

Section 2

AFVs in the Airport Shuttle Industry: Characterization of a Niche Market

INTRODUCTION

The national Clean Cities program, sponsored by the U.S. Department of Energy (DOE), identified airports as a key “niche” market for the sales and use of alternative fuel vehicles (AFVs). This Section of the Information Tool Kit characterizes the airport ground transportation shuttle market for those involved in marketing of AFVs or promoting their use.

A number of factors have combined to direct the attention of the AFV industry to this market:

- **Fastest growing sector** –The airport sector is the fastest growing transportation sector in the United States.
- **Proven success** – AFVs have found success in airports; surveys have shown that the majority of large American airports use AFVs and many are planning to increase the number and types used. A wide variety of vehicles, including passenger shuttles, service the “landside” of airports and many more on the “air side” (not covered in this report) service aircraft and support other airport functions.
- **High fuel usage** – Many types of airport shuttles operate for long hours and consume large amounts of fuel. For those interested in promoting the use of alternative fuels, a single shuttle represents an opportunity for a large amount of alternative fuel to be used. For alternative fuels that cost less than gasoline and/or diesel fuel, this high fuel usage corresponds to an opportunity for savings in fuel cost.
- **Significant market size** – Surveys performed as part of the development of this characterization report identified 50 to 90 companies operating shuttles at each of four major airports. Although many of these companies operated only a few vehicles, the structure of the industry presents many opportunities for AFV introduction or “sales” at every major airport.
- **Environmental benefits** – Airports, and those involved in regulating them, are increasingly concerned with air quality issues, and so are interested in the potential emission benefits of many types of AFVs. This is especially true of airports located in areas that are not in attainment of National Ambient Air Quality Standards (NAAQS) and that currently are expanding or planning expansion. The activities at airports often are a major source of ozone forming

emissions and of other air pollutants. Shuttles in general represent a significant portion of the vehicular emissions at an airport and are an excellent focus of emission reduction programs.

- **Limited infrastructure needs** – Airport shuttles by definition are always near or make frequent trips to the airport. Thus, while they may have a large daily range (miles traveled between refueling stops), a single fueling station located at the airport is often sufficient. Unlike some other types of vehicle applications, airport shuttles usually do not need an extensive network of fueling stations to support their operation.
- **Availability of appropriate AFVs** – Original equipment manufacturers (OEM) and “up-fitters” (those who add passenger compartments onto chassis provided by other manufacturers) offer many types of vehicles that can serve shuttle transport operations and operate on various alternative fuels. These range from vans to heavy-duty buses.
- **Opportunities for public funding assistance** – A number of programs are available at the national level and in various states that can be used to support purchase of AFVs and installation of fueling infrastructure at airports.

The airport shuttle industry is quite diverse. Of necessity, this market characterization requires presentation of generalizations and overviews of types of applications, types of vehicles, operational considerations and AFV issues. The reader is cautioned to use the information presented here as an indication of what is typical and to recognize that understanding the operation of specific fleets is critical for a successful AFV “sales” effort. This detailed information must be obtained “on the ground” at each airport, through a committed outreach effort that includes information gathering.

In the Marketing Strategy Section of this information Tool Kit, we present the marketing implications of the airport shuttle industry market characterization in the context of an overall outreach process. In the Case Studies Section of the Tool Kit, we provide detailed information related to the investigations conducted at four airports in the Mid-Atlantic region that were used, in part, to develop this market characterization.

THE AIRPORT CONTEXT

Airports are large, complex entities with many component organizations, facilities, systems, and functions. To understand the airport shuttle market, one must have a basic understanding of the airport context that shapes the shuttle industry. We provide here a brief overview of key aspects of the airport sector.

A. Airport Ownership

Although examples can be found where either cities, towns, counties, states, multi-state transportation authorities, the federal government, or private entities own airports, commercial airports in the U.S. are virtually all owned and operated

by local or state governments. Until recently an airport had to be publicly owned in order to be considered a commercial airport.

Public-use general aviation airports may be found with either public or private ownership. Private airports designated as “reliever airports” or with over 2500 annual enplanements are eligible for federal funding, although the federal government bans the removal of airport-generated funds for non-airport related uses, which is a major reason private, for-profit organizations do not operate airports.

(The FAA has initiated a pilot program that has allowed five (5) commercial airports to be privatized. Congress established the airport privatization pilot program to explore privatization as a means of generating access to sources of private capital for airport improvement and development. The statute authorizes FAA to exempt an airport sponsor from its obligations to repay federal grants, return property acquired with federal assistance or use the proceeds of the sale or lease exclusively for airport purposes. Under the pilot program statute, private companies may own, manage, lease and develop public airports.)

Because most large commercial airports in the U.S. are public entities, they are subject to the usual constraints facing public organizations. Relative to the acquisition of AFVs, one implication of public ownership of airports is the often slow pace and rigidly structured process of procurement. Airports will usually be forced to follow the same procurement procedures as their parent government organization (e.g., city, county or state).

Another interesting aspect of public ownership is the effect of political pressure. Frequently, the upper management levels of an airport are appointed by local elected officials. As a result, airport management can be subject to pressure from elected officials, which may be useful if the elected officials favor the use of AFVs.

Any large airport is a major economic engine and is viewed as an important element of the local economy. Keeping the airport running smoothly is critical to all parties. Thus, while airport officials are often accepting of new technology, they will have to be convinced that proposed changes, such as AFVs for airport shuttles, will be sufficiently reliable to meet the airport’s mission.

B. Airport Funding Sources

Large airports generate significant economic benefits for their regions. They also demand major funding resources to sustain operation and, in many cases, permit expansion. Airports have a variety of funding sources, which are useful to understand for anyone trying to promote AFVs in the airport environment.

