

# Sustainability Assessment of COVID Solutions for Airports: Materials, Energy, Air Quality, Water and Cleaning Challenges

## **Airport Consultants Council Planning and Environmental Committee Contributors**

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**January 14, 2021**

## Executive Summary

Multiple governments and industry groups have shared reports and planning guides that provide recommendations to help the aviation industry (and others) in responding to and recovering from the impacts of the COVID-19 pandemic. Considerations for sustainability impacts on airport facilities and operations as it relates to these COVID-19 recommendations must also be considered by airport facility management, operations, concessions, and environmental departments so that airports can meet their long-term energy and sustainability goals. Members of the ACC Planning and Environmental Committee reviewed guidance from aviation and other industry-related resources and identified measures, challenges and recommendations that could contribute to helping airports meet their sustainability goals related to waste management, cleaning protocols and energy, air quality and water management. These topic areas were specifically targeted due to their significant impact to sustainable operations.

## Materials Management

The rate, quantity, and type of materials that airports are recycling and putting in the landfill since COVID-19 has significantly changed. Increased or new waste products include disposable masks and other PPE, coffee cups and other disposable dining products. With fewer passengers, there is much less waste overall which is a good thing for Reduce, Reuse and Recycle waste management goals. While the main priority of waste management during COVID-19 is to protect human health, including perceptions of risk, certain practices could be adjusted to maintain or increase the diversion rates from the landfill. This section analyzes guidance from the ACI-NA Environmental Affairs Committee, Waste Management Working Group, *Waste Management COVID-19 Response, Roadway to Recovery*, jointly issued U.S. Departments of Transportation, Homeland Security, and Health and Human Services and the American Institute of Architects' (AIA) *Re-occupancy Assessment Tool*.<sup>1,5,6</sup>

COVID-19 Measure	The Challenge	Recommendations
<b>Wear masks or cloth face coverings and other personal protection equipment (PPE)<sup>1</sup></b>	The World Health Organization (WHO) estimates a global use of 89 million masks and 76 million gloves each month. A disposable mask will last 450 years in our environment. <sup>2</sup> The Centers for Disease Control and Prevention (CDC) and other well-known health organizations have released clear guidelines on the type of mask that is most effective. <sup>3</sup> These guidelines do not say that people should use disposable masks, yet millions of people are using billions of disposable masks, creating massive amounts of waste worldwide. <sup>4</sup>	<ul style="list-style-type: none"> <li>• Consider promoting the purchase of or supplying reusable masks for passengers who do not have one. Determine if COVID-19 funding could be used towards this cost differential.</li> <li>• Review concessions selling masks and encourage them to sell reusable masks.</li> </ul>
<b>Consistent with CDC and OSHA guidance, dispose of public PPE (gloves/masks) in landfills. They are not considered a biohazardous waste to be disposed of separately.<sup>5</sup></b>	Airports are utilizing existing collection containers for waste PPE; however, collection container labeling is needed to clarify where masks and gloves should be disposed. The ACI-NA Waste Management Working Group does not recommend separate recycling of PPE in public spaces. <sup>5</sup>	<ul style="list-style-type: none"> <li>• Consider installing bins for non-public areas for janitorial and TSA staff to recycle disposable masks and other PPE. There are at least two recycling companies who will specifically take PPE for a cost.<sup>5</sup></li> </ul>
<b>Eliminate shared serving utensils or bins for cutlery; mandate use of disposable utensils/plates/bowls.<sup>6</sup></b>	An excessive amount of trash is being sent to the landfill due in part to switching to disposables. Some U.S. cities saw an average increase of 20% in municipal	<ul style="list-style-type: none"> <li>• If airplane cabins and restaurants at airports formerly supplied non-disposable utensils and have now switched to disposables,</li> </ul>

