Report

Improving Truck Efficiency and Reducing Idling

State of Oregon
Department of Environmental Quality

Submitted to: House Interim Committee on Environment and Water
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Improving Truck Efficiency and Reducing Idling

In 2009 the 75th Oregon Legislative Assembly enacted House Bill 2186, directing the Department of Environmental Quality to conduct a study of potential requirements regarding the maintenance or retrofitting of medium- and heavy-duty trucks in order to reduce aerodynamic drag and greenhouse gas emissions from those trucks. As part of the study, the department was also directed to study potential restrictions on engine use by parked commercial vehicles, including but not limited to medium- and heavy-duty trucks. These particular issues were among those identified earlier as recommended strategies to address climate change by the Governor's Task Force on Global Warming in 2006. Specifically the Task Force recommended that the state

- Set and meet goals for reduced truck idling at truck and safety stops, and
- Set and meet goals for freight (truck/rail) transportation efficiency; achieve this through equipment coordination and land use.

In conducting this study, House Bill 2186 specifies that DEQ evaluate:

- Comparable requirements of other states or the United States Environmental Protection Agency;
- The availability of financing programs to fund initial capital costs that are recouped in fuel savings over time;
- Differences among truck types, such as short-haul trucks and long-haul trucks;
- Implementation according to a phased-in schedule taking into account fleet size;
- The feasibility of requiring sellers of medium- and heavy-duty trucks to disclose to buyers the existence of applicable greenhouse gas emissions reduction requirements; and
- The feasibility of providing economic hardship exemptions and deferrals for owners and operators of trucks, after considering the ability of owners and operators of trucks to attain a return on investment within the time period specified in any financing instrument available to fund initial capital costs associated with any potential requirements.

This report fills the directive in House Bill 2186 for DEQ, after consultation with stakeholders, to report to the legislative interim committees on environment and natural resources on recommendations for improvements to truck efficiency and reduced idling by Oct. 1, 2010. DEQ convened a workgroup of stakeholders to discuss the topics listed in House Bill 2186. While the workgroup provided valuable advice and counsel as to the direction and scope of this report, the conclusions and recommendations are solely those of the Oregon Department of Environmental Quality.

Improving Truck Efficiency and Reducing Idling

State of Oregon Department of Environmental Quality

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Executive Summary

Climate change has been an issue of concern in Oregon for a number of years. Mitigation strategies are tied to energy usage and broadly speaking include efforts to improve efficiency in the use of that energy and/or to reduce the carbon impact from any given energy source. In 2006, the Governor's Task Force on Global Warming recommended the following strategies to reduce energy usage from trucks and other freight transportation:

- Set and meet goals for reduced truck idling at truck and safety stops, and
- Set and meet goals for freight (truck/rail) transportation efficiency; achieve this through equipment coordination and land use

Trucks play an important role in the U.S. economy. Long-haul trucks provide timely door-to-door delivery of freight critical to making the widely used "just-in-time" business model so successful. At the same time, trucking is an energy-intensive form of freight transport and the industry's fuel consumption is growing faster than for other petroleum users. Experts expect these increases to continue.

Several studies have identified fuel-efficient technologies for long haul tractor-trailers. A recent report by the National Academy of Sciences concluded that "A given percentage reduction in this vehicle category [heavy duty tractor trailer] will save more fuel than a matching percentage improvement in any other vehicle category. The potential fuel savings in tractor-trailer trucks represents about half of the total possible fuel savings in all categories of medium-and heavy-duty vehicles." However, many barriers have prevented widespread adoption of these technologies despite demonstrations of fuel economy and favorable returns on investment.

As part of its own efforts to address climate change, the state of California in 2008 identified several early action strategies including requirements to improve long haul truck efficiency with devices to reduce aerodynamic drag and rolling resistance. This program continues with requirements for older vehicles to phase in over the next ten years.

DEQ is recommending a program that harmonizes with California's since the California measure already affects trucks entering that state regardless of where they are domiciled. Compatible laws would make it easier for companies to implement requirements and comply, and level the playing field for fleets that travel into and serve Oregon but would not otherwise be subject to the California heavy duty greenhouse gas requirements.

DEQ is also recommending adopting EPA's model idling regulations. To complement measures that improve fuel efficiency when a vehicle is in motion, reducing idling can further reduce fuel consumption, greenhouse gas emissions and nuisance conditions often associated with idling vehicles.

Regulations limiting idling have been adopted in twenty six other states and a number of local jurisdictions. These have been put in place over a number of years and represent a hodge-podge of different requirements, exemptions and performance expectations. Several years ago EPA, acknowledging that it lacked authority to regulate idling on a national scale, developed a model idling law in conjunction with stakeholders to promote uniformity in idling requirements to make compliance more likely and reasonable. A variety of cost-effective technologies are available to meet housekeeping power needs otherwise resulting in idling and attendant emissions during overnight stays or breaks. Education and outreach will be key to successful implementation.

DEQ recommends an adequate phase-in period for both the truck efficiency and idling measures before beginning compliance efforts to allow truck operators, carriers and shippers to incorporate these requirements into their business plans.

While these technologies show a positive return on investment, obtaining initial capital can prove challenging for many in the trucking industry. Oregon tax credit and loan programs to support energy efficiency are in place but are programmatically and financially limited in their ability to fully address this need. Federal funds have been and are expected to continue to be allocated to support innovative financing programs available for truck efficiency improvements. Private funding sources have expressed interest in lending in this topic area but typically require the involvement of third parties like Cascade Sierra Solutions, an Oregon based nonprofit, that is capable of bundling projects and managing risks to lower costs. DEQ recommends continued exploration of options to assist with initial capital investment, such as loans, loss reserves and possibly grants or tax credits.

Some workgroup members representing industry raised concerns about uncertainties associated with the current economic conditions, adverse impacts on small businesses, the likelihood of realizing the expected fuel economy benefits, the availability of resources to assist truck operators in compliance and resources for uniform enforcement of requirements, particularly idling. Other workgroup members pointed out the importance of reducing energy use and greenhouse gas emissions from commercial vehicles and felt that the recommendations are reasonable. Given the lead time anticipated for rollout of this program, DEQ notes that economic conditions will likely be markedly different when the programs would go into effect, and that fleet operators and equipment manufacturers may be in a better position at that time to implement the strategies necessary to secure the benefits outlined in these recommendations.

Truck Efficiency Recommendation

DEQ recommends that the 2011 Oregon Legislature authorize the Environmental Quality Commission to adopt regulations substantially similar to California's heavy-duty greenhouse gas measure, including provisions for financial hardship

deferrals, with adequate lead-time and notice to all affected parties. The details of this recommendation begin on page 35 of this report.

Idling Recommendation
DEQ recommends that the 2011 Legislature authorize the Environmental Quality Commission to adopt regulations limiting unnecessary idling by commercial vehicles, incorporating the major elements of the US Environmental Protection Agency Model Idling Law that itself was the result of a national stakeholder consensus to provide effective, realistic and uniform controls on unnecessary idling across the country. The details of this recommendation begin on page 39 of this report.

Complete copies of this report can be found online at
www.deq.state.or.us/aq/committees/docs/truck/improveEfficiencyReport.pdf

Background

Purpose / Scope

This report fulfills a directive of the 2009 Oregon Legislature (HB 2186, Section 1; See Appendix A) to research and report on potential legislation regarding the maintenance or retrofitting of medium- and heavy-duty trucks in order to reduce aerodynamic drag and otherwise reduce greenhouse gas emissions from those trucks. As part of the study, DEQ is also required to research potential restrictions on engine use by parked commercial vehicles to reduce idling (defined as the operation of an engine when the vehicle is parked or not in use). This report presents results of DEQ's study, with recommendations for legislation, to the interim legislative committees on environmental and natural resources.

Introduction

Trucking plays a key role in the American economy in the movement of freight. While there are competing ways to move freight, trucks retain an important function, if nowhere else than having the flexibility to deliver goods in the "last mile" to any location and under delivery time constraints. Even with certain other advantages offered by rail and water freight, trucking still dominates, carrying an estimated 80% of the total quantity of goods transported, particularly when shipping high value and time sensitive goods and materials. Trucking itself is a derived demand that closely mirrors economic activity in the United States. The amount of trucking activity that occurs is tied closely to industrial production. Figure 2 shows the results from a Ceridian-UCLA Pulse of Commerce Index based on over the road truck fuel sales that reveals the close relationship between industrial production and trucking activity. The index tracks the volume and location of fuel being purchased and thus closely monitors the over the road movement of raw materials, goods-in-process and finished goods to U.S. factories, retailers and consumers.

Figure 1 Freight Movement by Mode

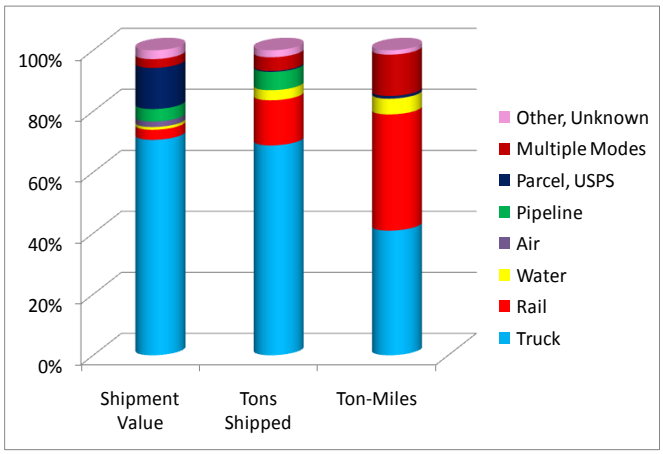
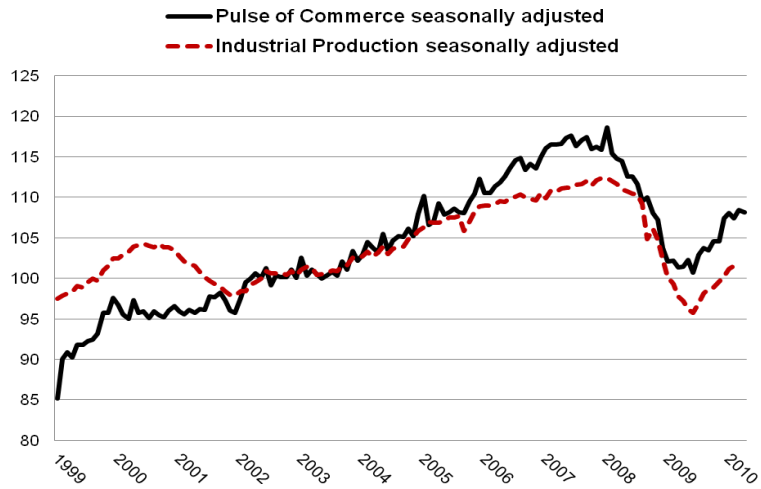


Figure 2 Truck Activity Mirrors Industrial Production

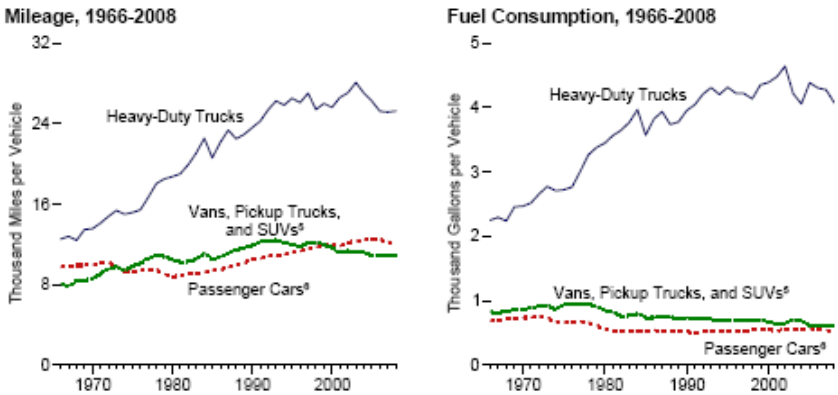


Improving Truck Efficiency and Reducing Idling

Transportation is inherently dependent on energy. Trucking, in particular, depends almost exclusively on petroleum to provide the power to make freight movement possible. Combustion engines powered by non-renewable fuels have resulted in an unprecedented degree of prosperity and mobility, but not without serious negative consequences.

Since 1997 the United States has imported over half of the oil used in this country, with increasing political and economic risks as a result. The transportation sector consumes two thirds of the oil used in this country, primarily as gasoline in passenger vehicles. The second largest transportation sector energy consumer, primarily as diesel, is trucking. However, usage in this sector is increasing at a faster rate than for light duty vehicles (Davis et al, 2009). Between 1970 and 2007 petroleum consumption by medium- and heavy-duty trucks increased at an annual average rate of 3.4 percent as compared to 1.4 percent for light duty vehicles. Fuel consumption by trucks is projected to continue to increase more rapidly in both absolute and percentage terms over the next 25 years (Table 1). Given the high volume of fuel consumed that is imported, the transportation sector is especially vulnerable to supply interruptions and price volatility in world markets.

Figure 3 Change in VMT and Fuel Consumption



from: EIA: Annual Energy Review, 2009

The growth in fuel use in this sector is driven by a number of factors. Freight movement by truck, while the most energy intensive, is the preferred mode for time sensitive and high value products. Diffusion of just-in-time deliveries across industry sectors has effectively shifted business spending from maintaining inventory to transportation of goods to ensure on time delivery, a factor in which trucking excels over other modes (ICF, 2002). The growth in online retailing has also increased use of trucks by shifting responsibility for the last mile of product delivery, from the consumer to a delivery truck. The flexibility represented in freight movement by truck underscores their critical role in at least one link of every supply chain.

Table 1 Projected Medium- and Heavy-Duty Truck Fuel Consumption

	Fuel Consumption – barrels per day	U.S. Transportation Liquid Fuel Consumption – Share
2008	3.9 million	26 %
2035	5.1 million	30 %

from: NAS, *Technologies and Approaches to Reducing the Fuel Consumption of Medium and Heavy Duty Vehicles*, 2010

Commercial vehicles play a vital role in Oregon's economy. In Oregon, trucks travel more than two billion miles each year, hauling a wide variety of goods into, out of, through and within the

state. In 2002, trucks carried over 225 million tons of goods worth about $148 million and by 2035 Oregon's transportation system is expected to handle about 560 tons of cargo valued at nearly $520 million (USDOT 2002). According to Oregon's Department of Transportation (2008), trucks carry 75-80% of freight shipped in the state. In 2007, ODOT's Motor Carrier Transportation Division registered 46,526 commercial trucks and 3,943 buses based in Oregon ODOT 2008). They also issued credentials for 250,000 out-of state trucks operating in Oregon and 233,059 temporary passes and trip permits for trucks operating in Oregon on a short-term basis. In addition, Oregon has thousands of buses (school, transit and charter), which carry children and adults between home, school, work and other destinations. Oregon has 5,535 school buses in service. In 2008, these buses transported 282,891 students over 67 million miles (Huillet 2009). In the greater Portland Metro area alone, Tri-Met operates a fleet of 660 transit buses which travel over 26 million miles, consuming 5.9 million gallons of diesel fuel annually (Tri-Met 2010).

A wide variety of technologies and fleet management strategies are available to improve the overall efficiency of freight movement by trucks and to realize the full potential of diesel engines through greater efficiency and reduced idling and emissions. Agencies can also enhance compliance and enforcement through collaboration, education, outreach and incentives for the support of development and usage of anti-idling and fuel efficient technologies.

Study Group and Stakeholder Involvement Process

DEQ formed a Truck Efficiency and Reduced Idling Study Group to provide the Department with feedback on this report and recommendations related to potential truck efficiency and idling requirements. The objective was to discuss DEQ proposed recommendations and consider alternatives on select issues identified by the DEQ, within the timeframe provided. Appendix B contains the membership of the Study Group.

This final report to the interim legislative committees on environment and natural resources summarizes the study group's discussions and the Department's recommendations. The Truck Efficiency and Reduced Idling Study Group members have reviewed it for completeness. The conclusions expressed here are the Department's and do not necessarily reflect the views and positions of the members of the Truck Efficiency and Reduced Idling Study Group.

All meetings were open to the public and had a time set aside for the public to provide comment. Additionally, citizens who wished to discuss proposals were encouraged to communicate directly with a Truck Efficiency and Idling Study Group member or DEQ staff. DEQ developed a website and on-line subscription service to notify the public of meetings and provide meeting materials. More than 1100 individuals subscribed to the email list serve for this project.

Air Emissions and Impacts

Greenhouse Gas Emissions from Commercial Vehicles

Transportation is not only a significant energy user but also a contributor to climate change. Freight movement by truck is especially energy intensive compared to other freight modes. In 2008, transportation sources, including personal travel and freight movement, accounted for 32 percent of total CO_2 equivalent emissions nationally (Figure 4). Freight movement by truck accounts for 22 percent of greenhouse gases from all transportation sources resulting in 389 million metric tons of CO_2e emitted (Figure 5). Overall, transportation sector greenhouse gas emissions have grown by 20 percent since 1990 but emissions from the trucking sector alone increased at a rate five times greater than light duty over this time (EPA, 2010). The Energy Information Administration forecasts that this growth will continue, in both absolute and percentage terms, for medium- and heavy-duty vehicles through 2035, Table 1 (EIA, 2009).

Figure 4 US Greenhouse Gas Emissions by Economic Sector

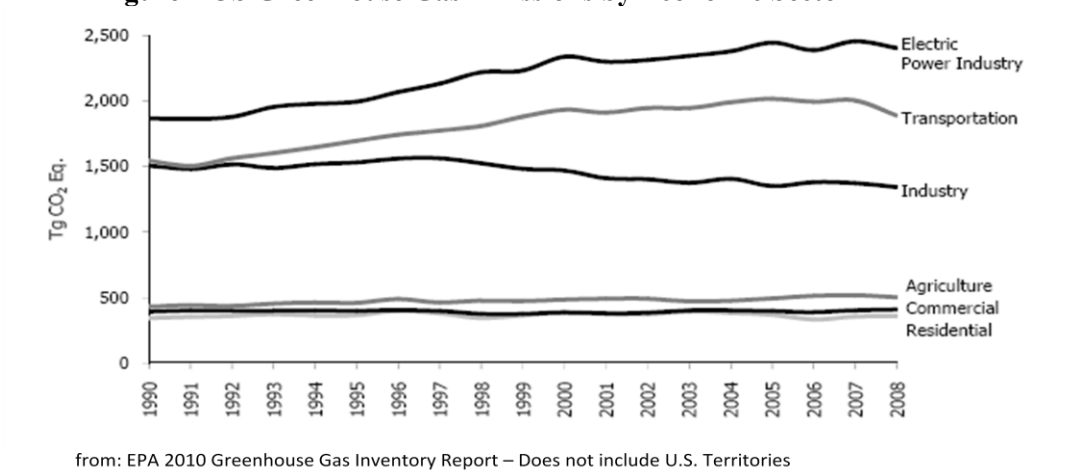
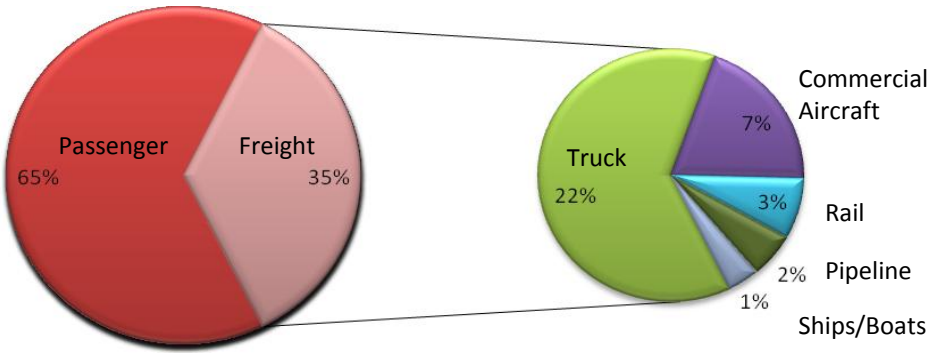
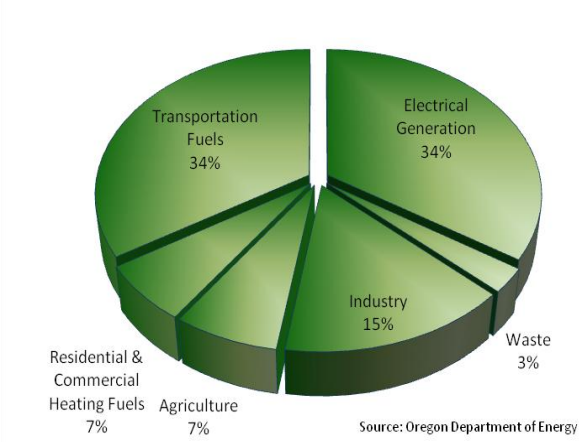


Figure 5 US Greenhouse Gas Emissions by Transportation Mode - 2008



Sources in Oregon emitted nearly 70 million metric tons of greenhouse gases into the atmosphere in 2005, a 26 percent increase over Oregon's 1990 greenhouse gas emissions of 55.5 million metric tons (ODOE 2008). Transportation emissions account for 34% or 23.8 million metric tons of greenhouse gas emissions, with nearly 23 percent of that (5.5 million metric tons) from on-road diesel. According to its business as usual forecast, the Oregon Department of Energy estimates that greenhouse gas emissions from Oregon will be 61 percent higher by 2025 (OR Strategy for Greenhouse Gas Emissions, Dec 2004).

Figure 6 Oregon Greenhouse Gas Inventory, 2005



The International Panel on Climate Change recognizes six major greenhouse gases: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Many of these gases are produced by both natural and human activities; however, particular attention has been given to carbon dioxide emissions since they account for the vast majority of anthropogenic greenhouse gas emissions (85 percent in the U.S.). Carbon dioxide comes from a number of sources including fossil fuel combustion (coal, gasoline, diesel and natural gas). Carbon dioxide accounts for almost all greenhouse gas emissions from mobile sources (both road and non-road). Because it's the most prevalent of all manmade greenhouse gases, the other five greenhouse gases are typically reported in terms of a carbon dioxide equivalent based on their global warming potential to provide a common unit of measure.

Human Health and Environmental Impacts

The exhaust from diesel engines is a complex mixture of gases and ultra fine particles, with a number of known and suspected human health and environmental impacts. Heavy duty diesel vehicles constitute about 6 percent of the motor vehicle fleet but contribute about 65 percent of fine particulate and 35 percent of nitrogen oxide emissions from all motor vehicles.

The particulates in diesel exhaust are so small that they can enter the bloodstream from the lungs, carrying adsorbed organic compounds deep into the body. Exposures to diesel particulate have been shown to contribute to increased incidence of respiratory illness, cardiovascular disease, cancer, work and school absences, hospital and emergency room visits, and premature death in both occupational and non-work settings. Diesel particulate ranks among the top air toxics in Oregon, with 96 percent of the population at an elevated risk above 1 in a million for cancer from ambient lifetime exposure. Extrapolated from health risk data from the EPA, DEQ estimates the direct and indirect costs of public health and environmental impacts in Oregon from diesel engines at around 500 million to two billion dollars per year.

Nitrogen oxides form during the high temperature combustion of fuel in diesel engines. Nitrogen oxides are a pre-cursor for ozone, which forms when those oxides are subjected to heat and sunlight in the presence of hydrocarbons. The EPA has found that ozone causes respiratory illnesses, including asthma, chronic bronchitis and emphysema, in more than 11percent of the

population. Tropospheric ozone has been identified as a potential adverse factor for climate change as well.

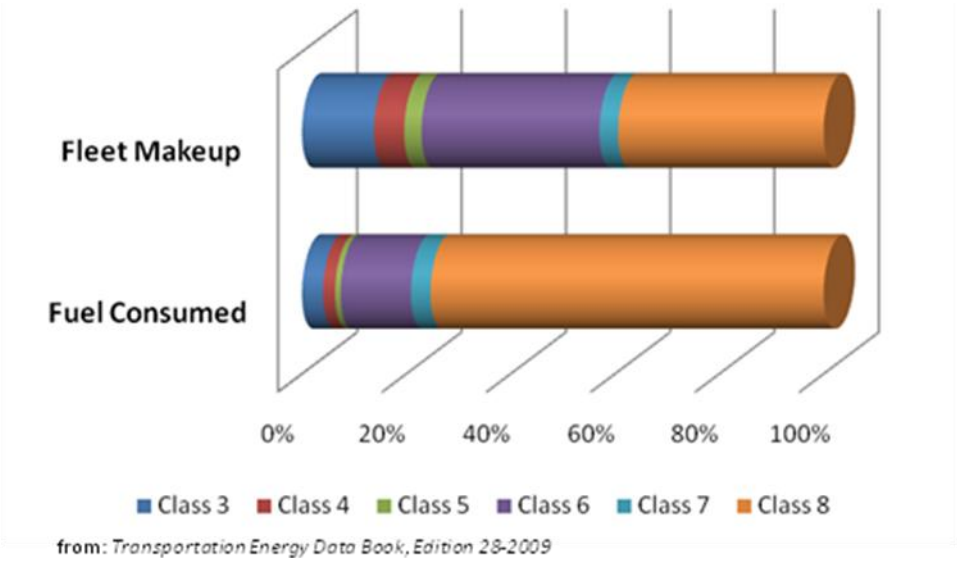
In addition to health effects experienced by the public generally, truck drivers are specifically at risk. Long-term exposure to diesel exhaust is known to increase the risk of lung cancer among truck drivers (Garshick et al, 2008). Further, studies of air pollution inside and outside of trucks idling at truck stops, indicate emissions of fine particulates often exceeds National Ambient Air Quality Standards (Miller 2007, Doraiswamy et al, 2005 & 2006). In addition to pollutant exposure, resting in a truck with the engine idling has been shown to be disruptive of sleep efficiency, a factor which contributes to fatigue during waking hours (Kabbani & Haring, 2004).

On road heavy duty vehicle emission standards for PM and NOx that have fully phased with the 2010 model year trucks will result in significant reductions in these pollutants in coming years. However, because of the lag in vehicle turnover, full benefits from these standards are not expected to be realized until sometime after 2030.

Truck Efficiency Findings

Trucks are fundamentally different from passenger cars because they are designed to carry a load. While medium- and heavy-duty trucks have that common characteristic, usage patterns, fuel consumption and other attributes vary considerably among the different sizes of trucks (Appendix D). These make a profound difference in how a particular vehicle consumes fuel and

Figure 7 Medium-, Heavy-Duty Trucks & Fuel Usage



creates emissions, as well as the available strategies that can be used to improve fuel efficiency. Businesses that use medium duty trucks, weight classes 2B through 6, do so primarily to facilitate other activities they see as their business. These companies do not ordinarily see themselves as trucking companies but rather as companies with trucks. Heavy duty trucks,

weight class 7 and 8, are most often found in businesses that understand themselves to be in the trucking business. These businesses rely primarily and heavily on the use of trucks to generate income. Medium duty trucks tend to operate in short trips, travel in stop and go traffic, at medium to low speeds with moderate annual miles travelled. Heavy duty trucks are used for longer trips, operating continuously at highway speeds with high annual miles travelled. These trucks have the lowest fuel economy but since they transport the greatest amount of freight over longer distances, the efficiency measured in ton-miles per gallon is much higher than for any other weight class of trucks. Even with this efficiency in freight movement compared to other weight classes, the volume of fuel consumed by this sector represents 75 percent of the fuel used by all medium- and heavy-duty trucks.

The most common measure of fuel economy is miles per gallon, although it obscures the value of measures taken to reduce the amount of fuel consumed per unit of work accomplished. Fuel consumption is inversely related to fuel economy, and more directly ties to the goal of decreasing the amount of fuel used to travel a given distance. Evaluation based on fuel consumption also shows that for the same increment of change, greater fuel savings are achieved for those vehicles starting from lower fuel economy baselines, like heavy-duty trucks. In the example outlined in Table 2, each step change improvement in fuel economy represents the same percentage difference, but the amount of fuel saved is half again as much as the previous increment.

Table 2 Fuel Economy vs. Fuel Consumption

Improvement in MPG	5 to 10	10 to 20	20 to 40	40 to 80
Percent change	100%	100%	100%	100%
Gallons saved per mile	0.1	0.05	0.025	0.0125
Gallons saved per 10,000 miles	1000	500	250	125

Improving fuel consumption from heavy-duty vehicles, which consume more fuel per mile, offers greater opportunities for fuel savings than comparable improvements in light duty vehicles with relatively higher baseline fuel economy. Heavy-duty trucks travel significantly more miles per year than any other vehicle, light or medium duty, but also represent - with their low starting point in fuel economy - an opportunity to achieve some of the greatest gains in fuel use reduction. Fuel economy among heavy-duty trucks has remained static over the last several years from the users' perspective, in part because of the engineering design changes made to comply with stringent emission standards. This has resulted in significant reductions in harmful respirable pollutants. In fact, with these gains it is now possible for truckers running the newest model year heavy duty truck to claim a lesser non-greenhouse-gas pollutant impact on a ton-mile basis than their competitor freight movement modes, water and rail, which have historically been less polluting form of freight transportation. These emission standards are expected to remain stable for some time, allowing engine and truck manufacturers to focus on delivering improvements in fuel consumption. This focus on reducing fuel consumption in this sector creates an opportunity for trucking to reduce costs and possibly secure a more competitive position for environmental sustainability.

Improving Truck Efficiency and Reducing Idling

Although commercial vehicles are powered by different types of fuel that contribute to greenhouse gas emissions, diesel engines power more than 90 percent of the nation's commercial trucks and 95 percent of the full-sized transit buses. Diesel engines are widely used due to their unique combination of energy efficiency, power, reliability, durability and safety. In fact, diesel is the most efficient of all internal combustion power systems. Because of the superior efficiency of the engine and higher energy content of the fuel, diesels typically deliver 20-40 percent more miles per gallon and 10-20 percent fewer greenhouse gas emissions than comparable gasoline vehicles (Diesel Technology Forum 2009).

In spite of these efficiencies, heavy-duty trucks have come under increased scrutiny due to the relatively high energy intensity of freight movement by trucks and the opportunities that are available to reduce fuel consumption within existing tractor and trailer profiles (National Academy of Sciences, 2010; Denning & Kustin, 2010; Cooper et al, 2009; Rocky Mountain Institute, 2009; Malone, 2008; Ogburn et al, 2008; Smith, 2007; Elliott et al, 2006; Langer, 2004; Ang-Olson & Schroeer, 2002; Muster, 2000; Gaines 1998). Improvements in fuel consumption for medium- and heavy-duty trucks could be secured through a variety of means including engine and powertrain design, logistical improvements including increasing capacity within weight or volume limits, minimizing empty backhauls, driver training and monitoring, and reduced congestion on the highway. Reducing aerodynamic drag and rolling tire resistance stand out as specific techniques that have the capability of being deployed on both new and existing vehicles to deliver significant fuel savings at relatively low cost. Successful implementation can result in near term fuel savings, reduced operating costs and reduced emissions contributing to the build-up of greenhouse gases and respirable pollutants associated with adverse public health impacts.

Tractor trailer combinations have relatively high fuel consumption, very high average vehicle miles travelled and a large share of the overall truck market. The most recent investigation on this issue by the National Academy of Sciences reaffirmed that improving the fuel efficiency of these classes of vehicles is of high and increasing importance. The report (NAS, 2010) concluded that, "A given percentage reduction in this vehicle category will save more fuel than a matching percentage improvement in any other vehicle category. The potential fuel savings in tractor-trailer trucks represents about half of the total possible fuel savings in all categories of medium- and heavy-duty vehicles."

Comparable Requirements of Other States or US EPA

There have been several efforts over the years to produce improvements in fuel consumption for medium- and heavy-duty trucks. These include partnership opportunities between the public and private sector intended to provide research, technology development support and, more recently, regulations at both the state and federal level establishing expectations for performance.

21st Century Truck Partnership

The 21st Century Truck Partnership is a cooperative research and development program formed by four federal agencies (Departments of Defense, Energy, Transportation and the Environmental Protection Agency) in a partnership with the truck industry and supporting industries in 2000. The goal was to advance technologies used in trucks and buses, yielding safer, cleaner and more efficient vehicles. In support of the general goal research was carried out in several areas of technology:

- Integrated vehicle systems for commercial and military trucks and buses;
- Engine combustion, exhaust aftertreatment, fuels and advanced materials to achieve higher efficiency and lower emissions;
- Heavy-duty hybrid propulsion systems;
- Reduction of parasitic losses to achieve significantly reduced energy consumption;
- Technologies to improve truck safety, resulting in the reduction of fatalities and injuries in truck-involved crashes; and
- Technologies that reduce energy consumption and exhaust emissions during idling.

A review of the program in 2008 by the National Academy of Sciences found that many program goals had not been met because technologies were not implemented, not feasible from an engineering perspective and/or not adequately funded. Funding has proven difficult to sustain at the levels to meet the ambitious goals set out for the Partnership. The report recommended a clearer goal setting strategy, reviewed periodically and stated in measureable engineering terms. The review did conclude that the program had succeeded in bringing stakeholders to the table, facilitating communication and accelerating the pace of development, and ultimately recommended that funding continue and at levels that reflect the importance of reducing fuel consumption from heavy-duty vehicles.

EPA SmartWay Transport

The Environmental Protection Agency established SmartWay Transport as a collaborative effort among industry and government with a goal to improve fuel efficiency and reduce greenhouse gases associated with the movement of freight. It accomplishes this goal by establishing minimum standards for certification of freight carriers and shippers within the program through a variety of best practices and then reinforcing the business case for taking on these measures. Freight carriers agree to assess their operations and to undertake a minimum number of steps to improve fuel consumption. Shippers assess their own operations and commit to undertaking steps to reduce their impact, including agreeing to ship products using SmartWay carriers. A key element of SmartWay has also been research and documentation of the technologies that reduce aerodynamic drag, rolling resistance and idling time that can be deployed on tractors and trailers used in long haul freight service. SmartWay is also used to certify manufacturers' products that are at least 15 percent more fuel efficient than baseline typical values. EPA has used the SmartWay equipment certification to also guide federal funding through grants and loans for fuel efficient technologies and idle reduction technologies, both on the truck and at truckstops. Federal funding has also been used to support innovative financing packages that create opportunity and lower barriers for interested parties to participate in improving efficiency and lowering emissions, most targeted towards the trucking freight movement sector. SmartWay Transport has succeeded in securing the participation of 1200 truck carriers and shippers.

Energy Independence and Security Act

The Energy Independence and Security Act was signed into law in December 2007. The Act contained a number of provisions intended to move the United States toward greater energy independence and security, to increase the production of clean renewable fuels, to protect

consumers, to increase the efficiency of products, buildings, and vehicles, to promote research on and deploy greenhouse gas capture and storage options, to improve the energy performance of the Federal Government, and for other purposes. Two provisions in the bill have specific importance for the issue of medium- and heavy-duty truck fuel use, directing the Department of Transportation to establish for the first time fuel economy standards for medium- and heavy-duty vehicles and, in support of that effort, a directive to the National Academy of Sciences to consider approaches to measuring fuel economy, assess current and future technologies for reducing fuel consumption, analyze how such technologies may be practically integrated into trucks and associated costs and other impacts on the operation of medium- and heavy-duty trucks.

The National Academies published their study in March 2010. The report outlined many different strategies to improve truck fuel efficiency among a variety of medium- and heavy-duty weight classes. The study evaluated a number of strategies, some of which are most reasonably implemented on a new vehicle basis including engine efficiency, weight reduction, transmission and driveline, accessory electrification, waste heat recapture, hybridization and dieselization. The report also considered other strategies, improving aerodynamics and lower rolling resistance, which can be deployed on both newer and existing vehicles. A fuller discussion of the findings relevant to this study is included below.

The report also provided a beginning framework to establish fuel economy standards for medium- and heavy-duty vehicles. In June 2010 President Barack Obama directed EPA and the National Highway Traffic Safety Administration to collaborate on developing a fuel consumption standard for medium- and heavy-duty trucks. The projected timeline is for announcement of a draft proposal by fall 2010 with anticipated adoption by July 2012. This would apply to new vehicles only beginning with the 2014 model year.

