City of Long Beach **Memorandum**

Working Together to Serve

Date: January 11, 2019

To: Patrick H. West, City Manager

From: Jess L. Romo, Director, Long Beach Airport

For: Mayor and Members of the City Council

Subject: **Status Update on Airport Sustainability**

This memorandum provides an update to the Long Beach Airport's (Airport) plan to be a national leader in airport sustainability. In response to the City Council's action in August 2018, the Airport shared an outline of a broad plan with the Mayor and City Council via memorandum, dated September 17, 2018. This included a plan to assess many opportunities associated with sustainability. The Airport also made a commitment to develop the plan within 180 days, and this commitment has been met. In collaboration with a consultant team well-versed in all aspects of sustainability, a Sustainability Plan Outline (Outline) has been completed and is attached for your review. This document will serve as a planning document and is complementary to a Request for Qualifications (RFQ) on Airport sustainability expected to be released later this month.

While the Airport initially planned to move forward with the RFQ shortly after the September update to the Mayor and City Council, the decision was made to hold back release of the RFQ until a draft of the Outline was prepared. This ensures that the scope of services being solicited in the RFQ and Outline are aligned. The RFQ provides for a minimum of 60 days to allow sufficient time for firms to respond to the RFQ. The Airport also anticipates the process will allow for a varied and reasonable number of qualified firms to assist in implementing measurable, meaningful, and financially feasible sustainability goals and programs for the City and the Airport. As previously stated in communications with the Mayor and City Council, the Airport will involve many interested stakeholders and will include input by the Sustainable City Commission and the Airport Advisory Commission.

If you have any questions regarding the Outline, please feel to contact me at (562) 570-2605.

ATTACHMENT

CC: CHARLES PARKIN, CITY ATTORNEY
LAURA L. DOUD, CITY AUDITOR
DOUGLAS HAUBERT, CITY PROSECUTOR
TOM MODICA, ASSISTANT CITY MANAGER
KEVIN J. JACKSON, DEPUTY CITY MANAGER
REBECCA GARNER, ASSISTANT TO THE CITY MANAGER
MONIQUE DE LA GARZA, CITY CLERK (REF. FILE #18-0687)

long beach airport

SUSTAINABILITY PLAN OUTLINE 2019

PREPARED FOR LONG BEACH AIRPORT BY HNTB

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1. Introduction

The City of Long Beach (City), owner and operator of the Long Beach Airport (LGB or Airport) has developed this outline for the development of a Sustainability Plan as a guide to incorporate significant and measurable steps to mitigate the environmental impacts of the Airport. The Long Beach Mayor and City Council have directed LGB staff to develop a plan to lead the nation on sustainability for airports. In a press release dated August 2018, the Office of the Mayor stated, "The initiative asks the Long Beach Airport to work with LGB airlines and other partners to become an incubator of clean tech in aviation, with the goal of becoming a carbon neutral facility."[1]

Executive Order (EO) B-55-18 to Achieve Carbon Neutrality, establishes a new statewide goal to achieve carbon neutrality "as soon as possible, and no later than 2045, and achieve and maintain net negative emissions thereafter."

This Sustainability Plan Outline (SPO) will provide an overview of sustainability initiatives at LGB in several focus areas and conduct an initial assessment of the Airport's potential strengths in its sustainable policies and programs in **Section 2** of the SPO. **Section 3** outlines a potential strategy for decision-making and prioritization of goals. **Section 4** identifies stakeholders who will be critical to the development of the Sustainability Plan. **Section 5** provides a preliminary list of sustainability resources and initiatives, as well as potential funding mechanisms to assist with implementation support. This section also includes a selection of case studies and makes preliminary recommendations for LGB to consider. **Section 6** presents an initial overview of action and monitoring plans or mechanisms to ensure accountability by Airport staff and departments. The SPO will provide an introduction or overview for each of these topics; the overarching goal is for the Sustainability Plan to provide a detailed analysis of focus areas and topics in response to direction from the Mayor and City Council.

[1] City of Long Beach, Office of the Mayor, "A Sustainable Long Beach Airport," Release Date: 2018-08-15, http://www.longbeach.gov/mayor/news/sustainable-airport/ (accessed 11/20/18).

WHAT IS SUSTAINABILITY?

As an important first step in the development of the Sustainability Plan, LGB staff should work with stakeholders to define "sustainability" for the Airport. According to the Sustainable Aviation Guidance Alliance (SAGA), the Triple Bottom Line (environmental stewardship, economic growth and social responsibility) and EONS (economic vitality, operational efficiency, natural resources, social responsibility) are common definitions of sustainability in the airport industry.[2] See **Figure 1**.

Figure 1

EONS Approach to Sustainability

Source: SAGA, http://www.airportsustainability.org/learn , accessed 12/4/18.

CALIFORNIA'S SUSTAINABILITY PRIORITIES

In 2006, the California Global Warming Solutions Act of 2006, also known as AB-32, set the State's first greenhouse gas (GHG) target of reducing emissions to 1990 levels by 2020, and 40 percent emissions reductions below 1990 levels by 2030. More recently, on September 10, 2018, California Governor Jerry Brown built upon this goal with the issuance of *Executive Order (EO) B-55-18 to Achieve Carbon Neutrality*, which establishes a new statewide goal to achieve carbon neutrality "as soon as possible, and no later than 2045, and achieve and maintain net negative emissions thereafter." This new goal is in addition to the existing statewide targets of reducing GHG emissions. The order requires the California Air Resources Board (CARB) to "work with relevant

state agencies to ensure future Scoping Plans identify and recommend measures to achieve the carbon neutrality goal."[3]

California's 2017 Climate Change Scoping Plan adopted by CARB identifies how the State can reach its 2030 climate target to reduce GHG emissions by 40 percent from 1990 levels, and substantially advance toward the 2050 climate goal to reduce GHG emissions by 80 percent below 1990 levels.

LGB SUSTAINABILITY MISSION STATEMENT

A critical early step in developing the Sustainability Plan will be to determine what the Airport desires to achieve by creating a mission statement, or vision. A well-articulated value statement will establish the foundation for LGB's Sustainability Plan. This will be developed with input from the Stakeholder Advisory Group (SAG), as discussed in ***Section 4, Stakeholders***.

2. Baseline Assessment

LGB is committed to being an aviation industry leader in environmental sustainability. The Airport is dedicated to implementing programs and systems to reduce emissions, save energy and water, and to incorporating various sustainability practices to reduce its carbon footprint. The Airport's green improvements implemented thus far have resulted in measurable air quality, energy and water conservation, and sustainability benefits for the Long Beach community and the planet.[4]

It is important for the Sustainability Plan to document fully the current conditions and previously implemented initiatives to develop the most valuable sustainability path for the Airport moving forward. This SPO focuses on several facets of sustainability, with

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[2] Sustainable Aviation Guidance Alliance, "Plan," http://www.airportsustainability.org/plan (accessed 11/12/18).
[3] "Governor Jerry Brown signs SB 100 and Executive Order to achieve carbon neutrality by 2045," Inside Energy & Environment, https://www.insideenergyandenvironment.com/2018/09/governor-jerry-brown-signs-sb-100-and-executive-order-to-achieve-carbon-neutrality-by-2045/ (accessed 11/12/18).
[4] LGB, Environmental Status Report: Green Airport Program, 2012, http://www.lgb.org/civicax/filebank/blobdload.aspx?BlobID=2672 (accessed 11/12/18).

emphasis on the areas of study that will have the most impact on the Airport's overall sustainability, such as air emissions, energy, and water usage. This outline provides current sustainability highlights; however, it is not intended to be an exhaustive list of the Airport's current practices, which will be documented in the Sustainability Plan. The majority of initiatives discussed in this section are reported on LGB's Green Programs website (http://www.lgb.org/information/green/air.asp) or the Airport's 2012 Environmental Status Report, and thus should be confirmed and/or updated in the Sustainability Plan.

2.1 AIR EMISSIONS

REDUCED VEHICLE EMISSIONS

- On-site parking is within walking distance of the terminal. This eliminates the need for satellite parking with shuttles, reducing vehicle emissions.

