MARYLAND
Department of the Environment

Facts About...

IDLING TECHNOLOGY

Maryland's Idling Law (Transportation Article §22-402)
A motor vehicle engine may not be allowed to operate more than 5 consecutive minutes when the vehicle is not in motion, except as follows:

- When a vehicle is forced to remain motionless because of traffic conditions or mechanical difficulties over which the operator has no control;
- When it is necessary to operate heating and cooling or auxiliary equipment installed on the vehicle;
- To bring the vehicle to the manufacturer's recommended operating temperature; or
- When it is necessary to accomplish the intended use of the vehicle.

Diesel Exhaust Health Effects

- Diesel exhaust is a mixture of harmful gases and solids, including particulate matter (PM), carbon monoxide (CO), ozone precursors - volatile organic compounds (VOCs) and nitrogen oxides (NOx), and 40 chemicals that are classified as "hazardous air pollutants" under the clean air act.
- Health studies show that exposure to diesel exhaust primarily affects the respiratory system and worsens asthma, allergies, bronchitis, and lung function. There is some evidence that diesel exhaust exposure can increase the risk of heart problems, premature death, and lung cancer.

The Costs of Engine Idling

- Heavy-duty diesel truck engines consume between 0.8 and 1.3 gallons of fuel per hour at idle. A typical long-haul truck idles 1,830 overnight hours and consumes $5,500 of fuel annually at $3.00 per gallon .
- Additional maintenance costs resulting from overnight idling are estimated at $1.15/day.
- Decreased engine life is associated with substantial wear to the engine.
- Truck drivers and support personnel are at increased health risk. Diesel exhaust can accumulate on and around the truck as well as pollute the air inside nearby buildings.

Energy and Economic Impacts

- Approximately 500,000 heavy duty (HD) trucks travel more than 500 miles for a typical trip.
- Truck idling consumes approximately 1.0 billion gallons of fuel annually.
- Fuel costs due to truck idling are estimated to be $3 billion annually at $3.00 per gallon.

Average truck idle/rest period, emissions and fuel use:

- NOx - 0.37 tons/year per vehicle
- CO_2 - 21.7 tons/year per vehicle
- Diesel Fuel - 1,920 gallons/year per vehicle

Note: These numbers are based on a truck idling 8 hours a day for 300 days per year.

- **Idle Reduction Technology**
  A significant amount of heavy-duty diesel vehicle idling can be reduced by using currently available idle control technologies. Some of these technologies can also provide sleeper/cab heating and cooling, heat for engine warming, and electrical power for battery charging and on-board accessories. Each technology has its advantages and drawbacks.

  - **Electronic Idle Limiters** – Idle limiting devices that are software-based idle limit controls

    - **Idle Shutdown System**
      - The idle shutdown system is built into the engine's electronic control software and enables the engine to shutdown automatically if it idles longer than the programmed time. The idle shutdown feature usually comes disabled from the factory, but can be programmed by the local dealer to shutdown at an idle time between 3 and 1,440 minutes.
      - Idle shutdown systems have been standard features in most modern electronically controlled on-road heavy-duty engines since the early 1990's.
      - Idle shutdown systems can be retrofitted on any electronically controlled engine that did not have the shutdown system as a standard feature.

    - **Automatic Stop-Start System**
      - Automatic stop-start systems are predominantly comprised of additional engine software controls that automatically stop and restart the engine as necessary to maintain the engine and cab/sleeper berth temperatures and battery voltage within preset limits.
      - Industry sources indicate that automatic stop-start systems reduce idle time, on average, by approximately 50 percent.
      - A frequently cited drawback of this system is the discomfort it causes to the sleeping driver during the periodic stop and restart of the engine.
      - The system costs between $800 and $1,200 on a new vehicle. Aftermarket systems cost approximately $2,000 installed.

  - **Auxiliary Devices -** Auxiliary devices are truck-mounted and can be used to provide some or all of the necessities that would normally require the truck engine to idle.

    - **Fuel-Fired Heaters**
      - Fuel-fired heaters are used to provide heat to the cab/sleeper berth and/or to preheat the engine block for easy engine start-up during cold weather.
      - The heaters run 20 or more hours on a gallon of diesel fuel and typically use the fuel from the truck's fuel tank.
      - Fuel-fired heaters cost between $1,000 and $3,000 per unit.

    - **Auxiliary Power Units (APU)**
      - APUs use a small diesel-powered engine (5 to10 hp) equipped with a generator/alternator to provide climate control, heat to the engine for cold weather starting, 12-volt DC electrical power to charge the batteries, and 110-volt AC power for on-board accessories.
      - The APU typically uses fuel from the vehicle's fuel system. The fuel consumption of diesel-fueled APUs range between 0.08 to 0.3 gallons per hour.
      - The cost for an APU ranges between $5,000 and $7,000.
      - The drawbacks of APUs include their initial cost, additional weight, and maintenance requirements.

