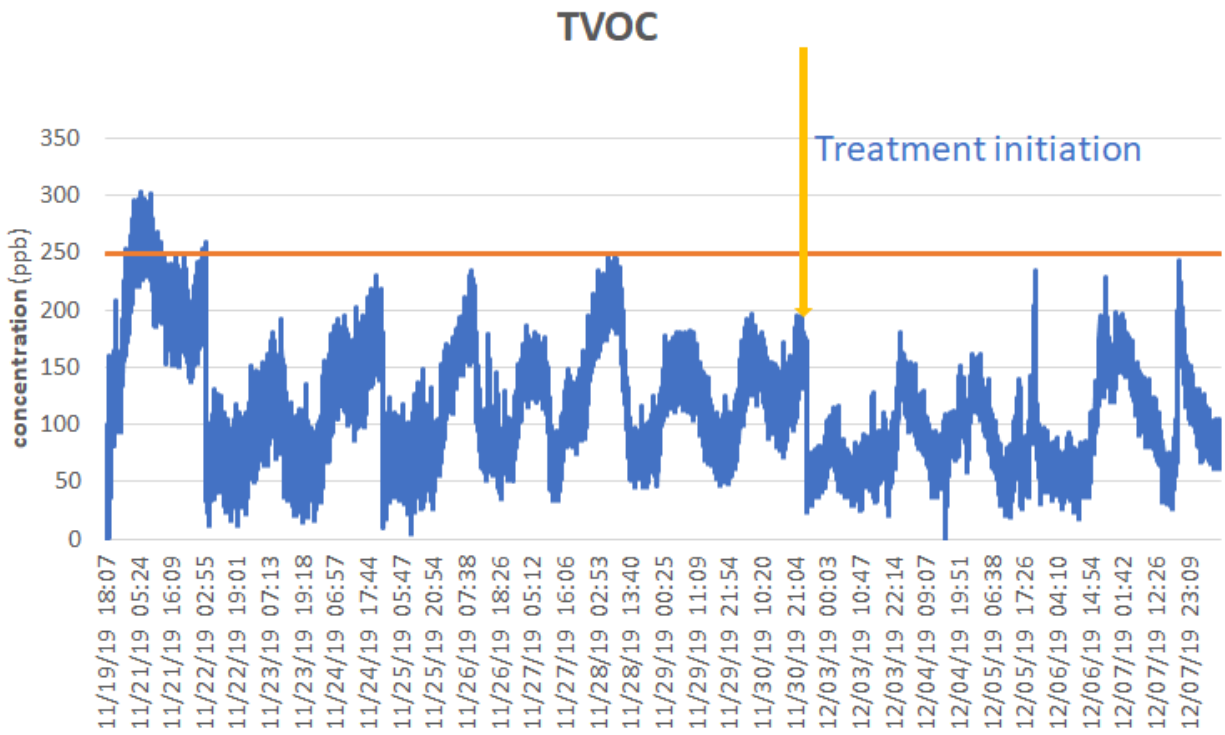
OSH

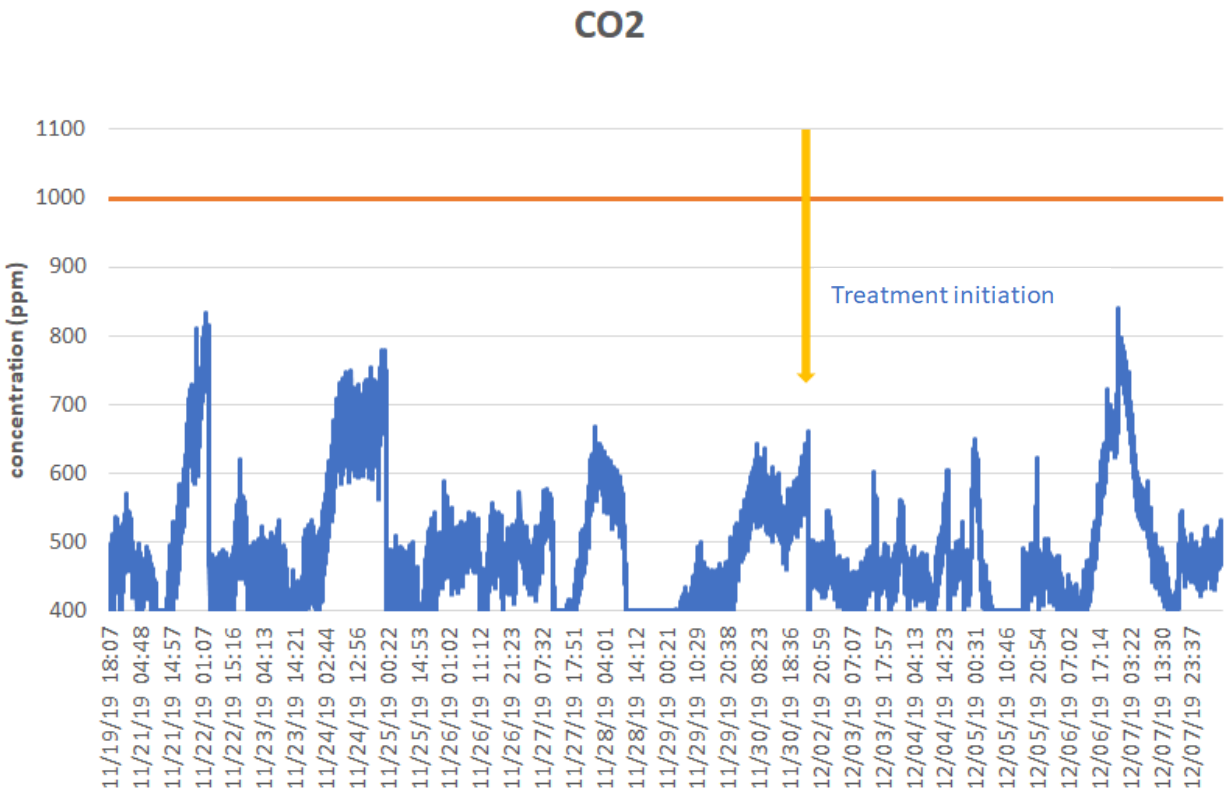
Occupational safety and health is a field that ensures the safety and health of the people at work [13]. Each country has its own set of standards and regulatory authority to enforce them. The first standards for indoor air quality and air testing started from this field, especially in industries like coal mining, gas, and petrochemical processing in which people are exposed to chemicals during their workday but it also evolving to more modern work environments like offices and open spaces.

LEED

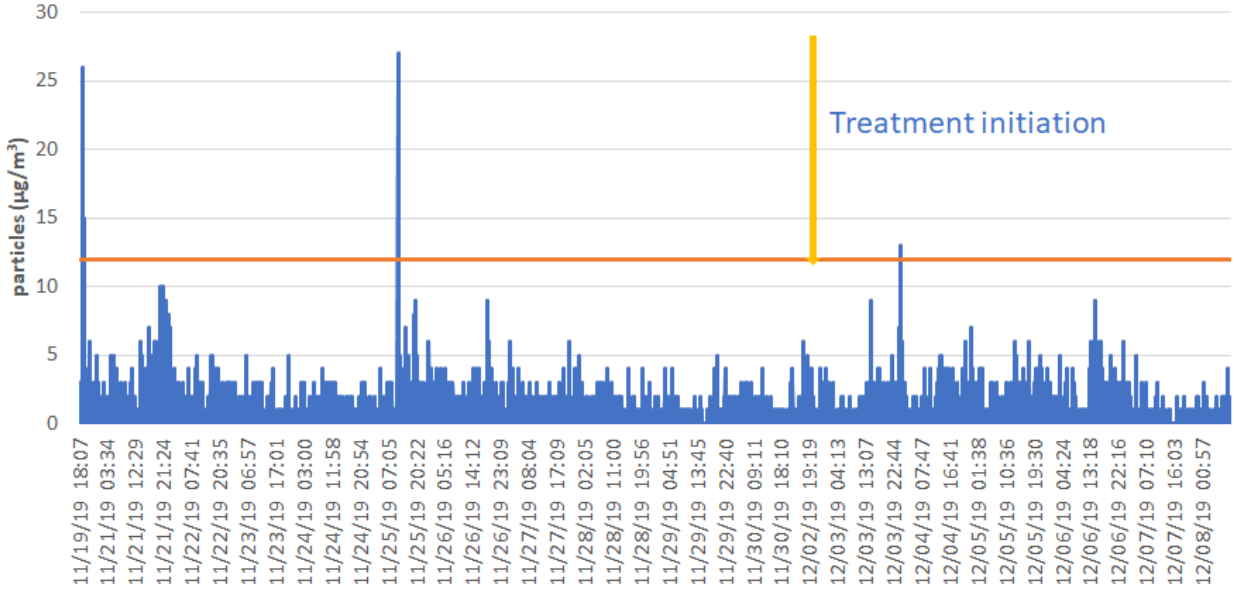
Leadership in Energy and Environmental Design (LEED) is one of the most popular green building rating system in the world. Green building is the practice of designing, constructing and operating buildings to maximize occupant health and productivity, use fewer resources, reduce waste and negative environmental impacts, and decrease life cycle costs. When it comes to indoor air quality, LEED defines standards of certain pollutants that has to be monitored prior to the occupancy of a new building or after renovation of an old one. These pollutants include PM2.5, PM10, CO, ozone, tVOC, Formaldehyde and specific VOC's like Benzene and Toluene. The disadvantage of LEED standards is that it doesn't monitor those pollutants after occupancy.