- **Landing Fees** – Landing fees are a major source of funding for large airports. Each time an aircraft lands, the airline must pay a fee based on the weight of the aircraft.
- **Tenant Rents** – Airport tenants pay the airport for use of their facilities, which may include office space, passenger areas near gates, check-in counter space, gates, hangars, cargo areas, etc. Primary airport tenants include airlines, Fixed Base Operators (FBOs), food concessionaires, and other service providers. (FBOs are usually for-profit organizations that are contracted by the airport to provide certain common services, such as aircraft fueling or other support functions. For instance, many international air carriers will rely on the local FBO for these services rather than have their own local aircraft support service operations.)
- **Private Public Partnership** – This is similar to tenant rents, but the agreement is larger in scope. In exchange for agreeing to build or fund facility projects, private entities (e.g. a major airline) receive long-term leases or ownership, which, in turn, gives them effective control of the facility.
- **Concession Fees** – Airport retailers, in addition to rent, pay for the privilege of operating on-airport. These concession fees are usually based on a minimum annual payment or a percentage of revenue, whichever is greater.
- **Customer Facility Charges (CFCs)** – These are similar to a concession fees, but the charge is based on the annual number of the concessionaire's customers. This is a new form of funding primarily applied to rental car companies.
- **Passenger Facility Charges (PFCs)** – The FAA allows airports to charge up to \$4.50 per enplaning passengers. The charges are collected by the airlines and the monies can only be used for FAA approved projects.
- **Airport Improvement Program (AIP)** – The U.S. government currently collects aviation excise taxes including:
 - 10% of domestic air fares,
 - 6.75% of air cargo waybills,
 - \$0.218 per gallon on non-commercial aviation jet fuel,

- \$0.193 per gallon on non-commercial aviation gasoline, and
- \$6 per international departure.

The taxes are earmarked for the *Aviation Trust Fund*, from which Congress appropriates the Airport Improvement Program funding. All commercial-services airports are entitled to AIP funding. The funds are separated into two parts, discretionary and non-discretionary. Discretionary funds are allocated on regionally based need and the airport must apply for funds. Non-discretionary funds are allocated by formula based on airport operations and passengers. Smaller airports reaching certain thresholds are guaranteed minimum amounts while larger airports have capped amounts. The AIP has limitations on which aspects of airport operations it can be used to fund.

- **State and Local Funding** – State and local governments can fund their airports from their general budgets as they see fit.
- **Other Federal Funding** – Other federal programs such as TEA-21 and CMAQ are potential funding sources for rail and highway airport access projects. The FAA has a new competitive program called the Inherently Low-Emission Airport Vehicle Pilot Program. This program will make up to \$2 million available to up to 10 airports in non-attainment areas for ILEVs and infrastructure. Proposals are due in February 2001. Information on this program is provided elsewhere in this “Tool Kit.”
- **Private Funding** – Much like state and local entities, private enterprises can fund their own airports.
- **User Fees** – Privately run airports are able to charge user fees. Examples include the terminal usage fee charged by many Canadian airports.

C. Airport Size and Rate of Expansion

A rapidly growing airport is likely to have increasing shuttle traffic, which implies additional shuttle purchases. Airports can be roughly divided into three types. The first type is the hub airport, where the highest volume of passenger traffic is from people arriving on one flight and departing on another, changing aircraft to reach their destination. Saint Louis is an example of a major hub airport. The second type is the “origin and destination” (spoke) airport, where high volumes of passengers begin or end their trips. Miami is an example of an origin and destination airport. The third type is a combination of the two. Chicago’s O’Hare is an example of a combination airport. For a given aircraft passenger volume, origin and destination airports generally have higher vehicle traffic and more ground shuttle use.

Table 1 lists the top 100 airports in the U.S. by the number of originating passengers and shows the rate of increase in passengers between 1998 and 1999.

Table 1. Domestic O&D Traffic Figures for Top 100 Airports
 (DB1A)