REDUCED EQUIPMENT EMISSIONS

- The air carrier ramp has preconditioned air and electrical power at each aircraft parking position, which allows pilots to shut off auxiliary power units while waiting at the gate, reducing aircraft and ground vehicle emissions.
- Electric-charging infrastructure allows airlines to switch much of their fossil-fuel burning tugs and baggage loaders to zero emission electric models. These special "fast-charging" ground service equipment (GSE) charging stations effectively reduce the normal charge time of battery-powered equipment to about 20-25% of the normal charge time without damaging the equipment's battery. This reduction allows GSE to perform their duties more efficiently and achieve the same duty cycle as internal combustion equipment in the same capacity.
- LGB has five electric charging stations and airlines have purchased 25 electric vehicles. Additional charging stations will be installed as part of the Airport Modernization Project.
- Twenty-three (23) percent of City vehicles are compressed natural gas (CNG) or hybrid.

STRENGTHS

The Sustainability Plan will evaluate the strengths of the existing programs.

OPPORTUNITIES FOR IMPROVEMENT

The Sustainability Plan will evaluate the areas where the Airport can improve its existing programs or introduce new programs.

GOALS

Building upon the "Opportunities for Improvement," the Sustainability Plan will develop sustainability goals in the focus area of Air Emissions.

2.2 ENERGY

- The Airport is in the process of converting all taxiway lights to LED bulbs. LEDs are brighter than incandescent light bulbs and have a significantly longer lifespan — an estimated seven to 10 years as opposed to one year for incandescent bulbs.
- The Airport is in the process of converting eligible interior lighting in facilities it maintains to LEDs.
- LGB utilizes the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) standards to conserve energy and reduce waste in its construction projects.
- The Airport is saving electricity with photovoltaic (solar) panels. The solar panel project consists of the installation of panels at various locations at the Airport; solar panels will be installed on the rooftop levels of parking structure A and B. These new solar arrays will provide power to the Airport's electrical grid, significantly offsetting electrical usage.
- All passengers enter and exit planes via manually moved staircases and ramps rather than loading bridges commonly found at other airports; this reduces cost and electricity usage.
- The Airport's newly upgraded parking structure A is saving energy with smart sensors, dual switching, and occupancy sensors to control lighting.

STRENGTHS

The Sustainability Plan will evaluate the strengths of the existing programs.

OPPORTUNITIES FOR IMPROVEMENT

The Sustainability Plan will evaluate the areas where the Airport can improve its existing programs or introduce new programs.

GOALS

Building upon the "Opportunities for Improvement," the Sustainability Plan will develop sustainability goals in the focus area of Energy.

2.3 WATER CONSERVATION

- The historic terminal modernization project undertaken in 2013 equipped all restrooms with low-flow toilets and waterless urinals.
- The Airport has cut back on irrigating turf areas in the winter, planted drought resistant shrubs and trees, and installed a computerized irrigation system to reduce waste.

STRENGTHS

The Sustainability Plan will evaluate the strengths of the existing programs.

OPPORTUNITIES FOR IMPROVEMENT

The Sustainability Plan will evaluate the areas where the Airport can improve its existing programs or introduce new programs.

GOALS

Building upon the "Opportunities for Improvement," the Sustainability Plan will develop sustainability goals in the focus area of Water Conservation.

2.4 WATER QUALITY

- Continuous Deflective Separation (CDS) technology has been installed, which keeps pollutants out of stormwater runoff and protects the area's water supply.
- Stormwater pollution prevention Best Managements Practices (BMPs) are used, including:
    - Retain grassy areas where possible;
    - Utilize certified wash racks that divert wash water into the sanitary sewer;
    - Provide free video training and informational resources for airport tenants related to BMPs;
    - In addition to CDS technology, installation of bio-filters and water clarifiers to remove oils, fuel, bacteria and sediments in high traffic storm drain areas;
    - Prohibit aircraft washing where wash water can enter storm drains;
    - Promote dry washing of aircraft and vehicles to eliminate contaminated runoff;
    - Perform stormwater sampling and testing;
    - Conduct over 90 percent of industrial activity indoors; and
    - Require indoor or covered materials storage.

STRENGTHS

The Sustainability Plan will evaluate the strengths of the existing programs.

OPPORTUNITIES FOR IMPROVEMENT

The Sustainability Plan will evaluate the areas where the Airport can improve its existing programs or introduce new programs.

GOALS

Building upon the "Opportunities for Improvement," the Sustainability Plan will develop sustainability goals in the focus area of Water Quality.

2.5 SOLID WASTE AND RECYCLING

CONSTRUCTION

- LGB is committed to recycling 100 percent of the pavement and base material demolished during construction projects. For runway improvements, all nonhazardous material is pulverized in place and reinstalled for taxiways and ramps. This reduces vehicle emissions by eliminating two-thirds of haul-truck traffic. All other materials are processed and recycled locally.
- During construction of the passenger concourse in 2012, 75 percent of waste was diverted from disposal.

OPERATIONS

- LGB's LEED-designed passenger concourse incorporated 10 to 20 percent post-consumer materials.
- Seventy-five (75) percent of the space in the concourse takes advantage of day-lighting to save energy and provides passengers with great views of a greener LGB.

STRENGTHS

The Sustainability Plan will evaluate the strengths of the existing programs.

OPPORTUNITIES FOR IMPROVEMENT

The Sustainability Plan will evaluate the areas where the Airport can improve its existing programs or introduce new programs.

GOALS

Building upon the "Opportunities for Improvement," the Sustainability Plan will develop sustainability goals in the focus area of Solid Waste and Recycling.

2.6 COMMUNITY

- Specially designed tall mast lighting with hoods shield our neighbors from light pollution, while keeping the same illumination for operations and security.

STRENGTHS

The Sustainability Plan will evaluate the strengths of the existing programs.

OPPORTUNITIES FOR IMPROVEMENT

The Sustainability Plan will evaluate the areas where the Airport can improve its existing programs or introduce new programs.

GOALS

Building upon the "Opportunities for Improvement," the Sustainability Plan will develop sustainability goals in the focus area of Community.

3. Planning & Strategy

It is expected that the selected Consultant Team(s) will lead LGB through the sustainability planning process. The National Academies Press (NAP) recognizes the need for and value of a decision framework and emphasizes that the application of a decision framework results in consistent and effective results. The NAP's "Sustainability for the Nation: Resource Connections and Governance Linkages" (2013) states, "While decision frameworks vary in design and purpose, they generally have common elements that include:

- Problem identification and formulation,
- Identification of clear goals,
- Illumination of key questions that help decision participants scope problems and management options,

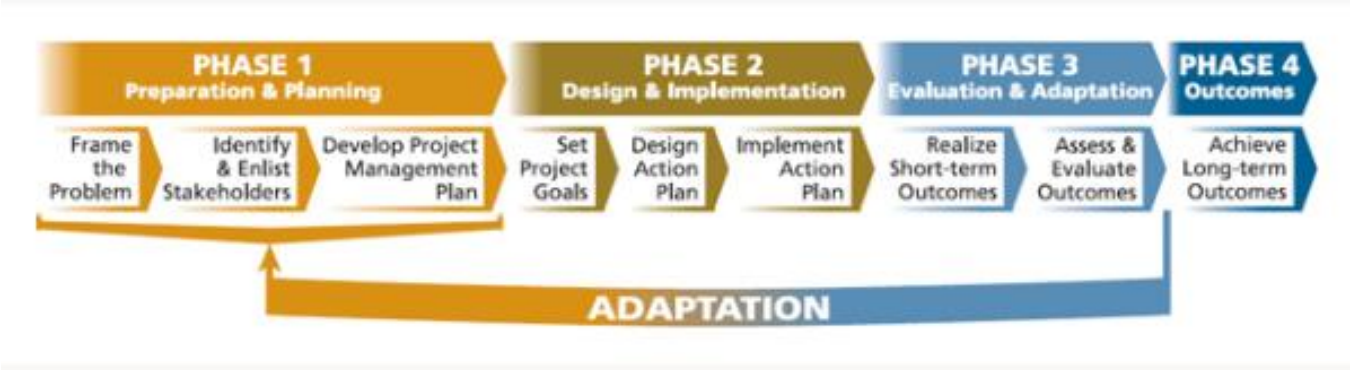
- Processes for knowledge-building (including scientific, technical, experiential, and cultural knowledge) and application of appropriate analytical tools to assess actions, options, trade-offs, risks, and uncertainties,
- Connection of authorities tasked with making decisions to outcomes associated with those decisions.

