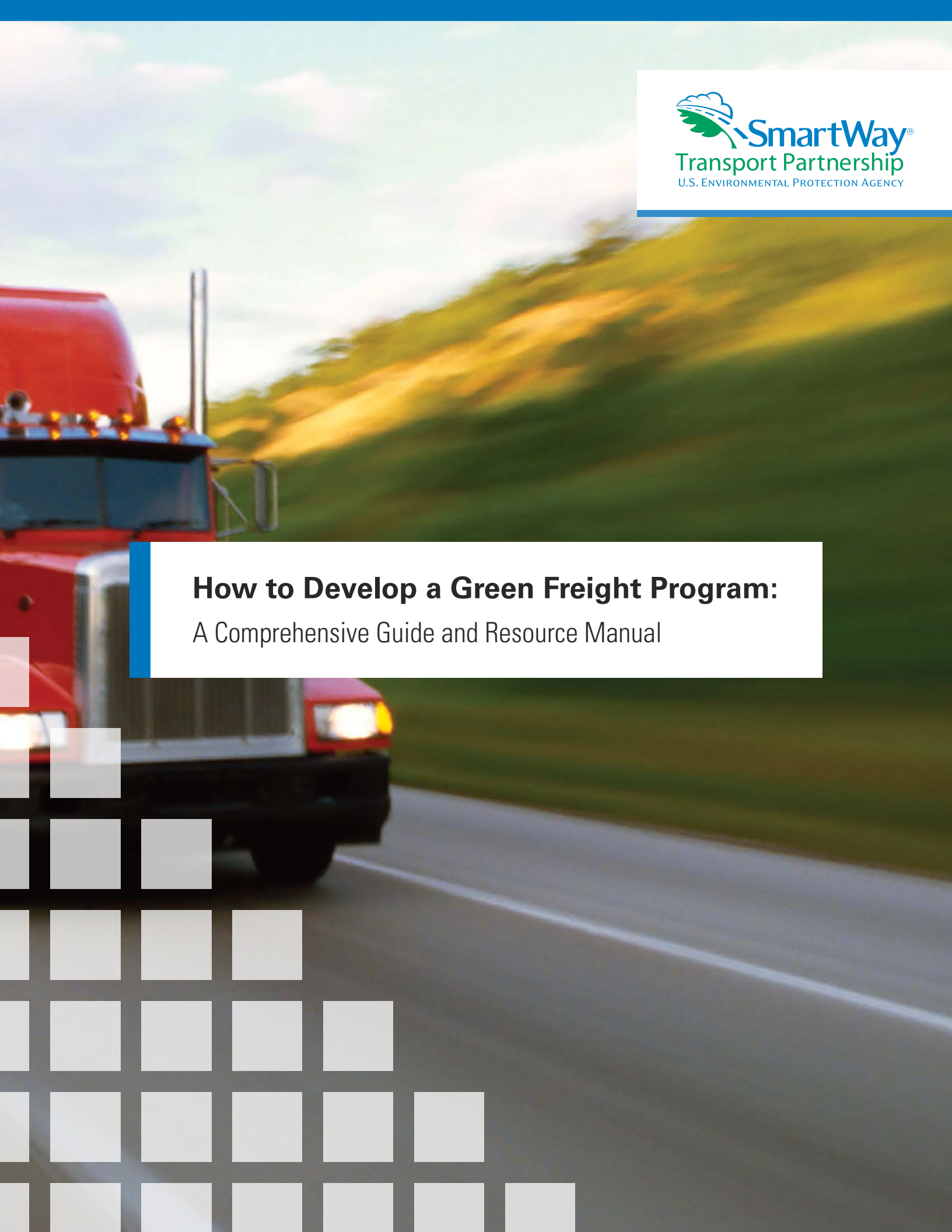


SmartWay®
Transport Partnership
U.S. Environmental Protection Agency

How to Develop a Green Freight Program:

A Comprehensive Guide and Resource Manual

Introduction

MESSAGE FROM SMARTWAY

MODULES

APPENDICES

Message from SmartWay

Chris Grundler, Director, Office of Transportation and Air Quality (OTAQ), U.S. EPA

Freight transportation is critical to businesses, consumers, and the world economy. The freight sector moves vast volumes of goods, commodities, materials, and food, domestically and globally, and is a primary factor in economic growth and development. But goods movement comes with an impact on the planet's environment: it contributes a significant portion of mobile source air pollution emissions, and its contribution is expected to grow significantly in coming years. Globally, carbon dioxide (CO_2) emissions from freight transport are growing more quickly than those from passenger vehicles. In particular, heavy duty vehicles are expected to be the largest emitter of CO_2 from all transportation modes by 2035.[1]

Freight transport is also responsible for a substantial fraction of other pollutants such as black carbon, which has a disproportionate impact on short-term global warming. For example, in 2000, approximately 19 percent of global black carbon emissions came from transportation sources, with the vast majority being diesel-fueled.[2] Similarly, diesel trucks are responsible for the largest fraction of nitrogen oxides emissions among all transportation sources.[3]

1. Climate and Clean Air Coalition (2014). Green freight goes global: Moving toward a global action plan. Retrieved from http://www.epa.gov/smartway/about/documents/webinars/ccac-webinar012214.pdf. p. 12.
2. U.S. EPA (2012). *Report to Congress on Black Carbon*. Retrieved from http://www.epa.gov/blackcarbon/2012report/fullreport.pdf. p. 102.
3. J. Borken-Kleefeld (2012). Pollutant emissions from the road transport sector—global and regional technology perspectives. Retrieved from http://www.htap.org/meetings/2012/2012_10/Presentations/Monday/Borken_TRA_issues1.pdf.

Increasingly, freight shippers and carriers and their customers are demanding tools and solutions to better measure and manage their greenhouse gas and other emissions nationally and globally. Recognizing the social, environmental, and economic impacts of goods movement, the U.S. EPA collaborated with the U.S. freight transportation industry in 2004 to create the SmartWay Transport Partnership to help reduce transportation sector emissions and energy use from goods movement.

The SmartWay Transport Partnership uses a market-based, public-private collaboration framework to provide freight shippers, carriers, and logistics companies with tools to benchmark and improve fuel-efficiency, save money, and track progress, while earning public recognition for their achievements. Since its launch, SmartWay has grown into an effective bi-national partnership program operating in the United States and Canada. Its principal elements include:

- *Partnership Program*, which assesses, benchmarks, and tracks the emissions of carriers, shippers, and logistics companies; includes a national program to foster the adoption of advanced technologies and strategies; and develops carbon benchmarking and reporting tools to empower Partners to optimize their freight-related carbon footprint.
- *Technology Program*, which features technology assessment, SmartWay Tractor/Trailer designation, and SmartWay technology verification. The information provided by this program helps freight carriers ensure the performance and effectiveness of investments in fuel savings and emission reduction technologies.
- *Recognition, marketing, and outreach activities*, which give Partners visibility (SmartWay website, logo, awards), information and education (webinars, fact sheets, e-update, website, workshops), and brand marketing (public service announcements, media campaigns, events).

- *Financing*, which provides innovative mechanisms to help freight transportation companies invest in installing fuel-saving and emissions-reducing technologies.
- *Light duty vehicle labeling*, which creates consumer demand for and awareness of SmartWay-certified vehicles which are used in preferential leasing and purchasing programs.

SmartWay also supports international green freight programs in other countries and regions, working (and sharing information) with global, regional, and multilateral initiatives to develop consistent performance metrics and measurement tools across the global supply chain.

This course book is designed to provide information, best practices, lessons learned, and guidance to enable nongovernmental organizations, governmental agencies, and other entities to design, build, and implement their own green freight programs modeled on SmartWay. It shares best practices and lessons learned from the U.S. EPA's more than 10 years of experience in developing and implementing SmartWay. It is our sincere hope that others will benefit from this experience and use this guidance to develop effective green freight programs, which will benefit not only stakeholders in host countries' freight industry but the global climate as well.

This course book is designed to be used in a group session or workshop led by an instructor or as a guide for personal study. It is divided into five "modules" that walk readers through the process of establishing a green freight program from the beginning stages of market analysis through program assessment and future improvement. Each module can be used as a stand-alone reference document; the five modules can also be taken as a whole to provide a comprehensive approach to establishing a green freight program. In addition to the main content, the workbook includes tips, examples of how the SmartWay program operates, and group exercises designed to set participants on the path to creating

a successful green freight program. Times indicated for sections and group exercises are guidelines. Feel free to take as much or as little time as you need to cover the material.

Modules at a Glance

Module I: Drivers for Green Freight Initiatives

Suggested time: 2 hours

Learn about the systemic drivers that can lead to the establishment of a green freight program, as well as the benefits of using a voluntary program approach to address these challenges and encourage environmental improvements in the freight industry.

Module II: Build Program Foundation

Suggested time: 3 hours

Learn about key aspects of a green freight initiative's program framework and considerations for the development of a green freight program.

Module III: Create Program

Suggested time: 5 hours

Learn about the design and development steps needed to launch and sustain a successful green freight program.

Module IV: Launch and Implement Program

Suggested time: 3 hours

Learn how to ensure the successful launch and initial implementation of a green freight program.

Module V: Evaluate, Refine, Enhance, and Expand

Suggested time: 2 hours

Learn how to grow, enhance, and mature the program, to transition beyond initial program implementation, and to ensure that it will continue to meet the needs of the freight industry as the marketplace and needs change.

MODULE I Drivers for Green Freight Initiatives

In this module, you will learn about the systemic drivers that can lead to the establishment of a green freight program, as well as the benefits of using a voluntary market-based, public-private partnership program approach to encourage environmental improvements in the freight industry. Key concepts include the impacts of the freight industry, regulatory drivers, customer demands, and challenges to freight sustainability efforts.

CONTENTS

Suggested time for this module: 2 hours

A Local and Global Impacts of the Freight Industry

There are many important reasons for establishing a green freight program. The freight industry has far-reaching and complex environmental, social, and economic impacts that accrue at the local level but have global consequences. While the freight industry provides a critical service to the world's growing population, it nonetheless accounts for a significant portion of the total emissions of black carbon, greenhouse gases (GHGs), and other pollutants from the transport sector. In certain regions of the world, the freight sector's contribution of GHG emissions can be inordinately high. For example, in India, only 5 percent of vehicles are trucks, yet they consume 46 percent of transport fuel and generate 63 percent of carbon dioxide (CO_2) and 59 percent of particulate matter emissions (which includes black carbon).[1] As globalization and urbanization continue, developing economies grow and standards of living continue to rise; fuel consumption and emissions associated with freight movement will rise as well. By the year 2050, medium- and heavy-duty freight trucks worldwide are projected to consume 1,240 billion liters of fuel, a 138 percent increase over 2000 levels.[2]

By establishing a green freight program in your country, you can achieve many benefits for your citizens. Some of the primary benefits are listed below.

Energy and environmental impacts

- *Reduce public health impacts from diesel emissions.* Oxides of nitrogen (NO_X) and particulate matter (PM), including black carbon,

1. Green Freight Asia. *Competitive Advantage Through Fuel Efficient and More Sustainable Operations*. Retrieved from http://cleanairinitiative.org/portal/sites/default/files/documents/Freight_Paper-_UNCRD_FINAL_Aug2010.pdf.
2. Green Freight Asia. *Competitive Advantage Through Fuel Efficient and More Sustainable Operations*. Retrieved from http://cleanairinitiative.org/portal/sites/default/files/documents/Freight_Paper-_UNCRD_FINAL_Aug2010.pdf.

Freight Industry Structure and Participation Roles

Many freight organizations and stakeholders work together to move product smoothly from point A to point B. The main types of freight organizations, as defined by SmartWay's Partnership criteria, are described below:

- *Carriers* own or lease and operate their own truck fleets, rail lines, air vehicles, barges, or marine cargo vessels to transport goods.
- *Shippers* contract out their shipping, most commonly directly with carriers but also through logistics providers.
- *Logistics providers* provide bundled logistics services—including management of materials, transportation, and/or inventory; inbound and outbound freight; and/or warehousing—to carriers and shippers.
- *Freight forwarders* provide pickup and delivery for domestic and international shipments.
- *Freight brokers* buy and sell freight transportation services and usually work on behalf of carriers or shippers.

are key pollutants that are produced by the diesel engines that are the workhorses of the freight industry. Those emissions contribute to serious public health problems, including premature mortality, and contribute to the creation of tropospheric ozone. These pollutants aggravate respiratory and cardiovascular diseases, which can result in increased hospital admissions, emergency room visits, and school absences; lost work days; and restricted activity days. Additionally, since 2002, the U.S. Environmental Protection Agency (EPA) has classified exposure to diesel exhaust as likely to be carcinogenic to humans.

- *Lessen impacts on vulnerable populations.* Children, the elderly, and people with existing health conditions are disproportionately affected by emissions generated by the freight industry because their cardiovascular, respiratory, and immune systems are more vulnerable to pollutants. In addition, freight yards, ports, borders, and other areas of concentrated truck/rail activity are often near lower-income neighborhoods, with their emissions disproportionately impacting these communities.

- *Reduce black carbon and GHG emissions that contribute to climate change.* The transportation sector consumes a significant amount of diesel fuel, and the freight industry is a major component of the transportation sector (though exact proportions vary from country to country). In terms of emissions, every liter of diesel consumed creates 2.7 kilograms of CO_2—a major GHG—as well as black carbon, another key contributor to climate change.

- *Improve energy security.* The freight industry is largely reliant on petroleum-based fuels, which constitute up to 30 percent of operational costs in mature markets.[3] A freight industry that uses less fuel is also less vulnerable to fuel price increases, less vulnerable to changes in fuel availability, and less reliant on imported fuels.

3. KPMG International (2011). *Competing in the Global Truck Industry: Emerging Markets Spotlight.* Retrieved from http://www.kpmg.com/Global/en/IssuesAndInsights/ArticlesPublications/global-truck-industry/Documents/emerging-markets.pdf.

Defining the Terms

What Is Black Carbon, and How Does It Impact the Environment?

Black carbon is a component of PM that comes from the incomplete combustion of fossil fuels, biofuels, and biomass. Older, less efficient engines and higher-sulfur diesel fuels are significant sources of black carbon. It is very effective at absorbing light and also reduces the reflectivity of snow and ice, which contributes to increased temperatures and accelerated snowmelt.

Social and economic impacts

- *Lower transportation fuel costs.* Fuel prices have a significant impact on freight carrier profitability and competitiveness. They also affect the cost of delivering products to shippers and, ultimately, to consumers. In the United States, along with labor, fuel costs represent the highest portion of operating costs for truck freight transportation.[4] In countries with lower labor costs that rely on fuel imports, fuel costs may be responsible for up to two-thirds of total freight costs.[5] So a green freight program that delivers improved freight operating efficiency and reduced fuel consumption will have a direct economic benefit to freight carriers, shippers, and the public.

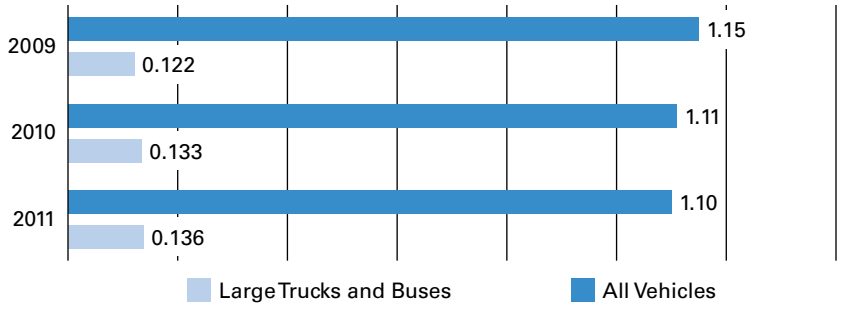
- *Mitigate infrastructure and congestion problems.* The freight industry demands space on roads for moving its products by truck. Freight movement can exacerbate already congested roadways, particularly in urban areas, increasing the costs associated with lost productivity. For example, recent estimates put the daily cost of traffic congestion at $55 million per day in the Philippines.[6] More efficient freight operations, such as reducing empty-miles, can both help reduce congestion and minimize freight-related infrastructure needs and pollution. Furthermore, as urban populations and vehicle ownership grow (estimates suggest that people living in cities will nearly double by 2050, reaching 6.3 billion globally; vehicle ownership will increase at the same time, particularly in developing countries[7]),

4. American Transportation Research Institute (2010). *An Analysis of the Operational Costs of Trucking*. Retrieved from http://www.atri-online.org/research/results/ATRITRBOpCosts.pdf.
5. Green Freight Asia. *Competitive Advantage Through Fuel Efficient and More Sustainable Operations*. Retrieved from http://cleanairinitiative.org/portal/sites/default/files/documents/Freight_Paper-_UNCRD_FINAL_Aug2010.pdf.
6. Remo, M.V. (2013). Traffic costs P2.4B daily. *Philippine Daily Enquirer*. July 6. Retrieved from http://business.inquirer.net/130649/traffic-costs-p2-4b-daily. (P2.4 billion at 0.023 U.S. dollars per Philippine peso.)
7. Shell Foundation (2012). *Scaling Solutions for Sustainable Mobility*.

freight efficiency will become imperative to minimizing congestion and transportation-related air pollution.

- *Improve roadway safety.* All on-road traffic poses safety risks, including accidents resulting in injuries and loss of life. As overall traffic volumes increase, so do such accidents. Large, heavy-duty trucks can be responsible for a significant and increasing proportion of overall accidents and fatalities. For example, the figures below show truck-related fatalities in the United States from 2009 to 2011. During this time, the fatality incidence rate associated with truck accidents increased in comparison to total fatalities for all vehicles.[8] It is interesting to note that individuals involved in large truck accidents are much more likely to die (as opposed to just being injured) compared to those involved in an average "All Vehicle" accident. For example, in 2011 fatalities from large truck accidents accounted for about 10 percent of all of the total vehicle fatalities, but injuries from large truck accidents only account for about 4 percent of all vehicle injury accidents. To the extent that green freight programs improve routing, reduce kilometers travelled, and reduce truck speeds, overall roadway safety should also improve.

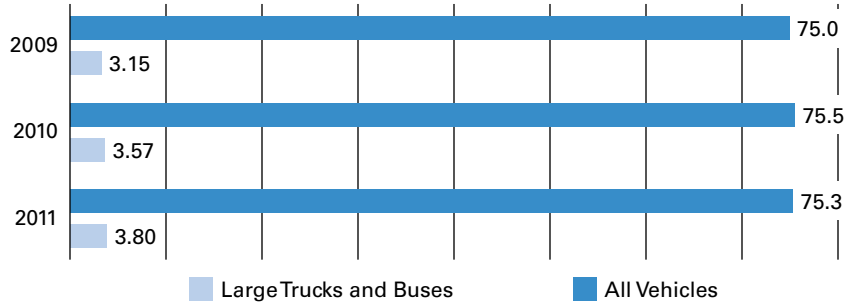
Figure 1.1 – Fatality Rates (per 100 Million Vehicle-Miles Traveled) for Large Trucks and Buses, and All Vehicles, 2009–2011



Source: Federal Highway Administration, *Highway Statistics 2010* and *Highway Statistics 2011*, Table VM-1; and National Highway Traffic Safety Administration, FARS and GES.

8. Federal Motor Carrier Safety Administration (2013). Commercial Motor Vehicle Facts – March 2013. p. 2. Retrieved from www.fmcsa.dot.gov/safety/data-and-statistics/commercial-motor-vehicle-facts-%E2%80%93-march-2013.

Figure 1.2 – Injury Rates (per 100 Million Vehicle-Miles Traveled) for Large Trucks and Buses, and All Vehicles, 2009–2011



Source: Federal Highway Administration, *Highway Statistics 2010* and *Highway Statistics 2011*, Table VM-1; and National Highway Traffic Safety Administration, FARS and GES.

Fuel Economy Improvement Technologies and Strategies

- Aerodynamic retrofits (e.g., cab, roof, and trailer fairings; nosecones)
- Rolling resistance improvements (e.g., low-rolling-resistance tires, single-wide tires, tire pressure monitoring, and automatic tire inflation)
- Idle reduction technologies and strategies (e.g., auxiliary power units, auto engine start/stop, truck stop electrification)
- Improved engine/powertrain design (e.g., turbocharging, turbocompounding, hybridization)
- Lightweighting (e.g., aluminum wheels, engine, and trailer)
- Operational efficiency improvements (e.g., route/network optimization, packaging reductions, driver training)

- *Drives technological innovation.* Green freight programs can play a role in spurring technological advances in engine, tractor/trailer, and tire design, as well as cleaner fuel standards. Programs can also help bring those innovations to market at a scale that drives down costs. For example, SmartWay has promoted the use of aerodynamic truck and trailer treatments such as gap reducers, which have become increasingly common on tractor-trailer rigs in the United States and can reduce fuel consumption by 5 percent or more. In addition, the pervasiveness of computer- and GPS-based freight tracking systems allows for significant improvements in operational efficiency, such as the reduction of empty back-hauls. As truck fleets in other countries continue to take advantage of new efficiency technologies and logistics strategies, their adoption will become easier and less costly elsewhere. Freight carriers and shippers that do not adopt these measures soon are likely to operate at a disadvantage relative to their competition.

Transport America

Close-up of gap fairing technology

- *Local economic development.* Freight efficiency keeps local capital local and frees up financial resources for alternative uses. A green freight program can also foster new local industries. Jobs associated

with installing and maintaining clean diesel technologies, for example, can be created and sustained from the demand driven by a green freight program.

GROUP EXERCISE:

Identify the Impacts of Freight

15 minutes

Create lists of environmental, social, economic, and other impacts that the freight industry has in your country (include both positive and negative impacts).

B Current and Prospective Regulatory Drivers

Global trends in NO_X and PM regulations

For years, many countries have been developing and implementing regulations to address the significant health and environmental impacts of diesel exhaust. A number of countries and regions have adopted complementary sets of standards for exhaust emissions and clean diesel fuel specifications. These include the European Union, Brazil, Canada, China, and Mexico, among many others. The engine standards have typically targeted new engine and vehicle manufacturers and are often based upon U.S. or European Union requirements. They have become progressively more stringent since the 1990s, with both NO_X and PM emissions levels falling by up to 99 percent from uncontrolled levels. These standards are possible only when paired with regulations that bring ultra-low-sulfur diesel fuel (50 to 15 parts per million [ppm] sulfur) to market, enabling retrofit installations of or new equipment with PM filters and diesel oxidation catalysts that can eliminate 99 percent of carbonaceous PM and 90 percent NO_X emissions reductions.

Low-Sulfur Fuel and Clean Diesel Technologies

The level of sulfur in diesel fuel can vary substantially from region to region, and even over time within a given area due to differences in crude oil and refining processes. Advanced clean diesel technologies are only possible with lower-sulfur fuel, and even relatively small increases in sulfur levels can impair catalyst and filter function. Thus, adoption of advanced NO_X and PM emissions standards will require rigorous monitoring and enforcement of associated diesel fuel sulfur standards.

In addition to the associated health benefits and GHG reductions, reducing PM also reduces black carbon emissions. Black carbon is of particular concern due to its very high global warming potential—by some estimates 680 times higher than carbon dioxide's on a mass basis.[9]

The following table summarizes the historical emissions standards for heavy on-road diesel engines in both the United States and the European Union, clearly demonstrating the progressive tightening of NO_X and PM limits over time.

Figure 1.3 – Heavy-Duty Diesel Truck Emissions Standards, EPA and EU (Engine Dynamometer Testing over Transient Cycles)

EPA, Converted to g/kWh				
Year	HC	CO	NO_X	PM
1994	1.74	20.79	6.71	0.13
1998	1.74	20.79	5.36	0.13

Year	NMHC	CO	NO_X	PM
2004: Option 1	n/a	20.79	3.22	0.13
2004: Option 2	0.67	20.79	3.35	0.13

Year	NMHC[a]	CO	NO_X[a,b]	PM
2007+	0.19	20.79	0.27	0.013

EU, g/kWh[c]				
Date, Stage	NMHC	CO	NO_X	PM
2000, Euro III	0.78	5.45	5.00	0.16
2005, Euro IV	0.55	4.00	3.50	0.03
2008, Euro V	0.55	4.00	2.00	0.03
2013, Euro VI	0.16[d]	4.00	0.46	0.01

CO: carbon monoxide
g/kWh: grams per kilowatt-hour
HC: hydrocarbons
NMHC: nonmethane hydrocarbons
NO_X: nitrogen oxides
PM: particulate matter

a. Sales-weighted phase-in from 2007 (50%) to 2010 (100%).
b. Most engines from 2007 to 2009 meet the family emissions limit of ~1.6–2 g/kWh NO_X.
c. Note that additional steady-state standards also applied to Euro III–Euro V.
d. For diesel engines, this is a THC standard.

9. GWP_{100}, or 100-year global warming potential estimate. From Clean Air Task Force (2009). *The Carbon Dioxide Equivalent Benefits of Reducing Black Carbon Emissions from U.S. Class 8 Trucks Using Particulate Filters: A Preliminary Analysis.*

The technologies used to meet the above NO_X and PM strategies generally require additional energy and therefore decrease vehicle efficiency to some degree. For example, diesel particulate filters can erode fuel economy by 2 to 4 percent.[10] If adopted alone, these technologies do not offer cost savings or a market incentive for adoption. However, if vehicle PM and NO_X controls can be bundled with integrated fuel efficiency improvement strategies, fleet managers can effectively offset these costs through greater overall fuel savings.

The Interdependence of Vehicle Emissions and Fuel Standards

No significant air pollution reduction strategy can work without reducing sulfur in fuels to near-zero levels. A pollutant itself, sulfur interferes with and eventually disables technologies used to control other air pollutants. More specifically, sulfur fouls conventional and advanced technologies to control vehicle emissions, including CO, PM, NO_X, and hydrocarbons. Low-sulfur fuels are the key to reducing emissions from existing vehicles and enabling advanced control technologies and fuel-efficient designs for new vehicles.

Sulfur is a naturally occurring component of crude oil and is found in both gasoline and diesel. When those fuels are burned, sulfur is emitted as sulfur dioxide or sulfate PM. Any reduction in fuel sulfur immediately reduces these sulfur compounds; as sulfur levels decline past a certain point, the benefits increase to include total pollutant emissions.

Reduced-sulfur fuel (~150 ppm) makes existing vehicles cleaner, decreasing emissions of CO, hydrocarbons, and NO_X from catalyst-equipped gasoline vehicles and PM emissions from diesels, with and without oxidation catalysts. These benefits increase as vehicles are designed to meet higher emissions standards and sulfur levels are

10. Cambridge Systematics (2010). NCHRP 25-25 (Task 59): *Evaluate the Interactions Between Transportation-Related Particulate Matter, Ozone, Air Toxics, Climate Change, and Other Air Pollutant Control Strategies*.

The Interdependence of Vehicle Emissions and Fuel Standards (continued)

reduced further. Low-sulfur fuel (~50 ppm) allows for advanced control technologies for diesel vehicles. Near-zero sulfur fuel (~10 ppm) allows for the use of NO_X absorbers, reducing NO_X emissions to more than 90 percent in both diesel and gasoline vehicles. This enables more fuel-efficient engine designs that are incompatible with current emissions control systems. Particulate filters achieve the maximum efficiency with near-zero sulfur fuels, virtually eliminating PM emissions altogether.

The technologies required to reduce sulfur to near-zero levels are in use in many areas of the world. Current costs are reasonable and the refining industry continues to make progress in developing more active catalysts and novel processes for removing sulfur, reducing costs even further.

Studies show the benefits of sulfur reduction far outweigh the costs, even though required refinery investments continue to be significant. EPA found that human health and environmental benefits due to sulfur reduction were 10 times higher than the costs. (This study assumed stricter emissions standards contingent on low-sulfur fuels.) Furthermore, a European study showed that near-zero sulfur fuels significantly reduce total fuel costs by increasing fuel economy. The considerable potential for GHG emissions reductions adds further to the health, environmental, and social benefits of sulfur reduction.

From: Blumburg, K., M. Walsh, and C. Pera (2003). *Low-Sulfur Gasoline and Diesel: The Key to Lower Vehicle Emissions*. International Council on Clean Transportation. Retrieved from http://www.theicct.org/sites/default/files/publications/Low-Sulfur_ICCT_2003.pdf.

Global trends in fuel efficiency standards and CO_2 emissions

While adoption of emissions and fuels standards targeting NO_X and PM has become widespread, many countries have not made as much progress in regulating heavy-duty diesel vehicle fuel efficiency and

CO_2 emissions. The very broad size and weight range associated with heavy-duty trucks, as well as the wide variety of their applications, have made reasonable, equitable fuel efficiency standards for heavy trucks more difficult to develop than standards for light-duty vehicles. Even after efficiency and emissions standards are adopted for new vehicles, their full impact can take years or decades to be seen. Because of the extreme durability and longevity of heavy diesel trucks, fleet turnover is generally a slow process.

In the United States, in 2011, EPA and the National Highway Traffic Safety Administration (NHTSA) jointly adopted fuel economy and CO_2 emissions rate standards for heavy trucks and buses to be phased in from 2014 through 2018. In addition to improving energy security and addressing climate change concerns, these regulations will have the added benefit of significantly reducing fuel costs for vehicle owners and operators in the long run. These agencies also developed separate standards for combination tractors, heavy-duty pickup trucks and vans, and vocational vehicles (e.g., service trucks and buses) in order to account for their unique uses and constraints. Of these standards, those for combination tractors are directly relevant to freight carriers. Differentiated standards were adopted for nine sub-categories of combination tractors based on weight class, cab type, and roof height. The final standards will achieve a 9 to 23 percent reduction in emissions and fuel consumption from affected tractors over the 2010 baselines. (Note that these standards only apply to heavy-duty tractors, not trailers.) The following table presents the new U.S. standards for combination tractors, expressed in CO_2 emissions as well as fuel consumption rates.[11]

11. ICCT (2013). US: Heavy-duty: Fuel consumption and GHG. Retrieved from http://transportpolicy.net/index.php?title=US:_Heavy-duty:_Fuel_Consumption_and_GHG#CO2_and_Fuel_Consumption_Standards.

Figure 1.4 – Final (MY 2017) Combination Tractor Standards

Category	EPA CO_2 Emissions			NHTSA Fuel Consumption		
	g/ton-mile			gal/1,000 ton-mile		
	Low Roof	Mid Roof	High Roof	Low Roof	Mid Roof	High Roof
Day Cab Class 7	104	115	120	10.2	11.3	11.8
Day Cab Class 8	80	86	89	7.8	8.4	8.7
Sleeper Cab Class 8	66	73	72	6.5	7.2	7.1

Other countries have also begun to adopt heavy-duty fuel economy regulations. Canadian fuel economy targets take effect in 2014 and are closely aligned with U.S. standards. Japan adopted the first fuel economy standards for heavy vehicles with a gross vehicle weight greater than 3.5 tonnes in 2005 (phased in through 2015) based on kilometer per liter targets, resulting in a 12 percent reduction in fuel consumption. The Japanese regulatory targets also incorporate incentive mechanisms such as progressive taxes based on vehicle weight and engine size. China began the adoption of fuel consumption limits in 2012. China's Phase I standards apply to vehicles greater than 3.5 tonnes. Separate standards apply to straight trucks, tractors, and buses, and vary by gross vehicle weight. China is currently developing more aggressive (Stage II) standards.

GROUP EXERCISE:

The Regulatory Context for Green Freight

15 minutes

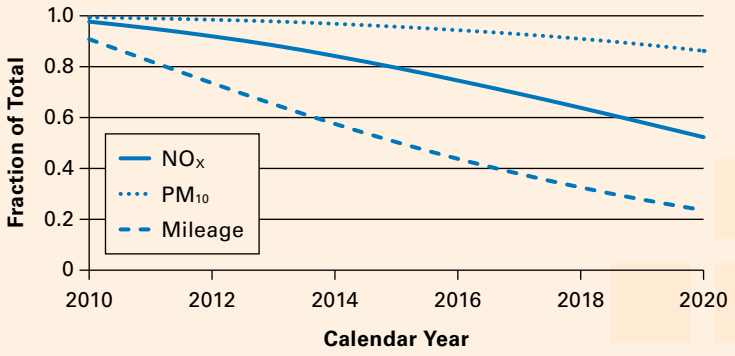
Discuss regulations and regulatory trends related to the freight industry in your country. Do the current emissions and fuel standards permit advanced emissions controls? If not, how can a green freight program help accelerate the advancement of those standards?

The Challenge of Legacy Vehicles

The 2007 U.S. heavy-duty truck emissions standards (fully phased in by 2010) required emissions reductions relative to earlier truck engines, resulting in NO_X and PM reductions of more than 90 percent. In time, these standards will result in dramatic emissions reductions for the United States' heavy-duty fleet as a whole. However, diesel trucks are remarkably durable. In 2011, more than 43 percent of all combination trucks were still on the road after 20 years of service, even though annual mileage accumulation rates decrease with vehicle age.

Because of the slow turnover of the heavy-diesel truck fleet, it can take decades to see the full benefit of adopting emissions standards for new engines. The figure below clearly demonstrates this feature of the heavy truck fleet, showing the fraction of NO_X, PM (with particles 10 micrometers or smaller in diameter), and total mileage attributable to pre-2010 model year long-haul diesel trucks in the United States. Over the period shown, the mileage fraction associated with these older trucks drops dramatically (from roughly 90 to 20 percent). However, due to their much higher emissions rates, these older vehicles are still responsible for the majority of emissions in 2020 (about 50 percent of NO_X and about 85 percent of PM). This disproportionate relationship between truck age and the fraction of emissions highlights the need for programs to address the emissions associated with the in-use ("legacy") fleet through green freight programs and other strategies.

Figure 1.5 – Fraction of NO_X, PM_{10}, and Total Mileage Attributable to Pre-2010 Trucks



Source: Generated by default national inputs from the MOVES2010b model.

C Freight Customer Needs and Industry Challenges

Growing customer demand for global carbon accounting and reporting

In addition to complying with regulations targeting PM, NO_X, and fuel economy, more and more the freight industry is being asked to define its contribution to their customer's carbon footprints and climate risk. Reporting CO_2 emissions ("carbon reporting") is becoming commonplace for various industry sectors around the globe, often driven by customer interest in product and service sustainability. As a result, corporate customers, shareholders, lenders, and insurers are increasingly demanding greener freight options to complement their overall corporate social responsibility (CSR) initiatives. CSR initiatives often include carbon reporting goals through nonprofit organizations like the Carbon Disclosure Project, which provides a platform for organizations to report their carbon performance. These organizations assist corporations seeking to understand the sources of their GHG emissions and decrease emissions through both operations and supply chain management include a freight transportation component. Overall, indirect emissions, of which transportation is a major contributor, can represent as much as 86 percent of a company's total emissions.[12]

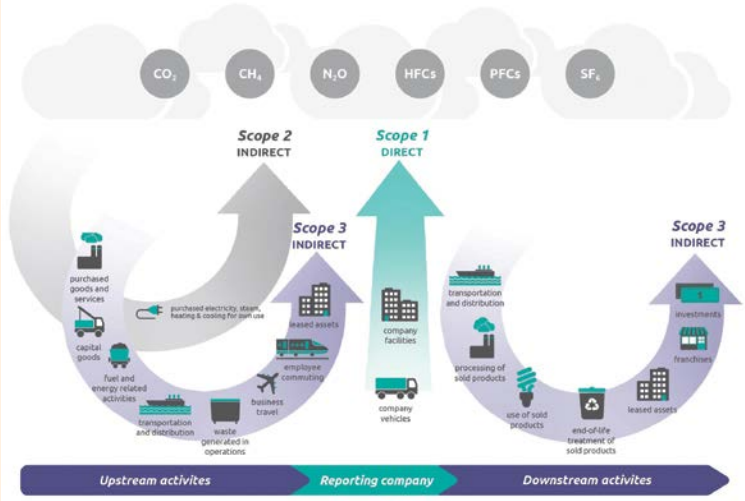
In order to fulfill the reporting requirements of their sustainability initiatives, freight customers need to quantify the environmental impact of their freight. The 2012 CDP Supply Chain Report indicates that 39 percent of reporting Supply Chain member companies will begin deselecting suppliers that do not adopt good carbon-management practices. So, as awareness of climate change issues continues to increase worldwide

12. Mathews, H S., C.T. Hendrickson, and C.L. Weber (2008). The importance of carbon footprint estimation boundaries. *Environmental Science and Technology* 42: 5839–5842. As cited in Carbon Disclosure Project (2012). *CDP Supply Chain Report 2012: A New Era: Supplier Management in the Low-Carbon Economy.*

GHG Protocol Emissions Scope

When business and organizations report their GHG emissions for the Greenhouse Gas Reporting Protocol, they account for both their *direct emissions* (Scope 1 emissions) and *indirect emissions* (Scope 2 and 3 emissions). Scope 1 emissions are direct emissions from company-owned or company-controlled sources. Scope 2 emissions are indirect emissions from the generation of purchased energy, and Scope 3 emissions are all indirect emissions that occur in the company's value chain. When an organization hires a freight transport company to move its products, those transport emissions contribute to that organization's Scope 3 emissions.

