

# APPENDIX C

## SURVEY RESPONSE SUMMARIES

### AIRPORT RESPONSES

#### **Albany International Airport (ALB)**

Albany International Airport (ALB) is located in an attainment area in accordance with national ambient air quality standards. While the airport does not have an explicit clean vehicle policy for private ground transportation operators, ALB does encourage and promote the use of clean vehicle technologies and fuels by both private and airport fleets at the airport property. ALB opened the first airport-owned CNG station and implemented the first airport-owned CNG fleet in New York State. The airport was also among the first in the state to install public-use EV charging stations, comprising six Level-2 chargers.

#### *Idling*

ALB does not have an anti-idling policy specific to the airport. The State of New York imposes anti-idling requirements through an executive order that prohibits idling exceeding five minutes.

#### *Motivating Factors*

The main reasons for supporting alternative fuels, clean vehicles, and energy efficiency projects include the goal toward pursuing environmentally friendly design, reducing the airport's carbon footprint, enhancing public image, as well as meeting county regulations regarding sustainability practices. If the airport pursued a clean vehicle policy, the policy would coincide with existing regional and local government program goals.

#### *Potential Barriers*

Lack of understanding from private fleets, state of alternative fuel technologies and their costs, lack of public fueling infrastructure, and lack of grants to fund private fleet conversions are all legitimate factors that make implementing clean vehicle policies very challenging. In order to implement a clean vehicle policy, the airport suggests there needs to be initiative, political will, and funding opportunities. Additionally, ALB believes that clean initiatives need to be affordable. For example, vehicles powered by a hydrogen fuel cell are considered zero-emission, but the significant costs of the technology and fuel create barriers to adoption.

#### *Funding Opportunities*

Airports are currently under pressure to initiate carbon reduction programs. New York State will get approximately \$129 million from the Volkswagen Settlement that can be used to replace diesel engines with electric ones. The airport believes this alternative funding source could potentially be a good incentive for fleets to pursue alternative fuels. ALB has used various grants to convert its airport-owned fleet to CNG, but these grants are not available to private operators. Private fleets are not eligible to receive Airport Improvement Program grants, and the airport believes that the majority of state and local grants would not apply to private commercial fleets. The state of New York is active in sustainable initiatives. Starting in April 2017, a carbon offset fee was added to every electric bill. However, the state has not made funding available for private fleets to use to develop a clean vehicle program.

### *Additional Considerations*

In 2014, ALB had the opportunity to participate in the Green Electric Vehicle pilot program with Hertz Rent a Car in Albany. Hertz provides electric vehicle car rentals at the airport, and the airport installed electric charging stations in airport parking lots stemming from collaboration with and funding from the New York Power Authority and the New York State Energy Research and Development Authority. There is not high utilization of the stations—interviewees estimate 50-60 percent usage. The airport currently does not charge a fee for electricity to charge EVs at the airport EV stations.

### **Denver International Airport (DEN)**

*Disclaimer: Denver International Airport did not participate in a telephone interview. The summary provided is adapted from the survey questionnaire completed by airport personnel.*

Denver International Airport (DEN) serves the greater Denver area and is currently located in an area of non-attainment for ground-level ozone.

DEN encourages the use of alternative fuels, including compressed natural gas (CNG), propane, liquefied natural gas (LNG), biodiesel, and hybrid-electric vehicles. The airport also encourages the private ground transportation fleets to implement alternative fuel vehicles (AFVs) and idle reduction strategies. DEN incentivizes the private fleets to adopt AF and clean vehicles by offering lower airport access charges for those fleets that implement AFVs. The airport also provides alternative fuel infrastructure on airport property, which can be used by the commercial ground operators.

The airport does not have a formal clean vehicle policy that requires the use of clean vehicles and fuels by private ground transportation operators. DEN has an anti-idling policy, which prohibits idling that exceeds five minutes. This policy is in line with city idling ordinances, which are posted on signs on the airport premises.

The airport does not offer any funding opportunities for private fleets to use alternative fuel or clean vehicles.

### **John Glenn Columbus International (CMH)**

John Glenn Columbus International Airport (CMH) is located in Franklin County, which is part of the Metropolitan Columbus Intrastate Air Quality Control Region. This region is in maintenance for PM<sub>2.5</sub> and 8-hour ozone, and in attainment for other federally regulated criteria pollutants.

#### *Alternative Fuels and Infrastructure*

The airport does not currently advocate or mandate vehicle or fuel type for private ground transportation operators. However, the local transit service—Central Ohio Transit Authority—runs several routes to the airport and operates some CNG-powered transit buses. The airport does not have CNG fueling infrastructure located on airport property, but two city-owned public CNG fueling stations are located in close proximity to airport property.

The airport owned and operated shuttle fleet runs on propane that refuels at a propane fueling station hosted by the airport's maintenance contractor, located approximately half a mile from

airport property. The station is open to the public, and commercial operators have access to it.

#### *Electric Vehicle Charging*

The airport is also anticipating implementing electric vehicle charging equipment by the second quarter of 2018, which would be available for commercial vehicle use. CMH is planning to purchase two mobile electric vehicle charging systems, which will be made available to airport customers and commercial operators. The procurement process is under review and pending approval as of this report's publication date.

#### *Idling*

CMH has an idling policy at the terminal for commercial vehicles, which prohibits idling for all unattended, stopped, or parked vehicles. Enforcement personnel can use some discretion, such as for adverse weather conditions. Once the vehicles are stopped, operators are required to shut off the engine while in the terminal. This policy is in the airport rules and regulations and enforced by airport authority personnel. CMH does not currently incentivize or require specific sustainability practices, but some airport regulations indirectly produce sustainability benefits. For example, commercial vehicles are required to wait in a fixed position in a designated public cell phone waiting lot before entering the terminal to reduce unnecessary circling.

#### *Funding Opportunities*

The airport is not aware of funding opportunities that specifically apply to private ground transportation operators. CMH is currently pursuing Voluntary Airport Low Emission (VALE) grant opportunities for airport contracted and owned fleets, but these grants do not apply to commercial operators.

The airport is participating in the Columbus Smart City initiative, managed by the City of Columbus. The project plan includes specific incentives for taxi companies and TNCs to acquire funding to electrify their fleets. However, the City is trying to increase charging infrastructure before incentivizing the purchase of electric fleet vehicles, and the incentive plan is still in the formulation stage. There are also potential plans to apply incentives to the heavy-duty vehicle sector.

As an interested stakeholder, CMH has several representatives serving on Smart City committees and is indirectly involved with the project by attending meetings and providing input on project direction. Electrification and CNG are strongly encouraged at a local level. The City of Columbus has been pushing for CNG, and through the Smart Cities initiative, the City is augmenting that with strategies to increase electrification.

#### *Potential Barriers*

The airport, in general, is supportive of alternative fuels and energy efficiency practices, and does not anticipate any major barriers to implementing a clean vehicle policy.

#### *Additional Considerations*

CMH has an operating agreement in place with the two major transportation network companies. The airport is in the final draft stages of developing a set of airport regulations specifically written for TNCs. The TNCs are required to wait in a geofenced staging lot, which

is designed so that ride requests made on airport property are routed automatically to the first vehicle that entered the smaller geofence of the staging lot. TNCs have to be located in a geofenced lot before receiving any ride requests made on airport property.

### **St. Louis Lambert International Airport (STL)**

St. Louis Lambert International Airport (STL) serves the greater St. Louis area and is located in unincorporated St. Louis County. An airport commission governs STL, which is an enterprise division of the City of St. Louis. The airport is located in a non-attainment area for ozone (marginal) and PM<sub>2.5</sub> (moderate). Since the airport is owned by the City of St. Louis, its sustainability programs are in line with existing city and county programs.

#### *Alternative Fuels and Infrastructure*

The airport does operate alternative fuel vehicles—predominantly CNG—in its own fleet, but STL does not require private ground transportation fleets to operate clean vehicles at the airport. STL operates a parking facility and provides shuttle service between the designated parking area and the terminal. All shuttle buses run on compressed natural gas. The airport owns the vehicles and contracts with a third party for their operation and maintenance. STL also has an airport-owned public CNG fueling station on airport property, which helps with fueling the airport CNG fleet.

#### *Idling*

St. Louis County has an anti-idling policy prohibiting idling for more than three consecutive minutes for any vehicle—with the exception of emergency vehicles—unless the engine is being used to operate a loading/unloading device (St. Louis County Health Department). This mandate falls under the county's pollution nuisance ordinance, and violators can be fined up to \$1,000. The airport operates its own police department that enforces the anti-idling policy in the secure areas of the airport. County police enforce the idling policy on the public access roads in the airport.

#### *Funding Opportunities*

At time of publication, STL is prioritizing acquiring funding to develop its own alternative fuel fleet, since the airport has direct control over those vehicles. STL is also prioritizing using any available funding to offset the costs of gate electrification and electric ground power equipment.

FAA and government funding is typically not available to private fleets, and the airport is unable to provide or secure funding for private ground transportation operators to convert their fleets to alternative fuels. However, STL believes the upcoming VW Settlement funding might be available to private operators to convert their fleets to AFVs, although the funding details are still unknown.

Since St. Louis is in the non-attainment area, the region is eligible to receive Congestion Mitigation and Air Quality (CMAQ) funding. East-West Gateway Council of Governments, a regional council of governments and metropolitan planning organizations (MPOs) of the bi-state region (Missouri and Illinois), receives and distributes CMAQ funding for eligible projects in the greater St. Louis region. Again, these funding options are not available for use by private ground transportation fleets.

### *Obstacles to Adoption*

Lack of financial resources and limited access to grant funding are major obstacles encountered by airports while designing and implementing clean vehicle policies. Energy efficiency grants and various government grant programs, such as the Diesel Emissions Reduction Act (DERA) and VALE program, are available to airports, but the application process is complex. STL has worked with area Clean Cities Coalitions, but has found they typically do not provide assistance with the specifics of the grant application. The airport suggested the option of hiring a consultant to complete the application for the VALE program—particularly to calculate the proposed project's emissions reduction.

### *Additional Considerations*

Recently, St. Louis International officially started working with transportation network companies. The airport signed a contract with several TNCs to provide transportation services at the airport. TNCs pay a \$1,500 administrative fee and \$3 trip fees that either originate or end at the airport—i.e., a \$3 fee for picking up and a \$3 fee for dropping off passengers at the airport. The airport provides a staging area for TNC vehicles, and the companies provide a geofence to allow only the vehicles located in the airport staging area to receive passenger assignments. TNC vehicles are also subject to insurance requirements and other airport requirements applicable to commercial vehicles.

Due to the large number of potential vehicles and high driver turnover, TNCs do not provide vehicle/driver lists to the airport. TNC vehicles are also not required to have decals that other commercial vehicles serving the airport are required to have. STL relies on TNC self-reporting to document vehicle trips and passenger pick-ups/drop-offs. Currently, the airport does not impose any sustainability requirements on TNC vehicles operating at the airport.

It is too early to assess the results of the agreement with the TNCs. As more time passes, STL will be able to accumulate more data and evaluate the success of its cooperation with TNCs.

## **Logan International Airport (BOS)**

Logan International Airport is located in East Boston, in the state of Massachusetts. It is the largest airport in the New England region and 17-th busiest airport in the United States. The airport is located in maintenance area for carbon monoxide.

### *Alternative Fuels and Infrastructure*

The airport encourages private fleets to use alternative fuels and other clean vehicle technologies, particularly compressed natural gas (CNG), battery electric, and hybrid-electric vehicles. Logan International was one of the first airports to own CNG buses. The airport has an airport-owned CNG station on airport property to serve the CNG fleet. Logan also operates diesel hybrid buses.

The airport provides preferential parking for CNG and electric vehicles (EVs). Additionally, taxicabs that operate electric or hybrid vehicles have priority in picking up passengers at the airport (EVs and hybrids jump to the front of the taxicab line). The vehicles are marked with a display tag denoting them as hybrid or electric vehicles. In addition to premium parking,

EVs also do not pay for charging the vehicles at the airport (the airport does not charge them for electricity).

While Logan International encourages the use of alternative fuels and clean vehicle technologies, the airport does not impose any explicit policy on private fleets. Instead, the airport encourages fleets to work toward reducing total GHG emissions per state agency requirements. The one exception is that the airport requires a rental car company operating at the airport to run a certain percentage of its fleet on alternative fuel (electric or hybrid-electric).

Logan regularly tracks the environmental impact of the airport, including GHG emissions, GHG for enplane passenger, etc., and reports these and other metrics to the Massachusetts Department of Environmental Protection (DEP).

#### *Idling*

While the airport does not have its own anti-idling policy, it has posted signs in all parking and waiting lots restricting vehicle idling to no more than five minutes on airport property. Violators are ticketed if they idle for more than five minutes. This requirement is imposed by the State of Massachusetts and is enforced by state police.

#### *Funding Opportunities*

Logan International is not aware of any funding sources or grants to encourage private fleets to use cleaner fuels and vehicles at the airport. The airport has used VALE grants in the past to convert airport-owned fleets to alternative fuels, and uses these grants as much as possible. However, private fleets are not eligible for VALE funding.

#### *Potential Barriers*

Although Logan International Airport does not have a formal policy for private ground transportation fleets, the airport does not see any major challenges in implementing clean vehicle programs by airports.

#### *Recommendations*

In Logan's opinion, the availability of local/state grants or private sector funding for converting fleets to AFs is very important for implementing a successful clean vehicle program at the airport. Another requirement for successful implementation is the availability of adequate fueling infrastructure at or around the airport.

#### *Future Plans*

Logan has plans to install more EVSE infrastructure in the airport parking garages, TNC lot, and taxi pool lots, as well as replace airport diesel-powered ground support equipment (GSE) with electric GSE in the near future.

#### *Additional Considerations*

Logan International has a formal agreement with transportation network companies allowing them to operate on airport property. The airport uses a geofence that enables TNCs to receive calls from airport customers only when the vehicles are located in a designated airport lot. TNCs (Uber and Lyft) cooperate with the airport and comply with the requirements imposed by Logan.

## Los Angeles International Airport (LAX)

Los Angeles International Airport (LAX) is the largest airport in the state of California and serves the greater Los Angeles area. The airport is located in a non-attainment area for ozone, NO<sub>x</sub>, and PM<sub>2.5</sub>.