In addition to these common elements, decision frameworks generally provide transparency about goals, information, and decision processes; inclusiveness of relevant participants; and structures or processes to adapt decisions over time in response to new goals, changing circumstances, or new knowledge."[5]

A common framework is shown graphically in **Figure 2** and is consistent with the sustainability framework developed for the US EPA in the "Green Book." The four phases include: (1) preparation and planning; (2) design and implementation; (3) evaluation and adaptation; and (4) long-term outcomes.

Figure 2

Conceptual Decision Framework



Source: NAP, Sustainability for the Nation: Resource Connections and Governance Linkages (2013), Figure 4-1, https://www.nap.edu/read/13471/chapter/6#72

DEVELOPMENT OF GOALS

Initially, the identification and prioritization of goals would be developed and refined by the Stakeholder Advisory Group, discussed in ***Section 4, Stakeholders***. The Airport is

[5] The National Academies Press, Sustainability for the Nation: Resource Connections and Governance Linkages (2013), https://www.nap.edu/read/13471/chapter/6 (accessed 12/2/18).

encouraged to facilitate a "goals and target-setting" meeting with a Stakeholder Advisory Group. The group would be expected to refine the focus areas identified in ***Section 2, Baseline Assessment*** and recommend initiatives that the Airport could undertake to improve sustainability in each focus area. The approach would include development of goals based upon the Opportunities for Improvement and expanded upon by the group. Goals and ideas would be gathered and organized into one overarching goal for each focus area and a series of sub goals that would contribute to achieving the overarching goal. Each goal would include a description, timeframe for implementation and estimated cost of implementation. A Focus Area Champion (FAC) is recommended for each focus area, and would lead the discussion surrounding suggested goals for that specific focus area.

RANKING GOALS

Once the focus areas and goals are defined by the Stakeholder Advisory Group, the sub goals should be assessed for relative ease of implementation and for social and environmental impacts. The costs and potential funding strategies would also be considered. Each sub goal would be rated low, medium or high against the environmental, social and economic impacts associated with the sub goal. A low ranking would indicate that the sub goal would contribute minimally toward the overall goal. A medium ranking would indicate a larger contribution to the goal, and a high ranking would indicate the highest contribution, e.g., that the sub goal greatly influences or contributes to the overall goal.

The ranked goals will serve as a guide for implementation. The Airport should consider goals with high rankings in various areas; the final Sustainability Plan should look to focus on initiatives that make meaningful contributions economically, environmentally, and socially.

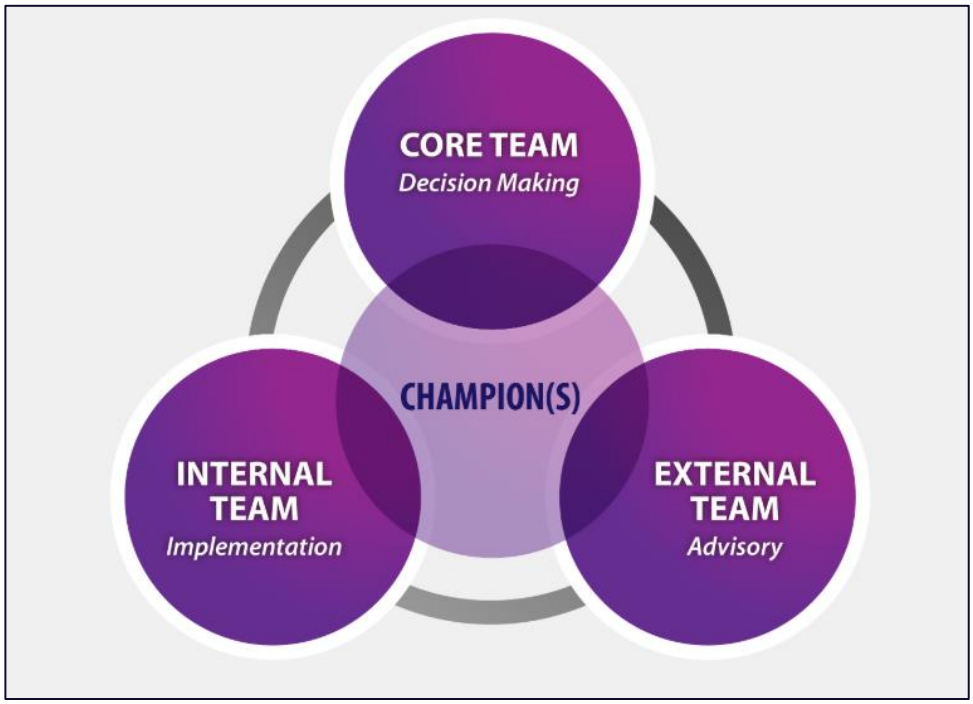
It is expected that the Sustainability Plan will incorporate multiple levels of public involvement throughout the planning process. Upon additional input from other key stakeholder groups, it is expected that the goals will be further refined and prioritized.

4. Stakeholders

Prior to kicking off the Sustainability Plan, key stakeholder groups should be identified and engaged. These groups will help to plan and implement the selected sustainability practices. A common stakeholder model, as identified by SAGA, includes "a core team that is responsible for and has the authority to make decisions, an internal team that helps to plan and implement the selected practices, and an external team that advises the airport and identifies opportunities for collaboration. In some cases, certain stakeholders may participate in more than one group (e.g. tenant relations may participate in the internal and external groups)."[6] See **Figure 3**. SAGA also notes the importance of collaboration with outside groups to broaden the program's perspective, and share resources, expertise and guidance.

Figure 3

Stakeholder Involvement Model



Source: Sustainable Aviation Guidance Alliance.

The primary stakeholder groups to engage throughout the planning process for the Sustainability Plan include the following:

- Stakeholder Advisory Group (*see description below)
- Airport Leadership (Director and Senior Management)
- Airport Tenants (Airlines and Concessionaires)
- Long Beach Airport Staff
- City of Long Beach Staff
- Federal Aviation Administration (FAA)
- Regional and Municipal Agencies and Organizations
- Public

Stakeholder Advisory Group (SAG)* - consists of representatives from City staff, as appointed by department directors from a cross-section of divisions (e.g., Planning/Environmental, Operations, Engineering, IT, Finance, Real Estate, Health & Safety). It also includes designated representatives from the Airport Advisory Commission and the Sustainable City Commission. The SAG facilitates the development of the Sustainability Plan during all phases of the process and plays a major role in implementing the Sustainability Plan. All stakeholder groups identified should be engaged throughout the planning process; however, **the SAG is central to the development of the final Sustainability Plan.

The primary responsibilities of the SAG include the following:

- Provides the primary input on the Sustainability Plan development
- Defines the primary goals, sub goals, objectives and targets
- Identifies existing sustainability initiatives
- Collects data for initial baseline assessment
- Defines decision-making guidelines and screening criteria for potential sustainability goals and strategies
- Develops an implementation and monitoring program

[6] Sustainable Aviation Guidance Alliance, http://www.airportsustainability.org/share (accessed 11/20/18).

- Reports to staff and other key stakeholders on the Sustainability Plan development and implementation

Other stakeholders who will be critical to development of the Sustainability Plan will be identified to include local organizations, neighborhoods and agencies as part of the early steps of the Sustainability Plan process. The Long Beach Office of Sustainability will be a valuable resource for the Airport. The City's Sustainability Action Plan, which was developed by City staff and members of a Sustainable City Commission (with citizen input) may also serve as a reference as the key stakeholders of the Sustainability Plan.

5. Initiatives and Implementation Support

In addition to establishing sustainability goals, the final Sustainability Plan will consider methods to integrate sustainability into its activities by committing to the use of sustainability rating systems for development and improvement projects. Funding mechanisms and programs should also be identified and evaluated for effectiveness as they pertain to LGB.

