Argonne NATIONAL LABORATORY

ECONOMICS OF IDLING REDUCTION OPTIONS FOR LONG-HAUL TRUCKS

For high idlers (~2,000 h/yr), all idling reduction options save money over 5 years when fuel costs more than $2/gallon.

For low idlers (~1,000 h/yr), the fuel-cost crossover point is higher; in some cases, payback may take more than 5 years.

Many long-haul trucks still idle their engines overnight to provide "hotel load"—heating, cooling, and electricity for appliances—for drivers taking required rest periods in their sleeper cabs. Idling a truck engine for stationary power, however, uses a lot of fuel, accelerates engine wear, and produces harmful emissions.

An Argonne National Laboratory analysis, "Idling Reduction for Long-Haul Trucks: An Economic Comparison of On-Board and Wayside Technologies" (available at http://www.anl.gov/energy-systems/publication/idling-reduction-long-haul-trucks-economic-comparison-board-and-wayside), examined the costs and return on investment for alternatives to idling for rest-period power. A fact sheet providing a general overview of idling reduction equipment for long-haul trucks—Long-Haul Truck Idling Burns Up Profits—is available at https://www.afdc.energy.gov/uploads/publication/hdv_idling_2015.pdf.

Argonne's analysis looked at solutions best suited to providing long-duration hotel load, including auxiliary power units (APUs, which can be diesel or battery powered), heating systems, cooling systems, and electrified parking spaces (EPS). EPS, also known as truck stop electrification, can be single system (providing climate control from an off-board HVAC system plus power) or dual system (providing plug-in power for a truck's on-board HVAC unit and accessories). Dual system EPS is also known as shore power.

The study focused on device and fuel costs. The key variables examined were displaceable idling hours (generally 1,000 to 2,000 hours per year) and the price of fuel. The analysis of total cost showed that for high idlers (~2,000 h/yr), all idling reduction options considered in this study save money over 5 years when fuel costs more than $2/gallon.

For lower idlers (~1,000 h/yr), the fuel-cost crossover point is higher; in some cases, payback may take more than 5 years (Figures 1 and 2).

Similarly, for those displacing more idling hours, the higher capital-cost solutions will pay back more quickly. For trucks that log fewer idling hours, options with a fixed cost per hour (i.e., EPS) will be more cost-effective, if EPS is available.

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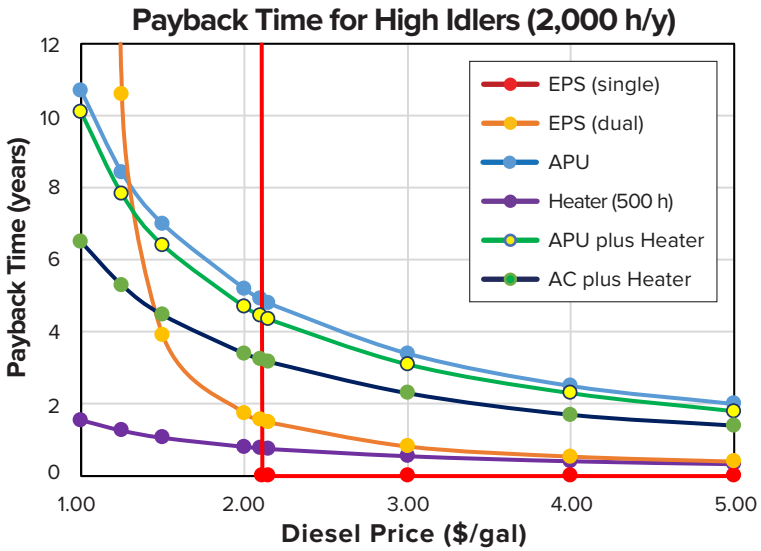

Figure 1. Equipment payback time as a function of fuel price for high idlers (2,000 h/yr). (Assumptions: idling fuel consumption = 0.8 gal/h; EPS cost, single system = $1.85/h; EPS cost, dual system = $1.00/h.)