### *Alternative Fuel Vehicle Requirement*

The airport has an alternative fuel vehicle requirement that applies to vehicles with a GVWR of 8,500 pounds or more. The AFV policy is available on LAX's website (<http://www.lawa.org/alternativefuel>) and is included in all leases, contracts, and in the airport rules and regulations. This requirement covers all fleets that have a permit, lease, contract, license, or any sort of agreement with the airport, with the exception of construction equipment, government agencies, transportation network companies, and taxis. The City of Los Angeles, which has regulatory jurisdiction over taxi operations, enforces its own "green taxi" policy.

The LAX Alternative Fuel Vehicle Requirement Program originally mandated that 100 percent of on-road vehicles on airport property—including trucks, shuttle vans, passenger vans, and buses that were 8,500 pounds or more—be alternative fuel or emissions comparable by January 31, 2015. Off-road vehicles, public safety vehicles, alternative fuel vehicles previously approved, low use vehicles, and vehicles used in construction activities were exempt from the rule. However, the airport did not achieve that goal and has recently updated the policy. The 2017 updated policy provides for 100% compliance with AFV rule by April 30, 2019. The airport does not have an MPG requirement for vehicles.

LAX's current AFV policy mandates the use of alternatively fueled or Comparable Emissions Vehicles (gasoline or diesel with emissions comparable to a similar AFV). If an AFV or Comparable Emissions Vehicle is not commercially available, then the Least Polluting Available Vehicle is allowed. The definition of *alternative fuel* includes CNG, LNG, methanol, ethanol, electricity, and fuel cell. It does not include biodiesel since LAX is located in a non-attainment area for NO<sub>x</sub>. The policy also does not necessarily include hybrid vehicles. Regular gasoline vehicles and hybrids are accepted if they are comparable to similar AFVs in terms of emissions. LAX's Independent Third Party Monitor—vehicle emissions expert—evaluates vehicles for compliance to Comparable Emissions or Least Polluting Available Vehicle status.

Bi-fuel—or flex-fuel—vehicles are evaluated as gasoline vehicles since verification that vehicles are operating on alternative fuel is not possible. If they are comparable in emissions to similar AFVs, they are allowed. However, the concept of comparable emissions is challenging as the technology is constantly evolving. Vehicles accepted as AFV-comparable one year may not meet those requirements the following year.

The AFV requirement was mandated by a 2005 legal agreement called the LAX Master Plan Program's Community Benefits Agreement (CBA) between LAX and the LAX Coalition for Economic, Environmental and Educational Justice, an organization comprised of local community and environmental groups, to allow the airport master agreement to go forward. The LAX Alternative Fuel Vehicle Requirement is part of that agreement. In 2007, the airport drafted the actual AFV requirement and started including it in leases and contracts. When the

original AFV policy was developed, the airport did not involve private fleets in developing the requirement, as the requirement was mandated as part of the CBA.

At present, LAX does not offer any incentives for private fleets to use alternative fuels, but it is looking into potential opportunities to incentivize the ground transportation operators. The airport is currently researching the possibility of offering a zero-emission vehicle incentive, but needs FAA approval to use airport revenue for such an incentive.

#### *Motivation for Implementing an AFV Requirement*

The policy was mandated as the result of a legal agreement, and was implemented as policy in 2007. The major motivations for implementing the AFV requirement include satisfying the regional air quality agency and achieving air quality conformity in airport project environmental documents. Other reasons include improving local and regional air quality and establishing/improving the “green” image of the airport in the community. The airport hopes to start tracking the environmental impact of the AFV policy in the future.

#### *AFV Requirement Compliance*

LAX uses a combination of approaches to monitor fleet compliance with clean vehicle requirements. Fleets must provide annual reporting and have to log detailed information about their fleets, such as the number of vehicles, vehicle weight, and type of fuel. The airport also retains an Independent Third Party Monitor who is a vehicle emissions expert and who, upon the airport’s request, will evaluate vehicles for compliance based on VIN number, make, model, engine model year, etc. LAX maintains an online vehicle database that helps monitor compliance, and all operators have to submit a report to LAX. The airport is working to ensure vehicle compliance with the AFV rule.

There are two types of compliance: annual reporting and vehicle compliance with the AFV rule. The airport is working on the goal of 100 percent reporting by fleets, and is requiring that operators with non-complying vehicles develop a plan to show how they will bring the non-compliant vehicles to compliance with the AFV requirement. The airport is actively working with the operators toward improving vehicle compliance.

LAX recently issued notices of non-compliance for (a) annual reporting and/or (b) compliance of the vehicles. The airport started requiring operators to show compliance with the reporting requirement before getting an airfield permit, and it intends to institute this for ground service vehicles as well.

With the new, updated AFV requirement, the airport incorporated an enforcement mechanism. Three or more violations of the program within two years are considered a default of the permit, license, contract, lease, Non-Exclusive Licensing Agreement (NELA), concessionaire agreement, and/or Certified Service Provider (airfield) Program. In such a case, the airport may pursue suspending or canceling the permit, license, contract, lease, etc., if fleet operators are not in compliance. The airport may also seek to recoup the administrative cost of enforcement from non-compliant operators.

#### *Idling*

The airport does not impose an anti-idling policy for private ground transportation fleets. However, the state of California has an idling regulation—California Commercial Vehicle

Regulation—that applies to heavy-duty vehicles with a GVWR of 10,000 pounds or more. This regulation bans idling that exceeds five minutes within California borders. While LAX does not have its own anti-idling policy for on-road vehicles, it does have a loading zone time limit rule: drivers shall not stop, stand, or park any commercial vehicle at any designated loading zone for longer than 45 seconds unless actively engaged in loading or unloading passengers. Airport field officers enforce that rule by moving vehicles along or issuing administrative citations for violations. The airport includes an anti-idling requirement in its environmental mitigations for construction projects, and has a five-minute anti-idling policy for off-road diesel vehicles.

### *Public Transit Options*

LAX encourages airport customers to use transit while traveling to and from the airport. There are six FlyAway bus stations around the city with no reservation required and costing between \$8 and \$10 for a one-way fare to LAX. The airport markets this information through brochures, through information published on the airport website, and through social media channels.

Google Transit provides route, location, fare, and schedule information, as well as connecting transit service information from Santa Monica Big Blue Bus, Metro, and other participating agencies. The airport is also in the process of extending the GreenLine rail transit line.

### *Funding Opportunities*

There have been a few grants in the recent past for converting vehicles to alternative fuels, but in the airport's experience, funding was typically limited. Funding opportunities were more robust when the AFV requirement was implemented in 2007, but the existing grant programs currently have long waiting lists. The airport monitors the availability of such funding and applies whenever possible, but in most cases, the funds are already committed. This lack of funding is a big problem.

### *Barriers and Obstacles*

When the airport's AFV policy was initiated, the main challenges were internal, such as getting all divisions on board and contract managers having the responsibility of implementation. However, at that time there were some funding sources available for converting fleets to alternative fuels. Today there is more competition for funding and it is not as available. Additionally, CNG, electric, and other AFVs are more expensive than clean gasoline vehicles and require fueling infrastructure. These issues create barriers to implementation of the AFV policy.

The main obstacles encountered by the airport during implementation of the LAX Alternative Fuel Vehicle Requirement include the following (in the order of decreasing importance):

1. Lack of understanding and/or prioritization from private fleets – policy language is vague, too technical, and key terms are undefined/difficult for operators to determine compliant vehicles. Air quality expert needed to determine compliant vehicles.
2. State of alternative fuel technologies (i.e., AFVs are not competitive with traditional vehicles).
3. Costs associated with fleet conversion.
4. Lack of available grants to fund fleet conversion.

5. Difficulty with monitoring and enforcement of the imposed requirements – no enforcement mechanism.
6. Lack of public fueling infrastructure to support AFV fleet operations – LAX has three CNG stations near the airport, although some longer-haul operators may have fueling issues (mainly electric vehicles and propane).
7. Difficulty changing concessionaire agreement(s) – out of phase with renegotiation timeline, concessionaire wanting rebates or other benefits to implement, etc.
8. Other – the AFV requirement has not been updated since 2007 and does not reflect the lean vehicle technology available today; no exemption for low use vehicles; some low emission vehicles are precluded by the requirement (e.g., hybrid technology is now more common than AF); existing language allows older, higher polluting AFVs; multiple airport departments involved with operators; insufficient staff to administer the program.

Additionally, conventional vehicle technology has changed significantly since the requirement was developed in 2007. New gasoline/diesel vehicles are often as clean as CNG or even cleaner than older CNG vehicles. As a result, requiring AFVs may be counterproductive if conventional technologies, which are more cost effective, achieve practically the same environmental benefits and boost the compliance rates for airport fleet operators. This is part of the motivation for wanting to update the existing AFV policy. LAX wants to provide an opportunity to operators to operate clean vehicles, which would not have to be AFVs as long as they were low emission.

#### *Program Evaluation*

LAX is mostly dissatisfied with the existing clean vehicle program. The airport encountered a lot of issues with the program, including the following: operators don't understand the rule, it's too technical, the challenge of keeping operators informed about the AFV policy (though the policy is posted on the airport website), and uncertainty about the correct contact person to conduct reporting (sometimes the contract lists an administrative person that has no knowledge about the vehicles). Using online reporting is a good approach, although the maintenance of the system/database is labor extensive.

It is often not easy to purchase an AFV. For example, many manufacturers have discontinued producing CNG vehicles. LAX encountered this issue when trying to purchase CNG vehicles for its own fleet. Manufacturers canceled contracts because the vehicles were no longer produced, and dealers often do not keep big inventories of AFVs.

The airport involved fleet operators and performed outreach to develop a recent update to the LAX Alternative Fuel Vehicle Requirement. The 2017 updated policy is more age-based and requires more turnover of vehicles. The airport conducted outreach to key operators (to get good sampling), environmental groups and agencies, and other stakeholders while developing an update to the 2007 policy.

#### *Recommendations*

LAX believes that strong airport leadership, partnerships with major fleets and fuel suppliers, support of state/local air quality agencies, and the availability of grants to convert fleets to AFVs are all extremely important for designing a successful clean vehicle program. When

designing a clean vehicle program, an airport needs to determine which fleets will be included and which will be excluded. For example, the airport must decide if it will require fleets that only come to the airport infrequently (maybe once a year) to comply with an AFV policy.

Recommendations also include:

- Develop a tracking system/database
- Require annual reporting
- Include an enforcement mechanism
- Create a simple system for operators and staff to administer
- Ensure technology is available and affordable
- Update the clean vehicle program when needed

LAX requires annual reporting, but one of the most successful strategies was the creation of an in-house, on-line reporting and compliance tracking database, which is very helpful and is user friendly. This database allows the airport to track fleets and run reports on the number of operators, number of vehicles, vehicles by fuel type, number of older vehicles, engine years of all vehicles, etc. Operators have to report all their vehicles online annually, and if they do not have vehicles that are 8,500 pounds or greater, they simply check a box stating they have no vehicles that apply to show they have met the reporting requirement.

The challenges with reporting include the need to keep the database constantly updated, report new contracts, sort out duplicates, and ensure information accuracy. A lot of maintenance is required to keep the database up-to-date and accurate. Also, some operators do not know if their vehicles are 8,500 pounds or not, so in these cases the airport has to refer to the third-party expert.

LAX maintains a number of vehicle databases. The LAX Alternative Fuel Requirement Program database includes all the vehicles covered under the requirement, including airport-owned vehicles, and even the ones that do not need a permit. The Permits Office has databases for airfield and ground service-permitted vehicles. Having multiple databases allows for cross-checking information to ensure accuracy.

#### *Additional Considerations*

Transportation network companies are not part of the AFV requirement. They have a permit to operate at the airport, but they are mostly private vehicles under 8,500 pounds, so they are not subject to the AFV rule.

### **Phoenix Sky Harbor International Airport (PHX)**

Phoenix Sky Harbor International Airport (PHX) is located in a non-attainment area for ozone (O<sub>3</sub>) and particulate matter (PM). The area maintains attainment status for other pollutants.

#### *Clean Vehicle Program*

The airport encourages, and in some cases requires, private ground transportation providers to use a wide variety of alternative fuel technologies, from compressed natural gas (CNG), to propane, electric, and other technologies.

Use of alternative fuels and fleet age are mandated for certain contracted fleets, including taxis and shared ride vans. For other private ground transportation operators, these requirements are new and suggestive in nature and come in the form of incentives. The airport began mandating alternative fuels for taxis and shared ride vans in the mid-1990s. The primary reasons for implementing a clean vehicle/alternative fuel policy at the airport include:

- Improving air quality
- Establishing/improving “green” image of the airport in the community
- Exploring business opportunities

Phoenix Sky Harbor has Clean Energy CNG stations located on airport property, and at the time the AF policy was implemented, wanted to increase utilization by mandating that contracted commercial ground transportation fleets adopt CNG. The airport also began transitioning the airport-operated fleet to CNG.

Sky Harbor currently offers discounted trip fee rates for commercial vehicles that are dedicated alternative fuel vehicles, including CNG and propane. The trip fee discount does not apply to contract operators (taxi and shared ride van) as they are required contractually to use AFVs. Bi-fuel vehicles are not eligible since the airport cannot confirm if the operators are using alternative fuels in those vehicles. There is a caveat; some fleets may have 100 percent dedicated AFVs (e.g., CNG), but some of their vehicles may still have small gasoline/diesel conventional engines (1-2 gallon reserve) as back-ups. Such vehicles/fleets are not penalized for having conventional engines as back-ups as long as they run their operations on alternative fuels.

#### *Compliance with Clean Vehicle Program*

The contracted fleets (taxis and shared ride vans) complete a self-certification process to demonstrate compliance with clean vehicle requirements. Operators submit mandatory reports documenting their vehicles are dedicated alternative fuel vehicles. Normally between registration and/or maintenance documents (such as for converted vehicles), the operators can bring that paperwork in for a specific vehicle. The airport will verify and validate the paperwork and, if approved, will apply the reduced trip fees.

Sky Harbor may require fleet operators to bring in select vehicles for inspection by airport personnel. Ultimately, the airport will only permit vehicles that have already been validated as to the type of alternative fuel. There is also an RFID tracking system with hardware that monitors airport roadways, so vehicles can only access the airport if they have been pre-approved and have the hardware device installed.