5.1 Sustainability Rating Systems

Sustainability rating systems will provide valuable guidance as LGB sets goals to improve the sustainability of the built environment. The final Sustainability Plan may consider additional rating systems. This SPO focuses on two of the most well-known rating systems: LEED and ENVISION.

LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED)

The U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) LEED Certification provides third-party certification and awards buildings that demonstrate sustainability improvements. It is the most widely used green building rating system in the world. Buildings can qualify for four levels of certification: **Certified**, **Silver**, **Gold** or **Platinum** levels in LEED. LEED uses a checklist to assess projects, which can be verified under various rating systems (e.g., Building Design + Construction, Interior Design + Construction, Operation + Maintenance, etc.).

LGB currently utilizes LEED standards to reduce waste in its construction projects. The Airport may wish to consider setting a goal to pursue a specified level of LEED certification for new construction projects over a set number of square feet (e.g., > 10,000 SF) as well as for retrofit projects.

ENVISION

The Institute for Sustainable Infrastructure's (ISI) Envision rating system is a project assessment and guidance tool for sustainable infrastructure design, not only building design. The rating system establishes a framework of "criteria designed to help identify ways in which sustainable approaches can be used to plan, design, construct and operate infrastructure projects."[7] Envision is geared toward assessing "not only individual project performance, but how well the infrastructure project contributes to the efficiency and long-term sustainability of the communities it serves." Envision includes Levels of Achievement (LOAs) for each credit to drive project teams beyond conventional design.

Because the Envision rating system pertains to infrastructure projects, rather than only buildings, LGB may wish to consider the use of this system to register infrastructure projects or non-LEED projects for verification. At least one credentialed Envision Sustainable Professional must be part of the project team for projects registered for Verification.

5.2 Air Emissions / Greenhouse Gas Reduction Programs

LGB is committed to minimizing airport-related air emissions and greenhouse gases (GHGs). To further this effort, a detailed review of airport carbon accreditation will be included in the final Sustainability Plan. As noted in ***Section 1***, ***Introduction***, *EO B-55-18 to Achieve Carbon Neutrality* was issued by the California Governor in September 2018

[7] Institute for Sustainable Infrastructure, https://sustainableinfrastructure.org/ (accessed 12/3/18).

and establishes a new statewide goal to achieve carbon neutrality no later than 2045, and to achieve and maintain net negative emissions thereafter.

There are multiple voluntary sustainability programs with a focus on carbon management in the industry. For example, The Climate Registry (TCR) and CDP (formerly the "Carbon Disclosure Project") are examples of industry-neutral programs that promote self-disclosure of an organization's impacts in measuring, reporting and verifying carbon operations in order to manage and reduce them. The Airport Carbon Accreditation (ACA) program is likely the most well-known program and is also considered in this section. It is assumed that the final Sustainability Plan will provide specific monetary costs and steps required to apply for and receive ACA.

THE CLIMATE REGISTRY (TCR)

Launched in 2007 as a continuation of the work of the California Climate Action Registry (CCAR), TCR is a non-profit organization that assists users in voluntary carbon reporting.
The organization also consults with governments nationally and internationally on all aspects of GHG measurement, reporting, and verification. The City of Long Beach is a member/partner.[8]

CDP (FORMERLY THE "CARBON DISCLOSURE PROJECT")

CDP is a not-for-profit charity that discloses GHG and other environmental factors to measure and understand their environmental impact. The system includes investors, companies, cities, states and regions. The organization evaluates environmental data, responses, benchmarks performance against peers and provides information on areas of improvement for its members.[9]

[8] The Climate Registry, https://www.theclimateregistry.org/ (accessed 12/10/18).
[9] CDP, https://www.cdp.net/en (accessed 12/11/18).

AIRPORT CARBON ACCREDITATION

Launched in 2009, the Airport Carbon Accreditation (ACA) program enables airports to adopt and implement carbon management policies, methods and processes and to gain public recognition of their achievements. The ACA program is known as the "global standard for carbon management in the airport industry" and focuses on CO_2 emissions because they comprise the majority of airport emissions.[10] There are over 237 accredited airports worldwide, with 34 accredited airports in North America. Between 2017 and 2018, 48 new accreditations were achieved with 25% growth since the previous year.[11]

The ACA has four levels of accreditation with progressively higher thresholds of carbon (i.e., GHG) reporting, managing and offsetting. See **Figure 4**.

Figure 4

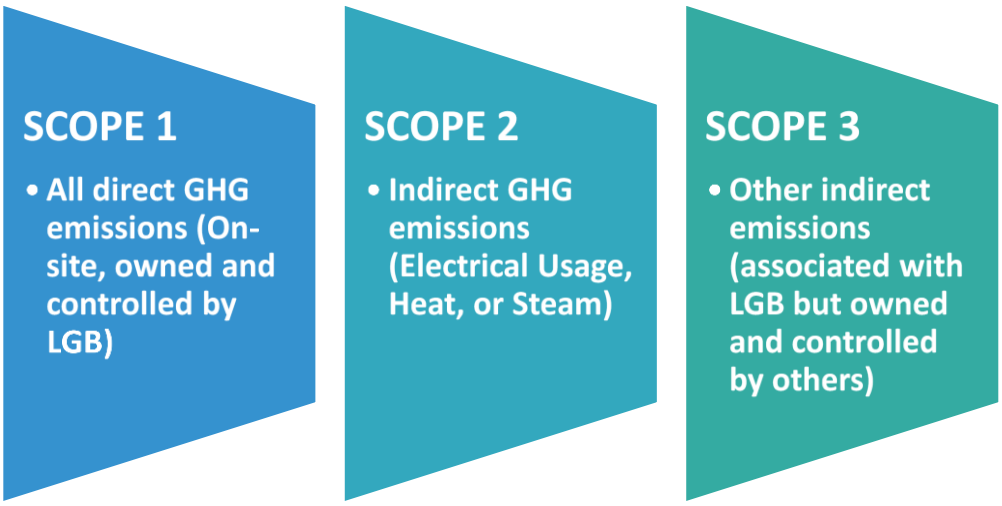
Main Requirements of ACA

Source: Airport Carbon Accreditation Annual Report, 2017-2018, Figure 1.

Level 1: Mapping (i.e., measuring their Scope 1 and 2 emissions); *Level 2: Reduction* (i.e., also managing/reducing these emissions); *Level 3: Optimization* (i.e., adding Scope 3 emissions to the program); and *Level 3+: Neutrality* (i.e., offsetting Scope 1 and 2 emissions). All U.S. airports that are ACA-certified have achieved Level 1; the majority have attained Level 2; several have attained Level 3; and one airport in North America (Dallas Forth Worth International) has achieved Level 3+. See **Figure 5.**

Figure 5

Scope Emissions Definitions



"Scope" = Sources and administrative boundaries, as associated with the ACA program.

The ACA program requires verification by an independent third party. The verification typically involves analysis of the methodology, data collection techniques and the calculation process that was used in developing the carbon footprint. Verifiers are certified by the ACA program, but they are hired by (and their fees are paid directly by) the applicant whose work they are verifying.

[10] Airport Carbon Accreditation Annual Report 2017-2018, p. 8.
[11] Airport Carbon Accreditation Annual Report 2017-2018, p. 6.

The following requirements are needed for **Level 1: Mapping** achievement:
An airport must:

- Determine its 'operational boundary' and the emissions sources within that boundary that are Scope 1 and Scope 2 sources, as defined by the Greenhouse Gas Protocol;
- Collect data and calculate the annual carbon emissions for the previous year for those sources;
- Compile a carbon footprint report; and
- Engage an independent third party to verify the report, before submission, to ensure that the carbon footprint calculation is in accordance with ISO14064 and accreditation requirements.[12]

The following requirements are needed for **Level 2: Reduction** achievement:
An airport must:

- Fulfill all the requirements of 'Mapping';
- Provide evidence of effective carbon management procedures including target setting; and
- Show that a reduction in the carbon footprint has occurred by analyzing the carbon emissions data of consecutive years.[13]

[12] https://www.airportcarbonaccreditation.org/airport/4-levels-of-accreditation/mapping.html (accessed 12/6/18).
[13] https://www.airportcarbonaccreditation.org/airport/4-levels-of-accreditation/reduction.html (accessed 12/6/18).