California Heavy Duty Greenhouse Gas Measure

In 2006 California approved and signed into law AB32, the California Global Warming Solutions Act, which mandates that greenhouse gas emissions are reduced to 1990 levels by 2020. The California Air Resources Board developed a list of early action measures that would collectively reduce greenhouse gas emissions by 42 million metric tons carbon dioxide equivalent, including requiring adoption of EPA SmartWay technologies on select long haul heavy duty trucks pulling 53 foot box van trailers. This program, adopted in December 2008, began with the 2011 model year tractors and trailers, requiring features that reduce aerodynamic drag and rolling resistance. Older model year vehicles will be subject to comparable requirements phasing in as early as 2012.

The rule applies to 53 foot tractors, and the box van trailers they pull, when the vehicles travel more than 100 miles from a dispatch point or more than 50,000 miles in a year. Because these requirements apply to any qualifying vehicle that operates on California highways, regardless of the base plate registration of the vehicle, many Oregon based fleets will be affected.

Technologies to Reduce Aerodynamic Drag and Rolling Resistance

Medium- and heavy-duty trucks, powered overwhelmingly by diesel engines, have undergone a remarkable transition in recent years from being among the most polluting vehicles on the road

to arguably the cleanest. This transformation has come about because of the need to meet stringent emissions standards established at the federal level. Despite fuel costs surpassing driver compensation and representing 1/3 of total marginal costs of long haul trucking operations as measured on a per mile basis (ATRI, 2008), attention to improving fuel economy has been held back by a variety of factors (see sidebar). Since the 1973 petroleum crisis, most tractors have some form of aerodynamic treatment, typically roof fairings. Market penetration of other available technologies has been low (NAS, 2010; Smith & Roberts, 2007).

Heavy truck fuel efficiency is influenced by a number of factors, including weather factors, driver technique, logistics and roadway utilization and technological improvements to the vehicle (see Appendix E for information on fuel consumption improvement technologies). The focus of most of the research and analysis on truck fuel efficiency has been on this latter category. Within this category are various enabling technologies including improvements to the engine and transmission, hybrid configurations and reductions in aerodynamic drag and rolling resistance. Advances in engines and transmissions are helpful in all applications and will continue to be implemented at the manufacturer level with each new model year. Hybridization is best indicated for medium-duty vehicles with stop-and-go duty cycles. Especially for over the road trucks, improvements in aerodynamic and rolling resistance, offer the greatest opportunity in the near term for fuel consumption improvements. These can also be installed on existing vehicles so that fuel consumption and emission reduction benefits can be secured sooner and at lower overall expense without depending upon fleet turnover to the latest new model year.

Energy losses in engine and driveline are significant in converting energy from liquid fuel to mechanical energy, as well as in powering auxiliary engine accessories essential to engine operation. Aerodynamic drag and rolling resistance constitute the next largest source of energy losses and potentially the greatest opportunity for fuel consumption gains. Every unit of energy saved at the wheels saves 3 units of energy that

<u>Industry barriers to reducing fuel consumption</u> (As identified in National Academy of Sciences, 2010; Denning & Kustin, 2010; Cooper et al, 2009; Rocky Mountain Institute, 2009; Malone, 2008; Ogburn et al, 2008; Smith, 2007; Elliott et al, 2006; Langer, 2004; Ang-Olson & Schroeer, 2002)

Demand for fuel economy not sufficient to bring all cost effective technologies to market

Trucking Industry neither concentrated nor cohesive

Manufacturer risk, relatively small number of vehicles

Large variety of customer requirements prevents manufacturing economies of scale

Fuel price increases stress profit margins while volatile prices inhibit R&D and discourage investments

Tractor and trailer are often not owned by the same party so motivation to save fuel is diffuse

Lifetime payback may be insufficient for demands of truck owners

Concerns about cost, Return on Investment, durability and maintenance requirements

Slim margins, recent decline in freight volume, rising fuel prices, driver shortages (training costs) prevent investment

Lack of trustworthy information and limited access to capital funds and financing inhibits investment

Sparse and fragmented R&D operations move slowly

need not be used to deliver traction power. Lower tractive loads also can lead to reducing horsepower in the engines with further potential for cost and weight savings with the use of

Figure 8 Energy losses in truck freight movement

smaller engines (Ogburn, Ramroth & Lovins, 2008) (Cummins 2007). On a level road at a constant speed of 50 miles per hour or greater, aerodynamic drag constitutes the biggest power loss, requiring 35 to 40 percent more available horsepower (and fuel) in the engine (Ang-Olson & Schroeer, 2002; Cummins, 2007).

Aerodynamic features typically found on the tractor include the sleeper cab roof fairing. Additional elements include chassis and fuel tank skirts, sloping hood and a rounded bumper and other features. In Figure 9, contrast the classic style with its more angular profile and other high drag inducing features like mirrors, headlights, air cleaners and dual exhaust stacks. These traditional features are thought to result in a fuel consumption penalty of at least 5 percent compared to the aero design. Nonetheless, the classic styling is favored by some drivers for its rugged appearance and fleets use these trucks for driver retention or rewards (NAS, 2010). Aerodynamic features for trailers include trailer skirts, trailer tails and gap fairings. Trailer skirts fill the undercarriage of the trailer in front of the rear wheel set. They can be made of single panels or constructed of multiple panels so they can be readily replaced if damaged. Rear trailer

Figure 9 "Classic" vs. Aero Styling

fairings are fitted to the rear to provide a continuous surface for air passing over the sides and top of the trailer. These fairings improve aerodynamic performance of the trailer by reducing "suction" on the end. Both of these fairings can be used on dry van and refrigerated box type trailers. Front trailer fairings reduce the wind resistance caused by the gap between the tractor and trailer and allow for smooth air flow between the units; they are designed for use on dry van

but not refrigerated trailers. These aerodynamic technologies get the most benefit at highway speeds, so the skirts and fairings are most effective in applications that are largely at those speeds.

Figure 10 Aerodynamic Trailer Designs

Trailer skirts, in particular, are prone to damage in normal vehicle operation, but manufacturers have responded with designs that are road damage tolerant. California Air Resources Board (CARB) staff estimate average annual costs for maintenance for trailer fairings to be $120. One manufacturer makes its device of pliable material that deforms but does not break in contact with hazards like railroad crossing, street curbs and other features. Another has developed a system that raises and lowers in relation to road speed, raising the skirt at lower speeds and lowering it at highway speeds. These features may also provide safety benefits, for instance in improving trailer tracking stability and reducing road spray from trailer tires. Trailer skirts can add about 200 pounds of weight to the vehicle, which makes a difference in payload capacity but only for the 21 percent of loads that are weight limited. However, even while accounting for added weight from the fairing, reduced fuel consumption still results in a net cost per ton mile savings of 1.4 percent over the trailer without the fairings.

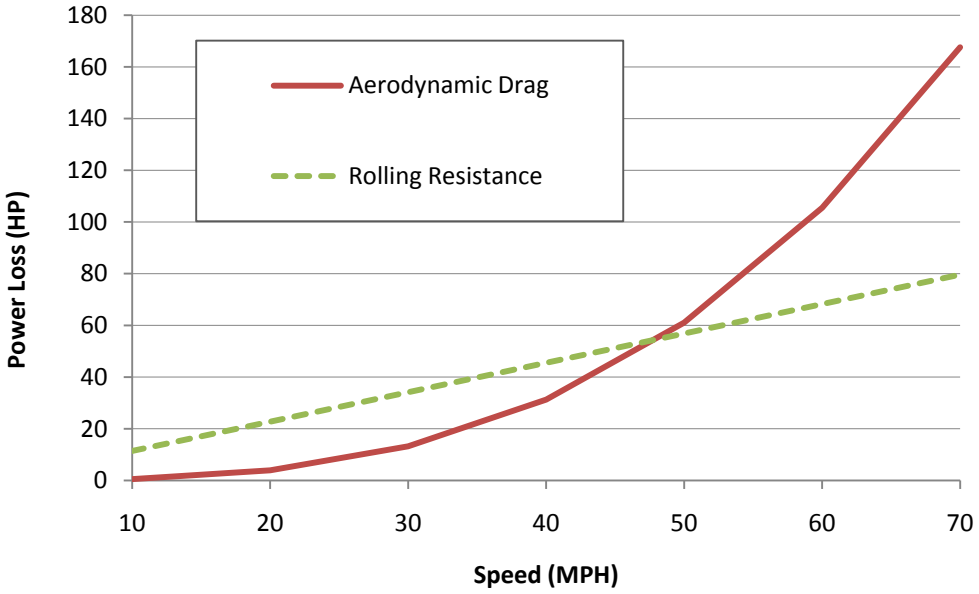
Box van trailers constitute about 60 percent of the vehicle miles travelled for long distance trucks. While trailers also come in 28, 45 and 48 foot lengths, it is the 53 foot trailer that dominates in long distance service. Little work has been done on investigating aerodynamic drag and the influence of fairings on vehicles shorter than 53 feet, but what has been done is suggestive of the opportunities for reducing fuel consumption in them as well. One study cited in the National Academy of Sciences review reported that there is a significant aerodynamic drag penalty for double trailers, but that it is offset in terms of operating costs by the increase in freight carrying capacity and reduced fuel consumption on the order of 20 percent. The NAS review also cited a scale model wind tunnel test on a combination multi-trailer configuration that included a variety of aerodynamic drag reduction devices on the trailers that resulted in a further decrease in fuel consumption of 9.9 percent compared to the standard 28 foot double. The NAS review also considered aerodynamic improvements for other types of trailers, like flat bed and tanker, but discounted fairing for use in those applications because of the lack of research as well as the difficulties in configuring aerodynamic features to these idiosyncratic trailers.

Rolling resistance is made up of the mechanical and aerodynamic forces that reduce the efficiency of a tire moving down the road. The transformation of mechanical energy as a tire flexes and deforms in operation is the most significant factor in rolling resistance. This increases

Figure 11 Operating power losses for tractor trailer combinations

the amount of energy needed to move the truck. The less flexing and deforming a tire makes, the more energy efficient it becomes, lowering power demands from the engine. Rolling resistance is primarily proportional to weight and speed, retaining a more significant influence than aerodynamic features at lower speeds. Factors affecting rolling resistance include how the tire is made, including tire compounds and other materials, appropriate tire inflation, tread pattern and depth, tire size and road surface.

Rolling resistance in the tires accounts for about one third of the power required to move a truck



down the road at highway speeds. Since 1980 rolling resistance has been reduced by more than 50 percent, primarily in the change from bias ply to radial tires. Many factors account for friction resistance, but tire manufacturers have control over several important factors like tire mass, rubber formulations and tread design. These are the factors that are the focus of the SmartWay performance requirements.

Lower rolling resistance tires can be configured as a conventional tires, effectively replacing current tires on a typical “eighteen” wheeler. Another option for trailer and drive axle options are single wide tires, effectively cutting the number of tires required in half. These tires also require replacing the wheel rims, which increases the initial cost but saves weight, thus allowing for greater freight carrying capacity. Low rolling resistance tires can be retreaded much like conventional tires but since the casings are subject to less heat and fatigue, there is a greater likelihood that these tires will be candidates for multiple retreadings. Including this retread benefit, CARB staff estimated annual fuel cost savings on the order of $500 to $1,000 with the greater savings accruing to those replacing bias ply tires. Steer tires on a long haul application may last up to 150,000 miles, drive tires at 350,000 and trailer tires every 125,000 miles. Rolling resistance decreases as any tire ages, but tires designed to have low rolling resistance retain an advantage over their life span. The low rolling resistance dual tires perform like conventional tires and recent studies have shown performance similar to that of dual tires by the single wide tires. Studies regarding rapid air loss events in single wide tires have not been shown to compromise stability, behavior or rollover performance of vehicles (NAS, 2010).

Cost Effectiveness of Fuel Consumption Measures

Several studies have been published evaluating cost effectiveness of the variety of fuel consumption efficiency measures available as current and emerging technology. Among the most prominent are those recently published, one jointly by the Northeast States Center for a Clean Air Future and the International Council on Clean Transportation (NESCCAF/ICCT, 2009) and the other by the National Academy of Sciences (NAS, 2010).

The NESCCAF/ICCT study modeled a variety of currently available and emerging fuel efficiency strategies, including operational measures, which are broader in scope than this particular report. This report focused on current and emerging technologies to reduce fuel consumption and lower CO_2 emissions available for long-haul trucks in the 2012 to 2017 timeframe. Of specific interest are the results shown for the option labeled SmartWay 1, which compares a SmartWay configured combination vehicle (including aerodynamic streamlining, single wide tires, idle reduction and improved lubricant) to the baseline truck/trailer. This is the configuration that most closely matches the requirements of the California heavy-duty greenhouse gas measure. Of the packages and measures modeled, this is the configuration that delivers the greatest fuel consumption savings considering incremental costs, lifetime ownership costs and time to payback. This reinforces much of the earlier conclusions indicating the potential for reducing fuel consumption among heavy duty long haul tractors and underscores this among all the other alternatives (many of which can only be implemented as new original equipment manufacture) as an effective strategy for reducing fuel consumption and lowering emissions. However, the report notes that the 15 year timeframe used in the study for evaluating the complete suite of available and emerging technologies, useful for evaluating the societal benefits, does not reflect the much shorter time horizon used by truck operators when making purchase decisions. The payback period for the SmartWay technologies only is, in both cases modeled, less than 4 years.

Figure 12 NESCCAF Fuel Consumption Reduction and Cost Results for Analyzed Packages

PACKAGE NAME	FUEL CONSUMPTION/ CO_2 REDUCTION (%)	INCREMENTAL VEHICLE COST ($)[a]	LIFETIME COST OF OWNERSHIP (15 YEARS, 7%)[a]	TIME TO PAYBACK [a](YEARS)
Baseline	n/a	n/a	n/a	n/a
Building Block Technologies				
SmartWay 2007 (SW1)	17.8% [2]	$22,930	-$23,600	3.1
Advanced SmartWay (SW2)	27.9%[2]	$44,730	-$55,800	3.8
Parallel hybrid-electric powertrain (HEV)	10%[3]	$23,000[4]	$100	7
Mechanical turbocompound	3.0%	$2,650	-$5,500	2.0
Electric Turbocompound	4.5%	$6,650	-$5,500	3.5
Variable Valve Actuation (VVA)	1.0%	$300	-$2,500	0.6
Bottoming cycle	8.0%	$15,100	-$4,800	5.2
Advanced EGR	1.2%	$750	-$2,600	1.4
Operational Measures				
Rocky Mountain Double (RMD) trailers	16.1% (grossed out) 21.2% (cubed out)	$17,500	-$34,100[5]	2.1
60 mph speed limit	5.0%	$0	-$13,900	n/a
Maximum Reduction Combination Packages				
Maximum reduction combination 1 (standard 53' trailer, hybrid, BC, SW2, 60 mph)	38.6% (grossed out) [6] 40.2% (cubed out)[6]	$71,630	-$27,300[5]	4.8
Maximum reduction combination 2 (RMD, hybrid, electric turbocom-pound, VVA, SW2, 60 mph)	48.7% (grossed out)[6] 46.2% (cubed out)[6]	$80,380	-$41,600[5]	4.3
Maximum reduction combination 3 (RMD, BC, hybrid, SW2, 60 mph)	50.6% (grossed out)[6] 48.3% (cubed out)[6]	$89,130	-$37,200[5]	4.7

[2] Includes idle reduction benefits from a diesel-fired APU
[3] Includes idle reduction benefits from battery storage; the modeled on-road fuel consumption improvement was 5.6%
[4] Includes credit for an auxiliary power unit (APU), which is included in the SmartWay package, but is not needed in a hybrid vehicle.
[5] The lifetime cost of ownership figures are calculated using fuel savings averaged between grossed out and cubed out trucks.
[6] Includes idle reduction benefits from battery storage.
[a] Calculations based on year 2022 high volume technology costs, EIA 2022 fuel price ($2.50/gal), a 7% discounted cash flow; time to payback assumes a constant 120,000 miles per year; the cost of ownership calculation assumes annual mileage declines over the life of the vehicle with a total mileage of 1.2 million miles in 15 years.

The National Academy of Sciences completed a comprehensive review of a wide variety of fuel consumption strategies currently in place and anticipated for the 2015-2020 timeframe in support of the development of a fuel consumption standard for new medium- and heavy-duty vehicles. Class 3 to 8 medium- and heavy-duty vehicles vary considerably in how they are used in duty cycles that range from significant highway speed travel with few stops to urban operations at lower speeds and many stops. To estimate fuel consumption benefits of various technologies, the study authors considered a tractor trailer, a Class 6 straight box truck, a Class 6 bucket truck, a refuse truck, a transit bus, a motor coach and a pickup/van and applied a combination of relevant technologies to that application. The benefits were not considered to equal the sum total of their individual effects, rather they factor in benefits of previously evaluated fuel savings

technologies. The results of that cost benefit analysis, factoring a 7 percent discount rate and a 10 year life, are presented in Table 3.

Table 3 National Academy of Sciences - Fuel Consumption Reduction Potential & Cost Effectiveness Calculations for Typical New Vehicles in 2015-2020

Vehicle Class	Fuel Consumption Reduction - %	Capital Cost - $	Cost Effectiveness Metric		
			$/% Fuel Saved	Dollars per Gallon Saved per Year	Breakeven Fuel Price $/gal
Tractor-trailer	51	84,600	1,670	7.70	1.10
Class 6 box truck	47	43,120	920	29.30	4.30
Class 6 bucket truck	50	49,870	1,010	37.80	5.40
Class 2b pickup	45	14,710	330	33.70	4.80
Refuse truck	38	50,800	1,320	18.90	2.70
Transit bus	48	250,400	5,230	48.00	6.80
Motor coach	32	36,350	1,140	11.60	1.70

The review committee recommended several ways to measure costs versus benefits. Dollars per percent fuel saved is the cost of the technology package divided by the percent reduction in fuel consumption. Dollars per gallon saved per year indicates how much it costs to save a gallon of fuel each year of the life of the vehicle, and reflects the fact that some vehicles are annually driven more miles than others. The third measure, breakeven price, is the fuel price that makes the present discounted value of the fuel savings equal to the total costs of the technology package. Even though the breakeven fuel price does not necessarily reflect how a buyer would evaluate technologies (considering different discount rates, operation and maintenance costs, etc.) the committee recommended it as a measure to evaluate private and societal costs and benefits of regulation. The report also notes that the fuel consumption reduction potential of specific powertrain and vehicle technologies is extremely dependent upon the application and that the technologies vary widely in cost benefit evaluation. Nonetheless, the tractor-trailer combination shows the greatest cost-benefit ratio as a package. When the package is broken down to component elements, improvements to reduce aerodynamic drag and rolling resistance offered very high cost benefit ratios among the modeled technologies. Based on their evaluation the National Academy of Sciences (2010) concluded that “A given percentage reduction in this vehicle category will save more fuel than a matching percentage improvement in any other vehicle category. The potential fuel savings in tractor-trailer trucks represents about half of the total possible fuel savings in all categories of medium-and heavy-duty vehicles.”

HB 2186 Return on Investment Calculations

Unlike most environmental regulations, which provide a societal benefit but have a cost to the regulated party, a truck efficiency program can have both a societal benefit and a net savings to the regulated party, measured as a return on investment. HB 2186 directs DEQ to evaluate the feasibility of providing economic hardship exemptions and deferrals if owners and operators are unable to attain a ROI. The bill defines ROI as:

(A) A net monthly savings gained through fuel efficiency that is equal to or greater than the net monthly payment obligation under a financing instrument, or

(B) The owner's or operator's initial capital costs, if self-funded, to comply with any potential requirements under this section are recouped in fuel savings within three years of the owner's or operator's expenditures of the initial capital costs.

To demonstrate a return on investment according to the direction outlined in HB 2186, the Department used a ROI calculation based on proposed program elements, relying upon pricing estimates, fuel economy and trailer to tractor ratios offered by workgroup members and other reliable sources. While a tractor may operate over a lifetime of 15 years, studies suggest that turnover from one owner to another is on the order of four years (NAS, 2010). Therefore, the Department considered a payback interval ranging from three years suggested in HB 2186 to four years identified in the NAS study. Trailers may be held by one owner for a longer lifetime of up to 20 years.

Two measures were calculated, a simple payback and a return on investment calculation including the cost of financing that could be repaid from fuel savings from aerodynamic devices and low rolling resistance tires. Calculations were completed for various fuel prices and annual miles travelled for both new and older equipment (Table 4). In addition, since trailers tend to outnumber tractors in a given fleet, scenarios for a single tractor and trailer and a single tractor with three trailers were calculated. Complete calculation results for net return and simple payback are provided in Appendix F. Fleet practices will have a significant direct impact on securing fuel economy improvements from any technology so the estimated fuel consumption improvements are conservatively estimated here for purposes of modeling.

Table 4 Assumptions for Net Return Calculations

Annual Mileage	45,000 to 115,000	
Fuel Price	$2.50 to $3.50 per gallon	
Discount Rate	10%	
		Fuel Economy Benefit
Incremental cost for SmartWay tractor	$2,100	3.5%
Incremental cost for LRR tires on tractor	$265	1.5%
Incremental cost for trailer skirt	$2,000	5%
Incremental cost for LRR tires on trailer	$265	1.5%

For every annual mileage scenario, a single tractor trailer combination upgraded with fairings and low rolling resistance tires offers a net positive return, even when figuring loan costs associated with a 36 month note. Simple payback, which does not include the cost of money, was less than 2.5 years under the most challenging fuel costs and usage conditions modeled, i.e., low annual miles and low fuel costs. This was true whether it was a new model year SmartWay vehicle or an older vehicle upgraded to comply with California's greenhouse gas requirements.

Trailers, more often than not, outnumber the number of tractors available. They may be left at distribution centers for loading and unloading while the long haul tractor remains in service pulling other trailers. Of course, it is only the trailer that is being pulled that is capable of delivering the fuel consumption benefits but, to be assured of the benefit within the fleet, all trailers require a capital investment for the upgrade. Other reports used 2 to 2.5 trailers per tractor, but based on workgroup advice the calculations were completed factoring 3 trailers per tractor. Under this condition, the annual net return on a four year note becomes positive for tractors travelling more than about 50,000 miles per year when fuel is at $3.00 per gallon[1]. A survey of vehicle ownership by the American Transportation Research Institute reported that average length of vehicle ownership for sleeper cab tractors was 6.9 years and for day cabs 9.5 years (Tunnell and Dick, 2006). The DEQ is currently conducting a survey to determine ownership duration for trailers but the suggestion from informal conversation with fleet owners is that ownership periods for trailers are much longer.

[1] As of August 24, 2010 diesel fuel was selling for $2.87 a gallon at the TA truckstop in Aurora.

Figure 13 Annual Net Return - 48 Month Note - Tractor with 3 Trailers

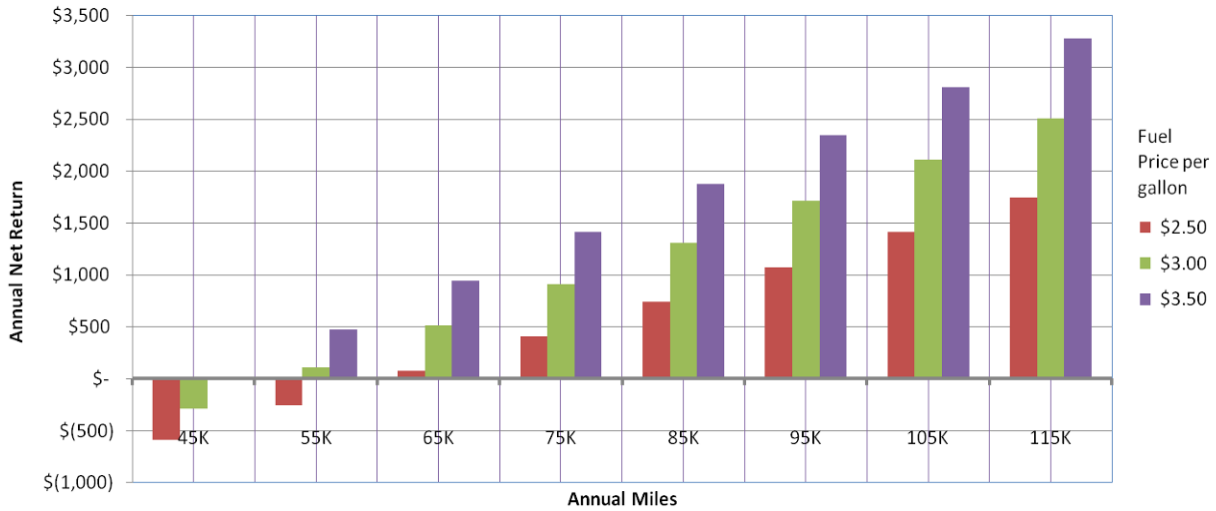
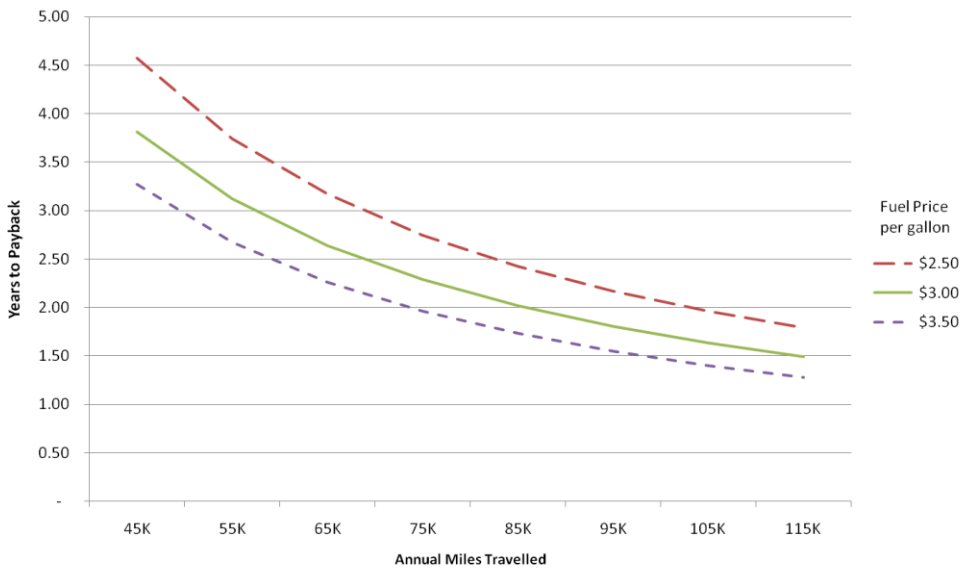


Figure 14 Simple Payback - Tractor with 3 Trailers



The 50,000 mile threshold is significant because it is established in the California program as the distinguishing threshold between long haul and short haul tractors, which are exempt from the requirements of the greenhouse gas measure. The aerodynamic features considered under that measure are not as effective and may have limited capability in a short haul application because of the increased encounters with curbs, tight side street clearances, backing maneuvers and severe road crossing humps. Approximately 62 percent of the short range fleet miles occur on trucks that travel fewer than 50,000 miles per year and a detailed analysis of benefit concluded that this mileage exemption would maximize the environmental benefit and minimize financial hardship for fleet operators (Schubert, Cromer 2008). The data from the analysis conducted for this report also shows that cost recovery is very good on these measures for vehicles travelling

above 50,000 miles annually. Therefore, DEQ recommends using the 50,000 mile threshold for long-haul tractors as a mechanism to prevent economic hardship that could otherwise occur if the program did not provide for a positive ROI.

Financing Programs

While fairings and low rolling resistance tires show a positive ROI for tractors that travel over 50,000 miles per year, limited cash flow, especially for the trucking industry where margins can be fairly tight, can pose a difficulty for fleets wishing to comply with a heavy-duty greenhouse gas requirement. Economic conditions since 2008 have reduced the size of the credit market, but even during more robust market conditions credit availability to truckers have been problematic. Trucking companies have been seen as high risk with limited collateral and marginal ability to repay. For the purposes of this green house gas measure, the amount of funding needed per truck, which may be significant from the trucker's point of view, is too small to efficiently manage from the banker's perspective. However, financing opportunities, some targeted specifically for truckers are available.

Under the Diesel Emission Reduction Act, a portion of appropriated funds is allocated to support innovative financing programs to reduce diesel emissions, which includes fuel consumption improvement activities. Innovative financing includes revolving loan funds, costs to cover bond sales and loan reserve programs. In recent years, EPA has awarded $12 million annually under this program. State and local governments and nonprofit organizations with a focus on air quality and/or transportation are eligible to apply for this funding. The awards are made as grants to the organizations, which are used as a loan or loan support but are not themselves repaid to EPA. For truck owners there are a range of financing options that have been supported including low-interest loans, extended payback periods and lease-to-own. These funds cannot be spent on actions that are mandated by federal, state or local requirements, although this has been interpreted to allow support for otherwise qualified activities that are implemented in advance of the compliance deadline.

Funding has been awarded to four organizations that provide low interest loans including the Houston/Galveston Area Council, Community Development Lending Services, Owner-Operator Independent Drivers Association and Cascade Sierra Solutions. Cascade Sierra Solutions is a nonprofit based in Oregon that has achieved remarkable success and a national reputation in furthering its mission to support truckers in reducing respirable pollutants, greenhouse gases and, often, operating costs by providing information, access to funding as well as opportunities to purchase and lease less polluting, more efficient equipment. CSS operates showrooms along the I-5 corridor conveniently located near truckstops and other locations accessible to truckers in Seattle, Portland, Coburg, Sacramento and Los Angeles. Since its founding in 2006, CSS has received $44 million in federal grants and $35 million in state grants, the latter mostly from California. CSS has also been able to secure lines of credit from private sources as well on the order of $46 million. To date CSS has a loan portfolio of $40 million but growth and demand for services is likely to lead to an increase to $90 million by the end of 2010.

EPA operates the SmartWay Finance Center online that provides access to commercial loans for purchasing fuel savings and emission reduction technologies. The service connects a multitude of lenders to trucking companies interested in financing technologies that are identified as

effective under SmartWay. An interested buyer submits an application, then receives and reviews offers from private lenders.

The state of Oregon through the Department of Energy has offered a tax credit and a loan program that have been potentially available to support truck fuel efficiency enhancements. Recent changes to the Business Energy Tax Credit have made it very difficult for truckers to meet qualifying criteria even though these technologies are demonstrably within the overall program scope, and program participation from the trucking industry has dropped to zero in the past year. The State Energy Loan Program offers at or below market financing for qualifying energy efficiency projects, but the program is primarily focused on large scale projects, greater than the scope of individual truck improvement efforts.

Several other states offer their own financial incentive programs that are available for truckers interested in buying energy efficient, emission reduction technologies. While these programs often have a geographic preference for fleets based in their states to the extent that these trucks may also operate in Oregon, these benefits would be available to support compliance efforts driven by an Oregon program. A complete listing of these incentives can be found at EPA and the U.S. Department of Energy websites at http://www.epa.gov/smartwaytransport/transport/what-smartway/financing-fundingoptions.htm and www.afdc.energy.gov/afdc/laws.

The state of California offers a loan program for truck efficiency improvement projects. Original funding comes from a statewide vehicle registration surcharge. The funding is used to support a program to offset risk exposure by private lenders offering financing to truckers. Under this program, a trucker attempts to secure financing from a private lender. When the lender determines that the project is otherwise eligible but the borrower represents a credit risk greater than its lending tolerance, the loan is presented to the California Treasurer who, after review, accepts the risk for repayment. The Treasurer draws 14 percent of the principal from the registration surcharge fund to build a loss reserve account for loans issued by the lender under this program. In the event of a default, the lender takes all reasonable steps to recover costs and draws on the loan reserve for any unrecoverable balance. The default rate is on the order of 1-2 percent. Overall, this has proven to be very successful with $16 million underwritten in over 250 loans.

Discussions with private lenders indicated that there is interest and capital available to lend for these kinds of projects provided that their costs are managed by keeping the overall number of projects funded small and managing risk. CSS currently acts as an agent to bundle projects and has a demonstrated ability to manage the risk with low default rates. A loss reserve program or revolving loan program managed by nonprofits or other qualifying organizations could be a very successful way to extend limited public funds to support efforts to improve fuel efficiency with demonstrable and significant public benefits. The optimal funding strategy for the state needs to be further developed, but could include elements like a targeted tax credit, a loan reserve fund or a revolving loan fund that could be accessed directly or through intermediary organizations like CSS.

Improving Truck Efficiency and Reducing Idling

The Recommended Oregon Heavy-Duty Truck Greenhouse Gas Measure

DEQ recommends that the Oregon legislature adopt a heavy-duty truck efficiency measure to reduce greenhouse emissions. An Oregon program to improve fuel efficiency among heavy duty vehicles can work by supporting the penetration of available technologies. Despite the fact that these technologies can save money for truckers, a variety of market barriers have prevented them from being widely adopted. A combination of performance standards and incentives can help achieve the important economic, environmental, energy security and employment needs of the state.

DEQ recommends that the Oregon program be based on the leading effort in California. California has adopted a program to reduce greenhouse gas emissions from long haul trucks by requiring deployment of the most proven technologies. The requirement affects trucks coming into California and not just those based in-state. Trucks based in Oregon and travelling in California are also required to comply. Carriers coming into or travelling through Oregon but not California are not. This results in disparate conditions that cause an unequal playing field and confusion. Adopting a measure comparable to California's would serve to level the playing field. Therefore, DEQ recommends that the Oregon program be identical to California's except for two elements: implementation schedule and financial hardship deferral. This program would serve to accelerate market penetration of the best available technologies for new and existing vehicles. Such a program could also result in increasing employment in Oregon alone by as much as 800 jobs (Goldberg, 2010).

The elements of a recommended proposal are outlined in the Recommendations section.

Reduced Idling Findings

Idle Hours and Fuel Consumption

According to Argonne National Laboratory (2009), the average sleeper cab tractor idles 6 hours per day, 300 days a year, burning nearly 1 gallon of diesel fuel an hour or about 1,800 gallons annually. For many long haul truck drivers, their trucks are their second homes. They are on the road for weeks at a time, essentially living out of the truck's sleeper cab when they are not driving (Allen 2007). Over half a million sleepers travel long distances and are required to rest for 10 hours following a consecutive 11 hours of driving to meet the safety–related requirements of the federal Hours-of-Service regulations (*49 CFR Part 395)* (FMCSA 2009).

Truck and bus drivers idle for a number of reasons. The primary reasons truck drivers idle is to heat and cool the cab and sleeper compartment, protect the engine in cold weather, and operate on-board electrical appliances (i.e. computer, television, radio, phone, global positioning system, microwave, mini-refrigerators, and coffee makers). Drivers also idle to maintain cargo conditions, meet manufacturer's operating recommendations, charge batteries, regenerate particle filters, mask noise, and to provide safety. In addition, they spend a good deal of time waiting to load and/or unload cargo and cross borders. Bus drivers idle for some of these same reasons, as well as to maintain a comfortable cabin temperature while boarding passengers. Drivers also idle out of habit; for many years, drivers have been taught to leave their diesel engines on. While there may be some need to do this with much older engines, it is not necessary for newer engines. Long duration idling typically occurs at truck stops, rest areas, travel centers, distribution hubs, bus terminals, airports, event centers, schools, hotels and motels, borders, ports, and roadsides. (ANL 2009, NMENV 2009, Allen 2007, NYSERDA 2004).

United States

The exact amount of fuel consumed by idling is not known, but in 2006 the Argonne National Laboratory estimated the amount of fuel consumed by workday and overnight long duration commercial truck idling based on the 2002 Vehicle Inventory and Use Survey and conservative assumptions of miles travelled by trucks annually[2]. The VIUS reports 669,060 sleeper trucks in use, and nearly 60% travel over 80,000 miles a year. Trucks that travel the longest distances in a year drive the farthest each day and are most likely to be idling overnight. However, truck drivers with short routes that include several stops each day, can also run out of hours far enough from home to have to rest in the truck. Their results show that sleepers use almost 670 million gallons of fuel worth nearly $1.8 billion ($2.70/gallon) to idle over 830 million hours overnight each year (Table 5).

[2] The ANL estimated overnight idling hours and fuel use based on the following conservative assumptions of miles traveled by trucks annually: trucks travelling over 80,000 miles/year idle 6 hours/day, 300 days/year (1,800 hours/year); those going 60,000-80,000 miles/year idle 70 % of that time (1,260 hours/year), 40,000-60,000 miles/year idle 40% (720 hours/year); and under 40,000 miles, 10% of that time. They also assumed that trucks without sleepers did not idle overnight, and idling fuel use was 0.8 gallons/hour.