#### *Motivation for Implementing a Clean Vehicle Program*

The airport voluntarily implemented the clean vehicle policy predominately to enhance perception and to improve local air quality. The airport also maintains a good partnership with the local air agency.

Sky Harbor tracks GHG emissions for carbon accounting, but does not currently track scope 3 emission, which includes emissions from ground access vehicles that are not directly controlled by the airport. The airport is in the second year of participating in carbon accreditation.

Maricopa County collects data on criteria pollutant emissions and emissions reduction efforts at the county level (not necessarily isolating emissions at the airport) for its Transportation Implementation Plan (TIP) including countywide fuel usages, passenger cars, trucking, etc. It would be difficult to separate the impact of vehicles accessing the airport, let alone to isolate the impact of private ground transportation fleets at the airport.

#### *Program Evaluation*

The airport is monitoring fleet behavior since implementation of its newly enlarged clean vehicle policy. Sky Harbor did not have information on the fuels the fleets were operating with prior to implementation of the incentive program, so is unable to benchmark air quality improvement. The airport did not require operators (outside of taxis and shared ride vans) to submit the type of fuel in the past (and still does not unless the operators want to apply for the trip fee incentive).

Anecdotally, the airport believes it has not incentivized the new group of off-airport parking and hotel shuttle van operators to purchase AFVs, but the clean vehicle policy is relatively new (only in place for a year). It is anticipated that operators will take into account the incentive when they upgrade their fleets.

As earlier discussed, contracted fleets (taxis and shared van rides) are subject to mandated AFV use rather than incentive-based. Thus, they do not have a choice but to comply with the policy requirements.

#### *Reducing Empty Rides*

In addition to incentivizing alternative fuel vehicles, the airport encourages TNC ground transportation providers to use strategies to reduce "empty rides". Letters of exemption are given to a few companies that are able to efficiently re-dispatch a vehicle after it has completed a drop-off, instead of making it return to one of the airport's holding facilities. This special one-off is given to companies that can prove they have the technological ability to re-dispatch in a way that is consistent with airport regulations and reduces empty rides. This is not yet built into a formal policy.

The existing clean vehicle policy does not specify MPG requirements for ground transportation fleets operating at the airport. The airport involved ground transportation fleets in developing the requirements for its clean vehicle policy. Some fleets were very vocal. Involving them in the discussion helped the airport achieve a better understanding and cooperation.

#### *Idling*

The airport does not have an explicit anti-idling policy at the airport, but the county has strict regulations about idling trucks; the airport does not impose anything in addition to the county rules. The Phoenix area experiences extreme heat in the summer, requiring the use of climate control. To incentivize drivers to reduce idling, Sky Harbor provides an air-conditioned rest area for them.

#### *Funding Opportunities*

The airport is not aware of any funding opportunities or grants used to encourage private ground transportation fleets serving the airport to adopt cleaner vehicles and fuels.

### *Factors for a Successful Clean Vehicle Program*

The airport did not encounter any major problems with implementing the newer incentive-based clean vehicle policy that involves providing airport access fee discounts to fleets that run AFVs. Sky Harbor believes that strong airport leadership and collaboration with the industry are the two most important factors for designing a successful clean vehicle program. The airport has good working relationships with GT providers.

The airport also believes that using incentives for clean vehicles and alternative fuels by ground transportation operators is a superior strategy to making clean vehicle requirements mandatory. If all ground transportation fleets were mandated to use AFVs rather than incentivized, the airport would have encountered more resistance from fleet operators, and implementing the program would have been more challenging.

Additionally, Sky Harbor suggests that airports look at real air quality benefits when designing a clean vehicle program. For example, the contracted taxi fleets were interested in exploring hybrid options. Sky Harbor conducted an analysis that showed the hybrid vehicles were equivalent to CNG and ethanol in terms of emission reduction benefits. This analysis received the city air manager's agreement to allow hybrids into the taxi contract.

While the airport is satisfied with the existing clean vehicle program for taxi and shared ride van contracts, it admits that not many private fleets (airport parking, hotel shuttles, etc.) use AFVs, except possibly intercity operators (the airport's biggest intercity operator uses a predominantly AFV fleet). Sky Harbor is hopeful that the enlarged trip fee program and cost incentive for AFV use will reduce emissions. The current clean vehicle program for contracted fleets is reviewed typically every few years. The incentives for non-contracted fleets were implemented only a year ago, and have not been revised since then.

Of key importance in providing effective incentives to fleets is the ability to track vehicles and trips. The airport uses a commercial vehicle management system, called GateKeeper, and employs an automated vehicle identification (AVI) system, that allow tracking the movement of ground transportation vehicles serving the airport.

### **San Diego International Airport (SAN)**

San Diego International Airport (SAN) is an international hub located in San Diego, California, and is owned and operated by the San Diego County Regional Airport Authority. The airport is located in an area of non-attainment for 8-hour ozone, and is in attainment for all other criteria pollutants.

#### *Clean Vehicle Program*

The airport employs an incentive program to encourage ground transportation providers at the airport to convert their fleets to alternative fuels or other clean air vehicles. The incentive program allows ground transportation operators to pay lower airport fees if they operate alternative fuel or clean air vehicles. The list of eligible vehicles is specified by the State of California and CARB, and includes CNG, propane, renewable diesel, electric, plug-in hybrids, and other low carbon-emission vehicles.

The incentive program is applicable to all eligible airport-permitted commercial ground transportation operators, including taxicabs, vehicles for hire, hotel shuttles, off-airport parking shuttles, rental car shuttles, and TNCs. Limousines and charter vehicles are exempt from the program requirements. The goal of the incentive program is to convert 100 percent of the applicable commercial ground transportation vehicles at the airport to AFVs or other clean air vehicles by 2017.

The requirements for TNCs were developed recently and differ from the other types of operators. Initially, when the program was developed in 2008, the focus was to incentivize ground transportation providers to convert to AFVs. The recently developed requirements for TNCs are more performance-based, providing incentives not only for the use of AFVs, but also for vehicle/ride sharing (resulting in VMT reduction) and for other energy efficiency strategies.

The airport also provides an incentive to hotel shuttles providing service to the airport for consolidating their operations with several hotels. The incentive includes the reduction of airport fees and charges for hotels that choose to utilize AFVs or clean air vehicles and consolidate their shuttle services with one or more hotels. The reduction in fees ranges from 50 percent for consolidating with two to three operators, to 75 percent for consolidating with four to five operators, and to 100 percent for consolidating with six or more operators.

Additionally, SAN employs a vehicle age restriction calling for the replacement older vehicles. According to this rule, ground transportation vehicles with a model year exceeding 10 years old are not allowed to operate at the airport. Vehicles with a model year between 7 and 10 years old must meet airport annual inspection requirements.

The above clean vehicle program originated in the memorandum of understanding (MOU) between the airport authority and California Attorney General signed in 2008, where the airport committed to reducing greenhouse gas (GHG) emissions at the airport. In 2010, SAN developed its ground transportation conversion incentive program, encouraging private GT operators to convert their fleets to clean air vehicles. Taxi fleets began converting to hybrids in 2012.

The program for TNC fleets is relatively recent; therefore, the conversion goals are slightly different. By 2020, TNC vehicles serving the airport must have an average GHG emissions intensity of 205-237 grams of CO<sub>2</sub> per mile, an equivalent of 38-43 MPG fuel efficiency (on par with 2016 hybrid taxi fleets' emissions). TNCs also get credit for ride sharing and other vehicle miles traveled (VMT) or trip reduction efforts.

The airport engaged ground transportation fleets in the discussion of the details of the incentive program when it was being developed. Additionally, SAN continues the dialog with all ground transportation fleets every year to gauge program success, receive feedback, and develop future goals.

#### *Compliance with Clean Vehicle Program*

The airport monitors fleet compliance with the requirements of the incentive program and performs annual vehicle inspections. Vehicles not complying with program requirements are subject to higher airport fees (double the fee). The current (2017) greenhouse gas rating

target for TNC fleets is 313-349 grams of CO<sub>2</sub> per mile (equivalent to 26-28 MPG) and the current trip fee is \$2.32.

#### *Alternative Fuel Infrastructure*

The airport has alternative fueling infrastructure on the property and around the airport, ensuring the availability of fueling options to fleets deciding to switch to AFVs. There is a public use CNG station in proximity to the airport. SAN also has EV chargers in the parking facility where customers only pay for parking (there is no fee for using the chargers).

#### *Funding Opportunities*

While the airport currently does not provide direct grants to private ground transportation providers to convert their fleets to AFVs, there are plenty of state grants that can assist with the process. In 2012, when taxicab vehicle conversions started, a third-party non-profit agency was able to secure grant funding for such conversions.

#### *Motivation for Implementing a Clean Vehicle Program*

While the initial driver for implementing the incentive program was the 2008 MOU between the airport authority and California Attorney General, the current benefits of the program include air quality improvements, complying with local/regional government regulations, achieving Leadership in Energy and Environmental Design (LEED) certification, and establishing a “green” image in the community.

#### *Program Evaluation*

The goal of the program is to convert 100 percent of the ground transportation fleets serving SAN to AFVs by 2017. As of October 2016, 97 percent of taxicabs, 71 percent of vehicles for hire, 21 percent of hotel shuttles, 93 percent of the off-airport parking shuttles, and 100 percent of rental car shuttles were converted to AFVs or other clean air vehicles.

The airport tracks the emissions reduction resulting from implementing its AFV incentive program. Over the period from 2010 to 2015, the incentive program resulted in an 86 percent reduction in GHG emissions from the taxicab fleet, 29 percent reduction in GHG emissions from vehicles for hire, and 48 percent reduction in GHG emissions from airport rental car shuttles. SAN is mostly satisfied with the current incentive program, will monitor its success, and may review and update the program when needed (e.g., the requirements for TNC operators were recently updated).

### **San Francisco International Airport (SFO)**

San Francisco International Airport (SFO) is the largest airport in the North California region and serves the San Francisco Bay Area. SFO is owned by the City and County of San Francisco. The airport has been implementing alternative fuels for 20 years.

When the airport first began investigating alternative fuel possibilities in 1997, it focused on CNG. Although CNG has been the only affordable, practical alternative fuel available, SFO believes that may be changing with the recent improvements and better availability of plug-in electric vehicles. The airport continues to promote natural gas, however, since plug-in EVs are still not as readily available, practical, or affordable for the types of vehicles that private ground transportation fleets use. In 2015, landfill-derived renewable CNG (RCNG) with a

carbon intensity (CI) of roughly 30 replaced fossil fuel–derived CNG with a CI of approximately 75.

The airport does not promote propane, ethanol, or hybrid vehicles as they are not equivalent to RCNG or battery electric vehicles in terms of GHG reduction. The airport also does not allow bi-fuel vehicles since there is no way to guarantee that operators are using alternative fuels to fuel the vehicles.

#### *Alternative Fuel Infrastructure*

SFO has two natural gas fueling stations on the airport premises, which encourages the ground transportation providers to use CNG. The CNG station providers have been almost exclusively providing RCNG derived from landfills. Under this scenario, regular hybrid vehicles would not offer an equivalent GHG emission reduction to RCNG. The only feasible alternative fuel options are PHEVs, EVs, or hydrogen. Electricity and hydrogen are allowed under the airport's clean vehicle policy. All city diesel vehicles have to run on renewable diesel (RD), and SFO is beginning to encourage airport bus operators to investigate RD use. The largest scheduled airporter bus service, which is also contracted with a local transit agency, fuels its fleet primarily with RD because of the transit district-imposed mandate.

#### *Clean Vehicle Program*

The airport has a formal clean vehicle policy dating back to 2000. The specific provisions vary by the category of operator and type of vehicles used. The airport strongly encourages or mandates operators to use AFVs if the product is reliable, affordable, and practical. The vehicle has to provide a reasonable level of operation in order for the airport to move ahead with a specific clean vehicle policy. The commercial ground transportation fleets are comprised of both fleets that operate entirely at the airport and those that operate only part-time at SFO. The policy may apply differently to different fleets depending on whether their operations are fully or partially based at the airport.

*Courtesy shuttles* are incentivized to operate CNG, plug-in electric, or hydrogen vehicles. While courtesy shuttle operators are not mandated to operate CNG/plug-in/hydrogen vehicles, these fleets will pay a triple trip fee for all trips if any vehicle is found to be non-compliant with the clean vehicle policy. Operators had a seven-year phase-in to run the non-compliant vehicles through their life cycle before retiring them and replacing them with CNG. Virtually all the vehicles in that category are compliant with the AF requirement.

Until recently, *shared ride vans* were mandated to operate only natural gas vehicles, though the airport would allow PHEVs or hydrogen fuel cell vehicles. This policy went into effect in 2009, but was modified in 2017 to allow non-CNG vans if California-certified CNGs were not available. This sector is heavily challenged by the advent of TNCs and is shrinking fairly substantially. Shared ride vans are also experiencing challenges with adequate product supply as there are not enough alternative fuel van models available that meet policy requirements.

*Taxis* are regulated by the municipality. This policy (implemented in 2008) requires each taxi fleet in the city to maintain total GHG emissions no greater than those in 1990, when fleets were smaller (total GHG emissions were lower due to number of vehicles, not because the vehicles were more efficient). By the time TNCs became popular, taxi fleets were 90 percent powered by hybrid-electric vehicles and this remains the case today. At one time, up to 10

percent of the vehicles in the taxi fleet were CNG-powered, but operators preferred the hybrid option to meet the average fleet GHG profile.

*Scheduled airporter vehicles* are mostly diesel coaches, with some operating gasoline-powered cutaways. The distance required to travel makes implementing AFVs challenging in that there is not enough infrastructure to accommodate the mileage range required of these vehicles. The airport allows this, and has no penalty if these operators continue to use conventional fuels. The airport encourages but does not require the use of renewable diesel.

*Limos and charters* do not operate entirely at the airport, so SFO has chosen not to regulate their operations. Limos are primarily regulated by the state. Additionally, the airport has chosen not to mandate alternative fuels because limos and charters could have significant range considerations.

*Airline crew shuttles* are encouraged to use alternative fuels and there are some natural gas vehicles in the fleet. However, SFO ultimately chose not to regulate them in part because the CNG fueling operators preferred to work directly with these companies to get them to consider natural gas vehicles. The state is going to look at an electric vehicle requirement in the next few years.