The following requirements are needed for **Level 3: Optimization** achievement:
An airport must:

- Fulfill all the requirements of 'Mapping' and 'Reduction';
- Widen the scope of its carbon footprint to include a range of Scope 3 emissions. (GHG Protocol). Scope 3 emissions to be measured include:
    - landing and take-off cycle emissions;
    - surface access to the airport for passengers and staff;
    - staff business travel emissions; and
    - any other Scope 3 emissions that the airport chooses to include.
- Presentation of evidence of engagement with third party operators to reduce wider airport-based carbon emissions.[14]

The following requirements are needed for **Level 3+: Neutrality** achievement:
An airport must:

- Fulfill all requirements of 'Mapping', 'Reduction' and 'Optimization'; and
- Offset its remaining Scope 1 and 2 carbon emissions (GHG Protocol) to show its commitment to achieving carbon neutral operations for all direct emissions and indirect emissions **over which the airport has control**, using internationally recognized offsets.

Note that "achieving carbon neutrality for an airport is in almost all cases impossible without external help. For this reason, airports, among many other industries, look to carbon offsetting as the final part of the solution. Carbon offsetting is providing funds or resources to other projects that reduce carbon dioxide so as to make up for the emissions that one is not able to eliminate. For example, an airport could pay for a wind

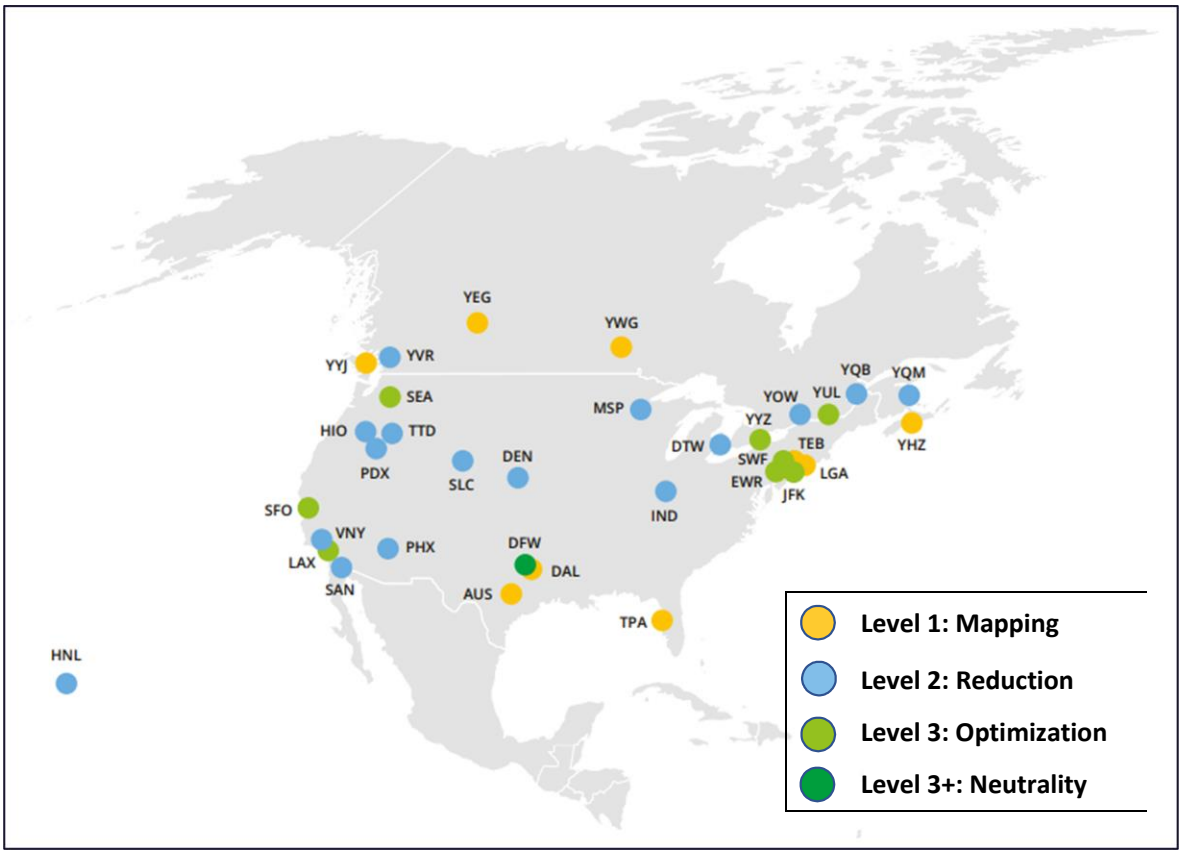
energy facility that replaces a coal-fired power-plant."[15] Attaining ACA Level 3+ typically requires the purchase of offsets, or credits to cover residual emissions in Scope 1 and 2.

5.3 What are Other Airports Doing?

The ACA website lists the accredited airports in North America, as well as the rest of the world. There are currently ten Level 1 airports in North America, 18 Level 2 airports, ten Level 3 airports and one Level 3+ Airport. **Figure 6** provides an illustration of accredited airports in North America from the 2017-2018 Annual Report.

Figure 6

North America Accredited Airports



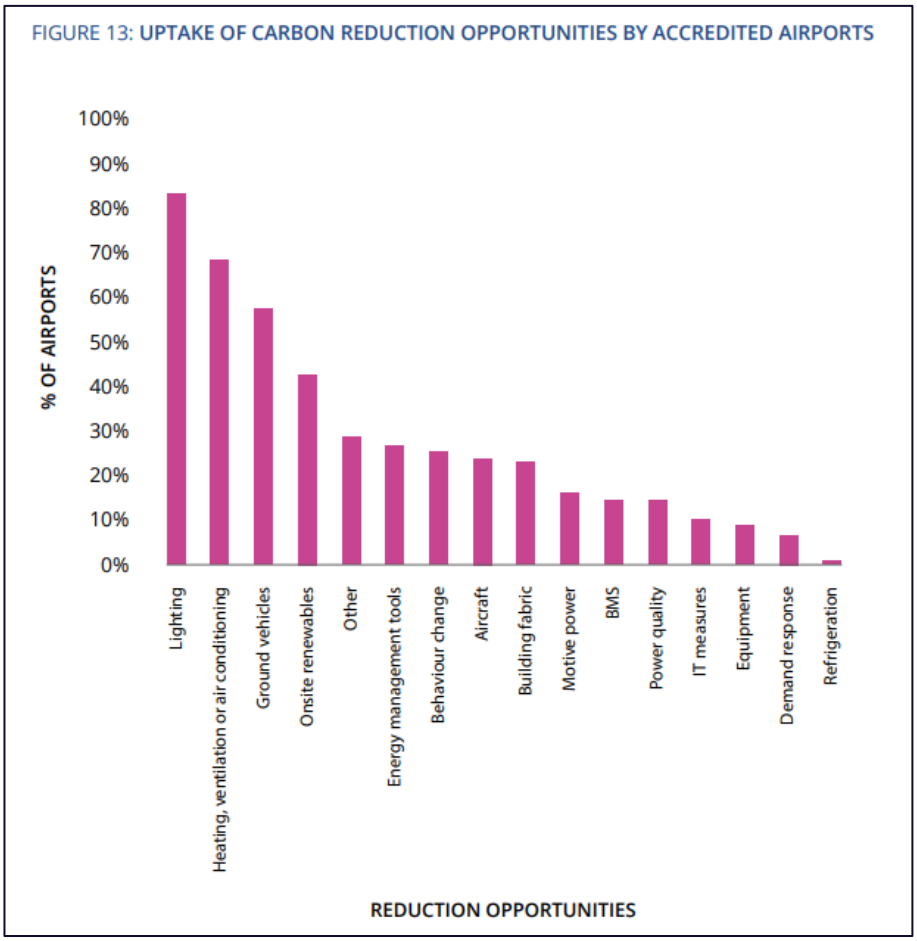
Source: Airport Carbon Accreditation Annual Report 2017-2018

[14] https://www.airportcarbonaccreditation.org/airport/4-levels-of-accreditation/optimisation.html (accessed 12/6/18).
[15] https://www.airportcarbonaccreditation.org/airport/4-levels-of-accreditation/neutrality.html (accessed 12/6/18).

