





AVIATION OPERATIONAL MEASURES FOR FUEL AND EMISSIONS REDUCTION WORKSHOP

Ground Support Equipment Emission Reduction Options

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Presentation







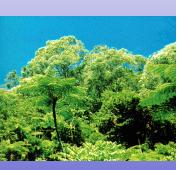
 Overall strategy
 Applicability of technology to equipment types and operation
 Other initiatives
 Conclusion





Emission Reductions







No single solution
 Infrastructure requirements
 Operational requirements
 Equipment availability
 Technology availability
 Cost considerations





Electric GSE









→Applicability →	Benefits/Challenges
♦Belt loaders	♦Zero emissions
◆Bag tractors ◆Aircraft tractors *	Lower maintenance costs
♦Forklifts	Increased equipment reliability
◆Container loaders ◆Cargo tractors	✦High infrastructure cost
*Limited Basis	Additional ramp space
Airport Pane	

Ottawa, 5-6 November 2002





























































Compressed Natural Gas









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- ✦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)





Liquid Petroleum Gas









* Limited use

Benefits/Challenges

◆Lower emissions (compared to gasoline - higher for HC and CO compared to diesel)

♦Safety concerns (employee strains)

 \diamond Tank location

♦Cost















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 \diamond Open loop systems \diamond Engine run times \diamond 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

 \diamond Installation location

♦Cost

 \diamond Maintenance

♦Life span

♦Not certified for all equipment

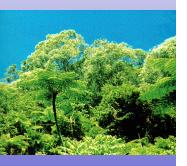
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♦*Run time*













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
 - \diamond Availability
 - ♦ Technology, cost and timeline

Canada











Solar Power Developing Technology

Applicability
Fuel service
carts

♦Other GSE

→ Benefits/ Challenges

♦Zero emissions

- No infrastructure required
- \diamond Limited applicability
- Presently only used to assist other power sources

























→Tow-barless tractors
→Lavatory carts
→Fuel carts













































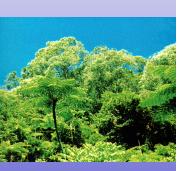






Conclusion









 →No one solution fits all needs
 →Technology is still developing
 →Aviation industry is utilizing what is available
 →Cost





Transports Canada <u>AVIATION OPERATIONAL MEASURES FOR</u> <u>FUEL AND EMISSIONS REDUCTION</u>

WORKSHOP

Thank you !