COVID-19 Measure	The Challenge	Recommendations
	<p>solid waste and recycling collection from March into April 2020, according to data from the <a href="#">Solid Waste Association of North America</a>.<sup>4</sup></p> <p>In addition, airlines and airports that must separately sort their recycling may not be recycling due to the associated health risks. This response is a temporary solution due to the COVID pandemic and it is anticipated that recycling will go back to normal operations when possible.<sup>5</sup></p> <p>Airports will still need to follow disposal requirements for deplaned international waste, which does not permit recycling.</p>	<p>airports should coordinate with their concessionaire management companies to determine when reusables will be reintroduced.</p> <ul style="list-style-type: none"> <li>• Recommend green concessionaire policies that include disposable items that are compostable (only if there is a compost program in place at the airport), made with recycled content, or recyclable. Airports need to identify centralized collection points for recycling and compost bins to facilitate easy recycling/composting. Consider joining the growing number of airports with composting programs (Seattle, Portland, San Diego, San Francisco, and Chicago).<sup>7</sup></li> </ul>

## Cleaning and Disinfecting Considerations

While cleaning and disinfecting activities have increased across the airport and airline industry, the sustainability and resiliency of these measures relies on keeping employees and passengers safe, using the right products, and increasing confidence in these and other measures to encourage passengers to fly again. This section analyzes guidance from the *Roadway to Recovery*, jointly issued U.S. Departments of Transportation, Homeland Security, and Health and Human Services and the Airport Council International North America (ACI-NA), Environmental Affairs Committee, Airport Industry Recover Issue Briefing: Industrial Hygiene Issues.<sup>1,8</sup>

COVID-19 Measure	The Challenge	Recommendation
<p><b>Enhance Cleaning and Disinfection Procedures</b><sup>1,8</sup></p>	<p>In a survey conducted by the CDC in May 2020, 1 in 3 adults used chemicals or disinfectants unsafely while trying to protect against COVID-19.<sup>9</sup></p> <p>Additionally, confirming products that will effectively disinfect for the coronavirus will be critical.</p>	<ul style="list-style-type: none"> <li>• Train staff responsible for cleaning and disinfecting. Some cleaning products can be hazardous, causing problems such as rashes, burns, coughing and asthma. There could be chemicals inhaled or that could get on the body that are not meant to.<sup>1,8</sup></li> <li>• Only using cleaning agents that are on EPA’s registered list of COVID-19 compliant products will help make sure that the products are effective.<sup>10</sup></li> </ul>
<p><b>Communicate and make visible enhanced cleaning and disinfecting activities</b><sup>8</sup></p>	<p>This is one of the biggest challenges airports and airlines will face as they strive to increase passenger confidence in travel. Communicating with data on the effectiveness of virus containment both at the airport and on flights will be critical.</p>	<ul style="list-style-type: none"> <li>• Enhancing the visibility (and frequency) of cleaning activities may be appropriate to alleviate fears of both employees and passengers.<sup>8</sup></li> </ul>
<p><b>Consider health and wellness related certifications to increase passenger confidence</b></p>	<p>With so many certification offerings available related to health and wellness, both building and airport specific, a feasibility study is recommended prior to selecting the most appropriate one. The WELL Building Standard has been around the longest with about half a dozen registered airports, none certified yet. SFO’s Harvey Milk Terminal 1</p>	<ul style="list-style-type: none"> <li>• There are several health and wellness rating systems to consider to further increase passenger confidence such as:               <ul style="list-style-type: none"> <li>○ the ACI Airport Health Accreditation program<sup>11</sup></li> <li>○ the WELL Health and Safety Rating.<sup>12</sup> In addition, the WELL Building Standard<sup>13</sup> is in</li> </ul> </li> </ul>

COVID-19 Measure	The Challenge	Recommendation
	Center has become the first Fitwel certified airport specific building. All the additional rating systems listed are new to the market and have come into development in response to the COVID pandemic.	<p>development of a WELL for Airports.</p> <ul style="list-style-type: none"> <li>○ Fitwel Building Certification which now includes a Viral Response Module to respond to the COVID 19 pandemic.<sup>14</sup></li> <li>○ the American Association of Airport Executives (AAAE) and the Global Biorisk Advisory Council (GBAC) has established a formal partnership to accredit airports called the GBAC STAR Facility Accreditation.<sup>15</sup></li> </ul>

## Energy Management and Indoor Air Quality

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) provides sound guidance based on HVAC strategies to reduce virus transmission in its *ASHRAE Position Document on Infectious Aerosols* and *ASHRAE Building Readiness*.<sup>16,17</sup> Some of the strategies recommended will have impacts on energy usage, HVAC performance, indoor air quality, and comfort for the short term and long term to consider.

