

# **Electric Utility Perspectives on Electric Technologies for Diesel Engine Run-Time Reduction**

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# Electric Power Research Institute

- Founded in 1973 as a nonprofit research center for the U.S. electric utility industry
- Annual budget of \$300M, approximately 700 employees
- Four sectors
  - Generation (fossil, renewable, distributed)
  - Nuclear
  - Environmental
  - Power Delivery and Markets
    - Electric Transportation
- EPRI Industry Reports (free to the public)
  - Electricity Sector Framework for the Future  
<http://www.epri.com/corporate/esff/>
  - The Electricity Technology Roadmap Initiative  
[www.epri.com/corporate/discover\\_epri/roadmap/](http://www.epri.com/corporate/discover_epri/roadmap/)

# Electric Transportation Research at EPRI

- EPRI has a 25-year history of innovation in advanced vehicles, including:



- Plug-in hybrids, battery electric vehicles, fuel cell vehicles
- Advanced battery development, fast charging, component design
- Modeling and simulation, control system development
- Engineering, environmental, economic, and market analysis
- Nonroad ET—electric material handling, TSE, airport GSE

# EPRI Objectives

- Conduct credible analyses based on independent, objective operating data and technical information
- Develop new products or technology in collaboration with industry partners
- Conduct demonstration projects in order to:
  - Demonstrate promising new technologies or products
  - Enable market transformation for new products
    - Customer education
  - Collect independent and objective operating data
- Support or facilitate utility participation in TSE projects
  - In-kind funding
- Assist with development of standards and safety procedures and make recommendations to appropriate organizations

# EPRI Activities

- Analysis
  - “Truckstop Electrification Study” – October 2001
  - “Business Model: Utility Opportunities for Truckstop Electrification” – February 2002
- Demonstrations
  - Onboard truck equipment with 120VAC Shorepower – EPA Smartway Transportation Grant (EPRI and SMUD)
  - Alabama IdleAire Demonstration Project (EPRI and Alabama Power)
  - Electric Transport Refrigeration Unit economic (Jul-04) and technical (Oct-04) analyses and software tools (EPRI with Southern Calif. Edison and SMUD)
    - Looking for a good eTRU demonstration project

# EPRI Initial View of TSE Benefits

Parked-Truck Power Option	Investment	Charges / Costs / Savings	Payback Period	NO <sub>x</sub> Impact
<b>Heavy-Duty Diesel Idling</b> 1,831 hrs/year @ 1.5 gal/hr, \$1.50/gallon	\$0	-\$4,120 annual fuel cost only	baseline	225 lbs /year/truck baseline
<b>On-Board Heating/Cooling w/ Shore Power</b> 1,400 hrs/yr @ 1.5 kW	\$2,000 Truck Owner	~\$2,450 annual savings - energy	1 year	166 lbs /year/truck avoided
	\$1,400/space Truckstop (or Depot)	\$4 per 8 hrs parking (12 hrs/day use)	1 year	518 lbs /year/space avoided
	<\$200/space Utility	6,570 kWh/yr/space	<4 years	
<b>Off-Board Electrical Heating/Cooling</b> @ 4 kW	No investment Truck Owner	\$700 annual savings - energy (700 hrs/yr) see note	No investment	77 lbs /year/truck avoided
	~\$6,000/space IdleAire	~\$10 per 8 hrs parking (12 hrs/day use)	~2 years	486 lbs /year/space avoided
	<\$200/space Utility	17,500 kWh/yr/space	<2 years	
<b>Transport Refrigeration Unit Electric-Standby</b> @ 6-kW load 800 hrs/yr	\$2,600 Trailer Owner	\$4,000 annual savings - energy	8 months	122 lbs /year/trailer
	\$3,400 / space Truckstop (or Depot)	\$8 per 8 hrs parking (12 hrs/day use)	1 year	585 lbs /year/space avoided
	<\$400/space Utility	26,280 kWh/yr/space	<2 years	

# Insights to Date

- As with our initial study, there are a number of different assumptions and projections for the cost/benefits of TSE
- A primary motivation of our demonstration projects is the collection and dissemination of objective operating data
- Utility and diesel combustion emissions will improve significantly over time, so the value of the pollution benefits are a moving target, but currently high
  - Electric technologies clean up even the oldest equipment
- The benefits of petroleum and greenhouse gas reduction are expected to increase in value
- Transforming traditional industry practice (idling) will take the expected amount of time, as with any new technology

# Electric Utility Perspectives

- Each utility is a unique combination of:
  - Generation mix
  - Customer base
  - Geographic locale
  - Regulatory environment
  - Economic health
  - Environmental challengesand so on. . .
- However, utilities are interested in TSE, idle reduction
- Primary motivations may include:
  - New load (especially off-peak)
  - Local source emissions reductions
  - Community service
  - Use of electric technologies as customer solutions

# Selected Industry Quotes

“An 80-space installation adds 400kW of peak load and can generate about \$51,000 per year in new revenue”

“Electric TRU demonstrations are good local source emissions reductions projects. By working with a single organization, we can help ensure that the project achieve its proposed benefits”

Electro-technologies can be important tools for our customers to cost-effectively meet environmental compliance requirements—which is a requirement for the continued health of our customers’ businesses.

# Infrastructure and Standards

- The two shorepower techniques are largely compatible
  - Low-power: 120 VAC, 15-20 amp
  - High-power: 240 VAC, 30 amp (or 208 VAC)
  - Installed capacity does affect the infrastructure expense
- TRUs with electric standby are more complex
  - Numerous electrical and connector requirements, up to 480 VAC.
  - Additional safety concerns
- Utilities largely view these installations as another industrial customer. They'll just hook up power and throw the switch.
- However, one should not assume that all utilities desire load growth.

# Summary

- Reducing diesel fuel consumption by displacement with electricity will reduce pollution and greenhouse gas emissions, create jobs, lower the trade deficit and reduce national petroleum dependence
- There is a significant, but not universal, interest in TSE projects at the utilities
- However, revenue may not justify complete funding of a project by a utility
  - Participation more likely as a member of a larger collaboration
- There is a lot of interest in the environmental benefits of TSE technologies and the potential for emissions credit
  - Need more in-use operating data on the various products and technologies