The ANL also estimated energy use by commercial trucks for long duration workday idling. Although the length of time these vehicles idle is considerably shorter than the 6-10 hours that sleepers idle, the sheer number of vehicles potentially involved, indicates workday idling may use more fuel than overnight idling. Because no detailed analysis exists on workday idling, the ANL made conservative assumptions[3] about idling hours for different classes of trucks to develop their estimate. Even these relatively conservative estimates yield over 2.3 billion hours and 1.8 billion gallons of fuel use annually for workday idling by medium- to heavy-duty commercial trucks.

Oregon

Official data on total idling hours for commercial vehicles in Oregon are not readily available. However, an estimate of overnight[4] idling hours and resultant fuel consumption for commercial trucks can be derived from data on parking demand in Oregon taken from a Study of Adequacy of Commercial Truck Parking Facilities - Technical Report prepared for the Federal Highway Administration in 2002. This study estimated peak hour demand in 2000 for commercial truck parking spaces along interstates and other National Highway System routes carrying more than 1,000 trucks per day. Oregon demand was estimated at 4,958 parking spaces (1,139 at public rest areas and 3,819 at truck stops and travel plazas) and this demand is projected to increase by 1.8 percent annually over the next 20 years based on estimates of the increase in truck volume over this period. Based on the ANL's assumptions that a sleeper cab idles an average of 6 hours a day, 300 days a year, 4,958 trucks/day would idle nearly nine million hours/year, consuming over seven million gallons of fuel (rate of .8 gal./hr.) at a cost of over $19 million. These idle hour and fuel consumption figures represent approximately 1 percent of the national estimates for overnight idling (National - 830 million hours and 670 million gallons).

Diesel fuel use in Oregon is 1.5 % of national use (Energy Information Administration). As such, fuel consumed by overnight idling in Oregon could be as high as 10 million gallons, 1.5 percent of the national overnight figure of 670 million gallons. Workday idling could add nearly 28 million additional gallons of fuel consumed.

[3] This estimate reflects uncertainty. The assumption is that the vehicles travelling the longest distances spent most of their time on the road and had the fewest idle hours, and those that traveled under 40,000 miles per year had fewer miles because they were stopped and idling while the vehicle was loaded and/or unloaded. The maximum idling hours were assigned to the under-40,000-mile trucks, 75% of maximum to those driven 40,000-60,000 miles, 50% to those driven 60,000-80,000 miles, and 25% to those driven more than 80,000 miles. In each case, they assumed that the vehicle operated for 300 days per year and estimated a typical number of hours idled per day for the body type. Vans and dump trucks were assigned 2 hours/day; utility vehicles, 3 hours/day; platform trucks, tankers, and garbage trucks, 1 hour /day; and all other trucks, 0.5 hour/day. In addition, trucks were assumed to burn fuel at a rate proportionate to their size; thus, a smaller truck that achieved twice the fuel economy of a class 8 tractor, which uses about 0.8 gal/hr to idle, would burn half as much fuel at idle (0.4 gallons/hour).

[4]

Table 5 Idling, fuel consumption and CO_2 statistics for the United States and Oregon

Geographic Area	Idle Hours (millions)	Fuel Used (million gallons)	Fuel Cost (Millions)[5]	CO_2 (Million Metric Tons)	Maintenance Cost (Millions)
United States					
Overnight	830	670	$1,800	6.7	116
Workday	2,320	1,850	$5,000	18.7	325
US Total	**3,150**	**2,520**	**$6,800**	**25.4**	**441**
Oregon (primarily overnight)	**9-12.5**	**7-10**	**19-27**	**<1**	**1-1.8**

Idling Emissions and Impacts

Based on the ANL's calculation of nearly 670 million gallons of diesel fuel consumed overnight by sleepers, estimated truck emissions for the U.S. total 6.7 million metric tons of carbon dioxide (Table 5), 124,000 tons of nitrous oxide, and 3,400 tons of particulate matter. Including daytime idling, estimates rise to a total of 25.4 million metric tons of carbon dioxide, 469,000 tons of nitrous oxide, and 12,800 tons of particulate matter. For Oregon, estimated emissions range from 71,881-101,184 metric tons of carbon dioxide, 1,328 – 1,870 tons of nitrogen oxides and 36 - 51 tons of particulate matter.

Excessive idling also contributes to wasted fuel, excessive engine wear, noise pollution and driver and passenger discomfort. At $2.70 a gallon for diesel fuel, about $6.8 billion a year ($1.8 billion overnight and $5 billion workday) is spent on unnecessary truck idling nationwide (2.5 billion gallons of fuel). According to the American Trucking Association (2009), running an engine at low speed (idling) causes twice the wear on internal parts compared to driving at regular speeds; a truck idling for one hour suffers wear equal to about seven miles on the road. Increased oil changes and engine overhauls due to idling can increase maintenance costs by an average of $0.14 per hour. Based on the idle hours listed in Table 5, maintenance costs for overnight and workday idling rise by an estimated $441 million nationwide and by 1-2 million in Oregon. In addition, noise pollution generated by idling trucks not only causes sleep loss for the driver, potentially negatively impacting highway safety, but is also problematic for surrounding communities (NYSERDA 2004).

Alternatives to Primary Engine Idling

A number of technologies and actions are available to reduce the amount of time trucks and buses idle their engines. Alternatives to primary engine idling have the potential to reduce operating costs and noise pollution, lower diesel emissions, increase energy security and improve health and environmental conditions at truck parking areas and the growing communities that surround them (NYSERDA 2004). Techniques to reduce unnecessary idling can be divided into three broad categories: (1) behavioral change induced by education and incentives, (2) idle reduction technologies, and (3) anti-idling policies and initiatives.

[5] Fuel cost at $2.70/gallon

Behavioral Change Induced by Education and Incentives

Education and incentives play an important role in changing behavior by informing the driver or operator about the adverse impacts of unnecessary idling on emissions, fuel consumption, engine wear, and potential health risks, as well as by encouraging desired behaviors. Companies may institute an “idle reduction” policy that includes training for their drivers on vehicle operation procedures to improve efficiency. Many large trucking companies have been successful in reducing idling times below national averages by offering their drivers financial incentives, recognition, and/or other forms of incentives to keep the number of idling hours and fuel consumed below certain thresholds. Some companies install electronic onboard computers to monitor their drivers idling habits and fuel consumption rates and to discourage unnecessary idling. Some company fleets have gone to the extent of providing for periodic inspections internally or by an outside organization to ensure records are accurate, complete, and up to date, and to assess effectiveness of drivers training (California Highway Patrol does inspections of trucking terminals). The results of these efforts can be used to educate drivers, inform organizational decisions and incent preferred driving behaviors (CARB 2004).

Commercial vehicle owners and operators have found other creative ways to alter idling behaviors and reduce fuel use. Drivers who infrequently require sleeping or resting accommodations, can turn the engine off when weather allows, stay at hotels or motels, and/or equip the sleeper berth with insulating blankets during inclement weather. School and business establishments can establish waiting rooms for drivers while trucks and buses await loading and unloading (CARB 2004). Additionally, truck drivers can cool their engines by shifting to a lower gear a few miles prior to their destination, instead of idling the engine to cool it before shutting the it off (Williams, 2009).

Idle Reduction Technologies

The term "idle reduction technology" refers to devices that allow engine operators to refrain from unnecessary main engine idling by using an alternative source of power to provide heat, air conditioning, and/or electricity while the vehicle or equipment is temporarily parked or remains stationary. There are several alternative technologies available to reduce or eliminate idling, save fuel, and reduce emissions. On-board idle reduction systems include auxiliary power systems that are installed on the truck to provide electrical, thermal, or mechanical power for some or all of the options that would normally require the truck engine to idle. These devices include auxiliary power units/generator sets, fuel cells, and battery packs. Direct-fired heaters, thermal storage systems and energy recovery systems provide temperature control, and electronically controlled idle limiters automatically stop and start the engine. Truck stops and plazas equipped with truck stop electrification systems allow trucks to draw electrical power and in some cases heating, cooling, telecommunication, and Internet hookups from a ground source.

The effectiveness of any one system will depend upon factors like idling time, climate, time of year and types of auxiliary loads, e.g., heating and/or air conditioning needs. Of the technologies available, an auxiliary power unit offers the greatest versatility but at the greatest investment cost. Based on assumptions outlined in the National Academy of Sciences 2010 report expected fuel savings of between $2,500 and $4,000 per year could be seen from the use of an APU whose purchase costs could be between $8,000 and $10,000. Up to a 9 percent reduction in fuel consumption has been reported from the various reduced idling technologies with a low value of

5 percent. See Appendices G & H for additional information and a comparison of these technologies, including their costs, fuel savings, benefits and drawbacks.

Anti-Idling Regulations and Initiatives

The air emissions impact of vehicle idling is significant enough that a growing body of government agencies now regulate idling, and promote and incent anti-idling initiatives. Although there is no comprehensive national regulation for idling in the United States, anti-idling policy has been established by individual states and municipalities around the country, with support coming from a variety of federal and industry sources.

State & Local Anti-Idling Regulations

Part or all of 28 states and the District of Columbia have anti-idling regulations in place (ATRI 2010). Several summaries of these anti-idling policies have been developed (MCDI 2009, EPA 2006, CARB 2002); the American Transportation Research Institute maintains a more current list (See Appendix I). Since there is currently no federal anti-idling law, the laws vary greatly across the nation. Most are characterized as environmental laws, monitored by state and local environmental protection agencies. Some are described as public health laws and controlled by the state or local health department. Other jurisdictions consider this a transportation matter, delegating authority to a department of transportation or motor vehicles. And still others enact these laws under nuisance standards, restricting the noise that results from an idling engine. A number of jurisdictions also delegate enforcement authority to state and local law enforcement officers.

State and local anti-idling laws typically impose a maximum idling time for vehicles and impose civil and criminal fines for non-compliance. The majority of jurisdictions limit idling to three, five, ten or fifteen minutes within a consecutive one-hour period, with five minutes being the most common (about 50 percent). Most provide some form of exemptions to these laws including, but not limited to, the following: emergency & law enforcement; vehicle safety inspection, maintenance or diagnostics; conformance with manufacturers specifications; traffic conditions and mechanical difficulties; power takeoff and auxiliary equipment; queuing; hours of service compliance; and passenger boarding. Several states and local jurisdictions also have an exemption for adverse weather conditions. Most extend the idling time to 5-25 minutes per hour for temperatures below 32° F and/or above 75° or 80° F. Some impose no idling restrictions when temperatures drop below 0° or -10° F.

Many enforcement programs are complaint based. Fines for first offenses typically range between $25 – $500, but several jurisdictions authorize the levying of fines as large as $25,000, plus the prospect of prison time. Some, such as Florida, issue warnings or use enforcement discretion for a specified period following adoption of a rule, and/or for the first offense (Phillips 2009).

The level of enforcement is just as diverse. Some states and cities consider emissions reductions from idling vehicles to be an important strategy to improve air quality and actively regulate idling (McAuliffe 2009, Ross 2009). Others recognize the existence of an idling law, but provide little or no enforcement (Stensrud 2009). Most states and municipalities fall somewhere in between.

Jurisdictions with successful compliance plans are proactive in education, outreach and enforcement. For example, Connecticut provides anti-idling outreach materials on its website and posts road signs with the idling limit. State employees monitor idling hot spots (truck stops, rest areas, schools, commercial fleets, and construction sites), regularly issue and track citations, and in some cases issue orders that require education and training for drivers and facility operators in order to curb idling (McAuliffe 2009).

In Massachusetts, idling education is required as part of the licensing process to receive a commercial driver license. Massachusetts also targets school children as part of its outreach program. They enlist youth to publicize the anti-idling law and distribute an anti-idling "toolkit" to schools, which includes stickers, posters, fact sheets, and an anti-idling pledge to be signed by parents, bus drivers, principals, and superintendents. Finally, to overcome limited resources, Massachusetts uses enforcement "blitzes." Blitzes focus enforcement on a particular issue by enlisting a large number of enforcement officers for a relatively short period of time. They usually target hotspot areas, and if combined with media publicity, can be very effective. Blitzes provide the appearance of regular, continued enforcement, raise public awareness of the regulation at issue, and offer a great opportunity to gather necessary statistical information (Ross 2009).

Philadelphia's Idle Free Philly Program employs citizen policing to help enforce city idling regulations. This program is a web-based tool with a strong mapping platform that allows residents to quickly and easily report illegal idling. Air Management Services and the Clean Air Council receive emails and respond to the complaints. The city's clean air agency can issue a ticket if enough information is provided, and the Clean Air Council will work with communities to address idling hot spots by educating drivers or through other effective means. This program also facilitates collaboration between residents, businesses, and environment and public health agencies and helps communities to take responsibility for improving their neighborhoods.

Oregon

There is no specific state law or rule directly affecting idling. Oregon Revised Statute 811.585 specifies a number of conditions that must apply when leaving a vehicle unattended on a public right of way including stopping the engine. This is enforceable as a traffic violation but would not apply in most instances where longer duration idling occurs. Oregon Revised Statute 818.030 (10) provides a weight exemption for idle reduction technology. A vehicle equipped with a fully functional idle reduction system designed to reduce fuel use and emissions from engine idling may exceed the maximum weight limitations established under ORS 818.010 by up to 400 pounds.

California

California's has been one of the most aggressive in developing statewide idling regulations. The CARB anti-idling rules, found in Title 13, section 2485, of the California Code of Regulations, apply to diesel-fueled commercial vehicles, with a gross vehicle weight rating of more than 10,000 pounds, operating in California.

The CARB anti-idling rules restrict idling to five minutes at any location with limited exceptions. This idling limit includes operating a diesel-fueled auxiliary power system to power a heater, air conditioner, or any ancillary equipment during sleeping or resting in a sleeper berth

when within 100 feet of a "restricted area" (a restricted area is any real property zoned for individual or multifamily housing units that has one or more such units on it). California Air Resources Board rules also stipulate that diesel-fueled auxiliary power systems for trucks with 2007 and newer engines must be California-certified, and fuel-fired heaters operated on trucks with 2007 or newer engines must meet emission standards specified in California's Low Emission Vehicle Program.

Federal Anti-Idling Efforts

In May 2001, former President G.W. Bush issued the National Energy Policy directing the EPA and Department of Transportation to work with the trucking industry to establish a program to reduce harmful emissions and fuel consumption from idling trucks. The federal government reiterated this charge in the National Energy Policy Act of 2005. The Act includes funding for fleets and other diesel users to purchase and install clean diesel technologies such as idling-reduction equipment. Congress appropriated nearly $50 million in FY 2008 to begin implementation of this five-year program. It also includes a vehicle weight exemption of up to 400 pounds to encourage fleets to install idle reduction equipment and to offset the added weight. However, a memo from the Federal Highway Administration's Size and Weight Division issued in the fall of 2005 interpreted that the federal weight exemption is not a national mandate, but rather left up to each individual state's vehicle enforcement officials to recognize. The American Trucking Association is currently working with Congress to change this interpretation.

In addition, the EPA's National Ambient Air Quality Standards regulations are a motivating factor in states' anti-idling programs. States are now allowed to integrate idling reduction efforts into their State Implementation Plans. The transportation sector plays a critical role in the states' compliance efforts and implementation activities within their respective State Implementation Plans.

EPA's Model State Idling Law

In May, 2004, at the National Idle Reduction Planning Conference in Albany, New York, representatives of the trucking industry identified inconsistent patterns and designs of state and local vehicle laws as a barrier to compliance and greater implementation of idle reduction technologies. At the industries request to be more involved in the development of idle reduction laws and achieve greater compliance with regulations, the EPA facilitated a series of workshops around the country in 2005 and developed a Model State Idling Law (2006) for states to consider adopting. It is the EPA's goal that the model law will foster greater compliance through common understanding of the requirements, and ease of implementation, and raise awareness among the trucking industry, states, and environmental groups about each other's needs.

The model law applies to commercial diesel vehicles designed to operate on highways (as defined under 40 CFR 390.5), and to locations where commercial diesel vehicles load or unload. The general requirement limits idling to five minutes in any 60 minute period for vehicles, and to 30 minutes while waiting to load or unload cargo. The Model Law provides several exemptions to the idling limits, including idling that pertains to traffic conditions, emergency and law enforcement, power for work related operations, state and federal inspections, prevention of safety or health emergencies, and service and repair. It also provides conditional exemptions that expire after implementing a state financial assistance program for idle reduction technologies or strategies. For instance, one conditional exemption allows an occupied vehicle to idle to heat or cool a sleeper berth during a rest

or sleep period, or to maintain cab comfort while waiting to load or unload. Another conditional exemption allows a bus to idle up to 15 minutes in any 60 minute period to maintain non-driver passenger comfort.

State and Federal Anti-Idling Initiatives

While idle reduction systems are cost effective in terms of payback periods, and significant benefits can be achieved by reducing greenhouse gases, many commercial vehicle owners and operators lack investment capital and other resources to update their vehicles, alter idling practices, and comply with laws. To address this issue and promote development of innovative idle reduction technologies, an increasing number of federal and state programs provide innovative financing options, partnerships and collaborations, fleet management tools, technical support, information, and public recognition to agencies, tribes, port authorities, school districts, fleet owners and operators, and non-profit organizations or institutions. These efforts not only increase fuel efficiency and reduce greenhouse gases and air pollution, they also advance the energy, economic and environmental security of our nation and states. Appendix J includes summaries of various initiatives in Oregon and at the federal level, which encourage idle reduction.

The Recommended Oregon Idling Reduction Measure

DEQ recommends that the Oregon legislature adopt regulations limiting unnecessary idling, which incorporate elements of the EPAs Model State Idling Law. The model law provides effective, realistic and uniform controls that promote consistency and greater compliance through common understanding of the idling requirements and ease of implementation. A variety of cost effective technologies are available to enable truckers idling overnight during rest periods, as well as those operating in a workday environment. A successful implementation plan by the department will also include education, outreach, incentives and an adequate phase-in of requirements.

The elements of a recommended proposal are outlined in the Recommendations section.

Recommendations

The following recommendations are being put forward by the Department for consideration by the interim legislative committees on environment and natural resources.

Truck Efficiency

DEQ respectfully requests that the interim legislative committees on environment and natural resources consider the following recommended truck efficiency improvement program.

Recommended Oregon Heavy Duty Truck Greenhouse Gas Measure

(Summary. See complete proposed regulation in Appendix K)

The following table outlines the elements of a program that would be recommended for adoption following authorization for the Environmental Quality Commission to proceed with rulemaking on this matter.

Table 6 Outline for Recommended Oregon Heavy-Duty Greenhouse Gas Measure

Heavy-Duty Tractor Requirements

Beginning January 1, 2015,

- 2016 model year and newer sleeper cabs pulling 53 foot dry van or refrigerated trailer must be EPA certified SmartWay tractor
- 2016 model year and newer tractor pulling 53 foot dry van or refrigerated trailer must use EPA certified SmartWay tires

Beginning January 1, 2016,

- 2015 model year and older tractor pulling 53 foot dry van or refrigerated trailer must use EPA certified SmartWay tires

Exemptions[1]

- Short haul tractor is exempt (<50,000 miles annually)
- Local haul tractor is not required to be EPA certified SmartWay tractor but must use EPA certified SmartWay tires
- Drayage (port) tractor and its 53 foot dry van or refrigerated trailer are exempt if travel is within 100 miles of port or intermodal yard
- California compliant tractor and trailer but must report status to DEQ

53 Foot Trailer Requirements

Beginning January 1, 2016,

- 2015 model year and newer dry-van trailer must be
  - EPA certified SmartWay trailer, or
  - Have EPA certified SmartWay tires and aerodynamics meeting minimum 5 percent fuel

savings
- 2015 model year and newer refrigerated trailer must be
  - EPA certified SmartWay trailer, or
  - Have EPA certified SmartWay tires and aerodynamics meeting minimum 4 percent fuel savings

Beginning January 1, 2018,
- 2015 model year and older dry-van or refrigerated trailer must meet applicable requirements noted above or by applicable deadlines in Optional Trailer Fleet Compliance Schedules

Exemptions[1]
- Local haul trailer is exempt from aerodynamics but must still meet tire requirements
- Short haul trailer is exempt when pulled by short haul tractor
- When unable to secure financing from application to at least three financial institutions, exempt for one year.

Optional Fleet Compliance Schedules
- Large Fleet - 21 or more trailers

Percentage of compliant trailers on or before,

Jul 1, 2016	Jan 1, 2017	Jan 1, 2018	Jan 1, 2019	Jan 1, 2020	Jan 1, 2021
5%	15%	30%	50%	75%	100%

- Early compliance option – for every trailer brought into compliance prior to the applicable deadlines, an owner may delay retrofit or replacement of 1.5 trailers until December 31, 2022.

- Small Fleet - 20 or fewer trailers

Percentage of compliant trailers on or before,

Jan 1, 2019	Jan 1, 2020	Jan 1, 2021	Jan 1, 2022
25%	50%	75%	100%

Requirements for Drivers
Must operate vehicles in compliance with applicable requirements and ensure equipment is in good operating condition. Must, upon demand, provide basic information to indentify the tractor and trailer, origin of freight and dispatch information by motor carrier or broker.

Requirements for Owners of Heavy Duty Tractors
Cannot use or authorize use of tractor that is not in compliance with applicable requirements.

Requirements for Owners of Box-Type Trailers
Must ensure that use of 53 foot box type trailer is operated on Oregon highways in compliance with applicable requirements.

Requirements for Brokers
Must only dispatch tractor and trailer that is in compliance with applicable requirements. Must provide broker contact information to a dispatched driver.

Requirements for Motor Carriers
Must only dispatch tractor and trailer that is in compliance with applicable requirements. Must provide motor carrier contact information to a dispatched driver.

Requirements for Shippers
Must only dispatch tractor and trailer that is in compliance with applicable requirements.

[1] To secure and maintain short haul and local haul tractor and local haul trailer exemption the vehicles must be registered with DEQ. Any change in status must be reported to DEQ prior to change in ownership or travel on an Oregon highway. Short haul exemptions must be updated every year including current odometer reading.

Phase-in Schedule
The heavy-duty greenhouse gas measure would be phased in depending upon statutory authorization and adoption of program rules by the Environmental Quality Commission, which could take place by December 2012. The proposal recommends a two year initial phase-in to allow manufacturers and truck users to take steps towards compliance. Since heavy duty truck model years tend to appear in the market place in the spring of the calendar year prior, a program adopted by January 2012 would take effect in 2015 with the 2016 model year. In-use tractors and trailers would come into compliance on a schedule that mirrors the pattern in California with full compliance by 2020. The proposed Oregon implementation schedule and the current California compliance schedule are shown in Table 77. Since the Oregon program will phase in effectively 5 years after the California requirements, the expectation is that availability of technology will be mature and readily available.

The lead-time for the Oregon program means that capital expenditures would not be required during the next several years while the economy is in recession. The lead-time, combined with annual deferrals if an operator is unable to secure financing, helps address concerns about the availability of up-front capital to comply with the program. The lead-time will also aid in informing truck operators of the requirements through outreach to state and local trucking associations, Oregon Motor Carrier Division newsletters, trade shows, presentations to individual trucking companies, truck repair facilities and new and used truck and trailer dealers. During the phase-in period, the Department will continue to explore other partnership opportunities to promote alternate and complementary fuel efficiency measures among fleets, for instance with insurance agents and brokers offering discounts for improved driver training and management programs that result in safer, more fuel conscientious drivers.

Table 7 Compliance Dates for Heavy-Duty GHG Measures in California and Proposed for Oregon

Full Compliance				Phase-In Period										
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
California														
2011 Tractors	Jan 1													
2011 Box Vans	Jan 1													
2011 Reefer	Jan 1													
≤2010 Tractors			Jan 1											
≤2010 Trailers				Jan 1										
≤2010 Large Fleet Trailers Optional Compliance		Jan 1 5%	15%	30%	50%	75%	100%							
≤2010 Small Fleet Trailers					Jan 1 25%	50%	75%	100%						
2003-04 Reefer									Jan 1					
2005-06 Reefer										Jan 1				
2007-08 Reefer											Jan 1			
Oregon														
2016 Tractors						Jan 1								
2016 Box Vans/Reefer						Jan 1								
≤2015 Tractors							Jan 1							
≤2015 Trailers									Jan 1					
≤2015 Large Fleet Trailers Optional Compliance							Jan 1 5%	15%	30%	50%	75%	100%		
≤2015 Small Fleet Trailers										Jan 1 25%	50%	75%	100%	

Reduced Idling

DEQ respectfully requests that the interim legislative committees on environment and natural resoruces consider the following recommended idling program to limit unnecessary long duration idling by commercial motor vehicles.

Recommended Oregon Idling Regulation

(Summary. See complete proposed regulation in Appendix L)

Applies to highway commercial diesel vehicles with a gross vehicle weight rating greater than 10,000 pounds and to locations where commercial diesel vehicles park, load or unload.

General Limitations for Idling

- Five minutes in any continuous 60-minute period
- Thirty minutes while at load/unload locations for heavy-duty vehicles

Exemptions

The idling limitation does not apply during the following conditions:

- Emergencies and law enforcement
- On-highway traffic conditions
- Prevent safety or health emergency
- Power takeoff and auxiliary equipment
- Vehicle safety inspection
- Maintenance, service, repair, diagnostic, mechanical difficulties, including DPF regeneration
- Armored vehicle

Conditional Exemptions (Expire no later than January 1, 2016)

- Passenger bus, 15 minutes in any 60 minute period
- Occupied vehicle with sleeper berth compartment when temperatures are less than 32°F or greater than 75°F at any time during idling period
- Occupied vehicle while at load/unload locations

APU, Generator Set, or other mobile idle reduction technology

Operating idle reduction technology to reduce main engine idling is…

- permitted for 2006 or older commercial diesel vehicles

- allowed on 2007 and newer commercial diesel vehicles provided the device meets 2007 heavy duty model year engine standards (in force three years following the effective date of this rule)

Compliance

Applies to vehicle owner and/or operator, and load/unload location owner.

Phase-in

DEQ recommends that the idling regulation be phased in with warnings issued for violations until July 1, 2015. This provides a good opportunity to educate commercial vehicle owners and operators about the law and any state financing programs.

Education and Outreach

DEQ recommends that the idling restrictions be coupled with signage requirements and an education and outreach program to inform owners and operators of the new idling regulation and encourage the use of best management practices to reduce idling and greenhouse gas emissions.

DEQ, in collaboration with the commercial vehicle industry and other stakeholders, will develop recommended best management practices. BMPs should:

- Encourage management practices to reduce idling and greenhouse gas emissions;
- Establish clearly defined BMP targets that are technically and economically feasible for the commercial vehicle industry operating in Oregon; and
- Provide guidance on implementation.

Owners or operators of loading and unloading facilities and truck stops, rest areas or similar facilities with 15 or more parking spaces available would be required to post notices indicating idling restrictions adopted by the EQC. In addition, DEQ would work with the commercial vehicle industry to provide technical assistance, education, and outreach, as follows:

- Publicize the new state idling regulation and program through a variety of low cost measures such as DEQ, Lane Regional Air Protection Agency and ODOT Motor Carrier webpages and announcements in trade association newsletters or websites[6];
- Require signage generally outlining the idling requirements at locations where trucks load and unload and where more than 15 truck parking spaces are provided
- Develop and maintain technical expertise in BMPs to reduce idling and greenhouse gas emissions;
- Provide technical assistance to the commercial vehicle industry in selecting BMPs that are compatible with air quality and other factors pursuant to the guiding principles;

[6] ATRI's *Idling Regulations Compendium* and *Cab Card*, ODOT's *Motor Carrier News*, USDOE's, *National Idling Reduction Network News*, Northwest Motorcoach Association, Northwest Propane Gas Association; Oregon Refuse and Recycling Association, Oregon Tow Truck Association, and Oregon Trucking Associations newsletters.

- Hold meetings to describe the program to commercial vehicle owners and operators;
- Develop and distribute educational materials encouraging the commercial vehicle industry to participate in the program;
- Provide information about idling and greenhouse gas emissions, and resultant impacts on public health and the environment to the media and Oregon communities; and
- Provide state sponsored financial incentives (e.g., tax credits, grants) and a recognition program (e.g., Fleet Forward Program) to help defray up-front capital costs and to acknowledge commercial fleets taking the initiative to reduce diesel pollution beyond what is required.

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Appendix A – Enrolled House Bill 2186

75th OREGON LEGISLATIVE ASSEMBLY--2009 Regular Session

Enrolled

House Bill 2186

Ordered printed by the Speaker pursuant to House Rule 12.00A (5). Presession filed (at the request of Governor Theodore R. Kulongoski for Department of Environmental Quality)

CHAPTER .....

AN ACT

Relating to greenhouse gas emissions; and declaring an emergency.

Be It Enacted by the People of the State of Oregon:

SECTION 1. (1) As used in this section:
(a) "Greenhouse gas" has the meaning given that term in ORS 468A.210.
(b) "Heavy-duty truck" has the meaning given that term in ORS 468A.795.
(c) "Medium-duty truck" has the meaning given that term in ORS 468A.795.
(d) "Return on investment" means:
(A) A net monthly savings gained through fuel efficiency that is equal to or greater than the net monthly payment obligation under a financing instrument; or
(B) The owner's or operator's initial capital costs, if self-funded, to comply with any potential requirements under this section are recouped in fuel savings within three years of the owner's or operator's expenditure of the initial capital costs.

(2)(a) The Department of Environmental Quality shall conduct a study of potential requirements regarding the maintenance or retrofitting of medium-duty trucks and heavy-duty trucks in order to reduce aerodynamic drag and otherwise reduce greenhouse gas emissions from those trucks. In conducting the study, the department shall evaluate:
(A) Comparable requirements of other states or the United States Environmental Protection Agency;
(B) The availability of financing programs to fund initial capital costs that are recouped in fuel savings over time;
(C) Differences among truck types, such as short-haul trucks and long-haul trucks;
(D) Implementation according to a phased-in schedule taking into account fleet size;
(E) The feasibility of requiring sellers of medium-duty trucks and heavy-duty trucks to disclose to buyers the existence of applicable greenhouse gas emissions reduction requirements; and

(F) The feasibility of providing economic hardship exemptions and deferrals for owners and operators of trucks, after considering the ability of owners and operators of trucks to attain a return on investment within the time period specified in any financing instrument available to fund initial capital costs associated with any potential requirements.

(b) As part of the study under this section, the department shall also study potential restrictions on engine use by parked commercial vehicles, including but not limited to medium-duty trucks and heavy-duty trucks.

(3) In conducting the study under this section, the department shall consult with relevant stakeholders.

(4) The department shall submit a report of its study, and shall include recommendations for legislation, to the interim legislative committees on environment and natural resources on or before October 1, 2010.

Appendix B – Truck Efficiency and Reduced Idling Workgroup

Name	Affiliation
Miguel Figliozzi (Chair)	Portland State University; Oregon Transportation Research and Education Consortium
Emily Ackland	Association of Oregon Counties
Jim Anderson	Truck and Travel Truckstop
Brian Burton	Daimler Trucks North America LLC
George Cartales	City of Hillsboro
Kyle Davis	Pacificorp
Paul Downes	CUSA Raz, LLC dba Raz Transportation; NW Motorcoach Association
Don Emerson	FMI Trucking
Bruce Erickson	Oregon Department of Transportation
Tom Gardiner	Cummins Northwest
Cynthia Hilton	Biggs Insurance; National Utility Contractors Association; Associated General Contractors
Brock Howell	Environment Oregon
Arch Hudelson	NW Propane Gas Association
Jay Letter	United Grocers, Inc.
Gary McClellan	Ray's Towing; Oregon Tow Truck Association
Wade Palmer	Kool-Pak
Doug Pentecost	Cascade Sierra Solutions
John Rakowitz	Oregon Chapter of Associated General Contractors
Bob Russell	Oregon Trucking Association
Matthew Smith	Navistar
Vic Stibolt	Jubitz Corporation
John Sullivan	Loren's Sanitation
Catherine Thomasson	Physicians for Social Responsibility
Denise Thornton	Demitrakikes Trucking Inc.
Rick Wallace	Oregon Department of Energy
Chuck Williams	CalPortland Company

Appendix C – Truck Efficiency and Reduced Idling Workgroup Minutes

Truck Efficiency & Reduced Idling Study Group

State of Oregon Department of Environmental Quality

Meeting Notes
Tuesday, April 27, 2010
1:00 a.m. – 5:00 p.m.
DEQ Headquarters

Attendance:

Study group members	**Member substitutes**
Miguel Figliozzi, Chair - Portland State University; Oregon Transportation Research and Education Consortium	Gary Hahn - CUSA Raz, LLC dba Raz Transportation
Emily Ackland - Association of Oregon Counties	Margi Lifsey – Oregon Department of Transportation
Jim Anderson - Truck and Travel Truckstop	
Brian Burton - Daimler Trucks North America LLC	
George Cartales - City of Hillsboro	**Public**
Tom Gardiner - Cummins Northwest	Gary Gaussoin – Silver Eagle Mfg. Co.
Cynthia Hilton - Biggs Insurance; National Utility Contractors Association; Associated General Contractors	Brendan McCarthy – Portland General Electric
Brock Howell - Environment Oregon	Fawn McNeely –Legislative Advocates
Arch Hudelson - NW Propane Gas Association	Grafton Sterling – Sterling Western Inc.
Gary McClellan - Ray's Towing; Oregon Tow Truck Association	Jody Wiser – Tax Fairness Oregon
Wade Palmer - Kool-Pak	
Doug Pentecost - Cascade Sierra Solutions	**ODEQ**
John Rakowitz - Oregon Chapter of Associated General Contractors	Kevin Downing – ODEQ
Bob Russell – Oregon Trucking Associations	Andy Ginsburg - ODEQ

Improving Truck Efficiency and Reducing Idling

Matthew Smith - Navistar	Shelley Matthews - ODEQ
Vic Stibolt - Jubitz Corporation	Uri Papish - ODEQ
John Sullivan - Loren's Sanitation	
Catherine Thomasson - Physicians for Social Responsibility	
Denise Thornton - Demitrakikes Trucking Inc.	
Rick Wallace - Oregon Department of Energy	
Chuck Williams - CalPortland Company	

Introductions and Welcome:

Air Quality Division Administrator, Andy Ginsburg, welcomed study group members and thanked them for their willingness to participate. He began by stating that this is not a rulemaking; DEQ does not have the regulatory authority to develop a rule. Rather, the 2009 legislative directed DEQ to develop a report on truck efficiency and idling with recommendations for the interim legislative committees on the environment and natural resources. The group's purpose is to provide input on potential requirements to reduce aerodynamic drag and unnecessary long duration idling by commercial vehicles, thereby decreasing resultant greenhouse gas emissions. He also led the group in a round robin so members would get to know each other better. He asked everyone to provide the following information: name; title; company/affiliation; experience with commercial vehicles, truck efficiency and/or idling; something about themselves that the rest of us wouldn't necessarily know; biggest hope or fear for this process.

Agenda and Draft Charter:

Mr. Figlozzi gave an overview of the agenda (handout) and draft charter (handout). He explained the purpose, process, roles and expectations of group members and went over the meeting schedule.

<u>Discussion highlights:</u>

Members requested that the first paragraph of the "Background" section, which summarizes the effects of global warming, be eliminated from the charter. They claim not everyone agrees global warming is occurring and they feel there are problems linking trucking to global warming. Another member stated that scientific evidence demonstrates the effects of greenhouse gases and global warming is a real and imminent issue. *Response: DEQ agreed to strike the first paragraph because the added information it provided on global warming was not necessary to have in the Charter.*

Members stated that they don't want their names attached to DEQ's report to the interim legislative committees on environment and natural recourses without qualifications for differences of opinion. *Response: DEQ will clarify to the legislature that this is DEQ's report and will document stakeholder comments.*

A member requested that the "penalties" bullet be stricken from reduced idling in section three (Truck Efficiency and Reduced Idling Study Group Charge) of the draft. Another member suggested that it's important to have a compliance/enforcement representative participating in the Study Group. *Response: DEQ will delete the penalties bullet and add a compliance bullet to both truck efficiency and reduced idling.*

A member emphasized the importance of documenting issues raised, as well as recommendations and thoughts of the study group members. Another member recommended using a format like the EPA's Model State Idling Law with study group discussion. *Response: DEQ will add the following wording to the draft charter: "DEQ will document concerns and issues raised by the study group". DEQ will also attach the minutes of the study group meetings to DEQ's report to the Legislature.*

Background and House Bill 2186:

Mr. Ginsburg gave a presentation on the context for and provisions of House Bill 2186, with an emphasis on section one (handout), which authorizes the truck efficiency and reduced idling study and legislative report. He mentioned that DEQ had sought authority last session to implement these and other strategies, and on these two issues the legislature requested further detail on what an implementable program would look like. The legislature directed DEQ to study these issues taking into account comparable requirements of other states and the U.S. EPA, financing, differences among truck types, a phased-in schedule, and economic hardship.