Figure 1.6 – Overview of GHG Protocol Scopes and Emissions Across the Value Chain



World Resources Institute

among investors and consumers, reducing supply chain carbon emissions through efficient freight choices is becoming an economic imperative.[13]

13. Carbon Disclosure Project (2012). *CDP Supply Chain Report 2012: A New Era: Supplier Management in the Low-Carbon Economy*.

Defining the Terms

What Is "Corporate Social Responsibility"?

Corporations worldwide are increasingly making public commitments to reduce their impact on the environment and improve relationships with the communities in which they operate. For many companies, a significant part of these corporate social responsibility commitments involves increasing efficiency (which reduces costs) and reducing emissions of their fleets and those of their suppliers. Hundreds of multinational corporations have joined SmartWay and have publicly committed to cleaner, more efficient freight operations.

Many of today's multinational firms and global suppliers are also interested in green freight programs in particular, especially if they build in standardized carbon reporting requirements. Companies like Walmart and IKEA that have global operations need to coordinate freight logistics in multiple countries to get products delivered from factory to customer in the most fuel-efficient manner possible. Not only are they seeking to reduce costs, but they are driving the demand for tools to accurately measure and reduce their carbon footprint throughout their entire supply and delivery chains worldwide.

Customers, clients, and shareholders are increasingly demanding transparency, accountability, and disclosure. Supply chain sustainability efforts create real business value through new products and services, premium pricing opportunities, and enhanced corporate reputations. Because carbon is a leading indicator of operational efficiency, addressing carbon reduces operating costs, improves a company's ability to compete globally, and reduces climate and supply chain risk. For example, the Carbon Disclosure Project findings from 2013 reported that 90 percent of members report business risks from climate change and 73 percent of members report cost savings from emissions reduction activities.

Making carbon footprint information publicly available, as the Carbon Disclosure Project and the Global Reporting Initiative do, can inspire a general movement toward sustainable operations. However, market-based green freight programs can do more by strongly incentivizing continual carbon performance improvements among their participants.

Additionally, many corporations are responding to internal and external pressures to adopt CSR goals and initiatives. Driven by a recognition of corporations' influence on such global issues as human rights, labor practices, climate change, economic development, and poverty, more and more stakeholders (e.g., shareholders, employees, customers, nonprofit

and advocacy organizations, local communities) are holding corporations accountable for their actions, meeting best practices, and submitting to third-party inspections and oversight. Participating in a green freight program responds to CSR concerns and can be a centerpiece in a corporation's efforts to become a more responsible corporate citizen.

Emerging need for common data points

For any marketplace, the absence of common standards, benchmarks, and comparable data points makes it difficult for buyers and sellers to compare products and services. In the freight sector, the lack of this type of information—emissions, fuel economy, environmental performance per ton-mile, etc.—hampers progress in bringing cleaner and more efficient practices and technologies to scale.

When freight customers have access to carrier efficiency and carbon emissions data, they can choose the carriers with the lowest environmental impacts and account for the carbon impacts of their supply chain options more accurately. In addition, when freight carriers have reliable information on industry efficiency benchmarks, they will be incentivized to identify and adopt cost-effective technologies and operational practices to lower their fuel consumption and emissions rates, better enabling them to compete and to become preferred providers for clients.

In most countries, neither freight carriers nor their customers have traditionally had harmonized industry standards on how to quantify, benchmark, and report fuel or carbon efficiency. This means that companies that buy transportation services often have no way of choosing "greener" transportation options, while local transportation companies are not incentivized to invest in those options, since the lack of transparency means that those investments and their benefits are not easily recognized.

GROUP EXERCISE:

The Value of Green Freight

15 minutes

Develop a list of challenges, benefits, and justifications that effectively communicate why your country would benefit from a green freight program.

How SmartWay Did It

After Identifying Market Failures and Limitations of a Traditional Regulatory Approach, EPA and Industry Collaborate to Create SmartWay

Over time, thanks to new fuel economy standards aimed at new engines, the U.S. freight vehicle fleet will become substantially more fuel-efficient. However, the new standards will not affect vehicles manufactured before 2014. They will remain active in the freight fleet for years to come.

To address this challenge, before SmartWay was launched in the United States, EPA identified a number of market failures that had been blocking efforts by shipping and logistics companies to improve the environmental performance of their legacy fleets. There was a notable lack of available fuel efficiency and emissions performance data for truck fleets and rail lines, and shippers had no reliable or credible way to benchmark the performance of their chosen carriers. In addition, there was little reliable information from credible, neutral third parties on the performance of new and available technologies, which in turn created confusion and skepticism toward how they would function in the real world and whether they were worth investing in.

Carriers also experienced significant disincentives from making improvements. Since the industry was predominantly made up of small trucking companies operating on small profit margins, most were unwilling or could not afford to invest in new technology. Even if these small companies could cover the capital outlay of a new investment with expected fuel savings, they could not afford any breakdowns or

How SmartWay Did It (continued)

failures from new, unproven equipment or risk failure to honor delivery commitments. Larger fleets that could afford to make improvements had limited incentive to do so as long as fuel costs were relatively low. Without these parties installing new technologies, the legacy fleet—difficult to control through regulations—would continue to operate inefficiently for years, until those vehicles were finally replaced.

EPA also realized that businesses would not buy into a regulatory solution that they felt was being imposed on them, but they could help EPA achieve fuel savings and emissions reduction goals through partnership and collaboration. The SmartWay program design therefore incorporated market incentives into a new public-private partnership model, creating a strong business case and mutual wins for all freight stakeholders: freight shippers, carriers, and logistics providers. This has led to a strong partnership where industry and EPA both benefit from reduced emissions, fuel usage, and operational costs.

D Creating Your Green Freight Program

In creating a successful green freight program, a country follows one of three paths:

- Develop regulations
- Establish a voluntary partnership program
- Use both regulatory and voluntary approaches

Experience has shown that creating a program that uses both regulatory and voluntary approaches is likely to be the most effective. While regulatory approaches usually target new vehicles, partnership approaches are often the preferred method for addressing in-use vehicles (also known as "legacy fleet"). *Nonetheless, establishing a green freight partnership program does not preclude deploying regulatory strategies or grant/*

subsidy approaches, nor is the reverse true. Both approaches to reducing emissions from the freight sector can be successful and work in tandem. This course book focuses on developing a market-based, voluntary partnership program that complements ongoing regulatory efforts.

What is a voluntary partnership program?

In essence, a voluntary partnership program is a structured relationship between a government agency and multiple private sector entities to address a public policy challenge. Such challenges can include air pollution resulting from economic activity, energy security, or other issues not fully addressed by private sector markets. Voluntary partnership programs are a popular policy tool in the United States and are increasingly popular in other countries. They are deployed in lieu of or as a complement to regulatory programs to achieve environmental goals. They can be effective tools because they can spark action without legislation, regulations, or civil penalties.

In a voluntary program, participants, or partners, commit to benchmarking, monitoring, and sharing or reporting information as well as taking specific verifiable actions beyond "business as usual." In exchange, the government agency commits to helping to remove market and other barriers, providing a reliable source of performance data and technical support, furnishing public recognition, and supplying other market incentives. Typically, participation in a voluntary program is codified in either a memorandum of understanding or a partnership agreement. Both documents are legally binding agreements that either party can terminate at any time, if the terms are violated, without fear of fines or other penalties.

Voluntary partnership programs can easily be used to provide grants or subsidies for equipment retrofits, engine rebuilds/early retirement (scrappage), and alternative/clean fuel adoption to reduce emissions. Examples of such programs include EPA's National Clean Diesel Program and the

Further Information

Examples of *SmartWay Partnership Agreements* can be found in Appendix C.

California Air Resources Board's Carl Moyer Program. In addition, voluntary programs such as SmartWay (United States and Canada), Green Freight Europe, Objectif CO_2 (France), Green Freight Asia, and Transporte Limpio (Mexico) can be successful in collecting standardized, reliable activity and fuel consumption data from freight carriers and making them available to their customers (shippers). Brazil, Chile, Japan, South Korea, and Australia are developing or considering developing similar programs.

Successful participants in partnership programs will often find themselves "ahead of the curve" in terms of meeting vehicle, fuel, and operational efficiency targets if and when performance standards are adopted. Conversely, the data and knowledge obtained during the course of a well-run partnership program, such as voluntarily submitted data on partner actions, facilities, and resources, can be used to inform successful regulatory programs and more effective environmental policies down the line.

Successful voluntary green freight programs share several core elements:

- Standardized data collection and performance benchmarking tools and processes that are organized by a neutral party, who can ensure protection of sensitive data as well as data consistency, integrity, and verification.
- Enhanced collaboration among stakeholders (shippers, carriers, and logistics service providers) to share best practices and jointly scale up green freight efforts.
- Streamlined and consistent methods for measuring and reporting fuel, CO_2, and other emissions.
- Active participation of the private sector in developing green freight policies and programs that are consistent with each other and with those of other global green freight programs.

Did You Know?

Voluntary Programs Can Help Shape National Standards

EPA and NHTSA drew from the SmartWay experience to identify technologies and operational approaches that fleet owners, drivers, and freight customers could incorporate to meet the new national fuel economy standards for heavy-duty vehicles. These agencies coordinated their efforts to develop harmonized CO_2 emissions standards (EPA) and fuel consumption standards (NHTSA). The standards recognize the diversity of the heavy truck fleet, differentiating standards for tractor rigs, which typically haul freight, and vocational (work) trucks. The first phase of the standards will be implemented for 2014–2018, with subsequent standards (Phase 2) currently under evaluation. NHTSA and EPA believe that operational measures promoted by SmartWay can also complement the final standards and provide benefits for the existing heavy-duty fleet.

Further Information

For more information about *program branding, outreach, and recognition events*, see Module III, Section B.

- Consistent branding, strong initiatives for outreach and marketing to core stakeholder groups, high-profile recognition events, and, if possible, leveraged financial support.

GROUP EXERCISE:

The Value of Using a Voluntary Approach

15 minutes

Discuss the benefits of using a voluntary partnership program approach to create a green freight program in your country.

Notes

Notes

MODULE II Build Program Foundation

In this module, you will learn about key aspects of a green freight program framework and considerations for the development of a green freight initiative. Key concepts include pre-program industry assessment, administrative infrastructure, program evaluation methodology, and funding issues.

CONTENTS

Suggested time for this module: 3 hours

A Assess State of Freight Industry, Technologies, and Practices

Operating conditions vary greatly from country to country within the freight sector, and the business strategies and incentives that work for companies in one country may not necessarily work in another. In order to design and implement a green freight program that effectively meets the needs of your country's freight sector, invest some time and resources to better understand how your freight shippers and carriers operate. Before you begin to outline a program framework, identify stakeholders, or conduct outreach to prospective partners, identify current and potential issues that face the freight industry in your country. By examining freight industry practices and technologies, you can identify the best places to allocate initial resources and plan for potential expansion areas. Below are some of the significant factors to consider when designing your green freight program.

Cost of operations varies significantly from country to country. Because a significant portion of freight industry capital is invested in commercial vehicles, freight companies pay close attention to the total cost of ownership of a vehicle. In emerging markets where the freight industry is relatively young and expanding, the purchase price of a vehicle plays a more significant role than in mature markets such as Western Europe, where vehicle service and repair costs are higher. For these reasons, it is crucial to design your program incentives and requirements to account for freight carrier economic considerations.

Projected growth of your country's freight sector may have a significant impact on the design of your program. In established markets such as Western Europe and North America, the size of the freight industry and number of shippers and carriers are relatively stable. However, in emerging markets, most notably in China and India, demand for commercial freight movement continues to grow rapidly, with international and domestic vehicle manufacturers increasing production to accommodate

demand and increase market share. A rapidly expanding fleet may offer opportunities for introducing advanced fuel efficiency and low emissions technologies through regulation of domestic original equipment manufacturers (OEMs). Domestic OEMs hold the dominant share of the new vehicle purchase markets in China and India (98 and 91 percent, respectively), facilitating direct regulation in these counties.

The rapidly growing freight truck market in these regions also presents an opportunity for regulatory agencies interested in introducing new emissions and fuel quality standards. Early introduction of these measures is critical for rapidly expanding vehicle fleets, since these vehicles may be in service for decades to come. The adoption of green freight programs can also complement and accelerate regulatory efforts aimed at developing and implementing integrated vehicle emissions and fuel standards in developing economies.

In the United States and Canada, the freight industry has consolidated to the point where a relatively small number of major carriers have a disproportionately large market share. However, new freight carriers and commercial vehicle manufacturers continue to grow in countries with still-developing freight industries. Additionally, the market penetration of advanced vehicle technology is often lower in countries with emerging freight markets, where carrier fleets often rely heavily on used, older vehicles, often imported from abroad. These older fleets offer significant opportunities for retrofitting advanced efficiency and pollution control technologies on the in-use fleet when paired with improved fuel quality standards. You should consider the industry growth rate, the mix of new and used vehicles, and the technology profile of the carrier fleets when developing an engagement strategy for equipment manufacturers, retrofit providers, and the carriers themselves.

Prevalence of added-value services in the freight industry, such as the after-market sales for spare parts, vehicle rentals, the used vehicle market, and fleet management services, is another important consideration

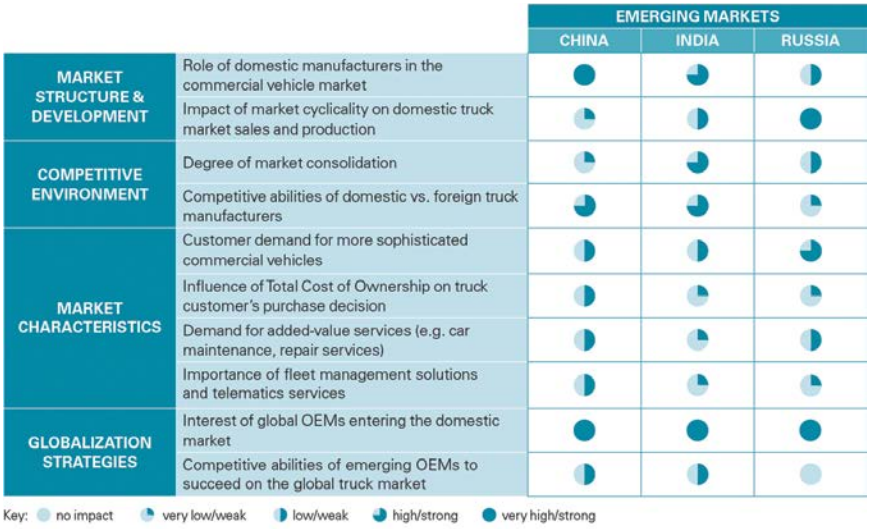
Further Information

For more information about *legacy fleets*, see Module I, Section B.

for program development. These services can play a major role in the provision of green freight technologies and create additional opportunities for collaboration. Recognizing which services are significant in your region will enable you to allocate your resources accordingly. For example, fleet management services such as third- and fourth-party logistics providers offer additional opportunities to improve freight efficiency in certain markets. These companies can also provide crucial support for your program by identifying and encouraging smaller freight carriers to participate and by helping educate their carriers about technology and operational strategies. In China, commercial vehicle customers have become increasingly interested in fleet management and logistics services, but their presence is restricted to international business hubs like Beijing and Shanghai.[1] In India, 80 percent of truck operators own less than 10 trucks each, and a large number of those transport goods with a single truck.[2] In industries with low market consolidation, logistics services may have less of a role.

1. KPMG International (2011). *Competing in the Global Truck Industry: Emerging Markets Spotlight*. Retrieved from http://www.kpmg.com/Global/en/IssuesAndInsights/ArticlesPublications/global-truck-industry/Documents/emerging-markets.pdf.
2. KPMG International (2011). *Competing in the Global Truck Industry: Emerging Markets Spotlight*. Retrieved from http://www.kpmg.com/Global/en/IssuesAndInsights/ArticlesPublications/global-truck-industry/Documents/emerging-markets.pdf.

Figure 2.1 – Characteristics of Different Market Elements in the Emerging Truck Markets



		EMERGING MARKETS		
		CHINA	INDIA	RUSSIA
MARKET STRUCTURE & DEVELOPMENT	Role of domestic manufacturers in the commercial vehicle market	●	◕	◑
	Impact of market cyclicality on domestic truck market sales and production	◔	◑	●
COMPETITIVE ENVIRONMENT	Degree of market consolidation	◔	◕	◑
	Competitive abilities of domestic vs. foreign truck manufacturers	◕	◕	◔
MARKET CHARACTERISTICS	Customer demand for more sophisticated commercial vehicles	◑	◑	◕
	Influence of Total Cost of Ownership on truck customer's purchase decision	◑	◔	◔
	Demand for added-value services (e.g. car maintenance, repair services)	◑	◔	◑
	Importance of fleet management solutions and telematics services	◑	◔	◔
GLOBALIZATION STRATEGIES	Interest of global OEMs entering the domestic market	●	●	●
	Competitive abilities of emerging OEMs to succeed on the global truck market	◑	◑	○

Key: ○ no impact ◔ very low/weak ◑ low/weak ◕ high/strong ● very high/strong

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Compile baseline industry statistics

Once you have a general understanding of the freight industry, technologies, and practices in your country, continue by collecting baseline industry statistics. These statistics will directly inform the goals that you set for your green freight program and will give you the foundation to quantify the success of your program over time.

The primary measures you need to collect are those that directly influence fuel use and emissions in the freight sector. These are listed below, in rough order of importance.

- *Number and size of shippers and carriers:* The number and size of shippers and carriers in the freight sector are the most significant factors influencing fuel use and emissions, indicating the overall scale of the industry. Knowing the total number of shippers and carriers operating in your area will also help you establish participation goals (e.g., 100 carriers in year 1, 250 in year 2). In addition, understanding the size distribution of your freight industry is critical to prioritizing recruiting and long-term outreach goals.

How SmartWay Did It

In its initial program launch phase, SmartWay focused its recruitment efforts on the largest truck carriers in the United States. While SmartWay currently includes roughly 2,500 carrier Partners (out of the 1.2 million trucking companies operating in the United States), these companies operate 8 percent of all freight trucks in the country.

- *Freight activity levels:* Historical freight activity levels enable you to project future year-to-year growth. Growth can be measured in a variety of ways, among them total revenue or profit, distance travelled, tonnage hauled, or containers shipped. Specifying growth in terms closely correlated to fuel use and emissions, such as distance or tonne-kilometers, will be most meaningful. Emerging markets often demonstrate high activity growth levels. For example, in China road freight traffic grew from 784 million tonne-kilometers hauled in 2004 to more than four billion in 2010 (roughly 5005 percent); in that same period, India's road freight traffic rose from 646 million to just over one billion tonne-kilometers hauled (about 50 percent).

Figure 2.2 – Yearly Growth in Freight Traffic In China

Traffic in million tons km	2000	2004	2005	2006	2007	2008	2009	2010
Transport of goods by road	612,940	784,090	869,320	975,425	1,135,469	3,286,819	3,718,882	4,300,543
Total share	30.7%	28.8%	29.5%	30.7%	32.2%	56.6%	59.9%	60.7%
Transport of goods by railway	1,377,050	1,928,880	2,072,600	2,195,441	2,379,700	2,510,628	2,523,917	2,764,413
Total share	69.0%	70.9%	70.3%	69.0%	67.5%	43.2%	40.3%	39.0%
Transport of goods by air	5,027	7,180	7,890	9,428	11,639	11,960	12,623	17,660
Total Traffic	**1,995,017**	**2,720,150**	**2,949,810**	**3,180,294**	**3,526,808**	**5,809,407**	**6,255,422**	**7,082,616**

Source: National Bureau of Statistics of China, *BRICS Joint Statistical Publication 2011*

Figure 2.3 – Yearly Growth in Freight Traffic in India

Traffic in million tons km	2004	2005	2006	2007	2008	2009	2010
Transport of goods by road	646,000	658,900	766,200	820,217	873,736	929,689	1,016,151
Total share	61.1%	61.5%	61.3%	60.9%	60.5%	60.1%	60.1%
Transport of goods by railway	411,300	411,800	486,400	526,488	570,686	616,962	673,195
Total share	38.9%	38.4%	38.7%	39.1%	39.5%	39.9%	39.8%
Transport of goods by air	547	548	580	769	871	860	1,076
Total Traffic	**1,057,847**	**1,071,248**	**1,250,180**	**1,347,474**	**1,445,293**	**1,547,511**	**1,690,422**

Source: Datamonitor, *Freight Transport in India*, 2011

Figure 2.4 – Yearly Growth in Freight Traffic in Russia

Traffic in million tons km	2000	2004	2005	2006	2007	2008	2009	2010
Transport of goods by road	152,735	182,141	193,597	198,766	205,849	216,276	180,136	199,341
Total share	9.8%	9.1%	9.4%	9.2%	8.9%	9.4%	8.7%	9.0%
Transport of goods by railway	1,373,178	1,801,601	1,858,093	1,950,830	2,090,337	2,116,240	1,865,305	2,011,308
Total share	88.1%	90.2%	90.2%	90.3%	90.5%	92.0%	90.2%	90.8%
Transport of goods by air	2,515	3,003	2,830	2,927	3,424	3,692	3,558	4,711
Total Traffic	**1,557,834**	**1,998,201**	**2,059,689**	**2,159,606**	**2,310,037**	**2,300,068**	**2,068,204**	**2,215,360**

Source: Federal State Statistics Service of the Russian Federation

Identifying which shippers are responsible for the greatest share of freight movement will also help you preferentially recruit shipping companies with the greatest influence over potential carrier partners. The types of freight most commonly transported will vary from region to region depending upon economic and other factors. For example, in the United States, petrochemical, agricultural, and food/beverage carriers are responsible for particularly large fractions of the total ton-kilometers hauled. Other countries, such as China, may have a much greater proportion of manufactured goods movement.

- *Predominant operation types and transportation modes:* Different freight operation types and transportation modes can have their own operating considerations and distinct environmental impacts, which may require different program incentives. For example, if a region has a large container port, it will most likely have significant drayage activity. Drayage fleets often consist of older, higher-polluting vehicles that can be cost-effectively retrofit for NO_X and PM control (where low-sulfur fuels have been adopted), but may not benefit significantly from many fuel economy improvements such as aerodynamic retrofits.[3] On the other hand, containerized freight may also

3. Dray fleets commonly operate in urban areas at relatively low speeds, while aerodynamic retrofits are most effective at highway speeds. In addition, dray companies generally do not maintain control over the trailers they haul, and therefore can only apply aerodynamic treatments to their tractors.

be transported via intermodal rail carriers, which are generally much more efficient at goods movement than trucks on a tonne-kilometer basis. In this case, rail carriers will be motivated to participate in your program if they are rewarded for their fuel efficiency relative to truck freight. Therefore the relative prominence of the various carrier operation types and modes in your region will determine which technologies, strategies, and incentives are appropriate for your program.

- *Vehicle characteristics:* Vehicle/engine size, fuel type, and age distribution all have a significant influence on the emissions levels and potential reductions associated with freight carriers.

  In general, larger, older diesel engines will have higher PM and NO_X emissions than newer and/or smaller diesels.[4] On the other hand, engines relying on gasoline or gaseous fuels (e.g., CNG, LNG, or LPG) will have lower PM and NO_X emissions, although they are likely to be less fuel-efficient than comparable diesel engines. Emerging markets often have a greater proportion of lighter trucks such as urban delivery vehicles than heavier, long-haul tractor-trailer rigs (partly due to the higher capital cost of heavier trucks). However, many of these trucks are obtained through the used vehicle market and are therefore older and higher-polluting.

  EPA's National Clean Diesel Program systematically targets older, higher-polluting diesel engines for retrofits or accelerated retirement. Identifying the predominant vehicle characteristics in your region can help you determine the technologies and retrofits to emphasize in the initial stages of your green freight program.

EPA's National Clean Diesel Campaign Reduces Emissions

EPA's National Clean Diesel Campaign (NCDC) promotes clean air strategies by working with manufacturers, fleet operators, air quality professionals, environmental and community organizations, and state and local officials throughout the United States to reduce diesel emissions. The program promotes a wide range of emissions reduction strategies and administers programs to channel funding through competitive grants to projects that support NCDC's mission.

4. Older diesel engines typically have higher emissions later in life due to deterioration (which increases PM but not necessarily NO_X), and due to the introduction of tighter emissions standards over time. Fuel economy can deteriorate over time as well, but can be mitigated through regular engine maintenance.

- *Emissions and fuel efficiency standards:* Technological innovations play a major role in the reduction of freight carrier emissions, but imposing environmental standards may increase direct costs to manufacturers and, in the absence of any fuel savings, vehicle operators. (Of course, these standards also deliver significant benefits to public health and the environment and frequently spur technological innovation that can benefit society in other ways.) Generally, these standards are more stringent in mature markets than emerging markets. The United States, Japan, and Western Europe lead the way in limiting commercial vehicle emissions. In 2001, in the United States, EPA signed emissions standards for heavy-duty highway engines model year 2007 and later for PM (0.01 grams per brake horsepower-hour, or g/bhp-hr), NO_X (0.20 g/bhp-hr), and non-methane hydrocarbons (0.14 g/bhp-hr). However, standards are not limited to mature markets: environmental demands in emerging markets are rising in China, India, and Russia, particularly in large metropolitan areas.[5] Combining information regarding vehicle age distributions with the phase-in of emissions and fuel economy standards will help you identify which portions of the carrier fleet are particularly high-emitting and/or have relatively poor fuel economy.

- *Fuel quality:* Many advanced emissions control technologies can only function with clean fuel such as ultra-low-sulfur diesel fuel—typically less than 50 parts per million (ppm) sulfur, although precise definitions vary by region. Many areas, including the United States, Western Europe, and Japan, have transitioned to ultra-low-sulfur fuels. In 2006, the United States implemented a diesel sulfur standard of 15 ppm. While emerging market countries have begun to reduce their fuels' sulfur content, they have not yet reached ultra-low sulfur levels: China and India have both set maximum sulfur levels for diesel at 350 ppm, and China has further targets set to take place in

5. For detailed summary of heavy-diesel engine exhaust emissions standards see: http://transportpolicy.net/index.php?title=Category:Heavy-duty_Vehicles.

the coming years (50 ppm by 2014, 10 ppm by 2017).[6] Green freight programs can generate market demand for the adoption of the aggressive fuel quality standards needed to enable the use of advanced emissions control technologies, as discussed above.

Figure 2.5 – On-Road Diesel Sulfur Levels (ppm)

Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Brazil*	3,500	2,000				1,800–500 transition				500						
China*	2,500						350				50			10		
EU-27	50				10											
India*	500					350										
Japan	50		10													
Russia	500								350		50	10				
Thailand	150							50								
USA	500	15														
South Africa	3,000	500 (50 in some markets)											10			

*Brazil, India, and China have sub-national regulations requiring higher-quality fuels in key cities and regions. These tables show nationwide regulations only.
Source: http://transportpolicy.net/index.php?title=Global_Comparison:_Fuels

- *Penetration of technology and fuel efficiency retrofits:* The availability and prevalence of technology and fuel efficiency retrofits vary depending on the relative cost of fuel as well as your freight industry's stage of market development. Areas with higher fuel prices may be more interested in fuel efficiency retrofits and may have higher investment in efficiency and pollution control technologies. Areas with lower fuel prices would be less concerned with investing in efficiency technologies that will bring them relatively modest cost savings. Similarly, PM and NO_X retrofits will likely have very low adoption rates in the absence of other market incentives, such as packaging fuel saving technologies with emissions reduction technologies. Determining the market penetration levels for retrofit technologies is difficult, but they may be estimated by obtaining sales figures from regional manufacturers and installers.

6. ICCT (2014). China: Fuels: Diesel and gasoline. Retrieved from http://transportpolicy.net/index.php?title=China:_Fuels:_Diesel_and_Gasoline.

Resources for collecting industry statistics

In gathering data on your region's freight industry, take some time to examine various data sources, including the following:

- *Trade associations.* National trade associations may track some of the information you need, such as the number of shippers and carriers, their respective sizes, and overarching trends in freight activity. For example, in the United States the American Trucking Association generates reports such as the *Trucking Activity Report*, *Annual Trucking Trends*, and the *U.S. Freight Transportation Forecast to 2024*, which summarize industry-wide activity by operation type and growth trends and identify the largest carriers and shippers by revenue.

- *Vehicle registries.* Vehicle registries maintained by government agencies may track information about vehicle characteristics such as weight classification, fuel type, and age distribution. Identify local, regional, or national organizations that register and/or certify motor vehicles for more information.

- *Government sources.* Government sources are also sources of local, regional, or national regulatory information such as emissions and fuel standards or fleet composition and characteristics. Your governmental office of environmental affairs or transportation will likely have publicly available information on those regulations.

- *Academic institutions.* Universities around the world have performed numerous studies of environmental and other impacts related to freight industry operation, obtaining emissions and activity data, and evaluating air quality impacts and control strategy options. For example, Tsinghua University in Beijing has collected and evaluated in-use NO_X and PM emissions rates for diesel vehicles operating over typical routes in both Beijing and Shenzen. Locally collected operations and emissions data and benefit assessments are particularly useful for evaluating site-specific costs and benefits for your green freight program.

EPA's MOVES Emissions Model

EPA recently released its mobile source emissions model, MOVES2010b, which reflects several significant updates from its predecessor, MOBILE6. MOVES is a new modeling platform built to support analysis at multiple scales, from detailed "project-level" assessments to emissions inventories at the regional or national level for greenhouse gases, so-called "criteria" air pollutants, and air toxics. To support multiple scale analysis, MOVES has adopted a "modal" emissions approach, which provides more flexibility in predicting emissions for different driving patterns and allows assessment of emissions impacts due to changes in vehicle acceleration as well as vehicle speed. Using a modal approach also enables a much broader assessment of vehicle emissions from multiple data sources, including inspection/maintenance programs, remote sensing data, portable emissions measurement systems, and traditional laboratory data.

- *Emissions and other models.* EPA's MOVES emissions model contains a vast amount of information regarding the heavy-duty truck fleet in the United States, including vehicle counts, age distributions, and average mileage accumulation rates. Many other regions have developed similar modeling systems, including Canada, the European Union, Mexico, and China, which may help characterize heavy-trucks and their associated activity in these countries. However, be aware that these sources generally do not break out the freight portion of the heavy-duty vehicle fleet, so their data may not adequately represent the characteristics of your green freight program carriers.
- *Online data sources.* Some data sources may provide information on a broader scale about emissions and fuel standards. For example, the International Council on Clean Transportation and DieselNet maintain Web pages that have information on emissions standards, fuel efficiency, and greenhouse gas standards for light- and heavy-duty vehicles in various countries and regions. This information can be found at TransportPolicy.net and DieselNet.com.
- *Private data services.* Private sources may provide information that is not publicly available or free. For example, IHS Automotive (Polk) and Datamonitor have generated reports with information on the number of U.S. shippers and carriers, vehicle characteristics, and freight activity levels, commodity types, and modes.

GROUP EXERCISE:

Assess the Freight Industry in Your Country

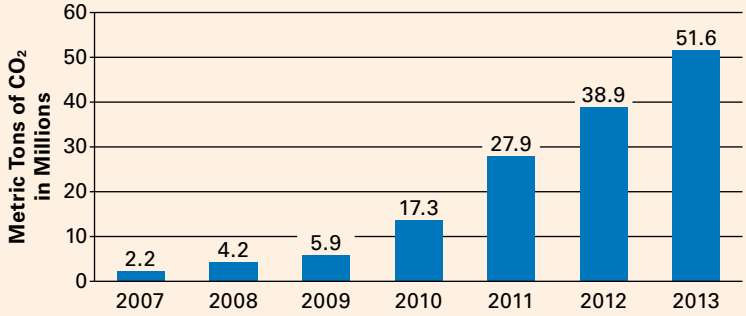
15 minutes

Conduct a mini industry assessment by making a short list of known freight issues, challenges, opportunities, and green freight technologies/practices. Indicate which are most relevant for your region.

How SmartWay Did It

In the program's earliest stages, before adoption of the SmartWay name and brand, EPA developed a detailed profile of the on-road freight industry in the United States. The assessment included baseline emissions projections as well as estimated emissions reduction benefits associated with various fuel efficiency technology penetration scenarios. For example, potential benefits were projected out to 2020 for 13 distinct technologies (e.g., tractor and trailer aerodynamic improvements, idle reduction systems), accounting for the amount of technology penetration in the baseline fleet. Next, considering the emissions and fuel reduction opportunities, the potential cost savings, and the financial and staff resources available for the program, EPA set an ambitious goal of achieving 18 million tonnes of carbon dioxide (CO_2) equivalent in reductions between 2002 and 2010. The following figure presents the progress toward this goal through 2013.

Figure 2.6 – SmartWay Partner Savings: 2007 to 2013 Performance Trends



Source: EPA SmartWay

B Identify Leaders in Industry, NGOs, Government Agencies, and Academia

Recruit charter partners/advisors to develop initiative

As you begin to plan your green freight program, include and engage people and organizations of all types who are part of the industry. By seeking their involvement in these early stages, you will realize two important benefits:

- Your program will be stronger, since a wide variety of stakeholders will contribute a broad set of perspectives and provide valuable feedback on your initial plans.
- By getting involved on the ground floor, your stakeholders will be more inclined to participate in and advocate for the program. They will be well positioned to serve as charter partners, advisory board members, and allies as the program gets up and running.

Consider tapping into these groups:

- Large shipping companies, preferably international, with a substantial presence in your country (e.g., retailers, manufacturers, consumer goods and commodity providers)
- Large truck, rail, marine, and air freight carriers
- Major logistics companies
- Original equipment/vehicle manufacturers
- Technology vendors (e.g., of emissions control and fuel economy retrofits)
- Trade associations (e.g. trucking industry, retailers)
- Business organizations
- Environmental/air quality, public health, economic development, and labor nonprofit organizations

Further Information

For more about *charter partners*, see Module III, Section A.

- Government transportation, environmental, and economic development agencies, including local and state agencies with jurisdiction over local air quality regulations
- Professors and researchers at leading colleges, universities, and research centers

GROUP EXERCISE:

Brainstorm Stakeholders

15 minutes

Develop a list of stakeholders, associations, and key players. Create an organizational map showing responsibilities and interrelationships.

How SmartWay Did It

In its early stages, SmartWay identified stakeholder group categories before engaging specific stakeholders, as shown below.

Stakeholder Groups	Type of Partners Who Participated
Direct members	Shippers Carriers Manufacturers
NGOs	American Trucking Associations California Trucking Association Association of American Railroads National Association of Truck Stop Owners International Brotherhood of Teamsters National Motor Freight Traffic Association Texas Trucking Association Environmental Defense Fund American Lung Association
Business groups	Business for Social Responsibility Global Environmental Management Initiative Ceres World Resources Institute
State and local	Regional air quality coalitions State air offices Local environmental leadership organizations State and local trucking associations

How SmartWay Did It

In 2003, SmartWay held a workshop with two groups: one representing businesses that shipped goods and had environmental interests (Business for Social Responsibility) and one representing trucking companies that typically owned and operated large Class 8 line haul trucks (American Trucking Associations).

SmartWay requested input on what the industry was currently doing and how government might help encourage shippers and carriers to improve fuel economy and reduce emissions from moving goods, by using cleaner, more efficient technologies.

Organize committees and assign responsibilities

As with any new initiative, it is helpful to have a large, specialized team working together so that no one group or person shoulders too many tasks and responsibilities. To this end, develop an organizational framework that shows how your stakeholders can be best organized to aid your program. Create committees that are assigned specific responsibilities, such as:

- *Oversight/steering committee.* Charge this committee with helping you establish and review overarching program goals and measure progress toward meeting them. Members of this committee could include high-level government officials, program funders, leading trade and business associations, and a select number of charter partners. Ask this committee to convene routinely before launch and annually after launch to ensure that the program is meeting realistic and meaningful goals and to help develop new ideas and directions.