For the 2017-2018 Annual Report, a study on the carbon reduction measures implemented by accredited airports was conducted. Preliminary results of the study conclude that electricity, boilers and vehicles are the sources that generate the highest emissions that are under control of airports. The most widely cited reduction opportunities tend to be lighting and HVAC systems. **Figure 7** from the Annual Report references the use of the different opportunity categories cited by the surveyed airports.

Figure 7

Opportunity Categories Cited by Surveyed Airports, 2017-18 ACA Annual Report



Source: Airport Carbon Accreditation Annual Report 2017-2018

CASE STUDIES: 2017-2018 ANNUAL REPORT

The ACA 2017-2018 Annual Report presents case studies from a selection of airports at different accreditation levels and regions. Several of the case studies are summarized below.

LOS ANGELES VAN NUYS AIRPORT, Level 2

Projects Implemented Toward Achieving Carbon Neutrality

- **Alternative fuel vehicles:** Replaced old fleet vehicles with electric vehicles and other clean, alternative fuel vehicles and installed electric vehicle chargers. Currently, 49% of the fleet is alternative fueled, 13% of which is electric.
- **Building energy use:** The airport participated in the Save Energy LA campaign in Summer 2016 by encouraging employees at the airport to turn off lights and unplug devices when not in use. LAWA produced a monthly environmental newsletter that provides employees with energy conservation tips and reminders.
- **Green Business Certifications:** Due to LAWA's conservation efforts in energy use, all LAWA offices at Van Nuys have earned green business certifications from the Los Angeles Green Business Program (https://www.greenbizla.org).

Looking forward: In addition to continuing to replace old fleet vehicles and install electric vehicle chargers, Los Angeles Van Nuys Airport will explore on-site renewable energy options, such as installing rooftop photovoltaic systems on buildings and look to replace old building HVAC equipment with more energy efficient units.[16]

STUTTGART AIRPORT, Level 3

Projects Implemented Toward Achieving Carbon Neutrality

- **Scale-up! Project:** The Airport is significantly expanding their electric fleet. In addition to electric passenger buses and baggage tugs, their charging stations are also used by battery-powered vans, cargo tugs, conveyor belts and a highloader.

[16] ACA Annual Report 2017-2018, p. 47.

- **Synthetic Diesel:** All non-electric vehicles are refueled with synthetic diesel. Compared to fossil diesel, the synthetic fuel emits significantly fewer air pollutants. In addition, they offset the CO2 emissions produced.
- **Charging Infrastructure:** Charging infrastructure of 48 parking spaces, including seven innovative fast-chargers, for passengers and taxi drivers with electric cars. They offer 100% green electricity for their car batteries.

Looking forward: Stuttgart Airport aims to reduce 50% of GHG emissions by 2030 as compared to 1990; and run the operations at Stuttgart Airport entirely carbon-neutral by 2050.[17]

TAG FARNBOROUGH AIRPORT, Level 3+

Projects Implemented Toward Achieving Carbon Neutrality

- **Upgrade to LED:** The terminal, apron high-masts, fuel-farm, administrative center, maintenance sheds and control tower have upgraded to LED lighting.
- **REGO energy supply**: The Airport committed to REGO energy supply (Renewable Energy Guarantees of Origin), which will see our annual footprint reduced by a further 2,000 tons.
- **Sustainable travel:** Sustainable travel has helped minimize liquid fuel use and their network of 20 electric vehicle (EV) chargers enables use of EV's from small ground handling trucks to a Tesla Model S. The Airport also has a bicycle fleet for footprint free travel between buildings.

Looking forward: TAG Farnborough Airport is working on a total re-fit of their airfield ground lighting system, replacing old tungsten fittings with LEDs.

DALLAS FORT WORTH INTERNATIONAL AIRPORT, Level 3+

Projects Implemented Toward Achieving Carbon Neutrality

- **Renewable Energy:** The Airport is committed to electrical consumption from renewable sources and has purchased and retired enough renewable energy credits to cover 100% of their annual usage.

[17] ACA Annual Report 2017-2018, p. 45.

- **Energy:** Adoption of "Continuous Commissioning®" to fine-tune building heating and cooling systems has significantly lowered energy consumption across the Airport.
- **Water:** Installed water-conserving plumbing fixtures in restrooms to cut customer water usage across all five Airport terminals by 50%, saving over 5 million gallons of water each month.
- **Water:** Partnered with neighboring cities to create a reclaimed water delivery system to conserve potable water in the region, reducing consumption by over 100 million gallons per year.
- **Vehicle Emissions:** Vehicle fleet has been almost completely converted to clean-burning CNG, cutting the Airport fleet's carbon emissions by 25% while saving millions in fuel costs.
- **Energy:** In the summer, the Airport takes its air conditioning systems offline during peak demand hours and cools six million square feet of terminal space with super-cooled water pumped from its Energy Plaza thermal storage infrastructure.
- **Recycling:** Over 180,000 tons of materials pulled from terminal renovations under the Terminal Renewal and Improvement Program (TRIP) have been recycled or diverted from landfills.[18]

Looking forward: Dallas Fort Worth International Airport is developing a sustainability dashboard to automate the collection and reporting of sustainability data. For procurement initiatives, the Airport "realizes that the next major focus area for sustainability is supply chain management and influencing the decisions of major airport suppliers."[19]

COCHIN INTERNATIONAL AIRPORT, (Not ACA accredited)

Although Cochin International Airport in India is not ACA accredited, it is the world's first solar power airport. All aspects of the day-to-day operations of the airport run on solar

[18] "Dallas Fort Worth International Airport Achieves Major Milestone With Carbon Neutral Recognition," 8/4/16, http://dfwairport.mediaroom.com/2016-08-04-Dallas-Fort-Worth-International-Airport-Achieves-Major-Milestone-With-Carbon-Neutral-Recognition (accessed 12/11/18).

[19] DFW, Sustainability Management Plan (2014, Updated July 2018), https://www.dfwairport.com/cs/groups/webcontent/documents/webasset/p2_314946.pdf, p. 49.

energy, including powering conveyor belts and digital systems. A surplus of energy created by the sunny climate allows the Airport to retain a surplus of energy when sunshine is not present. The Airport uses multiple solar panels placed on terminal roofs, hangars, a canal and a car parking area.[20] The Airport was awarded the Champion of Earth Prize - 2018, the highest environmental honor instituted by the United Nations.

5.4 Recommendation for LGB and Next Steps

With California's goal to achieve carbon neutrality by 2045, it is recommended that LGB should aim to achieve *Level 3+: Neutrality status*; however, there are several factors to consider in determining which level of accreditation the Airport considers initially. When considering its level of verification goal, it is important to evaluate the strength and breadth of the programs, policies and data management systems in place. For all levels, the Airport must first have its carbon footprint verified by an independent third party; the verification process requires time and close coordination. To achieve any accreditation beyond Level 1, the Airport must submit at least two consecutive years of verified historic carbon footprint data to show emissions have improved over time. A Level 3 certification requires the airport to have commissioned a study that quantifies emissions from aircraft, GSE and ground access vehicles.