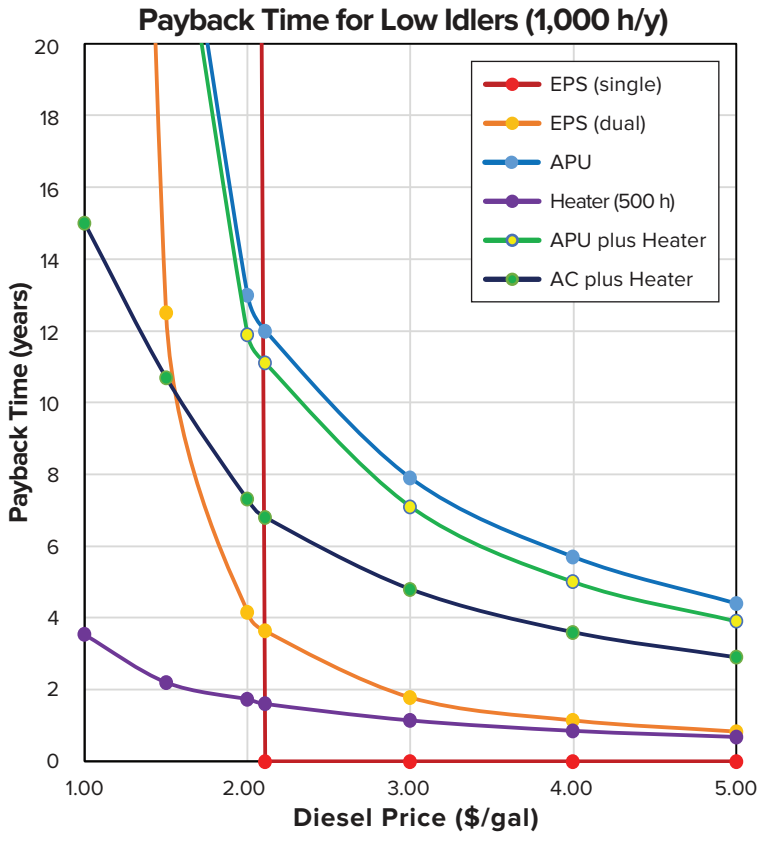

Figure 2. Equipment payback time as a function of fuel price for low idlers (1,000 h/yr). (Assumptions: idling fuel consumption = 0.8 gal/h; EPS cost, single system = $1.85/h; EPS cost, dual system = $1.00/h.)

Use Argonne's calculator (http://www.anl.gov/energy-systems/downloads/vehicle-idle-reduction-savings-worksheet) to calculate potential fuel savings with idling reduction.

Because the climate-control needs of the resting truck driver are key to determining the best-fit idling reduction solution for a particular fleet or truck, the geographic area covered is a crucial consideration. For trucks requiring bunk heat, a simple heater (plug-in or diesel) is usually the most cost-effective solution, even if the truck is equipped with an APU or is parked at a single-system EPS location. For trucks requiring bunk air conditioning, the use of single-system EPS is most cost effective for those logging fewer idling hours. Even for trucks with higher idling hours, the cost of EPS may be about the same as that for on-board air conditioning.

EPS installations are available at a limited number of truck stops, so few truck drivers can rely solely on EPS. This reduces EPS's overall utility. However, EPS has particular promise at dedicated terminals, where fleets on prescribed routes regularly stop to unload or reload and drivers require extended rest periods. Single-system EPS is particularly cost-effective in the provision of reliable, long-duration air conditioning, which makes it especially attractive in the South. Some EPS systems offer the higher-voltage power required for trailer refrigeration.

Argonne's analysis focused strictly on cost and fuel savings. While it did not consider the benefits of reduced emissions (i.e., greenhouse gases and criteria pollutants), it is important to note that all idling reduction options reduce costly engine wear and provide valuable emission-reduction benefits.

CONTACT
Linda Gaines
Transportation System Analyst
Phone: (630) 252-4919
Email: lgaines@anl.gov
www.anl.gov/energy-systems