Oregon Department of Transportation

U.S. Department of Transportation
Federal Highway Administration

Idle-Reduction and Advanced Fuel Efficiency Technologies

Session 2C Overview Worksheet

Session Summary

This session focuses on idle-reduction and advanced fuel efficiency technologies, both in terms of the strategies that DOTs could adopt for their own fleets as well as actions they could take to facilitate adoption of the technologies by roadway users. At the beginning of the session, Bill Van Amburg of CALSTART will provide brief remarks about his organization's efforts to commercialize emerging technologies for medium and heavy duty vehicles, after which we will open up for general discussion. The intended outcome of this session is to determine how DOTs can promote and adopt the usage of idle-reduction and advanced fuel efficiency technologies, and what tools would be useful in doing so.

Key Idle-Reduction and Fuel Efficiency Strategies

Idle-Reduction Strategies

- **Auxiliary Power Units and Generator Sets (APU/GS)**: devices that contain an EPA emission-certified engine and supply cooling, heating, and electrical power to Class 8 trucks and other applications. Battery-powered APUs are increasingly being used, similar to battery air conditioning systems, as described below.
- **Fuel Operated Heaters (FOH) aka Direct Fired Heaters (DFH):** small, lightweight heaters that burn fuel from the main engine fuel supply or a separate fuel reserve. They provide heat only and can be used in conjunction with cooling systems depending upon the cab comfort needs.
- **Battery Air Conditioning Systems (BAC)**: systems that use batteries to power an independent electric cooling system. Typically, these systems integrate an FOH to supply heating.
- **Electrified Parking Spaces (EPS) / Truck Stop Electrification (TSE)**: terms that refer to a technology that uses electricity-powered components to provide the operator with climate control and auxiliary power without having to idle the main engine. This can be on-board equipment (e.g., power inverters, plugs), off-board equipment (e.g., electrified parking spaces or systems that directly provide heating, cooling or other needs), or a combination of the two.
- **Automatic engine start/stop systems**: systems that turn the main engine on and off as required for heating and cooling when the driver is resting and use the onboard HVAC system to cool the cabin. These systems only start up the main diesel engine when cooling or heating is needed to maintain a temperature, shutting the engine down when the need is met. Advanced start/stop systems are now being designed to provide power to HVAC and other systems at brief stops while operating, such as traffic lights and stop signs.
- **Work site idle reduction:** a strategy to use products that provide work truck power for HVAC, as well as electric and hydraulic tool circuits, via stored energy, i.e. a battery pack.

Who has done this?

- Truck stop electrification in New Jersey
- Braun's SmartWay-certified tractors and trailers, APUs, and EPS
- Installation of advanced TSE units in Beaumont, Texas and Knoxville, Tennessee

Fuel-Efficiency Strategies

- **Aerodynamic Devices**: devices that save fuel by minimizing aerodynamic drag and maintaining smoother air flow.

- **Low Rolling Resistance (LRR) New and Retread Tires**: tire technologies that reduce rolling resistance and provide a fuel or emissions benefit for the engine.
- **Adaptive, predictive cruise control:** a pre-step to true platooning, this is becoming a new standard in line haul Class 8 trucks as it can plan for upcoming terrain and respond to traffic better than most drivers.
- **Automated Manual Transmissions (AMT):** transmissions which use a computer to shift the manual transmission at the optimal time. They are becoming almost standard in HD trucks, particularly line haul. New shift strategies beat most drivers and reduce workload and driver fatigue.
- **Thermal Storage Systems (TSS)**: system that collects heat energy as a truck is driven, and uses it to provide air conditioning.

Phase 2 Heavy-Duty Greenhouse Gas Standards

The U.S. Environmental Protection Agency (EPA) and National Highway Traffic Safety Administration (NHTSA) jointly created fuel economy and greenhouse gas emission standards for medium- and heavy-duty trucks for the first time in 2011. The standards covered model years 2014 through 2018 and applied to three categories of medium- and heavy-duty trucks: certain combination tractors, heavy-duty pickup trucks and vans, and vocational vehicles. The standards set targets for gallons of fuel consumed per mile, grams of CO_2 emissions per mile, and/or gallons of fuel consumed and greenhouse gas emissions per ton-mile, depending on the type of vehicle.

In August 2016, EPA and NHTSA jointly adopted a second round of standards for medium- and heavy-duty vehicles. The standards:

- maintain the underlying regulatory structure developed in the Phase 1 program
- provide first time CO_2 and fuel efficiency standards for certain trailers used with heavy-duty combination tractors
- are expected to lower CO_2 emissions by approximately 1.1 billion metric tons, save $170 billion in fuel costs for vehicle owners, and reduce oil consumption by up to 2 billion barrels over the lifetime of the vehicles sold under the program
- require a significant increase in fuel efficiency from vocational trucks, and one of the key strategies to achieve that identified by EPA is idle reduction because of the large amount of idling in the driving and work cycle (up to 50%)
- phase in beginning in model year 2021 and culminate in standards for model year 2027

Key Discussion Questions

1. How should DOTs balance investments in idle-reduction and advanced fuel efficiency technologies with other funding demands for emission reduction efforts?
2. What potential opportunities and challenges do you anticipate from emerging fuel efficiency technologies such as truck platooning?
3. What are good practices for idle-reduction and advanced fuel efficiency technologies that have been deployed? What are the barriers to applying these practices to other jurisdictions?
4. What types of resources and tools would be most helpful for DOTs to have in order to promote the adoption of idle-reduction and advanced fuel efficiency technologies in their own fleets and in those who use their roadways?
5. How can wider installation of vehicle telematics help with increasing fuel efficiency?