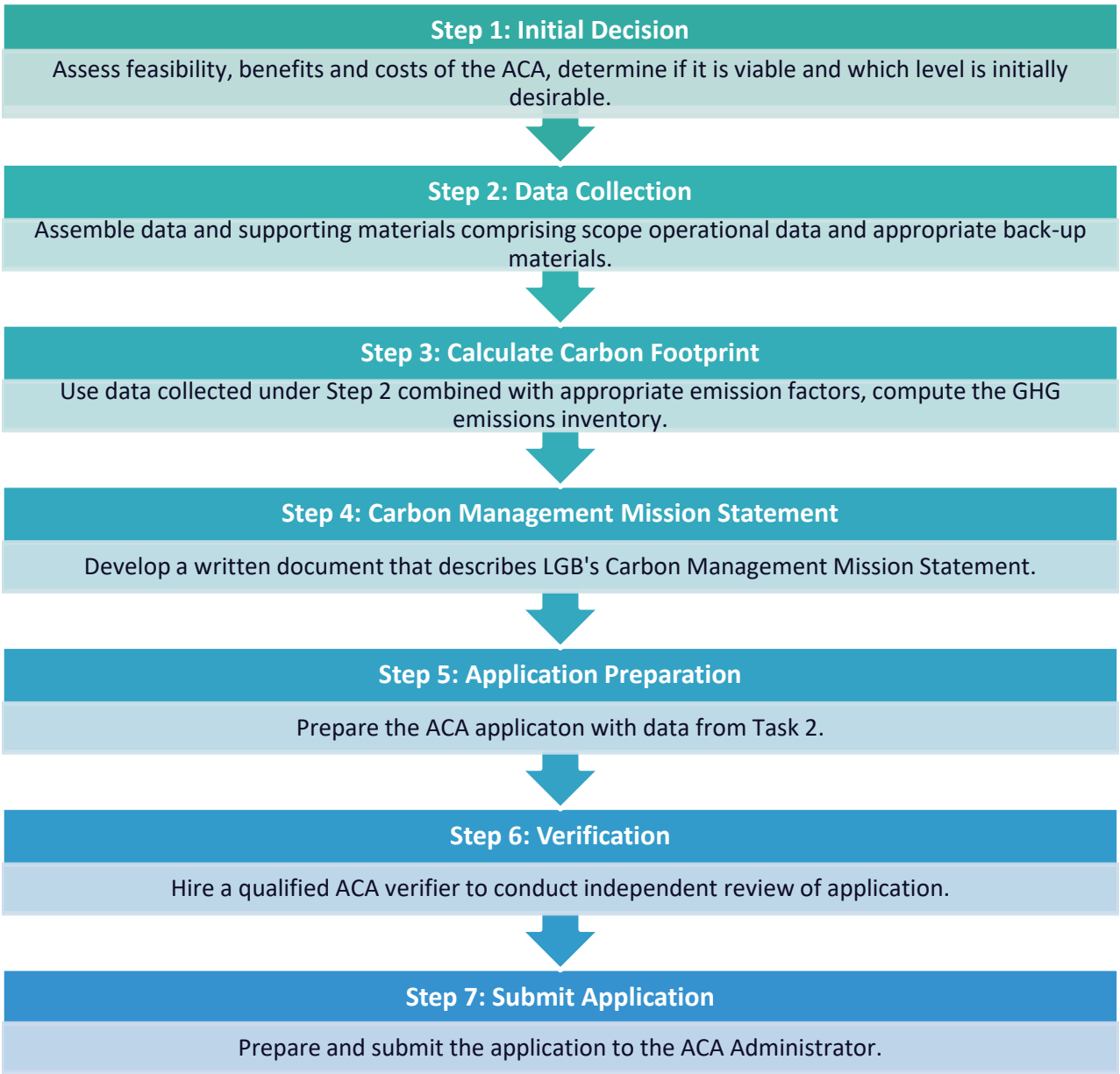
Beginning with a Level 1 application may be an appropriate first step for LGB. The benefit to this approach would be that the effort, participation, and costs versus benefits of the program can be measured and evaluated. Once Level 1 accreditation is achieved, attaining advanced certifications will be considered. Achieving ACA Level 3+ would take several years based upon the need to track the Airport's carbon footprint over a period of consecutive years.

The following six-step process, shown on **Figure 8**, is intended to guide LGB in completing the application for Level 1.

[20] Reuters, Cochin International Airport – the world's first solar-powered airport, https://www.reuters.com/article/idUSWAOA4O8EB9UH18AB (accessed 12/11/18.

Figure 8

Steps to Complete and Submit Level 1 ACA Application



5.5 Sustainable Funding Mechanisms

The Sustainability Plan will include discussion of available funding mechanisms for the Airport to consider. This SPO provides introductory information related to two of the most well-known funding mechanisms aimed at supporting aviation efforts to improve sustainability: VALE Grants and the Zero Emissions Vehicle Program.

VOLUNTARY AIRPORT LOW EMISSIONS PROGRAM (VALE) GRANTS

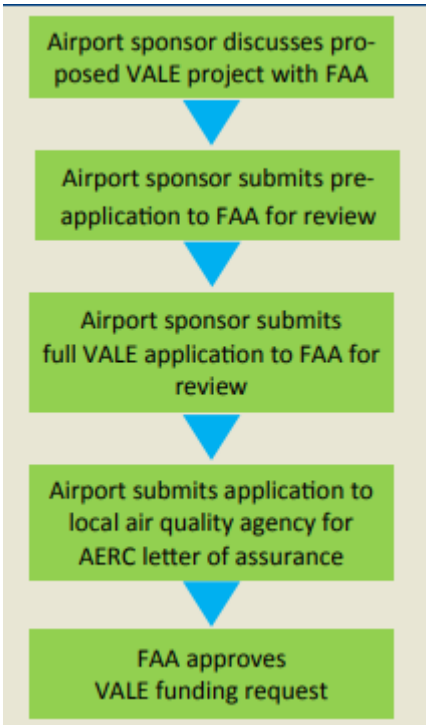
LGB is eligible to participate in the VALE program due to its location in Los Angeles County which is in non-attainment for Ozone (8-Hour), $PM_{2.5}$, and Lead; and in a Maintenance area for CO, PM_{10} and NO_2.

The Federal Aviation Administration's (FAA) Voluntary Airport Low Emission (VALE) Program was created as part of Vision 100 legislation in 2004 to help airport sponsors meet their state-related air quality responsibilities under the Clean Air Act and reduce airport ground emissions. The program is intended to encourage airport sponsors to implement clean technology projects that improve air quality. Through VALE, airport sponsors can use Passenger Facility Charges (PFCs) or Airport Improvement Program (AIP) grants to obtain funding for cleaner technology that the FAA deems cost effective. VALE projects also receive emission reduction credits from State governments, which the airports can use to meet future environmental obligations under the Clean Air Act. **Figure 9** illustrates the basic steps in the VALE application process.

Examples include financing of low emission vehicles, refueling and recharging stations, gate electrification, infrastructure upgrades, preconditioned air units, chargers for electric ground support equipment such as bag tugs and belt loaders; natural gas refueling stations for airport buses and shuttles; and electric gates at the terminal.[21]

The VALE program is available to commercial service airports located in areas that are in non-attainment or maintenance of National Ambient Air Quality Standards (NAAQS).

Figure 9
Overview of VALE Application Process (Steps)



Source: https://www.faa.gov/airports/environmental/vale/media/VALE-brochure-2017.pdf

As of September 2018, VALE grants have funded 105 projects at 51 airports; the grants are expected to reduce ozone emissions by 1,192 tons per year for the next 5 years. According to the FAA, this is equivalent to removing 66,550 cars and trucks from the road each year. VALE projects also generate Airport Emissions Reduction Credits (AERCs), recognized by the EPA and State Air Quality Agencies, can be used to meet future air emission regulation requirements for future capital projects. In addition to meeting the standard FAA airport improvement grant assurances, there are other special conditions an airport sponsors must meet when implementing a VALE project.

A Note about Lead (Pb):

Aviation gasoline (Avgas), which powers piston engine aircraft used at LGB and other airports that have general aviation activity, is a source of lead pollution. Currently, there is no operationally safe alternative to the use of Avgas for piston engines, however there are joint initiatives underway by the FAA and CAA for the development of short term and long term solutions to the use of Avgas. See the FAA Fact Sheet – Leaded Aviation Fuel and the Environment for more information.

https://www.faa.gov/news/fact_sheets/

LGB is eligible to participate in the VALE program based upon its location in Los Angeles County, which is in non-attainment for Ozone (8-Hour), Particulate Matter ($PM_{2.5}$), and partial non-attainment for Lead (Pb).[22] The County is a maintenance area for Carbon Monoxide (CO) (redesignated from non-attainment in 2007), PM_{10} (redesignated from non-attainment in 2013), and Nitrogen Dioxide (NO_2) (redesignated from non-attainment in 1998).[23, 24]

[21] https://www.faa.gov/airports/environmental/vale/media/VALE-brochure-2017.pdf; https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=15235

[22] LGB falls into the Los Angeles County portion of the South Coast air basin in nonattainment.