- *Technology committee.* Charge this committee with identifying technological needs and solutions to meet the goals established by the oversight committee. Members could include transportation technology engineers from national laboratories; universities; researchers from private industry who are working on emissions control strategies, clean fuels, logistics software, aerodynamic technology improvements, etc.; expert operators and drivers; and engine and vehicle manufacturers. Ask this committee to help you assess currently available, sustainable freight technologies and to identify technology needs will help your program reach its goals faster.

- *Outreach committee.* Charge this committee with supporting your program by helping to market and promote it to prospective partners, stakeholders, and the public. Members could include vice presidents of public relations from trucking associations, directors of communications of large shipper and carrier companies, and reporters and editors from trade (and general, if possible) media. Ask this committee

to help you develop a strategic communications plan to promote participation in the program and to foster support among the industry and public in general. The communications plan should also identify external resources that your program can leverage to reach audiences faster and more effectively.

C Establish the Administrative Infrastructure for the Program

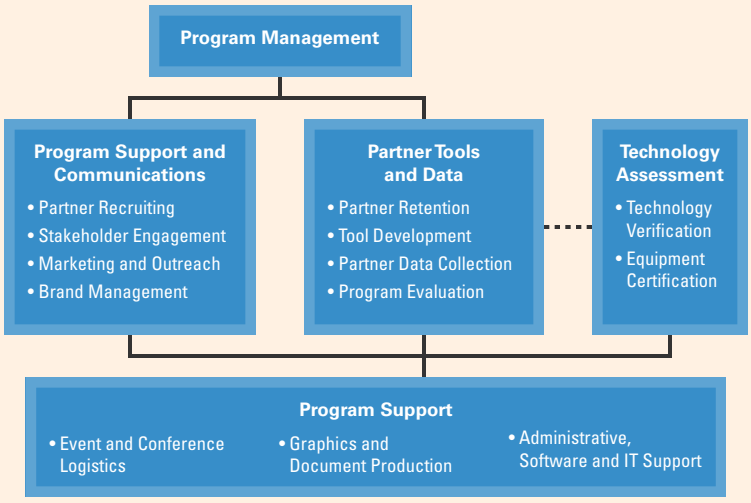
Your program's administrative structure will need to be set up within a government agency, such as the environmental ministry. The structure should be clear and simple. As with any initiative, your structure will reflect your program's goals and human and financial resources. To get started, map out an administrative infrastructure that includes the following elements:

- *Program lead/manager.* This person will be responsible for the overall development of the program and provide team leadership. All staff will report to this person.
- *Recruiting.* This team will focus on bringing new companies into the program as partners, affiliates, allies, etc.
- *Stakeholder engagement.* This team will establish strategic partnerships with stakeholders including nongovernmental organizations, state and federal agencies, and research institutes.
- *Tools and technologies.* This team will focus on developing tools to measure partner performance and communicating technical information to shippers and carriers. It will also be responsible for identifying, evaluating, and/or certifying technologies for carrier use.
- *Marketing and outreach.* This team will oversee all external communications to support the program, including brand building, recruiting, and partnership recognition.

- *Evaluation and assessment.* This team will focus on establishing metrics for overall program performance and maintain a dashboard to assess the program's progress against its overall goals. The team will also be in charge of ensuring the quality of the data reported by partners and developing and communicating best practices for partner data collection and reporting.

How SmartWay Did It

The SmartWay Organization Chart



GROUP EXERCISE:

Outline Program Administrative Structure

15 minutes

Draft an organizational chart that reflects your vision of an ideal administrative structure for your program. Indicate roles, responsibilities, and functions for each level in the hierarchy.

Consider overlaying this structure with sector-based expertise (truck, port, rail, air, etc.). One way to visualize this is to create a matrix—as in the example below, which assigns responsibilities as well as sectors to team members.

Team	Sector				
	Truck	Rail	Intermodal	Marine	Air
Marketing and Outreach					
Recruiting					
Stakeholder Engagement					
Tools and Technologies					
Evaluation and Assessment					

D Develop Program Performance Goals

Establishing clear, easily understood, and readily verifiable performance goals will be key to encouraging funding sources and other stakeholders to support your green freight program. While you may set multiple goals covering an array of different dimensions of your program, your public outreach and recruiting efforts should focus on a single measure, regularly evaluating and reporting on progress toward meeting this goal.

Depending upon regional industry, government, and public priorities, goals could include the following.

- Primary goals:
  - » Annual mass emissions reduction—e.g., *x* million metric tons of CO_2 reduced per year
  - » Fuel savings reduction—millions of gallons of fuel saved and/or fuel cost savings target

- Efficiency performance improvement—
  - *y* percent improvement per year in a performance metric such as grams CO_2 per tonne-kilometer (this particular goal could be established at the program level or at the partner level)
  - *z* percent improvement for program participants relative to regional or national fleet average performance levels (comparison relative to the baseline fleet will demonstrate more substantial improvements than simple annual improvements at the partner level)
- Secondary goals:
  - Partnership participation targets (e.g., 100 carrier and 20 shipper partners in year 1, 500 carriers and 100 shippers by year 5)
  - Technology penetration targets (e.g., 10,000 retrofits with certified aerodynamic/idle reduction kits by year 4)

GROUP EXERCISE:

Program Goal Setting

15 minutes

Make a list of performance goals for your green freight program for the first year, then the first five years. Indicate steps you would need to take to reach those goals and how you would measure success in meeting them. Examples include:

- Achieve *x* percent reduction in fuel use in *y* years
- Save $*x* annually in fuel costs
- Meet emissions reduction targets of *x* tons per year

E Establish Budget and Secure Funding

Considerations for setting a budget

Your program may have limited funding in its first year or two, so it will be very important to plan your allocation of these limited funds carefully for maximum benefit. Consider creating seven distinct budgetary "bins" to better manage and track your program spending and anticipate future funding needs.

- *Marketing and communications.* Expect your program's general marketing costs to include creating initial marketing materials and carrying out basic outreach and marketing campaigns. Expenses in this category may be higher in the program's early years as you develop basic marketing and communications materials. In later years, these expenses may decrease.
- *Recruiting and partner management.* This includes the cost of retaining partner account managers (PAMs) and recruiters as well as travel to events, development of marketing materials for recruiting and partner management, and IT support for partner management tool and database development and maintenance.
- *Market research.* Market research is important for identifying the characteristics of audience segments, prospective partners, penetration of various technologies, etc. This is another expense category that you can expect to be higher in the early years.
- *Financing.* The amount of funding allocated to grants will largely determine the size of funding in this bin. If you create a revolving loan or straight loan program, this line item may remain constant. As your program matures, you may identify other areas where funding is needed, and your financing program will expand.
- *Technology verification and testing.* A technology verification and testing program will evaluate the performance of vehicles,

How SmartWay Does It

SmartWay has used contractors in the past for recruiting and Partner management as a way to manage staffing needs and costs.

Further Information

For more about *Partner recruiting*, see Module III, Section B.

technologies, and equipment in reducing greenhouse gases and other air pollutants based on information and data submitted by manufacturers. If you start a verification program, expect to test a large number of technologies in the initial years and fewer later on. Technology verification and testing programs also require funding, the amount of which will dictate the extent of verification and testing the program can provide.

- *Expansion projects.* Once your program is up and running, you may choose to expand it to other areas of the industry, such as drayage and ports, or related initiatives such as anti-idling infrastructure development.

- *General operating costs.* The program will always require some general administrative and operations activity. As the program becomes better established, the need for those efforts and the cost associated with them will stabilize.

Further Information

For more about *program expansion*, see Module V, Section C.

How SmartWay Did It

Budget Allocation, Years 1–4

	Year 1	Year 2	Year 2	Year 4
Recruiting and Partner Management	10%	30%	40%	40%
Marketing and Communications	10%	20%	20%	20%
Technology Verification and Testing	50%	20%	30%	15%
Special Programs/Expansion	None	20%	None	20%
General Operating Costs	30%	10%	10%	5%

Strategies for securing funding

Every green freight program is funded through a mix of sources that depend on many outside factors, including interest from national and regional government agencies in transportation and freight-related issues, available capital, the role and influence of the nongovernmental organizations, and program capacity. To secure funding for your program:

- *Do your research.* Investigate all reasonable sources of funding, both in the public and private sector. Possible sources include public sector agencies in your country that oversee transportation, environmental, public health, climate change, economic development, labor, and public infrastructure spending as well as private family and corporate foundations. Also research international and bilateral organizations such as the World Bank and the International Development Bank.

- *Frame your program and its benefits in clear monetary—and other—terms.* If your program is successful, how much money may be saved? How many jobs may be created? What are the projected emissions reductions and fuel savings? What other economic, health, and environmental benefits may accrue to participating companies, the public, the nation? Funders and investors are going to want to know what their return on investment will be.

- *Involve all of your stakeholders.* Funding for your program can come from many sources. Be open to thinking creatively about matching funds, dedicated funding (money earmarked for a single purpose), seed funding, one-time grants, loans, etc., and how these sources together can provide adequate money to launch your program.

- *Build creative cost structures.* Consider establishing annual membership fees for partner participation, logo usage, and tool access to contribute funds for the program. (If you consider charging fees, be sure to understand the implications as fees may dissuade

participation.) Many programs also use in-kind contributions and sponsorships to raise money to sustain efforts. For example, a green freight program could have partner governmental organizations host its website or dedicate staff as an in-kind contribution. Sponsorships from equipment manufacturers, partner companies, or stakeholder associations for conferences and events could also serve as a revenue stream and/or a means to underwrite dedicated program activities or products (a newsletter, for example).

GROUP EXERCISE:

Brainstorm Funding Sources

15 minutes

Develop a list of potential funding sources and identify strategies to use when approaching them for financial support.

Notes

Notes

MODULE III Create Program

In this module, you will learn about how to design, develop, launch, and sustain a successful green freight program. Key concepts include partnership program design, tools, marketing, and technologies.

CONTENTS

Suggested time for this module: 5 hours

A Partnership Program Design and Development

Develop program goals

Establishing program goals are fundamental to creating an effective program. They will shape your program for years to come, so it is important to take time up front to carefully think through what your program's goals should be. A good first step is to consider the impact you would like your program to have on your country's freight industry over the next five to 10 years. These goals might include improving the average fuel economy of trucks, saving *x* gallons of fuel or barrels of oil, encouraging the broad adoption of cleaner engines and equipment, and reducing nitrogen oxides (NO_X), particulate matter (PM), black carbon, and carbon dioxide (CO_2) emissions from the freight sector.

To begin defining your goals, compare your aspirations with the freight industry drivers and conditions that you identified in Modules I and II. Remember that your goals will need to address the needs of the freight industry in your country, which will come with unique challenges and opportunities.

Once you have outlined your program's broad goals, identify some strategies that will help you achieve them. These will form the basis for the year-to-year metrics that your program will rely on to measure its success.

GROUP EXERCISE:

Developing Program Goals

20 minutes

Brainstorm possible program goals and strategies that could help you reach your goals.

Defining the Terms

What is the difference between a "goal" and a "strategy?"

Goals and strategies (or objectives) are very different. Goals are mission-oriented statements that provide direction for your program. Strategies, or objectives, are specific steps to attain those goals whose impacts you can measure.

How SmartWay Does It

SmartWay's *goal* is to "reduce transportation-related emissions by creating incentives to improve freight supply chain energy and environmental efficiency." SmartWay's *strategies* include recruiting Partners into the program, having Partners quantify and report their baseline environmental performance, helping Partners achieve efficiencies and improve environmental performance, etc.

Define your program's value proposition

To encourage companies to participate in your program, you will need to define and be able to articulate your program's value proposition. If companies do not understand how the program can add value to their operations, they will not be inclined to invest effort and resources into becoming partners.

To help you articulate your program's value proposition, engage your charter partners (see below) and other industry stakeholders. Ask them to help identify how your program can provide added value to industry players, perhaps by increasing access to reliable performance benchmarking information and data, providing financial support, stimulating the creation and adoption of new technologies, or something else. They know what types of assistance and support freight companies need and how that assistance and support should be offered so that it is accepted by those who need it. Sometimes green freight programs can provide companies with a means to surmount barriers (regulatory, informational, or otherwise) that prevent action. Recall the structure and unique demands of your country's freight industry as you develop a value proposition that will help convince companies to participate in your green freight program.

As your program grows and the freight industry evolves, your program's value proposition should also grow and evolve. SmartWay continues to collect information from its Partners, using feedback loops to regularly measure and evaluate the current costs and benefits of participation. That way, as Partner needs and the marketplace change, the program can adjust.

Identify charter partners

Charter partners serve as "anchors" to the program. Because they are industry leaders, their participation and endorsement can generate additional publicity for the program in its initial stages of development,

Defining the Terms

What is a "value proposition?"

A value proposition is a simple statement that explains what you are offering to a partner (or any customer) in terms they understand. It answers the fundamental question of any customer seeking goods or services, "What's in it for me?"

How SmartWay Does It

Before SmartWay officially launched, EPA recruited 15 Charter Partners, all national leaders in the freight industry: Canon, Coca-Cola, CSX Transportation, FedEx Express, HEB, The Home Depot, IKEA, Interface, Nike, Norm Thompson Outfitters, Roadway Express, Schneider National, Swift Transportation, UPS, and Yellow Transportation. When SmartWay started to develop its truck performance evaluation tool, SmartWay solicited feedback from these Charter Partners and used it to guide the design and development process. Their input was instrumental in the program's early successes.

leading the way for others in their sector. Feedback from charter partners can inform the program design and development process to ensure that the program will be successful. They can also provide an industry perspective on realistic goals for partners and insights into appropriate incentives for prospective partners. Their feedback will be crucial to developing a program that deals with the specific challenges and unique needs faced by the freight industry in your country.

To identify the best organizations to serve as your charter partners, look for "industry leaders" in the freight sector. These might be companies or organizations that are already implementing fuel or freight efficiency and emissions reduction strategies, the largest shippers or carriers by freight tonnage, those most concerned with their environmental reputation, or those that meet some other criterion. Aim to recruit a diverse group, representing the major freight sectors in your country (such as retail, food and beverage, and manufacturing); focus on companies that contribute significantly to the total annual ton-miles of freight in the industry. Ideally, your charter partners will represent a balance between shippers, carriers, and third-party logistics providers.

Identify initial program staffing needs, roles, and training requirements

Adequate and appropriate staffing for the program is very important. Your staffing needs will certainly change over time as the program grows—but for now, in this early stage, separate staff into four program areas:

- Program management
- Partner management and recruiting
- Technical support and development of new initiatives
- Marketing, branding, and education

During the initial development phase of the program, your staffing needs will be relatively small. To start, your program may only need to staff two

or three full-time equivalents (FTEs). Seek out program management staff who have experience in voluntary program design and implementation and understand the national freight industry. They will serve as consistent core staff throughout the program.

Once your program has transitioned past its initial development stage, add partner account managers (PAMs) and recruiters. PAMs will serve as the face of your program to partners; you will need approximately one FTE per 60 partners, though this may vary over time. For instance, in 2014 EPA had one PAM for every 200 Partners in the SmartWay program. When evaluating candidates to be PAMs, look for the following attributes:

- Experience as an account manager (preferred) or in customer assistance
- Strong quantitative, Excel, and database experience, and organizational skills to help partners with partnership responsibilities
- Strong interpersonal, communication, and relationship-building skills

Staff with knowledge of the trucking industry (including specific shipper sectors) and fuel-saving technologies are also desirable, but keep in mind that this specialized knowledge may require some additional training.

For recruiters, plan on assigning one FTE per 100–150 active recruits (depending on the size of prospects and the amount of travel needed). When evaluating potential recruitment staff, look for the following attributes:

- Experience with the freight industry
- Experience identifying ideas and presenting them to decision-makers
- Strong interpersonal communication, sales, and marketing skills
- Strong presentation and networking skills

Tip

Make use of computer-based tools and technologies, such as sales tracking systems and computer-based training, to maximize both recruiting results and employee effectiveness.

Tip

Outside experts and consultants with specific expertise in database development and marketing may be an efficient way to provide specialized skills at key, formative points in your program's development.

In addition to PAMs and recruiters, you will need technical staff to act as database and Web programmers and administrators. Later on, once your program has reached the expansion phase, you will need to hire new staff to support the development of new initiatives. Look for the following qualities in new initiatives staff:

- An entrepreneurial mindset
- Ability to write and interpret technical reports and convey technical knowledge
- Ability to identify trends and understand the technology adoption life cycle
- Industry sector-specific knowledge (financial, ports, borders/international freight)

All elements of your program will require some marketing, so build your staff with people who have some marketing, brand management, and communications expertise. While outside experts and consultants can provide specialized program management and communications services, your program will need in-house staff who can manage and coordinate all outgoing and internal communications. This enables you to operate all components of your program cohesively, with a consistent message that serves your original goals.

Overall, as your program reaches the expansion phase, it may grow to as many as 10 to 20 FTEs working on program management, recruiting, marketing and education, partner management, technical support, and the development of new initiatives.

During the growth phase of the program, staff will need training to acquire new skills and become acquainted with program goals, requirements, and tools. Consider developing a manual that outlines responsibilities for PAMs and recruiters as program needs expand. You should also document and train staff in the basic instructions on how to use

How SmartWay Does It

SmartWay developed a training manual that it provides to all PAMs and recruiters. If you would like to use the manual as a reference, contact SmartWay.

the program tools including partner reporting tools and the customer relations database, the timeline of events for new partners, and how to provide technical and marketing assistance to partners.

Define partner categories and their responsibilities and benefits

Consider the organizations you want to partner with in your program. How do they fit into the program framework? How can partner participation contribute to the goals of the program? In the initial phases of the program, consider developing partner categories that include the sectors that are responsible for the most ton-miles of freight or have the largest vehicle fleets in your country. By focusing initial recruiting efforts on the largest carriers and shippers in your country, you can make the best use of limited financial and staff resources. Other reasons for focusing on large carrier fleets include:

- Larger fleets buy or lease trucks more often and in larger quantities, and can typically afford to purchase good quality.
- Larger fleets are typically industry leaders and can coordinate with medium-sized fleets through trucking associations.
- Larger fleets resell trucks to smaller fleets and independent drivers. Independent drivers also sometimes work on a contract basis for large fleets.
- Larger fleets have national visibility and likely serve key shippers.

Partner categories of interest will include:

- *Shippers:* Any company that ships or receives items delivered by truck or rail transport.
- *Truck carriers:* Public for-hire fleets, truck owner operators, and private fleets.
- *Rail carriers:* Any domestic freight rail carrier.

How SmartWay Does It

In SmartWay, Partners in all categories (except Partner Affiliates) complete the Partner Tools annually, using the most reliable, quality-assured data available.

- *Logistics providers:* Companies that provide freight services to shippers through for-hire carriers.
- *Partner affiliates:* Trade associations, professional groups, environmental organizations, and other nonprofits that support the goals of the partnership.

Shipper companies will be a key facet of your green freight program. Shippers, particularly large international companies with high public and consumer visibility, are increasingly under pressure to benchmark, report, and reduce their supply chain's carbon footprint and other emissions. They are also looking for new opportunities to reduce operational costs. Because of this, they strive for efficient, sustainable operations throughout their supply chain. The new performance assessment tools developed for your green freight program will give shippers a reliable, consistent means of comparing carrier performance and optimizing carrier and mode selection, perhaps for the first time.

Under your green freight program, participating truck and rail carriers will be incentivized to improve their overall performance efficiency to compete effectively for shipper business. Carriers wanting to improve their performance will retrofit legacy fleets or specify new equipment with verified technologies, which will further drive technological innovation and adoption across the industry as a whole.

Third-party logistics providers play key role as freight brokers in shipper-carrier relationships. These companies can help all parties achieve efficiency goals by sharing information, identifying efficiency improvement opportunities, and recruiting new carriers from their vast network of service providers.

Partner affiliate status gives nonprofit associations and other organizations committed to freight sustainability a way to contribute to your program. Affiliates can include trade and professional associations, academic institutions, nongovernmental organizations, truck and trailer

dealerships, engine and vehicle manufacturers, vehicle leasing companies, and truck stops and travel plazas, among others. Affiliates commit to some or all of the following:

- Press and promotional events
- Educational workshops (where they can learn about the program and associated technologies)
- Partner support (helping partners with tools, marketing, etc.)
- Recruiting (bringing members and contacts on board)
- Discounts (e.g., discounted conference registration fees)
- Other (the affiliate can carry out and suggest more activities to help grow the partnership)

You can easily create additional partner categories, with specific participation criteria and goals, to include other modes of freight transportation as your program expands.

Further Information

For suggestions on *program expansion opportunities*, see Module V, Section C.

Define finance program structure

An optional element of your overall program is a finance program that helps partners overcome such barriers as high upfront costs to purchasing and installing emissions reduction technologies. A strong finance program can greatly contribute to the success of your green freight program. The majority of companies within the freight industry operate on a narrow margin, and many (particularly smaller companies) have neither the available capital nor the ability to risk investments in energy efficiency that may or may not provide a strong financial return.

A green freight financing program would typically include the following elements:

Funding. At the core of a program's financing program is capital that you can distribute to partners through loans, grants, revolving loan funds,

How SmartWay Does It

The SmartWay Finance Program awards nonprofit organizations and local governments competitive grants. They use them to establish national, regional, state, or local financing programs to help vehicle/equipment owners (with a focus on small businesses) finance the purchase of eligible vehicle replacements, idle reduction technologies, and emissions control retrofits. Eligible activities vary from grantee to grantee, depending on regional need. Financing approaches include grants or rebates, revolving loan funds, and subsidies.

or rebates. But whether your finance program uses public or private funding largely depends on the financial resources available to you. While SmartWay received public funding through EPA to provide grantees with funds to establish loan programs, consider all avenues for gaining access to capital, including public-private partnerships.

Structure. Once you have identified your funding source(s), consider whether to disperse funds in the form of a grant or rebate, subsidy, or loan. Loans can be structured through a revolving loan fund or a standard loan fund.

Eligibility requirements. Who or what is eligible for financial assistance? Determine eligibility criteria, such as company size (in terms of revenue or fleet), region, or particular technologies or vehicles.

Loan terms and consequences. Outline the necessary terms for loans and grants, as well as consequences for defaulting or not fulfilling the terms of the financial agreement.

Even if you are unable to provide a sizeable finance program, compile resources and information on other funding options that partners might consider. Investigate opportunities in the private sector and seek out regional or local public organizations or development banks that might provide funding, talk to them about your program and its goals, and secure their involvement and assistance so that your freight stakeholders have access to the capital they need to make improvements that support your program's goals.

B Partner Tools and Database

Define terms for partner agreements

While participation in your program will be voluntary by definition, use a formal partnership agreement to establish commitments between the program's participants and the administering agency. The agreement clearly defines the requirements for partners to remain in good standing in the program, including data submittal requirements and deadlines as well as potential audit requirements. The agreement also specifies the administering agency's responsibilities, such as what partner information will and will not be made public. In addition, the agreement clearly lays out the terms under which the partner and/or the administering agency may terminate the agreement.

Confer with your agency's legal department, as well as with Charter Partners, very early in the program development process in order to draft partnership agreements. Agreements, while crucial to establishing a clearly communicated binding relationship with partners, and relationships between government agencies and private sector partners, may be influenced by county-specific factors, such as regulatory constraints and legal protocols.

GROUP EXERCISE:

Developing Partnership Agreements

10 minutes

Discuss legal and other constraints to public-private agreements in your host country.

How SmartWay Does It

SmartWay has developed agreements for each Partner type. SmartWay Partnership Agreements are included in the tools submitted annually by Partners and must be completed along with the annual data submittals. See samples of the SmartWay Partner Agreements in Appendix B.

Determine a basis for performance metrics

Providing partners with tools to evaluate and report their performance through operational changes and technology improvements will strengthen the value proposition of your green freight program. The performance data that partners provide must be easy to obtain, reliable, and demonstrative of their performance. Various performance metrics can be used, including estimating gram per kilometer, gram per ton-kilometer, and/or gram per volume-kilometer emissions rates, or relative "emissions scores" for the different carriers in the program. The emissions of interest will include CO_2 and possibly NO_X and PM.[1]

Performance metrics should:

- Easily tie into the value proposition for partners, including measures of year-to-year progress (for example, allowing them to estimate average fuel economy improvement)
- Be calculated from reliable data sources that are readily available to partners (e.g., reporting based on fuel receipts, mileage records, bills of lading for payload)
- Help aggregate partner totals/results to measure overall program benefits that can be easily communicated to the public and policy makers (e.g., mass emissions reductions, fuel cost savings)

In addition, consider choosing performance metrics that are consistent with the data collection and calculation methods of other existing programs, such as SmartWay and Green Freight Europe. This will help global shippers consistently calculate carrier performance and determine their composite emissions footprint across all of their operations worldwide. The adoption of standardized performance metrics is also consistent with the global trend toward integrative carbon accounting (e.g., as promoted by organizations such as the Carbon Disclosure Project). Since

1. Other potential pollutants of interest include black carbon, methane, and nitrous oxide.

Emissions of Interest for Green Freight Programs

Carbon dioxide (CO_2) enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, and trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement).

Nitrogen oxides (NO_X), and more specifically nitrogen dioxide (NO_2), form quickly from emissions from cars, trucks and buses, power plants, and off-road equipment. In addition to contributing to the formation of ground-level ozone and fine particle pollution, NO_2 and other nitrous oxides are linked with adverse effects on the respiratory system.

Particulate matter (PM) is a complex mixture of extremely small particles and liquid droplets. PM has a number of components, including acids, organic chemicals, metals, and soil or dust particles, including black carbon. Depending on their size, particles can get deep into the lungs and even the bloodstream; accordingly, particle size is directly linked to its potential for causing health problems. Fine particles (under 2.5 micrometers in diameter) also contribute to reduced visibility (haze) and can cause lake and stream acidification, change the nutrient balance in coastal waters and large river basins, and affect the diversity of ecosystems, among other issues. Black carbon is a primary component of PM that comes from the incomplete combustion of fossil fuels, biofuels, and biomass.

shippers who adopt comprehensive supply chain carbon accounting will seek programs that use similar performance metrics and methodologies, your green freight program will obtain more support and participation if you model your performance benchmarking and reporting metrics, tools, and methods after existing programs.

Activity-based performance metrics that allow you to estimate actual emissions footprints require a significant amount of quality-assured data from partners. As an alternative, a new program may choose to characterize carrier performance more qualitatively. For example, for the first

few years of its operation, SmartWay calculated a relative emissions score for each carrier accounting for technology-based information, such as the number of aerodynamic retrofits or idle reduction technologies adopted by the carrier fleets. Discrete "Shipper Index Factors" representing poor, good, better, and best performance (e.g., 0/0.75/1.00/1.25) were then calculated for each shipper in the program based upon their carriers' SmartWay scores. While this approach does not allow shippers to estimate the actual emissions impacts associated with their carrier selections, it does give them a sense of their performance relative to peers. (EPA has since transitioned to a carrier-specific system based on gram-per-mile and gram-per-ton-mile performance metrics.) Transporte Limpio in Mexico uses a similar scoring system.

The approach described above can be a useful stepping stone toward a program fully based on mass emissions benefits. Another option is to adopt a "SmartWay 1.0"–type system. In SmartWay's initial phase, carriers received performance scores based on their reported use of a fixed set of verified technologies and strategies, with assumed efficiency and emissions benefits. This approach can help carriers become familiar with new technologies and strategies, and it minimizes the complexity of the emissions benefit calculations. However, adopting a new data reporting system can be challenging for partners who have become accustomed to the earlier system requirements. Therefore transitioning to a new system can be disruptive and may cause your program to lose momentum if not planned carefully.

The following table compares the primary features and limitations of the SmartWay 1.0 and 2.0 systems, clearly indicating the progression in accuracy and applicability associated with SmartWay 2.0.

Figure 3.1 – Progression of SmartWay

SmartWay 1.0	SmartWay 2.0
Estimated emissions results based on estimated savings from specific technologies	Calculated emissions results based on operations (e.g., total fuel use, miles, tons)
Results = index value (e.g., good, better, best)	Results = performance metric (e.g., grams per tonne-kilometer)
Simulates a hypothetical fleet	Uses a fleet's actual inputs
Large number of data inputs (every technology and strategy)	Fewer data inputs (miles, fuel use, payload)
Lumps fleet data—limited ability to compare similar types of trucks and operations	Multiple ways to sort data by truck and operation type for apples-to-apples comparisons
No checks on inputs	Multiple input checks

Develop program evaluation methodology

While partner tools will give your partners the ability to estimate their individual emissions footprints, consider developing a methodology to quantify the benefits of the whole program, including the collective impacts of all program partners. The collective impacts—your program's total emissions reductions—will likely be made up of three elements: carrier partners' emissions reductions, additional emissions reductions by shipper partners, and emissions reductions attributed to verified equipment sold to and installed by non-partners.

Calculating carrier emissions reductions. SmartWay aims to drive improvements in the environmental performance beyond what would have occurred without the program. To measure its impact, these efforts are best evaluated by comparing the emissions performance of partners and the industry as a whole. To quantify carrier partners' reductions, use the same performance metrics used by the partner tools to generate consistent numbers and units, and thus base the benefit calculations (emissions reductions) on grams per kilometer or grams per tonne-kilometer performance.[2]

2. In the absence of specific activity data, assessment of program benefits will be limited to evaluation of relative improvements. This section assumes that your program will collect partner-specific activity information allowing for the calculation of actual mass emissions reductions and fuel saved, as in the SmartWay 2.0 system.

The methodology for benefits from carrier activity compares SmartWay partner activities and emissions with the national trucking industry overall as represented in the EPA MOVES (Motor Vehicle Emission Simulator) national model.[3] The MOVES model estimates emissions for mobile sources in the U.S. and covers a broad range of pollutants. The advantage of comparing SmartWay partner performance to the MOVES model results is that the emissions savings benefits of EPA's heavy-duty fuel economy and fuels standards regulations are already incorporated in the MOVES model.[4] Thus, the benefits of these emissions reductions would not be counted as SmartWay program reductions, particularly because MOVES is periodically being updated with new emissions data and the impacts of new regulations.

To calculate the total emissions reductions from the SmartWay program, the SmartWay carrier partner data is compared to a National Reference dataset generated by MOVES. The National Reference dataset is normalized to the same scale as SmartWay to enable comparisons between the two datasets. For the national dataset, the SmartWay mileage totals for each class are applied and allocated among model years within each class according to each model year's proportion of the total mileage within class in the MOVES estimates. The MOVES-estimated fuel consumption for each model year is scaled to the miles derived in the previous step. This yields national average fuel consumption (and hence, CO_2 emissions) estimates that can be directly compared to SmartWay carrier partners' emissions and fuel consumption. The difference between the emissions of the SmartWay and the National Reference groups represents the emissions reduced by SmartWay.

3. EPA's Office of Transportation and Air Quality has developed the MOtor Vehicle Emission Simulator (MOVES). This emission modeling system estimates emissions for mobile sources covering a broad range of pollutants and allows multiple scale analysis.
4. MOVES2014 is the latest version of MOVES and includes the benefits of EPA Tier 3 emissions regulations as well the impacts of other EPA rulemakings promulgated since the last MOVES release, in addition to new emissions data, and new features that users have requested. MOVES2014 also includes the capability to model on-road and nonroad mobile sources within the MOVES platform.

Adjusting for benefits due to overall fleet fuel economy variation. While the average fuel economy of heavy-duty diesel trucks has remained relatively constant over many years, several countries including the United States, Canada, and China are getting ready to implement greenhouse gas (GHG) and fuel economy standards for new vehicles. Once these more efficient vehicles begin to penetrate the freight vehicle market, the emissions reductions partners obtain by replacing older vehicles not subject to the standards with new ones meeting the standards would not be attributable to the program—but rather to these new rules. Therefore, program benefit calculations will have to adjust future year performance metrics to account for the penetration of such new emissions standards into the fleet. This adjustment would require introducing specific vehicle model year information into the calculation methodology.[5]

Calculation of shipper savings. Shipper partners can reduce their carbon footprints in two ways: first by using carriers participating in the program (particularly by choosing higher-performing carriers and/or encouraging existing carriers to improve performance) and second through strategies designed to remove distance, weight, and/or volume from their freight supply chain, resulting in emissions reductions. The first type of emissions benefit is included in the two equations above. The second is calculated by summing the GHG reductions from all shipper strategies and modal shifts. Independent confirmation of these benefits may require special audit requirements to verify shipper partner activities.

Calculation of savings due to technology sales. If your program verifies and promotes the adoption of specific fuel efficiency technologies, such as idle reduction or aerodynamic retrofits, your program may be

How SmartWay Does It

The SmartWay 2.0 Shipper Tools allow Shipper Partners to estimate emissions reductions from strategies they implement to remove distance, weight, and/or volume from their freight practices, including practices such as modal shifts (e.g., from truck to rail shifts).

5. There will continue to be a large legacy fleet of vehicles built prior to the new fuel economy standards taking effect for many years after such rules are implemented. Therefore your program can claim full credit for any emissions benefits from improvements to the performance of those older vehicles. In addition, any vehicles designed to exceed these standards could also be included in benefit calculation.

able to claim additional emissions reductions beyond those attributable to program participants. Specifically, carriers that do not participate in the program will also likely purchase these products, and the resulting emissions reductions produced by non-partners using these products can be ascribed to the program, if they can be quantified. For each product, you can estimate the emissions benefits on industry-average usage levels. To calculate the benefits of sales outside of the program, first determine the number of devices used by program partners and subtract their benefits from the total. If your program does not collect specific technology information from its participants, you can survey a representative sample of partners to estimate the total usage of verified devices throughout the program.

Develop partner tools

One of the most valuable components of a green freight program is a standardized system of data collection, reporting, and calculation tools. The tools allow each partner to enter its annual freight-related activity information in a user-friendly format. SmartWay developed its Partner Tools using Excel spreadsheet forms, although your own tools might also be Web-based or developed using some other electronic platform.

When developing your partner tools, strive to meet the following objectives:

- Ensure that the platform is accessible, user-friendly, and familiar to your partners
- Tailor partner data entry requirements to readily available, reliable industry data sources
- Minimize data entry burden where possible, while balancing program needs for quality, verifiable data
- Integrate data quality checks into the tools themselves

Partner tools fall into two general categories: carrier tools and shipper tools. Carrier tools collect fleet and activity information for individual freight carriers, such as a truck or rail company, and calculate associated performance metrics for each carrier fleet. Shipper tools use the outputs of the various carrier tools in order to calculate the emissions footprints for each shipper company.

Tools for logistics companies are a hybrid of these two tool types. Like shipper tools, they use the outputs of the other carrier tools to determine the performance of their selected carriers. Like tools for other carriers, though, they then calculate an overall weighted average performance for the logistics company as a whole, which can then be used in the shipper tool along with other carrier mode information. The following summarizes the way these types of tools can be used in a green freight program.

Potential Sources for Carrier Data

A variety of data will be needed to complete the performance evaluation tools for your green freight program. These data should be as reliable and verifiable as possible. The data sources available to freight carriers will vary significantly, depending upon regulatory reporting requirements, contractual arrangements, and access to data systems, among other factors. Below is a partial list of common sources that U.S. truck carriers use for the mileage, fuel, and payload data they enter in the SmartWay Truck Tool.

