PHL PHILADELPHIA INTERNATIONAL AIRPORT

Presentation To

Pennsylvania Public Utility Commission

Alternative Fuel Vehicles Forum

Electric Vehicles Panel

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Presentation Overview

- ✓ PHL Characteristics
- ✓ Emission Reduction Program at PHL
  - ✓ Current Initiatives
  - ✓ Future Initiatives
- ✓ Funding
  - ✓ VALE
  - ✓ AFIG
  - ✓ DERA
- ✓ Obstacles and Lessons Learned

PHL Characteristics

Facts

- ✓ 448,129 aircraft operations in 2011 - Ranked 10th in North America*
- ✓ 30.8M passengers in 2011 (includes 4.4M international passengers)
- ✓ Seven terminal buildings, 126 boarding gates
- ✓ Municipal Run Airport System (2,370 acres)

*Source: 2011 ACI-NA, Top 50 Airports Ranking

PHL Characteristics

eGSE Statistics

- ✓ 83 pieces of eGSE currently in operation
- ✓ 58 scheduled for delivery in Summer 2012
- ✓ 232 Electric Charging Ports
- ✓ 2 Airlines using eGSE (US Airways and United)
- ✓ Emissions Reductions over Equipment Lifetime:
  - ✓ 715 tons NO_x
  - ✓ 805 tons CO
  - ✓ 45 tons $PM_{2.5}$
- ✓ Airline Fuel Savings per year: 255 Gallons

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PHL Emissions Reduction Program

Existing Initiatives

$41,192 ea.

Baggage Tractors

Belt Loaders

$50,156 ea.

eGSE Rechargers

Hybrid Vehicle Fleet

US Airways COBUS Shuttle

$540k ea.

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$28,866/dual port

$29,200 ea.

PHL Emissions Reduction Program

Potential Future Projects

Source: Clean Energy

CNG Station

Source: ChicagoTribune.com

EV Charging Stations

Alternative Fuel Shuttles, Taxis

Freedom Taxi

Source: freedom-taxi.com

Source: azuredynamics.com

Driving a **world** of difference in a light-duty **electric** vehicle.

AZD Ford Johnson Controls

Electric Vehicles

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Life Cycle Costs for Baggage Tractors

Fuel Type	Purchase Cost	Rebuild or Replacement Costs	Fuel Costs	Reduced Maintenance Costs	Total Costs If Reduced Maintenance	Total Costs If Same Maintenance
Gasoline	$17,000	$2,568	$59,481	$47,089	$126,139	$126,139
Diesel	$22,000	$1,351	$27,386	$47,089	$97,826	$97,826
LPG	$19,000	$2,568	$49,072	$37,176	$107,816	$117,729
CNG	$21,000	$2,568	$65,058	$37,176	$125,802	$135,715
Electric	$30,000	$5,147	$5,574	$15,696	$56,418	$87,810

Assumptions: 16 year equipment life; 6 year engine replacement interval for gasoline, LPG, and CNG; 8 year engine rebuild interval for diesel; 5 year battery life for electric; $2,500 unit cost for all rebuilds; $4,500 unit cost for all battery replacements, equipment used 8 hours per day for 350 days per year; idle is 40 percent of operating day; gasoline use is 3.2 gallons per hour at $0.75 (after tax credits) per gallon; diesel use is 1.7 gallons per hour at $0.65 (after tax credits) per gallon; LNG use is 3.3 gallons per hour at $0.60 per gallon; CNG use is 3.5 gallons per hour at $0.75 per gallon (including the cost of refueling facility operation and amortization); electric use is 8.33 kilowatts per operating hour; maintenance costs are $1.90 per hour for gasoline and diesel; maintenance costs are $1.50 per hour for LPG and CNG under a reduced maintenance scenario or $1.90 per hour under a "same maintenance" scenario; maintenance costs are $0.63 per hour for electric under a reduced maintenance scenario or $1.90 per hour under a "same maintenance" scenario.

Source: Technical Support for Development of Airport Ground Support Equipment Emission Reductions, US EPA, 1999

Funding

Voluntary Airport Lower Emission (VALE)

- ✓ Established under the 2004 *Vision 100-Century of Aviation Reauthorization Act*
- ✓ Managed by FAA
- ✓ Funded through Airport Improvement Program (AIP) grants and Passenger Facility Charges (PFCs)
- ✓ Provides funding to commercial service airports in <u>air quality nonattainment and maintenance areas</u>
- ✓ Participants earn <u>air emission reduction credits</u> to meet Clean Air Act
- ✓ Finances **75%** of Project Costs

Funding

Funding: Alternate Fuel Incentive Grant (AFIG)

- ✓ Program established under Act 166 of 1992
- ✓ Modified and expanded under Act 178 of 2004
- ✓ Managed by PA Department of Environmental Protection
- ✓ Goal is to reduce the Commonwealth's dependence on foreign oil and improve air quality

ELIGIBLE PROJECTS:

- ✓ Convert gas powered vehicles to alternative fuel vehicles.
- ✓ Incremental cost of purchase of alternative fuel vehicles.
- ✓ Purchase & installation of necessary fueling equipment.
- ✓ Next phase advanced research, development, training, and demonstration of new applications or next phase technology related to AFVs
- ✓ Incremental cost to purchase biofuels, including **biodiesel** and **ethanol**.

