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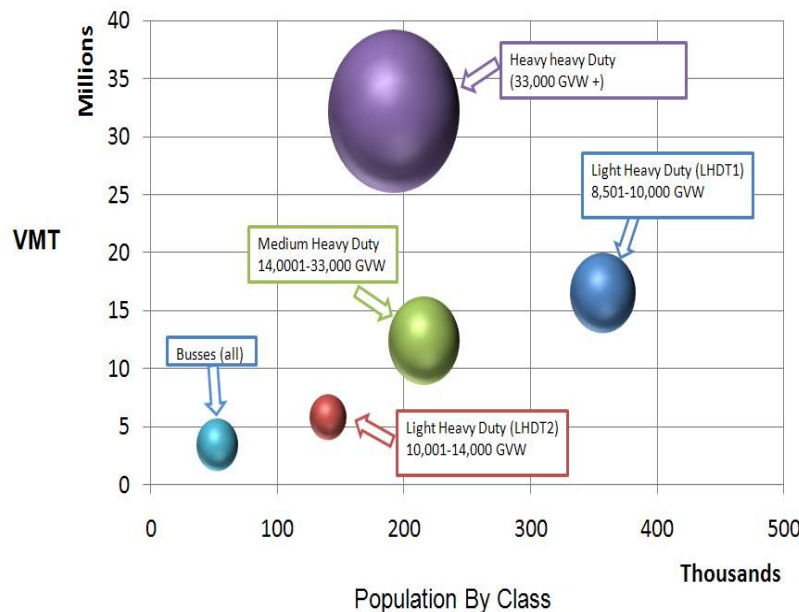
### Purpose

The purpose of the Technology Roadmap is to lay out a long term plan for research, development and market transformation in the areas of medium/ heavy-duty trucks and goods movement. The strategies and pathways outlined in the Roadmap will deliver pathways with clear actionable steps to meet or exceed the 2020 goals for California in air quality, energy security, petroleum reduction, and green house gas reductions. The roadmap will also set up a framework and timeline for longer term goals.

### Why Trucks?

The potential environmental and economic savings for trucks is enormous. Medium- and heavy -duty trucks account for approximately 9% of all green house gas (GHG) emissions, so any plan to reduce GHG must include trucks. GHG emissions from trucks increased by 77% from 1990-2006. If an average semi-truck improves its fuel efficiency from 6 MPG to 7 MPG, it saves 2,857 gallons of diesel each year. In contrast, increasing the fuel efficiency of an average passenger car from 35 MPG to 50.8 MPG saves only 107 gallons. By increasing the efficiency of trucks, and reducing the use of petroleum, we have the potential to address the issues of greenhouse gases, petroleum reduction, energy security and air quality.

At highway speeds, each one percent improvement in fuel economy would result in saving about 200 million gallons of fuel for the U.S. heavy truck fleet.



### Populations & Impact

There are approximately 950,000 trucks operating in California, in a large variety of sizes, shapes and vocations. As such, it's unlikely that there will be a single appropriate solution or pathway to meet the goals, but instead a series of complementary pathways resulting in the most appropriate solutions for different trucks and uses. The graph illustrates the impact of trucks in

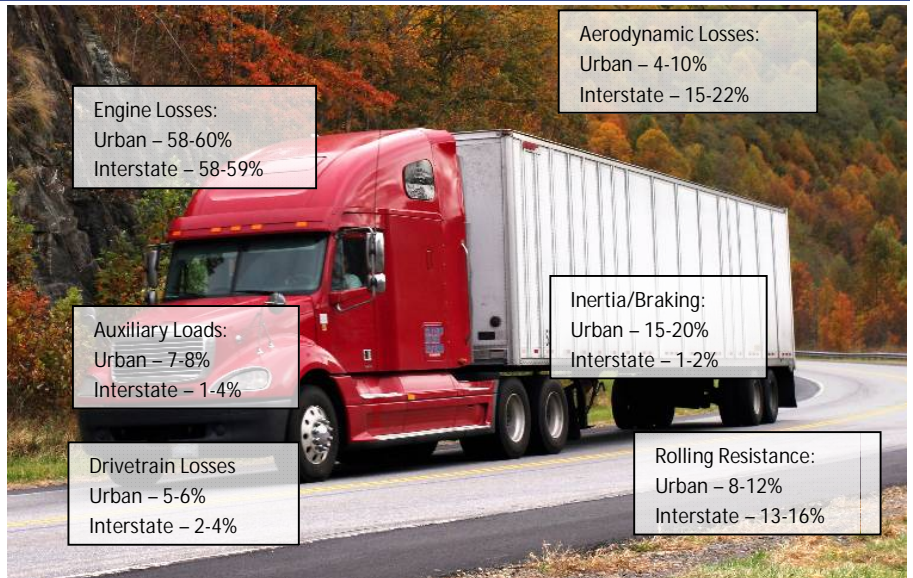
California, separated by classes. The horizontal axis represents the population's size, the vertical axis is vehicles miles travelled (VMT), and the area of the circles represents the gallons of fuel consumed. It demonstrates that population, VMT, and efficiency must all be considered when calculating a segments impact, and also shows that certain segments may be bigger contributors and better targets for improvement than others.

48 S. Chester Avenue  
Pasadena, CA 91106  
Tel (626) 744-5600

[www.calstart.org](http://www.calstart.org)

## Where does the energy go?

On a level road, for urban and interstate applications, these numbers represent approximate values for where the energy is used by a large truck. In evaluating potential technologies, it is imperative to understand where they would be utilized, and the differences between usages for trucks. The energy use and savings for an urban garbage truck is very different than a Class 8 semi truck.



## Strategies and Technologies

In a market as diverse as the trucking world, there will be a variety of strategies and technologies that will reduce fuel use and emissions. These can range from simple driver feedback tools, to encourage better habits, or speed reduction. Even tools that allow drivers to avoid congestion can provide significant benefits. Some potential technologies are listed to the right, and their expected potential improvements, but the list is much longer, and each must be judged based on cost, ease of use, durability, payback, required behavior changes, market acceptance, infrastructure issues, and many more factors. CalHEAT has identified many technologies, and in the next few months will be interviewing fleets, manufacturers and parts suppliers to determine the gaps and barriers to implementation.

Technology	2020 Improvement Goal
Low Carbon Fuels	10% GHG Reduction
Aerodynamic Aids	6-15% Efficiency Gain
Reduced Rolling Resistance	3-9% Efficiency Gain
Diesel Engine Efficiency	15-21% Efficiency Gain
Gasoline Engine	24% Efficiency Gain
Hybridization	9-50% Efficiency Gain
Improved Transmissions	4-8% Efficiency Gain

Our goal is determine the most appropriate technologies, identify the pathways to increase their use, and create a roadmap document that will identify the clear actionable steps needed to meet the goals for emissions reduction, greenhouse gas reduction, petroleum reduction and energy security.

For more information, visit:

- CalHEAT [www.calheat.org](http://www.calheat.org)
- California Energy Commission [www.energy.ca.gov](http://www.energy.ca.gov)
- CALSTART [www.calstart.org](http://www.calstart.org)