*Public transit* does operate hybrid buses, but the airport does not regulate this category.

*TNCs* currently represent the biggest sector, now carrying almost 30 percent of passengers arriving at the airport and accounting for some 70 percent of commercial vehicle activity. TNCs are lightly regulated by California's Public Utilities Commission, which has resisted implementing any low emission/clean vehicle requirements. Despite airport efforts to work with appropriate state agencies to regulate TNCs, the airport is currently unable to do that and therefore does not implement a clean vehicle policy with TNCs. Because TNCs take up so much of the market sector and make such a big impact on GHG emissions, the airport would like to implement a fee to offset the impacts. SFO has decided not to incentivize TNCs to adopt alternative fuel, such as by implementing a reduced trip fee for compliant vehicles as other airports have done. SFO policy is to penalize operators that do not reduce emissions rather than use an incentive strategy. The airport plans to observe TNC vehicles to get a better idea of their emissions based on vehicle make/model/year.

### *Idling*

SFO has limited curb space and has experienced an increase in total passengers, leading to the airport's implementation of a strict policy against waiting at the curb. The airport had considered implementing an anti-idling policy, but found that was not necessary since it requires a vehicle to be actively loading or unloading in order to remain at the curb. So while SFO has a strict anti-staging clause, there is no formal anti-idling policy in effect.

### *MPG Requirement*

The airport does not have a minimum MPG requirement for vehicles operating at the airport. SFO would consider looking into EPA SmartWay categories and establishing minimum MPGs based on those categories. The airport investigated this option for limo operators several years ago, when it was looking to charge more to operators below a certain EPA SmartWay threshold.

Due to the operators' position that only the state could regulate MPG, the airport could not impose such a rule. Additionally, in the case of hybrid vehicles, MPG may vary depending on the combination of highway and city drive cycles, complicating the assessment of true MPG. SFO believes a minimum MPG standard could be viable for certain fleets.

#### *Motivation for Implementing a Clean Vehicle Program*

The City and County of San Francisco had an interest in reducing emissions and increasing the adoption of alternative fuels back in the 1990s; the City was in fact among the first to participate in the U.S. DOE Clean Cities program. The Bay Area has historically regulated businesses to promote social aims, and has promoted a transit-first policy.

SFO actively worked with the regional air management district to determine if grant funds, which were normally restricted to public fleets, could be made available to private fleets via a pass-through to the airport. These grants offset the cost of purchasing CNG-powered vehicles. The airport was successful in getting the air district to permit the pass-through and SFO was the first agency to take advantage of that request. The airport also issued RFPs for the construction of two CNG fueling stations on airport property, managed by two different firms to maintain competition. That round of RFPs was followed by a second round several years later. The station operators pay rent to the airport.

The stations would only be commercially viable if the private ground transportation fleets operated on CNG. On-airport ground transportation did not run enough miles to justify viability due to insufficient fuel demand. It was necessary to make those stations financially viable by including private ground transportation.

The initial motivation for developing SFO's clean vehicle policy was to reduce overall criteria pollutant emissions in the region. Starting in the 2000s, GHG emissions reduction became more important and more in line with local and state air district thinking. However, the airport was not required to implement the policy. The current primary motivator is to continue reducing the airport's GHG profile, which the airport reports to various agencies that certify SFO's overall GHG emissions, including those from ground transportation.

SFO is planning to focus more heavily on scope 3 carbon reporting and is targeting the ground transportation sector to reduce overall airport emissions. SFO decided to target these emission reductions as a "good neighbor" policy and to enhance the sustainability profile of the airport. There is also the potential to make a business case for carbon trading.

#### *Fleet Outreach*

The airport conducted substantial outreach with the commercial fleets and did not experience much pushback. Initially, there was no alternative fuels mandate, which remains the case with the exception of shared ride vans. Instead, SFO presented the clean vehicle policy as a choice for operators.

The airport also worked with hotel shuttles to commit to achieving trip reduction in addition to incentivizing the implementation of CNG vehicles. They had to consolidate operations with nearby hotels and could contract for larger, more efficient vehicles also powered by CNG. The hotels could work out the trip reduction in whatever manner they chose; there was no mandate.

Some parking shuttle and limousine companies began operating hotel shuttle services under contract. The precise parameters were not prescribed by the airport. The airport director set the standard that SFO would charge triple to operators that did not participate with CNG, which was a big motivation but still a choice. Primarily, it became a business decision for operators to switch to CNG.

Another critical factor that contributed to fleet participation was that the price of CNG was lower than gasoline at the time of implementation. Parking operators, who also incurred the CNG trip fee differential a year later, knew they needed to comply to avoid paying triple. These operations are 100 percent dependent on the airport and do not conduct any business outside of the airport.

#### *Funding Opportunities*

No federal money was applied to commercial ground transportation vehicles. In the mid-1990s, funding for AF projects was made available from state-imposed fees (license plate renewal fees). A portion of those fees was channeled to each air quality district in the state for the acquisition of low emission or AF vehicles. This state action made money available only to public entities in the Bay Area.

In 2007, the air quality district made grant funds directly available to private sector applicants, including ground transportation firms. Previously, the grant administration process was labor intensive and SFO incurred high administrative costs applying for the grants and then executing and managing sub-recipient agreements with each of the operators. Currently, if operators want to acquire electric or CNG vehicles, they can use voucher funds administered through the state energy commission. Dealerships reduce the purchase price of AFVs and then the state reimburses them for the vouchers. The airport is not directly involved in the management of the voucher program.

Since funding is cyclical, these incentives are not always available to fleets. The burden is on the operator to find and take advantage of incentives; the airport does not guarantee in its clean vehicle policy that funding is available to offset the cost of purchasing an AFV. Furthermore, SFO would not waive the policy due to a lack of incentive funding. The only exception is when AF products are limited or not available.

The state budget makes funds available to the energy commission for incentive payments (vouchers). There is more money available for electric vehicles than for natural gas vehicles. These programs have been popular, and sometimes operators must wait for the next cycle of funding. By working closely with dealers, operators can find funding. There have even been a number of cases where operators buy vehicles without the grant funding, since they still pay less for fuel.

The state does allow tax credits to fueling station operators for providing renewable natural gas. Ultimately, the operators pay no more for landfill-derived gas than for fossil fuel-derived natural gas. The higher initial cost paid is offset by the tax credit difference. This has made RCNG economically feasible in California.

#### *Enforcement and Compliance*

The airport has a vehicle inspection regime that was initiated in the mid-1990s for all ground transportation fleets, with the exception of long distance charter buses. Operators must bring in vehicles annually for inspection by airport forces, with the fuel type noted during inspection. Providers must bring in vehicles for an initial preliminary inspection in addition to the annual inspection. The preliminary inspection requires operators to submit paperwork confirming the fuel type—which includes codes for CNG—and they need to provide evidence that a vehicle is a registered CNG vehicle.

There are two categories for hotel and parking operators, compliant and non-compliant. Compliant operators have agreed to meet the CNG requirements. If compliant hotel shuttle or parking operators come in with a non-compliant vehicle, they are charged triple for each trip, even if there is only one non-compliant vehicle in a fleet of compliant vehicles. Only 1 percent of hotels do not operate CNG. These hotels infrequently operate at the airport, so they pay the triple trip fee rate. It is a market force. Fleets can choose compliance or non-compliance each year. If a fleet decides to be non-compliant, it maintains that status for the duration of a year, or until the next inspection.

SFO's clean vehicle policy mandates that shared ride vans operate CNG vehicles except when the product is not available.

#### *Barriers and Obstacles*

Since the clean vehicle policy was instituted almost 20 years ago, operators have had time to adapt; the majority of the pushback came at the initial phase of policy implementation. The advent of TNCs represents the newest and biggest change in ground transportation operations, but since the airport is unable to regulate this sector, this has not been an issue.

When the clean vehicle policy was introduced, the airport had to prove to operators that there would be reliable, affordable, and practical product options. This same standard will apply as the state plans to push for more electric vehicles. CARB proposes that certain categories of ground transportation will have to start introducing plug-in electric vehicles beginning in 2021 and phase them in completely by 2031. Currently there is no product that can meet the specifications, but CARB proponents anticipate that the implementation of this new requirement will drive market production. This will be a new challenge, not because of airport-implemented policies but because of policies enforced by the state.

When the policy was implemented, SFO tried to consider potential issues and barriers, including business considerations. The airport worked to anticipate and address the concerns of transportation partners. SFO actively sought grant opportunities (even though grant funding would not be guaranteed), and offered the partners choices on ways to meet the policy requirements (including consolidation of operations, etc). Additionally, SFO wanted to ensure that CNG would be readily available at the airport for a reasonable cost.

#### *Program Evaluation*

The airport is fairly satisfied with the current clean vehicle policy, but there have been problems along the way. Recent issues have been related particularly to TNCs and limos.

The next goal would be to focus on operators that do not operate 100 percent at the airport by expanding the policy to those sectors, as they do contribute a lot of vehicle activity at the

airport. This can be done only in partnership with regulatory entities (state level) or with operators themselves. However, SFO has not determined a solution that is amenable to both the airport and those operators without resulting in a loss of revenue for the airport to achieve the level of compliance required.

The policy is amended as frequently as needed. The last issue was with the shared ride van operators due to a lack of product availability. Additionally, there are state requirements imposed by CARB that require vehicles operating in the state to be certified for emissions by CARB independently of EPA certification. This makes the California market much more limited, as it poses a significant cost for equipment manufacturers and aftermarket businesses to get the vehicles tested. As a result, there is not a big market for CNG shared ride vans.

Recently, SFO revised the CNG policy for vans, recognizing that product availability continues to be limited. The airport does not want to backslide in emissions, but will waive the policy when the product is not affordable, reliable, and practical. The airport recently appointed a new sustainability director who is committed to moving forward with improving SFO's GHG profile and does not want to go back to traditional fossil fuels.

#### *Recommendations*

Airports need to take an active role with their partners, introduce competition at every step possible, and approach these policies more from a commercial/business perspective than from a government/public official one, avoiding a bureaucratic mindset.

SFO wanted to introduce competition in terms of providing multiple CNG suppliers, give operators options to meet the policy requirements (i.e., consolidated services), and work closely with the local air quality district to secure funding to offset costs. SFO adopted an active role and was involved in the day-to-day concerns of the ground transportation providers as they transitioned to alternative fuels. The airport recommended repair and maintenance shops, worked directly with manufacturers and dealerships, and sought to address problems individually as they came up for the transportation partners.

### **Seattle-Tacoma International Airport (SEA)**

Seattle-Tacoma International Airport (SEA) is the largest airport serving the greater Seattle metropolitan area. The airport is located in an attainment area for all criteria air pollutants.

#### *Clean Vehicle and MPG Requirement Program*

The airport encourages the use of alternative fuels by private ground transportation fleets. In 2000, the airport began requiring—through concession agreements—that taxicabs serving the airport convert 100 percent of their fleet to CNG, with the exception of vans. SEA developed a schedule for taxi operators to convert their fleets to alternative fuels. Later, the requirement changed to requiring that all taxis serving the airport have a fuel economy of 45 MPG or higher, or operate exclusively on alternative fuels (CNG/propane/electricity). This is the current concession agreement for on-demand taxi services.

Historically the airport mainly promoted CNG, but currently the airport supports all types of alternative fuel technologies, or vehicles that meet the required fuel economy (45 MPG). This rule applies to taxis. Other private ground transportation providers are also encouraged to

use AFVs, but the requirements are less restrictive than they are for taxicabs. The airport has an agreement with transportation network companies (Uber and Lyft), but it is structured differently than for taxicabs. The requirement for all fleet vehicles to have a fuel economy of 45 MPG (or higher) is specified in concession agreements with taxicab companies. Alternatively, TNCs are required to achieve an equivalence to the taxi requirement through the calculation of carbon emissions per average trip, but this takes the form of an economic incentive/disincentive with TNCs, rather than a rigid contractual obligation. For example, when a TNC achieves the contractual equivalency to taxis (through the e-KPI policy), it pays a \$5 outgoing airport fee. That rate doubles for those vehicles that do not achieve the e-KPI requirement.

The airport has concession agreements with taxicab companies and operating agreements with other fleets. Concession agreements grant greater access to the terminal, but impose higher standards. SEA considers concession agreements to be a form of incentive since they allow exclusive access (no competition). In addition to the requirements for the taxi and TNC fleets, the airport requires the use of alternative fuel in door-to-door shuttle agreements and courtesy vehicle agreements that are feasible for AF implementation. Outside of the contractual requirements, several courtesy shuttle operators use propane autogas vehicles voluntarily at the airport.

The fleet requirements are specified in RFPs and are non-negotiable. However, over time concessionaires can petition the airport to change the policy if they can demonstrate that the imposed requirement is very difficult to achieve. For example, wheelchair accessible taxi vehicles operating under the concession agreement are not subject to the fuel economy or alternative fuel vehicle requirement on the basis of economic hardship.

The airport monitors fleet compliance with the clean vehicle requirements specified in the concession agreements. They inspect all taxicab vehicles monthly and update the vehicle list annually. Vehicles that do not comply are denied access to the airport.

#### *Idling*

SEA has an anti-idling policy that bans any idling at the loading areas in the airport. A ground transportation enforcement team enforces the policy and is located in the areas where taxis and TNCs operate. The enforcement team issues citations to idling policy violators. While there are no explicit fines associated with the citations, multiple citations may result in denying the violating vehicle access to the airport premises.

#### *Funding Opportunities*

Washington has limited financial incentives available to support the adoption of alternative fuel vehicles. The most attractive grants that exist apply to airport-owned/operated fleets; for example, the airport is considering government grants to acquire electric buses for the airport fleet.

#### *Program Evaluation*

SEA is mostly satisfied with the existing clean vehicle program, but always eager to continue to improve. The program requirements are reviewed and amended as needed every five years for taxicabs and annually for TNCs.

### *Motivation for Implementing a Clean Vehicle Program*

Seattle has a long history of environmental awareness and consciousness and is recognized for its sustainability leadership. Clean vehicle policies and requirements at the airport are typically developed by the airport itself as part of its sustainability practices, rather than imposed by a government or other outside authority. The airport works closely with the local Clean Cities chapter to develop and execute clean vehicle programs. While clean vehicle requirements are internally developed, the airport's policies are well aligned with regional goals in terms of demonstrating strong environmental stewardship (reducing GHG emissions, etc.). This consensus has been in place for a long time.