Mr. Ginsburg reiterated that this is not a rulemaking and DEQ does not have authority to adopt regulations pertaining to truck efficiency and idling. Uri Papish pointed out that although DEQ does not have authority to develop rules, we have developed a draft rule as a straw proposal to show what an idling rule might look like if we had that authority. DEQ will first recommend an idle reduction plan to the legislature and may later outline the details in a bill requesting authorization to write a rule.

Mr. Ginsburg informed the group that the truck efficiency report has not been completed because we are currently analyzing and incorporating into our report the recently published national Academy of Sciences study on improving truck efficiency. Therefore, we will begin with the idling piece, which will cover the 1st and a portion of the 2nd meeting of the study group.

DEQ's Reduced Idling Proposal:

Mr. Downing gave a presentation (PowerPoint and handout) on the draft recommended Oregon idling law. He began by summarizing the key components of the presentation: legislative charge; reasons for idling and its impact on fuel consumption, the company's bottom line, and public and environmental health; alternatives to idling; inconsistencies in nationwide idling regulations; EPA Model State Idling Law; and draft recommended Oregon idling law. Mr. Downing stressed that commercial vehicles play a vital role in Oregon's economy and while we are not attempting to eliminate idling, public policy can play a role in managing unnecessary and long duration idling more effectively in order to reduce greenhouse gas emissions.

Discussion highlights:

Legislative charge…
A member noted that HB 2186 directs DEQ to study potential restrictions on engine use by "parked" commercial vehicles, not trucks and buses stopped in traffic for reasons other than parking, and suggests a distinction should be made. *Response: DEQ is providing a report modeled after the EPA's Model State Idling law, which considers all sources of idling by commercial diesel vehicles designed to operate on highways and at load /unload locations and exempts some of those sources. DEQ will further investigate the language in the bill about parked vehicles.*

Effects of idling…
In response to Mr. Downing's comments on the effects of idling, diesel exhaust and fatigue on truck drivers, a member indicated that these findings are questionable and should be left out of the report, while another said that information should not have to be scientific to be included in the record. One member reported that there are significantly less industry fatalities since 2006 and they continue to decline. *Response: This is additional information that's being provided to the study group, which may or may not be included in the report. More discussion can occur on that later when the study group has an opportunity to review the report.*
A member noted that the cost of fuel is a huge deterrent to idling, the commercial vehicle/trucking industry is doing a great deal to reduce idling, and that idling is not such a significant problem in the newer cleaner burning engines. *Response: We're focusing on the role public policy plays in reducing greenhouse gas emissions and trying to identify the barriers and opportunities to reduce idling. Policy adds to the benefits of idle reduction gained from high fuel prices. DEQ also asked the group if industry could provide documentation of their efforts to reduce idling.*

Idling controls…
One member asked about the potential of going from an Auxiliary Power Unit to a more integrated system in the future. *Response: Unlike place based systems (IdleAire, CabAire and Shorepower) an Auxilliary Power Unit can be used anywhere. Since an idling restriction must become mandatory at some point, DEQ would like APUs available for temperature extremes to phase-in the requirement without putting drivers in danger.*

A member indicated that IdleAire is in bankruptcy and Shorepower use is low because drivers are challenged to use the system effectively and efficiently. Shorepower requires both on- and off-board equipment to operate and is difficult for trucks to plug in to. *Response: Oregon has been successful in establishing several Shorepower and IdleAire locations. IdleAire has restructured and reopened several locations elsewhere in the country. Although there is a high initial infrastructure cost for these systems, they save on fuel and incentives can be built in to encourage Truck Stop Electrification use over time as an idling requirement is phased in.*

Members suggested that the study group needs to address practical issues surrounding the use of TSE systems: availability, purchasing adapters, smoker vs. non-smoker use, space requirements, credit card availability and use. *Response: Running an engine is a very inefficient way of meeting need. Energy and emissions from a grid are 92% lower than idling, making TSE systems a viable*

option for controlling idling. DEQ is looking to study group members to help identify behavioral and technological issues, so we can find effective solutions.

Members discussed the various incentives available to assist with phase-in of idling regulations. They pointed out that the state is trying to curtail use of the Business Energy Tax Credit. We need to be aware of how incentives and phase-ins are structured.

EPA Model Law…
A member suggested that there is no model state idling law because the federal government is not involved in regulation and current idling regulations among states and local jurisdictions are highly inconsistent.

Draft recommended Oregon idling law
- *Applicability…*
A member suggested that the 10,000 lb. applicability limit proposed by DEQ in the draft recommended Oregon idling law is too low and should start at 26,000 lbs.; an idling law would be difficult to enforce for smaller vehicles.

One member feels our proposal is not comprehensive because it only takes into account big fleets. He recommends that we develop our proposal further by looking at the needs and impacts of different classes of fleets to ensure that these smaller classes understand how it applies to them.

– *Exemptions…*
Another member indicated that the temperature range ($<32^0$F or $> 75^0$F) provided on the conditional exemption for an occupied vehicle with a sleeper berth does not provide a reasonable comfort range for the driver. *Response: The range specified is consistent with the idling laws of many other states and jurisdictions. The range could also be adjusted or removed from the conditional exemption.*

– *Compliance and enforcement…*
A member stressed that it's important to distinguish between local and long-haul in defining "owner." Also, she suggested that it wouldn't be appropriate to fine a vehicle owner for the driver's negligence in violating an idling law and pointed out that driver's make honest mistakes and should have the benefit of a warning for the first offense.
One member mentioned that there are over 24,000 companies across North America with vehicles over 26,000 lbs. (more if you consider vehicles between 10,000 and 26,000) lbs. and without an effective enforcement system, we won't achieve a level playing field. The trucking industry prefers regulations that apply across the board. Specifically, without uniform enforcement some companies get away with violations, which means their costs are less, they pay cheaper rates to shippers, and this disrupts the market place.
A couple members reminded us that the level of the penalty will have different impacts on drivers and owners and that penalties are easier to enforce on businesses than drivers when dealing with interstate commerce.

Another member suggested we focus less on enforcement and more on encouraging volunteer compliance. For instance, setting a ratio of idle time to total time driven and providing incentives to meet the ratio.

One member stated that greenhouse gas reduction is a noble cause, but questions the emphasis on idle reduction by commercial vehicles as an efficient means to reduce greenhouse gases. Establishing and enforcing an idling law is complex. It will result in pockets of enforcement with extreme hardship on some. He advocates avoiding bad legislation by taking no action on idling and focusing our time and efforts elsewhere.
Response: We recognize that there are not enough DEQ staff and police to enforce all locations and that education and outreach, are primary enforcement mechanisms, in the early years with gradual movement towards enforcement. Compliance focuses on frequency and severity, while warnings are a common response to minor violations.
The EPA may not have the authority to establish a national idling rule, which is why they developed the model law to establish some consistency among the states. DEQ's recommendations for compliance and enforcement are based on idling restrictions adopted by 26 other states throughout the U.S.; we have incorporated common features of those regulations rather than breaking new ground. Your input is important in helping us put appropriate parameters on the regulation and to maximize its success.

Public Comment:

Gary Gaussoin of Silver Eagle Mfg. Co. encouraged the use of a common language in preparing the report to the legislature. For example, describing exempted activities as necessary activities, versus non-exempt activities that are unnecessary. Mr. Gaussoin suggested that hybrid trucks are expensive and there's an issue with storage of energy. He also asked DEQ to be cautious in copying California's rules. For instance, under California law a shipper may be fined if they allow a vehicle to operate with damaged aerodynamic equipment. The shipper is not knowledgeable about the equipment's condition.

Grafton Sterling, owner of Sterling Western Inc. encouraged DEQ to seek real time conditions at the major distribution centers in the Metro Areas of Portland, Clackamas, Woodburn, etc. He also suggested that Oregon should market their truck efficiency and idle reduction proposals in a positive manner, encouraging participation by everyone involved. For instance, DEQ should provide notices and inquiries to motor carriers and well thought-out information and materials to the legislature.

Jody Wiser of Tax Fairness Oregon suggested that if the idling rules phase-in over three years rather than becoming effective immediately, the first ticket should cost $300 and subsequent tickets should be much higher, because $100 is significantly lower than the cost of an APU unit and won't motivate change (she points to California's robust penalties). In addition, few people will be available to issue tickets. Jody also suggested that recommendations to the legislature include increased low-cost four-year financing for trucks that drive 51% or more of their total miles in Oregon and are from fleets of 50 or fewer – via Business Oregon ODOE or DEQ

Conclusion:

Andy Ginsburg concluded the discussion by stating that no one thing can be done to reduce greenhouse gas emissions; it will take thousands of small efforts/steps, as well as financing to move forward. He reiterated that this process will be difficult to implement and the study group will need to think through it carefully and learn from California. He thanked group members and the public for their input, stated that DEQ will consider their comments, and indicated that more information will be provided in future meetings.

State of Oregon Department of Environmental Quality

Truck Efficiency & Reduced Idling Study Group

Meeting Notes

Wednesday, May 19, 2010
8:30 a.m. – 12:30 p.m.
PSU

Attendance:

Study group members	**Public**
Miguel Figliozzi, Chair - Portland State University; Oregon Transportation Research and Education Consortium	Gary Gaussoin – Silver Eagle Mfg. Co.
Emily Ackland - Association of Oregon Counties	Margi Lifsey – Oregon Department of Transportation
Jim Anderson - Truck and Travel Truckstop	
Paul Downes – CUSA Raz, LLC dba Raz Transportation: NW Motorcoach Association	**ODEQ**
Don Emerson - FMI Trucking	Kevin Downing – ODEQ
Bruce Erickson – Oregon Department of Transportation	Shelley Matthews - ODEQ
Tom Gardiner - Cummins Northwest	Uri Papish - ODEQ
Cynthia Hilton - Biggs Insurance; National Utility Contractors Association; Associated General Contractors	
Brock Howell - Environment Oregon	
Arch Hudelson - NW Propane Gas Association	
Jay Letter - Unified Grocers, Inc.	
Gary McClellan - Ray's Towing; Oregon Tow Truck Association	
Wade Palmer - Kool-Pak	
Doug Pentecost - Cascade Sierra Solutions	
Bob Russell – Oregon Trucking Associations	

Matthew Smith - Navistar	
Vic Stibolt - Jubitz Corporation	
John Sullivan - Loren's Sanitation; Oregon Refuse and Recycling Association	
Catherine Thomasson - Physicians for Social Responsibility	
Denise Thornton - Demitrakikes Trucking Inc.	
Rick Wallace - Oregon Department of Energy	
Chuck Williams - CalPortland Company	

Overview

Oregon's Truck Efficiency and Reduced Idling Study Group convened to provide input on DEQ's recommendations and report on truck efficiency and reduced idling, due to the interim legislative committees on environment and natural resources by October 1, 2010. The Group plans to hold meetings from April 2010 through July 2010. The following is a summary of the Group's discussion at its second meeting. Responses to questions and comments are shown in italics and represent responses DEQ provided to the committee at the meeting.

Welcome and Agenda

Chair Miguel Figliozzi welcomed attendees and called the second meeting of the Truck Efficiency and Reduced Idling Study Group to order at 8:30 am. Chair Figliozzi gave an overview of the Agenda (handout).

Draft Charter (revised per 4/27 meeting)

Chair Figliozzi requested comments and approval on the draft charter, which DEQ revised based on committee input at the April 27th meeting of the study group.

Draft Meeting Notes

Chair Figliozzi requested comments and approval on the draft notes from the committee's April 27th meeting. The committee approved the notes with a recommendation to remove the sentence "DEQ successfully enforces safety violations and other infractions on drivers now (top of pg. 6)." Response: this statement will be removed.

Additional Idling Information

Mr. Downing presented additional idling information provided to DEQ by study group members:

1) Crash test information: Fatalities related to large truck crashes are going down. There are a number of contributing factors leading to crashes. A side benefit of reduced idling is drivers experience more restful sleep, which results in less fatigue and could contribute to alert, safer driving. A Federal Motor Carrier study suggests 13% of truck crashes have fatigue as a contributing factor.
2) Fuel prices in trucking industry: Fuel prices match or exceed the highest cost centers in the trucking business: cost of drivers and equipment.

3) Study from No. Carolina state: Findings showed that the Benefit of an APU comes from its usage. Also, drivers often idle the main truck engine while using APU's, minimizing benefits.
4) Study at University of California - Riverside: ECM monitoring data was collected and analyzed. It shows a truck is in idle mode 24-33% of the time. Discussion followed as to whether the idling data reflected total idling time or idling while in park. Dr. Figliozzi offered to follow up with the study authors.
5) IdleAire: Initially, IdleAire didn't feel that Oregon's temperate climates were favorable to installing and using IdleAire stations. Later, an internal business study at truck stops indicated it would be cost effective. Twenty-three IdleAire locations elsewhere around the country have indicated they plan to re-open under new company ownership.

Discussion highlights:

- Based on the way miles per gallon were calculated, a member indicated that the estimated 24-33% idle time from the California study may include idling while in traffic. Other members pointed out that ECM's provide data on idling while in park and while driving. In addition, idling while driving varies greatly between local and long-haul trucks, there's a significant amount of idle time in park for local trucks, and California study figure doesn't seem out of the ordinary.

DEQ's Draft Idling Recommendations and Enforcement of Idling Regulations in Other States and Jurisdictions:

Ms. Matthews gave a summary presentation on DEQ's draft idling recommendations, the rationale for those recommendations and Study Group comments from the first meeting (handout). The purpose of this agenda item was to summarize and document information and comments provided at the first meeting and to invite additional comments to ensure that DEQ had captured all of the Study Group's comments and concerns. She pointed out that the majority of the comments already received, pertained to applicability and compliance and invited study group members to submit additional comments to fill in the gaps.

Since the majority of the Study Group's comments from the first meeting pertained to compliance, Ms. Matthews provided additional information on enforcement of idling regulations by other states and jurisdictions in the U.S (handout). The report included information on location, idling limits, fines, enforcement entities, and the different types of enforcement. She noted that education and outreach will be an integral part of DEQ's idling recommendations to Oregon's Legislative committees and focused her discussion on successful education and outreach campaigns employed by other states and jurisdictions.

Discussion highlights:

-Uniform Regulations

- A member suggested that the trucking industry would like the idling regulations enforced uniformly to create a level playing field. He indicated that local (city) idling regulations

are very different from state regulations and, due to the complexity of the trucking industry, won't impact everyone the same. He also mentioned that he would like further discussion on incentives and fees.

-APUs

- One member commented that APU's are expensive and drivers are good at finding ways to get around idling requirements, so the state needs to provide economic assistance and incentives to fleet owners and drivers to achieve idle reduction goals.
- Member indicated that the greatest barriers are financial and some owners and operators have bad credit, creating further barriers to getting financing for APUs. One member claimed that an APU costs $0.03 cents a mile to maintain, and low-cost financing is needed to defray up-front costs.
- He also explained that trucking companies are working with thin margins and are very skeptical about data provided by Smartway and the idle reduction manufacturers; they won't simply believe what they're told. He recommended that APUs be provided to fleets and the results monitored to develop real world data to verify information provided by Smartway and idle reduction technology manufacturers.

-Compliance plan

- Some members cautioned DEQ on the use of public call-in/citizen policing to help enforce idling regulations due to potential abuse by disgruntled former employees and other slander issues.
- One member requested that DEQ provide specific recommendations for an idling compliance plan for Oregon at a future meeting of the study group.
- One member suggested that he prefers no idling legislation because the costs and difficulties are insurmountable and an idling regulation would create pockets of hardship/enforcement. For instance, larger truck stops and rest areas like Jubitz and Coburg, Oregon would be hot spots for enforcement. He also suggested that some communities would be more proactive than others in providing education and outreach and complying with a regulation, thereby encouraging drivers to stop at rest areas and truck stops with less aggressive compliance programs. He encouraged DEQ to look at successful compliance programs in other states and jurisdictions to evaluate their programs. In the event that an idling regulation is adopted, he requested a long phase-in process coupled with continued education, warning period, etc.

-Education, Outreach and Incentives

- Several members suggested a strong outreach and education program as part of DEQ's recommendations to the interim legislative committees, with an emphasis on educating owners and operators on the costs of idling and the benefits of changing driver behavior to reduce idling and fuel consumption. Training would focus on coaching, repetition, competition, monitoring, reporting and rewards. One member claimed that education and outreach within fleets is the most effective form of idle reduction and another suggested that a strong outreach and education package may be adequate without enforcement of an idling regulation.
- Members discussed the merits of various idle reduction incentives such as fuel savings, fewer accidents, improved driver and environmental health, lower worker's

compensation, reduced insurance rates through partnerships with insurance companies, green company awards, ODOT's "Trusted Carrier Program" sticker, etc.

- A member mentioned that many trucking companies are currently monitoring driver behavior (using ECM's and other devices and methods) and providing training, feedback, and incentives to reduce idling. He suggested that the trucking industry would benefit from assistance to expand these efforts by developing and promoting best practices.
- Another member proposed that DEQ develop an efficiency package demonstrating the significant benefits of reducing idling (reduced fuel consumption and greenhouse gases) etc. This would allow the market to regulate idling based on the costs of running the vehicles. Another member claimed that this method, unlike others (purchasing APU's has greater impact on some owners and operators than others), would also help create a more level playing field among the trucking industry.
- Another member responded that he's on board for a financial program to incent idle reduction, but cautioned that current economic constraints and thin margins limit incentives, and recommended gathering further information prior to proceeding.

-Availability of Data

- A member asked about the level of information and data available on what trucking companies are currently doing to reduce idling in fleets. Another responded that lots of information is available on EPA's Smartway program, but there's not much data available outside of this program. He claimed to know of many fleets with incentive and penalty programs in place.
- One member asked about the availability of information on driver behavior. Follow-up discussion focused on governed road speeds, automatic idle shutdown technologies, and equipment to monitor/track driver behavior.

-Other

- Members asked DEQ to also consider the following points: some company's would not benefit from fuel savings because fuel charges are passed through to the client; trucks with walking floors must idle the main engine while unloading; space is tight at some loading docks, necessitating frequent movement and making engine shutdown impractical; some organizations with significant fuel consumption are not concerned with reducing idling or gaining efficiencies.
- Response: *Mr. Papish summarized key issues brought up during the discussion on idling and encouraged members to review DEQ's draft idling recommendations and forward additional comments on to DEQ.*
- *Mr. Downing contacted the EPA and they indicated they don't believe they have authority to adopt a national idling law, so they promoted the Model State Idle Law for those states who could move forward with idling regulations. The EPA also indicated that, within the context of Smartway, they do not know how much idling control equipment has been installed on vehicles in the Smartway program; they don't track this data. Also, Smartway's calculations of tons of CO2 and fuel saved are theoretical calculations based on inputs from fleet managers. Smartway connects people up and encourages changes in behavior and use of fuel efficient technologies, but they offer no inherent tracking mechanisms. In order to implement a data collection system, we should consider the need for resources at a fleet and agency level.*

- *DEQ has the Fleet Forward Program, which acknowledges fleets for going above and beyond expectations and to differentiate themselves from other fleets.*
- *Voluntary compliance creates a variable pattern, whereas regulation sets a bar. For example, the bottle law combines regulation and incentive ($.05-.10 cents) for returned bottles.*
- *Mr. Downing encouraged members to have conversations outside the study group process and to think about what a complete incentive program would look like: resources involved; where funds would come from; how we would roll out a program that makes sense and complements a regulatory program; and how this incentive program would apply to approximately 300,000 out-of state vehicles.*

Oregon Heavy Duty Truck Greenhouse Gas Measure:

Mr. Downing gave a presentation (PowerPoint and handout) on DEQ's Oregon Heavy Duty Truck Greenhouse Gas Measure. He began by discussing the transportation strategies recommended by the Governor's Task Force on Global Warming and the charge of HB 2186 for DEQ to study potential requirements regarding maintenance or retrofitting of medium and heavy duty trucks to reduce aerodynamic drag and greenhouse gas emissions. He pointed out that trucking activity mirrors industrial production and provided data on the trucking industry's contribution to freight movement and emissions relative to other modes of transportation. He also highlighted the differences among truck weight classes and resulting fuel consumption. Mr. Downing wrapped up the presentation by discussing opportunities available to improve truck efficiency, current federal and state programs and Oregon's Heavy Duty Greenhouse Gas Measure: applicability, requirements, exemptions, phase-in and return on investment.

<u>Discussion Highlights</u>:

- One member asked for information/data on fleet turnover. Other members indicated…
  - About 6.8 years, but this is likely low because some go into farm service or are sold to foreign countries.
  - New trucks accumulate more miles the first 5-7 years
  - Mileage drops precipitously when vehicles go into farm or other service
  - 87% of Isuzu trucks are still registered somewhere in U.S.
- A member asked why the measure applies to 53' trailers (boxed and refrigerated)? *Response: It mirrors California and is the major mode of freight movement.*
- A member asked if DEQ had taken into account reductions in weight capacity of the tractor due to the weight of the aerodynamic equipment. *Response: We could provide an exemption for added weight of aerodynamic condition.* Another member responded that weight exemptions must be approved by Congress.
- A member asked what percentage of vehicles in Oregon would be subject to California's regulations? *Response: We don't know, but will find out. California did an analysis based on the Vehicle Inventory and Use Survey (last done in 2002). This analysis is no longer being supported by the US Census Bureau making it difficult for DEQ to do a comparable analysis. DEQ staff may need to go through California data used in their rulemaking process to determine the universe of vehicles that would be subject to Oregon requirement, outside of those already subject to California's.*

- One member asked what an Oregon requirement would accomplish over and above California's accomplishments? *Response: There's substantial benefit that comes from California being a large freight center and that their rule applies to any vehicle entering the state at any time. California acknowledges that most of the greenhouse benefit they get will come from VMT outside of California.*
- A member noted that most aerodynamic equipment installed on their fleet is removed within 5-6 years due to damage; it's only removed it when it can't be repaired (dock clearance and railroad tracks a problem). Another commented that aerodynamic equipment is not technologically advanced. *Response: When drafting the measure, DEQ avoided picking a technology, but envisioned a more universal plan. For example, having a 5% truck efficiency target. The challenge is identifying the most uniform method we could deploy, without creating an Oregon specific standard. We felt the simplest path is to mirror California and tweak it to make more sense, without creating an extraordinary burden to truckers or regulatory agencies.*

  Regarding implementation, we're in discussions with ODOT about forming a partnership. ODOT would send information to DEQ about potentially non-compliant vehicles that haven't installed required technologies. If a fleet submits information and we don't respond within a certain period of time, they would be considered compliant; this would be checked on an occasional basis through audits. Demonstration of compliance with California requirements demonstrates compliance with Oregon as well. Enforcement would be by penalty against the owner and we need to consider the volume of trucks subject to this, as well as ways to ease compliance. This would not be a time or labor intensive program.

  At the next meeting, we can walk through more process on this measure and discuss how it might roll-out. We can also discuss financing and the potential for recommendations from the group for strategies to support these kinds of efforts and how the state might help with financing assistance to truckers.

Public Comment:

Gary Gaussoin of Silver Eagle Mfg. Co.

- ROI slides: Consider using payback, 5.5 miles per gallon may be low, and add allowance for maintenance cost of aerodynamic equipment (at least 5%).
- Cost of maintenance information for aerodynamic equipment: Approximately 5-15%. There's not a lot of real-world data and estimates are only reasonable, not accurate.
- Kevin's presentation is excellent!

Conclusion:

The next meeting is on June 29th at DEQ Headquarters from 1-5 p.m. We will continue discussion on truck efficiency. If you have any materials to share with other study group members, please forward those to DEQ.

Truck Efficiency & Reduced Idling Study Group

Meeting Notes

Tuesday, June 29, 2010
1:00 p.m. – 5:00 p.m.
DEQ HQ

Attendance:

Study group members	**Others**
Emily Ackland – Association of Oregon Counties	Sharon Banks – Presenter - Cascade Sierra Solutions
Jim Anderson - Truck and Travel Truckstop	Dave Kayes – Substitute - Daimler Trucks North America LLC
Don Emerson - FMI Trucking	
Bruce Erickson – Oregon Department of Transportation	**Public**
Cynthia Hilton - Biggs Insurance; National Utility Contractors Association; Associated General Contractors	Holly Sears – Oregon Refuse and Recycling
Brock Howell - Environment Oregon	John Marsh - Webasto
Jay Letter - Unified Grocers, Inc.	**ODEQ**
Gary McClellan - Ray's Towing; Oregon Tow Truck Association	Kevin Downing – ODEQ
Doug Pentecost - Cascade Sierra Solutions	Andy Ginsburg - ODEQ
Rakowitz, John – Oregon Chapter of Associated General Contractors	Shelley Matthews - ODEQ
Bob Russell – Oregon Trucking Associations	Uri Papish - ODEQ
Matthew Smith - Navistar	
John Sullivan - Loren's Sanitation; Oregon Refuse and Recycling Association	
Catherine Thomasson - Physicians for Social Responsibility	
Rick Wallace - Oregon Department of Energy	
Chuck Williams - CalPortland Company	

Overview

Oregon's Truck Efficiency and Reduced Idling Study Group convened to provide input on DEQ's recommendations and report on truck efficiency and reduced idling, due to the interim legislative committees on environment and natural resources by October 1, 2010. The Group plans to hold meetings from April 2010 through July 2010. The following is a summary of the Group's discussion at its third meeting. Responses to questions and comments are shown in *italics* and represent responses DEQ provided to the committee at the meeting.

Improving Truck Efficiency and Reducing Idling

Welcome and Agenda

Chair Miguel Figliozzi was unable to attend this meeting and DEQ Program Operations Manager Uri Papish filled in as the Chair. He welcomed attendees and called the third meeting of the Truck Efficiency and Reduced Idling Study Group to order at 1:00 pm. Mr. Papish gave an overview of the Agenda (handout).

Draft Meeting Notes

Mr. Papish requested comments and approval on the draft notes from the committee's May 19th meeting (handout). The committee approved the notes with a recommendation to correct the reference to "foreign companies" on page 6 to "foreign countries." *Response: this was corrected*.

Oregon Heavy Duty Greenhouse Gas Measure (PowerPoint presentation)

Kevin Downing provided additional information on annual return on investment and years to payback at 6 mpg for both a single tractor and trailer and a single tractor with three trailers.

Discussion highlights:

- A member requested narrative to go with the tables in the presentation and expressed an interest in seeing a breakdown calculation of savings and costs. *Response: The final report will have text with the table.*

Innovative Programs for cleaner air, lower carbon and a better economy (PowerPoint presentation)

Sharon Banks, CEO and founder of Cascade Sierra Solutions, provided information on innovative financing options for technologies to enhance truck efficiency and reduce idling.

Sharon expressed that some lenders are reluctant to provide loans; they perceive the trucking industry to be sensitive to the economic conditions. In addition, loan amounts for truck efficiency and idle reduction technologies are low, while paperwork is high. CSS works with banks to provide financial packages of $2 million or more.

Sharon also mentioned that banks are hesitant to finance after-market equipment. To get banks interested in providing loans for aftermarket equipment, she recommends credit enhancements, loan guarantees, revolving loan funds and loss reserves be provided.

Discussion highlights:

A member stated that a drawback to CSS is that they only deal with a small portion of the trucking industry and it's impossible for them to deal with a large share due to the inadequacy of financing.
A member expressed concern that small fleets will not drive into Oregon, California or other states because of costs associated with meeting regulations.
A member expressed that the strength of DEQ's proposed regulation is that it's similar to California's.

In spite of the fact that some of the vehicles travelling in Oregon also travel in California and are subject to their regulation, one member claimed that DEQ's proposed regulation would have an adverse impact on Oregon's economy because fleets would avoid the state.
Another member countered that he doesn't feel the regulation would affect demand for trucking services or the economy. Compliance would impact the large fleets and corporations first, buying the smaller businesses some time.

Members continue to stress the benefits of voluntary programs with education, training, monitoring (driver behavior and fuel economy), incentives and outreach to the trucking industry. They feel that if an owner and/or operator benefits, they'll participate.

A member indicated that a lot of insurance companies are open to partnering with the trucking industry to provide discounts on insurance. For instance, discounts for vehicles with a modified GPS (measures vehicle conditions and drivers patterns). *Response: DEQ would like to meet with the member to discuss this further. There are other options to improve truck efficiency including increasing weight limits on trucks, freight only roadways, driver training, managing tire pressure and alignment.*
Another member suggested that a grant could be written to purchase a Smith machine - driver training simulator - for drivers to use to practice on to save fuel and increase safety.
DEQ mentioned that industrial facilities that violate regulations have an option to contribute funds to their local economy rather than to pay a fine. Some companies have paid for vehicles and equipment to be retrofit with emission control devices. *Responses: Regulations and education, outreach and incentives are not mutually exclusive. Regulations will save money by driving down costs. A regulatory framework can help by creating a demand for and supply of financing options. DEQ is also modeling their regulations after California's and many of the trucks travelling in Oregon are already subject to California's regulations. Further, DEQ's truck efficiency and reduced idling program will have provisions built in for deferrals and extensions, in the event that financing is inadequate.*

We haven't discussed a mandatory operator training, but we can consider setting-up a complementary program for training and other incentives.

Existing Oregon Financial Assistance/Incentive Programs

Rick Wallace, Oregon Department of Energy, provided copies of the new BETC application and rule language.

<u>Eligible BETC project requirements</u>:
Older trucks – APU's only now (no tires, no aerodynamics)
New trucks – APU + aerodynamics, wheels, and auto inflation, but APU must be with it
No longer part of conservation program
DOE uses Smartway efficiency measures and EPA data to calculate savings – still have to meet 10%
Trailer has to be connected to tractor - one trailer per tractor
Previously required to show cab card - now more restrictive (YA or YC plate needed). Provide two most recent calendar years of International Registration Plan billing notices that documents percentage of vehicles annual mileage that was driven in Oregon.

Simple payback period changed to 2-15 years

Discussion highlights:

One member noted that the objective of the changes is to contain overall costs of the BETC program.
A member stated that the BETC program is severely restricted; no trucks qualify for the BETC program as of today. It would be difficult to fund the program to the level necessary to be successful.
Another member pointed out that many of the truck efficiency and idling technologies are beneficial primarily to medium to large fleets. Focusing on the largest fleets and long-haul drivers gives the biggest bang for the buck.
As in previous meetings, a member proposed that we need to work with the EPA to develop national regulations/standards so manufacturers and the trucking industry will know the rules and to ensure a level playing field.
A member stated that we need to acknowledge the different classes of trucks in our proposed regulations: small local trucks versus medium to large long-haul. *Response: HB 2186 directs DEQ to recommend potential requirements to reduce aerodynamic drag and greenhouse gas emissions in medium and heavy duty trucks only. However, we were directed to look at all classes for idling.*
DEQ staff asked whether the BETC rules apply to the State Energy Loan Program and the DOE rep indicated they do not as they are separate programs.

- A member informed the group that the EPA is working on regulations for new heavy-duty vehicles and the regulations will likely apply to equipment that won't have the best payback/ROI. He feels the BETC program could provide additional funding to make marginally fuel efficient equipment more favorable. *Response: Once the requirements are met, BETC and other incentive programs would sunset.*

  Response: If we adopt a truck efficiency program similar to California, we'll lay out a plan and phase-in schedule well in advance to provide lead time for truck owners to seek financing and make use of other incentives.

California's Air Resources Board Heavy Duty Vehicle Air Quality Loan Program and the Smartway Finance Center

Mr. Downing provided handouts and information detailing these programs.

1) California's Air Resources Board Heavy Duty Vehicle Air Quality Loan Program: In partnership with the State Treasurer's Office (STO), the Air Resources Board (ARB) has developed an innovative heavy-duty vehicle air quality loan program to provide financial assistance to truckers affected by the Proposed Statewide In-Use Truck and Bus Rule and the Proposed Heavy-Duty Vehicle Greenhouse Gas Emission Reduction measure. The loan program guarantees loans for small trucking fleets that experience difficulties obtaining competitive rate loans in today's tight credit market. This program has provided over 250 loans totaling 16 million to date and has a default rate of less than 1%.

2) Smartway Finance Center: EPA and its contractor, IBank, provide this web site as a service to the trucking industry to bring interested buyers and lenders together for the purchase or lease of vehicles and technologies that conserve fuel and reduce emissions.

Discussion highlights:

A member asked us to define the universe of trucks that will be impacted by the truck efficiency regulation: in state vehicles and/or out-of-state vehicles operating in Oregon. Another member provided an example; Oregon companies travelling 50% in California are eligible for a loan guarantee program. *Response: There are approximately 46,000 trucks based in Oregon, a smaller segment pulls 53 ft. trailers. The decision to provide financing to out-of-state vehicles travelling in Oregon is a policy issue.*
A member responded that Oregon companies travelling 50% in California are eligible for the loan reserve program.
A member stated that regardless of whether we adopt a regulation, we should incent early adoption of fuel efficiency measures. *Response: This is possible as part of the phase-in schedule and could be accomplished by providing additional credit for early adoption.*

Outline and Compliance Schedule for Proposed Oregon Heavy Duty Truck Greenhouse Gas Measure

Mr. Downing went over the outline and compliance dates for Oregon's heavy duty truck greenhouse gas measure (handouts) and requested high-level comments. He also explained the choice of 2015 to begin the phase in. Andy pointed out that the years are subject to change.

1) Outline for Proposed Oregon Heavy Duty Truck Greenhouse Gas Measure:
    - Heavy duty tractor and 53 foot trailer requirements and exemptions
    - Optional fleet compliance schedules
    - Requirements for drivers, owners of heavy duty tractors and box-type trailers, motor carriers, and Oregon-based brokers and shippers.

Discussion highlights:

A member recommended that the proposed regulation specifically exempt intermodal containers.
A member asked who is responsible for truck efficiency violation/tickets (owned vs. leased vehicles) and where the fines will go. *Response: Currently owners are responsible for violations. Compliance is primarily through a fleet plan; drivers are not required to carry a plan. Someone won't be able to look at a particular vehicle and tell if it's in compliance; the question is whether the fleet is in compliance. There is also a long phase-in schedule. If a fleet can't get financing then the compliance schedule is pushed back a year. Compliance will be enforced through the audit of fleet plans. California has a four year head start and we can look to their experience in formulating compliance measures.*

Compliance would default to Division 12. There are 3 classes of violations with penalty tables. Small business is typically assessed smaller amounts and the fines address economic values gained from the violation and whether the violator came back into compliance. Programs like

this are education and outreach driven, not enforcement driven; usually 1-2 warning letters are issued before assessing penalties. We can show the group those figures.
A member indicated that California's program is fine driven (not education), and enforcement is a stumbling block in California's regulations due to lack of engagement by the enforcement division.

Response: Andy Ginsburg reiterated that the recommendations made to the legislative committees will be part of a DEQ report, not a study group report. We will include the group's views, concerns, etc. in the report and the Governor will ultimately decide if a bill is introduced to the legislature.

We are currently working on a legislative concept that describes the truck efficiency and idling program in enough detail to adopt this rule only, not some other rule. Our goal is for the statue to be specific enough to address only this program. The statute will not be included in the report to the legislature.

Compliance Dates for Heavy Duty Greenhouse Gas Measure: This report provides a comparison of Oregon and California compliance schedules for large and small fleet trailers. Oregon's schedule coincides with California's with a four year lag; California's requirements are phased-in between 2011 and 2017, while Oregon's phase in from 2015 to 2021.