Funding

Funding: Diesel Emissions Reduction Act (DERA)

Energy Policy Act of 2005 → ARRA of 2009 → US EPA → State Agency (PA DEP)

- ✓ Established as part of the 2005 Energy Policy Act (2011 Reauthorization)
- ✓ Funding provided through programs such as:
  - National Clean Diesel Funding Assistance Program
  - National Clean Diesel Emerging Technologies Program
  - SmartWay Clean Diesel Finance Program
  - State Clean Diesel Grant Program

ELIGIBLE PROJECTS:

✓Retrofit technologies that are certified or verified by the EPA or California Air Resources Board (CARB)

✓Idle reduction technologies that are EPA verified

✓Technologies from EPA's Emerging Technologies List

✓Incremental costs associated with early replacement and repowering with certified engine configurations

Schedule of Project Funding

Source	Project Description	Project Total	VALE Grant Amount	PADEP Grants
F8308	RECHARGERS, (10 Units for Terminal D)	$269,546	$202,160	* $67,386
F8708	RE-CHARGERS (15 for Terminals B/C)	$602,600	$451,950	* $150,650
F8909A	RE-CHARGERS, (25 Units for Terminals A-West, B/C & F- Purchase)	$2,642,007	$1,981,505	--
F9309B	RE-CHARGERS, (25 Units for Terminal A-West, B/C& F – Installation)	$6,143,640	$4,607,730	# $492,200 ^ $190,000 ▪ $575,966
F8308	Hybrids Vehicles, (3 Each – Purchase)	$21,392	$16,044	* $5,348
	TOTALS	*$9,679,185*	*$7,259,389*	*$1,481,550*

** = AFIG Summer 2008, ^ = DERA Winter 2009, # = AFIG Summer 2009, ▪ = Pending*

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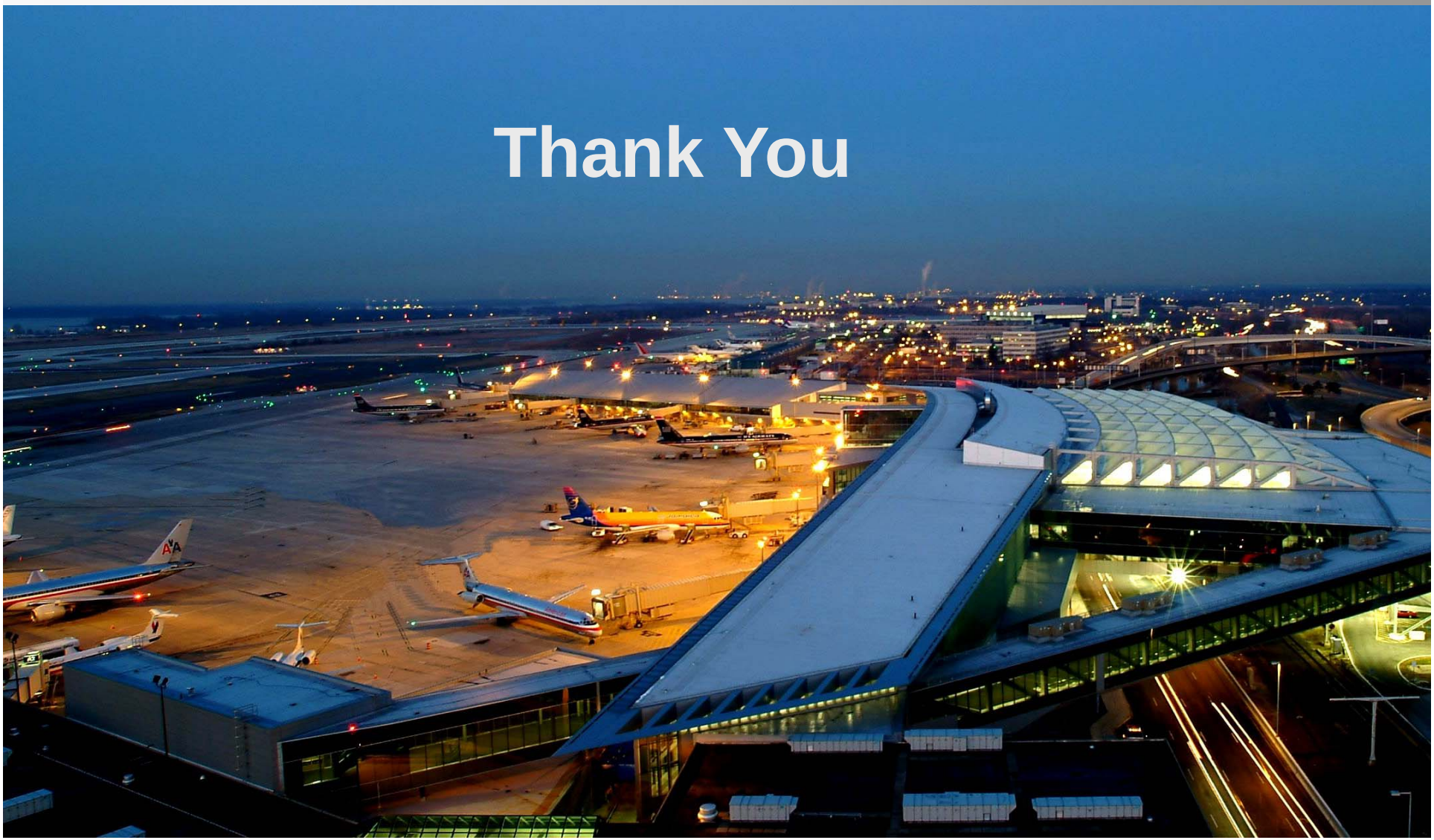
Obstacles and Lessons Learned

Partnerships with Airlines (eGSE)

Advancing the Program depends on the airlines':

- ✓ Available financial resources
- ✓ Infrastructure and Coordination (logistics)
- ✓ Age of existing GSE
- ✓ Schedule (funding open enrollment periods)

Thank You



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