COVID-19 Measure	The Challenge	Recommendations
<b>Higher Minimum Efficiency Reporting Values (MERV) filters for dense or high-risk spaces</b>	MERV ratings are a measure of the ability for a filter to clean the air. The higher the MERV value, the cleaner the air. However, the higher the MERV value, the thicker the filters and the higher the static pressure, resulting in a reduction of airflow than would normally occur with the filtration system as designed.	<ul style="list-style-type: none"> <li>● Check with your building engineer to determine ability for the air handling unit system to take on a higher MERV rated filter.</li> <li>● ASHRAE recommends a MERV 13 or 14 filter.<sup>17</sup></li> <li>● A portable free-standing High Efficiency Particulate Air (HEPA) filter may work best for areas of high occupancy density such as TSA check points.</li> </ul>
<b>Monitor indoor air</b>	Evidence of real time good air quality will help instill a higher level of passenger confidence. Simple visible signs can be used	Measure indoor air using environment quality sensors located throughout public spaces ideally connected to the building controls system

COVID-19 Measure	The Challenge	Recommendations
	<p>to indicate good air quality based on measured data.</p> <p>Based on a study by Gensler and View in June 2020, passengers listed continuous environmental monitoring and real-time display of environmental conditions as two of the top strategies associated with increased passenger confidence.<sup>18</sup></p>	<p>to provide alerts when indoor air conditions are not satisfactory. Consider integrating air quality sensors into public information displays. This could be a consideration for airplanes too. However, there would need to be a quick method of corrective action in case of bad air quality conditions such as a flush out with well filtered outside air and/or moving passengers to different gates or different TSA checkpoints.</p>
<p><b>Increase outdoor air ventilation rates</b></p>	<p>ASHRAE suggests increasing outdoor air ventilation. Acceptable levels are defined by ASHRAE Standard 62. While some rating systems such as LEED and the Well Building Standards recommend outdoor air levels 30% more than ASHRAE Standard 62 for good ventilation air quality, the new WELL Health and Safety rating system recommends 10 Air Changes Per Hour.</p>	<ul style="list-style-type: none"> <li>• 30% increased ventilation from ASHRAE 62 should provide enough outside air ventilation quantities in an airport environment. However, due to potential poor outdoor air quality due to aircraft exhaust, check with your building engineer to determine if filtration levels are appropriate.</li> </ul>
<p><b>Open outdoor air dampers to 100% as indoor and outdoor conditions permit</b></p>	<p>100% outdoor air for spaces would be a huge energy penalty when temperatures outdoors are not within comfort ranges.</p>	<ul style="list-style-type: none"> <li>• See Outdoor Ventilation Rates recommendations above.</li> <li>• If your air side economizer does allow for 100% outside air within a certain temperature range of outdoor comfort conditions, consider widening that range a couple of degrees on both ends of the range without a significant energy penalty assuming your design is slightly oversized to begin with. Check with your design engineer on the details.</li> <li>• In hot and humid climates that do not have economizer</li> </ul>

COVID-19 Measure	The Challenge	Recommendations
		opportunities, increase ventilation based on cooling coil or space conditions. See ASHRAE Building Readiness for additional guidance. <sup>17</sup>
<b>Pre-or Post-Occupancy Flush</b>	Flush the building for 3 air changes per hour of outside air, or for 2 hours pre and 2 hours post occupancy to obtain approximately 95% reduction in concentration of airborne infectious particles. <sup>17</sup>	<ul style="list-style-type: none"> <li>• If the airport has limited usage, an airport could consider condensing occupied areas as well (i.e., shut down sections of terminals) to reduce operational costs.</li> </ul>
<b>Bypass energy recovery ventilation systems (ERV) that leak potentially contaminated exhaust air back into the outdoor air supply</b>	This should be examined closely as there are many types of ERVs, and some have zero leakage back to the indoor air. There could be a significant energy penalty in bypassing the ERV system, particularly in peak summer and winter conditions.	<ul style="list-style-type: none"> <li>• Confirm the ERV is working properly, inspect it for proper seals, and make sure it has been tested, balanced and commissioned.<sup>21</sup></li> <li>• See ASHRAE’s Practical Guidance for Epidemic Operation of ERV systems for further guidance.<sup>21</sup></li> </ul>
<b>Add ultraviolet germicidal irradiation (UVGI) devices</b>	<p>UVGI devices, most specifically those using UV-C light, provide light in the electromagnetic spectrum to kill, or prevent the growth of, virtually all known microorganisms including COVID-19.</p> <p>UVGI lighting is recommended but consider how to minimize impacts of radiation if the UVGI lighting is placed in the occupied zone instead of in an air handler.</p>	<ul style="list-style-type: none"> <li>• Consider UVGI in ductwork or air-handling units serving high density spaces. Or consider a ceiling mounted, or portable UVGI devices.<sup>19</sup></li> <li>• Consider weighing the cost and benefit of UVGI vs a high efficiency MERV filter or portable HEPA filter.</li> <li>• Some airports at the forefront of indoor air quality have been incorporating air quality products that use a combination of UVGI, MERV and carbon filters, such as at Los Angeles, San Diego, Pittsburg, San Francisco, and New York.<sup>20</sup></li> </ul>