The primary reasons for implementing the airport's existing clean vehicle policy include establishing/improving a "green" image for the airport in the community and an incremental business opportunity (the airport leases property to a third party owned CNG fueling facility). Both reasons are equally important for the airport.

SEA has an environmental department that tracks the environmental impacts of airport sustainability practices, including reduction in greenhouse gas emissions and petroleum consumption.

### *Barriers and Obstacles*

One of the main obstacles encountered by SEA during implementation of its clean vehicle program was the difficulty fleets had in choosing between available alternative fuel technologies. Technology and fuel options change quickly and many ground transportation fleets, as well as the airports, find it difficult to make long-term decisions about the technologies and fuels. Access to local expertise in vehicle up-fitting and maintenance has also proven inconsistent for the duration of clean vehicle policy activities. Another major challenge for the airport was providing fair treatment to all fleets.

Airports can address these obstacles by:

1. Being open and transparent with fleets about the policies and approaches taken
2. Front-loading fleets with an exhaustive amount of relevant information
3. Looking at things fairly

### *Recommendations*

The main factors for designing a successful clean vehicle program include strong airport leadership and ensuring fleet access to fuel and vehicle support. Since AFV infrastructure is typically very costly, airports need to plan ahead and look at long-term impacts while designing clean vehicle programs. Airports should also thoroughly examine the total cost of infrastructure ownership (or capital) instead of taking easy short-term solutions.

Agreements are critical for implementing a successful program. SEA recommends avoiding month-to-month operating agreements and relying mostly on concessions. Preferential treatment and good access to the terminal are good incentives to encourage private fleets to comply with clean vehicle standards.

## **Tampa International Airport (TPA)**

Tampa International Airport (TPA) is located in Tampa, Florida, and is owned and maintained by the Hillsborough Aviation Authority. The airport is located in an attainment area for criteria pollutants.

### *Alternative Fuels*

Tampa International Airport encourages the use of alternative fuels and other types of clean vehicles, although it does not enforce a formal policy for private fleets. Airport-owned fleets actively use CNG and electric vehicles. The airport has a public-private partnership with Clean Energy and has a public-use CNG station on airport property.

TPA encourages the use of electric vehicles (EVs) at the airport by providing premium parking spots (closest to terminal) for EVs and by not charging for electricity. There are also dedicated alternative fuel vehicle parking spots located closest to the main terminal. EV drivers pay only the general parking rate and have an opportunity to use Level-2 chargers at no additional cost.

### *Idling*

The airport does not have an explicit anti-idling policy. Idling is reduced by prohibiting waiting at the terminal—vehicles are not allowed to stay at the curb unless the drivers are actively picking up or dropping off passengers. Additionally, the airport incentivizes drivers picking up arriving passengers by providing free parking for the first 60 minutes at the short-term garage. This helps prevent drivers from circling around the airport and reduces emissions.

### *Funding Opportunities*

The only funding that was available to private fleets to convert their fleets to alternative fuels was the Florida Natural Gas Fuel Fleet Vehicle Rebate program, which provided 50 percent of the incremental cost—up to \$25,000 per vehicle—to convert, purchase, or lease natural gas or propane vehicles. The program was funded at \$6 million per year since 2014, with 60 percent available to private fleets and 40 percent for public fleets. During the last legislative session, the state legislature decided to discontinue funding the program. As a result, no funding is currently available for fiscal year 2017-2018.

### *Motivation for Implementing a Clean Vehicle Program*

If TPA were to develop a formal clean vehicle policy for private fleets in the future, the main motivating factors would include improving air quality, pursuing Leadership in Energy and Environmental Design (LEED) certification, as well as improving a “green” image of the airport in the community. There are business considerations as well. Since the airport has a public CNG station on the property, it receives a portion of the revenue and a reduced rate from the station operator for fueling airport-operated vehicles.

The airport recently applied for carbon accreditation through Airports Council International for scope 1 mapping, so it is currently tracking emission reductions in that category. The airport tracks the environmental impact of its sustainability efforts for internal reasons. Additionally, the tracked metrics focus primarily on airport-owned fleets rather than private ground transportation fleets serving the airport.

### *Potential Challenges*

TPA believes the main challenges for developing a clean vehicle policy would include the substantial costs of clean vehicle technologies and the lack of available grants to fund fleet conversion. The most critical factors for implementing a successful clean vehicle program include strong airport leadership and partnership with fuel suppliers. The airport set a goal for a certain percentage of the airport-owned fleet to convert to alternative fuels by a future date, but there are no similar plans so far for private ground transportation fleets.

While the airport is neither satisfied nor dissatisfied with its sustainability practices, it believes there are always opportunities for improvements, which TPA will continue pursuing.

## **PRIVATE GROUND TRANSPORTATION PROVIDER RESPONSES**

### **Park 'N Fly – Hotel/Parking Shuttle**

Park 'N Fly operates at a number of airports, but the responses here are in reference to Hartsfield Jackson Airport (ATL) in Atlanta, Georgia. The company provides transportation service to and from ATL and off-airport parking lots; it has a contractual agreement with the airport but did not provide specifics. Park 'N Fly owns some of the parking lots and operates others through a management contract with the lot owners. The company operates 45 gasoline-powered vehicles at ATL, comprised of Chevrolet (3500 & 4500) cutaway vans.

### *Alternative Fuel and Clean Vehicles*

Currently the company does not operate any alternative fuel vehicles at ATL.

### *Idling*

Park 'N Fly does have an idling policy for company vehicles—the vehicles cannot idle more than 10 minutes at any given time.

### *Role of Airport*

The interviewee is not aware of any formal airport policy mandating alternative fuels or other sustainability practices at ATL. Park 'N Fly has considered implementing sustainability practices for the ATL fleet, but at the time of the interview has not taken any significant measurements or actions since these are not required by the airport. If airports develop clean vehicle programs, the company suggests involving the commercial ground transportation fleets in those discussions.

### *Funding Opportunities*

The company is aware of small grants available to help with the purchase of electric vehicles, and believes grants are the most helpful tool to assist with offsetting the cost of purchasing/converting alternative fuel vehicles.

### *Additional Considerations*

To the company's knowledge, TNCs are currently allowed to operate at ATL, which has impacted business for the other commercial GT operators including Park 'N Fly.

## **Parking Shuttle Operator – Anonymous**

The company provides on-demand parking shuttle service between San Francisco International Airport (SFO) and off-airport parking locations.

### *Airport Alternative Fuel Requirement*

The company started using alternative fuel vehicles to comply with an airport-imposed AF requirement. The company purchased new conventional vehicles and converted them to compressed natural gas (CNG) using conversion kits. It currently operates 15 company-owned CNG-powered buses in its fleet.

The airport requires 100 percent of private fleet commercial vehicles to run on alternative fuels or have AFV-equivalent emissions. When the airport implemented this policy in 2007, it helped private fleets obtain funding for converting to AFVs. This is no longer the case. Technically, SFO's AF policy is not mandatory. Fleets can choose not to comply, but they will be penalized with higher airport fees. The vehicles that do not comply with the AFV-equivalent emissions rule pay quadruple airport fees. Due to this significant economic disincentive, many fleets feel there is no option but to comply.

The airport discussed its AFV policy with the fleets prior to implementing it. Some of the operators voiced concerns, but the airport proceeded with the policy.

### *Driver Acceptance*

The airport clean vehicle policy did not affect the vehicle drivers since they do not own the vehicles. The CNG buses require a longer fueling time and need to be refueled more often than conventional vehicles, which drivers have cited as problematic. The company also had issues in the past with the limited range of CNG vehicles, which is lower than regular gasoline/diesel vehicles.

### *Alternative Fuel Infrastructure*

The airport has two CNG stations on the airport property and the fuel is sold at market rate. Despite the availability of fueling infrastructure at the airport, the company has experienced difficulties with pumps being down and fuel (CNG) being unavailable.

### *Funding Opportunities*

The fleet is not aware of any incentives available to CNG vehicles. There are a few incentives that apply to electric vehicles. The company does not currently operate EVs, but may look into them if the range of those vehicles improves. The company believes that government tax rebates/credits are most effective for encouraging private fleets to convert to AFVs, which the company has used in the past to offset costs, but they are currently not available.

### *Evaluation of Airport Alternative Fuel Policy*

The interviewee believes the SFO clean vehicle policy has been at least somewhat successful. The airport has involved private GT fleets in the decision-making process and provided adequate time and consideration to comply with the policy given the challenges inherent to meeting the clean vehicle requirements. These issues are very important when structuring a clean vehicle program. However, one of the most important considerations is making sure

that adequate alternative fueling infrastructure is readily available and accessible at or around the airport to support fleet operations.

#### *Obstacles to Adoption*

The company admits that switching to CNG was somewhat difficult, mainly due to the costs associated with the new technologies. Additionally, fleet vehicles initially experienced mechanical failures and higher maintenance costs—head gaskets failed on vehicles too often.

The main barriers for complying with the sustainability requirements imposed by the airport include the lack of available AF infrastructure at or around the airport, the costs of alternative fuel technologies, and the lack of qualified/certified mechanics who can service/repair AFVs. At one point, there was only one certified technician in the area qualified to inspect CNG vehicles.

The company has experienced issues with CNG availability as the airport CNG stations are down periodically due to pump failures/repairs/maintenance, which creates a lot of trouble for fleet operations. Therefore, fueling infrastructure should have redundancy. Finding qualified mechanics who know what to do and how to maintain AFVs is crucial for the success of any alternative fuel vehicle program. Fleets need to be aware of that before committing to alternative fuels.

#### **Carmel Car & Limousine Service – Limousine**

Carmel provides car service and has a fleet of stretch limousines, minivans, and SUVs. The company serves major airports in New York, including LaGuardia, John F. Kennedy, and Albany International (ALB).

#### *Alternative Fuels and Clean Vehicles*

The company does not own the vehicles that are in operation so it does not control the types of vehicles that drivers purchase and operate, and is therefore not directly involved in the purchase of AFVs or implementation of other fuel saving technologies. However, there are several hybrid vehicles and one electric vehicle in the fleet.

Carmel encourages the use of AFVs, but does not require its drivers to purchase them. The company is considering plans to open a new clean vehicle division that will use AFVs and other clean vehicle technologies for environmentally conscious customers. However, this decision depends entirely on the market availability of such vehicles, and the current market would not support the creation of a clean vehicle division. The company is also considering purchasing carbon offsets in the future to mitigate fleet GHG emissions. Carmel encourages but does not enforce environmental practices.

#### *Role of Airport*

The airports served by Carmel do not restrict the types of vehicles that can access airport facilities and do not impose any clean vehicle or AF requirements on private ground transportation operators. The company is aware of some airports that provide line position preference for alternative fuel vehicles, but there are no restrictions placed on the fleets to adopt AFVs or fuel-efficient vehicles. Additionally, the company suggests that some airports give preferential treatment to fleets that demonstrate environmentally friendly practices,

increasing their chances of winning the RFP. This is not Carmel's experience in working with Albany International.

The company would like the airports to install more alternative fueling infrastructure in and around the airport premises to encourage higher AFV usage and to provide free parking/rest areas near the airport to reduce the amount of circular traffic and idling that produce unnecessary emissions. Carmel believes that AF technologies are still much more expensive to acquire than traditional gasoline or diesel. It does not support the strategy of airports restricting vehicle types and regulating the private GT fleets in terms of alternative fuel, clean vehicle, and fuel efficiency standards. The company suggests that voluntary compliance or encouragement is a better strategy when working with private ground transportation fleets.

#### *Obstacles to Adoption*

The main obstacle for implementing AFV technologies is the up-front cost. A vehicle owner—whether a company or an individual driver—will typically choose an option that costs less and makes more economic sense. Additionally, Carmel stated that it would be challenging to meet alternative fuel vehicle requirements if the airport began to enforce AFVs or other clean vehicle technologies, since the private ground transportation fleets work within municipality regulations. It would be challenging if these two authorities had separate regulations.

#### *Funding Opportunities*

Few incentives exist for purchasing alternative fuel vehicles, but most of the incentives are one-time (grants/credits/rebates). This usually does not address long-term issues or higher life-cycle costs. For example, an AFV may have a lower range or smaller cargo space, which will affect the operations of the for-hire vehicle for the life of the vehicle. A one-time incentive may not be able to offset those costs.

Consumer preference is also important. If consumers preferred environmentally friendly vehicles (fuel-efficient or AFVs), then providers would use them. If consumers prefer larger, more comfortable vehicles and do not place much emphasis on energy efficiency, it is difficult for providers to justify the extra costs for converting to AFVs.

### **Presidential Worldwide Transportation – Limousine**

Presidential Worldwide Transportation is one of the largest limousine companies in Colorado that provides airport transportation to/from Denver International Airport (DEN), in addition to serving other airports in the state.

#### *Alternative Fuel and Clean Vehicles*

The company owns and operates 30-plus vehicles, including one stretch limo, sedans, SUVs, and minibuses (Ford, Mercedes). Because the company focuses mainly on corporate transportation services, around 50 percent of the fleet is comprised of sedans and SUVs.

Presidential operates one fully electric Tesla vehicle. The company mentioned that the ROI for the Tesla is fairly good in terms of fuel and maintenance savings after a certain amount of miles are put on it. However, the Tesla is not large enough to accommodate clientele and baggage. In the past, the company also operated five hybrid-electric Ford Fusions, but the

majority of clients did not accept them as luxury vehicles and the company discontinued using them.

#### *Deadhead Reduction*

The company uses software that reduces deadhead by matching vehicle trips with clients and by scheduling trips efficiently.

#### *Obstacles to Adoption*

The biggest barriers to purchasing and operating AFVs include customer preference and the limited product availability of luxury AFVs.

It is difficult for a limousine company to implement alternative fuel vehicles since there are few luxury models available. The market is expected to offer more AF luxury models soon, but they will be significantly more expensive than traditionally fueled vehicles, making it difficult for commercial operators to ensure a return on investment.

The company needs to make business decisions in line with client preferences. In Presidential's experience, the clients desire larger vehicles rather than fuel-efficient compact or alternative fuel vehicles. Limo company customers place higher value on comfort and prestige than on fuel efficiency. Four years ago, one of the company's large clients expressed interest in fuel efficiency and alternative fuels, but this is not the case presently. In addition, the price of gasoline and diesel is much lower today than it was a few years ago.