Airport	City	1999	1998	Growth Rate	Airport	City	1999	1998	Growth Rate
LAX	Los Angeles	32,950,690	31,416,360	4.88%	PBI	West Palm Beach	5,316,060	5,414,550	-1.82%
ORD	Chicago O'Hare	27,047,990	27,495,250	-1.63%	ABQ	Albuquerque	5,221,600	5,250,810	-0.56%
ATL	Atlanta	26,016,300	24,717,920	5.25%	RNO	Reno	5,152,540	5,280,970	-2.43%
LAS	Las Vegas	23,176,890	20,697,880	11.98%	PVD	Providence	4,863,750	4,274,180	13.79%
SFO	San Francisco	22,619,240	22,308,320	1.39%	MKE	Milwaukee	4,819,240	4,529,970	6.39%
MCO	Orlando	21,466,370	20,050,980	7.06%	BUR	Burbank	4,776,070	4,734,270	0.88%
PHX	Phoenix	20,139,110	19,289,040	4.41%	OGG	Kahului	4,666,840	4,330,380	7.77%
EWR	Newark	19,932,660	19,392,620	2.78%	JAX	Jacksonville	4,459,970	4,102,700	8.71%
DFW	Dallas Forth Worth	19,821,070	19,536,360	1.46%	CVG	Cincinnati	4,457,490	4,300,310	3.66%
LGA	LaGuardia	19,775,560	18,768,790	5.36%	RSW	Ft. Myers	4,288,450	4,098,670	4.63%
BOS	Boston	18,874,800	18,326,230	2.99%	MEM	Memphis	3,640,760	3,580,110	1.69%
SEA	Seattle	18,352,970	17,430,640	5.29%	SDF	Louisville	3,526,970	3,383,450	4.24%
DEN	Denver	16,990,290	16,643,100	2.09%	OMA	Omaha	3,368,000	3,342,260	0.77%
DTW	Detroit	14,496,440	13,629,880	6.36%	TUS	Tucson	3,288,930	3,217,200	2.23%
BWI	Baltimore	13,894,890	12,360,160	12.42%	OKC	Oklahoma City	3,165,180	3,134,590	0.98%
SAN	San Diego	13,594,380	13,148,290	3.39%	TUL	Tulsa	3,041,710	3,103,260	-1.98%
PHL	Philadelphia	13,179,370	12,633,210	4.32%	BUF	Buffalo	2,950,140	2,692,440	9.57%
MSP	Minneapolis	12,791,950	11,559,050	10.67%	ELP	El Paso	2,868,070	2,846,790	0.75%
TPA	Tampa	12,682,190	11,408,100	11.17%	GEG	Spokane	2,784,670	2,691,450	3.46%
HNL	Honolulu	12,155,260	11,683,610	4.04%	BHM	Birmingham	2,742,080	2,559,300	7.14%
FLL	Ft. Lauderdale	11,999,980	10,397,100	15.42%	MHT	Manchester	2,657,300	1,734,380	53.21%
DCA	National	11,269,350	11,586,000	-2.73%	LIH	Kauai	2,547,340	2,356,850	8.08%
IAH	Houston Intercontinental	10,902,080	9,944,110	9.63%	ANC	Anchorage	2,532,380	2,463,680	2.79%
MDW	Chicago Midway	10,689,280	9,042,290	18.21%	ORF	Norfolk	2,528,390	2,495,530	1.32%
STL	St. Louis	10,659,540	10,311,560	3.37%	BOI	Boise	2,415,500	2,306,750	4.71%
SJC	San Jose	10,349,170	9,476,350	9.21%	LIT	Little Rock	2,332,620	2,296,190	1.59%
PDX	Portland	10,184,180	9,666,970	5.35%	RIC	Richmond	2,311,620	2,245,170	2.96%
MIA	Miami	9,685,340	9,194,360	5.34%	GSO	Greensboro	2,241,760	2,264,430	-1.00%
JFK	JFK	9,666,670	8,933,290	8.21%	COS	Colorado Springs	2,229,080	2,441,790	-8.71%
MCI	Kansas City	9,406,260	9,118,180	3.16%	KOA	Kona	2,132,610	2,105,260	1.30%
OAK	Oakland	9,077,960	8,513,480	6.63%	DAY	Dayton	1,939,240	1,897,740	2.19%
IAD	Dulles	8,816,830	7,136,960	23.54%	ROC	Rochester	1,925,910	1,984,840	-2.97%
SLC	Salt Lake City	8,560,190	8,586,790	-0.31%	ALB	Albany	1,870,520	1,794,130	4.26%
CLE	Cleveland	8,121,200	7,900,760	2.79%	SYR	Syracuse	1,722,690	1,693,860	1.70%
MSY	New Orleans	8,048,910	7,574,360	6.27%	ISP	Islip	1,689,360	555,870	203.91%
SNA	Santa Barbara	7,286,650	7,185,270	1.41%	GRR	Grand Rapids	1,561,400	1,526,530	2.28%
SMF	Sacramento	7,268,150	6,927,660	4.91%	ITO	Hilo	1,493,440	1,406,530	6.18%
PIT	Pittsburgh	6,965,430	6,650,390	4.74%	TYS	Knoxville	1,441,200	1,302,630	10.64%
BNA	Nashville	6,692,050	6,353,770	5.32%	DSM	Des Moines	1,381,220	1,371,510	0.71%
RDU	Raleigh Durham	6,639,790	5,332,310	24.52%	SRQ	Sarasota	1,361,050	1,396,900	-2.57%
IND	Indianapolis	6,574,440	6,360,400	3.37%	CHS	Charleston, SC	1,302,370	1,321,090	-1.42%
HOU	Houston Hobby	6,550,630	6,644,340	-1.41%	SAV	Savannah	1,283,690	1,293,040	-0.72%
CLT	Charlotte	6,143,620	5,799,400	5.94%	JAN	Jackson	1,241,750	1,161,460	6.91%
ONT	Ontario	6,136,050	5,945,980	3.20%	MSN	Madison	1,171,570	1,161,870	0.83%
AUS	Austin	6,066,970	5,613,200	8.08%	GSP	Greenville	1,160,700	1,117,870	3.83%
SAT	San Antonio	6,060,360	5,990,130	1.17%	MYR	Myrtle Beach	1,137,620	970,370	17.24%
CMH	Columbus	5,886,670	5,731,720	2.70%	MDT	Harrisburg	1,120,440	1,174,810	-4.63%
BDL	Hartford	5,720,450	5,053,580	13.20%	PWM	Portland, ME	1,102,530	1,040,030	6.01%
DAL	Dallas Love	5,636,100	5,412,450	4.13%	LBB	Lubbock	1,094,620	1,109,100	-1.31%
SJU	San Juan	5,603,070	5,304,540	5.63%	ICT	Wichita	1,015,790	1,086,050	-6.47%

D. Air Quality Concerns

Airports, until fairly recently, were not the focus of much attention from the air quality regulatory community. Historically, “noise” has been airports major environmental concern. More recently, water quality issues associated with run-off have become more important. However, within the last few years, a number of factors have combined to direct the attention of the regulatory community toward airports’ air pollutant emissions. Environmental groups have done studies to show that the total emissions from all sources at several large airports are of similar magnitude as the largest industrial sources in their respective cities. As regional air quality planners in areas in non-attainment of air quality standards have been pushed to find additional ways of meeting their goals, they have begun to look at airports as potential opportunities for emission reduction. Much of the “emissions inventory” at an airport is tied to aircraft operations, which for the most part is not the responsibility of the airport. The U.S. Environmental Protection Agency (EPA) and FAA are working together with the airlines and the aircraft manufacturers to develop voluntary guidelines for the industry. Airports have a few areas under their direct control for emission reduction and frequently, some airport shuttle operations are among them.

