AVIATION OPERATIONAL MEASURES FOR FUEL AND EMISSIONS REDUCTION WORKSHOP

Ground Support Equipment Emission Reduction Options

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Presentation

- Overall strategy
- Applicability of technology to equipment types and operation
- Other initiatives
- Conclusion
Emission Reductions

- No single solution
  - Infrastructure requirements
  - Operational requirements
  - Equipment availability
  - Technology availability

- Cost considerations
Electric GSE

Applicability
- Belt loaders
- Bag tractors
- Aircraft tractors *
- Forklifts
- Container loaders
- Cargo tractors

*Limited Basis

Benefits/Challenges
- Zero emissions
- Lower maintenance costs
- Increased equipment reliability
- High infrastructure cost
- Additional ramp space
- Recharging

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Compressed Natural Gas

Applicability
- Bag tugs
- Belt loaders
- OEM type equipment (Ford, GM etc)
- Forklifts

Benefits/Challenges
- Lower emissions (compared to gasoline - higher for HC and CO compared to diesel)
- Infrastructure (limited availability, high cost for fill stations)

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Liquid Petroleum Gas

**Applicability**
- Bag tractors *
- Belt loaders *
- OEM type equipment (Ford, GM, Etc.)
- Forklifts

**Benefits/Challenges**
- Lower emissions (compared to gasoline - higher for HC and CO compared to diesel)
- Readily available
- Safety concerns (employee strains)
- Tank location
- Cost

* Limited use
Gasoline/Diesel Retrofit with 2 or 3 Way Catalytic Converters

**Applicability**
- Diesel and closed-loop gasoline engines where kits are available

**Benefits/Challenges**
- Lower emissions
- Reduced fuel cost
- Open loop systems
- Engine run times
- Installation location and space on GSE
- Many different engines (many sizes and Mfg)
Diesel Retrofit with Particulate Traps

**Applicability**
- All current and older model diesels where kits are available

**Benefits/Challenges**
- >85% particulate reduction
- Installation location
- Cost
- Maintenance
- Life span
- Not certified for all equipment
- Run time

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Fuel Cells
Emerging Technology with Significant Potential

Possible Applicability
- Bag tugs
- Belt loaders
- Jet tractors
- Cargo tractors
- Container loaders
- Chargers
- OEM type equipment

Benefits/Challenges
- Zero emissions
- No charge time, fueling could be similar to conventional fueling
- Less invasive infrastructure
- Availability
- Technology, cost and timeline

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Solar Power
Developing Technology

✈️ Applicability
✧ Fuel service carts
✧ Other GSE

✈️ Benefits/Challenges
✧ Zero emissions
✧ No infrastructure required
✧ Limited applicability
✧ Presently only used to assist other power sources
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Other Emission Reduction Initiatives

- Tow-barless tractors
- Lavatory carts
- Fuel carts
Conclusion

- No one solution fits all needs
- Technology is still developing
- Aviation industry is utilizing what is available
- Cost
Thank you!