Total miles

- Fleet-wide GPS reporting software
- Odometer readings
- Maintenance records
- Driver log books
- Standard mileage routes

Fuel

- Electronic or paper fuel receipt
- Driver log books
- Electronic or paper expenditure data

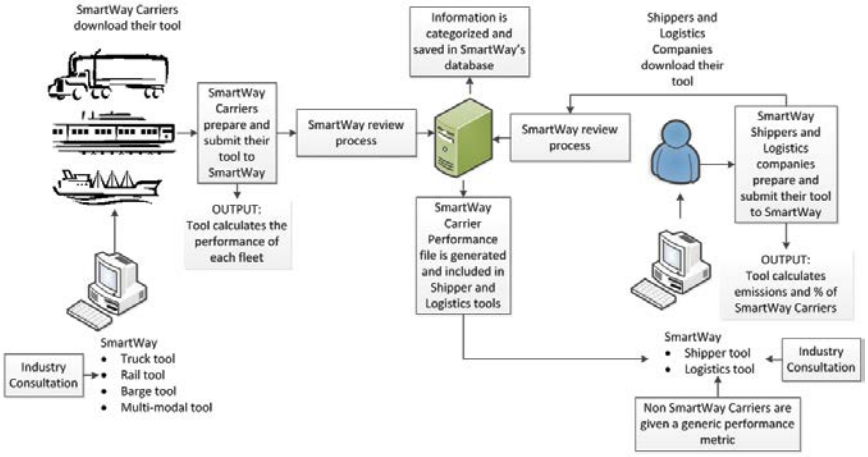
Potential Sources for Carrier Data (continued)

Average payload

- Driver log books expenditure data
- Fleetwide tracking software
- Centralized database with bill of lading weight information
- Bills of lading by representative sample

Data sources will be different for other carrier modes.

Figure 3.2 – SmartWay Integrated Process



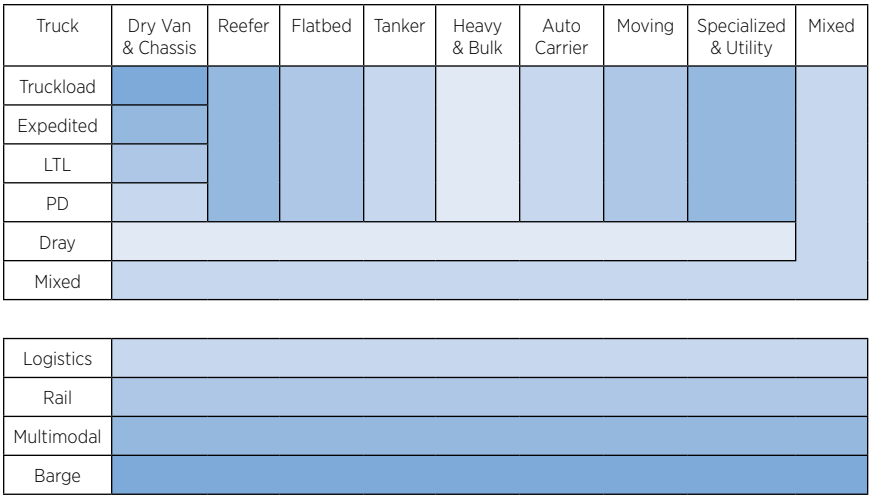
Natural Resources Canada

1. Carriers get their tools by email, download, or logging onto a Web page. They enter their detailed fleet and activity information, validate their data, correct any errors, save the results, and send them to their PAMs. The tools automatically calculate the performance metrics for the carriers' associated fleets.

2. PAMs review the carrier tools, identify and resolve any anomalous data in consultation with the partner, and upload the approved carrier data into the program database.

3. Carrier performance information is grouped into pre-determined categories within the database for comparison purposes. For example, it would not be reasonable to compare the efficiency of a truckload dry van fleet with a heavy-haul fleet. The SmartWay program established its performance categories for truck carriers in consultation with industry experts, based on a combination of operation and body types, as shown in the figure below.

Figure 3.3 – SmartWay Carrier Categories: 2013 Data Year



4. The program database generates a file containing the carrier performance information.

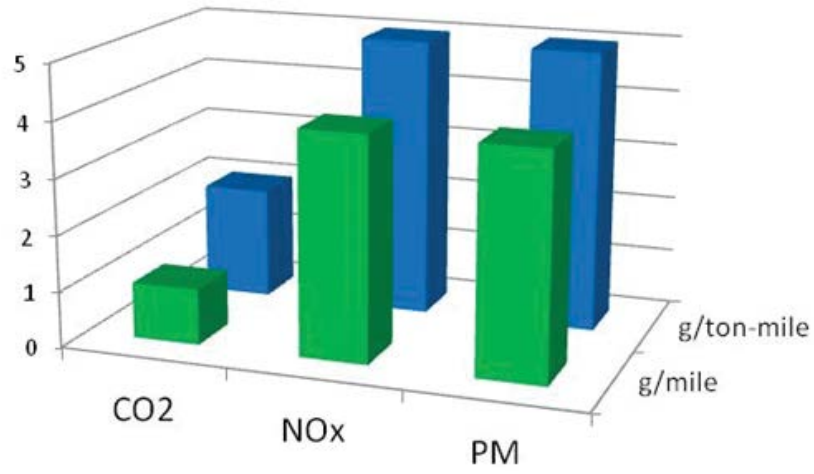
5. Logistics and shipper companies upload the carrier performance information into their tools and specify which carriers they use and the activity levels associated with each. The tools then calculate the companies' emissions footprint and the percentage of their carriers that are in the program. As with the carrier tools, logistics and shipper companies check and correct any flagged inputs and send their completed tools to their PAMs for approval.

6. The PAMs review the logistics and shipper tools, make corrections as needed, and upload the approved tools into the program database. Depending on program goals or strategies, the program may even set

predefined performance levels that companies may meet to qualify for a superior performance designation[6] or other award.

Carrier performance can be reported to logistics and shipper companies in a variety of ways, such as a relative score (e.g., "1–5"), an aggregated performance "bin" (e.g., "900–1,100 g/km"), or carrier-specific metrics (e.g., 1,087 g/km). SmartWay uses performance bins, representing a compromise between the specificity and precision desired by shippers and the privacy often desired by carriers. The figure below provides an example of the different performance bin levels that might be presented to shipper and logistic companies under this approach.

Figure 3.4 – SmartWay Fleet Performance Map



Establish a number of ranking performance bins that is granular enough to provide shippers with reasonably precision in their carrier evaluations, but not so numerous as to become difficult to manage or result in very low numbers of carriers per bin. The exact number of ranking bins and the associated bin cutoff values is not critical. That said, it is important for your carrier performance rankings to meaningfully reflect quantitative,

6. EPA originally provided SmartWay logo access only to Partners that met a performance threshold.

accurate measures of their emissions impacts—qualitative relative rankings such as a "gold/silver/bronze" scheme will not be adequate to allow for harmonization with global green freight programs.

The format and data entry requirements for carrier tools vary depending upon the freight mode. Separate tools may be developed for the following carrier modes:

- Truck
- Logistics
- Rail
- Marine[7]
- Air
- Multimodal

If the vast majority of program partners will likely be truck carriers, then develop and launch the truck tool first. Logistics companies are increasingly common, and the tool for these partners could be developed next.[8] The priority for developing tools for other modes will depend upon your country's local freight industry characteristics.

Carrier companies transporting freight via multiple modes (e.g., truck and rail over the course of a delivery) are referred to as multimodal carriers. The SmartWay Tool for multimodal carriers is effectively a shell that contains multiple tools, including those for truck, logistics, and rail carriers; multimodal SmartWay Partners complete each embedded carrier tool individually and then provide "composite fleet" information regarding how the different modes are used within their company.

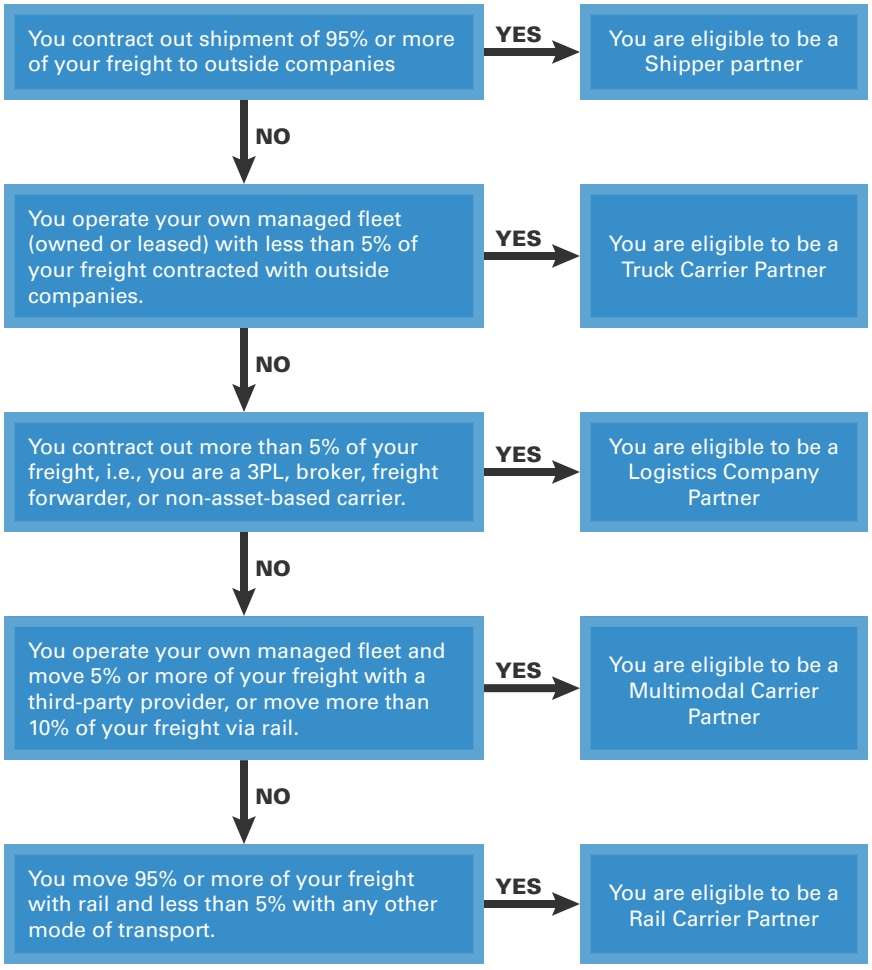
Tip

The outputs from certain carrier tools may be used as inputs for other tools. For example, the performance calculations from the truck tool could be imported into the logistics tool for use, while logistics tool outputs are subsequently imported into the shipper tool. Make sure to schedule tool due dates carefully to account for such interdependencies.

7. Different tools may be developed for barges/inland marine freight and ocean-going freight. This may need more detailed explanation or graphics.
8. While logistics companies hire carriers to move freight, they are hired directly by shippers. As such, logistics companies are treated as "carriers" in this discussion.

Today's carrier fleet operations can be complex, and determining which tool a given partner should use may not be straightforward. Therefore you should develop clear guidance to help partners identify the appropriate tools to use. An example "decision tree" is provided below, including the guidance for SmartWay Partners.

Figure 3.5 – SmartWay Decision Tree



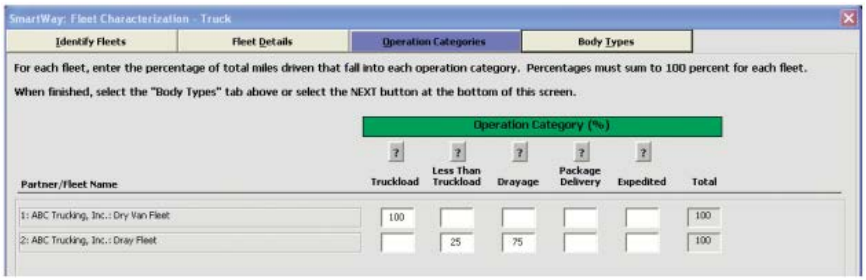
The carrier tools collect a wide variety of information. Although tools differ from category to category, the tools have many data requirements in common:

- Partner name and contact information

- Fleet characteristics such as operation and truck body types (e.g., 90 percent truckload/dry van, 10 percent drayage)
- Activity levels (distance travelled and tonnage hauled)
- Fuel types and volumes consumed
- Vehicle/engine size
- Engine age
- NO_X/PM controls

An example input screen for operation categories is shown in the figure below for the SmartWay Truck Tool.

Figure 3.6 – SmartWay Truck Tool Input Screen



Significant amounts of information will also be unique to each carrier mode and tool. Key factors that are specific to each mode of the SmartWay tools are listed below.

- Truck Tool—number of tractors by class, number of trailers, road type/speed, idle hours
- Rail Tool—railroad class, engine tier level, railcar types and miles, gross/revenue/non-revenue tonne-kilometers
- Barge—propulsion and auxiliary engine info, barge/vessel types, underway vs. maneuvering activity

Example input screens for activity, average payload, and trailer use are shown in the figures below from the SmartWay Truck Tool.

Tip

Emissions calculations will vary depending upon selection of a "preferred calculation metric" by the user—e.g., grams per kilometer or grams per ton-kilometer may be chosen. Base your emissions calculations on the metric with the greatest accuracy/reliability. For example, carriers with relatively light weight shipments should rely on grams-per-mile metrics, while carriers with heavier payloads should base their emissions estimates on grams-per-tonne-mile metrics.

Figure 3.7 – SmartWay Truck Tool Activity Screen

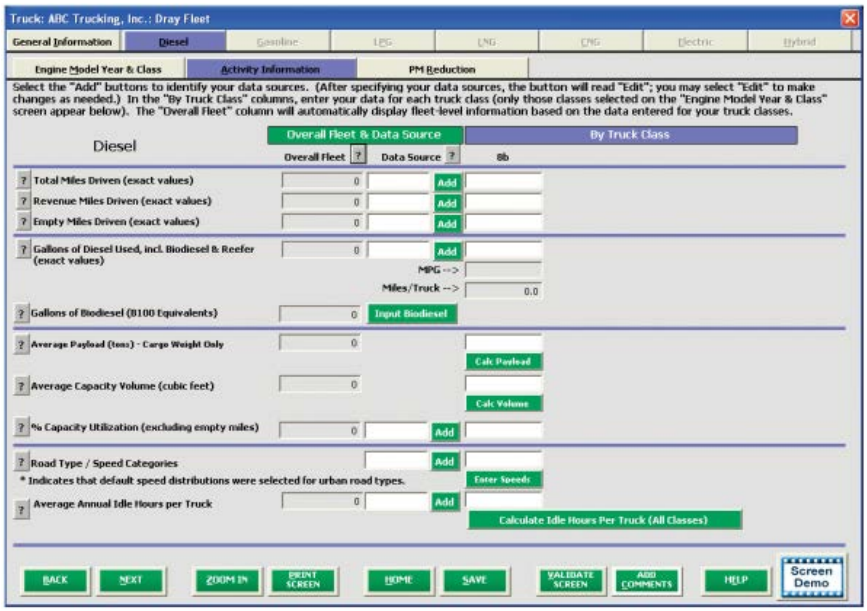


Figure 3.8 – SmartWay Truck Tool Payload Screen

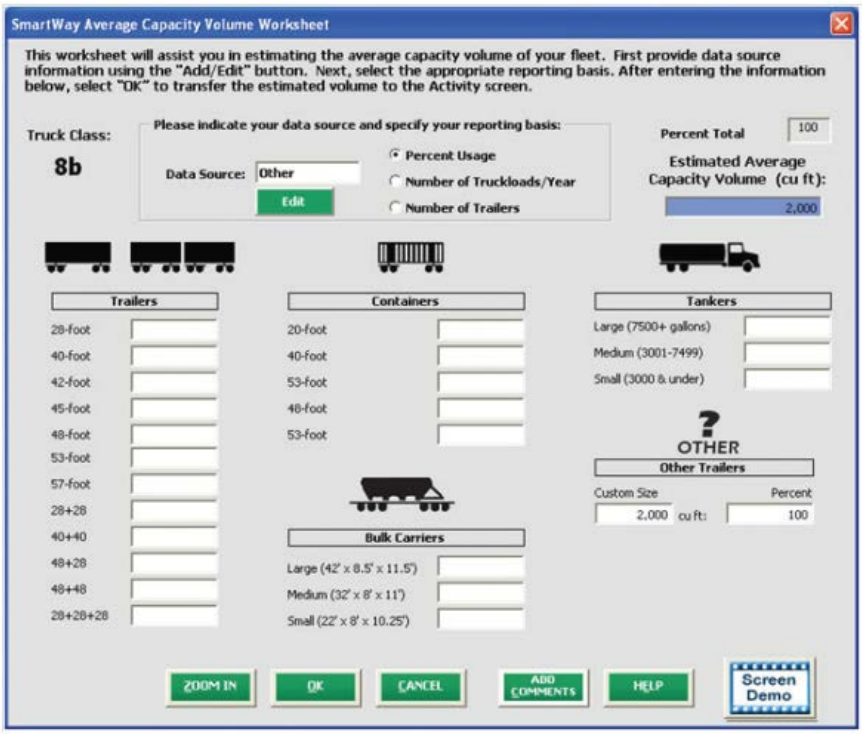
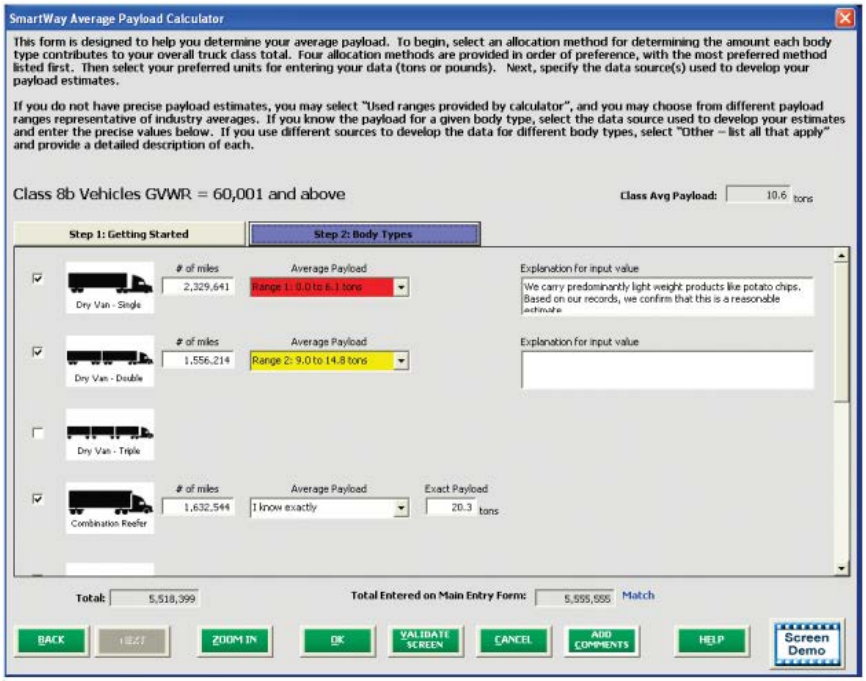


Figure 3.9 – SmartWay Truck Tool Trailer Use Screen



Once SmartWay Partners input the carrier fleet and activity, the tools automatically calculate mass emissions and the corresponding performance metrics for each fleet. CO_2 emissions for all tools are calculated from fuel consumption estimates and carbon fuel factors for each fuel type (diesel, gasoline, natural gas, etc.). Emissions calculations for NO_X and PM use emissions factors that vary by mode.

The emissions factors used in the SmartWay Truck Tool are expressed in grams per mile (and grams per hour for idling emissions), which are derived from EPA's latest MOVES emissions model. The MOVES model outputs account for a variety of factors, including fuel type (diesel and gasoline), vehicle class, engine age, driving cycle type (e.g., urban or rural), and average speed. Adjustment factors are applied to estimate emissions for alternative fuels such as natural gas and propane. Alternative emissions modeling approaches may be needed for trucks operating outside the United States and Canada to account for different emissions standards and/or fuel specifications.

Tip

Technical documentation for all SmartWay tools can be downloaded from the SmartWay website, http://www.epa.gov/smartway. User guides for the tools, explaining all required and optional inputs, are available upon request. Contact SmartWay for more information.

EPA developed the NO_X and PM emissions factors used in the SmartWay Rail Tool. They are expressed in grams per gallon of fuel and vary by engine size and age (i.e., emissions standard or "tier level"). SmartWay's Tools provide its Partners with standard reports allowing them to review their fleets' mass emissions and performance metrics. The figure below presents the performance metrics for an example truck fleet.

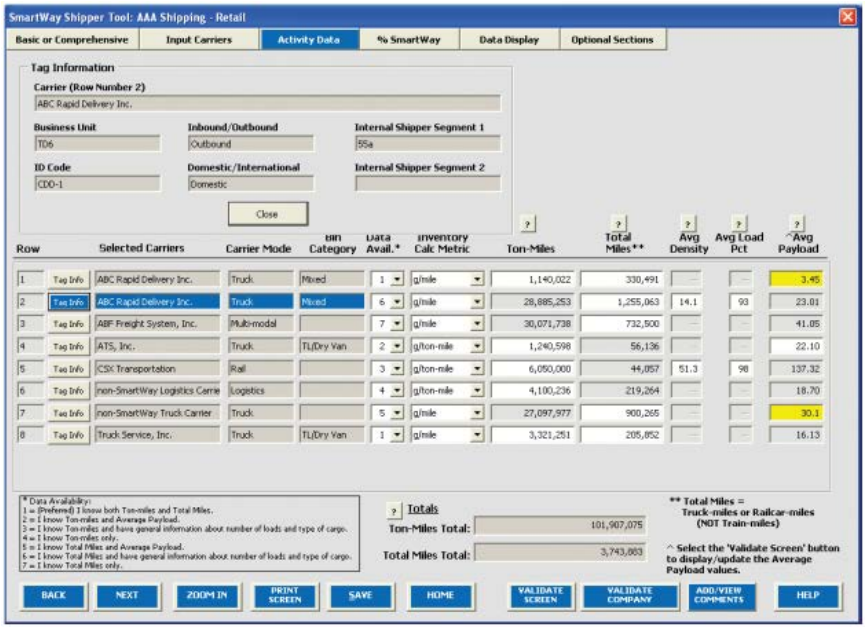
Figure 3.10 – Sample Truck Fleet Performance Metrics

Logistics and shipper tool development. Unlike the carrier tools described above, the logistics and shipper tools do not require fuel consumption estimates, since this information likely resides with the carriers. The logistics and shipper tools require users to identify all of the carriers they have used during the reporting year, specifying their mode and their program status (e.g., SmartWay truck carriers, non-SmartWay rail carriers). In addition, these partners must assign mileage and/or ton-mileage estimates to each carrier identified. The tools then combine this activity information with carrier-specific performance metrics in order to calculate mass emissions for the shipper and logistics companies. For example, total ton-mileage estimates for a given carrier would be multiplied by the carrier's corresponding gram per ton-mile values from the carrier performance file to estimate the mass emissions associated with that carrier's use over the year. The figure below shows an example activity input screen for the SmartWay Shipper Tool.

Tip

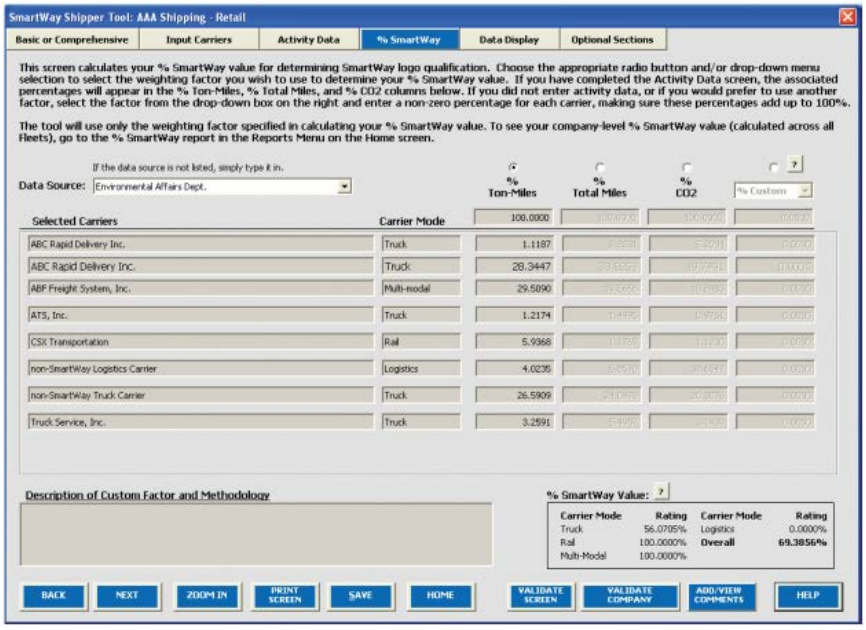
Work with charter partners and key stakeholders to identify readily available, reliable data sources for key tool inputs. Fuel consumption, distance travelled, and payloads are particularly important. We also recommend that all tools be peer-reviewed and signed off on by academics/stakeholders.

Figure 3.11 – SmartWay Shipper Tool Activity Screen



In addition to calculating emissions footprints, the SmartWay Shipper Tool calculates a "% SmartWay Value" based on the fraction of total distance traveled, tonnage hauled, or CO_2 emitted by SmartWay Partners. This value can be used as the basis for performance benchmarking, award and recognition ratings, or even program logo qualification. Because shippers' key role in program is to influence the market, this is a key gauge of their success. The figure below shows the screen in the Shipper Tool where users select the basis for their % SmartWay Value.

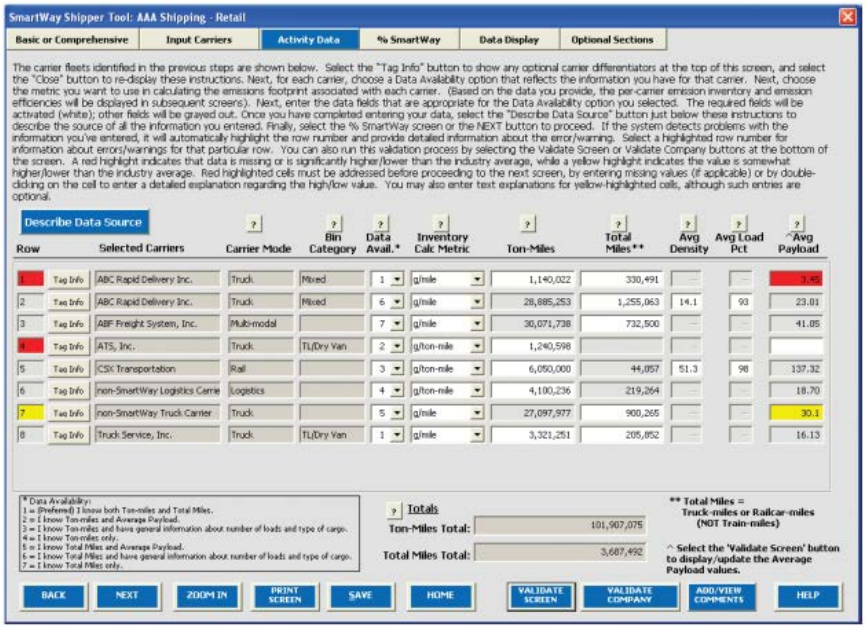
Figure 3.12 – SmartWay Shipper Tool "% SmartWay" Screen



As discussed previously, by designing your partner tools to collect activity data and report carbon performance metrics in a manner consistent with existing green freight programs such as SmartWay and Green Freight Europe, you will facilitate the efforts of shippers involved in global carbon accounting.

Tool validation. Ensuring the accuracy of partner performance data is a cornerstone of green freight programs. The SmartWay carrier and shipper tools both include validation checks to identify likely carrier calculation and/or data entry errors. Certain inputs are compared against industry average values, such as payload, annual distance traveled per vehicle, and vehicle efficiency. If a SmartWay Partner's values differ from the average by more than some pre-determined amount (e.g., more than two standard deviations) then the tool warns the user. In this case, the user can either change their input value or provide an explanation for the unusual value. The figure below presents an example from the SmartWay Shipper Tool highlighting warnings of differing severity (yellow and red), including one missing value.

Figure 3.13 – SmartWay Shipper Tool Warning Screen



Develop the partner management database

The partner management database stores the information collected from program tools, performs necessary calculations to determine program benefits, results, benchmarking, carrier ranking, and other calculations necessary for the program to function. It also serves as a customer relationship management tool, allowing PAMs to manage their partners and their annual submissions.

The server hosting the database can be located at your agency or a contractor, or maintained by a third party. However, rigorous security measures and regular data backups should be adopted as standard operating procedure.

The process that partners follow in order to submit their data should be designed to be easy and straightforward in order to minimize reporting burdens. SmartWay's data submission process consists of several steps, relying on the database for overall coordination:

How SmartWay Does It

SmartWay's overall Partner management database system consists of an Oracle database server, a ColdFusion application server, and an SMTP server.

1. Tools are updated for the new reporting year and posted on the SmartWay website.

2. PAMs use the database to generate and send emails to inform the Partners that the tools are ready to be downloaded. Each email includes a link to the SmartWay website, so the Partner just selects the link in order to download the tool.

3. Using the downloaded tool, the Partner fills out contact, fleet characterization, and fleet activity information as discussed above. The Partner can also provide optional information about themselves for posting on the SmartWay website as well as suggestions for program improvements.

4. After entering and validating data, the Partner clicks the "Create Submission File" button, which generates an XML file containing the entered data.

5. The Partner then emails the XML file to their PAM or a central email address. (A more automated submission process that will avoid the need to email the file is under consideration.)

6. The PAM uploads the XML file into the database. The database upload function validates and stores the information in the file.

7. Truck submissions have an automated evaluation function that provides guidance to the PAM on whether the submission must be reviewed, should be reviewed, or can be accepted without any review. Truck submissions are the most numerous and most complicated. Other submission types may be automated in the future. (Such automated reviews may not be necessary for smaller programs or programs that are just getting underway.)

8. Once the PAM has validated and approved the submission, it becomes available for inclusion in the calculation of program benefits, the carrier performance file, and the Partner list on the SmartWay

website. The PAM also has the option of checking a box that causes an automated email to be sent to the Partner informing them their submission was approved. The automated email includes a link to an EPA Web page where the Partner can view, download, or print their registration document, which was designed to be printed and framed. In the future these emails will also include a link allowing qualified Partners to obtain the logo files for use on their vehicles and packaging. (Again, such high levels of automation are most appropriate for large, mature green freight programs.)

9. Reporting deadlines are spread out throughout the calendar year in order to allow the outputs of certain tools to be included as inputs in others (as discussed above), as well as to distribute the PAM workload more evenly.

10. Toward the end of each reporting period, PAMs generate and send automated emails to Partners who have not yet submitted data. All emails generated by the database are recorded in a history log. PAMs can also manually add communication records for phone calls, in-person meetings, and emails generated outside the database. These records then provide a visual record of all communications and interactions with the Partner.

11. At the end of each reporting period, carriers have their approved and binned emissions estimates included in the carrier performance file. Binning is performed by a database administrator using restricted functions; it groups each carrier's emissions estimates into a bin, as discussed above. The estimate that is then published is the bin midpoint—not individual emissions estimates, which are considered to be business sensitive information.

12. The carrier performance file is used in the Shipper Tool, the Logistics Tool, and the Multimodal Tool. A Partner using one of those tools chooses carriers (who are SmartWay Partners) from the file. The Partner enters information on their non-SmartWay carriers as well.

13. At the end of each calendar year, the program benefits are calculated by the database using the activity data and emissions estimates submitted and approved by the program Partners.

14. On the last day of each month, an automated database routine is run that counts and saves the number of Partners in the program. This historical record can be used to track and manage the Partner base.

Provide "best data QA/QC practices"

To a large degree, the success of your program will depend on how well your participating partners measure and document their fleet characteristics and activity. Thus, it is critical that your partners enter their data into the tools accurately and completely. Only then will you be able to reliably estimate program benefits and will your partners be able to accurately assess the benefits of their investments in emissions reduction technologies and strategies.

Encourage your partners to perform data quality checks at a number of points in the data collection and reporting process. The charts below illustrate the general steps SmartWay's carriers and shippers use to capture and report their data, starting from goods movement through the completion of the SmartWay reporting tool.

How SmartWay Does It

In 2013, SmartWay published guidance for Partners on best practices associated with freight data quality assurance measures. This report, *Driving Data Integrity in Transportation Supply Chains*, provides descriptions of best practices as well as case studies of Partners who use them. The report is available at the SmartWay website, http://www.epa.gov/smartway.

Figure 3.14 – Best Practices Example of Carrier SmartWay Data Flows

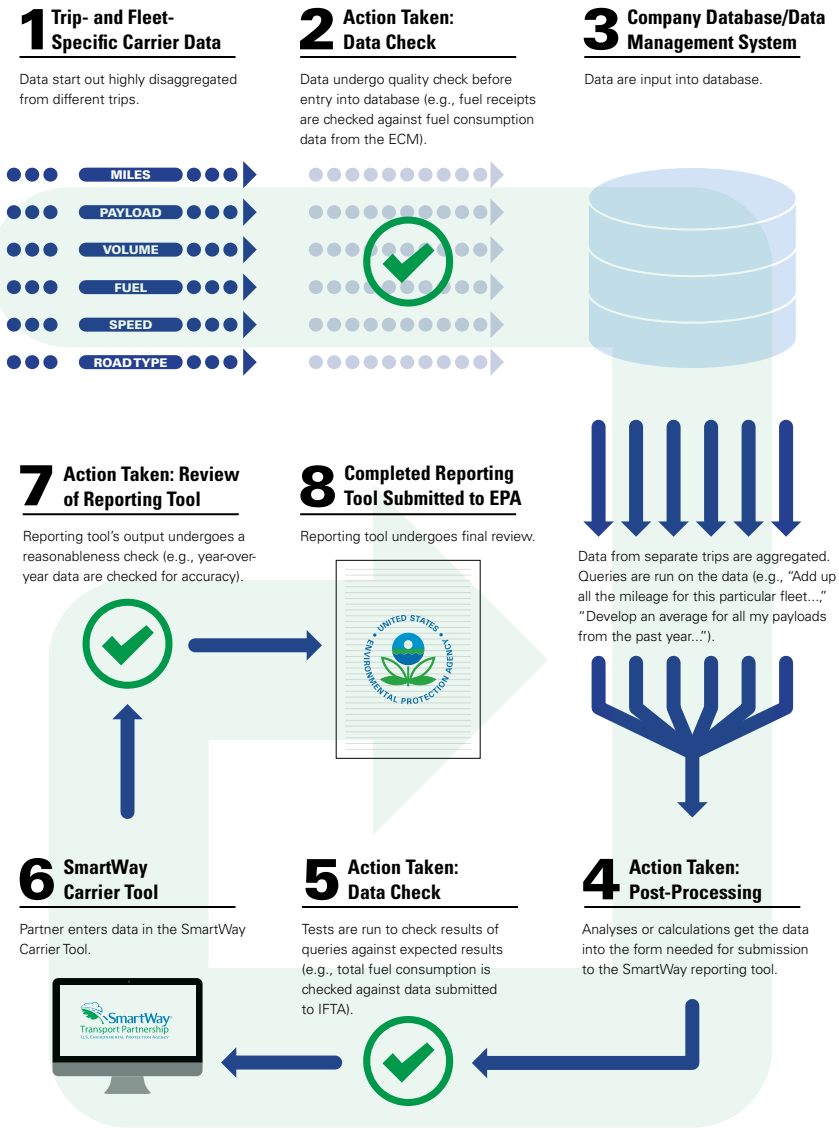
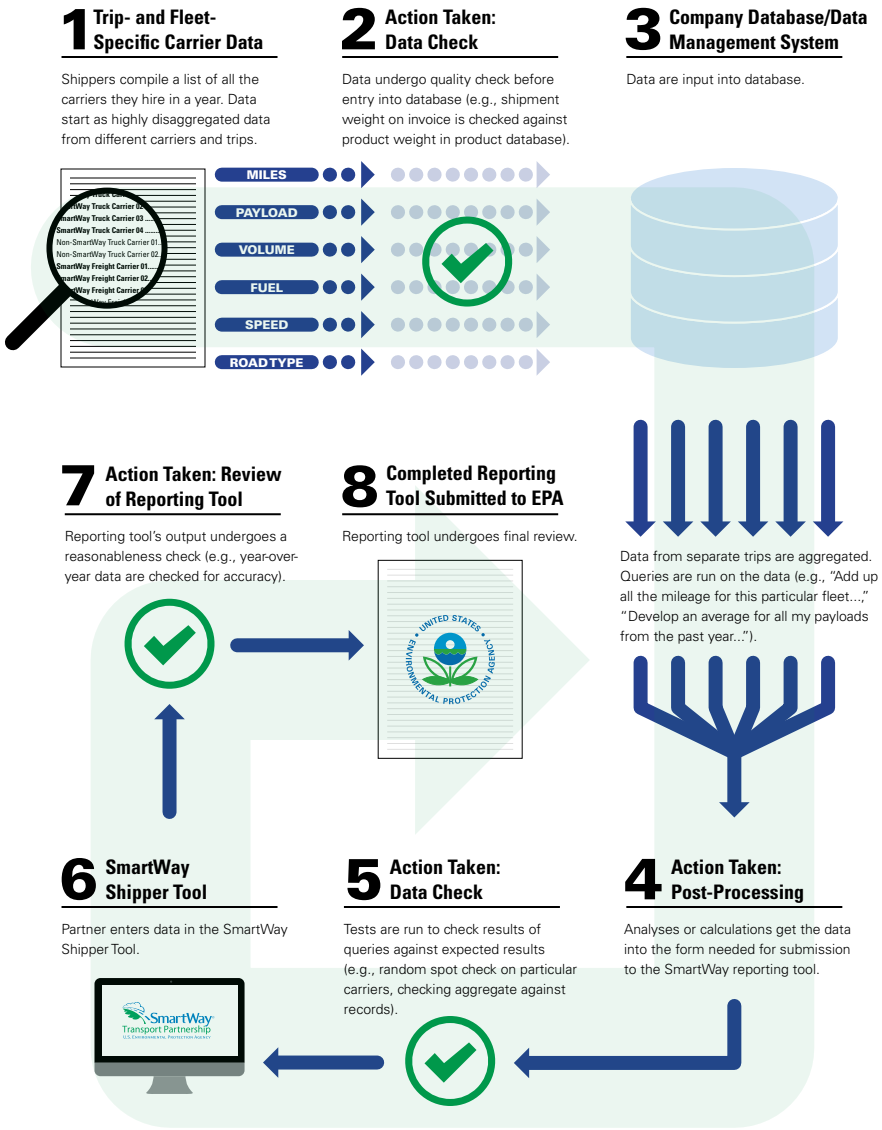


Figure 3.15 – Best Practices Example of Shipper SmartWay Data Flows



As seen in the figures above, partners should conduct their first QA/QC checks at the point where their disaggregated, trip-specific information is collected and uploaded into their company data management system. For example, truck carriers should compare their fuel receipt records for individual rigs with fuel consumption data from the rigs' electronic control modules (ECMs) to identify potential discrepancies.