Measurement Data

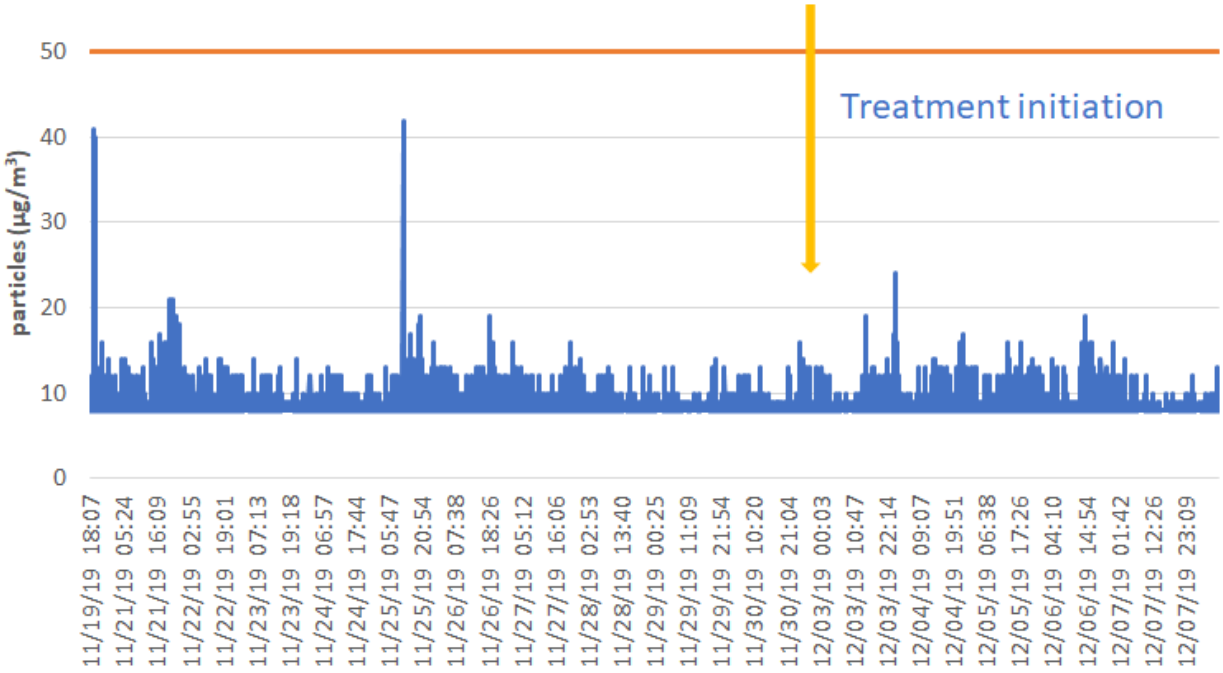




PM2.5


Treatment initiation
particles (µg/m³)
30
25
20
15
10
5
0
11/19/19 18:07
11/21/19 03:34
11/21/19 12:29
11/21/19 21:24
11/22/19 07:41
11/22/19 20:35
11/23/19 06:57
11/23/19 17:01
11/24/19 03:00
11/24/19 11:58
11/24/19 20:54
11/25/19 07:05
11/25/19 20:22
11/26/19 05:16
11/26/19 14:12
11/26/19 23:09
11/27/19 08:04
11/27/19 17:09
11/28/19 02:05
11/28/19 11:00
11/28/19 19:56
11/29/19 04:51
11/29/19 13:45
11/29/19 22:40
11/30/19 09:11
11/30/19 18:10
12/02/19 19:19
12/03/19 04:13
12/03/19 13:07
12/03/19 22:44
12/04/19 07:47
12/04/19 16:41
12/05/19 01:38
12/05/19 10:36
12/05/19 19:30
12/06/19 04:24
12/06/19 13:18