In addition to regulatory pressure, airports are generally interested in doing things in an environmentally friendly manner. As noted above, they are political entities and so they like to be seen as good neighbors. There are many aspects of their operations that impact their neighbors that are difficult to control. Thus, where they can do something beneficial, they will view that favorably.

Expansion of an airport is frequently associated with an increase in emissions. Federal agencies, such as the FAA, are prohibited from supporting or approving in any way any activity that does not conform to an approved air quality State Implementation Plan (SIP). For airports in air quality non-attainment areas, it is FAA's responsibility to assure that proposed airport expansions conform to the relevant SIP.

EPA's General Conformity Rule defines a “conforming” project as one that:

- conforms to the SIP's overall objective of eliminating or reducing the severity and number of air quality violations in a state, and achieving expeditious attainment of the NAAQS;
- does not cause or contribute to new NAAQS violations in the area;
- does not increase the frequency or severity of existing NAAQS violations in the area; and
- does not delay the state's timely attainment with NAAQS or impede required progress toward attainment.

For projects located in areas designated as being in non-attainment with the ambient air quality standards, the US EPA has issued rules for determining general conformity of Federal actions other than those associated with highway or transit

projects funded by the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA). Under the general conformity rules, a project is presumed to conform to the SIP's goals for achieving compliance with the ambient air quality standards if the increase in emissions due to a proposed Federal action is less than certain thresholds. In severe ozone non-attainment areas, the critical thresholds are 25 tons per year of volatile organic carbons (VOCs) and 25 tons per year of oxides of nitrogen (NO_x). In addition to this test, a conformity determination is also required if the emissions increase due to the project would equal or exceed ten percent of the total emission inventory for the entire non-attainment area. Compliance with the General Conformity Rule also requires that direct and indirect emissions, as well as emissions due to construction activities, of the ozone precursors VOCs and NO_x be addressed.

If threshold levels are exceeded, then emission "offset" measures must be implemented to reduce the increases in the emissions associated with the project to zero, not just to below the threshold level. It is their role as a potential offset measure that AFV shuttles may be of most benefit to expanding airports.

Some have interpreted the General Conformity Rule as penalizing airports that would implement emission reduction measures early (before they are needed for the conformity offsets) by not giving the airports credit for these measures in the conformity determination. In other words, the airports would have eliminated these measures as potential offsets by doing them too soon. The baseline used in the conformity determination would have been lowered. The analogy would be having a pole-vaulter dig a hole in front of the bar and then cut off some of his pole, too. This interpretation has delayed some airports from implementing clean fuel programs until they may need them. The General Conformity Rule is being reviewed and, hopefully, the Rule will be revised to address these concerns.

E. Modes of Access to Airports

Although many major airports are undertaking programs aimed at increasing the use of mass transit for access to the airport, today over 70 percent of the passengers at almost every airport arrive and return home by private automobile. With the expansion of airports, the reliance on the automobile has resulted in increased congestion on the access roadways and terminal curbsides, strain on parking facilities, and increased air emissions. The growing need for shuttles is, in part, tied to the lack of adequate multi-modal access options and the reliance on the automobile. The many types of shuttle applications are critical components of successful airport operations. Some airports have attempted to decrease reliance on automobiles by using shuttles to take passengers to and from rail stations or city centers. Commercial, shared-ride shuttles reduce traffic volume to the degree that they eliminate some private automobile trips. In fact, the increased congestion at airports has encouraged more people to use shared-ride shuttles to avoid the "hassles" of driving and parking in and around some airports. Many passengers arriving by private automobile must take shuttles to and from

parking lots. Airport passengers visiting a city may take shuttles to and from rental car facilities or hotels. Airport and airport tenant employees usually must be shuttled to more distant parking lots to reserve closer parking for passenger convenience.

The demand for airport shuttles is likely to continue and to expand essentially in lockstep with the increase in air passenger traffic.

SHUTTLE VEHICLE CHOICES

Key parameters that a shuttle operator must determine when choosing a specific shuttle model to use are:

- Number of passengers to be carried
- Height of passenger compartment (Can passengers stand up in the vehicle?)
- Expected service life
- Engine horsepower and torque
- Seating configuration
- Cost
- Low-floor or high-floor configuration
- Manufacturer's delivery schedule
- Passenger amenities
- Fuel type
- Fuel efficiency
- Are the vehicles bought from an OEM or "up-fitter"

Airport shuttles can be found in a wide range of types and sizes and all of these vehicle types are well suited for the AFV market. They can accommodate CNG fuel tanks and still have adequate passenger and luggage carrying space. Today, there is significant original equipment manufacturer (OEM) support for both AFV buses and AFV vans.

- The smallest shuttles are vans or extended vans that can carry from 6 to 12 passengers. Passengers cannot stand up in them and their luggage is loaded in the rear. (Minivans are not discussed here because they are not commonly used as airport shuttles, although they are frequently used in taxi service.)
- The largest common shuttles are 40-foot heavy-duty buses like those that are seen on transit routes in large cities. These buses, available from several major OEMs, are usually of monocoque or uni-body design, which eliminates the need for separate chassis. They are very durable with a 12 to 15 year service life.

- Between the traditional vans and the largest buses are cutaways and smaller buses. Cutaways are essentially vans with passenger compartments that allow passengers to enter and leave standing up. Luggage is carried in racks on-board. Seating capacity is about 12-20 people. The basic van chassis and cab is built by Ford or other OEM. An “up-fitter” adds the passenger compartment and sells the vehicle under their brand name. There has been a strong demand in recent years for CNG cutaways, and recently Ford introduced an NGV cutaway model for its 2001 model year.
- Another type of shuttle is similar to the cutaway but utilizes a heavier truck chassis and cab. These have a specially made passenger compartment “dropped onto” the chassis by an “up-fitter”, similar to some motor home configurations. Typical seating capacity is 24-36 people.
- Some small buses also have a capacity of 24 to 30 passengers with a chassis similar to the traditional yellow school buses.
- Minibuses are a fully configured subset of buses with internal standing room and built from the ground up by a bus OEM.

