Port Yard Hostler Demo Projects: Assessing LNG & Hybrid Yard Hostlers at POLB & POLA

Advanced Transportation Technologies

Clean Transportation Solutions SM

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Why Focus on Yard Hostlers?

- Ports of Long Beach (POLB) & LA (POLA) largest port complex in North America
  - Largest source of emissions in SCAQMD
  - Cargo handling equipment (CHE) #1 source of non-marine emissions
    - **Yard hostler largest source of CHE emissions!**
      - 64% of CHE PM emissions*
      - 59% of CHE NOx emissions*

      **POLB 2002 Emissions Inventory*

LNG Yard Hostler Demonstration Project

- Project team: POLB, Sound Energy Solutions (SES), CALSTART, LBCT, EPA
- 6-month study to determine viability of LNG yard hostlers in marine terminal environment
- $75K EPA co-funding

Evaluation Criteria

- Performance
  - Driver surveys
- Fuel economy
- Emissions reductions
- Vehicle availability
- Operational impacts
- Business case

Emissions Testing

- Testing planned:
  - Steady-state emissions on chassis dyno
  - In-use emissions testing at LBCT
- Comparison vehicles
  - LNG yard hostler w/ 2005 on-road NG engine
  - Diesel yard hostler w/ Tier 1 off-road engine
  - Diesel yard hostler w/ Tier 2 off-road engine
  - Diesel yard hostler w/ 2005 on-road engine
- Will complement CARB yard hostler emissions testing

Expected Emissions Reductions

- LNG vs. baseline CA Tier 2 off-road:

Baseline: CA Tier 2 Off-Road	
	% Reduction*
NOx	60-63%
PM	80%

**Based on HD engine certification*

Project Status

- Three (3) LNG yard hostlers under evaluation at LBCT since June, 2006
  - Performance data collection period extended through Dec. ’06 (possibly later)
- Emissions testing delayed
  - Contract for chassis dyno testing still being worked out
  - In-use emissions test plan under review by CARB and SCAQMD
- Anticipate final report complete summer 2007

Why the Interest in Hybrid Yard Hostlers?

- No change to existing fueling infrastructure
  - No alt-fuel infrastructure permits required
- No impact on fueling operations
  - Allows “wet-hosing” of yard hostlers
- No significant fuel evaporation concerns
- No additional fueling safety concerns

Hybrid Yard Hostler Demonstration Project

- Project team: POLB, POLA, CALSTART, LBCT, Kalmar, EPA
- Phase 1: Hybrid yard hostler drive train dev. & integ. via competitive RFP
- Phase 2: 6-month study to determine hybrid yard hostler viability (similar to LNG yard hostler project)
- $300K EPA co-funding

Evaluation Criteria

- Performance
  - Driver surveys
- Fuel economy
- Emissions reductions
- Vehicle availability
- Operational impacts
- Business case

Emissions Testing

- Testing planned:
  - Steady-state emissions on chassis dyno
  - Transient emissions testing on chassis dyno using “standard” yard hostler duty cycle (to be developed)
- Comparison vehicles
  - Hybrid yard hostler w/ 2007 on-road engine
  - Diesel yard hostler w/ Tier 1 off-road engine
  - Diesel yard hostler w/ Tier 2 off-road engine
  - Diesel yard hostler w/ Tier 3 off-road engine
  - Diesel yard hostler w/ 2005 (or later) on-road engine
- Will complement CARB yard hostler emissions testing

Two Components of Expected Emissions Reductions

- Expected emissions reductions from use of 2007 on-road engine:

Baseline: CA Tier 3 Off-Road	
	% Reduction*
NOx	93%
PM	93%

**Based on HD engine certification*

- Estimated combined emissions reductions from elimination or reduction of engine idling from 3 yard hostlers over 6 months:

Baseline: CA Tier 3 Off-Road	
	Tons*
NOx	18.9
PM	0.09

**Based on preliminary yard hostler idling emissions measurements performed by UCR*

Project Status

- Project will kickoff 12/06 or 1/07
- Hybrid yard hostler supplier selection by mid-2007
- Hybrid yard hostler evaluation & testing to begin in 2008
- Project completion expected early 2009

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