## Water Management

This section explores guidance from AIA’s *Re-occupancy Assessment Tool* on water management that includes water bottle refill stations and touchless restrooms, both very applicable to airports and some to airplanes.<sup>6</sup>

COVID-19 Measure	The Challenge	Recommendation
<p><b>Eliminate drinking fountains, replace with touchless glass/drinking bottle filling station.</b></p>	<p>Replace outdated drinking fountains with touchless water bottle refill stations. The challenge may lie in the budget for the quantity that may be needed to replace all the fountains at an airport.</p>	<ul style="list-style-type: none"> <li>• Consider grouping projects together into one major project to reduce costs.</li> <li>• Change design standards to make this update for all new construction and renovation projects.</li> <li>• Consider banning the sale of single-use plastic water bottles to encourage passengers to bring their own bottle such as at San Francisco International Airport in 2019.<sup>22</sup></li> </ul>
<p><b>Replace flush valves and faucets with hands-free devices, add touchless handwashing / hygiene stations</b></p>	<p>Many people try to avoid touching surfaces in a public restroom. Investments in new fixtures and more space per restroom is helpful to minimize surface touches. If your airport already has touchless fixtures, consider innovations and technology available to accommodate the touchless toilet partition door.</p>	<ul style="list-style-type: none"> <li>• Design standards should incorporate the touchless restroom and space constraint of restrooms to improve personal hygiene.</li> <li>• Airlines should consider developing the touchless restroom concept into existing and new planes.</li> <li>• Airports are going touchless, with airports such as Dallas Fort Worth and Los Angeles leading the way.<sup>23</sup></li> </ul>

## Conclusion

Federal Aviation Administration funding may be available for the planning aspects of some of these ideas through the Airport Improvement Program (AIP) or other FAA funding programs. Each project should be evaluated individually for funding eligibility purposes.

COVID-19 protocols for health and safety are critical to follow consistently across airports and airlines. Some of the measures included in this article will go a long way in increasing passenger confidence and improving the passenger experience. Many other recommendations can be used to maintain and improve airport sustainability and resiliency goals. COVID-19 measures taken by airports should consider the impact that decisions have on the long-term viability of their airport, their community and the planet.

## About the Authors

**Renée Azerbegi** leads **Ambient Energy** and our aviation portfolio by inspiring clients to create top performing buildings based on resilient and regenerative design principles. Ambient Energy celebrates sixteen years of **Building Performance, Commissioning** and **Sustainability Consulting** as a women-owned small business for the new and existing commercial building market from our Denver and San Francisco locations. Having provided services for large hub airports nationwide, such as DEN, SFO, SJC, BNA, DAL and more, we understand the unique sustainability and energy challenges and strategies appropriate for aviation projects.

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## Acknowledgments

Thanks to the ACC Environment and Planning committee members and friends for their valuable insights in review of this paper including:

Vivek Sindhamani	Netherlands Airports Consultants
Roeland Visser	InterVISTAS Consulting Inc.
Morgan Turner	Mead and Hunt
Jen Acton	San Francisco International Airport
Wade Conlan and Melissa Vasher	Hansen
Steven Harrill	Pond
Kristi Crase	View

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## Water Management

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