In selecting a vehicle size, the shuttle operator must balance “headway” times (the time intervals between stops at a given location) and expected demand. A simplistic example can demonstrate this relationship. Assume a fleet of 20 buses that can carry 20 passengers each. Such a fleet could theoretically accommodate the same number of passengers and the intervals between stops on average would be half as long as a fleet of ten larger buses capable of carrying 40 passengers each. In practice, however, the shuttle operator is constrained by customer expectations of reasonable waiting times. The operator will add shuttles to keep these intervals acceptable for the design peak demand period. This design peak demand is usually not based on holidays like Thanksgiving and Christmas, which are the true maximum demand periods, but are based on more common peaks, such as average day during the peak month. During the true peak holidays, passenger service does suffer. The fleet would be uneconomical if it were sized based on absolute peak demand.

When demand grows to a certain point, the operator must upgrade the size of the shuttle vehicles to accommodate more passengers and remain competitive. Many operators prefer to use the smallest size shuttle that meets the demand and passenger expectation for that market. The purchase cost of shuttles increases dramatically with increased size. For example, a 12-passenger CNG van may cost approximately \$25,000 and a 40-passenger heavy-duty CNG bus may cost \$300,000. On a per-seat basis, the van costs \$2,500 per seat, while the heavy-duty bus costs \$7,500 per seat. However, the heavy-duty bus will have a service life three times longer than the life of the van. Also, the larger bus can be equipped with more amenities and features such as low-floor for easy access. In addition, excess passengers during peak periods are more easily accommodated in the aisles of larger buses.

Individual shuttle company owners make all of these decisions concerning the characteristics of shuttles they use. Each operator has his own preferences or ways of doing business that must be respected. They know what their passengers expect, what the company can afford, and the operational implications of these vehicle choices.

TYPES OF SHUTTLE SERVICE OPERATIONS

Shuttle services at airports can generally be grouped into seven types:

1. **Door-to-door shared-ride shuttles.** These shuttles provide passenger transport to and from the airport and most are **owned and operated by private companies.** Most often, these services are provided on a shared-ride basis wherein passengers are picked up at assigned locations or at homes and businesses, and dropped off at the airport. Both out- and in-bound trips may be obtained by advanced reservation at a service desk in the airport (in some cases required if the rider is at the airport) or at a curbside pick-up location.
2. **On-airport shuttles.** These shuttle operations transport passengers between parking lots and the terminal, and at larger airports, provide inter-terminal passenger service. For on-site parking locations, shuttle services are generally managed by the airport, with vehicles owned or leased by the airport authority to serve the on-site airport parking lots. Costs of the shuttle operation are recovered as part of the airport's budget. Often an airport will contract for the operation of its airport parking lot and inter-terminal shuttle service fleet and may even specify the type of vehicles to use.
3. **Off-airport parking shuttles.** These are shuttles that service off-site commercial parking lots and are **owned and operated by private parties.**
4. **Hotel shuttles.** This type of shuttle service is operated by the hotel and is provided as a free service to hotel guests. Vehicles are **owned or leased by the hotel management.**
5. **Rental car company shuttles.** This type of shuttle transport operation provides passenger service to and from the rental car parking locations (on- and off-site rental car locations). **Vehicles are owned or leased by the rental car company.**
6. **Regional/city connectors.** These operations transport passengers from the airport to prescribed drop-off points within the region surrounding the airport or to the city served by the airport. They generally operate on a fixed

schedule in both directions. Frequently, the drop-off points are hotels or other centers of business-related travel (like a convention center). Other shuttle operations may provide a connecting service between an airport and other mass transit services (typically train service) that are not be at the airport. Generally, such operations are commercial ventures with **vehicles owned by the operating company, although some metropolitan transit districts provide this service**. In many ways, these buses simply represent a dedicated mass transit route.

7. **Airside shuttles**. These operations take passengers from the departing terminal gate to aircraft for boarding. Generally they are used for commuter aircraft that are parked in areas away from the terminal departure gate. These vehicles are **either owned by the airlines operating the aircraft, or provided as part of the airport operations** (and paid for out of airline concession fees). In either case, their service is an operating expense and not a revenue generator.

Another example is the large capacity custom-configured shuttles that are used at Dulles International Airport to transport passengers to and from the terminal gate departure area and aircraft. These shuttles are owned and operated by the airport operating authority.

SHUTTLE SERVICE OWNERSHIP

A. Privately Owned Commercially Operated Shuttle Fleets

The airport passenger delivery (to and from the airport) shuttle industry developed from the “line haul,” large bus business. It began as a reservations-only service, evolved into a charter-or-reservation service and then incorporated curbside demand coupled with shared-rides. SuperShuttle, for example, one of the foremost national airport shuttle companies, began with pre-arranged airport and hotel pick-ups of from two to four passengers per van.

As air travel increased, the passenger delivery shuttle services expanded. Given customer preference for the lowest possible fare, shuttle service operators worked hard to retain customers. Airport authorities, concerned about excessive roving and random pick-ups, moved to assert greater control over shuttle traffic. Several major airports now restrict access to their terminals through concession agreements and others charge access fees.

There appears to be a growing number of owner/operator shuttles, as observed by the large number of small companies and individually operated limousines circulating at Mid-Atlantic area airports. Presently, the total pick-up and drop-off rates for smaller companies is no greater than those of large companies; but industry observers believe the trend is towards more “taxi-like” operators. The marketing implication of this is that if more owner/operators enter the business, and are able to offer lower fares, larger companies and airport concession managers may lose control over airport ground transportation traffic. The increasing number of owner/operators suggests that the shuttle fleet may contain a greater number of older vehicles in less well-maintained condition (similar to the situation found with most urban taxi fleets). This could result in a lower standard of service, greater air pollution and more congestion at airport curbside locations.