While more incentives, including government tax credits and grants, as well as the preferential treatment of AFVs by airports, would certainly be helpful, the main obstacle with AFV adoption is customer preference. If clients wanted AFVs as limo rides, the company would include these vehicles in its fleet. However, even if various incentives were available, the company would still have serious challenges in adopting AF technologies if customers were unhappy with them.

#### *Role of Airport*

The airport typically is not involved in regulating limousine companies. Instead, Colorado Public Utilities Commission regulates limos in the state. Limo companies are subject to various regulations and requirements, including type of vehicle in operation, vehicle appearance, safety, driver background checks, etc. However, there are no requirements regarding vehicle fuel efficiency or the use of alternative fuels or propulsion technologies in limos. It was the company's decision to use and experiment with hybrid and electric technologies in its fleet. DEN might offer electric vehicle charging, but the interviewee could not confirm. The company does not charge its electric vehicle at the airport.

#### *Funding Opportunities*

The only government incentive for AFVs that Presidential is aware of is a \$7,500 tax rebate available for plug-in vehicles.

#### *Factors Influencing Adoption*

The company management is in favor of fuel-efficient or alternative fuel vehicles, but cannot neglect customer preferences. Limousine customers have a certain level of expectation from limo companies. Presidential stretched one of its Ford Fusion vehicles by six inches to increase

legroom, doing the modification through an OEM conversion. Despite the larger size and increased comfort after the modification, that vehicle is rarely used since customers do not want to ride in a Ford (not luxurious enough). If automakers could come up with a luxury vehicle that is reasonably priced, the company would definitely consider purchasing it, as a means of reducing environmental impact and as a way of separating itself from the competition.

#### *Additional Considerations*

Presidential has been impacted by transportation network companies (TNCs). Although TNCs do not directly compete with limo service, the company has seen a decrease in sales due to TNC operations at the airport. Additionally, the company loses drivers to TNCs.

Presidential believes it has a clear advantage over TNCs in the luxury market and in large group transportation. Therefore, the company concentrates on larger vehicles and shuttles as a way to address the market pressure from TNCs. The company also believes it can be competitive with TNCs in providing last mile transportation (from light rail in the region).

The airport policy toward TNCs is not helping traditional commercial transportation providers. The state of Colorado has been very friendly to TNCs, allowing them to operate anywhere with limited requirements imposed on vehicles or drivers.

Denver International Airport could do more to ensure that all GT providers operate on a level playing field and are subject to the same requirements. Currently TNCs are not required to fingerprint drivers and can operate any vehicles at the airport, while limo companies and other traditional operators are subject to strict rules and requirements. Limousine operators are subject to much higher standards.

The company cannot provide the same type of instant service as a TNC, which relies on non-paid private drivers while Presidential employs paid drivers. To provide the same on-demand service as TNCs, a limo company would have to pay its drivers an hourly rate to circle around the airport and be available on a moment's notice. This would be prohibitively expensive. The situation may be different for limo companies that use contractors rather than employees.

#### **Ace Taxi Services – Taxicab**

Ace Taxi Services offers taxi service, executive sedan service, and shuttle service, and operates at Cleveland International Airport (CLE).

#### *Alternative Fuels*

The company owns a fleet of about 180 vehicles and approximately 95-105 of these vehicles operate on CNG or propane. Ace introduced CNG and propane vehicles into its airport operations in 2010. Currently about 35 of the 60 taxicab vehicles operating at the airport run on CNG. The airport has a Clean Energy CNG fueling station near the airport, and Ace has one Clean Energy CNG station on its property.

#### *Factors Influencing Adoption*

Ace made the decision to switch to CNG primarily to pass along the benefits to drivers in terms of cost savings on fuel and maintenance. The company's vehicles average between 40,000 and 50,000 miles per year, so the addition of CNG and propane allowed the company

to reduce emissions and petroleum consumption in line with sustainability goals. To Ace's knowledge, CLE does not have an alternative fuel vehicle or clean vehicle requirement for the private ground transportation operators.

#### *Funding Opportunities*

The company initially used grant funding to help with vehicle conversions and received grants for installing a CNG station on its property. Ace is interested in the potential funding availability from the VW Settlement, but is concerned that VW funds will be used mainly for larger vehicles, such as Class 6 or 7, making eligibility unlikely for the taxi sector.

#### *Obstacles and Barriers*

Ace encountered several obstacles during the integration of AFVs into its fleet. First were the regulatory difficulties, such as fire marshal regulations, building codes, and local ordinances dealing with handling alternative gaseous fuels. The limited availability of qualified specialists to maintain vehicles and equipment was also an issue. The company had problems with equipment and vehicle failures, and OEMs did not support the vehicles because they had been modified—converting to AF voided the original manufacturer's warranty. Ace originally had a local equipment installer vendor that could convert the vehicles and provide service and repairs. That company closed, and Ace hired some of the vendor's mechanics and technicians who are familiar with CNG vehicles and the conversion system. Thus, Ace now has in-house expertise on natural gas vehicles. The company would have faced a major barrier to implementing AFVs without that in-house expertise.

When the company converted its fleet in 2010, the fuel price difference between CNG and gasoline was much more significant. Initially CNG was about \$1 cheaper per GGE (gasoline gallon equivalent) than gasoline. The cost savings is much less significant at the time of publication; CNG prices are estimated to be about 20 cents cheaper per GGE than gasoline and diesel and in some instances, CNG is more expensive than traditional fuels. The fuel price differential is not as advantageous as when the company first began converting vehicles to CNG. This is especially problematic for dedicated CNG vehicles since they do not have an option to use multiple fuels, like bi-fuel vehicles.

Ace would also like to see the state EPA office reduce the restriction on the certification needed to convert vehicles. The relatively high conversion costs are due to the expense involved in qualifying vehicles and the EPA approval process. Since vehicle models are updated regularly, the conversion kit from the previous year cannot be used for the newer model. As a result, if a vehicle model changes, it must go through a new qualification process that involves testing and certification, creating a significant obstacle to converting vehicles to alternative fuels.

The company also expressed concern about a lack of product availability. The current CNG vans may expire soon and Ace cannot find similar certified vehicles that can be converted to replace them.

#### *Role of Airport*

Cleveland International does not provide any incentives to private fleets for running alternative fuel vehicles at the airport. Ace believes that offering airport contracts to transportation providers that run fuel-efficient vehicles would be a good incentive to encourage GT operators to convert their fleets to AFVs.

At the same time, the company believes that allowing AFVs priority access in the drop-off and pick-up queue at the airport is unfair, and could create problems. Ideally, the main approach in encouraging drivers to operate AFVs should be for fuel efficiencies and fuel cost savings, and not because of other incentives. Therefore, Ace would like to focus its energy on the economic benefits rather than contractual incentives.

Ace Taxi would like to continue operating CNG vehicles and is interested in expanding its CNG fleet in the future, but has concerns about fuel access and availability. Clean Energy is considering shutting down its CNG station on the company's property due to insufficient utilization. Clean Energy owns the station and equipment and rents space for the station from Ace Taxi. The cost of operating the station is too high since there are not enough vehicles in the market that use natural gas. Additionally, bi-fuel vehicles are not using the CNG station because the price of gasoline is so low. Only dedicated CNG vehicles are fueling at the station, and their number is not enough to sustain station operations.

The company is not aware if the airport uses CNG for its own fleet.

Ace believes that ensuring access to fuel is one of the most important issues that the airports should consider while developing clean vehicle programs. Adequate EVSE at the airport is important to support EV operations, so the vehicle could park, charge, and maintain access to the airport queue.

#### *Additional Considerations*

Transportation network companies operate at Cleveland International and they negatively affect the market for taxicabs. TNCs are not subject to the same requirements as licensed operators at the airport (e.g., certain vehicle make and model, drivers having to wear a uniform, etc.).

#### **Eastside for Hire, Inc. – Taxicab**

Eastside for Hire provides taxi service and for-hire vehicles. Unlike taxis, for-hire vehicles charge a flat rate for transportation based on zip code. The company has a contract with the Port of Seattle to provide and manage a taxi fleet, and provides ground transportation services to Seattle-Tacoma International Airport (SEA). The company does not own most of the taxi fleet. All drivers are independent contractors. Of the 600 vehicles the company operates, it owns only about 10.

#### *Transition to Alternative Fuels*

When Eastside started converting its fleet to CNG, one of the main difficulties involved fueling and infrastructure, which was very expensive. Additionally, the CNG vehicles had range issues. Vehicles could not always go where they were needed, and operators had to increase the number of fueling trips. These issues had a direct impact on fleet operations. The hybrid vehicles were a much smoother transition, and the company does not currently have any issues meeting the SEA MPG requirement.

#### *Airport Clean Vehicle Policy*

SEA requires all taxis and for-hire vehicles to have a fuel economy of at least 41 MPG, which it states explicitly in the concession agreements. This requirement is expected to increase to

48 MPG. Eastside currently operates hybrid-electric cars in its fleet—primarily Toyota Priuses—in order to satisfy the airport requirement. Two other companies that serve the airport use either CNG or hybrid vehicles. Historically, SEA mainly promoted CNG, so Eastside started with CNG but then began integrating hybrid vehicles into the fleet.

In the initial agreement, the airport did not specify green vehicles but required that taxi fleets show reductions in GHG emissions, which could be shown in a number of ways, including fuel-efficient vehicles, alternative fuel vehicles, vehicle and trip reduction, etc. The agreement also specified that fleets show reductions in deadheading (or empty rides). Fleets would be penalized if they did not meet deadheading reduction goals.

The airport did not involve transportation providers in developing its clean vehicle rules. The rules were imposed on all ground transportation fleets operating at the airport.

### *Benefits*

The main benefit for Eastside is a long-term contract that grants the fleet exclusive access to the airport. Taxicab companies can take advantage of long-term contracts with the airport. For example, the first contract that the company signed with the airport was for two years. The following contracts were for five years each.

### *Deadhead Reduction*

Eastside participates in a deadhead reduction program that gives credits to vehicles/drivers that pick up passengers at the airport and return to the airport within three hours with another fare-paying customer. Vehicles that return to the airport within three hours with a customer also receive priority in taxi line position. While this program may work for longer trips, it can be difficult to get a return trip to the airport for short trips. As a result, drivers often lose money on short trips from the airport due to airport fees and unlikely passenger pick-up priority upon return. The company believes these short trips should not be counted in calculating the percentage because it is not realistic for drivers to pick up a return trip. The environmental impact of the short trips (some under half a mile) is also minor. Eastside does not feel the deadhead reduction policy, as it applies to short trips, is reasonable.

The described deadhead reduction program involves extensive reporting. The company has to document matched pick-ups and drop-offs within the three-hour window. The airport has implemented an automated vehicle information (AVI) system that employs infrared sensors that read the car number and register the time vehicles arrive and leave the airport. This device is attached to the windshield and communicates with the sensors.

The company has access to this data from the airport and uses it to identify which trips apply to the deadhead reduction program. Additionally, the company uses its own data from its computer dispatch system to document vehicle movement. Finally, the company also manually counts the number of trips and assesses deadhead reduction. Eastside is planning to upgrade to a POS system where each taxi will have a sticker on the side window. The coordinator tracking trips will use a radar gun to record the trips in the system (recording time and cab number). Between the airport AVI system, manual accounting, and the new radar system, the company can reliably track the number of trips.

### *Funding Opportunities*

Eastside does not know of any incentives that may help fleets comply with the requirements of the clean vehicle program at the airport. However, private fleets could potentially pursue a grant or loan from the Port of Seattle.

The company admits that tax credits or other government financial incentives would certainly help with converting the fleet to cleaner, more fuel-efficient vehicles. Eastside would like to implement an emissions reduction program in its fleet in the near future and may consider other sustainability practices. However, no solid timeline for these plans has been developed.

### *Obstacles to Adoption*

The company is currently dealing with a major obstacle related to having to switch to a smaller hybrid vehicle model in order to comply with the increased MPG requirements imposed by SEA (from 41 to 48 MPG). Eastside will be required to upgrade its vehicle fleet from the larger Toyota Prius V to the smaller Prius C model. The Prius C has much less baggage space, and the concern is for passengers carrying excessive luggage. For those customers, Eastside will have to dispatch vans that can accommodate bigger parties and excess luggage. These vans emit more emissions and have lower MPG, which contradicts the environmental goals of the Port of Seattle.

### **Yellow Checker Cab – Taxicab**

Yellow Checker Cab, Inc., is a taxicab company in San Jose, California, that mainly serves the San Jose International Airport (SJC) and does occasional pick-ups at San Francisco International Airport (SFO).

### *Airport Alternative Fuel and Clean Vehicle Program*

In 1996, San Jose Airport began mandating the use of alternative fuels. Currently the airport endorses the use of and provides lower trip fees to Super Ultra Low Emission, Level-II Vehicles (SULEV-II). These include natural gas vehicles, hybrids, and electric vehicles (EVs). The majority of the Yellow Checker Cab fleet is comprised of owner-operated vehicles; of the 265 vehicles the company operates, it owns only about 65.

SJC was planning to build a new terminal in 1996 that would add new gates. The federal government was willing to allow the airport to expand the gates conditional upon the airport cutting its overall emissions. This was essentially the reason why the airport implemented the clean vehicle program. Other strategies the airport employed to meet the emission reduction goals included an anti-idling policy, anti-staging policies, and restricting loading zones for all types of commercial vehicles. Cell phone lots were also a positive step toward reducing the number of people cruising around the airport while waiting to pick up travelers.

Yellow Checker Cab operates alternative fuel vehicles (AFV) and hybrids. The airport requirement was one of the primary reasons for converting the fleet to AFVs. SJC had numerous discussions with private fleets regarding the clean vehicle requirement before it was formally adopted. Additionally, the airport worked with taxicab companies and the Bay Area Air Quality District, obtaining funding for AFV purchases and facilitating the conversion of private fleets to AFVs and hybrids. The clean air vehicle requirement is included in the airport rules and regulations. The current airport policy requires that 25 percent of all taxi

on-demand fares use clean air vehicles (vehicles with emission rating SULEV-II). However, most of the taxicab companies serving the airport exceed that requirement.