12/06/19 22:16
12/07/19 07:10
12/07/19 16:03
12/08/19 00:57

PM10


Treatment initiation
particles (µg/m³)
50
40
30
20
10
0
11/19/19 18:07
11/21/19 05:24
11/21/19 16:09
11/22/19 02:55
11/22/19 19:01
11/23/19 07:13
11/23/19 19:18
11/24/19 06:57
11/24/19 17:44
11/25/19 05:47
11/25/19 20:54
11/26/19 07:38
11/26/19 18:26
11/27/19 05:12
11/27/19 16:06
11/28/19 02:53
11/28/19 13:40
11/29/19 00:25
11/29/19 11:09
11/29/19 21:54
11/30/19 10:20
11/30/19 21:04
12/03/19 00:03
12/03/19 10:47
12/03/19 22:14
12/04/19 09:07
12/04/19 19:51
12/05/19 06:38
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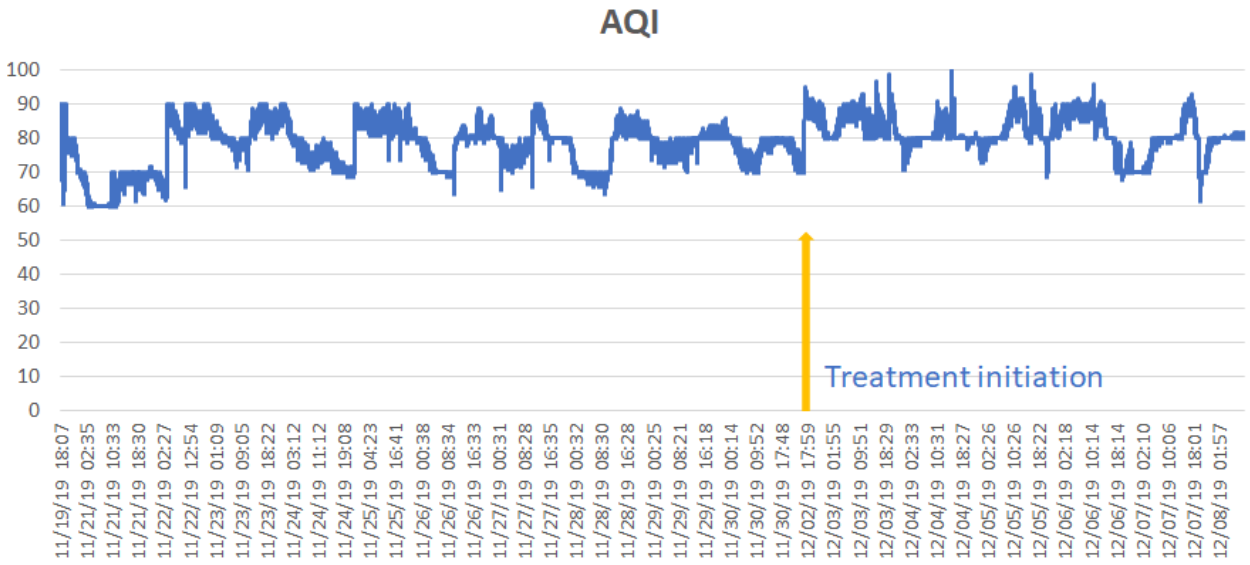
12/07/19 01:42
12/07/19 12:26
12/07/19 23:09