Partners should perform a second set of data checks when preparing their data for entry into your partner tools. At this stage, data are aggregated across routes and trips to calculate total distance travelled, ton-mileage hauled, and average payloads, among other factors. An example data quality check at this stage would include matching total estimated fuel consumption for the fleet against total fuel sales tax records.

Once the data have been entered into the tools, partners should compare the inputs, emissions, and performance results with those from prior years. The SmartWay Tools offer users a year-to-year comparison function in order to help identify significant discrepancies across years for QA/QC purposes.

Finally, once partners have submitted their data and uploaded those data into the program database, PAMs should perform additional QA/QC checks of their own. In many cases, these checks are redundant with many of the reasonableness checks performed by the partners. For example, the SmartWay program database performs automated QA/QC checks for each tool upload, highlighting any out of range flags contained within the tool, as well as year-over-year consistency checks. In this way, any discrepancies that SmartWay Partners may have missed or not adequately explained can be identified and addressed jointly by the PAMs and Partners before finalizing data submittals.

The best time to establish best practices for compiling and entering partner data is before partners join the program. To develop your own best practices, consider visiting a cross-section of freight companies to learn more about the specifics of how they collect their freight data and their processes for quality checking it.

Case studies of SmartWay Partners using best practices

SmartWay is fortunate to have many Partners who employ state-of-the-art best practices when it comes to data quality assurance measures.

For example:

- *AD Transport Express, Inc.*, based in Canton, Michigan, has been a SmartWay Carrier Partner since 2006, and demonstrates a strong commitment to data quality. AD Transport regularly checks satellite-reported vehicle miles traveled (VMT) and fuel data against IFTA[9] reports. It verifies satellite miles reported against truck odometer readings; in some situations, it also checks the satellite-recorded VMT against its own dynamic mileage software.

- *Swift Transportation* is a SmartWay Charter Partner and has been a SmartWay Carrier Partner since 2004. All of Swift's trucks have satellite systems that continuously log all operational and trip-related information (e.g., Global Positioning System [GPS] position, empty and revenue miles traveled, ECM parameters). This information is electronically transmitted daily to more than 1,500 staff for review. Drivers have goals and scorecards for miles per gallon (MPG) and idle time that are reviewed daily. Discrepancies in the data are rare, but when they occur, issues are identified and fixed quickly. For example, if the driver gets a low MPG daily score (e.g., 3.5 MPG recorded), the truck is brought into the shop for a diagnosis. The technicians are well trained to uncover problems from faulty sensors in the ECM that logged erroneous values.

- *Sharp Electronics Corporation*, based out of Mahwah, New Jersey, has been a SmartWay Shipper Partner since 2004. Sharp has a strong environmental sustainability commitment, is ISO 14001 certified, and requires all of its carriers to participate in SmartWay. Sharp uses a comprehensive enterprise resource planning (ERP) system to store all of its business process data. Customers' orders are submitted directly into this system, processed, and transmitted directly to the

9. The International Fuel Tax Agreement (IFTA) is an agreement between the United States and Canada that enables motor carriers operating in more than one jurisdiction to report fuel use.

transportation management system, where they are optimized, routed, and assigned to carriers. The shipment information is then electronically submitted to the warehouse management system for shipment and returns shipment-specific information back to the ERP system. To ensure that the data are accurate, the ERP system checks the returned shipment data against the original order data and creates an exception report when there are discrepancies. These errors are investigated to determine the nature of the problem, its root cause, and the countermeasures that will ensure data integrity. Sharp employees also perform manual verification checks on the data throughout the year, which further ensures that SmartWay-related data are accurate. Through these many controls, Sharp can confidently and efficiently analyze these data and identify, plan, and execute strategies that reduce GHGs and strengthen its bottom line.

- *IKEA Distribution Services, Inc.*, Westampton, New Jersey, is a SmartWay Charter Partner and was designated a SmartWay Champion in 2011. IKEA also won a SmartWay Excellence Award in 2012. In 2000, IKEA developed its IWAY program: a code of conduct covering areas such as environment, health and safety, and wages and working conditions. All carriers that work with IKEA agree to comply with IWAY and take part in onsite IWAY audits every 24 months. Additionally, any carrier that wishes to do business with IKEA in the United States or Canada must participate in SmartWay. As part of the IWAY audits, each IKEA carrier must confirm that it is up to date on its SmartWay reporting tool submissions, and it must also walk IKEA staff through its SmartWay reporting tool.

As with all voluntary programs, participants may be tempted to overstate their fleet or company performance. By increasing their estimated vehicle efficiency level, freight carriers would increase their chances of being hired by logistics and shipper companies looking to reduce their emissions footprint. Alternatively, logistics and shipper companies might overestimate the miles and/or ton-miles assigned to carriers participating

in the program in order to improve their chances of qualifying for a program logo or other recognition. Reliance on government and third-party audits of participants' data will reduce the risk of such behavior.

C Brand Development, Marketing, and Outreach

Branding and marketing

Branding and marketing are pivotal to the success of your program. Branding defines a positive and memorable image of your program to your stakeholders and the public, leading to increased and sustained partner participation. Marketing broadcasts your program and its key messages, accomplishments and outcomes, and opportunities for partner participation. Take time before the program is launched to develop a comprehensive branding and marketing plan to use as a roadmap for the next several years.

To create such a plan, you will need a few basic communications building blocks. Follow the steps below to ensure that your program has these elements in place to create an effective branding and marketing plan.

1. Develop a program brand, including logo and logo use criteria

Establishing and presenting a consistent brand is important for marketing and outreach. Your brand identity represents your program and conveys its attributes, values, purpose, and strengths. You can use your brand to:

- Unify your program under one easily recognizable symbol
- Provide a focal point and shorthand for referencing your program
- Distinguish your program from others
- Communicate your program offerings

Defining the Terms

What is a brand?

A brand refers to the look, design, graphics, language, and facts that identify and describe a product, program, or organization. As articulated by *Fast Company* magazine nearly 20 years ago, "The brand is a promise of the value you'll receive."

What is a logo?

A logo is a graphic symbol or design used to signify a product, program, or organization. Your logo is part of your program brand and contributes to program recognition.

To develop a brand, ask yourself the following questions about your program:

- What is your program's mission?
- What are your program's core services? Core values?
- How is your program different from others and unique in the marketplace?
- Who is your target audience?
- What are the benefits and features of your program's products and services from the partner perspective? From your perspective?
- How do you want your stakeholders and target audience members to view your program? What qualities do you want them to associate with your program?

Your answers to these questions are important, and they will change over time as your program evolves. Continually ask your team and your stakeholders these and related questions so you can maintain, discard, and add elements to your brand as the program matures.

Tip

Because defining your brand and developing a brand strategy can be complex, consider getting help from outside consultants.

GROUP EXERCISE:

Create a Brand Platform

30 minutes

Consider the questions listed above and discuss them with your group. Document your answers in a short one- to two-page document, which will become the basis for your brand platform. Consider it to be a living document that can change over time. Share it internally so that everyone has a common reference point for your program's mission, unique attributes, and features. It will serve your program in the long run by promoting clear and consistent messaging and reducing confusion.

How SmartWay Did It

This is SmartWay's *Program* logo:

This is SmartWay's *Partner* logo:

Note the similarities in design, color, and "feel." You can tell that they are part of the same "family" and brand.

Brand building blocks. Your program's brand is reflected visually via its logo and design elements as well as through the text in marketing materials. The basic building blocks of a brand include a program logo, color palette, dedicated fonts, and photos, all of which are used and incorporated into all program materials, including outreach and media materials.

Program logo. Your program logo helps define your brand and will be used on all materials, electronic and print. Use it consistently to quickly build a recognizable brand. The logo should reflect your brand identity, incorporating the colors and look and feel you want associated with your brand.

Consider trademark registration for your program and partner logo domestically and internationally. This will provide you with the ability to prevent its use by unauthorized parties and better control the way that your brand is used worldwide. The Madrid Protocol[10] provides a centrally administered system of obtaining "bundled" trademark registrations in different jurisdictions.

Palette. Your color palette should define the specific colors that are used in the program logo and across all program materials. The palette should also include complementary or "accent" colors for other materials. Use caution when selecting a palette. Different cultures have different associations with colors. For example, in the United States, red, white, and blue together are considered patriotic, while green is often associated with the environment and money. Red is associated with heat, danger, and stopping, while yellow is associated with caution and the sun. Pick colors that make sense for your cultural and programmatic contexts.

10. For more information about the Madrid system, including how to file an application, visit the World Intellectual Property Organization website at http://www.wipo.int/madrid/en.

Fonts. Adopt a standard set of widely available yet distinctive fonts to use in printed and electronic materials, including presentations and brochures. Use them consistently throughout all materials, with certain fonts assigned to headings, subheads, body text, website text, etc.

Photos. Photos can reinforce a program's identity and overall brand. Ideally, use photos with colors that are part of or complement the palette (see above) and images that complement your brand.

Once you have established the core building blocks of your brand (program logo, palette, fonts, photos), find a qualified graphic design artist or expert to help develop a partner logo, logo use guidelines, and internal style guide.

How SmartWay Did It

For its *SmartWay® Transport Partnership: Driving Data Integrity in Transportation Supply Chains Data Integrity* report, SmartWay selected as its dominant cover photo an image of an aerodynamic truck in motion, playing off the report title text ("Driving") while incorporating squares in stacked columns, metaphorically suggesting datasets.

How SmartWay Does It

SmartWay logo "do's and don'ts" include:

- SmartWay logos must be used in their entirety. The graphic may not be altered.
- The only SmartWay logo files approved for use can be obtained by contacting EPA.
- Logos must be applied on a white background.
- Logos must be legible at all times.

The full logo guidelines can be found at http://www.epa.gov/smartway/forpartners/index.htm.

Partner logo. A program's partner logo is different from, but built upon, a program logo. It uses the same colors and overall style, often incorporating the program logo in some capacity. For your green freight program, the partner logo will identify partners as responsible corporate citizens and environmental stewards. It could be awarded based on performance, or based on commitment and participation (reserving other program elements like awards to indicate performance). Examples of potential performance criteria to evaluate partner eligibility for logo use may include:

- Submit partner tools on time
- Achieve a certain performance level
- Meet percent usage of carrier requirements (for shippers and logistics)
- Meet applicable engine requirements
- Sign a logo use agreement
- Not in violation of the logo use agreement within the past three years

Partner logo use guidelines. Partner logo use guidelines will dictate how and when to use the Partner logo in corporate marketing and outreach materials. One effective format is a list of "do's and don'ts" for logo usage.

In addition to these guidelines, provide some direction for how partners should discuss their participation in the program in their own marketing materials and how partners become eligible to use the logo. Re-evaluate the logo eligibility requirements periodically and ramp them up when necessary to keep partners motivated to achieve program goals from year to year. Detail the process for dealing with logo use violations within the guidelines as well.

Style guide. A style guide explains your program's brand—the look, design, graphics, language, and facts that identify and describe your

program—and helps present a consistent identity that is crucial to maintaining the program's credibility and boosting the public's recognition and value of your program's brand. Having a style guide at hand will help to ensure that all involved are in step with your program's graphic and style standards.

2. Develop marketing materials and outreach tools

Marketing materials should be program-branded and must include the program logo. Additionally, always provide an easy way for readers to request more information about the program. Including your website address is a great idea if your stakeholders use the Web.

Your initial suite of marketing materials should include the following pieces:

- *A basic program brochure* that briefly describes your program and its mission and provides a "call to action" to your audience. The call to action might ask companies to join the program, associations to support the program, and the public to recognize and support partners—or it might be something else, depending on your program structure.
- *A program website* that serves as a repository for all program information. It should include information on partners, program news, funding opportunities, official program materials (including partner tools), technical reports, links to external resources, and general background information. The website should reflect your program's brand (logo, colors, tone).
- *A letter to your stakeholders* announcing your program and inviting their participation and support as the program launches.
- *Background information*, perhaps in the form of a technical report, articles, or papers that provide the foundation and justification for the program.

Tip

Partner affiliates, or other organizations that are dedicated to promoting the program and have large networks, can significantly magnify your message and outreach efforts. Seek them out and explore opportunities to create and release "co-branded" publicity and marketing materials in order to tap their networks.

How SmartWay Did It

SmartWay created branded pull-up banners to draw attention to its program at conferences and events. The banners, such as this one, are designed using the colors of the SmartWay logo or complementary colors along with minimal text.

Tip

If you and your partners and program stakeholders have access to high-speed Internet connections, consider using webinar technology. Webinars allow up to hundreds of people to attend, view, and participate in presentations remotely and in real time. Webinars can also be recorded and archived for future reference and repeat broadcasting as necessary.

How SmartWay Does It

The SmartWay website (http://www.epa.gov/smartway) is a key resource for Partners, prospective Partners, program staff, and of course all program stakeholders and the general public. It serves as a central and universally accessible repository of program information for all of SmartWay's current initiatives and informational resources. EPA staff update the website every week with announcements and all types of new content.

The website resides within the U.S. EPA's website, so it fits within EPA's overall Web design, navigation, and structure. When planning your program's website, start by determining who will host it and work within any design and operational boundaries they present. Potential hosts include government agencies, advocacy organizations, and trade associations. (If your green freight program is independently operated, its website may also be independent.) If you elect to have your program website hosted by another organization, you will lose some control over how it functions but often gain additional credibility and cross-promotional benefits that come from being associated with your host.

The SmartWay website organizes content into six categories:

- About
- Join
- For Partners
- News & Events
- What's New
- Stay Connected

Combined, these categories organize all of SmartWay's programmatic information and resources. In addition, the home page features quick links and widgets that show recent news and events, feature frequently asked questions, list upcoming webinars and events, and highlight outstanding SmartWay Partners. Important Partner and recruiting resources are prominently listed in order to ensure that they are easily found by visitors to the website.

As you consider your program's website structure and design, peruse the SmartWay website and the websites of other green freight programs to get ideas of what type of information can be housed on your website and how to organize it. However, keep in mind that websites are a work in progress! They can and should be analyzed and refreshed regularly to be as responsive to visitors' needs as possible.

3. Develop a media outreach strategy

Your program's marketing strategy should include media outreach, and planning should begin once your brand is finalized. Effective media outreach can result in increased program awareness and visibility, which in turn can support efforts to recruit new partners and provide positive recognition to existing partners. Your media outreach strategy should be multi-faceted, targeting traditional media and social media, and incorporating public service announcements and paid advertising, if possible.

GROUP EXERCISE:

Partner Outreach and Support Tools

10 minutes

Discuss what types of outreach and partner support tools your program might need to develop first.

How SmartWay Does It

Over the years, SmartWay has developed a wide range of outreach materials:

- Media outreach materials (press releases, messaging documents, etc.)
- Conference and trade show display tools
- Brochures
- Recruiting video
- Infographics
- Fact sheets
- Accomplishments reports
- Point of purchase materials
- Branded window clings, magnets, pens, and other giveaways
- Public service announcements and paid advertisements
- Posters
- Web tools (banners, etc.)
- Direct mail campaign materials
- Partner case studies
- PowerPoint presentations
- Technical documents and reports

Most of these materials are available on SmartWay's website: http://www.epa.gov/smartway.

Tip

Contact trade journals and request a copy of their editorial calendars. These calendars will show both the deadlines for submitting articles and the themes of different issues. Consult the themes and tailor articles on your program around the themes to boost the chances of your article being published.

How SmartWay Does It

SmartWay has written and published articles in several trade journals, including *Dairy Foods* and *STORES* magazines. These articles are 1,200 words long. They were written to appeal to the food and beverage and retail sectors around the theme of the benefits of partnering with SmartWay.

Traditional media

Newspapers, magazines, and trade publications constitute traditional media. One of the best ways to leverage traditional media is via trade publications focused on the freight industry and associated shippers. Trade publications often need content or articles authored by program experts, especially if the article topic coincides with themes selected for certain issues.

For articles in trade journals, determine which type of publication you want to target (e.g., general freight, consumer-focused, major sector) and review the publication's basic information. Note whether the publication is print media, online, or both; what its total circulation is; and whether it accepts outside-authored articles. Next review the editorial calendar to determine if there's an issue that coincides with your subject matter. Finally, propose the article to the appropriate journal contact via email and a phone call.

Social media

For many programs and organizations, social media is another avenue for reaching a wider audience. However, before developing a social media presence, determine which platform (if any) makes the most sense for your program. In the United States, many programs focus on the following three platforms:

- *Facebook.* Facebook has global presence and is known for its casual, friendly content. To use Facebook, create a Facebook page and remain committed to updating it frequently with program- and industry-related articles, images, videos, etc. Be sure to interact with the people who "like" your page and make sure your page is well-branded by incorporating your program's logo and other components.

- *Twitter.* Many companies and organizations use this microblog site to keep their "followers" up to date on current news and events. "Follow" fellow Twitter users in your industry or related fields, and others may follow you in return. Be sure to retweet when a partner or stakeholder tweets relevant news, and be sure to respond to people's questions and comments. Using Twitter as a social media marketing tool revolves around dialog and communication, so be sure to interact as much as possible.
- *LinkedIn.* Popular with professionals, LinkedIn is probably the most business-oriented social media platform. Programs and users can establish "LinkedIn Groups" that other users join to share information and network. It's important to consider whether you will have enough users to make it worthwhile.

When using social media, make sure you offer valuable and timely information that your audience will find useful and interesting. Keep your audience engaged by using images, videos, and infographics in addition to text-based content. Your partners and affiliates can also support your green freight program by publicizing participation on their social media platforms, which enables you to engage with their audiences.

Social media is constantly evolving. If your program commits to social media marketing, keep apprised of the latest trends and newest social media platforms.

Public service announcements (PSAs) and paid ads

Advertising isn't just for consumer goods and services—placing PSAs or paid ads also generates interest and buzz around programs and ideas.

- *PSA campaigns.* While PSA placement is often free, the design and implementation of a PSA campaign is not. If not planned correctly, it can be a costly venture with little payback. PSA campaigns should be strategic and targeted, with a defined mission and objective. When done well, they can provide valuable media coverage resulting in millions of impressions and millions of dollars of donated ad space. For an example of a SmartWay PSA campaign, see Appendix B.

Defining the Terms

What is a PSA?

PSA stands for "public service announcement." A PSA is an ad that serves the public good and is therefore placed by media outlets at a discount or for free.

How SmartWay Did It

In 2004, SmartWay launched its iconic "Product on Wheels" PSA campaign to increase program awareness and participation. Featuring yellow objects with catchy taglines, the campaign was highly successful. As a follow-up, in mid-2013 SmartWay launched another PSA campaign focusing on companies reducing their respective carbon footprints. As of July 2013, the PSA has been placed five times with a donated value of nearly $300,000.

- *Paid advertising.* If budget allows, consider paid advertising as a piece of your marketing strategy. Like PSAs, paid ad campaigns require careful thought and planning. However, paid ads also allow for some flexibility not available with PSAs. When you are paying for ad space, you can select the publications, the duration, and the size of your ad to fit your budget. In contrast, publications cannot guarantee they will run PSAs, as they only place PSAs when there is ad space that hasn't been filled.

4. Identify events and forums to leverage for visibility

Conferences, events, and forums are another strategy for marketing your program. While not all events will be appropriate or effective venues for your program, attending, exhibiting, and/or presenting at appropriate shows can produce results: increased awareness of the program, new recruits, opportunities to engage stakeholders, etc.

When choosing events to attend, consider the audience that will be attending, available booth display and speaking opportunities, and whether current partners will be there to provide program support in the form of testimonials and endorsements. Review your marketing and recruiting goals and strategies when choosing events. Are you interested in recruiting from a specific industry sector? If so, be sure to include industry-sponsored trade shows and conferences in your list of possibilities.

Smaller shows with opportunities for a significant program presence can be more successful in establishing new relationships and recruiting new partners. Staff and publicity can get lost in the crowds at the largest events, especially when your program is in its beginning phases and has not established industry name recognition. When SmartWay was first launched, smaller events offered the best opportunities to meet with prospects.

Further Information

For an example of a *paid SmartWay advertisement*, see Appendix B.

Tip

Don't be fooled by big events with large numbers of attendees. Sometimes smaller, more targeted events create better opportunities for your program.

Tip

Combine your media outreach and conference efforts by attending events sponsored by trade associations in whose journals you have published articles. Be sure to have copies of articles available for conference attendees.

Conferences and trade shows also offer great networking and presentation opportunities. Try to get a speaking slot on the agenda. Consider hosting a workshop or panel session for program partners and stakeholders. Workshops often serve as good venues to collect valuable feedback about program and partner needs and program direction. They can also serve as invaluable events to network. Additionally, program-sponsored workshops are an extra that make partners feel valued and more invested in the program. Conferences are also an opportunity for senior officials to publicize the program through keynote speeches and high-level public talks, so investigate speaking opportunities at related events.

Sponsoring relevant conferences can also increase your visibility and provide excellent recruiting opportunities. By taking an active role in the organization of industry events, you can provide your partners with increased opportunities to network and build their knowledge of green freight technologies and opportunities. As your program grows, consider expanding your awards ceremony into a dedicated program conference.

GROUP EXERCISE:

Create a Targeted List of Conferences and Events

10 minutes

Identify potential conferences and trade shows for your program to attend. List the shows by industry sector and by priority.

5. Create strong public recognition opportunities

To create a compelling value proposition for partners to join a program and change behavior by adopting environmentally friendly practices, voluntary programs rely heavily on conferring positive public recognition to partners who achieve program goals. Green freight programs can use this approach to great effect.

You can use several different types of strategies to create public recognition for your partners. For example:

- *Positive media coverage.* Most companies appreciate the value of receiving positive media coverage without having to pay for it. As a respected, objective voice on the environment and freight, your green freight program can issue press releases praising partners for committing to or reaching goals. You can also acknowledge partners in PSAs.
- *Logo usage.* Your program can build value into its brand and give access to logo usage only to partners who meet certain criteria (e.g., reporting regularly, agreeing to certain terms). Or you may elect to create a multi-tiered logo for varying levels of performance.
- *Awards.* Many voluntary programs hold high-profile annual awards ceremonies where partners are publicly recognized for their achievements. Sometimes new partners are inducted into the program during the ceremony. Often, high-level industry or government representatives are invited to attend and speak to raise the profile of the event. To leverage the most visibility for the award winners, consider developing and placing a PSA showcasing winners.

How SmartWay Does It

SmartWay offers many opportunities to confer public recognition on its Partners. One of its most effective means is the highly coveted annual SmartWay Excellence Awards. These recognize exceptional achievement among SmartWay Partners. The most recent award winners were chosen because of their environmental performance as demonstrated by Partner data submissions with the SmartWay freight assessment and carbon tracking tools. SmartWay also judged applicants for shipper and logistics awards using other additional leadership criteria.

SmartWay starts preparing for its awards program in late spring, and an awards event is then held in the fall of each year. SmartWay holds its annual event in conjunction with a major industry event to maximize attendance and increase media coverage. In 2013, SmartWay held its award event at the Council of Supply Chain Management Professionals' Annual Global Conference in Denver, Colorado. At the conclusion of the awards ceremony, SmartWay develops outreach materials that highlight winners, such as this PSA shown below.

Figure 3.16 – 2013 SmartWay Award PSA

How SmartWay Does It (continued)

The award categories Smartway has established are listed below.

Shipper awards. SmartWay shipper semi-finalists are top-performing Partners in good standing. EPA identifies a pool of top-performing candidates for consideration based on environmental performance, use of SmartWay carriers to move their freight, and freight mileage with "large" and "medium/small" mileage categories. Shipper semi-finalists are invited to provide EPA with supplemental, qualitative documentation that demonstrates leadership actions that support SmartWay's environmental goals. Final shipper awardees are selected from the pool of semi-finalists based on the supplemental information they provide.

Logistics awards. SmartWay logistics semi-finalists are top-performing Partners in good standing. EPA identifies a pool of top-performing candidates for consideration based on environmental performance, use of SmartWay carriers to move their freight, and freight mileage with "large" and "medium/small" mileage categories. Logistics semi-finalists are invited to provide EPA with supplemental, qualitative documentation that demonstrates leadership actions that support SmartWay's environmental goals. Final logistics awardees are selected from the pool of semi-finalists identified by EPA based on the supplemental information they provide.

Carrier awards. SmartWay carrier awardees are recognized for top environmental performance. EPA identifies Partners in good standing that are leaders in freight efficiency based on their SmartWay data within their fleet type and size categories. Large and medium/small carriers are selected based on their performance within 14 fleet categories.

Award criteria are developed and refined every year and made available to Partners so that they can compete. Find a list of SmartWay's awards criteria in Appendix B.

Develop other partner support tools and information

In addition to performance metric and emissions footprint calculation tools, your program may need a variety of other tools and resources to support partners. These could include financial and emissions benefits calculators, driver training modules, and other information designed to help your partners make informed decisions regarding their green freight investments and management strategies.

Finance and benefit calculators. Truck technologies and strategies that save fuel or use fuel more efficiently can pay for themselves through cost savings. They also help reduce GHGs emissions and other air pollution. A financial calculator can be designed to help truck owners compare the costs and estimate the fuel savings associated with various efficiency technologies.

In the past, SmartWay provided an online Excel calculator for owners of single trucks as well as multiple-truck fleets. It allowed truck owners and operators to compare the equipment costs and estimate or project fuel savings across various technologies by entering different values for fuel consumption, fuel cost, and information regarding financing terms (e.g., loan period and interest rate). The spreadsheet uses these inputs to calculate the total cost of the investment and expected monetary savings before and after loan repayment. Partners developing their emissions and fuel reduction strategies find this information very useful, and providing them with such easy-to-use calculators encourages their participation in program-sponsored loan programs.

These tools can also be modified to incorporate emissions reduction levels. For example, certain strategies such as PM retrofits will incur a small net cost to vehicle operators due to increased energy requirements. For these strategies, a subsidy or grant program can help make retrofits more financially attractive, and a benefit calculator can estimate its cost-effectiveness, in commonly expressed terms such as dollars per ton of emissions reduction. Such cost-effectiveness estimates provide

an excellent metric for comparing the relative value of different control strategy options and help loan program administrators allocate limited funds in the most effective way.

Driver training. Partners can also implement operational changes to improve freight efficiency and lower fuel consumption. For example, driver training programs that increase driver skills, knowledge, and performance can help trucking companies save fuel and reduce GHG emissions. A driver training program that improves fuel economy by 5 percent could save over $3,000 in fuel costs and eliminate 8 metric tons of GHG emissions per truck each year.

Even highly experienced truck drivers can boost their skills and enhance driving performance through driver training programs. Training that targets fuel efficiency can help drivers recognize and change driving habits that waste fuel. For example, driving 105 kilometers per hour instead of 90 can use up to 20 percent more fuel, idling a typical heavy-duty engine burns about 3 liters of fuel per hour, and driving with the engine rpm too high can waste several liters of fuel each hour. Other common habits that reduce fuel economy are frequent or improper shifting, too-rapid acceleration, too-frequent stops and starts from failing to anticipate traffic flow, and taking circuitous routes.

Driver training can generate larger efficiency gains for vehicles in urban service, where shifting practices have more influence on fuel economy. For a typical long-haul truck, the initial cost of training and the purchase of related equipment such as an electronic engine monitor and recorder could be recouped within two years from fuel cost savings. Trucking companies can realize even greater fuel and maintenance savings by using technologies that limit truck idling and highway speed.

Your program can encourage trucking firms to implement driver training programs to reduce fuel costs and teach drivers fuel-saving techniques through employers, vocational schools, and for-profit training

A Canadian study estimates that many fleets could achieve a 10 percent fuel economy improvement through driver training and monitoring. A study for the European Commission estimates that an annual one-day driver-training course can improve truck fuel efficiency by 5 percent. Private services claim fuel consumption benefits as high as 25 percent.

Source: http://www.fieldtechnologies.com/fleets-investing-in-green-truck-driver-training-will-reduce-fuel-costs/.

organizations. Electronic engine monitors can be installed to review drivers' operating patterns and benchmark individual performance over time. Partners can also create successful incentive programs that are simple to administer, such as combining training with rewards for enhanced driver performance.

You can model your driving training program on existing curricula like those developed by Natural Resources Canada and used by the Canadian and U.S. SmartWay programs. You can also contact your national or local trucking organizations for more details on improving driver performance and establishing driver incentive programs and truck dealers or equipment vendors for information on engine monitors and related fuel-saving devices.

Other information resources. Shippers and freight carriers may need additional information on a variety of topics, such as technical and educational background documents on fuel efficiency and emissions control strategies, financing opportunities, logo use requirements, and award terms. Consider developing a "Partner Resources" page on your program website to provide access to relevant information. The following provides a partial list of SmartWay Partner resources.

- Program overview (an introduction to SmartWay)
- Partner and affiliate lists
- Technical publications regarding control strategies
- Glossary
- Calendar of upcoming events/webinars
- Excellence Award winners
- Logo use guidelines
- Partner profiles
- Marketing resources
- Verified technologies lists

How SmartWay Did It

The SmartDriver for Highway Trucking e-learning program was developed by SmartWay and the Natural Resources Canada's FleetSmart Program. The training program provides specialized training packages that educate drivers on fleet energy management to promote energy efficiency. The training is available online for free for all Canadian and U.S. SmartWay Partners at Natural Resources Canada's FleetSmart website, http://fleetsmart.nrcan.gc.ca.

- International program summaries
- Partner case studies
- Best practices guidance documents
- Partner trends, indicators, and statistics

GROUP EXERCISE:

Identify Outreach and Partner Support Tools for Your Program

20 minutes

Develop a list of outreach and partner support tools that your prospective program will need. Discuss options and prioritize the list to determine where financial resources should be allocated.

D Technology Verification and Labeling

Your program partners can adopt a variety of technology strategies to lower their fuel consumption and reduce costs and emissions. To help your partners identify reliable, cost-effective technologies for their fleets and freight operations, develop test protocols, collect test data, and verify the performance of vehicles, technologies, and equipment that have the potential to reduce GHGs and other air pollutants from freight transport. Performance testing and verification will help establish which technologies and strategies are most appropriate for different truck types and usage patterns.

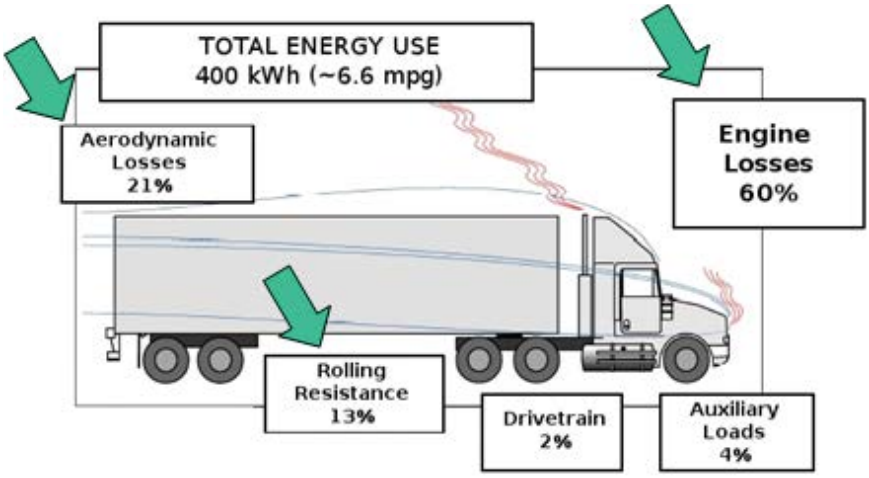
Energy consumption basics

Fuel use by freight trucks varies substantially depending on vehicle size and weight. As a general rule, Class 8 tractor-trailer rigs tend to have

lower fuel economy (roughly 4 to 7.5 mpg) than lighter vehicles. For comparison, Class 4 diesel trucks (typical city delivery vans) average between 7 and 12 mpg.[11] A vehicle's operation-cycle (e.g., frequency of starts and stops, acceleration requirements, average speed, percent of time at idle) also has a direct impact on fuel consumption and GHG emissions. The frequent acceleration and braking common in urban operations result in particularly poor fuel economy. Operation at very high speeds and extended idle time also decrease fuel economy for freight trucks.

Energy consumption patterns for a typical Class 8 truck are presented below. These values help identify the primary energy requirements for conventional diesel truck operation as well as opportunities for reducing fuel consumption.

Figure 3.17 – Initial Focus: Areas of Most Opportunity



John Woodrooffe

About one-third of the energy requirements for operating fully loaded Class 8 trucks at highway speed come from aerodynamic drag and tire rolling resistance. In contrast, trucks operating at slower urban speeds

11. National Research Council (2010). *Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles*.

may encounter negligible aerodynamic drag (less than 1 percent) and rolling resistance levels only about half that of the Class 8 truck example (about 5 percent).

Different GHG reduction strategies are appropriate for addressing the different types of energy loss. Technologies currently being explored for the heavy diesel truck market fall into five categories: engine power systems and transmissions, drag reduction (including aerodynamic and rolling resistance), weight reduction, accessory and "hotel" loads, and idle reduction. In addition, technologies from one category can have synergistic effects (both positive and negative) when employed together.

Due in part to their relatively high unit costs, some of the GHG reduction strategies under consideration for heavy trucks (such as hybridization) are only available through new vehicle manufacture and purchase, although certain aerodynamic improvements, low-rolling-resistance tires, idle reduction, and auxiliary power strategies are ideal for retrofit. The effectiveness of different efficiency strategies also will vary with vehicle age due to the fact that vehicles may change operators and duty-cycles after a number of years. For example, Class 8 trucks in the United States commonly spend the first few years of their life in long-haul service, which entails higher-speed operation (and greater mileage accumulation) than other service types.[12] After this time, these trucks are often moved into lower mileage, regional or urban/short-haul applications. These different service types and operation modes obtain substantially different benefits from different efficiency technologies. For example, aerodynamic and rolling resistance strategies obtain their maximum benefit at highway speeds, while hybrid technologies are best suited for lower-speed urban drive cycles.

12. Lutsey (2008). Institute of Transportation Studies, University of California, Davis. *Prioritizing Climate Change Mitigation Alternatives: Comparing Transportation Technologies to Options in Other Sectors*. Retrieved from http://www.its.ucdavis.edu/research/publications/publication-detail/?pub_id=1175.