#### *Compliance with Clean Vehicle Policy*

The airport checks emission ratings for all AFV vehicles and hybrids to see if they qualify for the clean vehicle standard. Each taxicab operating at SJC has an automatic vehicle identification (AVI) tag on its windshield, and the airport maintains the AVI system together with a database of all vehicles. Thus, the airport knows which vehicles go to the airport to pick up on-demand passengers and can determine the percentage of on-demand trips provided by clean air vehicles.

#### *Incentives*

The airport continues to offer an additional incentive: drivers operating clean air vehicles—AFVs or hybrids—enjoy a reduced airport trip fee. In the past, SJC also offered other preferential treatments to clean air vehicles, including better access to the terminal and prioritization in picking up passengers. The current system, however, does not provide these incentives and clean air vehicles are treated in the same manner as any other taxicabs at the airport.

#### *Alternative Fuel Infrastructure*

The airport operates a natural gas station (CNG) on the property that offers a good price for CNG vehicles, but such vehicles are becoming fewer and fewer. The majority of the vehicles currently participating in the clean vehicle program are hybrids (e.g., Toyota Prius).

#### *Obstacles to Adoption*

When the airport began requiring AFVs in 1996, it was difficult for fleets to comply with the airport requirements since the vehicles were not readily available. At that time, hybrids were not available and CNG vehicles were probably the only available option. Currently, the willingness of fleets to switch to clean vehicles—including AFVs and hybrids—is directly correlated to the price of gasoline.

#### *Factors for Implementing a Successful Program*

The company believes that the reduced trip charge for clean air vehicles is the most successful incentive implemented by the airport that encourages fleets to convert to AFVs and hybrids. The company has not seen any funding available for AFV purchase/buy-down recently. As for providing pick-up priority, that practice can be very disruptive to the entire on-demand system. Any on-demand system relies on an orderly “first come—first served” principle and allowing some cabs to jump the line can disrupt that system.

#### *Funding Opportunities*

Yellow Checker Cab does not know of many government grants or rebates that can help with purchasing AFVs. Most of such rebates and tax credits apply to plug-in hybrids and electric vehicles. The cab industry in the San Jose area has not embraced EVs due to their limited range and high price. Cab drivers are concerned that if they get a long trip (e.g., a 130-mile roundtrip), they may not be able to complete the trip and may need to be towed. Additionally, the cost for any EV with a practical range for a taxicab (200-300 miles) is excessively high. The average queue time for a taxicab at the airport is approximately 1.5 hours, so charging

time is probably not a pressing issue for EVs. However, due to the other concerns mentioned, the taxicab companies have not embraced EVs.

#### *Evaluation of Clean Vehicle Program*

The company believes that the airport clean air vehicle program is successful. In recent years, drivers have offered no resistance to the clean air vehicle requirement and have embraced it for the most part. The fact that taxicab companies are exceeding the goal of "25 percent of trips on clean air vehicles" indicates acceptance by the companies and drivers of clean vehicle technologies and the airport's clean vehicle rules. The latest airport report indicates that for all taxicab companies (including Yellow Checker Cab), approximately 50 percent of all fares from the airport are in clean air vehicles.

#### *Additional Considerations*

The cab industry currently faces tough challenges with losing market share to transportation network companies. The future of the entire cab industry is uncertain. Yellow Checker Cab offered the following example to illustrate the negative market dynamic.

In December 2015, taxicabs at the airport provided about 35,000 trips per month; in June 2017, taxicabs were providing 15,000-16,000 trips per month. The majority of trips, if not all of them, were lost to TNCs.

Factoring in this loss, the remaining (potential) growth areas for the taxicab industry remain within non-emergency medical transportation and wheelchair-accessible taxicabs. These two segments are covered successfully by taxicabs in the San Jose area. However, there is a possibility that TNCs may adapt and try to capture that market as well. There are not many long-term plans in the taxicab industry regarding clean air vehicles. The industry is in a survival mode and is unlikely to focus on alternative fuel or clean vehicles.

The airport treats TNCs as commercial ground carriers and imposes trip fees. TNCs even pay trip charges that are slightly higher than what the taxicabs are paying. However, TNCs continue to aggressively increase their market share. TNCs are currently providing 90,000 trips per month out of the airport. TNCs do not need an on-demand dispatching system; they do not need anybody curbside, which is an extra expense for the taxicab industry. TNCs are also not subject to the clean air vehicle requirements that have been placed on the taxicab industry.

In the past, taxicabs were a big part of airport ground transportation. Currently in most airports, TNCs hold a larger share of GT than taxicabs, but the airports are not requiring the TNCs to adhere to clean vehicle requirements since they use personal cars. Given that the taxicab industry is such a shrinking part of the airport ground transportation, and is an industry that is not healthy, it would be counterproductive for airports to push additional requirements on taxicabs. Taxicab companies have already embraced hybrids, and it is not clear what additional clean vehicle requirements could be reasonably imposed on the industry.

## **Bayrunner Shuttle – Airport Scheduled Services**

Bayrunner Shuttle provides scheduled airport service on fixed routes from the eastern and western portions of Maryland, seven stops on each route, to the Baltimore-Washington Airport (BWI).

### *Alternative Fuels and Efficiency Practices*

The company owns and operates its own fleet, which includes 10 Chevrolet Express vans. Three of the 10 vans are propane-powered and the company does not currently use any other alternative fuels. Since Bayrunner operates a small fleet, the transition to propane was relatively easy and the transition saved on operating costs for several years.

Because Bayrunner Shuttle is a scheduled airport van service, there are no deadheading or empty ride issues. The company is also working to reduce idling, though no explicit policy is in place.

### *Role of Airport*

To the company's knowledge, BWI does not require private ground transportation operators to implement alternative fuel vehicles or other sustainability practices.

BWI does not offer preferential treatment for commercial ground operators, and there is a standard contract for all operators. The airport imposes an annual fee for Bayrunner to operate at the airport, but does not become involved specifically with the operations of commercial ground transportation providers.

Bayrunner believes it is helpful for airports to include GT providers in discussions when developing a clean transportation policy. Airports can also improve on the convenience and accessibility of alternative fuels by providing adequate alternative fuel infrastructure and electric vehicle charging stations.

### *Funding Opportunities*

The company uses state tax credits to offset the cost of utilizing propane, but is not aware of any explicit incentives or grants offered by the airport to help with the purchase of alternative fuel vehicles. State tax credits are good incentives to help keep the price of propane down.

### *Motivation for Adopting Alternative Fuels*

Bayrunner implemented propane primarily for business reasons; when the propane vans were introduced in 2012/2013, gasoline and diesel prices were significantly higher than propane. The company believed that propane would save on fuel costs. Since the price of diesel and gasoline has decreased, the current cost savings is not as significant. Bayrunner plans to continue working with propane, but depending upon technological advancements and market availability, may consider other types of vehicles and fuels in the future. The company primarily fuels the shuttle vans at one of its office locations, but there is also a propane fueling station located near BWI.

## **Green Ride – Shared Van**

Green Ride provides shared van ride service to Denver International Airport (DEN). Green Ride also rents space from Northern Colorado Regional Airport, but does not service that airport.

### *Alternative Fuels*

The company recently decided to transition the fleet to alternative fuels. Currently it operates one propane vehicle and plans to convert 14 others to propane bi-fuel vehicles within the next couple of months. Green Ride plans to have about one-third of its 50-vehicle fleet running on propane. One of the primary reasons for choosing propane was the availability of a fueling station. The company has a propane fueling station at its hub shop and a local fuel supplier is available.

The decision to convert to AFVs was not a result of airport requirements. The company had considered implementing AFVs for some time. In the past, Green Ride purchased used vehicles for its fleet. It did not make sense to convert them to run on propane autogas because the company could not put adequate miles on the vehicles to recoup the investment. Since the company changed its procurement policy, however, and now purchases new vehicles that have longer lifespans, Green Ride is able to recoup the cost of AFV conversion. The company also plans to convert any new vehicles that it purchases.

### *Motivation for Adopting Alternative Fuels*

Green Ride encourages and supports sustainability, and has implemented several initiatives including a recycling program and idle-reduction policy in addition to alternative fuel adoption. The company cares about a positive “green” image in the community.

The company also tries to adjust the type/size of the vehicle for the task required to avoid using unnecessarily large vehicles and empty rides. For example, if 20 people go to the airport and only 5 are coming back, the company policy is to use the smallest vehicle that can accommodate passengers to reduce fuel consumption and emissions.

The financial aspects are also important. Green Ride is interested in incorporating sustainability initiatives, given those initiatives are affordable and make business sense. The company believes it will be able to recoup all the costs of converting vehicles to propane within the first year of operation.

### *Funding Opportunities*

Green Ride does not qualify for government AFV incentives because most of the incentives apply to new vehicles, and they are based on the year of conversion. The vehicle must be converted to AF in the same calendar year that it was produced or purchased to qualify for the incentive. Additionally, incentives often do not cover bi-fuel vehicles, only dedicated AFVs.

Some state and local tax credits and rebates are available to private fleets converting vehicles to alternative fuels, but these credits are also based on when the vehicle is converted. For example, if a company purchased the vehicle in January but converted it in October, it will receive only a portion of the tax credit since the vehicle was not considered a converted/alternative fuel vehicle for the majority of the year.

Several government grants cover a portion of the incremental cost of converting vehicles to AFVs—sometimes up to 50 percent. For example, a propane conversion costing \$6,000 per vehicle may end up costing a fleet \$3,000 after applying the grant. However, such grants are mostly available for conversions to dedicated AFVs. Bi-fuel vehicles do not qualify.

#### *Role of Airport*

Denver International does not impose any rules regarding the use of AFVs by private fleets and does not provide incentives and/or preferential treatment to fleets operating clean vehicles at the airport.

#### *Obstacles to Adoption*

The main challenge the company faced with its AFV conversions was getting enough capacity for the fuel tank. Vehicles sometimes run long trips and/or a large number of trips per day. This is problematic with a dedicated propane vehicle since the vehicle does not have enough range and would have to refuel more often. For this reason, Green Ride chose to use bi-fuel propane technology, allowing the vehicles to run on either propane or gasoline. Since the company is in the initial phase of converting the vehicles, it has not encountered any problems yet.

#### *Need for Adequate AF Infrastructure*

In order to design successful clean vehicle programs, airports need to provide alternative fuel stations at the airport to help fleets operate AFVs. Green Ride operates along the I-25 corridor from Denver International Airport to Cheyenne, Wyoming, which covers roughly 100 miles. The company's shop in Fort Collins is located in the middle of the route between Denver and Cheyenne. Practically no propane fueling stations are located on that route. Because of this, Green Ride wants larger propane tanks and bi-fuel capability for the vehicles so the company can run the entire route without the need to refuel. The company prohibits fueling a vehicle with passengers on board, so operators have to use free time to fuel vehicles. Considering the scarcity of alternative fuel stations, lack of fueling infrastructure is a major challenge for fleets that want to convert to AFVs.

#### *Recommendations*

Green Ride is still in the learning phase and is conducting research to ensure that the company will be able to recoup its investment in alternative fuel technologies. The company does not have any advice yet for other fleets regarding the AF conversion process.

### **Go Airport Shuttle and Executive Car Service – Shared Van and Taxicab**

Go Airport Shuttle provides service in multiple Florida cities. In Broward County, the company is called B&L Service, Inc., or Yellow Cab, and provides limo, taxicab, and shared van rides. It is part of nationwide company known as Go Airport Shuttle and Executive Car Service. In South Florida, Yellow Cab provides service to/from Fort Lauderdale-Hollywood International Airport (FLL) and has a contractual relationship with the airport. The company can also pick up or drop off passengers at other airports in the area. Yellow Cab owns its own fleet, but all the drivers are independent contractors. Therefore, drivers are responsible for their own fueling and routing.

### *Role of Airport*

Fort Lauderdale Airport does not impose any formal or informal sustainability requirements on private ground transportation fleets and does not have an anti-idling policy related to drivers who operate at the airport. The airport also does not have any incentives available to encourage the adoption of sustainability practices by private ground transportation fleets, to the interviewee's knowledge.

### *Alternative Fuels and Clean Vehicles*

Yellow Cab uses a large number of hybrid-electric vehicles. Approximately one-half of Yellow Cab's 500-plus fleet is hybrid, consisting mostly of Toyota Priuses. Not all the company vehicles can be replaced with hybrids, but for those that can, the company plans to continue phasing in hybrid vehicles. The company decided to make this voluntary transition.

Yellow Cab is responsible for vehicle maintenance, and Toyota Priuses are more cost-effective in terms of fueling and maintenance costs than traditionally fueled vehicles. The company estimates that the maintenance cost of a Prius is 30 percent less than for a Ford Crown Victoria, which is the vehicle model purchased by the company prior to switching to the Prius. The company also supports the fact that hybrids are better for the environment compared to gasoline or diesel vehicles.

Yellow Cab estimates that the company's vehicles run 40,000-50,000 miles per year per vehicle, so the hybrid makes more sense in terms of fuel cost savings. The initial upfront investment pays off quickly. The switch to hybrid vehicles was mostly a business decision with the added consideration that hybrid vehicles are beneficial in terms of reduced fuel consumption. With a large number of vehicles (more than 500), the company can also take advantage of the economies of scale by purchasing parts in bulk, etc. However, individual owners can benefit by using hybrids as well. Over time, owners will realize the lower fuel and maintenance costs. Yellow Cab initially estimated it would save between 1.4 and 1.6 million gallons of fuel per year by integrating hybrids into the fleet. The company is not currently running as many vehicles as when it made that estimate, but believes it is currently saving between 1.1 and 1.3 million gallons of fuel per year.

The company operates 23 gasoline-powered vans that are unlikely to be converted to hybrids since currently there are no available hybrid technologies for such vehicles. Yellow Cab plans to continue operating traditional gasoline vehicles until hybrid alternatives become more available. The company anticipates phasing out the gasoline-powered Crown Victorias within the next 10 months.

Additionally, Yellow Cab refurbishes old hybrid batteries and returns them to Toyota. The company has trained employees and purchased equipment to refurbish the hybrid batteries, which has helped with the cost of maintenance.