AQI
100
90
80
70
60
50
40
30
20
10
0
Treatment initiation
11/19/19 18:07
11/21/19 02:35
11/21/19 10:33
11/21/19 18:30
11/22/19 02:27
11/22/19 12:54
11/23/19 01:09
11/23/19 09:05
11/23/19 18:22
11/24/19 03:12
11/24/19 11:12
11/24/19 19:08
11/25/19 04:23
11/25/19 16:41
11/26/19 00:38
11/26/19 08:34
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11/27/19 08:28
11/27/19 16:35
11/28/19 00:32
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11/30/19 09:52
11/30/19 17:48
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12/03/19 18:29
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12/04/19 10:31
12/04/19 18:27
12/05/19 02:26
12/05/19 10:26
12/05/19 18:22
12/06/19 02:18
12/06/19 10:14
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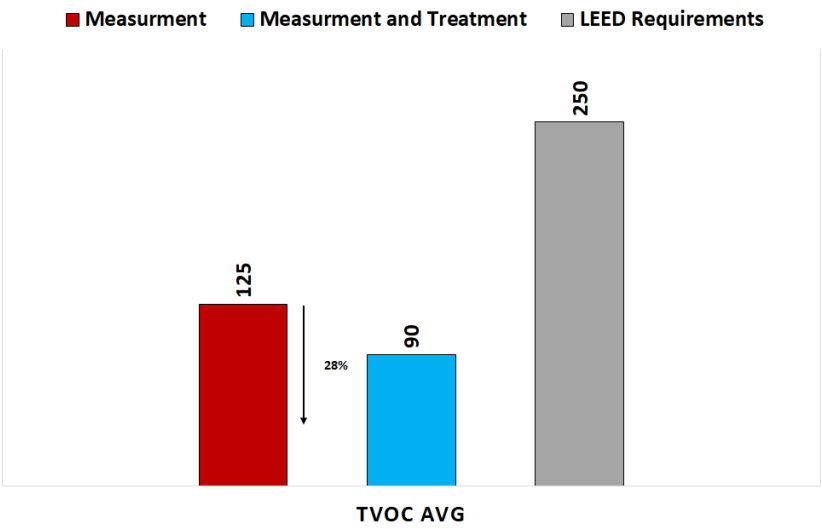
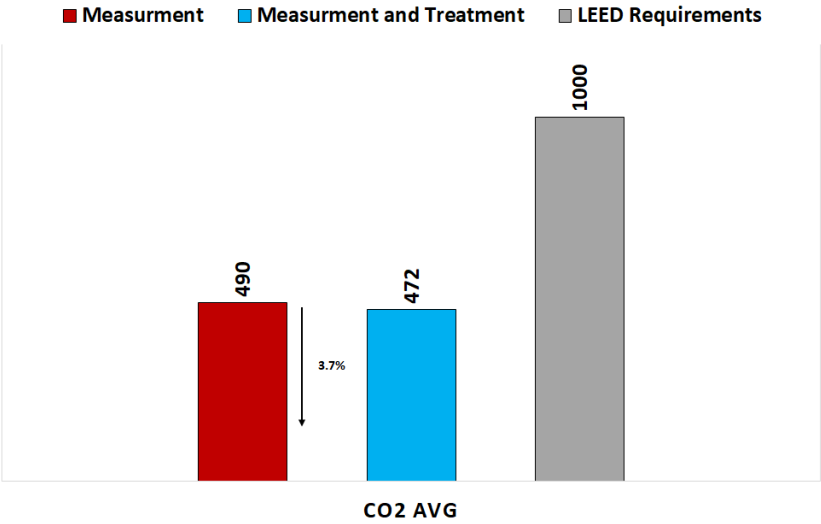
12/07/19 10:06
12/07/19 18:01
12/08/19 01:57