Technology overview

Your program partners may choose from a variety of green freight technologies to provide fuel savings and/or emissions reductions, including:

- Idle reduction technologies
- Aerodynamic technologies
- Low-rolling-resistance tires
- Tire pressure monitoring
- Auto-tire inflation
- Low-viscosity lubricants
- Weight reduction
- Extended trailer capacity
- Emissions retrofit technologies

Ryder, XTRA

Examples of aerodynamic technologies installed on a tractor-trailer

Idle reduction technologies. Idle reduction technologies allow engine operators to refrain from long-duration idling of the main engine by using an alternative technology. An idle reduction technology is generally defined as the installation of a technology or device that:

- Is installed on a vehicle (e.g., bus, truck, locomotive, automobile, marine vessel) or equipment at a location.
- Reduces unnecessary main engine idling of the vehicle or equipment.
- Is designed to provide services (e.g., heat, air conditioning, and/or

Each year, long-duration idling of truck and locomotive engines in the United States consumes over a billion gallons of diesel fuel and emits 11 million tons of CO_2, 200,000 tons of NO_x, and 5,000 tons of PM. Also, idling can increase engine maintenance costs, shorten engine life, harm driver health, and raise noise levels.

How SmartWay Does It

For a list of retrofit technologies approved by EPA and the California Air Resources Board, visit EPA's National Clean Diesel Campaign website at http://www.epa.gov/cleandiesel/.

How SmartWay Does It

SmartWay has verified dozens of technologies that have the potential to reduce greenhouse gases and other pollutants from freight transport. For details, visit the SmartWay website at http://www.epa.gov/smartway/forpartners/technology.htm.

electricity) to the vehicle or equipment that would otherwise require the operation of the main engine while the vehicle or equipment is temporarily parked or remains stationary.

Many truck drivers run their engines to stay warm or cool in their trucks while resting after long hauls. While driver comfort is essential to job performance, long-duration idling is costly to the driver or fleet owner and harmful to the environment. The amount of idling varies widely among trucks by season, type of operation, and driver practices. A typical long-haul combination truck can idle between 1,600 and 2,400 hours per year, which would use about 900 and 1,400 gallons of fuel, respectively. Saving fuel annually through idle reduction by installing an auxiliary power unit, for example, would remove about 9 to 14 metric tons of CO_2, reduce NO_X and PM emissions, and save between $3,600 and $5,500 in fuel costs.

Common idle reduction technologies include truck stop electrification, auxiliary power units and generator sets, direct fired heaters, battery air conditioning systems, and automatic shut-down/startup systems. Behavioral approaches can also result in significant idle reduction though driver training, monitoring, and incentives.

Aerodynamic technologies. Wind resistance (or "aerodynamic drag") increases the amount of fuel required to move trucks over the road, with resistance increasingly rapidly as vehicles approach highway speeds. Aerodynamic technologies minimize drag and improve air flow over the entire tractor-trailer. Aerodynamic technologies can be included with newly manufactured tractors and trailers or retrofit onto existing equipment. Specific technologies include:

- Gap fairings that reduce turbulence between the tractor and trailer.
- Side skirts and undertrays that minimize wind resistance under the trailer.
- Rear fairings, air tabs, and boat tails that reduce turbulence at the rear of the trailer.

In highway-type operation, fairings can reduce fuel use by 5 percent or more when used with aerodynamic tractors on long-haul Class 8 trucks. This approach also reduces NO_X emissions, saves up to 800 gallons of fuel, and eliminates over 9 metric tons of GHG emissions per year.

The following are example categories of aerodynamic technologies:

- Trailer gap reducer and trailer side skirts (used in combination with one another); trailer boat tail and trailer side skirts (used in combination with one another)
- Advanced trailer end fairing
- Advanced trailer skirts

Rolling resistance improvements. Tire rolling resistance accounts for nearly 13 percent of combination truck energy use. Most combination trucks have non-low-rolling-resistance dual tire assemblies on the drive and trailer axles, with two sets of wheels and tires at each end of an axle. This configuration increases rolling resistance compared to low-rolling-resistance options.

A variety of tire options can improve truck fuel efficiency. One promising strategy is to use low-rolling-resistance tires—either single wide or energy-efficient dual tires. In addition to lower rolling resistance, a single wide tire and wheel is lighter than two standard tires and wheels. Total weight savings for a typical combination truck using single wide-base tires on its drive and trailer axles range from 800 to 1,000 pounds. The weight savings would reduce fuel consumption, or increase cargo capacity for trucks that are weight-limited. Single wide tires have lower rolling resistance and aerodynamic drag and generate slightly less pass-by noise than dual tires. Another benefit to using single wide-base tires is that fewer tires need to be replaced. There are three types of wheels (in order of decreasing weight): steel, low-weight steel, and aluminum. The less weight the rim holds, the better fuel economy the truck will get.

Recent tests of low-rolling-resistance tires indicate a potential fuel economy improvement of 2 to 5 percent compared to conventional dual tires. By using low-rolling-resistance tires, a combination long-haul truck could save over 500 gallons of fuel per year and cut emissions of CO_2 (the most common GHG) by more than 5 metric tons annually. Most importantly, these environmental benefits can often be achieved while cutting costs.

Maintaining proper tire inflation can also improve truck fuel economy. When not properly inflated, tires flex more under load. This produces heat and increases rolling resistance, which wastes fuel. Truck tires inflated 10 pounds per square inch (psi) below recommended air pressure levels can reduce truck fuel economy between 0.5 percent and 1 percent. Heat and stress from improper inflation soften and deflect tire components, causing faster and more uneven wear, which shortens the life of the tire. Underinflated tires also have more frequent punctures, increasing the risk of tire failures that could lead to costly road service and loss of revenue.

Despite the importance of proper tire inflation pressure, a recent survey of combination trucks found that less than half the tires surveyed in the United States were within 5 percent of the recommended inflation pressure. Another industry survey indicates that only 8 percent of truck drivers check tire pressure with a tire gage before each trip. One reason fleets may find it difficult to keep tires properly inflated is that truck tires can lose up to 2 psi each month, even if the rim seal and valve stems are tight.

One way to prevent tire underinflation is for fleets to have tire maintenance management systems in place to ensure that drivers and equipment maintenance personnel check tire pressure at frequent intervals and fill tires that are under-inflated. This can be made easier by the use of electronic tire pressure monitoring systems that signal to drivers and maintenance personnel when a tire becomes underinflated.

Automatic tire inflation (ATI) systems monitor and continually adjust the level of pressurized air in tires, maintaining proper tire inflation automatically while the truck is in motion. One ATI system uses the vehicle's own air-brake compressor to supply air to all the tires. Once an ATI system is installed, it should not require any special attention from the drivers. This eliminates the need to check tire pressure manually, which saves time and labor while ensuring consistent and proper tire inflation.

Using ATI systems can not only extend tire life but save truck fleets money by reducing the risk of expensive tire failure caused by under-inflation. Installing an ATI system on a truck's drive and trailer axles costs up to $800. For a typical long-haul combination truck, annual fuel savings could reach 100 gallons, saving $346 in fuel costs and eliminating a metric ton of GHG emissions. Annual tire maintenance costs can also decrease. The cost of installing an ATI system in a long-haul truck is generally recouped in just over two years through fuel and maintenance cost savings.

Low-viscosity lubricants. Lubricants reduce friction and wear of critical vehicle systems including the engine, transmission, and drive train. Without lubricants, the moving parts inside these systems would grind together, causing heat, stress, and wear. Conventional mineral oil lubricants may have too high viscosity (internal friction that resists sliding and inhibits flow) to effectively slip between and lubricate the moving parts of these systems, particularly in newer truck components that are designed with close tolerances and tight fits. Conventional lubricants may also be heavy, making it harder for pumps, gears, and shafts to move. These effects create energy losses and friction losses and waste fuel.

Low-viscosity lubricants are less resistant to flow than conventional lubricants, a property that helps reduce friction and energy losses. Manufacturers generally offer low-viscosity blends as "fuel economy" lubricants, since the fuel-saving potential of these products is significant. A U.S. national trucking association reports that synthetic transmission and axle lubricants can improve fuel economy by 0.5 percent in the summer and

2 percent in the winter (viscosity is temperature-dependent). A paper published by a professional engineering society found that synthetic engine and transmission lubricants could improve fuel economy by 5 percent, with greater gains at lower speeds. Another paper from this same organization reports that synthetic gear lubricants can improve fuel economy by about 3 percent. European research demonstrates a 3 to 5 percent gain in truck fuel economy using low-friction engine lubricants and a 1 to 4 percent gain using low-friction transmission lubricants.

Synthetic and semi-synthetic lubricants typically cost more than conventional mineral oil lubricants. Truck service stations suggest that semi-synthetic oils cost about 50 percent more than conventional mineral oils. However, for most trucks, the fuel cost savings generally outweigh the higher cost. Furthermore synthetic lubricants may extend the interval between lubricant changes, further reducing costs of truck fleets.

The combined effect of low-viscosity synthetic engine oils and drive train lubricants can improve fuel economy by at least 3 percent, saving nearly 485 gallons of fuel per year for a typical combination truck. Even with the higher cost of the synthetic oil, truck owners can save more than $1,680 in fuels per year. Additional cost savings may be possible due to reduced wear and maintenance. Switching to low-viscosity lubricants will reduce GHG emissions by 4.93 metric tons per year for each truck.

Weight reduction. Truck fuel consumption increases with the weight of the vehicle. Many truck components are typically made of heavier material, such as steel. Heavier trucks require more fuel to accelerate and to climb hills and may reduce the amount of cargo that can be carried.

Every 10 percent drop in truck weight reduces fuel use between 5 and 10 percent. Generally, an empty truck makes up about one-third of the total weight of the truck. Using aluminum, metal alloys, metal matrix composites, and other lightweight components where appropriate can reduce empty truck weight (known as "tare weight"), thus enabling more payload, improving fuel efficiency, and reducing GHG emissions.

Most truck manufacturers offer lightweight tractor models that are 1,000 or more pounds lighter than comparable models.

Lighter-weight alternative materials can cost more. Therefore, use of lighter-weight truck options is more common in freight applications that are weight-sensitive, like heavy goods and refrigerated foods. However, virtually any truck fleet could employ weight-saving strategies.

Trimming 3,000 pounds from a heavy truck (about 4 percent of its loaded weight) with lighter-weight components could save 240 gallons of fuel each year. Saving this much fuel would eliminate between 2 metric tons of GHG emissions per year. Trucks that employ more weight-saving options would save more. In addition, in weight-sensitive applications, lightweight components can allow more cargo and increased productivity.

Extended trailer capacity. The amount of cargo that a typical combination truck can carry is limited by its trailer capacity. A typical combination truck consists of a three-axle tractor pulling a two-axle, 53-foot trailer, with the capacity to carry approximately 3,800 cubic feet and 45,000 pounds of cargo.

Longer combination vehicles (LCVs) are combination trucks with multiple trailers and/or longer trailers than those used with a standard five-axle combination truck. The extra capacity that LCVs provide enables truck fleets to haul the same amount of cargo with fewer trips. LCVs have slightly lower fuel economy, as measured in miles per gallon, than typical combination trucks. However, because LCVs carry more cargo per trip, they require less fuel per ton-kilometer. LCVs generally have much better ton-kilometer fuel economy than other combination trucks. Since only part of a truck's fuel consumption is used to overcome mass, the percent increase in LCV ton-kilometers exceeds the percent increase in LCV fuel consumption. Increased productivity cuts fuel consumption and reduces GHG and air pollutant emissions.

In the United States, federal and state laws specify truck size and weight limits; similar restrictions may be in place in your region. Additional factors may influence the more widespread use of LCVs. LCVs have inherent stability and control limitations because of their length and number of trailers. Therefore, it is important that only experienced drivers under safe conditions operate LCVs. Widespread use of LCVs could have an adverse affect on bridges and other transportation infrastructure.

LCVs are more fuel-efficient, on a ton-kilometer basis, than typical combination trucks. For example, a "Rocky Mountain Double" configuration consumes 13 percent less fuel per ton-kilometer of freight than a typical combination truck. This saves over $8,000 in fuel costs per year. "Turnpike Doubles and Triples" reduce fuel use per ton-mile by 21 percent, saving over $13,000 in annual fuel costs.

Emissions retrofit technologies. Retrofit technologies, such as diesel oxidation catalysts (DOCs) and diesel particulate filters (DPFs), reduce PM emissions significantly, but they can vary greatly in terms of scope, cost, and potential impact to fuel use and emissions reduction.

DOCs are exhaust after-treatment devices that reduce emissions from diesel engines. Typically packaged with the engine muffler, DOCs are widely used as a retrofit technology because they require little or no maintenance, although low-sulfur diesel fuel is required for proper operation. DOCs consist of a precious-metal-coated flow-through honeycomb substrate contained in a stainless steel housing. As hot diesel exhaust flows through the substrate, the precious metal coating causes a catalytic reaction that breaks down pollutants. Engine manufacturers have used DOCs in a variety of applications for many years.

In many older diesel engines, crankcase emissions, also known as "blow-by," are released directly from the engine into the atmosphere through a vent or the "road draft tube." Closed crankcase ventilation (CCV) systems capture the oil in blow-by gas, return it to the crankcase,

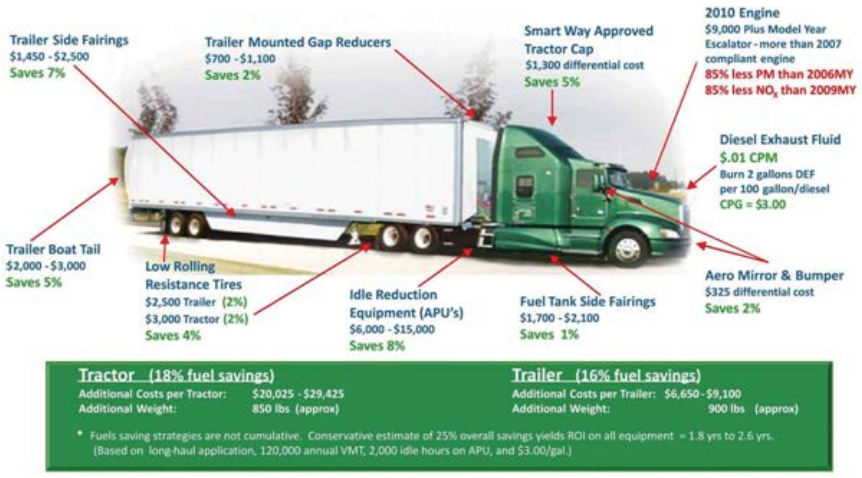
then redirect these gaseous emissions back to the intake system for combustion instead of emitting them into the air. CCV systems can help keep engine compartments and components clean and reduce oil usage. Emissions will be further reduced if the CCV is paired with a DOC or DPF.

DPFs (also known as PM traps) are exhaust after-treatment devices that significantly reduce emissions from diesel-fueled vehicles and equipment. DPFs typically use a porous ceramic or cordierite substrate or metallic filter to physically trap PM and remove it from the exhaust stream. DPFs can be installed on existing vehicles and must be used in conjunction with ultra-low-sulfur diesel, which has a sulfur content of less than 15 parts per million. DPFs may require special mounting or brackets as they are typically heavier than a conventional muffler or DOC. In addition, an electronic backpressure monitoring and driver notification system must be used with a DPF.

While some of the technologies discussed above result in a net cost to truck owners and operators (e.g., the NO_X and PM emissions reduction strategies), investment in a technology package with advanced fuel efficiency features can more than offset any extra capital and operating costs. For this reason, green freight programs may find it most effective to promote the adoption of integrated "upgrade kits" that include both NO_X and PM controls as well as fuel economy improvement strategies.

A detailed example of cost-effective technology packaging for a U.S. tractor-trailer rig is shown in the figure below.

Figure 3.18 – SmartWay Strategies: Cost vs. Fuel Savings



Cascade Sierra Solutions

Define performance standards and identify labeling criteria

To provide for accurate and effective testing and verification of technologies designed to reduce fuel use and associated emissions, develop a rigorous set of performance standards for each technology so that you can determine which technology adheres to the standards and qualifies for verification or certification certified under your program. All standards should be clear and uniform so that manufacturers can follow them throughout the testing protocol. Setting specific performance standards (for fuel efficiency or emissions rates) will require a balanced consideration of a variety of factors, including technological feasibility, costs, and benefits.

To ensure brand integrity and quality, make sure that all parties who want to display the program label that designates a piece of equipment or tractor/trailer as verified by your program apply and display the label in accordance to a detailed licensing agreement.

Tip

As an alternative to defining your own performance standards and labeling criteria, your program may choose to adopt existing technology verification lists developed in other countries, such as SmartWay, the California Air Resources Board, or the European Vehicle Emission Reduction Technology Association.

Further Information

A link to the *licensing terms for tractor/trailer labels* is included in Appendix C under the *For Partners* heading.

Develop testing protocols

The goal of a technology test program is to create a standard test process that compares the emissions and fuel efficiency of applicable heavy-duty vehicles under representative operating conditions. So, when developing testing protocols, collaborate with the transportation industry so that the protocol effectively measures the benefits of the technology in question as it is applied to the various heavy-duty vehicle configurations and applications on the road. For example, certain technologies are not applicable to single-unit truck configurations.

Without an objective, stand-alone test protocol, it is difficult to develop a common understanding of how to assess criteria air pollutants, GHGs, and fuel efficiency of heavy-duty vehicles, including advanced vehicle designs and components. Having this information will help your program establish performance-based eligibility criteria for the next generation of trucks and quantify the benefits of hybrid vehicles.

Develop verification process

The testing protocols discussed above are a critical component of a larger, overall technology verification process. This process will evaluate the performance of vehicles, technologies, and equipment that are intended to reduce GHGs and other air pollutants when submitted by manufacturers. The verification process should include a thorough review of the technologies and/or strategies as well as test data from prescribed test protocols to establish credible performance and ensure efficiency improvement.

Consider the following measures before establishing your verification process:

- *Manufacturer representative involvement.* The applicant for verification must be a manufacturer representative with detailed knowledge of the technology, its manufacture, in-use operation,

How SmartWay Does It

To facilitate the development of more specific testing protocols, SmartWay developed the SmartWay Truck Emissions Test Protocol as a starting point for discussion among stakeholders. This working draft is a first step toward a performance-based specification that would be technology-neutral, able to quantify a broad range of heavy vehicle configurations and applications, and able to measure technical innovations as they emerge. The draft protocol is highly detailed, defining test track and dynamometer requirements, other test equipment specifications, drive cycle development, vehicle payload and test weight, among many other elements.

Further Information

A link to examples of more specific *testing protocols* available through SmartWay can be found in Appendix C.

performance, durability, and prior testing. The manufacturer representative is responsible for attesting that information is correct and that the technology will be manufactured, be installed, and perform as described.

- *Regulatory requirements.* Some technologies may not merit verification as the product may have other regulatory requirements (e.g., emissions standards) that supersede verification.
- *Availability.* The technology submitted for verification must be commercially available for installation. Do not verify products still in the research and development stage.
- *Health effects and safety.* Address concerns with health effects or safety prior to review of a technology for verification.

The verification process can be summarized as follows:

1. *Apply for verification.* To begin the verification process, manufacturers first complete and submit an application.
2. *Application acceptance.* Once the manufacturer has addressed any follow-up questions from program administrators, the application is accepted.
3. *Verification test protocols.* Test protocols are specific to the technology being tested and can vary depending on the intended application of that technology.
4. *Testing.* For aerodynamic and tires technologies, the manufacturer follows the verification protocols and submits the test results for review. For idle technologies, the manufacturer submits product information and test results for review.
5. *Test information and results.* Once testing is complete, the applicant submits the test results in formats described by your program. The program administrator reviews the data to determine if the technology qualifies for verification.

Further Information

A sample *verification application* and a link to other SmartWay verification-related resources can be found in Appendix C.

6. *Notice of verification letter.* If the technology qualifies, the manufacturer receives a verification letter.

7. *Verified technologies list.* The verified technology is added to a list. The list describes the technology and other information contained in the verification letter so that potential program partners (and others) may determine if they wish to purchase the technology.

8. *Verified technologies and changes.* Products sold as verified technologies must be produced and installed as described by your program. If a manufacturer changes a verified technology or implements changes relative to information provided to your program, the manufacturer must update the documentation with the verification program. If your program determines the changes may impact performance or the changed technology may not be represented by the original verification, your program may require further testing or conclude that the changed product requires a separate verification.

GROUP EXERCISE:

Technology Verification and Labeling

20 minutes

Review your program's technology verification and labeling criteria and compare them with program design details to ensure that partnership elements and evaluation criteria are aligned.

Notes

MODULE IV Launch and Implement Program

In this module, you will learn how to ensure the successful launch and initial implementation of your green freight program. Key concepts include the launch of the charter partner program tools, partner recruitment, staff training, and the inaugural launch event.

CONTENTS

Suggested time for this module: 3 hours

A Launch Charter Partners

Reach out to your primary contacts at your charter partner companies. Let them know that you are now ready to launch your program and that you would like to publicly announce their participation as charter partners, a special status conferred to a select group who helped create the program. Plan to announce charter partners at a special recognition event where they receive a certificate from a high-ranking official thanking them for their contributions or participate in a ceremonial partnership agreement signing. Be sure to invite the media and prepare partners to provide quotes and interviews for subsequent stories.

Figure 4.1 – SmartWay Charter Partner Plaque

Once the charter partners are officially announced, you establish a pilot period, giving them some time in the spotlight, or start recruiting more partners into your program immediately.

GROUP EXERCISE:

Identify Prospective Charter Partners

10 minutes

Brainstorm a list of prospective charter partners to recruit. As a group, prioritize a list of prospects and determine where to allocate initial recruiting resources.

B Recruit Partners

Recruiting new partners is important, but recruiting the *right* partners is extremely important. At this stage, look for companies that will be committed to your program's goals, have a positive public and industry reputation, and are willing to work with you to improve and test-drive new program elements as they are unveiled.

Before you begin, identify your prospective partners and create effective communication materials that are targeted to their interests. Use staff with experience in marketing to lead your recruiting efforts. Deploy the following professional sales techniques to increase your chances of success:

- Leverage current relationships
- Use industry resources
- Develop new strategic relationships
- Attend conferences and events
- Hold face-to-face meetings
- Use cold calls and direct mailings

Further Information

For more information on *communications materials and marketing*, see Module III, Section C.

How SmartWay Does It

In the United States, EPA Regional offices typically have strong relationships with local and regional companies. SmartWay frequently confers with these offices to identify potential Partners, present SmartWay at local and regional events, and connect with local and third-party organizations to help spread the word about the program.

How SmartWay Does It

Every year, SmartWay checks the annual "Top 100" list created by *Transport Topics* (a key freight industry publication) to identify large companies that have not yet joined SmartWay.

Leverage current relationships

Ask charter partners, industry experts, and companies participating in other programs if they know of potential partners or (if not charter partners) if they themselves would be interested in joining the program. If you want to target multinational companies, check with U.S. or Canadian SmartWay staff to see if they are already SmartWay Partners in the United States or Canada.

Use industry resources

Consult industry trade publications or popular lists, such as the "most sustainable companies" list,[1] to identify environmental leaders as potential partners.

Develop new strategic relationships

Get to know state and national trucking associations, proactive shippers, federal agency regional offices, and environmentally oriented associations. Their contacts, members, and stakeholders are likely to find your program relevant and aligned with their strategic goals and should be good prospects for recruiting. For example, groups working to increase efficiency and reduce GHGs interface with a large number of companies that might be interested in your program.

Attend conferences, expos, and events

Attend relevant events, such as trade shows and shipper and carrier conferences, to raise visibility of your program across the freight sector. Before you go:

SmartWay's multimedia presentation and marketing materials are on display at an industry conference.

1. Corporate Knights' List of Most Sustainable Companies is found at http://global100.org/global-100-index/.

- Be sure to understand audience and attendees.
- Have visually appealing program materials on hand to display and distribute.
- Schedule time to network with other attendees and exhibitors.

Face-to-face meetings

When budgets allow, face-to-face meetings can be used as an effective recruiting technique. Whether held at an event, as a follow-up to a phone call, or through a third-party contact introduction, an opportunity to meet with a prospect face to face should not be missed!

Use cold calls and direct mailings

If you have or can secure contact information of industry group members, you can call them directly (make a cold call) and/or send direct mailings. To get the best results, make sure the membership organization endorses your program, try to have the mailing co-signed or co-branded by the membership's organizations highest executive, send a mailing before making a call, and be sure to include information on the benefits of the program tailored for the recipient. Place follow-up calls shortly after your mailing is scheduled to arrive, and reference the letter early on in the phone conversation. In general, direct mail campaigns are much more successful when endorsed by a membership organization (via signed letter) and follow-up calls are made to members.

GROUP EXERCISE:

Evaluate Industry Resources

10 minutes

Generate a list of organizations and industry resources that might provide information on prospective partners for your green freight program.

Tip

One face-to-face meeting with a prospect that shows serious interest can be more fruitful than 10 cold phone calls to the same prospect. Casual face-to-face meetings at industry shows can help prospects become seriously interested, and subsequent calls can formally bring them on board.

Tip

During the recruiting process, reach out to the appropriate person (e.g., decision-making authority, "champion") within an organization. This will save you both time and effort.

Tip

Partners and potential partners are businesses. Don't waste their time with continuous calls and mailings if initial efforts are not productive.

Further Information

See Appendix C for an example of a *co-branded letter*.

Defining the Terms

What is a "PAM"?

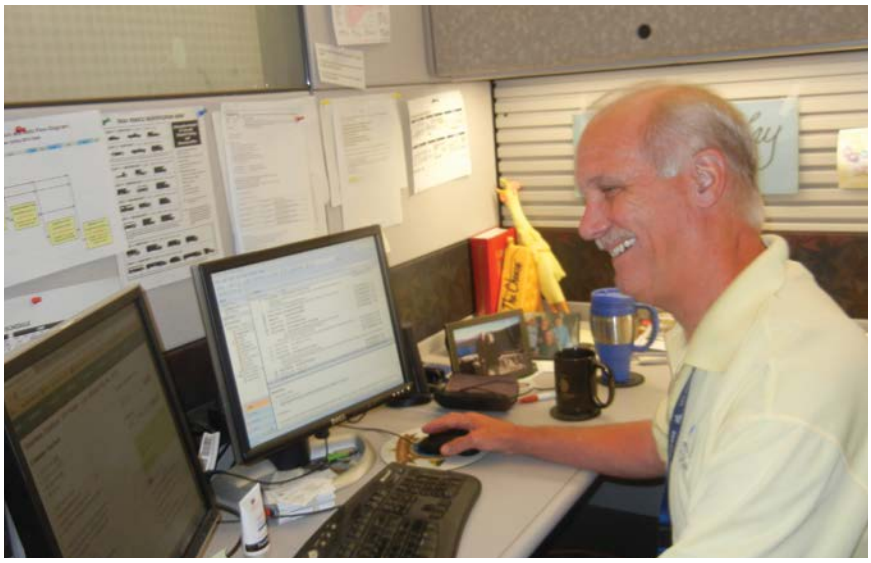
This acronym is often used in place of "partner account manager," a staff member responsible for day-to-day communications with partners.

Further Information

For more about *PAMs*, see Module III, Section A.

C Train Partner Account Managers

Partner account managers (PAMs) can add a personal, customer-service component to your program and help partners answer questions, complete data requests, and generally stay on track to meet their goals. PAMs can also help collect anecdotal information, such as case studies, quotes, and different types of data, which can be important to communications efforts as well as future program development. Think of PAMs as being personal program consultants who perform the following tasks:



Richard Kridler

SmartWay PAM welcomes a new Partner to the partnership.

1. Provide general assistance with paperwork and reporting

As the administrative liaison to partners, PAMs provide general assistance with the processing of program paperwork and data as soon as partners join. Their first responsibility is to make a "welcome aboard" call, where they:

- Provide a welcome kit to new partners
- Explain program, goals, and objectives
- Clearly explain deadlines and other data submission requirements

- Offer marketing materials to partners to publicize their participation
- Offer general assistance to partners and discuss ways to achieve partner goals

PAMs can also explain how to correctly follow logo use guidelines and use program tools.

2. Support the program helpline and email mailbox

PAMs field many questions and inquiries from new and prospective partners, industry associations, the media, and even the public, especially during the early phases of program implementation. An efficient way to handle this workload is to set up a dedicated phone line and email mailbox through which your stakeholders can contact knowledgeable staff and get their questions answered. Before setting up a helpline, create training resources, such as lists of frequently asked questions, fact sheets, and even suggested scripts with common language and terms, that your staff can use to represent the program and all of its elements.

Once you have these resources in place, hold an orientation for staff and train them in how to support a helpline and email mailbox. During the orientation, set a schedule for them to either be available to answer the phone line or check messages left on the helpline's voicemail. Set up a system for cataloging queries and recording responses. This record can eventually serve as a basis for creating consistent language to commonly asked questions. You can even log questions and answers into a list of "commonly asked questions," which can become a dynamic document that lives on the program's website. Similarly, set up a schedule for staff to check the email mailbox (e.g., daily, or twice a day—morning and afternoon) and record questions and answers.

To set up the helpline and the mailbox, contact your phone and Internet service providers. They will set up a toll-free number and a dedicated email address for you (you might even be able to choose a phone number and e-mail address that are easy to remember).

Further Information

For more on *logo use guidelines*, see Module III, Section C.

How SmartWay Did It

SmartWay set up both a phone line, 734-214-4767, and an email address, smartway_transport@epa.gov for those with questions about the program. Staff strive to respond to all queries within seven days of receipt.

Once PAMs are prepared to answer questions and you have the phone number and email account set up, include the phone number and the email address on all outgoing outreach materials so that your target audience know how best to contact you. Include the number and email address on business cards, email signature blocks, brochures, posters, fact sheets, case studies, and any other public communications materials.

3. Assist partners in program implementation

Although partner recruitment is key to the success of the program and requires significant program resources, continuous engagement will help ensure that partners actually implement the program. A few engagement strategies include the following:

- Take advantage of momentum when partners first join, when their interest and enthusiasm for the program is high.
- Work with partners to set personalized long- and short-term goals and milestones; communicate often to ensure that they are working toward them.
- Constantly resell the program to partners through all communications.

4. Cultivate relationships with partners

PAMs serve as the primary point of contact for partners, and thus they are well positioned to cultivate strong relationships with them. These relationships can last years and become an invaluable component of the partner's program experience.

5. Provide marketing assistance

PAMs can help partners leverage opportunities to market their participation in the program. They can help develop press releases, generate case studies or profiles, offer suggestions on how to best use the logo, and help write articles and internal memos. PAMs should be considered important program brand ambassadors.

6. Add value by collecting feedback from partners

As the primary contact for partners, PAMs are well positioned to receive feedback from Partners and get a sense of what partners might want or need from the program. PAMs can then help improve the partner participation process and provide feedback on tools, webinars, services, and other materials that might increase the value of the program to partners.

Assigning PAMs

Once PAMs are trained and thoroughly understand their roles and responsibilities, assign them to partners. You can base assignments on a variety of factors, such as industry or region.

At the start of the program, PAMs will need to allocate more time to each of their partners, so the number of partners they serve should be kept to a small number. Later, once program elements are more automated, PAMs can manage dozens—if not hundreds—of partners at the same time.

GROUP EXERCISE:

Create a PAM Framework

10 minutes

Create a framework that shows how PAMs will be assigned (e.g., by industry, region) and designate categories. Identify possible PAMs for each category based on their area of expertise.

D Launch Database

The database is central to the efficient operation of the program, serving as the repository for partner fleet and performance data over time, as a platform for data quality review and program benefit assessment, as a potential hub for electronic communications between the program and partners, and also for maintaining prospect contacts. It is therefore essential to launch the database successfully before the first partner tool is submitted. This will ensure effective monitoring of partner submittals, prospect marketing efforts, questions, and problems as they arise.

After designing and beta-testing your relational database, confirm that it is ready to upload, approve, and process partner tools. Also confirm that the program application is ready to interface with the database (e.g., the database may automatically export information regarding approved tools for partner list updates). Next, make sure the PAMs and database administrators are fully trained on database use and their responsibilities. Ensure that regular data backups are performed to minimize potential data loss in case of system outages or other problems. Also perform regular data validation checks to confirm that there are no "orphaned" or bad records. Finally, maintain adequate security procedures to avoid unauthorized data modification.

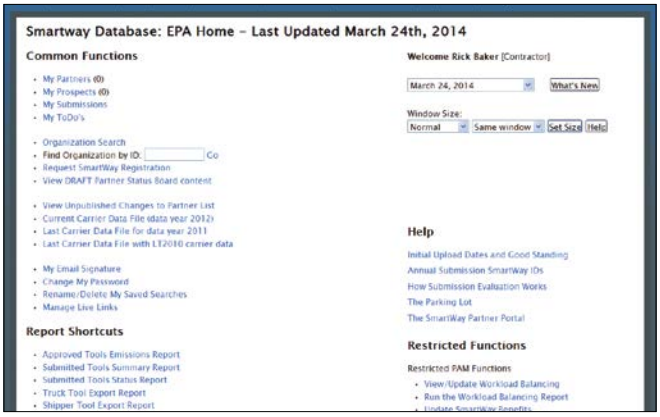
Further Information

For more information about *database design, use and responsibilities*, see Module III, Section B.

Further Information

For more information about *program tool beta testing*, see Module III, Section B.

Figure 4.2 – SmartWay Database Homepage



GROUP EXERCISE:

Review an Example Partner Tool

15 minutes

Upload a completed sample of the SmartWay Truck Tool and walk through the review and tool approval process as a group.

E Launch Program Tools

Depending on the complexity of their fleets, partners may spend a significant amount of time collecting and inputting data into their tool(s). Therefore it is critical that the tools function properly and are easy to work with as soon as they are delivered. After full beta-testing with selected stakeholders, the tools must be obtained by all partners. To distribute tools and associated documentation, post the electronic files on the program website for download, email file packages to the partners, or (for Web-based tools) provide links to the correct online forms. Partners must receive clear instructions on how to open and save their tools via easy-to-understand user guides and FAQs. If online support documentation and videos are included within the tools themselves, test and confirm the associated links before launching.

Once the tools have been distributed to the partners, the assigned PAMs must confirm receipt and ensure clear communications lines for any partner questions. Finally, make sure PAMs are in contact with the tool developers in order to troubleshoot and address any problems; quick responses to difficulties with the tools are imperative to maintain confidence in the program and meet submission deadlines.

Further Information

For examples of *SmartWay user guides* and *FAQs,* see Appendix C under the *For Partners* heading.

GROUP EXERCISE:

Download the SmartWay Truck Tool

15 minutes

As a group, download the SmartWay Truck Tool from the website and review the process of filling out and completing the tool.

F Launch Finance Program

Subject to resources and policy considerations, a finance component can be an important aspect of a program because many companies lack adequate capital to invest in innovative green freight technologies. A finance program gives companies additional incentive to pursue a green freight initiative by removing a significant barrier to participation.

Launch your finance program and larger green freight program together. This will maximize the impact of the marketing activities and launch event to generate positive press coverage.

GROUP EXERCISE:

Outline Your Finance Program

10 minutes

Identify your preferred finance program structure and administration (i.e., your agency or a third party). Discuss its minimum capital requirements, and possible funding sources, for its initial launch.

Further Information

For more information about the importance of a *green freight financing program*, see Module III, Section A.

How SmartWay Does It

SmartWay held its inaugural kickoff event on February 9, 2004, at a high-profile industry event, the American Trucking Associations' Annual Leadership Meeting in Washington, D.C. SmartWay invited its highest-level official, the EPA Administrator, to attend and demonstrate the agency's commitment to the program. SmartWay's 15 Charter Partners also attended, in addition to many other stakeholders.

G Begin Marketing Activities and Hold Inaugural Launch Event

Hold a high-visibility launch event to signify the "kickoff" of the program. This event will provide positive press and many recruiting benefits. For maximum impact, invite high-level administrators, stakeholders, and industry leaders to attend.

SmartWay's Charter Partners attended the program's launch event in 2004.

The kickoff event can include several components:

- Recognition of charter partners
- Demonstration of the partner tools and program website
- Multimedia press conference
- Technology demonstrations and/or vehicle displays
- Photo opportunities

Be sure that all of the program elements, such as the launch of the program website and social media tools, are ready before the day of the event so that they can be formally unveiled at the event for maximum impact.