Additional discussion on idling

- A member stated that model year 2007 and newer engines should not be subject to the idling regulations. *Response: Our legislative directive is to reduce greenhouse gas emissions. The 2007 and newer engines emit less particulates, but are not significantly more efficient at reducing greenhouse gasses. We are also proposing to defer compliance and are providing an education and outreach up front to encourage as much compliance as possible before the regulations go into effect. We will also issue warnings prior to ticketing violations.*

Conclusion:
Uri Papish informed the group that the next meeting will be on July 29th at DEQ Headquarters from 8:30 am - 12:30 pm. and will discuss program funding, the draft report to the legislative committees, and idling enforcement. He also asked the group what they would like to cover at the next meeting and opened the conversation to public comment. There was no public comment.

Truck Efficiency & Reduced Idling Study Group

State of Oregon Department of Environmental Quality

Draft Meeting Notes

Thursday, July 29, 2010
8:30 a.m. – 12:30 p.m.
DEQ HQ

Attendance:

Study group members	**Public**
Emily Ackland – Association of Oregon Counties	Joe Grycko – Pacific Power
Jim Anderson - Truck and Travel Truckstop	Margi Lifsey – Oregon Department of Transportation
Don Emerson - FMI Trucking	Holly Sears – Oregon Refuse and Recycling
Bruce Erickson – Oregon Department of Transportation	
Tom Gardiner – Cummins Northwest	**ODEQ**
Brock Howell - Environment Oregon	Kevin Downing – ODEQ
Jay Letter - Unified Grocers, Inc.	Andy Ginsburg - ODEQ
Gary McClellan - Ray's Towing; Oregon Tow Truck Association	Shelley Matthews - ODEQ
Doug Pentecost - Cascade Sierra Solutions	
Rakowitz, John – Oregon Chapter of Associated General Contractors	
Bob Russell – Oregon Trucking Associations	
Matthew Smith - Navistar	
Vic Stibolt – Jubitz Corporation	
John Sullivan - Loren's Sanitation; Oregon Refuse and Recycling Association	
Catherine Thomasson - Physicians for Social Responsibility	
Rick Wallace - Oregon Department of Energy	
Chuck Williams - CalPortland Company	

Improving Truck Efficiency and Reducing Idling

Overview

Oregon's Truck Efficiency and Reduced Idling Study Group convened to provide input on DEQ's recommendations and report on truck efficiency and reduced idling, due to the interim legislative committees on environment and natural resources by October 1, 2010. The Group plans to hold meetings from April 2010 through July 2010. The following is a summary of the Group's discussion at its fourth meeting. Responses to questions and comments are shown in *italics* and represent responses DEQ provided to the committee at the meeting.

Welcome and Agenda

Chair Miguel Figliozzi welcomed attendees and called the fourth meeting of the Truck Efficiency and Reduced Idling Study Group to order at 8:30 pm. Mr. Figliozzi gave an overview of the Agenda (handout).

Draft Meeting Notes

Mr. Figliozzi requested comments and approval on the draft notes from the committee's June 29th meeting (handout). There were no recommendations for corrections and the committee approved the notes.

DRAFT – Improving Truck Efficiency and Reducing Idling

Kevin Downing provided an overview of the draft report to the legislative committees on environment and natural resources (handout). He informed study group members that DEQ will be making additional grammatical and bibliographic edits to the reports, and that we will take comments at the meeting today and will accept additional written comments through 5 p.m., August 12, 2010. DEQ staff had planned to summarize the proposed truck efficiency and Idling regulations, but the group chose to forego the summaries and go directly to group discussion and comments.

<u>Discussion and comment highlights</u>:

-Executive Summary

Several members commented that the legislative committees and others would probably only read the executive summary. They offered suggestion to make the report more comprehensive and to adequately reflect the position of the group members on the truck efficiency and idling recommendations.

- One suggestion was to add a statement to the executive summary indicating that the study group is reluctant to support the proposed truck efficiency and idling regulations and state the reasons why in order to provide balance. *Response: This is not a blanket industry opinion.*
- Concern was expressed for public and environmental health and reducing carbon emissions and global warming. As such, it was suggested that we add a paragraph stating that industry representatives are concerned with the regulation given the economy and their input was taken into consideration. In addition, the report should list costs, expected paybacks, emission reduction expectations, and specific funding mechanisms to assist with up-front capital costs (grants, tax credits, loans, reserves, insurance rebates, etc),

- A suggestion was made to add a bulleted list of truck efficiency and idling recommendations and benefits (reductions in fuel consumption and greenhouse gases, etc).
- It was recommended that we provide an executive summary of the study group meeting minutes.
- A member commented that the study group's role is fact finding, not providing advice.

-Impact on Industry

- Industry is concerned with expenses pertaining to truck efficiency and idling regulations. Deficits are budgeted for the next decade and the group sees little in the way of short-term relief.
- A member stated that DEQ has tried to be sensitive to industry concerns. However, he feels the regulation will have a significant negative impact on small Oregon companies. He recommended that the timelines be long and phased-in.
- A member indicated that the trucking industry is concerned with the proposed restrictions, not completely opposed.
- A member commented that Smartway fuel savings are nowhere near real world statistics.
- A member pointed out that the 30 minute idling limit for load/unload locations won't apply to medium duty trucks. They make 25-30 stops a day @ 15-20 minutes each, so we won't get the fuel efficiency expected and payback will take longer.
- *Responses to the Executive Summary and Impact on Industry comments: We appreciate your comments and will make the study group's concerns clear to the legislative committees. We will revise the executive summary, incorporating some of your requests into this section. However, we are hesitant to summarize the study group's position on the truck efficiency and idling regulations in the executive summary because we'd be making value judgements on the content. As agreed to by the group, DEQ will attach the minutes of all four study group meetings, as well as written comments received through 5:00 pm. August 5th, 2010, as appendices to the report.*

  The legislative concept will also be included as an appendix to the report, hopefully prior to the legislative presentation. The concept is specific. It directs us to adopt truck efficiency and idling rules. It's not as detailed as the rule and allows us to make changes without revising statute.

  Unlike many other regulations, the proposed truck efficiency and idling regulations do have a return/payback. It will impact companies, but it has a net positive effect after initial costs. We've also built in lag times, phase-in schedules, and financing. In addition, please note that the proposed truck efficiency or idling restrictions could be adopted separately.

-Technical Corrections and Clarifications

- The report should provide information on the context by which the study group members came to the table: concern for the economy and environment.

- Reduction in Nitrous Oxide not adequately covered on page 9 (Nitrogen Oxide). *Response: We'll acknowledge this issue.*
- The section on trailer skirts (pg. 15) should discuss significant costs of maintaining truck efficiency technologies, by way of concrete examples including cost of the devices and repair costs. *Response: An estimate for maintenance of devices is provided in the report based on estimates from ARB staff and input from the public in attendance at workgroup meetings. There are a variety of approaches to providing trailer skirts that meet aerodynamic requirements while minimizing maintenance costs. We anticipate that improvements in this area will continue to be made before the effective date of the proposed requirements, making it very speculative to be definitive now.*
- The recommended Oregon heavy-duty truck efficiency greenhouse gas measure on page 25 should point out that unlike Oregon, California provided millions in incentives (Carl Moyer, APU's, etc.) before implementing their truck efficiency measure. *The Carl Moyer Memorial Air Quality Standards Attainment Program provides incentive funds for the incremental cost of cleaner than required engines and equipment. Eligible projects include cleaner on-road, off-road, marine, locomotive and stationary agricultural pump engines, as well as forklifts, airport ground support equipment, and auxiliary power units. The program achieves near-term reductions in emissions of oxides of nitrogen (NOx), particulate matter (PM), and reactive organic gas (ROG) which are necessary for California to meet its clean air commitments under the State Implementation Plan. California voters in 2006 approved a $1 billion dollar bond measure to cut criteria pollutant emissions from freight movement activity in four priority trade corridors. While some of the so-called Prop 1B funding has gone for vehicle replacement, it is not designed to function as a financial assistance program for truck efficiency upgrades. California has provided a loss reserve loan guarantee program specifically designed for truck efficiency upgrades that has resulted in supporting over 250 loans on the order of $16 million lent.*
- The report does not address the cost to DEQ of administering the regulation. *Response: Andy Ginsburg provided an overview of future staffing and program funding needs during the meeting. See additional information below.*
- Kevin Downing mentioned a glaring omission in the report: the number of vehicles potentially subject to Oregon's, but not California's, restrictions, and the reductions in CO2, fuel, and engine wear that would result from adoption of truck efficiency and idling rules. Unlike California, we lack a database to tap into to determine the number of non-Oregon based vehicles that travel into Oregon, but not California. He indicated that DEQ will use ODOT data on commercial fleets to mail out a letter requesting members of the trucking industry to complete a simple online survey to assist us in estimating the number of vehicles affected, the cost to industry for vehicles not already covered by California, and the costs to staff this effort. A representative of the trucking industry indicated that they can publicize the survey. DEQ could send out postcard reminders to encourage response.

-Timeframe

- We were asked to clarify the timeframe for submitting the report and acting upon it.

Response: We're required to present the report to the legislative committees on environment and natural resources on or before October 1st, 2010. Administrators for the House and Senate environment committees have confirmed dates at the September committee hearings for DEQ to present our truck efficiency and idling proposal: Tuesday, September 21, 8 AM to noon – House Environment and Water; Wednesday, September 22, 8 AM to noon – Senate Environment and Natural Resources. They have not yet confirmed specific times for the presentations.

We are working to finalize the Legislative Concept and we'll then submit it to the study group for review.

If the legislature authorizes a rulemaking process, we anticipate the rule would go before the EQC for adoption by late 2012 and the rules would apply to 2016 model years.

Future Staffing and Program Funding Needs

Andy Ginsburg provided an overview of future staffing and program funding needs as follows:

Funding needs will be minimal in the first few years

- Extended phase-in for rules
- Outreach to fleets if rules adopted: develop and distribute signage

Funding needs will increase beginning in 2016

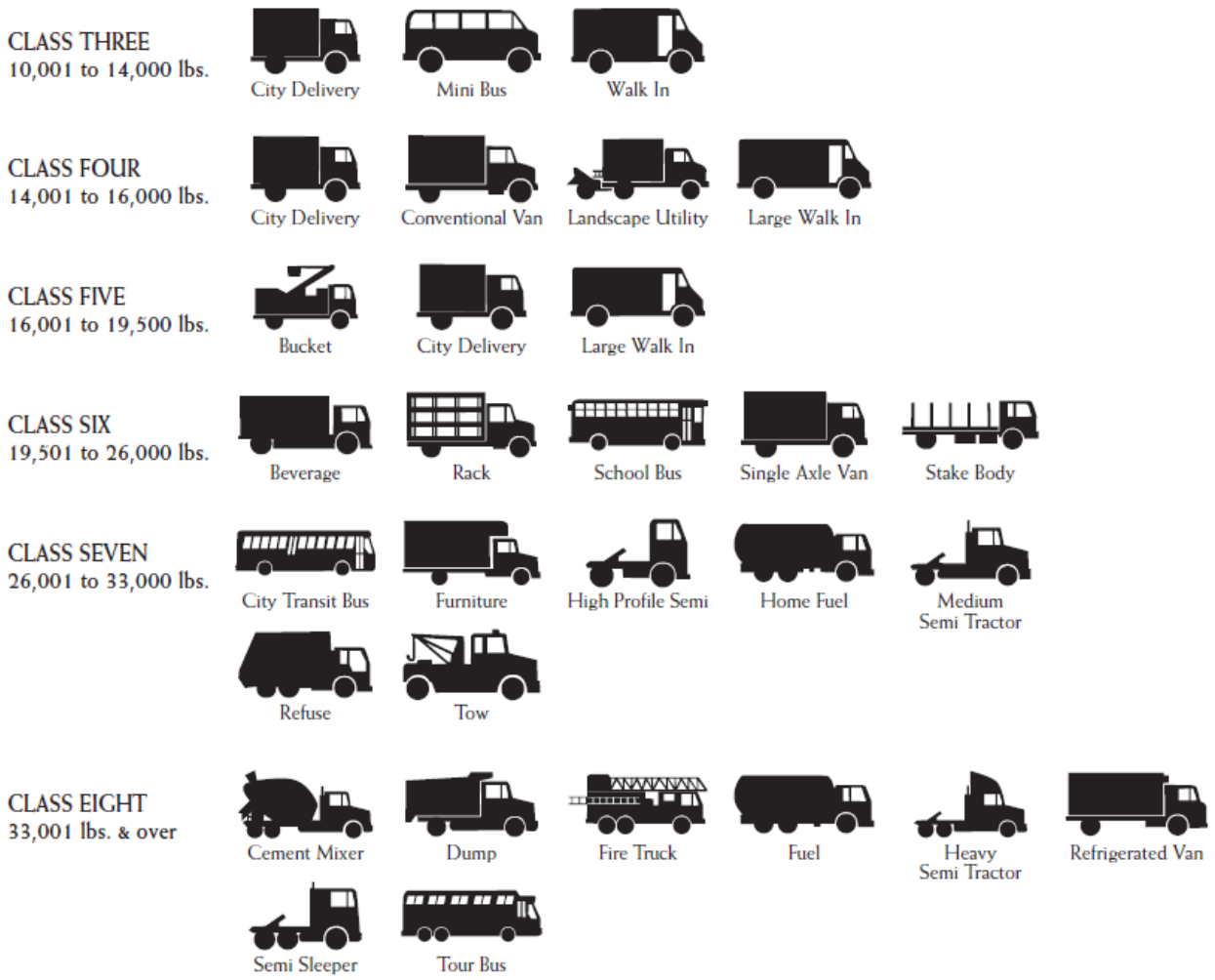
- We anticipate the economy will recover adequately by the 2015-2017 biennium to request general fund for approximately 2 FTE to verify compliance with the regulations. In comparison, California has 11.5 FTE.

This is not a universal inspection program. Our focus will be primarily on education and outreach with spot-checking for compliance. For example, during 2015, interns would conduct random evening and overnight idling inspections and issue warnings and tickets for violations.

Conclusion:

Miguel Figliozzi and Andy Ginsburg thanked the group for their time and input on the truck efficiency and idling recommendations and closed the meeting.

Appendix D – Truck Weight Classes



Appendix E – Fuel Consumption Improvement Technologies

from: Carlo Smith & Cory Roberts. *The Adoption of Technologies, Policies and Systems for Improving Fleet Fuel Performance.* Iowa State University Center for Transportation Research and Education, 2007.

Power Unit Technologies
Power unit technologies include equipment that may affect the configuration of engine, cab, chassis, and drive-train systems. Many of these technologies are specified during initial unit purchase; e.g., the selection of transmission type and configuration. Other technologies may be retrofitted to existing units, as in the case of APUs.

Automatic Shutdown: Automatic shutdown systems provide a method to ensure the reduction in the time power units are left idling during overnight parking or waiting to complete a scheduled delivery or pick up. A similar outcome can be addressed through management policies that require shutdown; however, the automated system helps ensure compliance with no-idle policies. Such shutdown devices are estimated to contribute as much as a 5.9% improvement in fuel performance by eliminating unnecessary idle time (Ang-Olson and Schroeer 2002).

Transmissions (Automated, Automatic): Transmission technologies affect fuel performance in two ways. From a mechanical perspective, the electronics in automatic and automated systems help ensure the most effective shift timing. From a human resources perspective, automated transmissions are not as susceptible to driver variation as a result of distraction or fatigue. (Kilcarr 2006A). Estimated improvements in performance range from 2%–5% (Kilcarr 2006A; Langer 2004)

Automated transmissions automatically determine gear selection. Pneumatic or electronic actuators move the shift forks and rails. No foot clutch is needed. Automatic transmission shift via electronic controls help eliminate the potential for torque loss during shifting. When manual transmissions are specified for units, firms pay closer attention to the number and ratio of gears. This determination is influenced by application and operating conditions (Kilcarr 2006A). Transmission selection is an important specification issue that is influenced by the type of operation the unit is expected to serve, the engine power selection, the rear-axel ration, and driver habits among the factors.

Speed Governor Implementation: Reducing highway speed can have a significant impact on mileage performance. Whether mandated through policy or implemented via systems such as engine governors, estimated fuel improvement from such actions range from 7%–20% (Ogburn and Ramroth 2007; SmartWay 2004) depending upon the original and reduced speed levels. For

example, simulations of long-haul truck operation show a near 14% improvement in fuel economy as average speed decreases from 70 to 55 mph (Ang-Olsen and Schroeer 2002).

Auxiliary Power Units (Diesel/Battery): APUs improve overall fuel performance by significantly reducing the time a power unit is left idling. The common practice for many operators of power units with cab sleepers is to run the primary engine at idle to power heating, ventilation, and air-conditioning (HVAC), and accessory systems when parked for an extended rest period or overnight. Installation of a small diesel generator or battery power unit dramatically reduces or eliminates the use of fuel for such operations. Overall fuel improvement is estimated to be as much as 8% or, when considering just the fuel burned during the idling period, the estimated savings is as much as 80% (Ogburn and Ramroth 2007).

Bunk Heaters: Bunk heaters serve a similar, though more limited, purpose as APUs. They provide heat to the cab living quarters during cool weather operation and therefore allow for engine shutdown rather than idling for extended periods.

Hydrogen Injection System: Hydrogen injection systems provide a means of onboard electrolysis to create hydrogen gas. The hydrogen gas is then included in the combustion mixture. Including hydrogen in the fuel mixture results in a more complete combustion and results in increased power, fuel performance, and lower emissions.

Tire and Wheel Technologies

Tire and wheel technologies are being used to reduce weight and rolling resistance in fleets. The EPA estimates that heavy trucks use as much as 15%–30% of fuel consumption to overcome rolling resistance (variability is due in part to the current weight of the unit and load). Each of the methods addressed can be included as part of an original vehicle configuration or can be installed on existing fleet vehicles. Technologies such as the installation of low-rolling resistance tires can be employed on trailers, as well as power units.

Low-Rolling Resistance Tires: Tire technologies and materials are helping reduce the amount of rolling resistance created by automotive and truck tires. For heavy trucks, a 3% reduction in rolling resistance is estimated to improve fuel efficiency by one percent. The current level of technology is estimated to help reduce fuel consumption by 3%–6% (Langer 2004, Ogburn and Ramroth 2007).

Single-Wide Tires: Single-wide tires support improved fuel performance in part as a result of lowering the rolling resistance in vehicle operation due to materials, and also as a smaller contact footprint than a dual tire configuration. In addition, single-wide tires typically reduce wheel weight by several hundred pounds.

A study by Oak Ridge National Laboratories indicated that replacing the standard truck configuration of two thinner tires per wheel with a single-wide tire improves fuel efficiency and provides more stability. The study estimated a 2.9% fuel savings from newer generation single-wide tires (ORNL 2006). Tests of a Michelin wide-base tire showed an improvement of 3.7%–4.9 percent. Computer simulation suggested an improvement of 2.7% (Ang-Olsen and Schroeer 2002).

Aluminum Alloy Wheels: Aluminum wheels support improved fuel performance predominantly as a result of their lower weight than traditional metal-cast wheels.

Automated Tire Inflation: A 10 psi reduction in tire pressure is estimated to reduce fuel efficiency by 0.5%–1% on heavy duty trucks. Automated tire systems facilitate improved performance by monitoring tire pressure and ensuring that pressure remains at an optimal level (Ang-Olson and Schroeer 2002).

Nitrogen Tire Inflation: Nitrogen tire inflation is expected to improve fuel performance because of the lower likelihood of pressure loss. In addition to the fuel performance improvement, nitrogen inflation is expected to help tires run cooler, improve tread life, reduce oxidation of tire components, and reduce rim and wheel corrosion.

Aerodynamics

Methods to improve tractor-trailer aerodynamics can have a significant impact on fuel performance for vehicles operating at speeds above 45 mph. Highway speeds require more significant amounts of energy to overcome aerodynamic drag. Such drag dramatically increases as vehicles operate at higher speeds. Components that improve tractor and trailer aerodynamics can be specified on new vehicles or added to existing vehicles.

A Rocky Mountain Institute report of efficiency opportunities in Canadian fleets suggests that modifications to trailer aerodynamics can reduce drag by as much as 20% and lead to an approximate 10% decrease in fuel consumption for trucks operating at 105 kilometers per hour (approximately 65 mph). These improvements are identified with tractor trailer configurations employing a traditional box-type trailer.

Power unit modifications include roof fairings, cab extenders, aerodynamic bumpers and mirrors, and fuel tank fairings. Trailer modifications can include trailer skirts, trailer tails, and other means to affect wind flow around the trailer unit.

Cab Extenders: Cab extenders reduce the gap between the sides of the tractor unit and the trailer. This may also be accomplished to some extent with the use of a trailer fairing that attaches to the front of the trailer unit. Reducing the gap from 45 to 25 inches shows a 1%–2% improvement (Ang-Olsen and Schroeer 2002). In general, employment of extenders is expected to improve performance between one and three percent (Kilcarr 2006B; Smartway 2004; Langer 2004; Ang-Olson and Schroeer 2002).

Aerodynamic Mirrors: Aerodynamic mirrors reduce the wind resistance alongside the tractor unit and are estimated to help improve fuel performance between one and two percent (Kilcarr 2006B).

Roof Fairings: Roof fairings help direct the flow of air above and around the trailer. Savings of as much as 10% are estimated for trucks traveling at an average speed above 45 mph (Kilcarr 2006B). Compared with trucks with no fairings, improvements of 15% have been identified (Ang-Olsen and Schroeer 2002, Smartway 2004; Bachman, Erb and Bynum; Ogburn and Ramroth 2007).

Trailer Skirts: Trailer skirts line the sides of a trailer unit between the wheels and reduce drag alongside the trailer. Skirts are estimated to improve fuel performance by 3%–5% on average (Kilcarr 2006B; Ang-Olson and Schroeer 2002; Smartway 2004, Ogburn and Ramroth 2007).
Trailer Tails: The airflow around the back end of a trailer can contribute to overall drag. Trailer tails that attach to the back end of a trailer unit to direct air more smoothly around the trailer are estimated to provide an additional 6% fuel savings (Ogburn and Ramroth 2007).

Management Policies
Management policies can help focus driver attention on factors that contribute to improving fuel performance. Perhaps the least expensive means to reduce fuel consumption, management policies rely on driver compliance.

No Idling Policy: A 2006 report by Argonne National Labs estimated that over 1.5 billion gallons of diesel fuel may be lost annually to long-duration idling (Gaines, Vyas and Anderson 2006). Estimates of fuel consumption range from 1,800 to 2,400 gallons of fuel per truck, per year. Establishing an idling policy related to the use of main engine operations during overnight parking and waiting during shipment drop-off and pick up can significantly affect performance in a manner similar to that achieved with the implementation of idle-reduction technologies.
Reduced Warm-up Time: New engine technologies are reducing the need for engine warm-up and warm-down periods. Here again, any actions to reduce warm-up time serves a similar purpose as an effort to reduce idling time.

Required Use of Electric Wayside Facilities: More truck stop facilities are beginning to outfit their parking areas with connections for electrical power, Internet service, HVAC, and other similar devices. The use of these facilities offers a more efficient means of accessory operations than running the main power unit. Mandating their use when available offers another means to reduce vehicle idling and gain the related fuel performance improvements.
Maximum Speed Policy: As noted earlier, speed reduction strategies can significantly reduce fuel consumption. As an alternative to system installation such as governors, such a policy can achieve much of the same benefit with compliance.

Driver Training for Fuel Performance: Variation in performance due to driver skills and practices can be significant. Some estimates of fuel performance improvement resulting from driving skills suggest as much as a 35% difference (Kilcarr 2006B). The benefits of training vary a great deal more than the implementation of particular systems; however, training may very well be one of the most inexpensive and productive ways to improve performance.

Fuel Performance Benchmarking: Fuel performance benchmarking employs an incentive plan to encourage drivers to focus more on their driving habits. Some companies will use benchmark criteria combined with financial incentives to motivate drivers to pay attention and change behaviors that will contribute to improved performance.

Required Maintenance: Maintenance operations support fuel performance by assessing the wear and tear on fleet operations and ensuring that fuel systems, air intake systems, drive systems and so forth, remain in top working order.

Information System Technologies
Information system technologies support improvements in fleet fuel performance by helping identify and implement improvements in the routing and scheduling of fleet operations and by providing systems to monitor ongoing performance as a base from which to implement improvements in systems and training.

Wireless Transportation Management Systems: Satellite-based transportation management systems (TMS) provide a means to communicate with drivers and monitor unit operation. System features can include the monitoring of truck operations from speed, to fuel consumption, to other more detailed engine operating factors. Such systems can also provide updated information regarding routing to help drivers circumvent areas of congestion and improve fuel performance.

Onboard Fuel/Systems Performance Monitoring: Onboard monitoring systems help drivers to better monitor their fuel consumption and adopt habits that may help improve fuel performance.
Fuel Management Systems: While they don't directly influence fuel performance, fuel management systems help improve overall fleet fuel costs by providing information regarding fueling locations that offer lower fuel prices considering their current fuel levels and present and future routing.

Advanced Routing and Scheduling Systems: Routing and scheduling systems help improve fuel performance by scheduling pickup and delivery activities to reduce potential idling. They also support better performance by directing drivers to loads that minimize empty driving time and help improve load planning and fuel consumption per load.

Appendix F – Net Return and Simple Payback Calculation Results

Return and Payback Period for Single New Tractor and Trailer Combination[1]							
Annual Net Return (36 month note)	Price per gallon			Simple Payback (Years)	Price per gallon		
Annual Mileage	$ 2.50	$ 3.00	$ 3.50		$ 2.50	$3.00	$ 3.50
45,000	$ 210.01	$ 585.01	$ 960.01		2.29	1.91	1.64
55,000	$ 626.68	$ 1,085.01	$ 1,543.35		1.88	1.56	1.34
65,000	$ 1,043.35	$ 1,585.01	$ 2,126.68		1.59	1.32	1.13
75,000	$ 1,460.01	$ 2,085.01	$ 2,710.01		1.38	1.15	0.98
85,000	$ 1,876.68	$ 2,585.01	$ 3,293.35		1.21	1.01	0.87
95,000	$ 2,293.35	$ 3,085.01	$ 3,876.68		1.09	0.91	0.78
105,000	$ 2,710.01	$ 3,585.01	$ 4,460.01		0.98	0.82	0.70
115,000	$ 3,126.68	$ 4,085.01	$ 5,043.35		0.90	0.75	0.64

Return and Payback Period for Upgrading One Tractor and Trailer Combination							
Annual Net Return (36 month note)	Price per gallon			Simple Payback (Years)	Price per gallon		
Annual Mileage	$ 2.50	$ 3.00	$ 3.50		$ 2.50	$3.00	$ 3.50
45,000	$ 545.54	$ 845.54	$ 1,145.54		1.64	1.37	1.17
55,000	$ 878.87	$ 1,245.54	$ 1,612.20		1.34	1.12	0.96
65,000	$ 1,212.20	$ 1,645.54	$ 2,078.87		1.14	0.95	0.81
75,000	$ 1,545.54	$ 2,045.54	$ 2,545.54		0.99	0.82	0.70
85,000	$ 1,878.87	$ 2,445.54	$ 3,012.20		0.87	0.73	0.62
95,000	$ 2,212.20	$ 2,845.54	$ 3,478.87		0.78	0.65	0.56
105,000	$ 2,545.54	$ 3,245.54	$ 3,945.54		0.70	0.59	0.50
115,000	$ 2,878.87	$ 3,645.54	$ 4,412.20		0.64	0.54	0.46

[1] Assumptions outlined in Table 4.

Return and Payback Period for New Tractor and Three Trailers							
Annual Net Return, (36 month note)	Price per gallon			Simple Payback (Years)	Price per gallon		
Annual Mileage	$ 2.50	$ 3.00	$ 3.50		$ 2.50	$3.00	$ 3.50
45,000	$ (1,493.69)	$ (1,118.69)	$ (743.69)		4.64	3.87	3.31
55,000	$ (1,077.03)	$ (618.69)	$ (160.36)		3.80	3.16	2.71
65,000	$ (660.36)	$ (118.69)	$ 422.97		3.21	2.68	2.29
75,000	$ (243.69)	$ 381.31	$ 1,006.31		2.78	2.32	1.99
85,000	$ 172.97	$ 881.31	$ 1,589.64		2.46	2.05	1.75
95,000	$ 589.64	$ 1,381.31	$ 2,172.97		2.20	1.83	1.57
105,000	$ 1,006.31	$ 1,881.31	$ 2,756.31		1.99	1.66	1.42
115,000	$ 1,422.97	$ 2,381.31	$ 3,339.64		1.82	1.51	1.30

Return and Payback Period for Upgrading Tractor and Three Trailers							
Annual Net Return (36 month note)	Price per gallon			Simple Payback (Years)	Price per gallon		
Annual Mileage	$ 2.50	$ 3.00	$ 3.50		$ 2.50	$3.00	$ 3.50
45,000	$ (1,158.17)	$ (858.17)	$ (558.17)		4.58	3.81	3.27
55,000	$ (824.84)	$ (458.17)	$ (91.50)		3.74	3.12	2.67
65,000	$ (491.50)	$ (58.17)	$ 375.16		3.17	2.64	2.26
75,000	$ (158.17)	$ 341.83	$ 841.83		2.75	2.29	1.96
85,000	$ 175.16	$ 741.83	$ 1,308.50		2.42	2.02	1.73
95,000	$ 508.50	$ 1,141.83	$ 1,775.16		2.17	1.81	1.55
105,000	$ 841.83	$ 1,541.83	$ 2,241.83		1.96	1.63	1.40
115,000	$ 1,175.16	$ 1,941.83	$ 2,708.50		1.79	1.49	1.28

Return and Payback Period for New Tractor and Three Trailers							
Annual Net Return (48 month note)	Price per gallon			Simple Payback (Years)	Price per gallon		
Annual Mileage	$ 2.50	$ 3.00	$ 3.50		$ 2.50	$3.00	$ 3.50
45,000	$ (772.85)	$ (397.85)	$ (22.85)		4.64	3.87	3.31
55,000	$ (356.19)	$ 102.15	$ 560.48		3.80	3.16	2.71
65,000	$ 60.48	$ 602.15	$ 1,143.81		3.21	2.68	2.29
75,000	$ 477.15	$ 1,102.15	$ 1,727.15		2.78	2.32	1.99
85,000	$ 893.81	$ 1,602.15	$ 2,310.48		2.46	2.05	1.75
95,000	$ 1,310.48	$ 2,102.15	$ 2,893.81		2.20	1.83	1.57
105,000	$ 1,727.15	$ 2,602.15	$ 3,477.15		1.99	1.66	1.42
115,000	$ 2,143.81	$ 3,102.15	$ 4,060.48		1.82	1.51	1.30

Return and Payback Period for Upgrading Tractor and Three Trailers							
Annual Net Return (48 month note)	Price per gallon			Simple Payback (Years)	Price per gallon		
Annual Mileage	$ 2.50	$ 3.00	$ 3.50		$ 2.50	$3.00	$ 3.50
45,000	$ (589.37)	$ (289.37)	$ 10.63		4.58	3.81	3.27
55,000	$ (256.04)	$ 110.63	$ 477.30		3.74	3.12	2.67
65,000	$ 77.30	$ 510.63	$ 943.96		3.17	2.64	2.26
75,000	$ 410.63	$ 910.63	$ 1,410.63		2.75	2.29	1.96
85,000	$ 743.96	$ 1,310.63	$ 1,877.30		2.42	2.02	1.73
95,000	$ 1,077.30	$ 1,710.63	$ 2,343.96		2.17	1.81	1.55
105,000	$ 1,410.63	$ 2,110.63	$ 2,810.63		1.96	1.63	1.40
115,000	$ 1,743.96	$ 2,510.63	$ 3,277.30		1.79	1.49	1.28

Appendix G – Idle Reduction Technologies

Auxiliary Power Systems

Auxiliary power systems are installed on the truck to provide electrical, thermal, or mechanical power for some or all of the options that would normally require the truck engine to idle. These devices include Auxiliary Power Units/Generator sets, fuel cells, and battery packs (CARB 2004).

Auxiliary Power Units/Generator Sets

An auxiliary power unit is a truck mounted device that uses a small horsepower diesel engine to provide heat and air conditioning, charge batteries and provide electrical power and on-board accessories (e.g. televisions, microwaves, and computers). Generators use a small engine that converts mechanical energy to electricity which is then used to operate resistance heaters or heat pumps, air conditioners, battery chargers, and other hotel loads. The auxiliary power unit typically uses diesel fuel from the vehicle's fuel system at a rate of 0.08 to 0.3 gallons/hour (Stodolsky et al., 2000), compared to the vehicle's engine idling fuel consumption rate of about one gallon/hour. For main propulsion engines older than 2003 emissions of NOx and PM will be reduced with the use of an APU. Emission controls on newer engines may have a net result of higher PM emissions from the APU, even though CO_2 emissions remain lower from the use of the APU. Additional exhaust controls on the APU can minimize the criteria pollutant emissions from this equipment. The drawbacks are their initial cost ($8-10K per unit) (Pentecost 2009), additional weight (300-500 lbs.), and maintenance requirements. Auxiliary power units and generator sets require maintenance in the form of oil and filter changes. Some studies have found that maintenance on these devices will cost approximately $1,500 per year. In addition, these devices can take one to two days to install and can add approximately $1,500 to the cost of the unit (Smartway 2009, CARB 2004).

Battery Packs

Battery packs are on board systems that heat and cool long-haul vehicles without idling the main engine or operating an auxiliary diesel engine. The system operates up to 10 hours and has a battery life of over two years. The batteries are fully charged after four to six hours of main engine operation. The entire system weighs 210 pounds and can be installed under the bunk bed in the sleeper berth. The drawbacks of this system are that it may not fully meet the ancillary power needs of the sleeper berth (CARB 2004), it can take six to eight hours to install at an approximate cost of $560 (Smartway 2009), and maintenance costs run about $1,500 per year. The price range for this system is $3-7 thousand per unit (Pentecost 2009).

Fuel Cells

An auxiliary power system that has a promising future in eliminating truck idling emissions is the fuel cell. A fuel cell produces electricity by converting the chemical energy of fuel directly to electrical power in a controlled chemical reaction. Fuel cells are clean and efficient. They can provide sufficient power to heat or cool a cab/sleeper compartment and run on-board electrical equipment. Fuel cells are expected to be commercially viable within ten to fifteen years.

However, technical and economic issues, such as availability and infrastructure of a suitable fuel, the production costs of the units, and integration of the units with other on-board truck systems need to be overcome before these systems can become cost-effective for commercial truck operators (CARB 2004).

Direct Fired Heaters

Direct Fired heaters provide cab and sleeper heat and/or preheat the engine block without idling the trucks engine. Different models exist for a variety of applications. The units are safe, reliable, relatively small and lightweight, consume a small amount of fuel, raise the temperature gradually and evenly, are relatively inexpensive, and emissions are extremely low. The units can operate anywhere; they typically tap into the fuel and power supply of the vehicle, avoiding the need for external hook ups. Fuel operated heaters can take about 6 hours to install which adds approximately $480 to the total cost (Smartway 2009, CARB 2004), and an estimated $750 per year in maintenance costs (Pentecost 2009).

A report by the U.S. EPA shows that diesel fuel-fired heaters reduce nitrogen oxide emissions by approximately 99 percent and fuel consumption by 50 to 80 percent (U.S. EPA, 2002). They also enhance the performance of temperature sensitive exhaust controls. The drawbacks of this technology are its inability to provide cooling and its use of the truck's battery power for operation. The cost of fuel-fired heaters ranges from $1,000 – 1,500 per unit (Pentecost 2009, U.S. EPA, 2003).

Thermal Storage Systems and Energy Recovery Systems

A thermal storage system stores energy from the vehicle's air conditioning system in cold storage as the truck is driven, then provides air conditioning when the engine is off. A fuel operated heater can be combined with this technology to provide heat. This system does not consume any direct fuel, emits no noise or pollution, and weighs about 330 lbs (Smartway 2009). The cost ranges from $5,000-7,000 per unit (Pentecost 2009).