[23] FAA, "List of Commercial Service Airports in the US and their Nonattainment and Maintenance Status, Updated June 21, 2017, https://www.faa.gov/airports/environmental/vale/ (accessed 12/10/18), and EPA, Nonattainment Areas for Criteria Pollutants (Greenbook), https://www.epa.gov/green-book (accessed 1/7/19).

[24] EPA, California Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants ("Greenbook," Current as of 12/31/18, https://www3.epa.gov/airquality/greenbook/anayo_ca.html (accessed 1/7/19).

ZERO EMISSIONS VEHICLE PROGRAM

The Zero Emissions Vehicle (ZEV) Program is a California state program, managed by the California Air Resources Board (CARB), designed to help the state achieve its emissions goals by requiring that a certain percentage of vehicle fleets use the cleanest available technologies (e.g., plug-in hybrid vehicles, battery electric vehicles, hydrogen fuel cell vehicles). ZEV regulation was first adopted in 1990 as part of Low Emission Vehicle (LEV I) regulations and has undergone several changes and updates since that time. With the ZEV program, automakers must maintain a certain number of "ZEV credits" which are earned by selling zero emission cars and trucks; the credit per vehicle is based on engine type and electric range. EO B-48-18 was signed by the State Governor In January 2018, which set "ambitious targets of 200 hydrogen fueling stations and 250,000 electric vehicle chargers to support 1.5 million zero-emission vehicles (ZEVs) on California roads by 2025, on the path to 5 million ZEVs by 2030. As part of this, the 2016 ZEV Action Plan was updated ("2018 ZEV Action Plan Priorities Update") to highlight the most important actions to take to implement the new directives in the EO.[25]

While LGB has increased its fleet of ZEVs and electric-charging infrastructure, the Airport should consider an even greater focus on zero emission technologies. For example, the San Pedro Bay Ports has emphasized its focus on Zero Emissions technologies and set voluntary air quality goals, in part to help greatly reduce regional greenhouse gas emissions. As part of this effort, the Port has developed a Zero Emissions Roadmap (2011), the Zero Emissions Truck Collaborative, and the Zero Emissions White Paper (2015). The Zero-Emissions Roadmap report that describes "the best way to support the development of port-related zero-emission technologies. This roadmap does not suggest a single solution to reduce emissions, but rather a suite of strategies that together have the potential to dramatically improve air quality throughout the region. The effort to achieve zero emissions goods movement will require technological innovation, multiple approaches, and regional partnerships." The Port has also been the recipient of multiple grants, several of which have been for the development and demonstration of various cargo handling equipment. The Port has also committed to emission-reduction projects through funding various projects through its Technology Advancement Program (TAP). This program aims to improve the use and availability of clean technologies with the goal of reducing emissions.[26]

LGB should consider participating in regional partnerships as the Port has done in furtherance of its emission reduction goals. For example, the Zero Emissions Truck Collaborative that originated from the Port's Zero Emissions Roadmap includes a partnership between the Los Angeles County Metropolitan Transportation Authority as the lead, Port of Los Angeles, Port of Long Beach, South Coast Air Quality Management District (SCAQMD), Gateway Cities, and Caltrans.

6. Tracking and Reporting

The final Sustainability Plan will include a detailed methodology for tracking sustainability progress and to ensure accountability by Airport staff and departments. Sustainability programs require active management. ACRP's "Lessons Learned from Airport Sustainability Plans" reports that airports "deploy a range of management methods, demonstrating that no one approach fits all organizational cultures."[27] SAGA recommends using key performance indicators (KPIs) and associated metrics to measure progress. The recommended steps include:

1) **Existing KPIs and Metrics** - Identify existing KPIs and metrics already being measured that would apply to the sustainability goals. For example, tracking electricity use in kilowatt-hours and natural gas and petroleum use in MMBTUs.
2) **Commonly Used KPIs and Metrics** –SAGA provides the following as commonly used indicators:
   - The GRI Airport Sector Supplement
   - ISO 26000: 2010 Guidance on Social Responsibility
   - Envision™ Infrastructure Sustainability Rating System
   - LEED™
   - The CDP (formerly Carbon Disclosure Project)
   - The Global 100

[25] Governor's Interagency Working Group on Zero-Emission Vehicles, 2018 ZEV Action Plan Priorities Update, September 2018, http://business.ca.gov/Portals/0/ZEV/2018-ZEV-Action-Plan-Priorities-Update.pdf (accessed 12/10/18).
[26] The Port of LA, "Zero Emissions Technologies," https://www.portoflosangeles.org/environment/air-quality/zero-emissions-technologies (accessed 12/10/18).
[27] National Academy of Sciences, "Lessons Learned from Airport Sustainability Plans," 20, p. 12.

3) **Airport KPIs and Metrics** – Customize the metrics to be specific to the facility and goal. SAGA notes that common airport factors are "per passenger," "per operation," and "per square foot."
4) **Action and Monitoring Plans** – Develop a monitoring plan in a matrix format that includes components such as who is accountable for implementation, the schedule, the milestones and the resource needs.

The SAGA website has a Microsoft Excel spreadsheet template available for download as a starting point in developing an Action and Monitoring Plan at http://www.airportsustainability.org/measure.

REFERENCES AND RESOURCES:

Airport Cooperative Research Program (ACRP), "Lessons Learned from Airport Sustainability Plans," 2015.

Airport Carbon Accreditation, https://www.airportcarbonaccreditation.org/

Airport Carbon Accreditation Annual Report, 2017-2018, file:///C:/Users/cpinegar/Downloads/Airport%20Carbon%20Accreditation%20Annual%20Report%202017-2018%20(3).pdf

CDP, https://www.sustainable-performance.total.com/en/reporting/reporting-standards/cdp

City of Long Beach, Long Beach Sustainability, http://www.longbeach.gov/sustainability/

"Dallas Fort Worth International Airport Achieves Major Milestone With Carbon Neutral Recognition," 8/4/16, http://dfwairport.mediaroom.com/2016-08-04-Dallas-Fort-Worth-International-Airport-Achieves-Major-Milestone-With-Carbon-Neutral-Recognition.

Dallas Fort Worth International Airport, *Sustainability Management Plan* (2014, Updated July 2018), https://www.dfwairport.com/cs/groups/webcontent/documents/webasset/p2_314946.pdf

FAA, Voluntary Airport Low Emissions Program (VALE), https://www.faa.gov/airports/environmental/vale/

Fresno Yosemite International Airport Sustainability Management Plan, 2012, https://www.faa.gov/airports/environmental/sustainability/media/Fresno-Yosemite-Airport-Sustainability-Management-Plan.pdf

Governor's Interagency Working Group on Zero-Emission Vehicles, 2018 ZEV Action Plan Priorities Update, September 2018, http://business.ca.gov/Portals/0/ZEV/2018-ZEV-Action-Plan-Priorities-Update.pdf

Long Beach Airport, *Environmental Status Report: Green Airport Program*, 2012, http://www.lgb.org/civicax/filebank/blobdload.aspx?BlobID=2672

The National Academies Press, *Sustainability for the Nation: Resource Connections and Governance Linkages* (2013): Chapter 4, *Development of a Decision Framework*, https://www.nap.edu/read/13471/chapter/6

Port of Long Beach and Port of Los Angeles, Clean Air Action Plan, http://www.cleanairactionplan.org/about-the-plan/stakeholder-advisory-group/

Reuters, "Cochin International Airport – the world's first solar-powered airport," 10/12/18, https://www.reuters.com/article/idUSWAOA4O8EB9UH18AB

Salt Lake City International Airport, *Sustainability Management Plan*, 2015 https://www.slcairport.com/assets/pdfDocuments/SLC-SMP-FINAL-08-2015.pdf

Sustainability Aviation Guidance Alliance, http://www.airportsustainability.org/

U.S. Environmental Protection Agency, California Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants *("Greenbook")*, current as of 12/31/18, https://www3.epa.gov/airquality/greenbook/anayo_ca.html