The following are important characteristics of privately owned commercially operated shuttle operations. The most important characteristic of fleets is that the shuttle operations generate the main source of revenue for the owner.

Table 2 provides examples of privately-owned shuttle operators and their operating characteristics. Several companies are regional or national in scope and operate at more than one airport. Among them are SuperShuttle, Coach USA and Aerolink. SuperShuttle operates shared-ride vans with local companies as franchise operations; Coach and Aerolink tend to manage local fleets under contract. These regional and national organizations are followed in size by very large local companies such as Meers in Orlando, Florida; Continental in Chicago, Illinois; Shuttle Express in Seattle, Washington; and Airport Shuttle/Montgomery Shuttle in the Baltimore-Washington metropolitan area.

Reliability

High among the concerns of commercial operators is the reliability of their vehicles. There are challenges inherent in the business such as driver reliability, mechanical reliability, safety, and customer perception. Many operators are reluctant

Privately Owned Shuttle Fleets

- **Cost/benefit calculations vary by company and operating strategy.**
- **The positions of purchase decision-makers vary, depending on company, but decisions often are made at the corporate level with input requested from franchisees.**
- **Access to national offices is not easy; consequently more success can be achieved by talking first with the local manager.**
- **Labor/driver competency is an issue; retaining good drivers is another reason to minimize equipment problems.**
- **Convenient refueling and vehicle operating reliability are more important than fuel costs.**
- **This is a “high volume/thin margin” business.**

Table 2. Comparison of Selected Privately Owned Shuttle Company Operations

Item	SuperShuttle	Continental	Washington Flyer
	Shared-Ride Franchise (Baltimore-Washington)	Shared-Ride Major City (Chicago)	Bus Regional (Washington, D.C. Area)
No. of Vehicles in Service/type	120 7-passenger vans	125 vans	20 full-sized buses
How Long in Business	More than 10 years	147 years (yes, started with horse & carriage)	About 30 years
Average Passenger Load	2 to 4/ trip	5 to 7/ trip	2,900-3,000/mo
Average Range for Round Trip/ Annual mileage	About 100,000 to 120,000 /year/ vehicle	20 miles typical round trip	95 miles avg. trip 1.9 million/year
Vehicle Replacement Cycle	4 years	2 to 3 years	5 years
Acquisition Decision-Maker	Franchisee with Corporate	Vice President For Operations	Airport Authority
Fuel Type	Gasoline	Gasoline	Diesel
Fuel Use/MPG	10 to 12 MPG	600,000 gal/year	6 MPG
Refueling	At airport	At various locations	At airport
Maintenance and Repair	Contractor does on-site	Out-sourced to a contractor	Most done on-site, in-house; major jobs off site
AFV Experience	Yes	Clean City Stakeholder	No

to expose their fleets to anything new, such as AFVs, which they perceive might diminish their level of service. Obviously, this perception must be changed if AFVs are to be successfully introduced.

As noted above, there is some tension between shared-ride shuttle operations and individual ride operations such as taxicabs. As the lines become blurred, this tension may ease, but so may the quality of operating equipment and airport concession agreement controls that can benefit the AFV market.

Commercial shuttle reliability in large urban areas is affected by the same traffic and congestion problems experienced by all drivers. Traffic congestion is an external factor that cannot be controlled, but it puts pressure on shuttle operators to maximize internal controls by using known, proven products.

Purchase Decisions

Most fleets have a flexible policy for the retirement of old vehicles and the purchase of new ones. Generally, shuttle buses operate for a decade or more before being replaced. Buses may undergo several overhauls during their useful life. Vans and cutaways are kept for two to three years and are allowed to accumulate 200,000 to 300,000 miles before being replaced. One large company has determined that when maintenance and repair (M & R) costs rise from \$.10 to \$.22 per mile, it is time to replace the vehicle. In addition, as noted above, some companies may alter vehicle types, or add new vehicles as capacity and headway times change.

Franchise operators make their own decisions about purchases although they must comply with company requirements and may also work with the parent company for financial assistance and guidance. Purchase decisions often begin with a local fleet manager. If there is no fleet manager, another manager such as the maintenance supervisor or a front desk manager may be responsible. In small franchises it is not uncommon to find the “Vice President” working the front desk.

Cost Considerations

Hiring and retaining competent drivers is an on-going issue for some, but not all, large companies.

Some managers characterize the shuttle business as a “low margin” operation, meaning that it is necessary to get the maximum use from vehicles and strictly control costs. Surprisingly, few operators expressed serious concern about fuel costs although commercial operators are willing to consider any suggestion that reduces operating expenses. An alternative fuel may look attractive if it costs less than conventional fuel but this is not likely to be the deciding factor. The

marketing value of a lower AFV fuel cost is diminished when conventional fuel is competitively priced or when the high cost of AFV equipment cannot be amortized against fuel costs within the useful life of a vehicle.

Operational Factors

Convenient refueling is an important issue for all shuttle operators. Operators who refuel once a day resist any fuel that requires a second trip to the pump. However, shuttle companies with enough units to have some vehicles in reserve during off-peak hours can more easily accommodate multiple refueling. Refueling is generally done close to the airport. Maintenance and repair is a mixture of in-house minor repairs and out-sourced major repairs.

Commercial shuttles are high trip-volume vehicles. Typically they operate in shifts but many units may run from 4:00 or 5:00 A.M to Midnight. Trips in a large city like Chicago average 20 miles per round trip. Passenger loads in shared-ride vans range from three to seven persons per trip. One major Chicago company serves one million passengers a year.