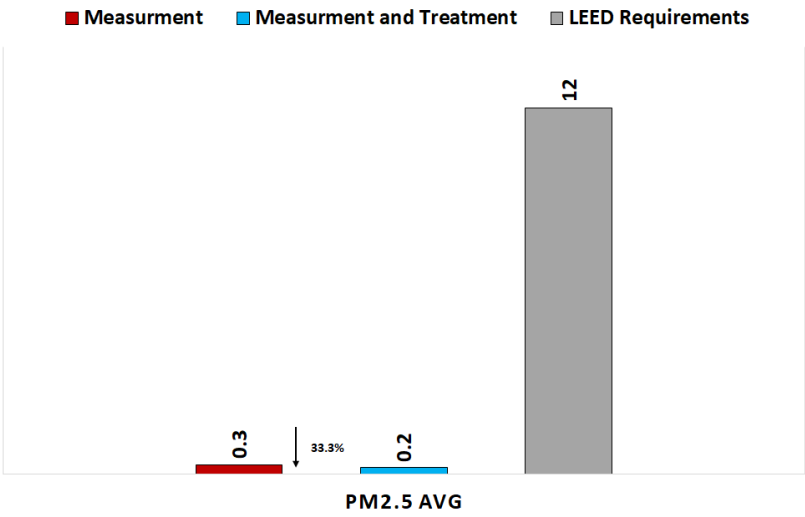
Data Summary and Analysis



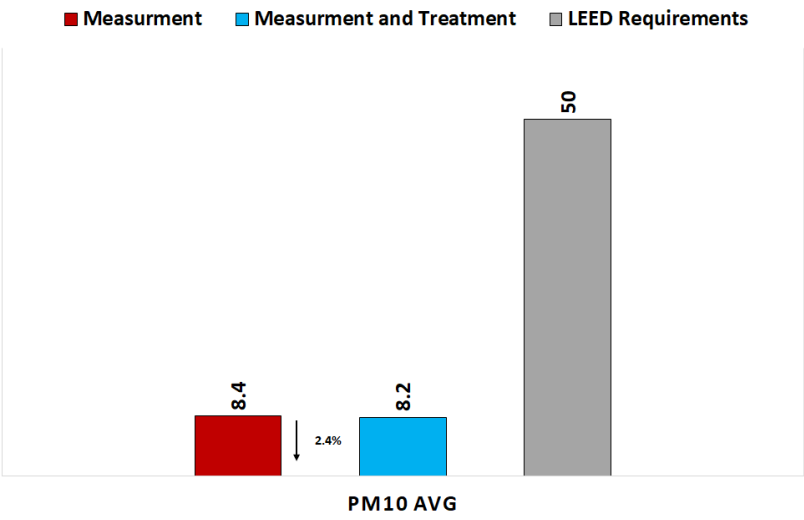
There was a significant improvement in the average value of TVOC when operating AURA with the treatment algorithm. The average TVOC decreased by 28% from 125 ppb to 90 ppb, improving the air quality of the room. Aura's Ray Filter, which has activated carbon, is responsible for the significant improvement seen.



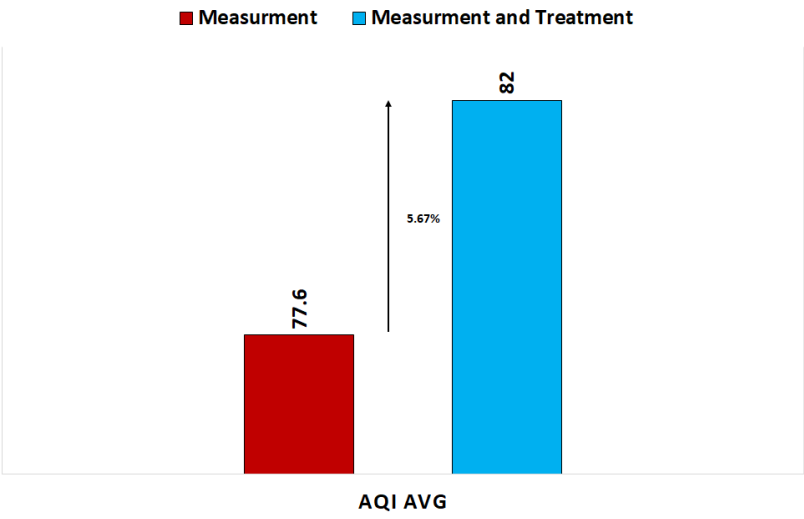
There was a slight decrease in the CO2 levels in the meeting room. Overall the CO2 level in the room is low and caused by the high flow rate of fresh air flowing into the room- something that could be more efficient and save energy if done by demand according to the AURA CO2 sensor.



There was an improvement of 33.3% in the PM2.5 average value- that is due to the HEPA layer in the RAY filter of Aura. Overall the levels of PM2.5 are very low, much lower than the LEED requirements.



There was a slight improvement of 2.4% in the PM10 average value. Overall the levels of PM10 are very low, much lower than the LEED requirements.



The Aura device produced a significant increase of 5.67% in the room's air quality, improving the overall air quality from a good level to one that can be classified as excellent.