An energy recovery system recovers the stored heat energy from the engines coolant by continuing the circulation of the hot coolant through the cab heater, thereby keeping the vehicle interior warm after the engine is turned off. In warm weather, the System also provides cab ventilation with the Autovent feature that keeps excess heat from building up in a stationary vehicle cab. The system burns no fuel, emits no pollution, uses very little electrical power, is easy to install (<three hours), and weighs five lbs (CSS 2009). An ERS costs between $1,000 – $1,500 per unit (Pentecost 2009).

Electronically Controlled Idle Limiters

Idle limit controls are software based and include idle shutdown timers and automatic stop-start systems.

Idle shutdown timers are standard features in most modern electronically controlled heavy-duty engines. The system is built into the engine's electronic control software and can be programmed to shutdown the engine automatically if it is left to idle for more than the programmed time (e.g. between two to 1,440 minutes in Cummins Inc. engines and three to 60 minutes in Caterpillar

Inc. engines). The system can also electronically turn off the ignition to avoid battery discharge that may occur if accessories such as lights, or the radio, were left in the “on” position during engine shutdown.

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 pre-set limits. Currently several manufacturers, including Detroit Diesel Corp., Cummins Inc., Caterpillar Inc., and Mack Trucks Inc., offer this feature as a factory option. For safety purposes, the system only works when the parking brake is engaged with the transmission in neutral, the hood engine/compartment closed, and the ignition key in the "on" position. The system is disabled by turning off the ignition or when the vehicle is being driven. An "engine only” mode or a "cab comfort” mode are available. The “engine only” mode monitors engine oil temperature and battery voltage, while the "cab comfort” mode includes monitoring of engine mode parameters as well as sleeper berth temperature. The system includes a sensor for monitoring the outside ambient temperature so that under extreme ambient conditions the engine runs continuously.

The effect of the automatic stop-start system on engine run time and reduction in idling time varies based on several major factors: ambient temperature and humidity, drivers preferred temperatures, use of on-board accessories, air conditioning system efficiencies, and floor and sleeper wall insulating capabilities. The system does not add weight to the truck and does not require separate maintenance. However, the periodic stop and restart of the engine is frequently cited as a disturbance to the sleeping driver. It could be more readily applied in medium duty settings where workday idling may be more common and where fuel consumption may be reduced by 3 percent (Duleep 2008). To minimize driver discomfort, the technology has been developed such that the engine speed slowly increases during start-up and slowly decreases before shutdown. Also, this technology still requires the inefficient use of the vehicle engine to meet ancillary needs (CARB 2004). Electronically controlled idle limiters retail from $100-500 (Pentecost 2009).

Truck Stop Electrification

Truck stop electrification refers to an independent electrical system that provides a vehicle with an alternate source of power, eliminating the need to idle the primary engine. This technology provides trucks with electrical power to run heating, air conditioning, and ancillary appliances. The U.S. Department of Energy maintains a list of truck stop electrification locations (DOE 2010). They report 10 operating locations in 6 states: Shorepower (6), Envirodock (2), and CabAire (2); with three Shorepower facilities in Oregon (Coburg and Portland, off I-5 and Klamath Falls, off U.S. 97). IdleAire declared bankruptcy in May 2008. Unable to find a buyer for their assets, they ceased operations in January 2010, closing 131 locations in 34 states. Subsequently the company has been restructured and is resuming operations currently at 10 locations, anticipating another nine by the end of 2010.

Dual-System Truck Stop Electrification

Dual-system electrification, also known as shorepower, requires both on- and off-board equipment so trucks can plug into electrical outlets at the truck stop. To use dual-system electrification, trucks must be equipped with an inverter to convert 120-volt power, electrical

equipment—possibly including an electrical heating, ventilation and air conditioning system—and the hardware to plug into the electrical outlet.

Truck stop outlets are owned by the truck stop or by a private company that regulates use and fees. Onboard equipment is owned and maintained by the trucking company (USDOE 2010).

The drawbacks of this system include the high initial truck stop infrastructure cost, cost for equipment add-ons to trucks, and its limited availability. Shorepower infrastructure cost per parking space is $5,000-8,500. Truck modification costs range from $15.00 for an extension cord to more extensive truck inlets such as a simple cab plug ($180) to full on-board electric HVAC ($1,800). Shorepower user fees are $0.75 - $1/hour (Bates 2009).

Figure 15 Shorepower Truck Idling Electrification System

Single-System Truck Stop Electrification

With single-system electrification, such as CabAire, off-board equipment at the truck stop provides heating, air conditioning, vehicle and idle detection, lighting security cameras, and cable and internet connections. These systems are contained in a structure next to the truck parking spaces. A hose from the heating, ventilation and air conditioning system is connected to the truck window and, in most cases, to a computer touch screen that enables payment.

Figure 16 CabAire Truck Idling Electrification System

These stand-alone systems are generally owned and maintained by private companies that charge an hourly fee. To accommodate the heating, ventilation and air conditioning hose, an inexpensive window template must be installed in the truck (USDOE 2010).

The drawbacks are infrastructure installation and maintenance costs, diesel odors, limited availability, and the need for significant government subsidies for more rapid implementation. The hourly cost can be excessive for some long-haul drivers who take a federally-required 10 hour rest after 11 hours on the road and pay for this cost on their own. The potential for diminished parking capacity due to infrastructure space demands may also pose additional issues for truck stop owners and operators. The infrastructure cost is approximately $10,000 per parking space and may vary depending on the number of parking spaces installed (CARB 2004).

Appendix H – Comparison of Idle Reduction Technologies

Technology	Initial Cost	Operational Charge	Fuel Saving/yr[1]	Maintenance Saving/yr	Benefits	Drawbacks
Auxiliary Power Systems						
Auxiliary Power Unit	$ 8-10K per unit	.2 gph $360	$ 4,500	$ 1,500	HVAC and power, remote use, "stand alone"	Heavy, large , expensive, maintenance, emissions
Battery Pack (Electric APU - A/C and heat)	$3-7K per unit	$0	$4,860	$1,500	HVAC anywhere, no noise or emissions	Inadequate ancillary power, limited use away from grid, initial cost, adds weight
Fuel Cell					HVAC and power, clean, efficient	Not available for 10-15 years and currently not cost effective
Direct fired Heater [2]	$ 1-1.5K per unit	0.2 gph $36	$2,250	$750	Heat anywhere; small, inexpensive, safe, reliable, raises temperature gradually and evenly	No A/C or power, requires battery power; enhances performance of temperature sensitive exhaust controls, some emissions
Thermal Storage System	$5-7K per unit	$0	$2,250	$750	HVAC for cab/sleeper only, anywhere; does not consume any direct fuel, emits	Large mass of storage medium, requires battery power, limited use

Technology	Initial Cost	Operational Charge	Fuel Saving/yr[1]	Maintenance Saving/yr	Benefits	Drawbacks
					no noise or pollution	
Energy Recovery System	$1-1.5K per unit	$0	$2,250	$750	Burns no fuel, no emissions, uses little electrical power, easy to install (<3 hours), weighs 5 lbs, auto-ventilation in warm weather	No A/C or power, limited use
Electronically Controlled Idle Limiter	$ 100-500	$0	$ 2,250	$ 750	Prevents idling, intermittent services anywhere, no added weight or separate maintenance	Uses main engine; noise disrupts rest; no A/C, heat or power

Improving Truck Efficiency and Reducing Idling

Technology	Initial Cost	Operational Charge	Fuel Saving/yr[1]	Maintenance Saving/yr	Benefits	Drawbacks
Truck Stop Electrification						
Dual-System (Shorepower)	$ 5-8.5K per parking space, $15 (extension cord) - $1800 (full onboard HVAC)	$.75 (power only) - $1 (power & TV), lower with negotiated guaranteed usage	$ 4,860	$ 1,500	HVAC and power, no emissions	High infrastructure and maintenance costs, limited availability, use fees excessive for some drivers, requires electric upgrades to truck
Single-System (CabAire)	$ 10K per parking space	$ 1.85 -2.89 per hr per truck	$ 4,860	$ 1,500	HVAC and power, no emissions	High infrastructure and maintenance costs, limited availability, potential reduced parking capacity, odor issues

[1] Fuel savings/yr based on $ 2.70/gal of diesel and an average of 1,800 idle hours/yr.
[2] Technology can operate to provide heat in cold weather
Data provided by Pentecost (2009), except Shorepower costs (Bates 2009).

Appendix I – Compendium of Idling Regulations

COMPENDIUM OF IDLING REGULATIONS

The information in this table is for reference purposes only and should not be relied upon for regulatory compliance. This information may contain errors and omissions and is subject to change. Actual state, county or city codes should be referenced for specific requirements. On-line users may access these codes by clicking on the individual regulations.

State	Maximum Idling Time	Exemptions
Arizona, Maricopa County	**5 minutes** (30 min. for bus passenger comfort or 60 min/90 min if greater than 75° F) Fines: $100 – 1st violation $300 – 2nd+ violations	• Traffic or adverse weather conditions • Emergency or law enforcement purposes • Power takeoff involving cargo or work functions • Conform to manufacturer's specifications • Maintenance or diagnostics • Hours of service compliance
Maricopa County Vehicle Idling Restriction Ordinance. Maricopa County Air Quality Department (602) 506-6010, www.maricopa.gov/aq		
California	**5 minutes** Fines: Minimum $300 Subsequent penalties can range from $1,000 to $10,000	• Bus passengers are onboard or 10 minutes prior to boarding • Traffic conditions • Queuing beyond 100' of residential • Adverse weather conditions or mechanical difficulties • Vehicle safety inspection • Service or repair

		• Power takeoff involving cargo or work functions • Prevent safety or health emergency • Emergency vehicles
CA Code of Regs, Title 13, Div. 3, Art. 1, Ch. 10, §2485. California Air Resources Board (800) 242-4450, www.arb.ca.gov		
California, **City of Sacramento**	**5 minutes** (prohibits refrigeration unit operation within 100' of residential or school unless loading/unloading) Fines: Not <$100 nor >$25,000 per violation *(Title 1, Ch.1.28.010)*	• Traffic conditions/control • Traffic conditions • Vehicle safety inspection • Service or repair • Conform to manufacturer's specifications • Power takeoffs involving cargo or work functions • Prevent safety or health emergency • Hours of service compliance @ truck/rest stop • To recharge hybrid electric vehicles
Sacramento City Code, Title 8, Ch. 8.116. City of Sacramento Department of Transportation (916) 264-5011, www.cityofsacramento.org/transportation		
California, **Placer County**	**5 minutes** (prohibits refrigeration unit operation within 1000' of residential or school unless loading/unloading) Fines: $50 Minimum	• Traffic conditions/control • Traffic conditions • Vehicle safety inspection • Service or repair • Conform to manufacturer's specifications • Power takeoffs involving cargo or work functions • Prevent safety or health emergency • Hours of service compliance @ truck/rest stop • To recharge hybrid electric vehicles • Operate intermittent equipment • Alternatively fueled vehicles • Attainment areas
Placer County Code, Article 10.14. Placer County Air Pollution Control District (530) 745-2330 www.placer.ca.gov/airpollution/airpolut.htm		
Colorado, **City of Aspen**	**5 minutes within any 1 hour** Fines: $1,000 maximum and/or 1 year imprisonment *(§1.04.080)*	• Safety reasons • To achieve an engine temperature of 120° F and an air pressure of 100 lbs/square inch
City of Aspen Municipal Code §13.08.110. Aspen Environmental Health Department (970) 920-5039, http://www.aspenpitkin.com/depts/44/		
Colorado, **City & County of Denver**	**10 minutes in any 1-hour period** Fines: Not >$999 and/or 1-year	• Less than 20° F for previous 24-hour period • Less than 10° F • Emergency vehicles

	imprisonment *(DMC §1-13)*	• Traffic conditions • Being serviced • Auxiliary equipment
Denver Municipal Code §4-43. Denver Department of Environmental Health, Division of Environmental Quality, (720) 865-5452, http://www.denvergov.org/DEQ, http://www.denvergov.org/DEQ		
Connecticut	**3 minutes** Fines: Not >$5,000 per week *(RCSA Title 22a §174-12(c))*	• Traffic conditions or mechanical difficulties • Ensure safety or health of driver/passengers • Auxiliary equipment • Conform to manufacturer's specifications • Less than 20° F • Maintenance • Queuing to access military installation
Regulations of Connecticut State Agencies Title 22a, §174-18(b)(3). State of Connecticut Department of Environmental Protection; Bureau of Air Management (860) 424-3027, www.dep.state.ct.us		
Delaware	**3 minutes** (15 minutes: 32° to -10° F; No limit: Less than -10° F) Fines: $50 - $500 per offense *(Title 7, Ch. 60, §6005 & §6013)*	• Traffic conditions or mechanical difficulties • Conform to manufacturers specifications • Repair • Emergency vehicles • Using auxiliary equipment/power take off • Power during sleeping or resting beyond 25 miles of truck stop with available electrified equipment • Vehicle safety inspections
Regulation 45, Excessive Idling of Heavy Duty Vehicles. Delaware Division of Air & Waste Management (302) 739-9402, www.awm.delaware.gov/		
District of Columbia	**3 minutes** (5 minutes if less than 32° F) Fines: $500, doubles for each subsequent violation	• Power takeoff
District of Columbia Municipal Regulations Title 20, §900.1. District of Columbia Department of Health Environmental Health Administration Air Quality Division (202) 535-2257, www.dchealth.dc.gov		
Florida	**5 minutes** Fines: TBD	• Traffic conditions • Emergency or law enforcement purposes • Verify vehicle is safe to operate • Power work-related operations • Prevent safety or health emergency • Sleeping or resting in a sleeper berth (*exemption expires Sept. 30, 2013*)

Heavy-Duty Vehicle Idling Reduction. Department of Environmental Protection, Air Resource Management (850) 488-0114, www.dep.state.fl.us/Air		
Georgia, **City of Atlanta**	**15 minutes** (25 minutes if less than 32°F for passenger comfort/safety) Fines: $500 minimum	• To perform needed work • Traffic conditions • Natural gas or electric vehicles
Code of Ordinances §150-97(c). City of Atlanta, Office of Transportation (404) 330-6501, www.atlantaga.gov/Government/PublicWorks		
Hawaii	"No person shall cause, suffer, or allow any engine to be in operation while the motor vehicle is stationary at a loading zone, parking or servicing area, route terminal or other off street areas…" (3 minutes for start up/cool down or passenger loading/unloading) Fines: Not <$25 nor >$2,500 per day *(106 HRS §342B-47)*	• Adjustment or repair • Auxiliary equipment or power takeoff • Passenger loading/unloading = 3 min. • At start-up and cool down for more than 3 min.
Hawaii Administrative Rules §11-60.1-34. Hawaii State Department of Health, Clean Air Branch (808) 586-4200, http://www.hawaii.gov/health/environmental/air/cab/index.html		
Illinois Cities: Aux Sable, Goose Lake, Oswego Counties: Cook, DuPage, Lake, Kane, McHenry, Will, Madison, St. Claire, Monroe	**10 minutes within any 60 minute period** (30 minutes within any 60 minute period: Waiting to weigh, load or unload freight; No limit: Less than 32° F or greater than 80° F) Fines: $90 – 1st conviction; $150 – 2nd & subsequent convictions in 12 month period	• Less than 8,000 lbs. GVWR • Traffic conditions/controls • Prevent a safety or health emergency • Emergency or law enforcement purposes • Service or repair • Government inspection • Power takeoffs involving cargo or work functions • Resting in a sleeper berth • Mechanical difficulties • Queuing
625 Illinois Combined Statute 5/11-1429. Illinois Department of Transportation (217) 782-7820, www.dot.state.il.us		
Illinois, **Chicago**	**3 minutes in any 60-minute period** **(**No limit: <32° F or >80° F) Fines: $250	• Emergency vehicles • Power auxiliary equipment • Service or repair or government inspection • Traffic conditions • Idle reduction technologies • Mechanical difficulties • Exhaust filter regeneration

http://www.amlegal.com/library/il/chicago.shtml. City of Chicago, Department of Environment (312) 744-7606, http://Cityof Chicago.org		
Maine	**5 minutes in any 1 hour period** (No limit: < 0º F; 15 min/hr: 0º - 32º F) Fines: $25 - $500 – 1st offense; $150 - $500 for each subsequent offense *(MRSA §585-K(5))*	• Traffic conditions • Prevent safety or health emergency • Emergency or law enforcement purposes • Maintenance, servicing, repairing, or diagnostic purposes • State or federal inspections • Power work-related operations • Sleeper berth a/c or heat during rest or sleep periods • A/C or heat while waiting to load/unload • Mechanical difficulties if receipt of repair is submitted w/in 30 days
Public Law, Chapter 582. Maine Bureau of Motor Vehicles (207) 624-9000, www.maine.gov/sos/bmv		
Maryland	**5 minutes** Fines: Not <$500 (MC § 27-101(b))	• Traffic conditions or mechanical difficulties • Heating, cooling or auxiliary equipment • Conform to manufacturer's specifications • Accomplish intended use
Maryland Transportation Code §22-402(c)(3). Maryland Department of the Environment (410) 537-3000, www.mde.state.md.us		
Massachusetts	**5 minutes** Fines: Not <$100 - 1st offense Not <$500 for each succeeding offense	• Being serviced • Delivery for which power is needed & alternatives unavailable • Associate power needed & alternatives unavailable
General Laws of Massachusetts Ch. 90: § 16 A. Massachusetts Department of Environmental Protection (617) 292-5500, www.mass.gov/dep		
Michigan, Detroit	**5 consecutive minutes in any 60 minute period** **Fines:** 1st = Warning 2nd = $150 to operator and/or $500 to owner	• Traffic conditions • Power auxiliary equipment • Emergency vehicles • Motionless for >2 hours & <25°F • State inspections • Hybrid vehicle recharging • Electric, hydrogen or natural gas powered vehicles
Detroit City Code, Part 3, Sec 55-6-91. Detroit Police Department, Parking Enforcement Hotline (313) 967-1752, www.detroitmi.gov		

Minnesota, Minneapolis	**0 minutes in residential areas between 10 p.m. and 6 a.m.** (including refrigeration units) Fines: $700 maximum and/or 90 days imprisonment *(Title 1, Ch. 1)*	• Permitted construction equipment • Compliance with traffic signals or signs • Emergency or law enforcement purposes
Code of Ordinances, City of Minneapolis, Minnesota, Title 15, Ch. 389.100(7) & (8). Minneapolis Environmental Management (612) 673-5897, www.ci.minneapolis.mn.us/environment/		
Minnesota, City of Owatonna	**15 minutes each 5 hours in residential areas** Fines: $1,000 maximum and/or 90 days imprisonment *(Chapter XI, Section 1100:00)*	• None
Owatonna City Code, Chapter IX, Section 900:10. City of Owatonna (507) 444-4300, www.ci.owatonna.mn.us		
Minnesota, City of St. Cloud	**5 minutes**, **West St. Germain Street from 8th to 10th Avenue** Fines: Not <$200 *(SCOO §706:35)*	• None
St. Cloud City Ordinance §700:90. City of St. Cloud, Parking Violations (320)255-7209, www.ci.stcloud.mn.us		
Missouri Counties: Clay, Franklin, Jackson, Jefferson, Platte, St. Charles, St. Louis	**5 minutes in any hour** **(**30 minutes/hour when waiting to load/unload) Fines: TBD	• Traffic conditions/controls • Prevent safety/health emergency • Emergency purposes • Maintenance/repair • State or federal inspections • Power work-related operations • During government-mandated rest periods • Mechanical difficulties • Auxiliary power units
Missouri Code of State Regulations, Division 10, Chapters 2.390 and 5-385. Missouri Department of Natural Resources, Division of Environmental Quality (573) 751-4817, www.dnr.mo.gov/env/apcp/index.html		

Missouri, **City of St. Louis**	**5 minutes in any hour** (10 minutes if > 32º F) Fines: Up to $100	• Emergency vehicles • Transporting special needs persons • Power for auxiliary purposes • Traffic or adverse weather conditions • Repair or diagnostics • Engaged in the delivery of goods
St. Louis City Ordinance 68137. City of St. Louis, Department of Air Pollution Control (314) 613-7300, www.stlouis.missouri.org/citygov/airpollution		
Missouri, **St. Louis County**	**3 consecutive minutes** Fines: Maximum $1,000 and/or 1 year imprisonment (§612.390)	• Operating a loading, unloading, or processing device • Emergency vehicles
St. Louis County Air Pollution Control Code §612.340. St. Louis County Air Pollution Control (314) 615-8924, http://www.co.st-louis.mo.us/doh/environ/airpollut		
Nevada	**15 minutes** Fines: Not <$100 nor >$500 – 1st; Not <$500 nor >$1,000 – 2nd; Not <$1,000 nor >$1,500 – 3rd; Not <$1,500 nor >$2,500 – 4th and subsequent offense(s) over a 3-year period *(NAC445B.727)*	• Variance has been issued • Emergency vehicles • Snow removal equipment • Repair or maintain other vehicles • Traffic congestion • Maintenance at repair facility • Emission contained & treated per Commission • To perform specific task
NV Administrative Code Ch. 445B.576. Nevada Division of Environmental Protection; Bureau of Air Pollution Control (775) 687-9350, www.ndep.nv.gov/bapc		
Nevada, **Clark County**, (including Las Vegas)	**15 minutes** Fines: Not >$10,000 (CCA*AQR §09)*	• Variance has been issued • Emergency vehicles • Repair or maintain other vehicles • Traffic congestion • Emission contained & treated per Control Officer • To perform a specific task • Maintenance at repair facility
Clark Co. Air Quality Regs. §45. Clark County Department of Air Quality Management (702) 455-5942, http://www.accessclarkcounty.com/depts/daqem/aq/		

Nevada, **Washoe County** (including Reno)	**15 minutes** Fines: Not >$250 – 1st offense Not <$250 nor >$500 – 2nd and subsequent offenses *(WCDBHR §020.040(E))*	• Emergency vehicles • Snow removal equipment • Repair or maintain other vehicles • Traveling on public right-of-way • To perform specific task • Maintenance at repair facility
Washoe Co. District Board of Health Regs. §040.200. Washoe County District Health Department, Air Quality Management (775) 784-7200, www.co.washoe.nv.us/health		
New Hampshire	**5 minutes if greater than 32° F** (15 minutes: 32° F to -10° F) Fines: TBD	• Traffic conditions • Emergency vehicles • Power takeoff or heat/cool passengers • Maintenance or diagnostics • Defrost windshield • Less than -10° F
Air Resources Division Admin. Rules Env-A 1101.05. New Hampshire Department of Environmental Services, Air Resources Division (603) 271-1370, www.des.state.nh.us		
New Jersey	**3 minutes** (15 min. if stopped for ≥ 3 hrs. & < 25º F) Fines: $100 for 1st; $200 for 2nd; $500 for 3rd; $1,500 for 4th & subsequent offenses *(NJAC 7:27A3.10(m)(14))* Penalties: For commercial vehicle and property owner, $250 for first violation, $500 for second violation, $1000 for third and each subsequent violation.	• Traffic conditions • Mechanical operations • Waiting or being inspected • Performing emergency services • Being repaired or serviced • Use of sleeper berth in non-residential areas (before April 30, 2011) • Auxiliary power unit/generator set, bunk heaters, etc. • Sleeper berth with 2007 or newer engine or diesel particulate filter (after April 30, 2011)
New Jersey Administrative Code Title 7, Ch. 27-14.3. New Jersey State Department of Environmental Protection, Air Quality Management, Regulatory Development (609) 292-2795, www.state.nj.us/dep/aqm		
New York	**5 minutes** Fines: Not <$375 nor >$15,000 – 1st offense; Not >$22,500 – 2nd offense &	• Traffic conditions • Comply with passenger comfort laws • Auxiliary power or maintenance • Emergency vehicles • Within mines or quarries

	subsequent offenses *(NYSCL Ch. 43-B §71,2103(1))*	• Parked for more than 2 hrs & less than 25° F • State Inspections • Recharging hybrid electric vehicles • Farm vehicles • Electric vehicles
New York Code of Rules & Regulations Title 6, Ch. 3 Part 217-3.2. New York State Department of Environmental Conservation; Division of Air Resources (518)402-8292, www.dec.ny.gov		
New York City	**3 minutes** (1-minute if adjacent to a public school) Fines: Not <$50 nor >$500 and/or imprisonment for 20 days – 1st; Not <$100 nor >$1,000 and/or imprisonment for not >30 days – 2nd offense; Not <$400 nor >$5,000 and/or imprisonment for not >4 months – 3rd & subsequent offenses. *(NYCAC 24-190(g))*	• Emergency vehicles • Operate loading, unloading or processing device
New York City Administrative Code Title 24-163. New York City Department of Environmental Protection (212) 639-9675, www.nyc.gov/dep		
New York, New Rochelle	**5 minutes** Fines: Not more than $50 and/or 15 days imprisonment – 1st offense; Not more than $100 and/or 45 days imprisonment – 2nd offense within 18 months; Not more than $250 and/or 90 days imprisonment – 3rd & subsequent offenses within 18 months *(CCNR §312-68)*	• Traffic conditions • Comply with passenger comfort laws • Auxiliary power or maintenance • Emergency vehicles • Within mines or quarries • Parked for more than 2 hrs & less than 25° F • State Inspections • Recharging hybrid electric vehicles • Farm vehicles • Electric vehicles
Code of the City of New Rochelle, Part II, Ch. 312, Art. II, §312-33. City of New Rochelle, Code Enforcement/Abatement (914) 654-2051, www.newrochelleny.com		
New York, Rockland County	**3 consecutive minutes** Fines: Not >$250 and/or 15 days imprisonment for 1st; not >$1,000 and/or 15 days	• Traffic conditions • Comply with passenger comfort laws • Power for auxiliary purposes • Maintenance

	imprisonment for 2nd & subsequent offenses *(LL #4, § 4)*	• Performing emergency services
Laws of Rockland Co. Part II, Ch. 377. Rockland County Department of Health (845) 364-2512, www.co.rockland.ny.us/health		
North Carolina	**5 consecutive minutes in any 60-minute period** **Fines:** TBD	• Traffic conditions • Emergency vehicles • Power auxiliary equipment • Manufacturer's recommendations • Federally mandated rest or sleep periods (expires May 1, 2011) • Auxiliary power units • California Low-NOx idling label • Safety or health emergency • Heavy-duty farm vehicles
North Carolina Administrative CodeTitle 15A, Ch 2D, 1010, North Carolina Division of Air Quality (919) 733-3340, www.ncair.org		
Ohio, Cleveland	**5 minutes in any 60-minute period** (10 minutes/hour at loading docks/areas or if <32° F or > 85° F) Fines: $150	• Prevent safety or health emergency • Traffic condition/controls • Emergency vehicles • Service or repair • Vehicle safety inspection • Power auxiliary equipment • Sleeping or resting in a sleeper berth • Mechanical difficulties • Idle reduction technologies
Cleveland Traffic Code Ch. 341.11. City of Cleveland, Department of Public Safety (216) 664-2200, http;//www.city.cleveland,oh.us/CityofCleveland/Home		
Ohio, Maple Heights	**5 minutes in any 60-minute period** (10 minutes/hour at loading docks/areas or if <32o F or > 85o F) Fines: $150	• Prevent safety or health emergency • Traffic conditions/controls • Emergency vehicles • Service or repair • Vehicle safety inspection • Power auxiliary equipment • Sleeping or resting in a sleeper berth • Mechanical difficulties • Idle reduction technologies

Maple Heights Traffic Code Ch. 432.42. City of maple Heights, Police Department (216) 662-5885, http://mapleheights.cuyahogacounty.us/dept/police.asp		
Ohio, South Euclid	**0 minutes** (20 min./hr: Loading/unloading; No limit: <32° F or >85° F) Fines: $50 – 1st conviction $150 – 2nd & subsequent conviction in 12-month period	• Traffic conditions/controls • Prevent safety or health hazard • Emergency vehicles • Service or repair • Vehicle safety inspection • Power auxiliary equipment • Sleeping or resting in a sleeper berth • Mechanical difficulties • Idle reduction technologies • Queuing
South Euclid Traffic code Ch. 339-13. City of South Euclid, Division of Police (216) 381-1234, http://www.southeuclidpolice.com/Home.html.		
Pennsylvania	**5 minutes in any 1 hour period** (15 min/hr if sampling, weighing, or loading or unloading) Fines: $150 - $300 per offense (plus civil penalties up to $1000)	• Traffic conditions • Prevent safety or health emergencies • Comply with manufacturer's specifications • Emergency or law enforcement purposes • Maintenance or repair • Government or security inspections • Power work-related operations • Mechanical difficulties • Sleeper berth a/c or heat during rest or sleep periods when temperatures <40º F or >75 º F & parked legally (*exemption expires May 1, 2010*) • Vehicles with CARB low-NOx idle labels
Diesel Idling Reduction Rule. Department of Environmental Protection, Bureau of Air Quality (717) 787-9702, www.dep.state.pa.us/dep/deputate/airwaste/aq		
Pennsylvania, Alleghany County	**5 minutes** (20 min./hour if less than 40° F or more than 75° F) Fines: Warning – 1st offense; $100 – 2nd offense $500 – 3rd & subsequent offenses	• Traffic conditions • Boarding & discharging passengers • Queuing • Cool down/warm up per manufacturer's recommendations • Sleeping/resting in truck • Safety inspections • Ensure safe operation • Emergency vehicles • Power accessory or service equipment

		• Repair or diagnostics
County of Allegheny Ordinance No. 16782, §2105.92. Allegheny County Health Department, Air Pollution Control (412) 687-2243, ww.achd.net		
Pennsylvania, City of Philadelphia	**2 minutes or 0 minutes for layovers** (5 minutes if less than 32° F) (20 minutes if less than 20° F) Fine: $300	• None
Air Management Reg. IX §3(A). Philadelphia Department of Public Health, Air Management Services (215) 685-7578, www.phila.gov/health/		
Rhode Island	**5 minutes in any 1 hour period** (No limit: < 0º F; 15 min./hr between 0º and 32º F) Fines: Not >$100 – 1st offense; Not >$500 for each succeeding offense *(APCR §45.6)*	• Traffic conditions • Ensure health or safety of driver/passengers • Power work-related operations • Sleeper cabs during federally mandated rest periods (exemption expires July 1, 2010) • Maintenance, servicing, repairing, or diagnostic purposes • State or federal inspections • Emergency or law enforcement purposes • Auxiliary power unit/generator set
Air Pollution Control Regulation No. 45. Department of Environmental Management, Office of Air Resources (401) 222-6800, www.dem.ri.gov		
South Carolina	**10 minutes in any 1 hour period** Fines: $75 for each offense (*effective July 1, 2009*) *(SCCL §56-35-40)*	• Traffic conditions • Prevent safety or health emergency • Emergency or law enforcement purposes • Maintenance, servicing, repairing, or diagnostic purposes • State or federal inspections • Power work-related operations • Sleeper berth a/c or heat during (a) rest or sleep periods; (b) <40º F or >80 º F; or (c) at rest areas, terminals, truck stops, or legal parking locations >500' from homes or schools • While waiting to load/unload
South Carolina Code of Laws 56-35-10. State Transport Police (803) 896-5500, www.scstp.org		

Texas Cities: Arlington, Austin, Bastrop, Benbrook, Cedar Hill, Celina, Colleyville, Dallas, Elgin, Euless, Georgetown, Hurst, Hutto, Keene, Lake Worth, Lancaster, Little Elm, Lockhart, Luling, Mabank, McKinney, Mesquite, North Richland Hills, Pecan Hill, Round Rock, Rowlett, San Marcos, University Park, Westlake Counties: Bastrop, Caldwell, Collin, Hays, Kaufman, Tarrant, Travis, Williamson	**5 minutes, April – October** **(30 minutes for bus passenger comfort or transit operations)** Fine: Varies by jurisdiction	• 14,000 lbs GVW or less • Traffic conditions • Emergency or law enforcement • To perform needed work • Maintenance or diagnostics • Defrost windshield • Airport ground support • Rented/leased vehicles • Owners of rented/leased vehicles
Texas Administrative Code Title 30 § 114.512. Texas Commission on Environmental Quality (512) 239-1000, www.tceq.state.tx.us		
Utah	"A person operating or in charge of a motor vehicle may not permit the vehicle to stand unattended without: (a) stopping the engine…" Fines: Not >$750 and/or not >90 days imprisonment *(UC 76-3-204; 301)*	• None
Utah Code Title 41-6a-1403. Utah Department of Public Safety (801) 965-4461, www.publicsafety.utah.gov		
Utah, **Salt Lake County**	**15 minutes** Fines: Not >$1,000 and/or not >6 months imprisonment – 1st; Not >$2,500 and/or not >1 year imprisonment – 2nd & following offense(s) within 2 years *(UC 76-3-204; 301)*	• Power refrigeration unit if greater than 500 ft from any residence • Heat/cool sleeper berth if greater than 500 ft from any residence • Emergency vehicles
Salt Lake City-County Health Dept. Regulation #28 4.1.9. Salt Lake Valley Health Department, Environmental Health Services, Air Pollution Control (801) 313-6720, www.slvhealth.org/eh/air		

Virginia	**10 minutes for diesel vehicles (3 minutes for all other vehicles) in commercial or residential urban areas** Fines: Not >$25,000 *(CV 10.1-1316)*	• Auxiliary power
Virginia Administrative Code, Title 9, 5-40-5670(B). Virginia Dept. of Environmental Quality (804) 698-4000, www.deq.state.va.us/air		
West Virginia	**15 minutes in any 60 minute period** Fines: $150 - $300	• Traffic conditions/controls • Prevent safety or health emergency or in accordance w/ safety regulations • Emergency vehicles • Maintenance, service or repair • Federal or state inspections • Power auxiliary equipment • Security inspections • Mechanical difficulties • Sleeping or resting in a sleeper berth if <40° or > 75°F & legally parked (expires May 1, 2012) • Sampling, weighing, loading or unloading • Waiting for a police escort for a permitted load • California low-NOx idling label • Powered by clean diesel technology or biodiesel fuels
West Virginia Senate Bill No. 183. West Virginia State Police Headquarters (304) 746-2100, www.wvstatepolice.com		

Appendix J – State and Federal Anti-Idling Initiatives

Oregon Initiatives

West Coast Governors' Global Warming Initiative and the Western Climate Initiative

In 2003, Governor Theodore Kulongoski launched, with the Governors of California and Washington, the West Coast Governors' Global Warming Initiative to address the issue of climate change and outline strategies and projects to curb greenhouse emissions. The Governors approved a series of recommendations for action to combat global warming, including actions that reduce idling and greenhouse gas emissions: set new targets for improvement in performance in average annual state fleet greenhouse gas emissions; establish a plan for the deployment of electrification technologies at truck stops in each state on the I-5 corridor, on the outskirts of major urban areas, and on other major interstate routes., and explore regional activities to adopt comprehensive state and regional goals for greenhouse gas emissions reductions, standards to reduce greenhouse gas emissions from vehicles, and develop a market-based carbon allowance program. Building upon this commitment, in February 2007, Oregon joined other western states and several Canadian provinces and signed an agreement establishing the Western Climate Initiative, a joint effort to reduce greenhouse gas emissions and address climate change.

Oregon Clean Diesel Initiative

To address the concerns of diesel pollution, DEQ formed the Oregon Clean Diesel Initiative, a progressive, non-regulatory approach focused on accelerating the benefits of a clean diesel strategy, including financial assistance (grants and tax credits) and other support services. DEQ works with fleet owners and operators to offer ways they can take advantage of the benefits of diesel engines, while reducing their impact. Strategies employed include encouraging public and private diesel fleets to burn less fuel (reduced idling, vehicle efficiencies, driver training), burn cleaner fuels, install emission control devices, and replace older engines with new, cleaner engines. Fleets get help choosing the right mix of strategies for their business and in some cases, the fuel savings pays for the strategy, especially when combined with tax credits and grants (when available). DEQ also assists Oregon grant applicants in providing data, reviewing proposals and offering advice on designing a compelling project.

Fleet Forward Program

DEQ 's Fleet Forward program is part of the Initiative, giving fleets well deserved recognition for taking steps to voluntarily reduce their diesel exhaust. To become a Fleet Forward member, a fleet must operate medium to heavy duty diesel commercial vehicles or equipment in Oregon > 50% of the time (or drive > 30,000 miles/year/vehicle or operate > 900 hours/year/equipment in Oregon), and do one of the following: burn less fuel (in at least 80% of the fleet); burn cleaner fuels (B20+ or other cleaner fuels); replace old engines with cleaner, newer engines, or retrofit engines with advanced pollution control devices. Burning less fuel includes reducing unnecessary idling through driver training and incentives, as well as other fleet management strategies.

