Research Results

ATRI American Transportation Research Institute

Demonstration of Integrated Mobile Idle Reduction Solutions

The Problem

The idling of a truck's main engine has long been used to provide heat, air conditioning and cab power during driver layovers or rest periods. Aside from air quality impacts, the practice dramatically increases fuel consumption and engine wear costs. A number of technologies exist that can generate cab power without operating the truck's main engine. However, the in-cab performance and related return-on-investment of these technologies has not been well documented.

Research Goal

The research objectives included:

- Collection and quantification of operational data leading to an assessment of fleet operator costs, benefits and payback period for selected idle reduction technologies; and
- Developing recommendations for integrating commercially-available idle reduction technologies into the original equipment manufacturer (OEM) truck manufacturing process.

Methodology

ATRI was selected by the U.S. Environmental Protection Agency to conduct a Demonstration of Integrated Mobile Idle Reduction Solutions. This demonstration involved working with project teams to demonstrate and evaluate mobile idle reduction technologies on heavy-duty trucks, either installed as part of the truck manufacturing process or prior to the truck being placed in service.

Through a competitive solicitation process, ATRI selected three motor carriers for the demonstration. Two fleets, Diversified Transfer & Storage and NFI, evaluated auxiliary power units. The third, Schneider National, Inc., evaluated two different air conditioning systems (one battery-powered and the other a thermal storage system). After carriers purchased and installed the selected idle reduction technologies, ATRI worked closely with the participating fleets to collect and evaluate the performance data and analyses.

Findings

After deployment of the selected idle reduction technologies, main engine idling comprised between 5 to 22 percent of total engine operating time. This represented a reduction in idling of 42 to 78 percent from baseline conditions. Idling continued to be highest during the hottest or coldest months which may imply the selected technologies were less effective during extreme temperatures.

The estimated annual emission reductions from the use of the selected technologies amounted to more than 27 tons of nitrogen oxides, 0.6 tons of particulate matter, and 1,265 tons of carbon dioxide.

The payback periods for the selected technologies were generally longer than anticipated. Payback periods ranging from 16 to 45 months were identified for some of the units while other units were not expected to provide a payback within the period of ownership. Several factors influenced the payback periods, including the level of baseline idling, the usage of the technology, and the start-up and ongoing costs.

Several features were identified which could facilitate the integration of commercially-available idle reduction technologies into the truck manufacturing process. These features include improving cab insulation, improving air flow by designating vent locations and ducting paths, standardizing connections and components, coordinating main engine and idle system use, and developing system management tools. The further development of these features is expected to improve performance, decrease installation costs and provide better management oversight and utilization.

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ATRI's primary mission is to conduct and support research in the transportation field, with an emphasis on the trucking industry's essential role in the U.S. and international marketplace.