Differences for Off-Airport Parking Lot Shuttles

Although many of the same cost factors for shared-ride shuttles affect privately owned/operated parking lot shuttles, the main difference is that shuttles operating to serve private parking lots are an expense item, and not a revenue generator. The cost of shuttle operation must be covered by fees charged to customers for parking on the lot. These shuttles operate more or less continuously and the number of vehicles in use varies with peak arrival and departure times. Parking lot shuttle operators control costs by using shared-ride pick-ups for out-bound passengers and both call-in and curbside pick-up for returning passengers. Privately owned parking lot shuttles may even accommodate one or two hurried passengers and short-circuit the shared-ride pick-up cruise through the lot.

B. Airport-Managed Shuttle Fleets

Unlike commercially owned shuttle operations, which transport passengers to and from an airport, airport-managed shuttle fleets are not revenue generators, but are another expense item within the overall operation of the airport.

Airport Managed Shuttle Fleets

- **These vehicles, in nearly continuous use, are high mileage and high fuel-use applications.**
- **Airports either contract with commercial operators for parking lot shuttle operation or use airport employees.**
- **Airports may own or lease the vehicles directly or hire a contractor who purchases or leases the vehicles.**
- **Maintenance costs for airport-managed shuttles are viewed as a relatively important cost item.**

Operational Factors

Typical operating characteristics of an airport-managed fleet are described in Table 3. Typically, airport-managed parking lot shuttle

Table 3. Characteristics of Typical Airport-Managed Shuttle Fleet

Characteristic	Typical Airport-Managed Shuttle Fleet
No. of Vehicles in Service/type	20-50 buses
Average Passenger Load	15-30
Average Range for Round Trip/ annual mileage	1-3 miles About 60,000/year
Vehicle Replacement Cycle	Approximately 3 years for vans/cutaways Up to 15 years for buses
Acquisition Decision-Maker	Airport Authority
Fuel Type	Diesel
Fuel Use/MPG	6-10 MPG
Refueling	On Airport
Maintenance and Repair	Some in-house, some contracted
Experience with AFVs	Yes

services operate on a regular schedule, picking up passengers from various parking lot locations. Premium lots receive a higher level of service. Buses usually serve medium and long-term lots; cutaways more often serve premium lots. Similar operational characteristics prevail for inter-terminal services, which move from terminal to terminal on a regular schedule.

An airport can exercise as much control as it wishes over the type of vehicles leased, purchased, or contracted. However, some national fleet managers believe that many of the airports they serve are not particularly aggressive in this area. Airport fleet managers may need to be convinced to include AFV requirements or incentives in the airport’s concession agreements.

Cost Considerations

The cost of maintenance for on-airport shuttle vehicles is considered to be a relatively significant expense item.

Commercial contractors that operate airport-managed shuttles apply the same range of purchase and management decisions found in shared-ride commercial shuttles. A commercial operator on a fixed price contract will be concerned about reliability so that the cost of operations does not exceed the contract price. Such operators typically will not use AFVs unless the airport requires them (and all bidders) to do so. Experience with AFV airport buses over the last 5 to 7 years now allows contractors to estimate costs more accurately than they could previously.

C. Hotel-Owned Shuttle Fleets

Like airport-managed shuttle fleets, hotel shuttle operations are an expense item and not a revenue generator.

Operational Factors

Hotel shuttles are operated as a courtesy for hotel guests. Table 4 provides the characteristics for a typical hotel shuttle fleet operation in the mid-Atlantic area. Some large hotels, with concern for liability, may employ professional drivers but it is not unusual for bellhops, rather than professionals, to drive them. Some hotels operate their courtesy shuttles on a schedule; others simply run them on request. Almost all hotels use their shuttles for service to other locations in addition to airports.

Table 4. Typical Hotel Shuttle Fleet Characteristics

Characteristic	Typical Hotel Shuttle Fleet
No. of Vehicles in Service/type	2 to 4 vans and cutaways
Average Passenger Load	4 to 8 per trip About 10,000 /year
Average Range for Round Trip/ annual mileage	2 to 10 miles/trip About 50,000/year
Vehicle Replacement Cycle	3 to 4 years/200,000 miles
Acquisition Decision-Maker	Local hotel manager coordinating with national corporate office
Fuel Type	Both diesel and gasoline can be found
Fuel Use/MPG	10-12 MPG
Refueling	At airport
Maintenance and Repair	Some in-house, some contracted
Experience with AFVs	No

A typical hotel operation uses from 2 to 4 vans or cutaways. Most hotel cutaways appear to use diesel fuel; the vans use gasoline. A hotel associated with an airport is often located within five miles of the airport so the average round trip for hotel courtesy shuttles is in the 6 to 8 mile range. The heaviest operating times are morning and afternoon peak periods. Typically, these vehicles acquire 40,000 to 50,000 miles per year and are replaced, depending upon mechanical condition, every 3 to 4 years. The local hotel manager makes a recommendation to either the franchise owner or corporate headquarters, based on the experience of his transportation manager, engineer or maintenance staff (depending on the size of the facility).

Cost Considerations

Hotel managers want to control the costs of their shuttles but they do not control these costs as strictly as for-profit privately-owned door-to-door shuttle fleet managers. Hotels view their shuttles as a convenience for hotel guests. These shuttle operations are not considered a significant cost center (compared to the costs of running the entire hotel complex) and management appears to pay relatively little attention to their operating parameters. Because these vehicles are basically promotional in nature, hotels may be amenable to AFVs as a way to enhance customer service and sales, provided that capital costs can be controlled and refueling is conveniently located.

D. Rental Car Company Shuttle Fleets

The following are important characteristics of rental car company shuttle operations. Like airport-managed and hotel shuttle operators, rental car company shuttle operations generate no revenue from customers and are an expense item to the operation.