Tip

Save all clippings, press articles, announcements, etc., as a record of program marketing and exposure. Well organized, this compendium can serve to generate models for future content and ideas for future outreach.

GROUP EXERCISE:

Create a Launch Event Guest List

5 minutes

Identify organizations and representatives, including VIP guests, charter partners, and media, to invite to the launch. Create a guest list, and assign people to extend invitations to those on the list.

Notes

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MODULE V Evaluate, Refine, Enhance, and Expand

In this module, you will learn how to transition beyond initial program implementation to ensure that your program will continue to meet the needs of the freight industry into the future. Key concepts include collecting partner feedback, evaluating data, and refining, enhancing, and expanding your program.

CONTENTS

Suggested time for this module: 2 hours

A Collect Partner Feedback

Partners in your green freight program can provide ideas and feedback that can shape your program's future course. They will also have valuable insights, based on firsthand experience, into whether your program is delivering on its promises and is ultimately sustainable. Handled with care, they can serve as excellent resources to help you make mid-course corrections, fine-tune your tools, help you make realistic plans, and help you set achievable goals.

When to collect feedback

There will be many opportunities to collect partner feedback throughout the planning and implementation of your green freight program:

- During initial program development meetings with stakeholders, charter partners can provide feedback on program design, methods, procedures, and partner resources.
- When developing and introducing new tools, or making significant updates to existing tools, partners can provide feedback on their design and usability.
- As your program grows and welcomes partners, new recruits can provide feedback on recruiting approaches, messages, and materials that succeeded in capturing their attention and bringing them into the program.
- After the first few years of program implementation, seasoned partners can provide feedback on the pace and scope of the program's evolution and key turning points.
- At any time, third-party stakeholders such as equipment and technology manufacturers, trade associations, experts, and academics can provide feedback on the program's impact on the industry, environment, and economy from their unique perspective.

How SmartWay Does It

Academic experts in the United States have cooperated with SmartWay to help evaluate program benefits and opportunities for improvements. For example, researchers at MIT's Center for Transportation and Logistics conducted a quantitative evaluation of how different policies could impact SmartWay program participation rates and environmental benefits, including changes in program support resources or focusing recruitment and retention on larger carriers. Miami University of Ohio and Colorado State University interviewed shippers and carriers in detail, identifying companies' motivation to participate in voluntary green freight programs such as SmartWay and how these companies adopt technologies and operational strategies to improve overall sustainability of supply chains.

What to ask when collecting feedback

The questions you ask when collecting partner feedback will depend on the development stage your program is in and the feedback that you seek. Below are a few examples of questions you could pose to partners.

Evaluating partner engagement:

- Do you read the program tool user guides?
- Do you read the program technical documents?
- Do you regularly visit the program website?
- Do you read the e-updates and attend webinars?

Value and success of tools and resources:

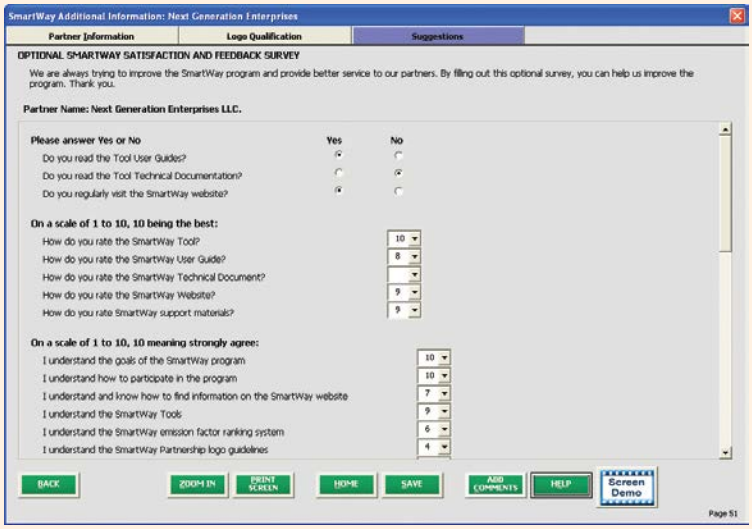
- How do you rate the program tool?
- How do you rate the program user guide?
- How do you rate the program technical document?
- How do you rate the program website?
- How do you rate the program support materials?

Level of program comprehension (on a scale of 1 to 10, 10 meaning "strongly agree"):

- I understand the goals of the program.
- I understand how to participate in the program.
- I know how to find information on the program website.
- I understand the program tools.
- I understand the program logo guidelines.
- I understand the program award criteria.

How SmartWay Does It

To collect Partner feedback on an ongoing basis, SmartWay embeds questions in the Partner Tool that Partners submit annually. In addition, SmartWay hosts webinars and partner listening sessions to communicate directly with Partners, and PAMs solicit direct feedback during their Partner interactions.



Level of program satisfaction (on a scale of 1 to 10, 10 meaning "strongly agree"):

- The program provides good customer service.
- My business sees strong value in its participation in the program.
- I enjoy participating in the program.

In addition to ranking program components, consider posing some open-ended questions. Responses can provide more direct, specific feedback. Below are a few open-ended questions to consider posing to partners:

- What do you like about the program?

- What don't you like about the program?
- What does the program do well?
- What does the program do poorly?
- What keeps you in the program?
- How can the program provide added value to your business?
- What would you like to see changed in the program?
- What could the program do to enhance your experience?

How to collect feedback

You can collect feedback using a variety of tools and techniques. Some common ones include the following:

- *Online or paper surveys.* Surveys are well suited to collecting both quantitative and qualitative information from a large number of people. Surveys can ask respondents a handful or large numbers of questions, in multiple choice or fill-in-the-blank open-ended response formats. Today, many organizations take advantage of free, online survey tools such as SurveyMonkey, which allow you to program questions in minutes, provide a link for sharing via email, and create basic reports with graphics from the responses.
- *One-on-one interviews.* Interviews are more labor-intensive and time-consuming than surveys, but they offer significant advantages. They can yield great amounts of qualitative information from respondents' opinions and offer an opportunity to dig deeper and pose follow-up questions to probe for more meaningful responses than are available from a multiple choice survey.
- *Focus group discussions.* Focus groups collect qualitative information and feedback from a group of participants with a common experience or background. They provide more opportunity than surveys to learn from participants but go into less depth than one-on-one interviews. Focus groups are often used to test out program messages,

How SmartWay Does It

To collect feedback on best practices for collecting and quality-assuring freight data for SmartWay tools, SmartWay staff visited 13 program Partners. During these visits, SmartWay staff interviewed key Partner personnel involved in data collection and review to clarify how their data management and quality assurance measures ensure data validity. The interviews provided valuable insights that in turn shaped SmartWay's guidance to all Partners.

marketing campaigns, and publication materials with target audiences before they are finalized to see whether they are understood and effective.

- *Stakeholder meetings.* Meetings and workshops provide an excellent venue for collecting feedback. They can be used as forums to present program information to a wide audience and collect feedback through informal interactions with attendees, completing evaluation forms from workshop participants, and listening to questions and comments from panelists or members of the audience.

The nature of feedback

As you collect feedback from partners, stakeholders, and other audiences, keep in mind that many of them will offer suggestions and commentary that may be unrealistic for your program to incorporate, based on resource constraints or your organization's strategic priorities and mission. Do not lose sight of your program's goals and mission as you consider feedback.

GROUP EXERCISE:

Develop a Feedback Plan

15 minutes

Choose a significant phase of your program for which you want to collect feedback. Think of five questions you would like to ask partners and develop a plan with the tools and techniques best suited to provide you with the feedback you seek.

If time permits, gather to discuss and identify how your green freight program goals fit with your agency's mission and identify feedback mechanisms and questions that will show how your program is helping to fulfill your agency's goals and mission.

B Compiling, Processing, and Evaluating Data

Ideally, you will take stock of your program often, regularly identifying opportunities for refinement and improvement. On the other hand, major programmatic changes such as moving from a "1.0"- to a "2.0"-type system should be infrequent to promote continuity and predictability for your partners. Use partner feedback to assess support for your program and the potential for improved recruitment and expansion. Each year, evaluate your partners' reported performance data to estimate overall program benefits.

Over time, your database of partner performance information can become a tremendous resource, not only for evaluating your program but also for assessing the state of the freight industry as a whole. Detailed activity profile information by carrier mode and operation type can be used by academics and other stakeholders to identify opportunities for system-wide efficiency improvements such as mode shifts or enhanced logistics. In addition, regulatory agencies may benefit from these data when developing future fuel efficiency and emission control standards, as well as potential strategies targeting in-use freight vehicles. For example, in the United States, EPA used the cost and effectiveness data developed for SmartWay designated tractors and trailers, as well as various retrofit options, and collaborated with stakeholders to inform the development of the Phase I (model year 2014–2018) heavy-duty truck fuel economy standards.

GROUP EXERCISE:

Examine an Example Benefits Calculation

15 minutes

Walk through an example annual benefits calculation. Review selected SmartWay Trends, Indicators, and Partner Statistics (TIPS) pages (found at http://www.epa.gov/smartway/tips/index.htm) to understand the range of possible data evaluations.

Further Information

To learn more about *collecting performance data* from partners and *evaluating program benefits*, see Module III, Section B.

How SmartWay Does It

Since its establishment, SmartWay has expanded to include logistics, rail, multimodal, and barge Partners, a drayage truck initiative, and a technology verification and designation program for both retrofit technologies as well as SmartWay-certified OEM tractor and trailer packages.

C Refine and Add New Elements to Enhance Program

Ideas for mature green freight programs

Recruit smaller carriers. Typically small, independent freight carriers and owner-operators far outnumber large companies, which operate hundreds or even thousands of trucks. These small "owner-operators" often own between one and a dozen trucks, have very limited financial resources, and may find it difficult to commit the time and effort required to collect and input operational information. For these reasons, early owner-operator participation rates likely could be improved upon for your program. In order to expand your mature green freight program to incentivize small freight carriers to join, you will need to develop special incentives and allowances to meet their needs and address their challenges. For example, providing low-/no-interest loans or subsidies for fuel efficiency technology and emission control retrofits for these carriers can be particularly effective, given these carriers' low capital reserves and limited access to credit. In addition, you may consider developing "streamlined" versions of your program's truck carrier data reporting tools or a "short form" to minimize the data collection and entry burden for these carriers. For example, your program could use industry averages in lieu of carrier-specific information on vehicle speed distributions, idle hours, and other factors for program participants with five or fewer vehicles. You might also be able to persuade some of the large logistics partners in your program to actively recruit small carriers, assisting with distribution and quality assurance of the streamlined tools.[1]

Incorporate shipper operational strategies. Most of the technology and operational strategies for reduced fuel consumption and emissions described in previous modules must be implemented by freight carriers

1. While simplifying the data requirements in this way may increase the uncertainty associated with emissions and fuel use reductions, it could be stipulated (as part of their agreement with the logistics companies) that these carriers may be subject to third-party audits for data validation at some point in the future.

(e.g., aerodynamic and idle retrofits, driver training, diesel particulate filters). However, shippers also have a variety of strategies available to them that could generate substantial benefits:

- Network optimization—commonly involves relocation of distribution centers or other network configuration changes.
- Route optimization—uses software in conjunction with real-time location data (i.e., GPS) to optimize for fuel consumption (vs. other possibilities such as time minimization).
- Load optimization—uses software, usually as part of an overall transportation management system, to ensure that trailers, pallets, and containers are holding the maximum amount of goods while adhering to specific requirements (company and government) regarding product placement within the trailer and overall weight. This strategy helps ensure that a trailer that might normally "cube out" can carry more freight and thus lead to fewer trips.
- Use of intermodal options—depending on commodity type and available transportation infrastructure, modes with better performance metrics may be adopted by shippers (e.g., rail or barge).
- Packaging reduction—includes making changes in product packaging by using different and/or reusable materials, reconfiguring products to decrease empty space in shipping packages, or eliminating unnecessary materials to reduce weight. With lower weight and/or volume, more total freight can often be carried in the same load.
- Idle reduction—unlike the truck-based measures described in earlier modules, shipper idle reduction strategies involve various "no idle" policies implemented at locations controlled by the shipper.

Enhanced versions of shipper performance tools can be developed to allow shipper partners to calculate the emission reductions associated with one or more of these strategies. However, be sure to provide clear guidance on how partners should develop their inputs for these

calculations. Additional quality assurance measures including third-party validation audits may also be required to ensure the accuracy of the estimated benefits.

Richard Kridler

SmartWay PAM helps a shipper partner calculate its emission reductions.

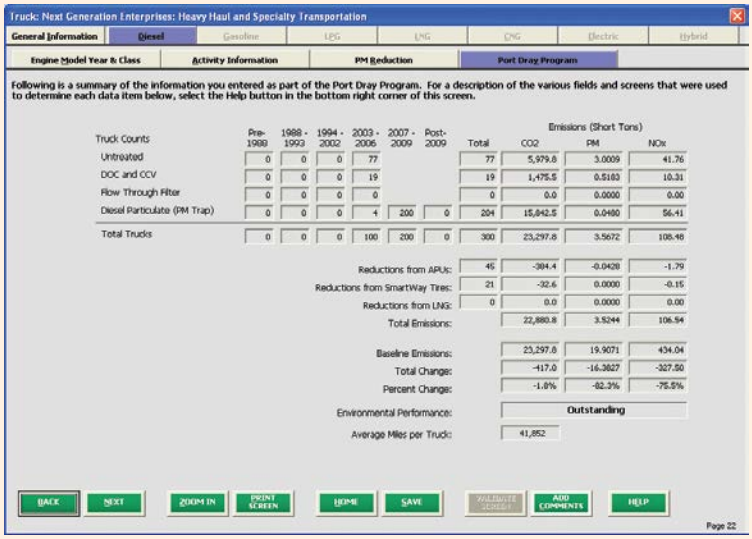
Develop additional Web-based program tools. SmartWay has relied upon Excel-based reporting tools since its inception. These tools are easy to distribute (via email or through website download) and are readily compatible with most users' computer operating systems. However, the data entered in these tools could also be provided using standard online forms through a Web portal. In a Web-based application, partners would log in, enter their data, have their data validated and their emissions estimated, and have reporting options available as with Excel. This system is better than one relying on the exchange of Excel files in many ways: partners cannot lose files, version control is handled automatically and universally, etc. However, exchange of business-sensitive information over the Web will likely require additional security measures, such as the management of user IDs and passwords and data submittal verification. Development of Web-based reporting forms will also require a different programming skill set (e.g., Java instead of VBA).

How SmartWay Does It

SmartWay has developed a tool to help port drayage carriers measure particulate matter (PM), oxides of nitrogen (NO_X), and carbon dioxide (CO_2); identify strategies for reducing harmful diesel emissions; and track emissions performance on an annual basis.

To become SmartWay Partners, drayage carriers commit to tracking and reporting their emissions on an annual basis. They also agree to have their emissions performance ranked and posted to the SmartWay website.

SmartWay shipper and logistics Partners assess the emissions performance of their carriers, including drayage carriers, and SmartWay's performance rankings are an important factor used when selecting dray carriers at ports throughout the United States.



Consider developing other electronic tools to help your partners, such as calculators to estimate the costs, financing, and payback period associated with investments in various efficiency improvement options. Online Web portals could also be developed to provide direct access to key documents (e.g., program registration documents and logo graphics), as well as industry performance data. SmartWay is considering developing

a Partner Portal that will allow carrier and shipper partners to query the program database to obtain year-over-year comparisons of their own performance as well as comparisons with partner averages at different levels of industry disaggregation (e.g., industry-wide or specific retail or wholesale sector for shippers). Access to this type of performance data will provide partners with previously unobtainable, uniquely added value that helps them to optimize performance.

GROUP EXERCISE:

SmartWay Partner Portal

10 minutes

View the SmartWay Partner Portal. Walk through examples demonstrating year-to-year comparison as well as inter-partner comparisons. (You may need to use dummy data to protect confidentiality.)

Create tools for other freight modes and sources. Truck carriers, shippers, and logistics providers usually control the majority of the freight-related emissions and fuel consumption in a region, and they provide the foundation for any green freight program. However, rail/intermodal, inland marine (barge), ocean-going marine, and air freight carriers can also have significant impacts. These additional freight modes have quite different operating characteristics, fuel use, and emission rates than truck freight. They require special consideration in order to bring them into your program. For example, ocean-going container vessels track and measure their freight activity in units of volume (TEUs) or nautical miles rather than kilometers or ton-kilometers. For this reason, reporting tools for container vessel fleets must be designed to collect volume-based activity information. In addition, equivalencies must be established between the different modal activity metrics to allow for inter-mode comparisons—e.g., converting between tonne-kilometers and volume-kilometers and vice versa. Without such equivalency factors, shippers will not be able to consistently evaluate the different

components of their supply chain footprint. So, expanding beyond the truck mode will require detailed input from experts in these other modes as well as shippers that commonly use multiple freight modes. Also reference other green freight programs such as SmartWay, Green Freight Europe, and the Clean Cargo Working Group to help you integrate other freight modes in a way that can ultimately be harmonized with these other programs.

Marine ports, intermodal railyards, borders, and their associated drayage carriers also offer substantial opportunities for efficiency improvements and emission reductions through green freight programs. These locations frequently maintain very accurate, detailed information regarding freight throughput and other operating practices that may facilitate the required data collection and reporting. In addition, such facilities are often associated with specific sets of dominant shippers that can be easily identified and called upon to encourage drayage company participation in the program.

Expand to include other pollutants. SmartWay focuses on diesel engines and the reduction of fuel use, CO_2, NO_X, and PM emissions. However, green freight programs may provide additional benefits such as reduction in other GHG and climate-changing emissions including black carbon, methane, and N_2O. Estimating the emission levels for these pollutants should be relatively straightforward, based on the fuel consumption and PM emission estimates already developed for your program. Refrigerants associated with air conditioning equipment and trailer refrigeration units (such as HFCs) are also powerful GHGs, and refrigerant emissions could also be estimated for your program participants. Quantification of these emissions could incentivize the adoption of low-GHG alternatives.

Move toward a standardized, integrated global freight supply chain carbon accounting system. The freight industry is a global industry, increasingly driven by shippers with global multimodal supply chains.

Further Information

For more information on *Green Freight Europe*, please visit http://www.greenfreighteurope.eu/.

For more information on the *Clean Cargo Working Group*, please visit http://www.bsr.org/en/our-work/working-groups/clean-cargo.

These shippers need a single, internally consistent global accounting system and database for estimating and reporting their transportation carbon footprint across all components of their supply chain. As your green freight program develops, shippers will benefit from a continual movement toward performance measurement and data-sharing protocols that are consistent with those used by the global leaders in green freight, including SmartWay (United States/Canada), Green Freight Europe, Green Freight Asia, and BSR Clean Cargo Working Group. Establishing harmonized tools, methods and metrics, and data-sharing arrangements with these programs and other programs in your region will benefit your shipper partners and foster long-term commitment to your program and ultimately to ongoing emission reductions.

GROUP EXERCISE:

Program Expansion Areas

10 minutes

Brainstorm areas for future program expansion in your country. Explore modes, sectors, pollutants, and any regional needs or opportunities that need to be addressed.

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APPENDIX A Brief History of SmartWay and Major Milestones

The SmartWay Transport Partnership is a public-private partnership developed by the U.S. Environmental Protection Agency (EPA) and the U.S. transportation industry to encourage the conservation of fuel and reduce greenhouse gas and other emissions.

The initial idea for SmartWay took hold in 2001 as part of EPA's Office of Transportation and Air Quality's initiatives. In December of that year, EPA released *Industry Options for Improving Ground Freight Fuel Efficiency*, a report which identified current freight industry energy use, environmental impacts, and trends. At that time, ground freight accounted for significant transportation energy use and emissions and was expected to grow more rapidly than all transportation sectors except air travel. In January 2002, EPA held a larger roundtable event to discuss the concept of launching a public-private partnership with industry stakeholders and gather stakeholder input. EPA subsequently established a Ground Freight Transportation Initiative to take advantage of opportunities to improve efficiency and reduce emissions in the freight sector by promoting a voluntary program approach to work with industry. The ultimate goal of the initiative was an improved freight handling and delivery system that would be cleaner and more cost-effective.

EPA began working closely with the American Trucking Associations (the leading freight industry group in the United States), Business for Social Responsibility (a nonprofit environmental advisory group), major freight companies, and other stakeholders who became known as SmartWay's Charter Partners. The Charter Partners worked with EPA for about two years to design a freight program that had a strong business case for industry. EPA officially launched SmartWay on February 9, 2004, at the American Trucking Associations' Leadership Meeting.

Over the next two years, EPA focused on recruiting and outreach and added SmartWay Logistics Partner and Affiliate categories. By the end of 2006, nearly 500 Partners had joined SmartWay, and EPA began to transition into an expansion and refinement stage. SmartWay program administrators started to consider how to sustain program growth, improve the partnership, and ensure that Partners successfully meet their goals.

They launched and eventually completed some long-term projects, such as the technology verification program, the SmartWay Upgrade Kit, and SmartWay's vehicle labeling program.

Starting in 2006, EPA also identified the need for innovative financing options that would enable companies to invest in fuel efficiency technologies. At this time, EPA began to work with federal grant programs, states, local energy offices, and private financial institutions to create innovative financing strategies such as low-interest loans, tax credits, and grant programs. SmartWay compiled information regarding different costs, financing, and loan opportunities for clean technologies into an online portal, the SmartWay Finance Center.

The expansion of the SmartWay brand and the development of a second generation of program tools and methods (SmartWay 2.0) continue to this day. Since 2008, SmartWay has supported international expansion efforts, including a formal agreement with Natural Resources Canada to integrate SmartWay throughout Canada. EPA also continues to develop programs that provide value to SmartWay Partners, such as the Heavy-Duty Fuel Economy Test Program.

Today the SmartWay Transport Partnership program serves the mutual goals of freight carriers, shippers, and EPA: cost savings, fuel efficiency, and environmental stewardship.

SmartWay's Major Milestones

2001	2002
• Initial discussions for design and development • *Industry Options for Improving Ground Freight Fuel Efficiency* is released	• Stakeholders and champions identified • Charter Partners join • Initial Partnership takes form
2003	**2004**
• Charter Partners help plan program design and features • First Partnership tools, agreements, and outreach materials are launched	• SmartWay is officially launched • First 100 Partners join • New Partner categories, Affiliates and Logistics Providers, are added
2005	**2006**
• Partnership grows to 300 Partners • Long-term projects, such as the SmartWay Upgrade Kit and SmartWay Truck, are launched • Technology Verification Program launched	• Program grows to 500 Partners, more focus on Partner management results • First annual SmartWay Excellence Awards is held • SmartWay Light-Duty Designation and "Grow and Go" are launched
2007	**2008**
• Supply chain concepts are introduced • SmartWay Tractors and Trailers and Certified Vehicles are launched • SmartWay Finance Center opens	• SmartWay 2.0 development begins • Package Labeling pilot program and consumer awareness marketing efforts established • SmartWay begins international activities with International Summit

SmartWay's Major Milestones

2009	2010
• Enhanced technology verification program is developed • Heavy-Duty Fuel Economy Test Program is established	• SmartWay refines its marketing materials • Supply chain carbon accounting tools are developed
2011	**2012**
• SmartWay Drayage Program is introduced • U.S. Freight Sustainability Summit held • Version 2.0 Shipper and Logistics Tools and multimodal "suite" are made available for Partners and intermodal carriers, respectively	• SmartWay surpasses the 3,000 Partner mark • Version 2.0 Rail Tool made available for rail carriers • SmartWay unveils online driver training program to U.S. and Canadian Partners • SmartWay adopted by Canada
2013	**2014**
• Draft Inland Marine Tool is developed for barge carriers • SmartWay publishes guidance on best practices to quality-assure freight-related data	• SmartWay celebrates its 10-year anniversary! • EPA lends SmartWay best practices and lessons learned to the Climate and Clean Air Coalition to develop a Global Green Freight Action Plan

APPENDIX B Resources

Websites

Green freight organizations:

- SmartWay homepage: http://epa.gov/smartway
- SmartWay Canada: http://www.smartway.nrcan.gc.ca
- Transporte Limpio (Mexico): http://www.transportelimpio.gob.mx
- EcoStation (Australia): http://www.ecostation.com.au
- GreenFreight Europe: http://www.greenfreighteurope.eu
- Objectif CO_2 (France): http://www.objectifco2.fr/
- Green Distribution Partnership (Japan): http://www.greenpartnership.jp
- Clean Air Asia: http://www.greenfreightandlogistics.org
- Green Freight China: http://cleanairinitiative.org/portal/projects/GreenFreightChinaProgram
- Green & Smart Transport Partnership (Korea): http://cleanairinitiative.org/portal/sites/default/files/presentations/PM-2-korea_2_-_GreenSmart_Partnership_CGFI.pdf

Relevant associations and stakeholder groups:

- ATA Trucks Deliver a Cleaner Tomorrow: http://www.trucking.org/cleaner_tomorrow.aspx
- Cascade Sierra Solutions: http://www.cascadesierrasolutions.org
- EPA National Clean Diesel Campaign: http://epa.gov/diesel
- EPA Clean Diesel Collaboratives: http://epa.gov/cleandiesel/collaboratives.htm
- International Council on Clean Transportation: http://theicct.org

- American Council for an Energy Efficient Economy: http://www.aceee.org/sector/transportation
- DieselNet: http://www.dieselnet.com/
- Consignment Carbon: http://www.consignmentcarbon.org/index.php
- Climate and Clean Air Coalition Heavy Duty Diesel Vehicles and Engines Initiative: http://www.unep.org/ccac/Initiatives/HeavyDutyDieselVehiclesandEngines/tabid/130319/language/en-US/Default.aspx
- Green Freight Asia: http://greenfreightasia.org/

Other resources:

- NRCan and SmartWay's SmartDriver E-learning: http://fleetsmartlearning.nrcan.gc.ca/Saba/Web/Main
- EPA Heavy-Duty Regulations and Standards: http://www.epa.gov/otaq/climate/regs-heavy-duty.htm
- NHTSA Fuel Economy: http://www.nhtsa.gov/fuel-economy
- CARB Heavy-Duty Greenhouse Gas Regulation: http://www.arb.ca.gov/cc/hdghg/hdghg.htm
- Greenhouse Gas Equivalencies Calculator: http://epa.gov/cleanenergy/energy-resources/calculator.html
- Detailed EPA emissions standards document: http://epa.gov/oms/highway-diesel/regs/diesel-engine-standards.htm
- SmartWay Verified Technologies list: http://www.epa.gov/smartway/forpartners/technology.htm
- National Clean Diesel Verified Technologies list: http://www.epa.gov/cleandiesel/verification/verif-list.htm
- California Air Resources Board Verified Technologies list: http://www.arb.ca.gov/diesel/verdev/vt/cvt.htm
- National Academy of Sciences technology overview: http://www.nap.edu/catalog.php?record_id=12845

Region-specific articles and other resources

Asia:

- *Design of Green Freight China Program: Review of Freight Logistics Solutions*: http://cleanairinitiative.org/portal/sites/default/files/2c._GFCP_-_Review_of_Green_Freight_Logistics_Solutions_-_May2011.pdf
- "Evaluating Impact of Green Freight Technologies" (Clean Air Asia): http://www.baq2012.org/assets/Uploads/BAQ2012Sudhir-Gota.pdf
- *Best Practices in Green Freight for an Environmentally Sustainable Road Freight Sector in Asia*: http://cleanairinitiative.org/portal/sites/default/files/BGP-EST5A_Green_Freight_Best_Practices_-_CAI-Asia_Dec2011.pdf

Africa:

- "Towards Sustainable Transport Under SSATP DP2: Building Support for an Environmentally Sustainable Transport Forum in Africa": http://www.ssatp.org/sites/ssatp/files/publications/HTML/Conferences/Addis12/Tuesday/04_Sustainable%20Transport%20Forum_FR-EN/01-Sustainable-Transport-Forum_EN.pdf
- "Green Supply Chains—the Best of Planet and Profit (South Africa)": http://www.enviropaedia.com/topic/default.php?topic_id=349
- *Green Economy Accord (South Africa)*: http://sustainabledevelopment.un.org/index.php?page=view&type=400&nr=676&menu=494

Latin America:

- "The Clean Air Institute: Reducing Emissions from Transport" (Clean Air Initiative for Latin America and the Caribbean): http://www.unep.org/ccac/Portals/50162/docs/Diesel_Presentations/JOANNE_GREEN_CLEAN_AIR_INSTITUTE.pdf

Europe:

- "Dow Engaged in Sustainable Transportation at Launch Ceremony for Green Freight Europe": http://www.dow.com/news/press-releases/article/?id=5683

International logistics:

- "DHL Green Solutions for Air, Ocean and Road Freight": http://www.dhl.com/en/about_us/green_solutions/air_ocean_road_freight.html

APPENDIX C SmartWay Program Materials

About SmartWay

- *Current list of SmartWay Partners*
  http://epa.gov/smartway/about/partnerlists.htm

- *SmartWay Trends, Indicators, and Partner Statistics (TIPS)*
  http://epa.gov/smartway/tips/index.htm
  TIPS (Trends, Indicators, and Partner Statistics) is a source of leading freight movement industry indicators and quick facts about current SmartWay Partner performance metrics.

- *SmartWay Outreach Materials*
  http://epa.gov/smartway/about/outreach.htm
  Fact sheets, case studies, Partner profiles, public service announcements, and other resources to help Partners and other stakeholders spread the word about the program.

Join

- *SmartWay Affiliate and Community Resources*
  http://epa.gov/smartway/forsupporters/index.htm
  Resources for organizations that encourage members or customers to participate in SmartWay. Has links to the Affiliate Agreement and Affiliate logo use guidelines.

- *Business Case for Being a SmartWay Shipper Partner*
  http://epa.gov/smartway/forshippers/documents/420f12073a.pdf
  Short description of the benefits of enrolling in SmartWay

- *SmartWay for Countries*
  http://epa.gov/smartway/forcountries/index.htm
  Information and resources for countries interested in setting up a green freight program, organized by region.

For Partners

- *Tools and Resources for Partners*
  http://epa.gov/smartway/forpartners/index.htm
  Provides partner tool, example tools, users guides, and other resources organized by partner type.

- *Carrier Performance Rankings*
  http://epa.gov/smartway/forpartners/performance.htm
  Microsoft Excel files containing the latest SmartWay Partners fleet ranking categories and emission rates.

- *Data Quality Assurance and Quality Control*
  http://epa.gov/smartway/forpartners/data-quality.htm
  Publications and resources to help SmartWay Partners achieve and maintain high levels of data quality.

- *SmartWay Technology Program*
  http://epa.gov/smartway/forpartners/technology.htm
  Resources and information on SmartWay Verified Technologies.

- *SmartWay Excellence Awards*
  http://epa.gov/smartway/about/sw-awards.htm
  A list of criteria, winners, and resources pertaining to SmartWay's annual Partner recognition event.

- *2014 SmartWay Excellence Awards Criteria*
  http://epa.gov/smartway/about/documents/awards/420f14012.pdf

News and Events

- *SmartWay News and Events*
  http://epa.gov/smartway/about/news.htm
  The latest news about SmartWay. Visitors can sign up to receive e-Updates by email and view event announcements (including webinar schedules and past presentations), media coverage, press releases, and an archive of old news items.

SmartWay Samples

- *Partnership Overview*
- *Program Highlights*
- *Carrier Partnership Agreement*
- *Shipper Partnership Agreement*
- *Logistics Partnership Agreement*
- *Overview of Shipper Strategies*
- *Overview of Carrier Strategies*
- *EPA Diesel Technology Verification Application*
- *Co-Branded Letter*
- *SmartWay Marketing Statement*

SmartWay
U.S. Environmental Protection Agency

SmartWay Transport Overview

What are the results of SmartWay Transport?

SmartWay Transport aims to increase the availability and market penetration of fuel efficient technologies and strategies that help freight companies save money while also reducing adverse environmental impacts.

Specifically, SmartWay Transport programs lower emissions of carbon dioxide (CO_2), nitrogen oxides (NO_x), and particulate matter (PM) .

Since 2004, SmartWay Partners report:

- Saving 120.7 million barrels of fuel ($16.8 billion in fuel costs saved)
- Eiminating 51.6 million metric tons of CO_2
- Eliminating 738,000 tons of NO_x
- Eliminating 37,000 tons of PM

SmartWay Transport is the US Environmental Protection Agency's flagship program for improving fuel efficiency and reducing greenhouse gases and air pollution from the transportation supply chain industry. Developed jointly in early 2003 by EPA and Charter Partners represented by industry stakeholders, environmental groups, American Trucking Associations and Business for Social Responsibility, this innovative program was launched in 2004. SmartWay Transport is comprised of partnerships, policy and technical solutions, and research and evaluation projects that find new ways to optimize the transportation networks in a company's supply chain. Supported by major freight industry associations, environmental groups, states, companies, and trade publications, SmartWay Transport is leading the way to greater fuel efficiency and lower emissions from the freight sector, while presenting a model of government and industry cooperation for public and private benefits.

SmartWay Transport Partnership is a strong government/industry collaboration between freight shippers, carriers, logistics companies and other stakeholders, to voluntarily achieve improved fuel efficiency and reduce environmental impacts from freight transport. Participating companies use performance based quantification and reporting tools that benchmark and inform industry and the marketplace on freight operations, energy and environmental efficiency. SmartWay partners demonstrate to customers, clients, and investors that they are taking responsibility for the emissions associated with goods movement, are committed to corporate social responsibility and sustainable business practices, and are reducing their carbon footprint. To date, the partnership includes nearly 2,900 companies and associations committed to improving fuel efficiency.

SmartWay Tractors and Trailers meet voluntary equipment specifications that can reduce fuel consumption by 10 to 20 percent for 2007 long-haul tractors and trailers. Each qualified tractor/trailer combination can save between 2,000 to 4,000 gallons of diesel per year. Models that meet these equipment specifications save operators money and reduce greenhouse-gas emissions and air pollutants.

EPA Technology Verification for SmartWay Designation is a testing and verification program designed to quantify emissions reductions and fuel savings from various available technologies, such as tractor and trailer aerodynamics, auxiliary power units, and wide-based tires. As a result, companies can compare the fuel efficiency and environmental performance of various technologies and make more informed purchases.

For more information: www.epa.gov/smartway/.

SmartWay
U.S. Environmental Protection Agency

SmartWay Program Highlights

EPA's SmartWay **...is a market-driven partnership to help businesses move goods in the cleanest most efficient way possible. By providing a consistent set of tools and information needed to make informed transportation choices, SmartWay enables companies across the supply chain to exchange performance data in ways that protect the environment, enhance our nation's energy security and foster economic vitality. To encourage continued improvement, SmartWay provides incentives and recognition for top performers.**

SmartWay Saves Oil

- Since 2004, SmartWay partners have saved 120.7 million barrels of oil. This is equivalent to taking over 10 million cars off the road for an entire year.
- Fewer dollars going overseas for foreign oil means more dollars to invest at home; having fewer imports also reduces our national trade deficit.

SmartWay Saves Money and Supports US Business Interests

- SmartWay is helping US businesses to slash their fuel costs, saving $16.8 billion dollars to date. These savings support America's trucking industry and the customers they serve.
- Truck, trailer and equipment suppliers to the US trucking industry also rely upon SmartWay to help them demonstrate to customers the benefits of cleaner, more fuel-efficient products.