Participants qualify for three, four or five star levels with increasing levels of public relations opportunities (website mention, featured fleet Web story, ongoing promotion, certificate, decals, bumper stickers). Fleets that start at one level and move up to a higher level will get special recognition.

Business Energy Tax Credit

The Oregon Department of Energy offers a Business Energy Tax Credit to Oregon businesses, trades, and rental property owners that invest in efficient truck technology projects. Applicants may receive a tax credit of up to 35 percent of the project costs. The credit must be filed over a period of five years, 10 percent in the first and second years and five percent for each remaining year. A tax credit may be received in one year if total projects costs are $20,000 or less. Efficient truck technology projects may include the purchase of idle reduction equipment, aerodynamic packages, single-wide tires, and automatic tire inflation.

Non-profit organizations, schools, and other public entities without an Oregon tax liability may receive the tax credit for an eligible project, but must "pass-through" or transfer their project eligibility to a pass-through partner in exchange for a lump-sum cash payment. The Oregon Department of Energy determines the rate that is used to calculate the cash payment. The pass-through option is also available to a project owner with an Oregon tax liability who chooses to transfer his or her tax credit. For additional information on possible tax implications in using the pass-through option, please consult a tax professional.

Alternative Fuel Loans

The Oregon Department of Energy offers a loan program for energy efficiency, renewable resource, and alternative fuel projects. Eligible alternative fuel projects include fuel production facilities, dedicated feedstock production, fueling stations, and fleet vehicles. The program issues Oregon general obligation bonds to provide funds for the loans. Loan recipients must complete a loan application and pay a loan application fee. (Reference Oregon Revised Statutes 470.050)

Cascade Sierra Solutions

Cascade Sierra Solutions (CSS), an Oregon based non-profit organization, provides comprehensive idle reduction solutions for commercial trucks and trailers nation-wide. Programs support all verifiable technologies that save fuel and reduce diesel emissions including options for upgrades, vehicle replacement and alternative fuel and hybrid vehicle technologies. Any fuel saving technology qualified as a U.S. Environmental Protection Agency's SmartWay Transport Carrier Strategy and approved by the CSS Technical Advisory Team is eligible for financing. Options for upgrades or vehicle replacement are available to registered truck owners. CSS combines available grants and tax incentives with a revolving loan fund to provide affordable leasing arrangements. Small Business Administration working capital loans and group insurance for truckers are also available.

Federal Initiatives

National Clean Diesel Campaign

The EPA established the National Clean Diesel Campaign to reduce pollution emitted from diesel engines through the implementation of varied control strategies and the involvement of national, state, and local partners. While currently there is no federal anti-idling law, the

campaign does include regulatory programs to address diesel fuel and new diesel engines, as well as programs to accelerate emission reductions from older diesel engines. The goal of the in-use diesel engine programs is to provide more immediate air quality benefits by promoting a variety of cost-effective emission reduction strategies, including: switching to cleaner fuels; retrofitting, repairing, repowering, and replacing equipment; and reducing idling. The EPA has employed a variety of tools to achieve these goals, including engaging in partnerships, fostering development of technologies, and providing funding assistance. EPA programs that provide funding and other resources for idle reduction include the National Clean Diesel funding Assistance Program, State Clean Diesel Grant Program, Clean School Bus USA, Smartway Transport Partnership, and Technology Verification.

National Clean Diesel Funding Assistance Program

The National Clean Diesel Funding Assistance Program provides competitive grants to reduce emissions from existing diesel engines through a variety of strategies, including but not limited to: add-on emission control retrofit technologies; idle reduction technologies; cleaner fuel use; engine repowers; engine upgrades; and/or vehicle or equipment replacement; and the creation of innovative finance programs to fund diesel emissions reduction projects. Eligible entities include regional, state, local or tribal agencies (or intertribal consortia) or port authorities with jurisdiction over transportation or air quality, and nonprofit organizations or institutions that a) represent or provide pollution reduction or educational services to persons or organizations that own or operate diesel fleets; or b) have, as their principal purpose, the promotion of transportation or air quality. The following types of fleets qualify for funding: buses, medium-duty or heavy-duty trucks, marine engines, locomotives and non-road engines, equipment or vehicles used in construction, handling of cargo (including at a port or airport), agriculture, mining or energy production (including stationary generators and pumps). Under this grant program, funding is restricted to the use of EPA and California Air Resources Board verified and certified diesel emission reduction technologies.

State Clean Diesel Grant Program

EPA's State Grant Program allocates funds to participating states to implement grant and loan programs for clean diesel projects. This program is not a competition, but an allocation process in which the states and the District of Columbia submit their interest in participating to EPA. EPA allocates funding to the states through a formula outlined in the Energy Policy Act (551 pp, 1.3MB). States may use their allocation to fund grant and loan programs for clean diesel projects that use: EPA or California Air Resources Board-certified or verified retrofit technologies, EPA-verified idle reduction technologies, technologies from EPA's Emerging Technologies List, early replacement and repower with certified engine configurations (incremental costs). Funds cannot be used to support federal, state and/or local mandates.

Clean School Bus USA

Clean School Bus USA is a public-private partnership that focuses on reducing children's exposure to harmful diesel exhaust by limiting school bus idling, implementing pollution reduction technologies, improving route logistics, and switching to clean fuels. Clean School Bus USA is part of the EPA's National Clean Diesel Campaign and provides funding for projects designed to retrofit and/or replace older diesel school buses. Eligible applicants are school districts, state and local government programs, federally recognized Indian tribes, and non-profit organizations.

Diesel Retrofit Technology Verification

The purpose of EPA's Diesel Retrofit Technology Verification program is to evaluate, verify, and inform consumers on the fuel saving and/or emission reduction capabilities of a given diesel retrofit technology. The verification process includes a thorough technical review of the technology as well as tightly controlled testing to quantify emission reductions. To date, EPA has verified the following categories of idle reduction technologies that save fuel and reduce emissions in trucks and buses when compared to idling the main engine: Electrified parking spaces (truck stop electrification); auxiliary power units and generator sets; fuel operated heaters; battery air conditioning systems; thermal storage systems; automatic shut-down/ start-up systems.

SmartWay Transport

The objective of SmartWay Transport is to increase fuel efficiency and reduce greenhouse gases and air pollution of the ground freight industry through four core components:
SmartWay Transport Partnership: A voluntary government/industry partnership among freight shippers, carriers, and logistics companies. The Partnership creates market-based incentives that challenge the trucking industry to improve the environmental performance of their freight operations, improve their efficiency and save money.
National Transportation Idle-Free Corridors: Under this project, EPA will work with states, local communities, and private industry to assist with the installation and deployment of emission reduction technologies at strategic points along major transportation corridors.
Innovative Financing Program: An innovative financial strategy that helps companies acquire fuel-efficient, low-pollution technologies through creative financial mechanisms such as low-interest loans. Grants are available to states, nonprofits, and academic institutions to demonstrate innovative idle reduction technologies for the trucking industry.
Verified Technologies Program: EPA provides a testing and verification program designed to quantify emissions reductions and fuel savings and allow companies to assess environmental performance of products.

Publications

The EPA has also conducted extensive research on fuel consumption and exhaust emissions. The National Clean Diesel Campaign's publications website (http://www.epa.gov/otaq/diesel/publications.htm) provides information regarding clean diesel programs, technologies, emissions reductions strategies, cost effectiveness and a broad array of other related information.

Other Federal Policies and Initiatives

Congestion Mitigation and Air Quality Improvement Program

The Congestion Mitigation and Air Quality Improvement Program, jointly administered by the U.S. Department of Transportation-Federal Highway Administration and the Federal Transit Administration, provides funding to state departments of transportation, municipal planning organizations, and transit agencies for projects and programs in air quality non-attainment and maintenance areas that reduce transportation-related emissions. Eligible activities include transit improvements, travel demand management strategies, traffic flow improvements, purchasing idle

reduction equipment, development of alternative fueling infrastructure, conversion of public fleet vehicles to operate on cleaner fuels, and outreach activities that provide assistance to diesel equipment and vehicle owners and operators regarding the purchase and installation of diesel retrofits. State transportation departments and municipal planning organizations must give priority to projects and programs to include diesel retrofits and other cost-effective emissions reduction activities, and cost-effective congestion mitigation activities that provide air quality benefits. For more information, visit the Congestion Mitigation and Air Quality website (http://www.fhwa.dot.gov/environment/cmaqpgs/).

Idle Reduction Facilities Regulation

States are permitted to provide facilities in interstate system rights-of-way that allow operators of commercial vehicles to reduce truck idling or use alternate power sources. States may allow idling reduction facilities for commercial vehicles to be placed in rest or recreation areas as well as in safety rest areas constructed or located on rights-of-way of the interstate system. The idling reduction facilities must not reduce the existing number of truck parking spaces at a given rest or recreation area. States may charge a fee, or permit charging a fee, for parking spaces actively providing idling reduction measures. For more information, see the Idling Reduction Facilities in Interstate Rights-of-Way fact sheet.
(http://www.fhwa.dot.gov/safetealu/factsheets/idlereduction.htm)

Clean Cities

Clean Cities is a government-industry partnership sponsored by the U.S. Department of Energy's Vehicle Technologies Program. The mission of Clean Cities is to advance the energy, economic, and environmental security of the United States by supporting local initiatives to adopt practices that reduce the use of petroleum in the transportation sector. Clean Cities carries out this mission through a network of approximately 90 volunteer coalitions, which develop public/private partnerships to promote alternative fuels and advanced vehicles, fuel blends, fuel economy, hybrid vehicles, and idle reduction. Clean Cities provides information about financial opportunities, coordinates technical assistance projects; updates and maintains databases and Web sites, and publishes fact sheets, newsletters, and related technical and informational materials. For more information, visit the Clean Cities web site
(http://www1.eere.energy.gov/cleancities/).

Emergency Economic Stabilization Act/Energy Improvement and Extension Act of 2008

The Emergency Economic Stabilization Act (House Resolution 1424) was signed by former President Bush, enacting the Energy Improvement and Extension Act of 2008. The bill amends and extends existing biodiesel blending and production tax credits, extends existing alternative fuel excise tax credit, and extends the alternative fueling infrastructure tax credit. The bill also creates a new tax incentive toward the purchase of qualified plug-in hybrid electric vehicles, based on vehicle weight and battery capacity. Additionally, qualified idle reduction devices are exempt for heavy-duty truck retail excise taxes.

Idle Reduction Equipment Excise Tax Exemption

The Energy Improvement and Extension Act of 2008 (PL 110-343), Section 206 excludes qualified on-board idle reduction devices and advanced insulation from the federal excise tax

imposed on the retail sale of heavy-duty highway trucks and trailers. The exemption also applies to the installation of qualified equipment on vehicles after the vehicles have been placed into service. The exemption applies to equipment that was determined by the Administrator of the EPA, in consultation with the Secretary of Energy and the Secretary of Transportation, to reduce the idling of the tractor at a motor vehicle rest stop or other location where such vehicles are temporarily parked or remain stationary. Only equipment sold on or after October 4, 2008, is eligible. For more information, see the EPA's SmartWay Transport Idle Reduction website (http://www.epa.gov/smartway/transport/what-smartway/idling-reduction-fet.htm).

Appendix K – Recommended Truck Efficiency Rules

DIVISION 255
TRUCK EFFICIENCY RULES

340-255-1005
Purpose

The purpose of this Division is to reduce greenhouse gas emissions from heavy-duty tractors and 53-foot or longer box-type semitrailers (trailers) that transport freight on a highway within Oregon.

340-255-1010
Applicability

(1) This Division applies to owners and drivers of the following equipment when driven on a highway within Oregon, as well as motor carriers, Oregon-based brokers, and Oregon-based shippers that use, or cause to be used, the following equipment on a highway within Oregon:

(a) heavy duty tractors that pull 53-foot or longer box-type trailers; and

(b) 53-foot or longer box-type trailers that are pulled by heavy duty tractors.

(2) The requirements in this Division do not apply to the following vehicles:

(a) drop-frame trailers;

(b) chassis trailers;

(c) curtain-side trailers;

(d) livestock trailers;

(e) refuse trailers;

(f) box-type trailers less than 53 feet in length;

(g) emergency vehicles; and

(h) military tactical support vehicles.(3) In accordance with the provisions of 340-255-1030, specified requirements of this Division do not apply to:

(a) local-haul trailers and the tractors pulling local-haul trailers,

(b) local-haul tractors and the trailers pulled by local-haul tractors,

(c) short-haul tractors and the trailers pulled by short-haul tractors, and

(d) drayage tractors and the trailers pulled by drayage tractors.

(4) Disclosure of Regulation Applicability: Any person residing in Oregon selling a heavy duty tractor or 53-foot or longer box-type trailer subject to this regulation must provide the following disclosure in writing to the buyer on the bill of sale:

"A heavy-duty tractor and 53-foot or longer box-type trailer operated in Oregon may be subject to the Oregon DEQ Heavy-Duty Vehicle Greenhouse Gas Emission Reduction Measure. These vehicles may be required to use low-rolling resistance tires and meet aerodynamic equipment requirements to reduce greenhouse gas emissions. For more information, please visit the Oregon DEQ website at http://TO BE DETERMINED."

340-255-1015
Definitions

(1) *"Aerodynamic technologies"* means components designed to reduce wind resistance on the tractor or trailer resulting in improved overall tractor fuel economy and reduced carbon dioxide emissions. There are two types of aerodynamic technologies: fairings and flow control devices.

(2) *"Box-type trailer"* means a dry-van trailer or refrigerated-van trailer that is not a drop-frame trailer.

(3) *"Broker"* means a person who, for compensation, arranges or offers to arrange the transportation of property by a motor carrier. A motor carrier, or person who is an employee or bona fide agent of a carrier, is not a broker within the meaning of this section when it arranges or offers to arrange the transportation of shipments which it is authorized to transport and which it has accepted and legally bound itself to transport.

(4) *"Cab side extender*" means a flow control device placed vertically on the rear side of the tractor that reduces the space between the tractor and trailer.

(5) *"Chassis trailer"* means a trailer composed of a simple chassis for the mounting of a containerized load.

(6) *"Compliance year"* means the calendar year in which a fleet owner may bring trailers into compliance to meet the minimum fleet conformance threshold that takes effect on January 1 of the following year.

(7) *"Compliant trailer"* means a trailer that complies with the equipment requirements set forth in 340-255-1020 (2). For the purposes of the optional trailer fleet compliance schedules, to bring a trailer into compliance means to either retrofit the trailer with the necessary equipment to comply with the equipment requirements set forth in 340-255-1020 (2), as applicable, or replace the trailer with another trailer that meets the equipment requirements set forth in 340-255-1020 (2), as applicable.

(8) "*Conformance" means* meeting or exceeding the minimum fleet conformance thresholds defined 340-255-1040, Optional Trailer Fleet Compliance Schedules, Tables 1 and 2. A conformance threshold defines the percentage of trailers in a fleet that are required to be compliant in accordance with a large fleet compliance schedule or a small fleet compliance schedule.

(9) *"Curtain-side trailer"* means a trailer with tarp sides that can be loaded from the sides, top, or rear.

(10) *"Delayed compliance trailer"* means a trailer for which compliance may be delayed pursuant to 340-255-1040 (2)(d).

(11) *"Dispatch"* means to coordinate delivery, pickup, and drop-off schedules of vehicles; and monitor the delivery of freight from these vehicles.

(12) *"Dispatch driver*" means the driver of a heavy duty tractor that has been dispatched by a motor carrier or broker.

(13) *"Drayage tractor"* means any in-use on-road tractor with a gross vehicle weight rating of 33,000 pounds or greater operating on or transgressing through port or intermodal rail yard property for the purpose of loading, unloading or transporting cargo, such as containerized, bulk or break-bulk goods.

(14) *"Driver"* means a person who physically operates a heavy duty tractor.

(15) *"Drop-frame trailer"* means an enclosed rectangular trailer with a deck that is lower to the ground in the area between the trailer hitch and the trailer wheels, to create more cargo space.

(16) *"Dry-van trailer"* means an enclosed rectangular non-climate controlled trailer.

(17) *"Early compliance trailer"* means a trailer that has been brought into compliance with the equipment requirements set forth in 340-255-1020 (2)(c) as applicable, before January 1, 2014, and for which the owner receives credit, in accordance with the *early*

compliance option set forth in 340-255-1040 (2)(d), that may be used to delay the compliance of delayed compliance trailers.

(18) "*Emergency vehicle"* means a vehicle as defined in ORS 801.260.

(19) *"Fairing"* means a structure with smoothly contoured solid surfaces that reduces the wind resistance of the objects they cover.

(20) *"Financial institution",* means a person lawfully conducting business as an organization as defined in ORS 131A.005 (3).

(21) *"Fleet"* means one or more trailers owned by a person, business, or government agency. A fleet consists of the total number of 53-foot or longer box-type trailers under common ownership or control even if they are part of different subsidiaries, divisions, or other organizational structures of a company or agency.

(22) *"Flow control device"* means a design element that manipulates the air flow around an object by changing the air flow characteristics in order to reduce the pressure force exerted on the vehicle.

(23) *"Fuel tank fairing"* also known as a chassis skirt, means a fairing located at the base of the cab between the front wheel of the tractor and the forwardmost rear wheel, covering the open space and streamlining the fuel tank.

(24) *"Good operating condition"* means the condition of a heavy duty tractor or box-type trailer that meets the applicable standards in 340-255-1025 for continued aerodynamic efficiency.

(25) *"Gross vehicle weight rating"* or *"GVWR"* means the GVWR as defined in ORS 801.298.

(26) *"Heavy-duty tractor"* means a class 7 or class 8 motor vehicle designed to pull a semitrailer on a highway by means of a fifth wheel mounted over the rear axle(s).

(27) *"Highway"* means a "highway" as defined in ORS 801.305.

(28) *"Integrated sleeper cab roof fairing"* means a fairing located on the roof of a sleeper-cab-equipped tractor that extends from the front windshield of the tractor cab to the rear edge of the sleeper cab, with enclosed sides that line up with the sides of the sleeper cab.

(29) *"Livestock trailer"* means a semitrailer designed to transport live animals.

(30) *"Local-haul base"* means the location where a local-haul tractor or local haul trailer is garaged, maintained, and routinely dispatched.

(31) *"Local-haul tractor"* means a heavy duty tractor that travels exclusively within a 100 mile radius of its local-haul base.

(32) *"Local-haul trailer"* means a 53-foot or longer box-type trailer that travels exclusively within a 100 mile radius of its local-haul base.

(33) *"Low-rolling-resistance tire"* means a tire that is designed to improve fuel efficiency of a tractor pulling a trailer by minimizing its rolling resistance, which consists of the energy lost as heat within the rubber itself, as well as aerodynamic drag of the tire, and friction between the tire and the road and between the tire and the rim when the tire is rolling under load; rolling resistance is expressed as the energy consumed per unit distance as the tire rolls under load.

(34) *"Military tactical support vehicle"* means a motor vehicle owned by the U.S. Department of Defense and/or the U.S. military services and used in combat, combat support, combat service support, tactical or relief operations, or training for such operations.

(35) *"Motor carrier"* means a "Motor carrier" as defined in ORS 825.005.

(36) *"Owner"* of a tractor or trailer means the person or persons registered as the owner of the tractor or trailer by the Oregon Department of Transportation or its equivalent in another state, province, or country (presumed at the time of any citation to be the person or persons identified as the owner on the registration document or title carried on the vehicle), except in the following circumstances:

> (a) a person who is financially and contractually responsible for maintaining the tractor or trailer is the owner for purposes of this Division if the registered owner of the vehicle clearly demonstrates the person's maintenance responsibilities include responsibility for installing and maintaining the tires and aerodynamic technologies required by this Division. Subsections (c), (d) and (e) and not this subsection apply to tractors or trailers that are leased.
>
> (b) for a tractor or trailer owned by the federal government and not registered in any state or local jurisdiction, the owner means the branch, agency or other organization within the federal government that operates the tractor or trailer, that is required to maintain accountability for the vehicle, or that is shown by the accountable entity to be responsible for the tractor's or trailer's maintenance.
>
> (c) for a leased tractor, the person or persons registered as the owner of the tractor or trailer by the Oregon Department of Transportation or its equivalent in another state, province, or country (usually the lessor) is the owner for purposes of this Division, except that the lessee of the tractor is the owner for purposes of this Division if the lease includes the following statement:

"The lessee of this heavy-duty tractor understands that when using a heavy-duty tractor to pull a 53-foot or longer box-type trailer on a highway within Oregon, the heavy-duty tractor must be compliant with Oregon Administrative Rules 340-255-1005 through 340-255-1055, and that it is the responsibility of the lessee to ensure this heavy-duty tractor is compliant. The regulations may require this heavy-duty tractor to have low rolling resistance tires that are U.S. Environmental Protection Agency (U.S. EPA) Verified SmartWay Technologies prior to current or future use in Oregon, or may entirely prohibit use of this tractor in Oregon if it is a model year 2016 or later tractor and is not a U.S. EPA Certified SmartWay Tractor."

(d) for a leased trailer that is leased prior to January 1, 2018, the person or persons registered as the owner of the tractor or trailer by the Oregon Department of Transportation or its equivalent in another state, province, or country (usually the lessor) is the owner for purposes of this Division, except that the lessee of the trailer is the owner for purposes of this Division if both of the following requirements are met:

(A). The lessor demonstrates that the lessor provided the lessee with actual written notice that clearly informed the lessee about the requirements of this Division and about the lessee's obligation under terms of the lease to ensure the trailer complies with those requirements prior to use of the trailer in Oregon. This requirement may be satisfied by inclusion of the following statement in the lease agreement:

"The lessee of this box-type trailer understands that when using a heavy-duty tractor to pull a 53-foot or longer box-type trailer on a highway within Oregon, the box-type trailer must be compliant with Oregon Administrative Rules 340-255-1005 through 340-255-1055, and that it is the responsibility of the lessee to ensure this box-type trailer is compliant. The regulations may require this trailer to have low rolling resistance tires and aerodynamic technologies that are U.S. Environmental Protection Agency Verified SmartWay Technologies prior to current or future use in Oregon."

(B). The lessor demonstrates that either:

a. the lease agreement permits the lessee to modify the trailer to be compliant with the requirements of this Division; or

b. the lessor provides a reasonable method to exchange the trailer for one that is compliant with this Division.

(e) for a leased trailer that is leased on or after January 1, 2018, the person or persons registered as the owner of the tractor or trailer by the Oregon

Department of Transportation or its equivalent in another state, province, or country (usually the lessor) is the owner for purposes of this Division, except that the lessee of the trailer is the owner for purposes of this Division if the lease agreement includes the following statement:

> *"The lessee of this box-type trailer understands that when using a heavy-duty tractor to pull a 53-foot or longer box-type trailer on a highway within Oregon, the box-type trailer must be compliant with Oregon Administrative Rules 340-255-1005 through 340-255-1055; and that it is the responsibility of the lessee to ensure this box-type trailer is compliant. The regulations may require this trailer to have low rolling resistance tires and aerodynamic technologies that are U.S. Environmental Protection Agency Verified SmartWay Technologies prior to current or future use in Oregon."*

(f) For purposes of this Division, the terms "lease," "leased," "lessor," and "lessee" mean the same as "rental agreement," "rented," "owner of the rented vehicle," and "renter," respectively.

(37) *"Oregon-based broker"* means a broker that maintains a business location in Oregon.

(38) *"Oregon-based shipper"* means a shipper that operates a facility in Oregon where freight is located prior to its transportation.

(39) "*Person*" means an individual, corporation, business trust, estate, trust, partnership, limited liability company, association, joint venture, government, governmental subdivision, agency, or instrumentality, public corporation, or any other legal or commercial entity.

(40) *"Rear trailer fairing"* means a fairing that attaches to the perimeter outer edges of the trailer's rear-facing surface to provide a continuous surface for the air passing over the side and top surfaces of the trailer.

(41) *"Refrigerated-van trailer"* means a rectangular trailer van that has a refrigeration or heating unit built into the trailer to maintain precise temperatures and is used to haul frozen food, fresh produce, hot or warm food, and other perishable items.

(42) *"Refuse trailer"* means a trailer that is used to haul solid waste material. Solid waste includes garbage, construction debris, commercial refuse, and other discarded materials.

(43) *"Semitrailer"* means a "Semitrailer" as defined in ORS 801.475.

(44) *"Shipper"* means a person that has possession of freight prior to its transportation. This may include, but is not limited to, owners of freight distribution centers, and temporary freight storage facilities.

(45) *"Short-haul tractor"* means a heavy duty tractor that travels less than 50,000 miles per year.

(46*) "Sleeper cab"* means a heavy duty tractor body that has a compartment containing a bed located behind the driving compartment.

(47) "*Tractor*" means a "Truck Tractor" as defined in ORS 801.575.

(48) *"Trailer"* means a semitrailer.

(49) *"Transport refrigeration unit"* or *"TRU"* means a refrigeration system powered by an integral internal combustion engine designed to control the environment of temperature sensitive products that are transported in trucks and refrigerated trailers. TRUs may be capable of both cooling and heating.

(50) "*TRUCKS*" is the on-line reporting tool for this Division.

(51) *"U.S. EPA Certified SmartWay Tractor"* means a tractor that has been certified by the United States Environmental Protection Agency (U.S. EPA) to meet the technical specifications and requirements of the U.S. EPA SmartWay Transport Partnership Program.

(52) *"U.S. EPA Certified SmartWay Trailer"* means a 53-foot or longer box-type trailer that has been certified by the U.S. EPA to meet the technical specifications and requirements of the U.S. EPA SmartWay Transport Partnership Program.

(53) *"U.S. EPA SmartWay Transport Partnership Program"* means the U.S. EPA's voluntary program that is a collaboration between the U.S. EPA and the transportation industry to improve energy efficiency, reduce greenhouse gas and air pollutant emissions, and improve energy security. This program establishes incentives for improving freight movement efficiency and the fuel efficiency of freight moving equipment. Information on the U.S. EPA SmartWay Transport Partnership Program is available from the SmartWay program office at 2000 Traverwood, Ann Arbor, Michigan 48105; and at the U.S. EPA SmartWay website at http://www.epa.gov/smartway/.

(54) *"U.S. EPA Verified SmartWay Technology"* or *"U.S. EPA Verified SmartWay Technologies"* means one or more aerodynamic technologies or low-rolling resistance tire models that have been identified by the U.S. EPA as meeting the technical specifications and requirements of the U.S. EPA SmartWay Transport Partnership Program.

340-255-1020
Requirements and Compliance Deadlines.

(1) Tractor Requirements.

(a) Except as provided in OAR 340-255-1030, *Exemptions,* beginning January 1, 2015, no 2016 or subsequent model year sleeper-cab heavy duty tractor pulling a 53-foot or longer box-type trailer shall operate on a highway within Oregon unless such tractor is a U.S. EPA Certified SmartWay Tractor.

(b) Except as provided in OAR 340-255-1030, *Exemptions,* beginning January 1,2015, no 2016 or subsequent model year heavy duty tractor, including but not limited to sleeper-cab heavy duty tractors, pulling a 53-foot or longer box-type trailer shall operate on a highway within Oregon unless such tractor's tires are U.S. EPA Verified SmartWay Technologies.

(c) Except as provided in OAR 340-255-1030, *Exemptions,* beginning January 1, 2016, no 2015 or previous model year heavy duty tractor, pulling a 53-foot or longerbox-type trailer shall operate on a highway within Oregon unless such tractor's tires are U.S. EPA Verified SmartWay Technologies.

(2) Trailer Requirements.

(a) 2016 and Subsequent Model Year Dry-Van Trailer Requirements.
Except as provided in OAR 340-255-1030, *Exemptions,* beginning January 1, 2015, no 2016 or subsequent model-year 53-foot or longer dry-van trailer shall travel on a highway within Oregon unless such trailer is either:

(A) a U.S. EPA Certified SmartWay Trailer, or,

(B) equipped with both:

1. tires that are U.S. EPA Verified SmartWay Technologies; and

2. any combination of dry-van trailer aerodynamic technologies that has been demonstrated to the U.S. EPA to meet or exceed a 5 percent fuel savings in accordance with the requirements defined by the U.S. EPA SmartWay Partnership Program.

(b) 2016 and Subsequent Model Year Refrigerated-Van Trailer Requirements.
Except as provided in OAR 340-255-1030, *Exemptions,* beginning January 1, 2015, no 2016 or subsequent model year 53-foot or longer refrigerated-van trailer shall travel on a highway within Oregon unless such trailer is either:

(A) a U.S. EPA Certified SmartWay Trailer, or,

(B) equipped with both:

1. tires that are U.S. EPA Verified SmartWay Technologies; and

2. any combination of dry-van trailer aerodynamic technologies that has been demonstrated to the U.S. EPA to meet or exceed a 4 percent fuel savings in accordance with the requirements defined by the U.S. EPA SmartWay Partnership Program.

(c) 2015 or Previous Model Year Dry-Van and Refrigerated-Van Trailer Requirements.

(A) A 2015 or previous model year 53-foot or longer box-type trailer may not travel on a highway within Oregon after the compliance deadlines in subsection (2)(c)(B) unless such trailer is either a dry-van trailer that meets the requirements of subsections (2)(a)(A) or (2)(a)(B), or a refrigerated-van trailer that meets the requirements of subsections (2)(b)(A) or (2)(b)(B).

(B) Compliance deadlines: A 2015 or previous model year 53-foot or longer box-type trailer must meet the requirements in subsection (2)(c)(A) by the following applicable dates:

1. For a dry-van trailer or refrigerated-van trailer: before January 1, 2018, or by the applicable compliance dates in OAR 340-255-1040, *Optional Trailer Fleet Compliance Schedules,* if such trailer is included in the fleet of trailers participating in, and remains eligible to participate in, an optional trailer fleet compliance schedule.

(3) Requirements for Drivers.

(a) A driver cannot operate a heavy duty tractor to pull a 53-foot or longer box-type trailer on a highway within Oregon unless both the tractor and the trailer:

(A) comply with the applicable requirements and compliance deadlines set forth in subsections (1) and (2); and

(B) are in good operating condition as defined in OAR 340-255-1025.

(b) A driver must, upon demand, provide the following available information to authorized enforcement personnel identified in OAR 340-255-1045:

(A) driver's license;

(B) vehicle odometer reading, if the tractor is an exempt short-haul tractor;

(C) tractor registration;

(D) trailer registration;

(E) origin of freight being transported, or to be transported;

(F) destination of freight being transported, or to be transported;

(G) if dispatched by a motor carrier, the motor carrier information set forth in subsection (7)(a)(B); and

(H) if dispatched by a broker, the broker information set forth in subsection (6)(a)(B).

(c) A driver shall not operate a heavy duty tractor to pull a 53-foot or longer box-type trailer on a highway within Oregon if the trailer has aerodynamic technologies that are not deployed or not in their operational configuration.

(4) Requirements for Owners of Heavy Duty Tractors.

(a) An owner of a heavy duty tractor cannot use or authorize the use of a heavy duty tractor to pull a 53-foot or longer box-type trailer on a highway within Oregon unless both the heavy duty tractor and the box-type trailer:

(A) comply with the applicable requirements and compliance deadlines set forth in subsections (1) and (2); and

(B) are in good operating condition as defined in OAR 340-255-1025.

(5) Requirements for Owners of Box-Type Trailers.

(a) An owner of a 53-foot or longer box-type trailer must ensure that the 53-foot or longer box-type trailer will not be pulled by a heavy duty tractor on a highway within Oregon unless the 53-foot or longer box-type trailer:

(A) complies with the requirements and compliance deadlines set forth in subsection (2); and

(B) is in good operating condition as defined in OAR 340-255-1025.

(b) An owner of one or more 2015 or previous model year 53-foot or longer box-type trailers that are subject to the requirements of subsection (2)(c) may elect to follow an alternative compliance schedule, if applicable. Owners that choose to follow an alternative compliance schedule must meet the requirements of OAR 340-255-1040, *Optional Trailer Fleet Compliance Schedules.*

(6) Requirements for Oregon-based Brokers.

(a) An Oregon-based broker must:

(A) only dispatch a heavy duty tractor or a 53-foot or longer box-type trailer for travel on a highway within Oregon if the tractor or trailer complies with the operating requirements and compliance deadlines set forth in subsections (1) and (2);

(B) provide the following information to a dispatched driver who will be travelling on a highway within Oregon:

1. broker's business name;

2. broker's street address, state, zip code;

3. broker contact person's name; and

4. broker contact person's business phone number.

(7) Requirements for Motor Carriers.

(a) A motor carrier must:

(A) only dispatch a heavy duty tractor or a 53-foot or longer box-type trailer for travel on a highway within Oregon if the tractor or trailer complies with the operating requirements and compliance deadlines set forth in subsections (1) and (2);

(B) provide the following information to a dispatched driver who will be travelling on a highway within Oregon:

1. motor carrier's business name;

2. motor carrier's street address, state, zip code;

3. motor carrier contact person's name; and

4. motor carrier contact person's business phone number.

(8) Requirements for Oregon-based Shippers.

(a) An Oregon-based shipper must not ship freight from its Oregon facility or facilities in a 53-foot or longer box-type trailer pulled by a heavy duty tractor on a highway within Oregon unless the heavy duty tractor and the 53-foot or longer

box-type trailer comply with the operating requirements and compliance deadlines set forth in subsections (1) and (2).

340-255-1025
Good Operating Condition Requirements.

(1) Good Operating Condition Criteria for U.S. EPA Certified SmartWay Tractor Aerodynamic Technologies.

(a) An aerodynamic mirror, a cab side extender, a fuel tank fairing, and an integrated sleeper cab roof fairing on a U.S. EPA Certified SmartWay Tractor must meet the following criteria:

(A) Each must be installed in accordance with manufacturer's specifications;

(B) Each must be securely fastened to the tractor; and

(C) Each must not be used if it is damaged to such an extent as to compromise its aerodynamic effectiveness.

(2) Good Operating Condition Criteria for U.S. EPA Certified SmartWay Trailer Aerodynamic Technologies.

(a) Aerodynamic technologies installed on a box-type trailer must meet the following criteria:

(A) The aerodynamic technologies must be installed in accordance with the manufacturer's specifications;

(B) The aerodynamic technologies must be securely fastened to the trailer;

(C) The aerodynamic technologies must not be used with missing sections;

(D) The aerodynamic technologies must not be used if damaged to such an extent as to compromise their aerodynamic effectiveness; and

(E) The rear trailer aerodynamic technology must be capable of being folded back against the trailer sides or otherwise be readily compacted to allow normal functioning of doors.

340-255-1030

Exemptions.

(1) A short-haul tractor is exempt from the requirements of 340-255-1020 (1)(a), (1)(b), and (1)(c) if its owner complies with the requirements in 340-255-1035, *Short-Haul and Local-Haul Tractor and Local-Haul Trailer Exemption Requirements*.

(2) A local-haul tractor is exempt from the requirements of 340-255-1020 (1)(a), but still must comply with the requirements of 340-255-1020 (1)(b) and (1)(c), if its owner complies with the requirements of 340-255-1035, *Short-Haul and Local-Haul Tractor and Local-Haul Trailer Exemption Requirements*.

(3) A local-haul trailer is exempt from the requirements of 340-255-1020 (2)(a)(A), (2)(a)(B)2, (2)(b)(A), and (2)(b)(B)2, but still must comply with the requirements of 340-255-1020 (2)(a)(B)1 and (2)(b)(B)1 if its owner complies with the requirements of 340-255-1035, *Short-Haul and Local-Haul Tractor and Local-Haul Trailer Exemption Requirements*.

(4) A 53-foot or longer box-type trailer is exempt from the requirements of subsection 340-255-1020 (2) while it is being pulled by a short-haul heavy duty tractor that is exempt under 340-255-1030 (1).

(5) A 53-foot or longer box-type trailer is exempt from the requirements of 340-255-1020 (2)(a)(A), (2)(a)(B)2, (2)(b)(A), and (2)(b)(B)2, but still must comply with the requirements of 340-255-1020 (2)(a)(B)1 and (2)(b)(B)1, while it is being pulled by a local-haul tractor that is exempt under 340-255-1030 (2).