Hotel Shuttle Fleets

- **Most hotels regard passenger transport shuttles as a customer convenience and part of their marketing.**
- **Fuel and labor costs are less important than for shared-ride and similar shuttles.**
- **The local purchase/lease decision-maker has significant influence.**
- **Now that Ford offers an AFV cutaway, hotels can consider these as well as vans.**
- **This is medium volume fuel-use market.**

Operational Factors

Table 5 provides the characteristics of a typical rental car company shuttle operation. Rental car company shuttles operate between airport terminals and holding facilities 18 to 24 hours per day. The industry leaders use full-size buses configured for passenger comfort. At some airports these run on a 5 to 10 minute schedule. Professional drivers are used for marketing and insurance reasons. Smaller companies operate cutaways on an on-call basis and it is not uncommon for the facility manager to drive a van for a pick-up or drop-off.

Large company purchase/lease decisions are made at the corporate level in consultation with regional managers. Vehicles are purchased or leased competitively. Large buses driven 50,000 miles a year may not be replaced for 15 years while cutaways may be replaced after 3 or 4 years, or after 200,000 miles of service. Off-site (not located at the airport) service shuttles typically operate in the range of 10 to 12 miles per round trip at moderate speeds depending on the rental car facility's distance from the terminal. On-site shuttles operate shorter distances.

Cost Considerations

Rental car company shuttles are similar to hotel courtesy vans in that they are operated for the convenience of customers. Costs are included as part of the rental facility's operating budget; hence, costs are managed but are secondary to customer satisfaction. Cost control may mean operating smaller vehicles during off-peak hours. A major rental car company will often use its buses during peak hours and switch to cutaways off peak.

Fuel efficiency is neither an issue nor expected because of the type of vehicle operation. Additionally, rental car company shuttles are similar to hotel shuttles in that they support other marketing goals and are not the companies' primary business.

Rental Car Shuttle Fleets

- **Several managers of national rental car operations are negative about AFVs.**
- **Rental car airport shuttles are relatively high volume operations.**
- **Reliability is important – especially for large companies (even though large companies have vehicles in reserve).**
- **Purchase/lease decisions are controlled at the corporate level.**
- **Shuttle operation costs are well managed, but are secondary to customer satisfaction. Fuel costs have not been a major issue.**
- **Small companies commonly operate cutaways; large companies use both cutaways and buses.**
- **Consolidated rental car facilities with co-location of rental car companies may present new opportunities for AFV buses.**

Table 5. Typical Rental Car Shuttle Fleet Characteristics

Characteristic	Typical Rental Car Shuttle Fleet
No. of Vehicles in Service/type	3 to 12 buses and/or cutaways
Average Passenger Load	6 to 20 per trip
Average Range for Round Trip/ annual mileage	10 to 12 miles /round trip
Vehicle Replacement Cycle	Large buses average about 12 to 15 years. Cutaways 3 to 4 years.
Acquisition Decision-Maker	Corporate headquarters in consultation with region/local managers
Fuel Type	Both diesel and gasoline can be found
Fuel use/MPG	Depends on vehicle size 6 to 12 MPG
Refueling	At airport or car rental facility
Maintenance and Repair	Some in-house, some contracted
Experience with AFVs	Most have none

Smaller companies tend to operate cutaways and these vehicles receive less upkeep than the buses operated by the major companies. Maintenance is an ongoing problem for these shuttles; fuel efficiency may concern some managers but it is not a major issue for them.

Reliability

Reliability is important to major companies. One major car rental company notes that 23% of its business is one-day car rentals. This is the most profitable part of this company’s business and caters primarily to expenses-paid business travelers. The company believes that time is important for such customers and every effort is made to offer rapid, convenient transfers from terminal to the rental facility. Another company official cited a J.D. Power Company study that found the most important component of airport customer satisfaction is a rapid and efficient arrival and departure schedule.

While vehicle reliability is valued, most rental car shuttle managers keep about one-quarter of their fleet in reserve to account for vehicle maintenance and repair. This provides some flexibility not enjoyed by shared-ride fleets and creates an opportunity to mitigate any risks perceived with incorporating new technologies.

AFV Perceptions

Major rental car companies voice the strongest objections to AFVs of any airport shuttle industry component. Executives from three national rental car companies cited studies conducted in the Denver, Dallas and Seattle areas that pointed to extensive problems with CNG buses. None of the companies interviewed wanted to “experiment” with alternative fuels. Their perception is that published comparisons of CNG versus conventional fuel are made between new CNG units and 20-year-old conventional buses. Four items were mentioned most often regarding CNG:

1. The increased cost of CNG buses compared to conventional diesel engine buses,
2. OEM reluctance to provide warranty coverage for CNG engines that is equivalent to that for diesel engines,
3. Inefficient and inconvenient refueling,
4. The perception that “clean diesel fuel” with catalytic converters is a “strong, cost effective option.”

When asked what it would take to encourage the acquisition of CNG vehicles, a representative of a major rental car company pointed to three things:

1. Remove OEM cost and use issues,
2. Assure refueling infrastructure availability,
3. Obtain subsidies to close the cost difference.

Budget Rental’s partnering with EV Rental at a number of airports nationwide is one exception to an apparent lack of interest in AFVs by rental car companies. These do not involve AFV shuttles however. EV Rental has made a limited number of CNG Honda’s and some hybrids available to Budget customers at some airports.

Consolidation

A growing trend for rental car concessions is the move by some airports to consolidate rental car facilities in one location. In such situations, the airport may require a consolidated carrier for all co-located rental car facilities. Industry leaders are anxious to ensure that high customer service standards are maintained. They believe that airports have a shared financial interest in satisfying customers. In turn, this leads to higher revenues for both parties. The marketing implication of this is that rental car companies are unlikely to purchase CNG buses on their own at any airport that is contemplating consolidation. However, an airport authority might be convinced to use, or require the use of, AFVs by the consolidated carrier.