Are APUs worth the price?

Justin Carretta, online news editor | *Fleet Owner* *Nov 13, 2008*

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According to a study conducted by the **NC Solar Center** at North Carolina State University (NCSA), using auxiliary power units (APU) to reduce idling is not cost effective for trucks that idle less than four hours a day. However, when fuel prices are high, the study recommends APUs for trucks that daily idle more than seven hours.

The three-year project drew its conclusions from 20 trucks that operated for over 2.8-million miles in 42 states during the 16-month data collection period. The study's authors concluded that, using the demonstration field test as a specific sample, APUs require at least a five-year payback period when fuel costs are $4.50/gal or less. The authors noted that as base engine emission standards become more stringent, the emissions benefit of APUs will drop, although fuel use and CO_2 reduction benefits will remain unchanged.

The study also concluded that a 100% substitution of APU usage instead of the base engine at mild temperatures would lead to an 80 to 90% reduction in NOx emissions, a 36 to 47% reduction in CO_2 emissions, and a 10 to 25% reduction in PM emissions. However, to ensure optimal use of the technology, fleets need to give drivers training and incentives.

Funded by a $500,000 grant from the U.S. Environmental Protection Agency (EPA), the project focused on the feasibility of developing mobile idle reduction technology (MIRTs) to reduce idling of long-haul trucks. In addition to the APUs, each truck was outfitted by Volvo with sensors that were remotely monitored by NCSU researchers.

The project had three stated goals—evaluate in-use performance of mobile idle-reduction technology (MIRT) by characterizing actual idle reduction times; evaluate fuel, maintenance, engine life savings, payback times, and user reactions, and submit a final case study report to EPA with conclusions reached.

Two fleets were used for the project. For Fleet A, consisting of mostly single drivers, the annual average idling for all stop durations and extended idling was estimated at 2,130 and 1,450 hours, respectively. Fleet B, consisting of mostly team drivers, averaged 770 and 250 hours, respectively.

Fleet A used Volvo's VN780 sleeper cab, while Fleet B ran Volvo's VN 630 mid-size sleeper cab. The APUs were comprised of three components: a 2006 Kubota Z482 048 liter engine, a generator and a Heating Ventilation Air Conditioning (HVAC) system supplied by Dometic Environmental Corp.

The study concluded that the use of anti-idling devices for all stop durations resulted in between 72 and 416 gallons of avoided fuel use per year for Fleet A, and between -4 and 89 gallons (for all stops) and -7 and 75 gallons (for extended idling) for Fleet B. The study's authors attributed the negative values for Fleet B to "double-dipping," the simultaneous usage of the APU and the base engine.

However, with diesel prices below $3 a gallon, the report did not see APUs to always be cost efficient, assuming an average truck price of $100,000 and a life cycle of 10 years. "For $4.50 per gallon or lower diesel fuel price, no truck has positive net cost savings because the reduction in fuel cost is not enough to offset levelized capital cost or non-fuel operations and maintenance (O & M) cost, even if the latter are at the low end of their ranges," the study said. "With discount rate of zero, a net cost savings is estimated for six Fleet A trucks for high fuel price ($8.00 per gallon) and low APU capital cost ($8,500), and only for one Fleet A truck for high fuel price and high APU capital cost ($13,000). With discount rate of 10%, only three trucks have net cost savings for high fuel price and low capital cost."

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