(6) A 2016 or subsequent model year sleeper cab heavy duty tractor is exempt from the requirements of 340-255-1020 (1)(a), but still must comply with the requirements of 340-255-1020 (1)(b), while it is pulling a local-haul trailer that is exempt under 340-255-1030 (3).

(7) A drayage tractor pulling a 53-foot or longer box-type trailer within 100 miles of the port or intermodal rail yard of origin or destination and the trailer it pulls are exempt from 340-255-1020 (1) and (2).

(8) A tractor or trailer that is compliant with the requirements of subarticle 1, sections 95300 to 95311, title 17, California Code of Regulations (Heavy Duty Greenhouse Gas Measure) as of the date of adoption of this Division are exempt from 340-255-1020. The owner of the tractor or trailer must report their CARB compliance status to DEQ for this exemption to apply.

(9) A 53-foot or longer box-type trailer or refrigerated van trailer is exempt from the requirements of 340-255-1020 (2) when DEQ determines that the owner of the trailer is unable to secure financing from application to at least three financial institutions for the installation of the necessary components on a 2014 or previous model year 53-foot or

longer box-type trailer or refrigerated van trailer to comply with 340-255-1020 (2). This exemption is in effect within 10 days after the Department receives the exemption request unless the Department notifies the owner or operator in writing that the exemption is not approved. This exemption applies only to the current calendar year for which this finding is determined.

340-255-1035
Short-Haul and Local-Haul Tractor and Local-Haul Trailer Exemption Requirements.

(1) To qualify for any exemptions in 340-255-1030 (1), (2) or (3), the owner of a heavy duty tractor or the owner of a 53-foot or longer box-type trailer must submit to DEQ all information and statements identified in 340-255-1035 (2) through (6) and must comply with subsections (7) through (15).

(2) Owner Contact Information:

(a) Short-haul or local-haul tractor owner's name, and if a business entity or governmental agency owns the tractor, the responsible official and title (if applicable);

(b) Local-haul trailer owner's name, and if a business entity or governmental agency owns the trailer, the responsible official and title (if applicable);

(c) Name of owner's company, corporation, or governmental agency (if applicable);

(d) Corporate parent (if applicable);

(e) Motor carrier identification number and type;

(f) Street address of owner or owner's company including city, state or province, zip code, colonia (Mexico only), and country;

(g) Mailing address including city, state or province, zip code, colonia (Mexico only), and country;

(h) Physical address of location where records pertaining to the applicable compliance schedule will be maintained including city, state or province, zip code, colonia (Mexico only), and country;

(i) Owner contact person's name;

(j) Telephone number of owner or owner's company;

(k) Email address of owner or owner's company (if available);

(l) Company taxpayer identification number (if applicable); and

(m) TRUCKS identification number of corporate parent (if one has been obtained).

(3) Local-Haul Base Information for Owners of Local-haul Tractors or Trailers (an owner may have multiple local-haul bases):

(a) Local-haul base contact person's name;

(b) Contact person's title;

(c) Street address of local-haul base including city, state, zip code, colonia (Mexico only), and country; and

(d) Telephone number of local-haul base.

(4) Short-haul or Local-haul Tractor Fleet Information. For each tractor to be exempted, the following information is required:

(a) Type of exemption applied for:

(A) Limit annual miles traveled to 50,000 (short-haul); or

(B) Limit total area of operation to within a 100 mile radius from its local haul base (local-haul);

(b) Tractor identification number (vehicle identification number (VIN));

(c) Tractor make;

(d) Tractor model;

(e) Tractor model year;

(f) State or province of registration;

(g) Country of registration;

(h) Registration type (state, IRP, temporary, seasonal, monthly, or other);

(i) License plate number;

(j) For short-haul tractors: Odometer reading; and

(k) For local-haul tractors: tractor's local-haul base street address, including city, state, and zip code.

(5) Local-haul Trailer Fleet Information. For each trailer to be exempted, the following information is required:

(a) Trailer type (dry van or refrigerated van);

(b) Trailer identification number (vehicle identification number (VIN));

(c) Trailer make;

(d) Trailer model;

(e) Trailer model year;

(f) State or province of registration;

(g) Country of registration;

(h) Registration type (State, IRP, Temporary, Seasonal, Monthly, or Other);
(i) License plate number; and

(j) Trailer's local-haul base street address, including city, state, and zip code.

(6) A dated written submittal by the owner with the information required by subsections (2) through (5) and one of the following statements:

(a) For all local-haul trailers and tractors:

"I agree to strictly limit all use of this [or these] *tractor[s]* [or trailer[s]] *to the area within a 100-mile radius of the local- haul base identified in this submittal. I understand that operation of the equipment outside this area will be a violation of Oregon Administrative Rules 340-255-1005 through 1055. I declare under penalty of perjury that the information provided is true, accurate and complete."*

(b) For short-haul tractors:

"I agree to limit use of this [or these] *tractor[s] to 50,000 or fewer miles per year . I understand that operation of the equipment for more than 50,000 miles per year will be a violation of Oregon Administrative Rules 340-255-1005 through 1055. I declare under penalty of perjury that the information provided is true, accurate and complete."*

(7) A local-haul exemption obtained under OAR 340-255-1030 (2) or (3) will remain in effect as long as the owner and the exempt trailer or tractor are in compliance with the requirements of this section. The owner of an exempt local-haul tractor or trailer must notify DEQ if the information submitted in accordance with subsections (2) through (6) has changed, and must submit the updated information to DEQ.

(8) For a local-haul tractor or trailer that is removed from an owner's local-haul fleet or is otherwise no longer exempt under OAR 340-255-1030 (2) or (3), the owner must notify DEQ and update the local-haul tractor or trailer information submitted in accordance with subsections (4) and (5) to reflect this change in status prior to change in ownership of the tractor or trailer, or prior to the trailer travelling on a highway within Oregon, whichever occurs first.

(9) For a short-haul tractor that is removed from an owner's short-haul tractor fleet or is otherwise no longer exempt under OAR 340-255-1030 (1), the owner must notify DEQ and update the short-haul tractor information submitted in accordance with subsections (4) to reflect this change in status prior to change in ownership of the tractor, or prior to the tractor travelling on a highway within Oregon, whichever occurs first. A tractor that is removed from the owner's short-haul tractor fleet or that for any other reason loses its exempt status under OAR 340-255-1030 (1) is ineligible for the short-haul exemption under OAR 340-255-1030 (1) for 36 months from the date its exempt status was lost.

(10) A short-haul exemption obtained under OAR 340-255-1030 (1) will remain in effect for a period of 1 year from the date that the information required in OAR 340-255-1035 (2) through (6) is submitted to DEQ if the owner and the exempt tractor are in continuing compliance with the requirements of this section. To extend the exemption for an additional 1 year, the owner must submit the tractor's current odometer readings prior to, but no more than 30 days before, the expiration date of the exemption.

(11) The driver of an exempt short-haul or local-haul tractor, or a heavy duty tractor pulling an exempt local-haul trailer must, upon demand, provide the following information to authorized enforcement personnel identified in OAR 340-255-1045:

(a) Driver's license;

(b) Odometer reading of tractor;

(c) Tractor registration;

(d) Origin of freight being transported;

(e) Destination of freight being transported;

(f) If dispatched by a motor carrier, the motor carrier information listed in OAR 340-255-1020 (7)(a)(B);

(g) If dispatched by a broker, the broker information listed in OAR 340-255-1020 (6)(a)(B); and

(h) Vehicle identification number.

(12) The driver of an exempt short-haul heavy duty tractor must, upon request, allow authorized enforcement personnel to directly view the odometer of the heavy duty tractor.

(13) The use of a short-haul tractor that is exempt under OAR 340-255-1030 (1) in excess of 50,000 miles in a year is a violation of this Division.

(14) The use of a local-haul tractor that is exempt under OAR 340-255-1030 (2) at a location farther than 100 miles from the vehicle's local-haul base is a violation of this Division.

(15) The use of a local-haul trailer that is exempt under OAR 340-255-1030 (3) at a location farther than 100 miles from the vehicle's local-haul base is a violation of this Division.

340-255-1040
Optional Trailer Fleet Compliance Schedules.

(1) Trailer Fleet Compliance Schedule Applicability.

(a) As specified in OAR 340-255-1020 (2)(c), an owner of one or more 2015 or previous model year 53-foot or longer box-type trailers may bring such trailers into compliance in accordance with an applicable compliance schedule set forth in this subsection.

(b) Trailer fleet size determination. For purposes of this section, fleet size is the total of all 53-foot or longer box-type trailers within the owner's fleet, including:

(A) trailers that do not operate in Oregon; and

(B) trailers that operate in Oregon, including but not limited to:

1. existing compliant trailers;

2. non-compliant trailers;

3. trailers exempted in accordance with OAR 340-255-1030, Exemptions; and

4. refrigerated van trailers.

(c) Applicable Compliance Schedules.

(A) A fleet owner with a trailer fleet size of 21 or more trailers, as determined in accordance with subsection (1)(b) above, may only participate in the large fleet compliance schedule, specified in subsection (2).

(B) A fleet owner with a trailer fleet size of 20 or fewer trailers has the option of participating in either the large fleet or small fleet compliance schedule, specified in subsections (2) and (3), respectively.

(2) Large Fleet Compliance Schedule.

(a) Minimum fleet conformance thresholds (Table 1): A trailer owner participating in the large fleet compliance schedule must ensure that the percentage of compliant trailers on the compliance plan base list, as defined in subsection (4)(c), is equal to or greater than:

(A) 5 percent beginning January 1, 2016;

(B) 15 percent beginning January 1, 2017;

(C) 30 percent beginning January 1, 2018;

(D) 50 percent beginning January 1, 2019;

(E) 75 percent beginning January 1, 2020; and

(F) 100 percent beginning January 1, 2021.

Table 1: Minimum Fleet Conformance Thresholds for the Large Fleet Compliance Schedule

Compliance Year (Y)	Minimum Fleet Conformance Threshold (P_Y)	Conformance Threshold Deadline
2015	5%	January 1, 2016
2016	15%	January 1, 2017
2017	30%	January 1, 2018
2018	50%	January 1, 2019
2019	75%	January 1, 2020
2020	100%	January 1, 2021

(b) Large fleet compliance plan: To participate in the large fleet compliance schedule, a trailer owner must provide the following information to DEQ, electronically or in a document package entitled “Large Fleet Compliance Plan,” by July 1, 2015. This submittal must include the following:

(A) Statement of intent, in accordance with subsection (4)(a);

(B) Trailer fleet list, in accordance with subsection (4)(b);

(C) Large fleet compliance plan base number, calculated in accordance with subsection (5)(a);

(D) Compliance plan base list, in accordance with subsection (4)(c);

(E) Annual conformance number for each compliance year, calculated in accordance with subsection (5)(e);

(F) Annual conformance commitment list for each compliance year, in accordance with subsection (4)(d); and

(G) Early compliance option reporting, if applicable: If a trailer owner elects to delay the compliance of trailers in accordance with subsection (2)(d), such owner must submit the following trailer information within the compliance plan:

1. Early compliance trailer number: The number of early compliance trailers determined in accordance with subsection (2)(d);

2. Early compliance trailer list: A trailer owner participating in the early compliance option must clearly identify on the trailer fleet list all early compliance trailers;

3. Delayed compliance trailer number, calculated in accordance with subsection (5)(c); and

4. Delayed compliance trailer list: A trailer owner participating in the early compliance option must clearly identify on the trailer fleet list all delayed compliance trailers.

(c) Large fleet compliance plan revision: A trailer owner may make certain revisions to the annual conformance commitment lists reported for compliance years 2018, 2019, and 2020, electronically or by submitting a document titled, "Large Fleet Compliance Plan Revision," by July 1, 2018. Although this allows a trailer owner to redistribute trailers among the final three annual conformance commitment lists, the trailer owner may not alter the number of trailers identified on each list. If participating in the early compliance option, a trailer owner may also redistribute trailers amongst the annual conformance commitment list for compliance years 2018, 2019, and 2020 and the list of delayed compliance trailers.

(d) Early compliance option: Subject to the requirements and limitations set forth in this subsection, for every one early compliance trailer in an owner's fleet, a trailer owner may delay the retrofit or replacement of 1.5 noncompliant trailers until December 31, 2021.

(A) Maximum allowable number of early compliance trailers, as calculated in accordance with subsection (5)(d): The number of early compliance trailers within a fleet may not exceed the equivalent of 20 percent of the sum of: 1) all trailers that the owner elects to bring into compliance under the large fleet compliance schedule and 2) the total number of trailers within the fleet that are in compliance before January 1, 2015.

(B) A trailer owner must bring all delayed compliance trailers into compliance before January 1, 2022.

(C) Early compliance option report: To participate in the early compliance option, a trailer owner must submit all information required by subsection (2)(b)(G), as part of the large fleet compliance plan by July 1, 2015.

(3) Small Fleet Compliance Schedule.

(a) Minimum fleet conformance thresholds (Table 2): A trailer owner participating in the small fleet compliance schedule must ensure that the percentage of compliant trailers on the compliance plan base list, as defined in subsection (4)(c), is equal to or greater than:

(A) 25 percent beginning January 1, 2019;

(B) 50 percent beginning January 1, 2020;

(C) 75 percent beginning January 1, 2021; and

(D) 100 percent beginning January 1, 2022.

Table 2: Minimum Fleet Conformance Thresholds for the Small Fleet Compliance Schedule

Compliance Year (Y)	Minimum Fleet Conformance Threshold (P_Y)	Conformance Threshold Deadline
2015	25%	January 1, 2019
2016	50%	January 1, 2020
2017	75%	January 1, 2021
2018	100%	January 1, 2022

(b) Small fleet compliance plan: To participate in the small fleet compliance schedule, a trailer owner must provide the following information to DEQ, electronically or in a document package entitled “Small Fleet Compliance Plan,” by July 1, 2017. This submittal must include the following:

(A) Statement of intent, in accordance with subsection (4)(a);

(B) Trailer fleet list, in accordance with subsection (4)(b);

(C) Small fleet compliance plan base number, calculated in accordance with subsection (5)(b);

(D) Compliance plan base list, in accordance with subsection(4)(c);

(E) Annual conformance number for each compliance year, calculated in accordance with subsection (5)(e); and

(F) Annual conformance commitment list for each compliance year, in accordance with subsection (5)(d).

(4) General Compliance Plan Components.

(a) Statement of intent: The statement of intent must be provided to DEQ as part of the owner's compliance plan by the applicable compliance plan due date. The statement of intent must include the following:

(A) A statement indicating that the trailer owner elects to participate in an optional trailer fleet compliance schedule;

(B) A statement identifying the compliance schedule in which the trailer owner elects to participate;

(C) For trailer owners electing to participate in the small fleet compliance schedule, a statement affirming that the owner's trailer fleet contains 20 or fewer 53-foot or longer box-type trailers;

(D) A statement affirming that the trailer owner will bring all non-compliant trailers subject to the requirements of this regulation into compliance in accordance with the applicable compliance schedule;

(E) A statement affirming that the trailer owner understands that participation in an applicable compliance schedule may be terminated by DEQ should the fleet owner, or any of the owner's vehicles, be found in violation of this regulation;

(F) A statement affirming that the trailer owner understands that if participation in a compliance schedule is terminated by DEQ, the owner must bring all affected trailers into compliance within 90 days or by December 31, 2017, whichever is later, but in no case later than December 31, 2020 if participating in the large fleet compliance schedule and December 31, 2021 if participating in the small fleet compliance schedule;

(G) A statement affirming that the trailer owner understands that if participation in an applicable trailer fleet compliance schedule is withdrawn, such owner will not be allowed to operate a non-compliant trailer on a highway within Oregon beginning January 1, 2018, except for exempted trailers;

(H) A statement affirming that the trailer owner agrees to allow DEQ, or any person authorized by the DEQ, to conduct periodic audits of vehicles and records to ensure compliance with the applicable compliance schedule, this regulation, and other air quality regulations; and

(I) A signature, or electronic attestation, of the trailer owner or, where applicable, a company or governmental official, affirming that all information contained within the compliance plan, including information

contained within the statement of intent and the trailer fleet list, is true and correct.

(b) Trailer fleet list**:** The trailer fleet list, as defined in this subsection, must be provided to DEQ as part of the owner's compliance plan by the applicable compliance plan due date. Except upon specific DEQ approval, the trailer owner may not change the number or identity of trailers included on the trailer fleet list once the submission due date for the applicable compliance plan has passed. The trailer fleet list must include the following:

(A) Name of trailer fleet owner, or responsible official and title if the owner is a business entity or governmental agency;

(B) Name of company, corporation, or governmental agency;

(C) Company's motor carrier identification number and type, if applicable;

(D) Company address including city, state or province, zip code, colonia (Mexico only), and country;

(E) Mailing address including city, state or province, zip code, colonia (Mexico only), and country;

(F) Physical address of location where records pertaining to the applicable compliance schedule will be maintained including city, state or province, zip code, colonia (Mexico only), and country;

(G) Contact person's name;

(H) Telephone number;

(I) Email address (if available);

(J) Company taxpayer identification number (if applicable);

(K) Name of corporate parent (if applicable);

(L) TRUCKS identification number of corporate parent (if applicable);

(M) List of all 2015 and previous model-year 53-foot or longer box-type trailers that are subject to the requirements of this Division while the owner is participating in an optional trailer fleet compliance schedule:

1. For an owner who elects to participate in the large fleet compliance schedule, the trailer list must include all trailers that will

operate in Oregon including compliant trailers, noncompliant trailers, exempted trailers, and refrigerated trailers;

2. For an owner that elects to participate in the small fleet compliance schedule, the trailer list must include all trailers in the owner's fleet, including compliant trailers, noncompliant trailers, exempted trailers, and refrigerated trailers. For the sole purpose of documenting the owner's eligibility for the small fleet compliance schedule, the trailer list for those submitting a small fleet compliance plan must also include trailers in the fleet that do not travel on a highway within Oregon;

(N) For each trailer listed, provide the following:

1. Trailer type (dry van or refrigerated van);

2. Vehicle identification number (VIN);

3. Trailer make;

4. Trailer model;

5. Trailer model year;

6. License plate number;

7. State or province of registration;

8. Registration type (state, IRP, temporary, seasonal, monthly, or other);

9. Country of registration;

10. Compliance status (compliant or non-compliant) ;

11. Exemption Status (not exempt, local-haul exempt, dedicated to short- haul or local-haul tractors);

12. Oregon operating status (indicate whether the trailer will operate in Oregon during the applicable optional compliance schedule).

(c) Compliance plan base list: The compliance plan base list is the list of all non-compliant trailers identified on the trailer fleet list as trailers that will be brought into compliance in accordance with the applicable compliance schedule. Trailers that are not early compliance trailers but are in compliance before January 1,

2015, may also be included on the compliance plan base list and used to meet minimum fleet conformance thresholds. The compliance plan base list shall not include the following trailers:

(A) Exempted trailers, including those local-haul trailers exempt under OAR 340-255-1030 (3);

(B) Early compliance trailers, if applicable;

(C) Delayed compliance trailers, if applicable; and

(D) Trailers that will not operate in Oregon for the duration of the applicable trailer fleet compliance schedule.

(d) Annual conformance commitment list: The annual conformance commitment list for a particular compliance year is the list of trailers on the compliance plan base list that the owner commits to bring into compliance to meet the minimum fleet conformance threshold that will take effect on January 1 of the following year. For each compliance year's annual conformance commitment list, the trailer owner must list a sufficient number of trailers to meet or exceed the annual conformance number for that same year.

(5) Calculation Methodology.

(a) Large fleet compliance plan base number: The compliance plan base number for large fleets is the number of trailers that a trailer owner elects to bring into compliance in accordance with the large fleet compliance schedule.

$N_{LB} = N_T – N_D – N_E – N_X$ (Equation 1)

"N_{LB}" = Large fleet compliance plan base number.

"N_T" = Total number of trailers listed on the trailer fleet list.

"N_D" = Number of delayed compliance trailers, as determined in accordance with subsection (5)(c), if applicable.

"N_E" = Number of early compliance trailers, not to exceed $N_{E, max}$ as determined in accordance with Equation 5, if applicable.

"N_X" = Number of trailers with a trailer fleet list exemption status of "local-haul exempt," "dedicated to short-haul tractors," or "dedicated to local-haul tractors," if applicable.

(b) Small fleet compliance plan base number: The compliance plan base number for small fleets is the number of trailers that a trailer owner elects to bring into compliance in accordance with the small fleet compliance schedule.

$N_{CA} = N_T – N_{NC}$ (Equation 2)

"N_{CA}" = Total number of trailers in Oregon fleet.

"N_T" = Total number of trailers listed on the trailer fleet list.

"N_{NC}" = Number of trailers that will not operate in Oregon for the duration of an applicable trailer fleet compliance schedule

$N_{SB} = N_{CA} – N_X$ (Equation 3)

"N_{SB}" = Small fleet compliance plan base number.

"N_{CA}" = Total number of trailers in Oregon fleet, as determined in accordance with Equation 2.

"N_X" = Number of trailers with a trailer fleet list exemption status of "local-haul exempt," "dedicated to short-hail tractors," or "dedicated to local-haul tractors," if applicable.

(c) Large fleet delayed compliance trailer number: The delayed compliance trailer number is the number of trailers for which compliance may be delayed, pursuant to OAR 340-255-1040 (2)(d), Early Compliance Option.

$N_D = N_E \times 1.5$ (Equation 4)

"N_D" = Number of delayed compliance trailers, if applicable. If N_D is not a whole number, round down to the next whole number.

"N_E" = Number of early compliance trailers, not to exceed $N_{E, max}$ as determined in accordance with Equation 5, if applicable.

(d) Large fleet maximum allowable number of early compliance trailers: The resultant number must be rounded down to the nearest whole trailer.

$N_{E, max} = (N_T – N_X) \times 0.20$ (Equation 5).

"$N_{E, max}$" = Maximum allowable number of early compliance trailers. If $N_{E, max}$ is not a whole number, round down to the next whole number.

"N_T" = Total number of trailers listed on the trailer fleet list.

"N_X" = Number of trailers with a trailer fleet list exemption status of "local-haul exempt", "dedicated to short-haul tractors" or "dedicated to local-haul tractors," if applicable.

(e) Annual conformance number: The annual conformance number is the number of trailers that a trailer owner must bring into compliance by December 31 of a particular compliance year to ensure that the percentage of compliant trailers within the compliance plan base list meets or exceeds the applicable minimum fleet conformance threshold that takes effect on January 1 of the following year.

$N_Y = (N_B \times P_Y) - N_{C,\,Y-1}$ (Equation 6)

"N_Y" = Annual conformance number for compliance year Y. If N_Y is not a whole number, round up to the next whole number if the fractional part is equal to or greater than 0.5, and round down if less than 0.5.
"N_B" = The compliance plan base number, either N_{LB} as calculated in subsection (e)(1) for a large fleet or N_{SB} as calculated in subsection (5)(b) for a small fleet.

"P_Y" = Minimum fleet conformance threshold for compliance year Y, as defined in subsection (2)(a) for large fleets and (3)(a) for small fleets, expressed as a fraction (e.g. 5 percent is entered into equation as 0.05).

"$N_{C,\,Y-1}$" = Total number of trailers within the compliance base that would already be in compliance prior to January 1 of compliance year Y. This number must not include early compliance trailers.

(6) General Requirements for All Compliance Schedules: To participate in a trailer fleet compliance schedule, a trailer owner must comply with the following requirements:

(a) The trailer owner must ensure that, by December 31 of each compliance year, the percentage of compliant trailers on the owner's compliance plan base list is equal to or greater than the applicable minimum fleet conformance threshold for that compliance year;

(b) The trailer owner must ensure that the number of trailers listed on each compliance year's annual conformance commitment list is equal to or greater than the annual conformance number for that same year;

(c) The trailer owner must bring into compliance all trailers listed in each compliance year's annual conformance commitment list before January 1 of the following year;

(d) The trailer owner must allow the DEQ, or any other authorized enforcement personnel, to conduct periodic audits of records and equipment to verify

compliance with an applicable compliance schedule, the owner's compliance plan, and other applicable air quality regulations;

(e) Should DEQ terminate the trailer owner's participation in a trailer feet compliance schedule, such trailer owner must bring all trailers into compliance within 90 days of such termination or by December 31, 2017, whichever is later, but no later than December 31, 2020 if participating in the large fleet compliance schedule and December 31, 2021 if participating in the small fleet compliance schedule;

(f) Starting January 1, 2018, except for eligible refrigerated-van trailers that the trailer owner elects to bring into compliance in accordance with OAR 340-255-1020 (2)(c)(B)2 and exempted trailers, a trailer owner may not allow the operation of a non-compliant trailer on a highway within Oregon if such owner withdraws participation from an applicable trailer fleet compliance schedule;

(g) The trailer owner must provide to DEQ any documentation and information required by an applicable trailer fleet compliance schedule by the compliance plan due date specified in such compliance schedule;

(h) The trailer owner must ensure that all information and documentation provided to DEQ is accurate and true;

(i) The trailer owner must ensure that all required information and documentation is received by DEQ by the applicable due dates; DEQ will not be responsible for materials lost in transit;

(j) If participating in the large fleet compliance schedule, the trailer owner must continue bringing trailers into compliance in accordance with the original compliance plan if a large fleet compliance plan revision is not submitted;

(k) The trailer owner must maintain all documentation pertaining to an applicable compliance schedule at the location indicated on the trailer fleet list;

(l) Upon the request of the DEQ or other authorized enforcement personnel, the trailer owner must provide all information and documentation necessary to verify compliance with this Division, including applicable compliance schedules and the owner's compliance plan, and information and documentation necessary to verify compliance with any other air quality regulation;

(m) A trailer owner who is participating in the small fleet compliance schedule may not allow a trailer subject to the requirements of this Division to operate on a highway within Oregon after July 1, 2016, unless:

(A) the trailer is listed on the owner's trailer fleet list; or

(B) the trailer was acquired after July 1, 2017 and both of the following criteria are met:

1. the owner provides documented proof to DEQ of the trailer's acquisition (purchase or transfer of ownership) date; and

2. the trailer is a compliant trailer;

(n) A trailer owner may not allow the operation of a non-compliant trailer on a highway within Oregon after December 31 of the compliance year in which the trailer is scheduled to be brought into compliance;

(o) With DEQ's specific approval, a trailer owner may remove a trailer from a particular compliance year's annual conformance commitment list for the purpose of re-designating such trailer into local-haul or short-haul service, thereby relieving such owner from the obligation of bringing that trailer into compliance. However, such owner must fill the vacancy left on the affected annual conformance commitment list with another trailer from the owner's final annual conformance commitment list on which at least one trailer is still listed. If such owner is participating in the early compliance option, the replacement trailer must be a delayed conformance trailer, if one still exists;

(p) Except as provided in subsection (2)(c), a compliance plan revision may only be made with the approval of DEQ if DEQ determines that a company merger, acquisition, split, or other changed circumstances affecting operations of the owner, necessitate revisions to the compliance plan;

(q) DEQ approval will not be granted to allow a newly-formed business, or an existing business commencing operations in Oregon, to participate in a compliance schedule after the submission due date for the applicable compliance plan has passed;

(r) DEQ may make non-confidential information provided pursuant to an optional trailer fleet compliance schedule available to the public for the purpose of helping determine the compliance status of a trailer or fleet;

(s) Although participation in an optional trailer fleet compliance schedule does not require DEQ's specific approval, DEQ may terminate a fleet's participation in a compliance schedule if the fleet or any tractor or trailer within the fleet is found in violation of this Division. Should DEQ terminate a fleet's participation in a compliance schedule, the owner must bring all trailers into compliance within 90 days or by December 31, 2017, whichever is later, but in no case later than December 31, 2020, if participating in the large fleet compliance schedule, and December 31, 2021, if participating in the small fleet compliance schedule;

(t) A trailer owner who is participating in the large fleet compliance schedule may not allow a trailer subject to the requirements of this Division to operate on a highway within Oregon after July 1, 2015, unless:

(A) the trailer is a compliant trailer; or

(B) the trailer is listed on the owner's trailer fleet list and is in compliance with all requirements of the large fleet compliance schedule; or

(C) the trailer is exempt under OAR 340-255-1030

(u) Any violation of the requirements of this subsection constitutes a violation of this Division.

Appendix L – Recommended Commercial Vehicle Idling Rules

Commercial Vehicle Idling

340-253-0005

Purpose and Scope

The purpose of this law is to protect public health and the environment by reducing greenhouse gas and other emissions while conserving fuel, performing essential work using combustion engines and maintaining adequate rest and safety of all drivers of long distance freight hauling vehicles.

340-253-0010
Applicability
This division is in effect as of DATE and applies to commercial motor vehicles that operate in the State of Oregon with a gross vehicle weight rating of greater than 10,000 pounds that are or must be licensed for operation on highways (as defined under 40 CFR 390.5), and to locations where commercial vehicles load or unload.

This specifically includes:

(1) Oregon-based vehicles; and

(2) Non-Oregon-based vehicles operating in Oregon.

340-253-0015
Definitions
The definitions in OAR 340-200-0020, 340-204-0010, and this rule apply to this division. If the same term is defined in this rule and OAR 340-200-0020 or 340-204-0010, the definition in this rule applies to this division.
(1) “Authorized emergency vehicle” means an emergency vehicle as defined in ORS 801.260.
(2) “Auxiliary power unit” or “APU” means any device that is permanently dedicated to the vehicle on which it is installed and provides electrical, mechanical, or thermal energy to the primary diesel engine, truck cab, and/or sleeper berth, bus’s passenger compartment or any other commercial vehicle’s cab, as an alternative to idling the primary diesel engine.
(3) “Commercial motor vehicle” means a vehicle with a manufacturer’s gross vehicle weight rating greater than10,000 pounds, which is self-propelled by an internal combustion engine and is designed primarily for transporting persons or property on a public street or highway.

(4) “Idle reduction technologies” means any device or system of devices that is installed on a motor vehicle subject to this rule and is designed to provide it those services, such as heat, air conditioning and electricity, that would otherwise require the operation of the primary diesel engine while the motor vehicle is temporarily parked or remains stationary.
(5) “Idling” means operation of the main propulsion engine of a motor vehicle while the vehicle is stationary.
(6) “Greenhouse gas” has the meaning given that term in ORS 468A.210
(6) “Gross vehicle weight rating" or "GVWR" means the value specified by the manufacturer as the maximum loaded weight of a single vehicle.
(7) “Heavy-duty” means a vehicle with a gross vehicle weight rating greater than 26000 pounds.
(8) “Highway” is means a “highway” as defined in ORS 801.305.
(9) “Official traffic control device” means any sign, signal, marking or device placed or erected by authority of a public body or official having jurisdiction, for the purpose of regulating, warning, or guiding traffic, but does not include islands, curbs, traffic barriers, speed humps, speed bumps or other roadway design features.
(10) “Official traffic control signal” means any device, whether manually, electrically, or mechanically operated, by which traffic is alternately directed to stop and proceed and which is erected by authority of a public body or official having jurisdiction.
(11) “Primary engine” An internal combustion engine attached to a motor vehicle that provides the power to propel the motor vehicle into motion and maintain motion.
(12) "Safety or health emergency" means:
(a) a sudden, urgent, or usually unforeseen, occurrence; or
(b) a foreseeable occurrence relative to a medical or physiological condition.
(13) “Primary diesel engine” means the diesel-fueled engine used for vehicle propulsion.
(14) “Vehicle operator” means any person who is in actual physical control of a on-road vehicle.
(15) “Vehicle owner” means the registered owner, lessee, licensee, or bailee of any commercial vehicle who operates or directs the operation of any such vehicle on either a for-hire or not-for-hire basis.

340-253-0020
General Requirement for Vehicles
No owner or operator of a vehicle shall cause, allow or permit vehicles covered by this rule to idle for more than five minutes in any continuous 60-minute period except as noted in 340-253-0025 and 340-253-00305 below.

340-253-0025
General Requirements for Load/Unload Locations
No load/unload location owner shall cause heavy –duty vehicles covered by this rule to idle for a period greater than 30 minutes while waiting to load or unload.

340-253-0030
Signage for Idling Requirements
An owner or operator of a location where vehicles subject to this act load or unload or a location that provides 15 or more parking spaces for vehicles subject to this act shall erect and maintain a permanent sign to inform drivers that idling is restricted in this state.

340-253-0035
Exemptions: The general requirement for vehicles does not apply for the period or periods where:
(1) a vehicle idles while forced to remain motionless because of on-highway traffic, an official traffic control device or signal, or at the direction of a law enforcement official or mechanical difficulties over which the operator has no control.
(2) a vehicle idles when operating defrosters, heaters, air conditioners, or installing equipment solely to prevent a safety or health emergency, and not for the purpose of a rest period, or as otherwise necessary to comply with manufacturers' operating requirements, specifications and warranties in accordance with Federal or State motor carrier safety regulations or local requirements.
(3) a police, fire, ambulance, public safety, military, utility service vehicle or other emergency or law enforcement vehicle, or any vehicle being used in an emergency capacity, idles while in an emergency or training mode and not for the convenience of the vehicle operator.
(4) idling of the primary engine is necessary for maintenance, servicing, repairing, diagnostic purposes or particulate matter trap regeneration, or, if idling is required for such activity.
(5) a vehicle idles as part of a state or federal inspection to verify that all equipment is in good working order, if idling is required as part of the inspection.
(6) idling of the primary engine is necessary to power work-related mechanical, safety, or electrical operations other than propulsion (e.g., controlling cargo temperature; operating lift, crane, pump, drill, hoist, mixer or other auxiliary equipment; collecting solid waste, recyclable material). This exemption does not apply when idling for cabin comfort or to operate non-essential on-board equipment.
(7) an armored vehicle idles when a person remains inside the vehicle to guard the contents, or while the vehicle is being loaded or unloaded.

340-253-0040
Conditional Exemptions: The general requirement for vehicles does not apply for the period or periods where:
(1) a passenger bus idles a maximum of 15 minutes in any 60 minute period to maintain passenger comfort while non-driver passengers are onboard. This applies to a motor vehicle subject to this article parked in any place that the vehicle is legally permitted to park, including, but not limited to, a fleet trucking terminal, commercial truck stop or designated rest area. This exemption expires three years following adoption of the rule. This exemption does not apply if the vehicle is parked at a location equipped with stationary idle reduction technology that is available for use at the start of the rest period.

(2) an occupied vehicle with a sleeper berth compartment idles for purposes of air conditioning or heating during a rest or sleep period, or a vehicle waiting to load or unload and the outside temperature at the location of the vehicle is less than thirty-two degrees or greater than seventy-five degrees fahrenheit at any time during the rest, sleep or load/unload period. This applies to a motor vehicle subject to this article parked in any place that the vehicle is legally permitted to park, including, but not limited to, a fleet trucking terminal, commercial truck stop or designated rest area. This exemption expires three years following adoption of the rule. This exemption does not apply if the vehicle is parked at a location equipped with stationary idle reduction technology that is available for use at the start of the rest period.
(3) an occupied heavy-duty vehicle idles for purposes of air conditioning or heating while waiting to load or unload.
(4) These exemptions expire on January 1, 2016.

340-253-0045
Relationship to Other Law
Nothing in this Section allows idling in excess of other applicable law, including, but not limited to any applicable ordinance, rule, or requirement as stringent as, or more stringent than, this section.

340-253-0045
Auxiliary Power Units
Operating an auxiliary power unit, generator set, or other mobile idle reduction technology as a means to heat, air condition, or provide electrical power as an alternative to idling the main engine is not an idling engine.

(1) Operating an auxiliary power unit or generator set on all model year 2006 or older commercial diesel vehicles is permitted.

(2) On or after three years following the effective date of this rule, the driver shall not operate an internal combustion APU on any vehicle equipped with a 2007 and subsequent model year primary diesel engine unless the vehicle is:

a) Equipped with a verified in-use strategy that reduces particulate matter by at least 85 percent, or

b) Have its exhaust routed directly into the vehicle's exhaust pipe, upstream of the diesel particulate matter aftertreatment device.

Labeling Requirements. 2007 and subsequent model year commercial diesel vehicles equipped with an internal combustion APU meeting the requirements specified in this subsection shall have a label affixed to the hood of the vehicle to allow operation of the APU in Oregon.