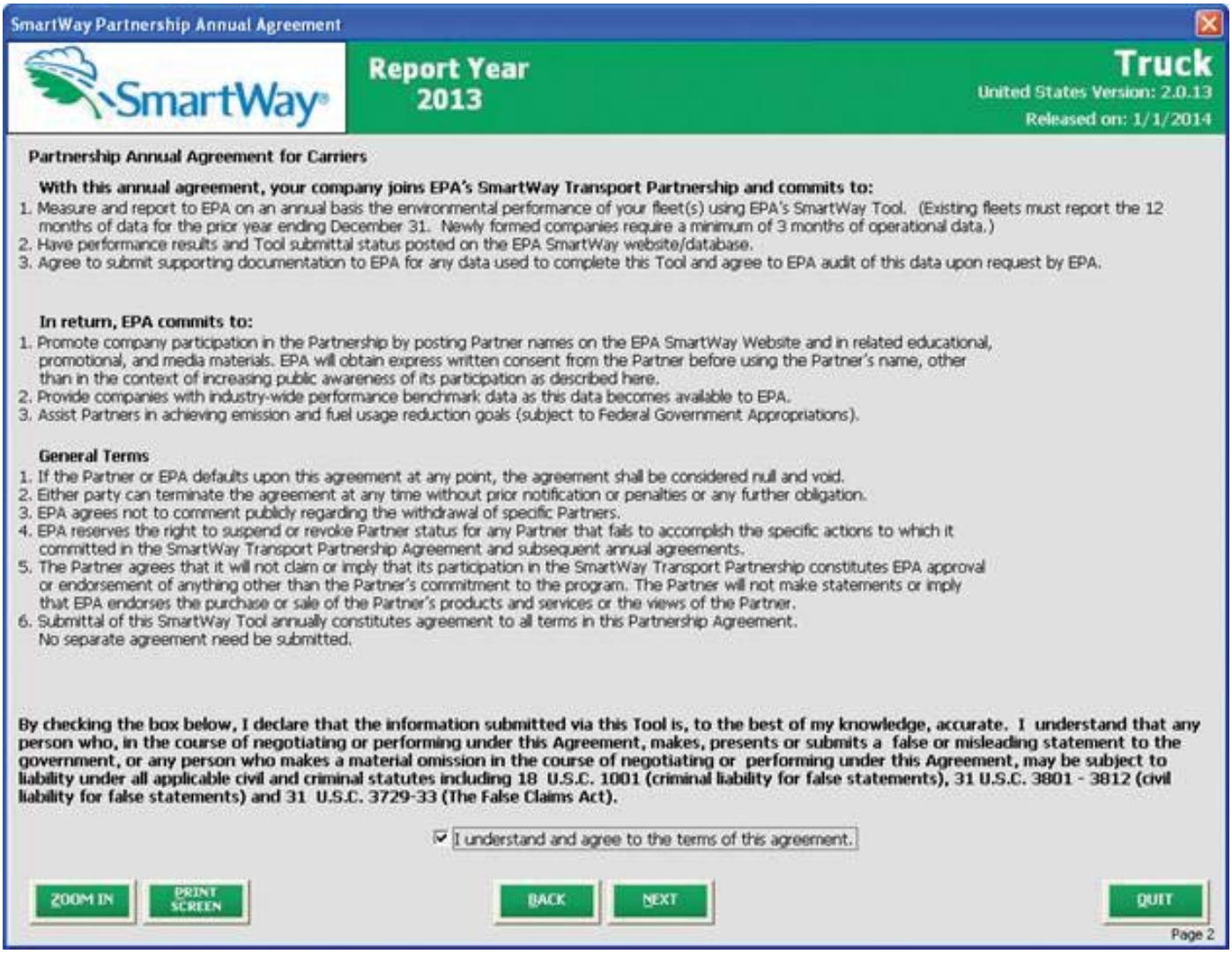
SmartWay Protects US Jobs and the Economy

- SmartWay is one of ATA's six strategies to ensure the long-term sustainability of the US trucking industry. According to ATA, 1 out of every 16 people (6.9 million people) working in the US private sector is employed in a trucking-related job; trucking annually generates $604 billion in gross freight revenues, or about 4 percent of the US Gross Domestic Product.
- A strong trucking industry is essential to our nation's competiveness and to US jobs. SmartWay contributes to the health of this vital sector, protecting US jobs and the economy.

Thousands of US Businesses and Organizations Need SmartWay

- More than 3,000 of the nation's shippers, truck and rail carriers (including many Fortune 500 companies) have registered with SmartWay to continue improving their transportation supply chains. They are using SmartWay tools to assess, track, and reduce transportation-related carbon, energy use, and air emissions.
- Small businesses rely upon SmartWay for technical expertise and assistance. SmartWay has provided financing to help truck owners, especially small - and medium-sized businesses upgrade to cleaner, more efficient trucks.
- The US government, through GSA, is relying upon SmartWay to implement EO 13514, which directs the federal government to green its supply chain.
- Environmental, state, and community groups rely upon SmartWay's clean air achievements (51.6 MMT CO2, 738,000 tons NOx, and 37,000 tons PM reduced so far) helping protect the health and well-being of citizens, especially in low-income communities near ports, truck stops, and borders.
- The United Nations, the World Bank, the Commission for Environmental Cooperation, as well as the governments of China, Mexico and Canada, have projects and programs that rely upon SmartWay's technical assistance, methods and tools.
- US ports rely on SmartWay's Port Drayage Truck program to help reduce pollution and address environmental justice concerns in and around major US ports.

Carrier Partnership Agreement


SmartWay Partnership Annual Agreement

SmartWay

Report Year 2013

Truck
United States Version: 2.0.13
Released on: 1/1/2014

Partnership Annual Agreement for Carriers

With this annual agreement, your company joins EPA's SmartWay Transport Partnership and commits to:

1. Measure and report to EPA on an annual basis the environmental performance of your fleet(s) using EPA's SmartWay Tool. (Existing fleets must report the 12 months of data for the prior year ending December 31. Newly formed companies require a minimum of 3 months of operational data.)
2. Have performance results and Tool submittal status posted on the EPA SmartWay website/database.
3. Agree to submit supporting documentation to EPA for any data used to complete this Tool and agree to EPA audit of this data upon request by EPA.

In return, EPA commits to:

1. Promote company participation in the Partnership by posting Partner names on the EPA SmartWay Website and in related educational, promotional, and media materials. EPA will obtain express written consent from the Partner before using the Partner's name, other than in the context of increasing public awareness of its participation as described here.
2. Provide companies with industry-wide performance benchmark data as this data becomes available to EPA.
3. Assist Partners in achieving emission and fuel usage reduction goals (subject to Federal Government Appropriations).

General Terms

1. If the Partner or EPA defaults upon this agreement at any point, the agreement shall be considered null and void.
2. Either party can terminate the agreement at any time without prior notification or penalties or any further obligation.
3. EPA agrees not to comment publicly regarding the withdrawal of specific Partners.
4. EPA reserves the right to suspend or revoke Partner status for any Partner that fails to accomplish the specific actions to which it committed in the SmartWay Transport Partnership Agreement and subsequent annual agreements.
5. The Partner agrees that it will not claim or imply that its participation in the SmartWay Transport Partnership constitutes EPA approval or endorsement of anything other than the Partner's commitment to the program. The Partner will not make statements or imply that EPA endorses the purchase or sale of the Partner's products and services or the views of the Partner.
6. Submittal of this SmartWay Tool annually constitutes agreement to all terms in this Partnership Agreement. No separate agreement need be submitted.

By checking the box below, I declare that the information submitted via this Tool is, to the best of my knowledge, accurate. I understand that any person who, in the course of negotiating or performing under this Agreement, makes, presents or submits a false or misleading statement to the government, or any person who makes a material omission in the course of negotiating or performing under this Agreement, may be subject to liability under all applicable civil and criminal statutes including 18 U.S.C. 1001 (criminal liability for false statements), 31 U.S.C. 3801 - 3812 (civil liability for false statements) and 31 U.S.C. 3729-33 (The False Claims Act).

☑ I understand and agree to the terms of this agreement.

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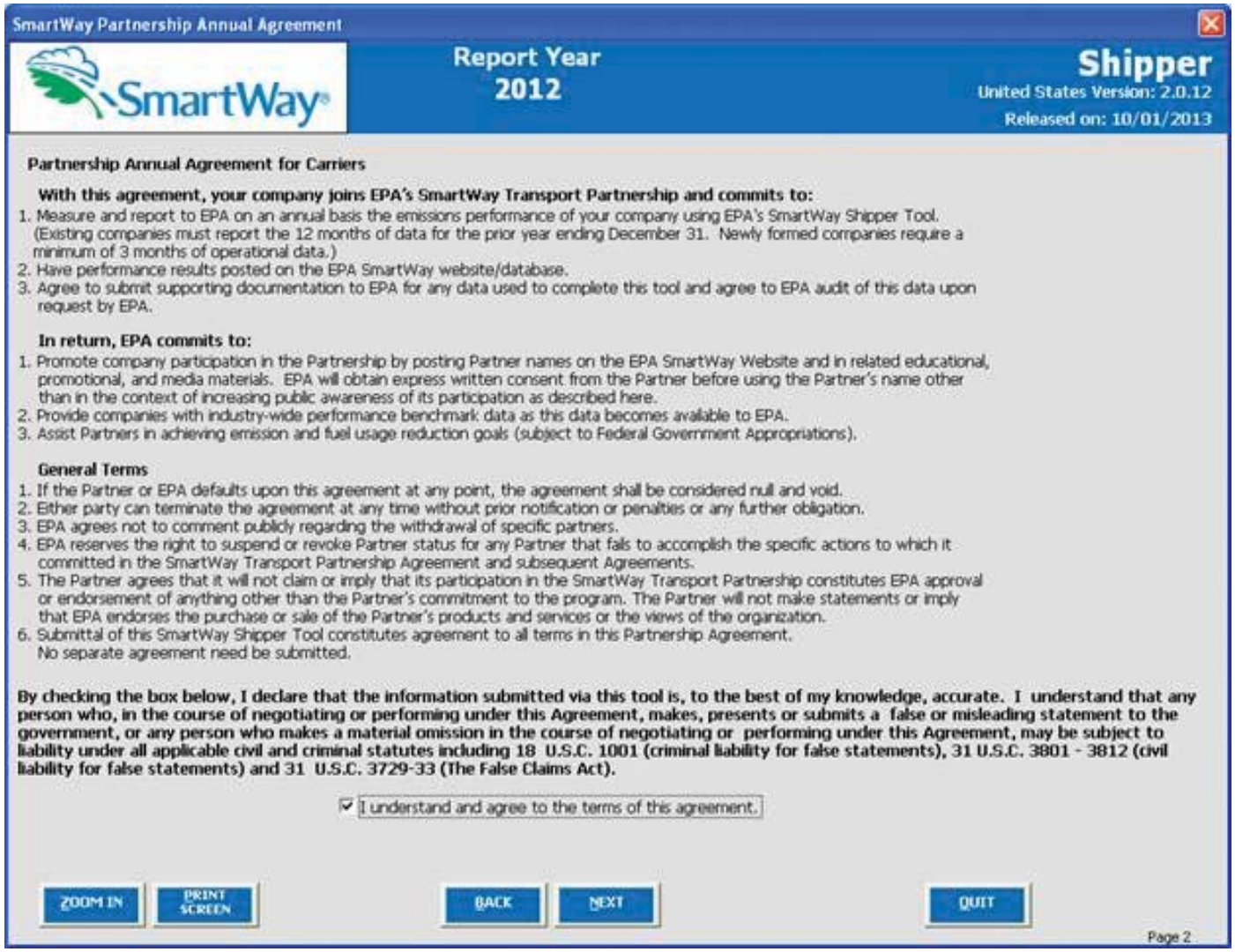
Page 2

Shipper Partnership Agreement



SmartWay SM Transport Partnership
U.S. Environmental Protection Agency

Overview of Shipper Strategies

Truck and rail operators are using a multitude of strategies to reduce the environmental impacts of carrying America's freight. Shippers are working to do their part too, not only by implementing measures at their own facilities that improve efficiency and lead to emissions reductions, but also by hiring the most environmentally responsible carriers. The following technologies and strategies are just some of the measures shippers can adopt to facilitate reductions in fuel consumption and emissions associated with freight shipping activities.

Intermodal Shipping

Many goods and materials may be delivered to distribution hubs more efficiently by rail than by truck.

- Intermodal shipping combines the fuel efficiency of rail with the logistical strengths of trucking.
- Standardized containers are easily transferred between rail and truck.
- Intermodal shipping can minimize overall fuel consumption, reduce emissions, and lower the costs of freight delivery.

Driver Comfort Stations

Drivers may spend a great deal of their work day idling their trucks to stay comfortable at shipping and receiving docks.

- Shippers can provide climate controlled comfort stations at dock facilities so that drivers won't need to idle their trucks to stay warm or cold.
- Eliminating idling provides significant fuel, emissions and maintenance benefits, and the improved driver comfort enhances safety.

Preferential Loading and Unloading

SmartWay Transport Shippers can support the goals of the Partnership by providing special shipping and receiving privileges for SmartWay Transport Carriers.

- Deliveries by Partner carriers may be given prime shipping and delivery times and positions.
- Selected docks may be designated as "SmartWay Transport Docks."

Idle Reduction Policies

Shippers usually have control over access to their docking facilities including any parking or waiting areas.

- A shipper may implement a "No Idling" policy for any truck that picks up or delivers freight to its facilities.
- "No Idling" policies may best be combined with driver comfort stations, so drivers have an alternative to idling their trucks while waiting.
- Idling reductions offer immediate air quality benefits for local communities, especially in urban areas where environmental justice may be a concern.

Improved Pickup and Delivery Scheduling

Excess waiting time for drivers often leads to excess idling and the increased fuel use and emissions.

- Shippers can improve scheduling with enhanced communications or logistics software.
- Improved pick up and delivery scheduling reduces excess idling and improves the on-time efficiency of freight operations.

Full Truckloads

Goods and materials are sometimes shipped on partially loaded trucks in the interest of expediency, increasing overall fuel use and shipping costs.

- Shippers can improve truckload scheduling with logistics software that helps to ensure full loads.
- Full truckloads not only improve efficiency, but also help reduce congestion on the roadways and at shipping and receiving facilities.

U.S. Environmental Protection Agency • Office of Transportation and Air Quality • February 2004 • EPA420-F-03-040 • www.epa.gov/smartway

Overview of Shipper Strategies (continued)

Shipper Corporate Fleet Improvements

Shippers often have small fleets of light duty vehicles (cars and light trucks) used around their facilities or for staff travel.

- Reducing older vehicles with more fuel-efficient and lower emitting vehicles reduces a company's overall environmental impact.

Warehouse Improvements

Shippers should consider any improvements in and around warehouses that will facilitate improved efficiency and emissions reductions.

- Warehouse operations can have a direct impact on the efficient loading and unloading of delivery trucks.
- Shippers should explore any efficiency gains that can be made with improved storage and warehouse logistics techniques.

Electric Forklifts

Many freight facilities still use diesel-powered forklifts to carry pallets, crates, etc., between the dock and warehouse.

- Electric forklifts are cleaner and more efficient to operate, producing no emissions at the facility.
- Utilizing electric forklifts reduces a company's environmental impact and improves ambient air quality in and around freight docking areas.
- Facilities might also consider alternatively fueled forklifts that run on compressed natural gas or propane.

SmartWay℠ Transport Partnership
U.S. Environmental Protection Agency

Overview of Carrier Strategies

Truck and rail transportation provides a cost-effective means to transport much of America's freight. There are simple actions that can be taken to make ground freight more efficient and cleaner for the environment. The following technologies and practices can help truck carriers save fuel and money, reduce air pollution, and cut carbon dioxide emissions that contribute to climate change.

Idle Reduction

An idling truck burns nearly one gallon of diesel fuel per hour. Reducing unnecessary idling could save each truck over $3,000 in fuel costs, reduce air pollution, and cut 19 metric tons of carbon dioxide annually.

- On-board idle reduction systems include auxiliary power units that provide electricity to the cab, direct-fired heaters and coolant systems that provide temperature control, and programmable automatic engine shut-off systems.
- Truck 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.

Improved Aerodynamics

Reducing the aerodynamic drag of a typical line-haul truck by 15 percent could cut annual fuel use more than 2,000 gallons, save over $3,500 in fuel costs, and eliminate 20 metric tons of carbon dioxide.

- Tractor aerodynamics can be improved by adding integrated roof fairings, cab extenders, side fairings, and aerodynamic bumpers. New truck buyers can purchase aerodynamic models with streamlined profiles.
- Trailer aerodynamics can be improved by minimizing tractor-trailer gap, adding side skirts and rear air fairings, and arranging cargo and tarpaulins as low, taut and smooth as possible.
- ·Single-unit trucks can be improved with air deflector bubbles or by purchasing new streamlined models.

Improved Freight Logistics

Improved logistics can reduce the miles that a truck drives empty. Eliminating 15 percent of a line-haul truck's empty miles could save $3,000 in fuel and reduce 24 metric tons of carbon dioxide annually.

- Improved logistics include load matching, more efficient routes and delivery schedules, and improved shipping and receiving practices.
- A carrier may employ low-cost options like triangular routing, coordinating loads with other fleets, and checking electronic load boards, or the carrier may purchase freight broker services and logistics software.

Automatic Tire Inflation Systems

Retrofitting a line-haul truck with an automatic tire inflation system could save 100 gallons of fuel annually and reduce tire wear and maintenance, while eliminating one metric ton of carbon dioxide.

- Truck fleets that find it too difficult or expensive to monitor tire pressure on a regular basis should consider installing automatic tire inflation (ATI) systems on drive and trailer tires.
- An ATI system used on a typical line-haul truck can generally pay for itself in just over two years, while decreasing the risk of expensive tire failure caused by under inflation.

Single Wide-base Tires

Specifying single wide-base tires on a new combination truck could save $1,000 immediately and reap annual fuel savings of 2 percent or more while cutting carbon dioxide by more than four metric tons.

- Single wide-base tires save fuel by reducing vehicle weight, rolling resistance and aerodynamic drag. These tires can also improve tank trailer stability by allowing the tank to be mounted lower.
- There are several single wide-base tire models from which to choose, plus these tires can be retreaded.

Driver Training

Even highly experienced drivers can boost their skills with training aimed at raising fuel economy by 5 percent or more, which would save $1,200 in annual fuel costs and cut eight metric tons of carbon dioxide.

- Effective driver training programs can improve fuel economy by 5 percent or higher. Some fleets report fuel economy gains of up to 20 percent.
- Among other techniques, drivers learn progressive shifting, engine speed optimization, idle reduction, smoother braking and acceleration, anticipatory driving, speed control, and optimal gearing.

U.S. Environmental Protection Agency • Office of Transportation and Air Quality • February 2004 • EPA420-F-02-052 • www.epa.gov/smartway

Overview of Carrier Strategies (continued)

Low-Viscosity Lubricants

When used in a line-haul truck, synthetic engine and drive train lubricants can improve fuel economy by up to 3 percent, saving as much as 500 gallons of fuel and cutting up to five metric tons of carbon dioxide annually.

- Low-viscosity synthetic or semi-synthetic lubricants flow more easily and withstand the extreme pressure of engine, transmission, and drive train systems better than conventional mineral oil blends.
- The operator of a typical line-haul truck can save up to $500 annually by switching to low viscosity lubricants, with additional savings possible due to reduced wear and maintenance of truck systems.

Intermodal Shipping

Intermodal freight transport combines the best attributes of both truck and rail shipping. Over long distances using intermodal can cut fuel and carbon dioxide by 65 percent, compared to truck-only moves.

- Carriers can maximize resources by using freight trains to handle the long-distance portion of a freight move, especially for less time-sensitive cargo that is shipped over 500 miles.
- Intermodal options include trailer on flat car (TOFC), container on flat car (COFC), double stack service, rail bogeys and dual-mode trailers, and rail platforms that can accommodate standard trailers.

Longer Combination Vehicles

A freight truck using longer or multiple trailers can haul more cargo than a standard combination truck, potentially saving up to $5,000 in fuel costs and 34 tons of carbon dioxide on a ton-mile basis annually.

- Common longer combination vehicle (LCV) configurations include the Rocky Mountain Double, Turnpike Double, Triples, and Eight-Axle Twin Trailers.
- A motor carrier operating in states that permit LCVs can reduce the number of trips required to haul a given amount of freight—saving time, money, and emissions.

Reducing Highway Speed

A line-haul truck with 90 percent highway miles that reduces its top speed from 70 to 65 miles per hour could cut its annual fuel bill nearly $1,500 while eliminating almost 10 metric tons of carbon dioxide.

- Reducing highway speed also reduces engine and brake wear, which cuts down the cost and frequency of maintenance service, and keeps revenue earning equipment on the road longer.
- Any truck carrier can adopt a speed management policy at little or no cost. The most successful speed reduction policies combine electronic engine controls with driver training and incentives.

Weight Reduction

Reducing 3,000 pounds from a line-haul truck by using lighter-weight components could save up to 300 gallons of fuel annually and eliminate up to three metric tons of carbon dioxide.

- Aluminum alloy wheels, axle hubs, clutch housings, and cab frame can trim hundreds of pounds from a truck tractor. Downsizing to a smaller engine can also provide significant weight savings.
- Thousands of pounds can be reduced from a truck trailer using aluminum roof posts, floor joists, upright posts, and hubs and wheels.

Hybrid Powertrain Technology

Hybrid vehicles can provide roughly $2,000 in fuel savings and cut carbon dioxide by up to 12 metric tons per year when used in stop-and-go freight applications like parcel delivery service.

- Hybrid vehicles have two propulsion power sources, making it possible to capture energy otherwise lost during braking and provide boost to the main engine which in turn can run more efficiently.
- Most hybrid vehicles use an internal combustion engine for the main power source with various secondary power and energy storage configurations, including electric and hydraulic systems.

Renewable Fuels

In addition to benefiting the environment and helping reduce U.S. dependence on foreign oil, using biodiesel can provide more lubricity which may help extend a vehicle's engine life. Most diesel engines can run on biodiesel without needing any special equipment, and when running on biodiesel, will have similar horsepower and torque as conventional diesel.*

- Biodiesel provides significant reductions in greenhouse gas (GHG) emissions -- B100 reduces lifecycle GHG emissions by more than 50 percent, while B20 reduces emissions by at least 10 percent.
- Biodiesel also reduces emissions of carbon monoxide, particulate matter, sulfates, hydrocarbons and air toxics.
- Biodiesel produced from crops grown in the U.S. can help America's family farmers while bolstering America's energy security.

* Always check with your engine manufacturer before switching to biodiesel, and look for biodiesel that meets applicable ASTM and BQ9000 requirements.

United States Environmental Protection Agency

Office of Transportation and Air Quality
EPA-420-F-12-023
May 2012

EPA Diesel Technology Verification Application

Part 1 of 2

This application is the first of two steps to request EPA verification of a diesel engine retrofit or vehicle technology. Once you have completed and submitted this form to EPA *Tech_Center@epa.gov* with **"Request for Verification"** in the subject line, a member of EPA's Technology Verification Team will contact and supply you with Part 2 of the application when needed. Please withhold all confidential business information (CBI) at this stage of the application.

1) Technology Type: Please identify your technology type by completing the table below.

	Technology Type **See Appendix for Technology Definitions*	**Mark with an "X" to Identify Technology**
(A)	**Exhaust After-treatment Device** (Applied to light-, medium-, or heavy-duty diesel engines/equipment)	
1	Diesel Oxidation Catalyst (DOC) or DOC Combination	
2	Diesel Particulate Filter (DPF) or DPF Combination	
3	Selective Catalytic Reduction Catalyst (SCR)	
4	Other Type of After-Treatment Device (Please Specify)	
(B)	**Engine Modification** (Modification to light-, medium-, or heavy-duty diesel engines/equipment)	
1	Engine Overhaul (or upgrade kit)	
2	Engine Conversion to Alternative Fuel or Power System (includes hybrid engine replacement)	
3	Other Type of Engine Modification (Please Specify)	
(C)	**Vehicle Modification** (Used on class-8, long-haul, sleeper cabs or 53'box, van trailers)	
1	Idle Reduction – Auxiliary Power Units (APUs)	
2	Idle Reduction – Fuel Operated Heaters (FOHs)	
3	Idle Reduction – Battery Air Conditioning Systems (BACs)	
4	Idle Reduction – Thermal Storage Systems	
5	Idle Reduction – Truck Stop Electrification (TSE)	
6	Idle Reduction – Rail Auxiliary Power Units (APUs)	
7	Idle Reduction – Rail Fuel Operated Heaters (FOHs)	
8	Idle Reduction – Rail Shore Connection Systems	
9	Idle Reduction – Marine Shore Connection Systems	
10	Idle Reduction – Other (Please Specify)	
11	Aerodynamics – Trailer Gap Reducer, Trailer Side Skirts, or Trailer End Fairings	
12	Aerodynamics – Other Type of Trailer Technology (Please Specify)	
13	Aerodynamics – Other Type of Tractor Technology (Please Specify)	

United States Environmental Protection Agency

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May 2012

14	Tires – Low Rolling Resistance Tires (LRRs) for Tractor or Trailer	
15	Other Type of Vehicle Modification (Please Specify)	
(D)	**Other** (Please describe your technology and given that it falls outside of our established verification categories, additional time will be needed to review and consider your verification request.	

Are you seeking placement on EPA's Emerging Technologies List? (Check one)
For information about the Emerging Technologies Program, visit:
http://epa.gov/cleandiesel/verification/emerg-process.htm

Yes ☐
No ☐

2) Product description: Please provide the specific name (including product ID numbers and/or serial and part numbers, if applicable) of the product, the manufacturer names making the components, and a short description of the product for which you are requesting verification.

3) Contact Information:

	Primary Contact	Secondary Contact
Company Name		
Contact Person		
Telephone (cell)		
Telephone (desk)		
Email Address		
Mailing Address		
Manufacturing Facility Address		

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4) Additional Information: Before submitting the form, please answer the following questions by putting an "X" in the respective column.

		Yes	No	N/A
1	Does your technology have regulatory requirements that supersede verification?			
2	Is your technology beyond the research and development stage and is currently commercially available?			
3	If you've answered "Yes" to the above question, does the technology have in-use experience in the intended market?			
4	Does your technology have any existing durability, emissions, or overall performance data?			
5	Does your technology have any health or safety concerns?			
6	Is this the first time you have submitted this technology for EPA verification?			
7	Are you currently pursuing verification with the California Air Resources Board (CARB) for this technology?			
8	Does your company offer full warranty over the sale of this product?			
9	Do you accept full responsibility in attesting to the EPA that all submitted information is correct?			

Our program is currently NOT considering the following for verification:

1. *Energy Depleting Hybrid System:* At this time, the agency does not have a certified protocol for testing hybrid technologies in which the energy storage system is charge depleting.
2. *Hydrogen System:* Due to the number of safety concerns regarding hydrogen systems, we currently do not verify these systems.
3. *Fuels and Fuel Additive:* All fuels and fuel additives must be EPA registered **instead of** going through the verification process. Engine additives and lubricants are not eligible for verification. See http://www.epa.gov/otaq/fuels/registrationfuels/index.htm for more information.

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Appendix: Technology Definitions

1. Exhaust After-treatment Device
   a. Diesel Oxidation Catalyst (DOC) reduces both particulate matter (PM) and hydrocarbons from the exhaust flow. DOCs usually consist of a precious metal coated flow-through honeycomb structure contained in stainless steel housing. As hot diesel exhaust flows through the honeycomb structure, the precious metal coating causes a catalytic reaction that breaks down pollutants into less harmful components. DOCs verified by EPA and CARB are typically effective at reducing PM emissions by 20 to 40 percent, and hydrocarbons by 40 to 70 percent.
   b. Diesel Particulate Filter (DPF) significantly reduces PM emissions from diesel fueled vehicles and equipment. DPFs typically use a porous ceramic, cordierite substrate, or metallic filter, to physically trap PM and remove it from the exhaust stream. The collected PM is reduced to ash during filter regeneration. EPA and CARB verified DPFs generally reduce PM by 85 to 90 percent and hydrocarbons by 70 to 90 percent.
   c. Selective Catalytic Reduction Catalyst (SCR) reduces NOx emissions from diesel exhaust by converting it to N_2 and water with the aid of a reducing agent. The reducing agent, also called Diesel Exhaust Fluid (DEF), is typically anhydrous ammonia, aqueous ammonia, or urea. The DEF is added to a stream of exhaust gas and is absorbed onto a catalyst. SCR catalysts are manufactured from various ceramic materials such as titanium oxide, zeolites, and various precious metals. Some SCR applications incorporate the use of a DPF with forced regeneration.
   d. Other type of after-treatment device: Any device that is installed after the exhaust manifold in an engine configuration.

2. Engine Modification
   a. Engine overhaul (or upgrade kit): a technology kit that allows for the replacement of various engine parts, while still retaining parts of the existing engine.
   b. Engine conversion to alternative fuel or power system (includes hybrid engine replacement: technology kit/device that replaces parts of the main engine and/or the engine frame or drive train.
   c. Other type of engine modification: any other engine and/or chassis modification kit or technology device

3. Vehicle Modification
   a. Idle Reduction technologies allow engine operators to shut down the main engine and refrain from long-duration idling of the main propulsion engine by using an alternative technology.
      i. Auxiliary Power Units supply cooling, heating, and electrical power to Class 8 trucks, locomotives and other applications when the vehicle is stationary, allowing the main engine to be shut off.

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ii. Fuel Operated Heaters (FOHs) combust fuel drawn from the main engine or other fuel system to provide cab heating and/or coolant heating.

iii. Battery Air Conditioning Systems (BACs) use batteries to power an independent electric cooling system. Typically, these systems integrate an FOH to supply heating.

iv. Thermal Storage Systems stores energy in cold storage as the truck is driven, and then provides air conditioning when the truck is turned off.

v. Truck Stop Electrification (TSE) or Electrified Parking Spaces (ESP) systems operate independently of the truck engine and allow the truck engine to be turned off as the EPS system supplies heating, cooling, and electrical power.

vi. Marine and/or Rail Shore Connection systems allow marine vessels or locomotives to "plug into" an electrical power source instead of using its diesel auxiliary engines while at the port or railyard. This system may also include cables, cable management systems, shore power coupler systems, distribution control systems, and power distribution.

vii. Other Idle Reduction device: any other device that provides an alternative source of power, thus allowing the main diesel engine to be shut off.

b. Aerodynamic Technologies can minimize aerodynamic drag and maintain smoother air flow over a tractor-trailer vehicle. This technology can decrease fuel consumption as well as NOx and CO_2 emissions.

i. Trailer gap reducer, trailer side skirts, or trailer end fairings

ii. Other type of trailer technology, any other technology that reduces drag on the trailer

iii. Other type of tractor technology, any other technology that reduces drag on the trailer

c. Low Rolling Resistance Tires (LRRs) for tractor or trailer: any tire technology that reduce resistance and provides a fuel or emissions benefit for the engine.

Co-Branded Letter

Dear NPTC Member,

In February 2004, the Environmental Protection Agency (EPA) Administrator Michael Leavitt and American Trucking Associations (ATA) President Bill Graves launched a new and innovative voluntary effort called the SmartWay Transport Partnership. This Partnership between EPA and the freight industry is designed to help trucking companies reduce fuel consumption, thereby saving money while also benefiting the environment. You may have heard about the Partnership, or visited the Partnership's exhibit booth, at the NPTC Annual Management Conference and Exhibition in Atlanta.

NPTC recognizes the value of the SmartWay Transport Partnership both to NPTC members and to the trucking industry as a whole, and has been supportive of EPA's efforts to publicize the Partnership and to recruit new Partners. Through this letter, we hope to make you aware of the benefits the Partnership can bring to your company, and to encourage you to consider becoming a SmartWay Transport Partner.

The SmartWay Transport Partnership is open to all sizes and types of fleets, and Partners are recognized as industry leaders. Truck fleets participate by agreeing to evaluate and improve fuel economy, thereby reducing operating costs and emissions, through a variety of strategies they implement voluntarily. Partners are provided with technical assistance and public recognition for their efforts. To date, over 80 companies have become SmartWay Transport Partners, including the following NPTC members: ADM Trucking, Inc.; Bridgestone/Firestone North American Tire LLC; Cardinal Logistics Management; Frito-Lay, Inc.; JK Trucking; Michelin Distribution Services, Inc.; Smithfield Packing Transportation Co., Inc. and Gwaltney Transportation Co., Inc.; Volvo, and Schneider National, Inc. Other Partners include some of the biggest names in trucking, such as FedEx, UPS, and Yellow Roadway.

We hope that you will take the time to learn more about how your company can benefit from becoming a SmartWay Transport Partner, and we hope that you will join NPTC in supporting this innovative effort that will ultimately benefit all of us. If you have any questions, or would like additional information, please contact Bob Inderbitzen, NPTC Director of Safety and Compliance, at (203) 994-4094 or safetybitz@aol.com, or the SmartWay Transport Partnership at (734) 214-4767 or smartway_transport@epa.gov. You may also obtain information by visiting the SmartWay Transport Partnership website at www.epa.gov/smartway.

Thank you for your interest.

Gary Petty
President & CEO
National Private Truck Council

Mitchell Greenberg
Program Manager
U.S. EPA SmartWay Transport Partnership

SmartWay Marketing Statement

SmartWay®
U.S. Environmental Protection Agency

There are many ways to ship goods. This is the smartest way.

1. What is SmartWay?

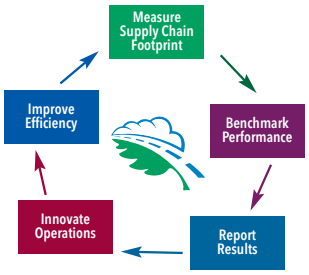
SmartWay is an innovative, voluntary, public-private, market-driven partnership. SmartWay helps companies improve their transportation supply chains – to move more ton-miles of freight with lower emissions and less energy, and at a lower cost. It helps companies gain a competitive edge and enhance their corporate image.

2. Who can join SmartWay?

Since 2004, 3,000 of the nation's shippers, logistics companies, truck, rail, barge and multimodal carriers (including many Fortune 500 companies) have registered with SmartWay. SmartWay carriers now account for 22% of all trucking miles. SmartWay is actively working to expand to all freight modes.

3. How does SmartWay work?

SmartWay gives its partners a consistent set of EPA-tested tools to make informed transportation choices – to help them measure, benchmark and report carbon emissions, and improve supply-chain efficiency and environmental performance. SmartWay helps its partners exchange reliable and credible performance data and accelerate adoption of advanced technologies and operational practices.



4. What results have SmartWay partners achieved?

Since 2004, SmartWay partners have eliminated **51.6 million** metric tons of CO_2, **738,000** tons of nitrogen oxides and **37,000** tons of particulate matter. They've saved **120.7 million** barrels of oil and **$16.8 billion** in fuel costs. This equals taking more than **10 million** cars off the road for an entire year.

5. How do SmartWay partners meet customer and stakeholder needs?

In a rapidly changing business landscape, SmartWay partners demonstrate to customers, clients and investors that they are taking responsibility for the emissions associated with moving goods. SmartWay partners are committed to corporate social responsibility and sustainable businesses practices, and are reducing their carbon footprint.

6. How do SmartWay partners benefit North America?

By moving goods in the cleanest, most efficient way possible in the U.S. and Canada, SmartWay partners protect the environment, enhance North America's energy security and foster economic vitality.

7. What additional benefits are there for SmartWay partners?

SmartWay partners are part of an alliance that includes Canada and a global network of Green Freight programs. SmartWay partners can network with their peers and share success stories. They gain access to public events and forums in which partners showcase their achievements. And SmartWay has market incentives, and recognition for top performers.

8. How can my company join SmartWay?

It's easy. Simply enter your freight activity data in a free, downloadable tracking and assessment tool, and submit it to EPA.

Visit epa.gov/smartway to learn more.

When you join SmartWay, you're in good company.

Some of SmartWay's shipper partners.

SHARP, Kimberly-Clark, Tyson, Walgreens, IKEA, hp, JCPenney, kraft foods, Johnson & Johnson, Nike, Lowe's, SC Johnson

What some shipper partners say about SmartWay.

"At Kimberly-Clark, we see SmartWay as both good environmental policy and good business. The transportation strategies that SmartWay recommends are saving us fuel, lessening our carbon footprint, and making a big difference in bringing us closer to our sustainability goals."

Stelios Chrysandreas
Transportation Manager, Kimberly-Clark

"We encourage shippers, carriers, and logistics providers to get involved in SmartWay and use it to the maximum because participation will make your operation both more environmentally efficient and more economically effective."

Mike Cole
Senior Director, North America Transportation, Kraft Foods

"We're serious about our responsibility to the environment, which is why we joined the SmartWay Transport Partnership. The framework it provides has enabled us to evaluate, measure and reduce the environmental impact of our transportation operations in a more comprehensive and strategic way. Specifically, SmartWay has helped us reduce fuel usage and greenhouse gas emissions, and improve our operational efficiency."

Kevin J. Igli
SVP and Chief EHS Officer, Tyson Foods

"SmartWay has been a great partner in helping us implement best practices in our environmentally focused fleet management."

Jesus Garciarivas
American Logistics, Hewlett Packard

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Any way you ship it, move it the SmartWay.

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