- **Truck Stop Electrification (TSE) –** Electric power (120V AC or 240V AC) is supplied to the HVAC system and to on-board appliances from the local electric power grid.
  - **Advanced TSE**
    - **Off-Board Technologies (IdleAire™)**
      - An overhead unit that provides heating/cooling, power outlets and computer access is fitted into the truck window using a template insert at the truck stop.
      - Truck modifications are not needed.
      - 40 amps of 110-volt power is provided for on-board appliances. In some locations, external 240-volt, 50 amp service is available for refrigeration systems.
      - Basic services cost $1.85 to $2.15 per hour. Standard services include use of: a two-stage, 5,000 watt electric heater; 15,000 BTU air conditioner; electronic thermostat; computer with USB connections; high-speed internet access; telephone service; 20 satellite television channels; electrical outlets; on-site personnel; and a remote help desk. Optional services, available for an additional fee, include: wireless internet access for drivers with their own computers; 20 satellite television channels; movies; and computer-based interactive driver training.
      - The infrastructure cost is approximately $16,000 per parking space.
      - Drawbacks: High infrastructure costs, only available at truck stops, needs a person 24 hours/day to install unit in truck

  - **Shurepower**
    - Shurepower requires 120/240-volt electrical outlets at parking spaces and requires inverter and electrical connections on trucks. Inverter/chargers are used to charge the truck batteries from grid-supplied electricity and to convert the truck batteries' 12-volt DC to 120-volt AC power for all on-board appliances.
    - The cost for on-board equipment is approximately $200 for a basic retrofit kit, which includes a portable heater with fan (good for cool and moderate weather), an extension cord, wiring, and receptacles with breaker and ground fault circuit interrupter (GFCI) protection; approximately one hour is required for installation. Higher level kits, which include fully-functioning heating, ventilation, and air conditioning, cost $2,000 or more and require approximately half a day to install.
    - The Shurepower option is now offered by most truck manufacturers. 50% of all new Class 8 sleepers are purchased with the Shurepower option; this number is projected to increase to 90% by the year 2009.
    - Services cost approximately $0.50 per hour to start and include electric power, internet access, and cable television. Payment is completed through an unattended payment method.
    - Shurepower infrastructure costs approximately $5,000-$9,000 per truck parking space.
    - Drawbacks: Infrastructure costs, majority of trucks not equipped with Shurepower option

- **Electric Truck Refrigeration Units (eTRU) and Hybrid Diesel-Electric Standby TRUs**
  - Diesel engine-driven TRUs create significant air and noise pollution; a diesel TRU engine can emit more NOx than the truck's main engine when idling. In one year, a Tier 2 TRU generates approximately 1,004 kilograms of CO, 1,371 kilograms of non-methane hydrocarbons (NMHC) and NOx, and 110 kilograms of PM, assuming operation 24 hours per day, 6 days a week. Assuming the same operation schedule, total annual emissions for all 34 horsepower TRUs registered in the United States are estimated to be approximately 250,000 tons of CO, 340,000 tons of NMHC and NOx, and 41,000 tons of PM.
  - To decrease pollution, many local, state, and federal governments seek to limit the use of TRUs. One approach is to use grid-supplied electricity to power TRUs. There are two options for using electricity to power TRUs:
    - The hybrid diesel-electric standby unit is a diesel-driven mechanical TRU that can be plugged in when parked; and
    - The eTRU uses electric-powered components that are powered by a plug in connection when parked and by a diesel generator when moving.
  - Hybrid diesel-electric standby units were not readily adopted in the United States in the past. Currently, a small number of eTRUs are available in the United States. Regulations may be passed that require the adoption of these units in some areas.
  - TRUs can significantly decrease diesel fuel consumption by using grid-supplied electricity while at the warehouse. Assuming six days of operation and the ability to plug into electricity for ten hours a day, approximately 2,200 gallons of diesel could be saved annually. At $3.00/gallon, that equates to an annual savings of $6,600.
  - Warehouses and trailer parking areas could be retrofitted to incorporate the necessary three-phase electric service for TRUs to operate on grid-supplied electricity.
  - eTRUs typically require three-phase electricity due to high power requirements; most Shurepower facilities only provide single-phase electricity.
  - It is estimated that a retrofit option will cost approximately $2,000 and an engine replacement will cost approximately $4,000-$5,000.
  - Drawbacks: Infrastructure and equipment costs, lack of industry-wide standards, and limited three-phase Shurepower availability

A more thorough discussion of idle reduction technologies, including specific product information, can be found on the EPA's Idle Reduction Technologies website, located at http://www.epa.gov/otaq/smartway/idlingtechnologies.htm