The company considered using alternative fuels for its fleet, but these technologies are much more difficult to implement. The fueling infrastructure required to support the types of services provided by the company is not always available. Additionally, vehicle range and refueling time—particularly for electric vehicles—make for-hire operations challenging. Hybrid vehicles do not require additional infrastructure and radically different operating procedures,

which works best for Yellow Cab. The company may reevaluate this decision if infrastructure improves and AF technologies improve and become more available.

#### *Driver Acceptance*

When the company began converting to hybrids, drivers initially resisted the change. Drivers feared that the Toyota Prius did not have adequate size and trunk space to accommodate passengers with luggage. However, after some experience with the Prius, many drivers realized that for the majority of trips, the vehicle adequately fits passengers and luggage, and passengers with extra luggage can request a larger car.

Yellow Cab has a formal training process for drivers, and it had to include special training for them to learn how to operate hybrid cars and take advantage of available efficiency gains. After experiencing hybrids in action, drivers like them. The company also has a policy that when a non-hybrid company vehicle is out of commission for repairs, the driver is loaned a hybrid. This helps acclimate drivers to hybrids.

#### *Obstacles to Adoption*

The company did not experience any particular difficulties in transitioning the fleet to hybrid technology, and wishes it could implement the hybrid vehicles at a faster rate. With the advent of TNCs, the vehicles are not running as many miles. Since vehicle life is extended, the company is not phasing in hybrid vehicles as fast as was initially planned. The company is replacing several vehicles per week of its 500-plus fleet.

#### *Funding Opportunities*

Yellow Cab is not aware of any incentives or grants that are available to help convert the fleet to hybrid vehicles.

### **SuperShuttle Los Angeles – Shared Van**

SuperShuttle is a global company serving several airports in Southern California, including John Wayne, Long Beach International, Hollywood Burbank, Ontario California International, and Los Angeles International (LAX). The responses in this summary refer to LAX.

#### *Alternative Fuels and Clean Vehicles*

SuperShuttle operates some natural gas vehicles; approximately 60 percent of the fleet is CNG-powered. No CARB-certified hybrid vehicles are in the vehicle class the company uses, so SuperShuttle is limited in the types of alternative fuel vehicles available. The company only uses CNG and does not operate any propane vehicles at LAX.

#### *Deadhead Reduction*

Shared rides, by nature, reduce empty rides since they represent an on-demand service. The company estimates that one shared ride shuttle can replace three taxicabs due to passenger carrying capacity.

#### *Airport Clean Vehicle Policy*

LAX has a clean vehicle policy that the company is subject to under its contractual requirements with the airport. However, SuperShuttle had already begun adopting alternative fuels in other locations, so it was a natural progression for the company to implement CNG vehicles at its LAX operations. The current policy, which is undergoing revision, initially

required operators to implement alternative fuels although it did not mandate a specific fuel. The policy also offers an option for operators to use an alternative fuel or comparable emissions vehicle. This policy was enacted in 2010/2011, and at the time, there were not many traditional-fuel vehicle options with comparable emissions to AFVs. The airport does not enforce an MPG standard, only an emissions standard. This requirement could be changed when the new policy is enacted.

Currently there are newer traditional-fuel vehicle models that meet the emissions standard and are comparable to AFVs. For example, the new Mercedes-Benz Sprinter vans have comparable emissions to the CNG Ford Econoline vans. The airport will allow such vehicles that meet the emissions standard in lieu of AFVs.

SuperShuttle is not at 100 percent compliance with the airport's policy, and to the company's knowledge, the other private ground transportation operators at LAX are also not in full compliance. The airport is somewhat flexible, mainly due to the extensive cost of converting 100 percent of a fleet to alternative fuels. SuperShuttle is working toward the policy goal as it replaces retiring vehicles with those that meet the emissions requirement. Converting the fleet all at once would have been a substantial cost burden. The interviewee was not aware if the other private fleets were directly involved in discussions with LAX during the policy decision-making process.

#### *Obstacles to Adoption*

*Upfront costs* – The most significant barrier is the initial cost of purchasing and converting the vehicles to CNG. Because the airport's policy allows for emission-comparable vehicles, SuperShuttle is purchasing emission-comparable OEM gasoline vehicles. Converting traditional-fuel vehicles to alternative fuels is the most significant investment since the company employs independent contractors who own and maintain the vehicles. The company purchases the gasoline-powered vehicles, converts them to CNG, and then sells them to the independent contractors. Adding \$10,000–\$15,000 per vehicle to convert it is a substantial expense for independent operators.

*Higher maintenance requirements* – The converted vehicles also tend to require more maintenance than OEM vehicles, with the potential for mechanical and inspection issues (i.e., tank inspections). Converted vehicles have different maintenance issues that make them more difficult to manage. Since there is substantial CNG infrastructure in the area, there has not been any issue with fuel supply. However, a lack of certified mechanic shops has been problematic.

*Fuel costs* – Additionally, when the policy was implemented seven years ago, CNG prices were much lower in comparison to gasoline and diesel, which helped the company justify the higher maintenance costs. Currently the CNG price is fairly equivalent to gasoline and diesel. Also, newer vehicle models are getting better fuel economy. These issues present a challenge to making the business case for converting vehicles to AFs.

Range has not been an issue since the vans are equipped with four fuel storage tanks, giving them about 28 GGE. Additionally, since the LAX area offers a robust CNG fueling infrastructure, there is adequate supply. However, range has been an issue for the company operating in other airport areas.

Meeting the LAX clean vehicle requirements has become easier since OEMs began manufacturing gasoline- and diesel-powered vehicles with higher MPG.

#### *Funding Opportunities*

There are currently no incentives at LAX to encourage operators to implement clean vehicles. Since SuperShuttle is an owner-operator business, the best type of incentive would be to reduce trip fees; operators would see that discount happening regularly and consistently. Grants can assist with the additional cost of the vehicle, but SuperShuttle believes the trip fee reduction would be more beneficial.

The company cannot attest to the success of the LAX clean vehicle policy program due the multitude of factors the airport may use to measure success. The company is not currently planning to implement additional AFVs or other sustainability strategies in the LAX market.

#### *Recommendations*

SuperShuttle suggests that airports need clear, concise clean vehicle policies that are enforced fairly among all partner fleets, and that make sense economically for fleets. Alternative fuels are not an easy investment, and airports should recognize the challenges of implementing alternative fuels. Incentives to reduce costs—such as reduced trip fees—would help reduce cost burdens. Modeling clean vehicle policies after existing airport programs that offer incentives is a more viable option to help increase AF adoption in the private ground transportation sector.

### **Rental Car Company – Anonymous**

This rental car company provides rental car shuttles to and from the airport terminal and the off-airport rental car facility. The company is a global operation, but summary responses refer to its operations at Denver International Airport (DEN).

#### *Alternative Fuels and Clean Vehicles*

The company has fuel-efficient and hybrid vehicles in its rental fleet. Because the rental car facility is located away from the airport terminal, it also operates 30 biodiesel-powered Gillig shuttle buses.

The company did not adopt alternative fuels as the result of an airport-imposed policy. To the company's knowledge, DEN does not require the use of alternative fuels for its commercial ground transportation operators. The company is concerned with limiting environmental impacts while continuing to operate its business, and the Denver location in particular stresses the importance of incorporating biodiesel into fleet operations. The company has a third party vendor that supplies biodiesel, which is then stored in tanks on the airport premises.

The biodiesel conversion was conducted prior to the interviewee's employment with the company, over seven or eight years ago. The interviewee was not aware of any specific problems the company had with implementing the alternative fuel buses, but assumed the conversion process was not difficult.

#### *Funding Opportunities*

The company is not aware of any incentives given directly by the airport to commercial ground transportation operators to adopt clean vehicles, fuels, or other sustainability initiatives.

Overall, the company is generally aware of the available federal funding opportunities, but does not believe it is eligible due to the company's size. The company plans to continue investigating opportunities to improve alternative fuel use in its fleet.

#### *Factors Influencing Adoption*

*Rebate incentive* – A rebate incentive to offset the cost of refurbishing buses to biodiesel would be helpful for local shuttle bus operations. The company considers the environmental, social, and financial aspects of these decisions, and weighs each of these considerations. The preferential treatment of AFVs by the airport is not necessarily the most important consideration. The interviewee suggests that a financial rebate could be more influential and helpful in the business decisions to convert vehicles to alternative fuels.

*Strong partnerships* – There are multiple rental car companies and shuttle bus fleets operating at DEN. Anything the airport can do to incentivize the companies would be helpful, such as providing partnerships with companies that supply alternative fuel technologies, and in particular, strong partnerships between the airport and rental car companies are critical for success.

*Lengthier agreements* – The company is always looking to improve the reliability and experience of its bus fleet, including the environmental impact of those buses. Bus acquisition is a large investment and fleets want to ensure that these buses will be utilized during their service life. The longer the agreement with the airport, the easier it is to spread the costs associated with upgrading vehicles to AFs and to justify the additional investment. Therefore, the length of the agreement with an airport is very important. While the company always wants to consider environmental impact, it needs the certainty of a continued need for utilizing the fleet. Airports should consider these factors when encouraging alternative fuel use. The typical five-year agreement is most likely not enough time to recoup the investment, since the break-even period for AFVs can be more than five years.

*Adequate alternative fuel infrastructure* – The airport providing alternative fuel infrastructure could be helpful, but the value in that depends on the type of AF used by the company. CNG fueling stations and EV charging stations would be the most beneficial. From the rental car company's perspective, it would be helpful for it to have some kind of use/control over fueling availability.

#### *Additional Considerations*

TNCs do affect the company's operation. While they are competition in the local transportation market, they do not directly impact the rental car company. The company plans to continue to innovate and grow its business, so while it is concerned about all competitors, it is more concerned about its own operations. TNCs may impact the rental car business, but not to the extent they have had on taxi operations.

The take-away from the TNC discussion is that airports should treat all commercial ground transportation operators equally in terms of operations. Airports need to create an even playing field so all operators pay the same concession fees, have the same access to the airport, etc.

## **TNC Operator – Anonymous**

The TNC operator that participated in the interview operates nationwide. As a TNC operator, the company contracts with drivers who are responsible for paying for their own vehicles, fuel costs, and maintenance. Because drivers are financially responsible for vehicles, fuel, and maintenance, they are incentivized to reduce the number of miles traveled to reduce fuel costs. The TNC also requires that the vehicles used by drivers be newer models.

### *Vehicle Miles Traveled (VMT) and Single Occupancy Reduction*

The TNC operator discussed its general green technology strategies/environmental approaches as the company employs several sustainability strategies. The company recently implemented a booking program that matches a driver who is dropping off a passenger with a rider requesting a ride in close proximity. This service helps eliminate vehicles in the central terminal area at airports by 50 percent, which reduces VMT and cuts down on carbon emissions.

In addition to this new program, the TNC operator also employs a service that combines passengers heading in the same direction in a single ride. This helps reduce single occupancy vehicle trips, and it is an effective solution to use at airports since passengers are already located in close proximity. The carpool/line option is also less expensive than a traditional ride, so passengers are encouraged to use it.

### *Alternative Fuels and Clean Vehicles*

The TNC operator has decided to focus its efforts on the supply side in terms of increasing the number of electric vehicles in the fleet.

There are several pilot programs currently implemented in California where the TNC operator is able to lease all-electric vehicles (Chevrolet Bolts) to drivers. The company offers the Bolts at the same leasing price to ensure that more miles being driven on the TNC operator platform are electric.

### *Airport Partnerships*

The TNC operator works in partnership with airports to reduce congestion and increase efficiency in the terminals. The company and airports work together to identify optimal pick-up and drop-off locations specifically for ride sharing. The locations chosen are intended to be easy and intuitive for drivers to access, creating a more efficient experience and reducing idling and circling. The TNC operator has noticed some inconsistencies in these locations chosen by airports, and it suggests that airports work more closely with the company to identify optimal locations, which will streamline operations and reduce idling. Passengers meeting drivers in pre-set locations help them find each other more quickly, effectively, and efficiently.

The company has formal agreements with more than 260 airports. The TNC operator is recognized as part of the ground transportation operators since the company provides direct and shared services to and from airports. Because of these agreements, the company is subject to the requirements imposed by the airport. These include adhering to specific pick-up and drop-off locations, reporting requirements, etc. The company enters into binding agreements that dictate specific drop-off and pick-up locations.

The TNC operator works closely with airports and ground transportation providers, but the agreements vary depending on the specific airport and negotiation process. In terms of sustainability requirements, the TNC operator generally supports airport goals to reduce emissions and to create the most efficient experience for passengers.

#### *Role of Airport*

Airports have good intentions when designing sustainability metrics and often think about options that restrict the types of vehicles they allow. Based on research and experience, the TNC operator has found this to be an ineffective strategy for the ride sharing model. When a passenger requests a ride from the TNC operator, the company assigns the nearest driver to that passenger to ensure the driver can reach the passenger as effectively and efficiently as possible. However, when airports restrict the types of vehicles allowed to enter the airport, it can have an immediate impact on the estimated time of arrival since it reduces the pool of drivers eligible to pick up passengers. This can create unintended consequences, including increased vehicle miles traveled and traffic congestion as the drivers might be located much farther away. The company believes vehicle type restrictions result in drivers taking longer to connect with passengers and passengers having a longer wait experience.

The TNC operator suggests that airports look at ways to increase the pool of clean vehicles rather than restricting the types of vehicles allowed to access the airport. In order to include more electric vehicles on the platform, the supply issue must be considered.

#### *Factors Influencing Adoption*

In terms of incentive options, the ability of airports to offer prime locations to TNCs for pick-up/drop-off is important to reduce circling and idling. In addition, providing a more robust electric vehicle charging infrastructure and supplying charging at no cost are natural incentives for owners to adopt electric vehicles, and could help to create additional supply.

The TNC operator has worked with utility companies and cities that are interested in helping to grow the number of electric vehicles, specifically through implementing creative rental programs. The company believes there are still numerous barriers to consumer adoption of EVs (e.g., limited access to charging infrastructure, especially at multi-family housing units). Offering a way to lease EVs would help improve access to these vehicles, and could override some of the typical barriers associated with EV ownership. The TNC operator is not exactly clear how airports would fit into the EV rental model, but thinks there could be potential there as the TNC and airport are attempting to achieve the same goal of reducing emissions.

#### *Additional Considerations*

The TNC operator believes EV adoption will improve as vehicle range increases. The company is also looking into opportunities with second life use from EVs.