



SmartWay[®] Transport Partnership:

Driving Data Integrity in Transportation Supply Chains





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Transportation and Climate Division
Office of Transportation and Air Quality
U.S. Environmental Protection Agency



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“On behalf of the EPA and the SmartWay Transport Partnership, I am pleased to provide *SmartWay Transport Partnership: Driving Data Integrity in the Supply Chain Industry*. This document is a compilation of best practices used by SmartWay Partners to assist with freight efficiency-related data collection, management, and quality assurance procedures.

The best practices outlined in this document will assist EPA and its industry partners in critical and efficient supply chain data management operations around the world.”

Christopher Grundler, Director
Office of Transportation and Air Quality
U.S. Environmental Protection Agency



SmartWay is a voluntary collaboration between the U.S. Environmental Protection Agency (EPA) and the business community (e.g., truck and rail carriers, shippers, logistics companies¹) to improve fuel efficiency and reduce environmental impacts from moving goods. Established by EPA in 2004, SmartWay is the only voluntary program working across the entire freight system to comprehensively address key national economic, energy, and environmental goals related to goods movement and freight sustainability. Environmental, state, and community groups rely upon SmartWay's clean air achievements in protecting Americans' health and well-being.

The freight industry uses price and on-time signals to assess its performance, but has historically lacked the necessary data to track its progress in environmental performance. In today's increasingly competitive global economy, corporations need to assess their carbon and criteria pollutant emissions consistently across their global supply chains. SmartWay performs this role by transforming the environmental cost of goods movement into an environmental performance factor that can be

1. Logistics companies include both third-party logistics providers (3PLs) and consultants (4PLs). Logistics companies charge a fee for supply chain services, including but not limited to transportation, distribution, warehousing, and customs clearance services. 3PLs are non-asset-based logistics companies.

uniformly quantified and ranked. The environmental performance factor is available to carriers, logistics companies, and shippers to help them make informed choices.

The environmental performance data that SmartWay generates allow the market to function in ways that drive environmental benefits:

- Carriers can cut costs, benchmark both internally and against peers to improve efficiency, and attract customers looking for environmentally preferred ways to move their goods.
- By identifying greener carriers or modes, shippers can make choices to reduce their carbon footprint and improve supply chain efficiency.

EPA is proud of the work that registered SmartWay Partners do every day to reduce fuel use and emissions. These efforts are good for their bottom lines. Since 2004, SmartWay Partners have saved 65 million barrels of oil, equivalent to taking 5 million cars off the road for an entire year. SmartWay Partners have also demonstrated their commitment to sustainability. SmartWay Partners have collectively reduced carbon dioxide (CO₂) by 28 million metric tons as well.

SmartWay Serves Domestic and International Freight Communities

More than 3,000 of the nation's shippers and truck carriers—including many Fortune 500 companies and Class 1 rail 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.

SmartWay's drayage program extends the benefits of cleaner, more efficient vehicles and equipment with tools designed specifically to help protect the health and well-being of citizens, especially in low-income communities near ports, truck stops, and borders. SmartWay also complements EPA regulations: SmartWay's experience in demonstrating new technologies and test procedures to evaluate trucks and truck components also helped to inform our nation's first-ever greenhouse gas and efficiency standards for freight trucks.

Through SmartWay, EPA has also provided technical and policy assistance to international agencies and foreign governments launching their own green freight programs:

- SmartWay in Canada was launched through a formal U.S.-Canada agreement.
- Mexico launched *Transporte Limpio*, modeled on SmartWay.
- China adopted a \$17 million green freight program using SmartWay technology transfer and market mechanisms demonstrated via a city pilot that SmartWay helped to develop and support.
- Green Freight Europe is working to emulate the benefits of SmartWay in an industry-driven non-governmental structure.
- The United Nations Environment Programme selected a SmartWay-like green freight program as a key climate initiative for developing regions under the Climate and Clean Air Coalition to Reduce Short-Lived Climate Pollutants (CCAC).²

2. CCAC supports efforts to rapidly reduce short-lived climate pollutants. These actions protect public health, food and energy security, and climate. For more information, visit CCAC's website: <http://www.unep.org/ccac/>.

SmartWay Strives to Lead Industry in Transportation Data Integrity

SmartWay's success depends on measuring and documenting emissions savings. Thus, it is critical that SmartWay Partners enter their data into the tools accurately and completely. Data accuracy and completeness also serve SmartWay Partners in turn, who can use SmartWay data outputs to assess the benefits of their investments in technologies and strategies to reduce their emissions.

EPA and its SmartWay Partners have joined forces to develop and implement a number of data quality assurance best practices to ensure SmartWay's data integrity. This document presents these practices and strategies to help readers in their own efforts to collect, manage, and assure the quality of their SmartWay-related data. The best practices outlined in this document can assist EPA and its partners in continuing to achieve our objectives, and in promoting best practices in supply chain data management more broadly. The latter is an important goal since supply chains are interlinked across industries and globally.

Thanks to the shared wisdom of these SmartWay Partners, the best practices in this document will help support more accurate, consistent, and reliable information across business supply chains. This will contribute to greater efficiency of transportation supply chain networks.

SmartWay Best Practices Ensure Data Quality

SmartWay drives data quality in transportation supply chain reporting for SmartWay Partners and the freight industry. SmartWay visits a cross-section of SmartWay Partners to assess their data collection methodologies and processes and uses the results to share best practices more widely. In addition, SmartWay regularly performs reasonableness checks compared to industry norms, year-over-year comparison reports, and reviews of its reporting tool submissions. SmartWay also provides up-to-date guidance on data that businesses need to calculate carbon footprints for transportation supply chains.

SmartWay Data Flow and Integrity Check Process



SECTION 1

SmartWay Data Flow and Integrity Check Process

1.1

SmartWay provides appropriate assessment tools for each supply chain mode

SmartWay provides tailored carrier and shipper assessment tools for different modes of moving goods. Available carrier modes include truck, rail, logistics, and multi-modal (truck/rail/logistics). Companies engaged in the same type of business, with similar equipment types and operations, can use these tools to compare their environmental progress over time and against peers.

Carriers input data into their carrier reporting tool for each applicable fleet or business unit level that a shipper can easily identify. For truck carriers, this is typically at the trucking fleet level. The multi-modal, logistics, and shipper reporting tools import carrier performance data, multiplied by each carrier's share of that shipper's freight, providing shippers with a composite weighted average of their emissions performance.

Carriers collect information, such as fuel used, miles driven, truck and engine model year, and cargo payload, and input it into the reporting tool to calculate freight environmental performance. The reporting tools generate outputs in grams-per-ton-mile or gram-per-mile allowing for emissions rankings within each mode of moving goods. The tools enable partners to integrate those data into a single environmental performance profile. They

can also see how their environmental performance profile changes from year to year as a result of the measures they take to reduce emissions and to improve efficiency.

The following charts illustrate the steps partners use to capture and report their data, starting from goods movement through the completion of the SmartWay reporting tool.

Once partners complete and submit their reporting tools, SmartWay quality-checks the data, enters the data into a database, and calculates their company emissions score. SmartWay then sorts the scores from low (best) to high (worst) and posts the ranked scores in a performance ranking report on the SmartWay website. This ranking system replaces what otherwise would be a black box or worse—thousands of individual carriers and shippers trying to provide and obtain this information absent uniform metrics, emission factors, or consistency in data integrity and organization.

Figure 1.1: Best Practices Example of Carrier SmartWay Data Flows

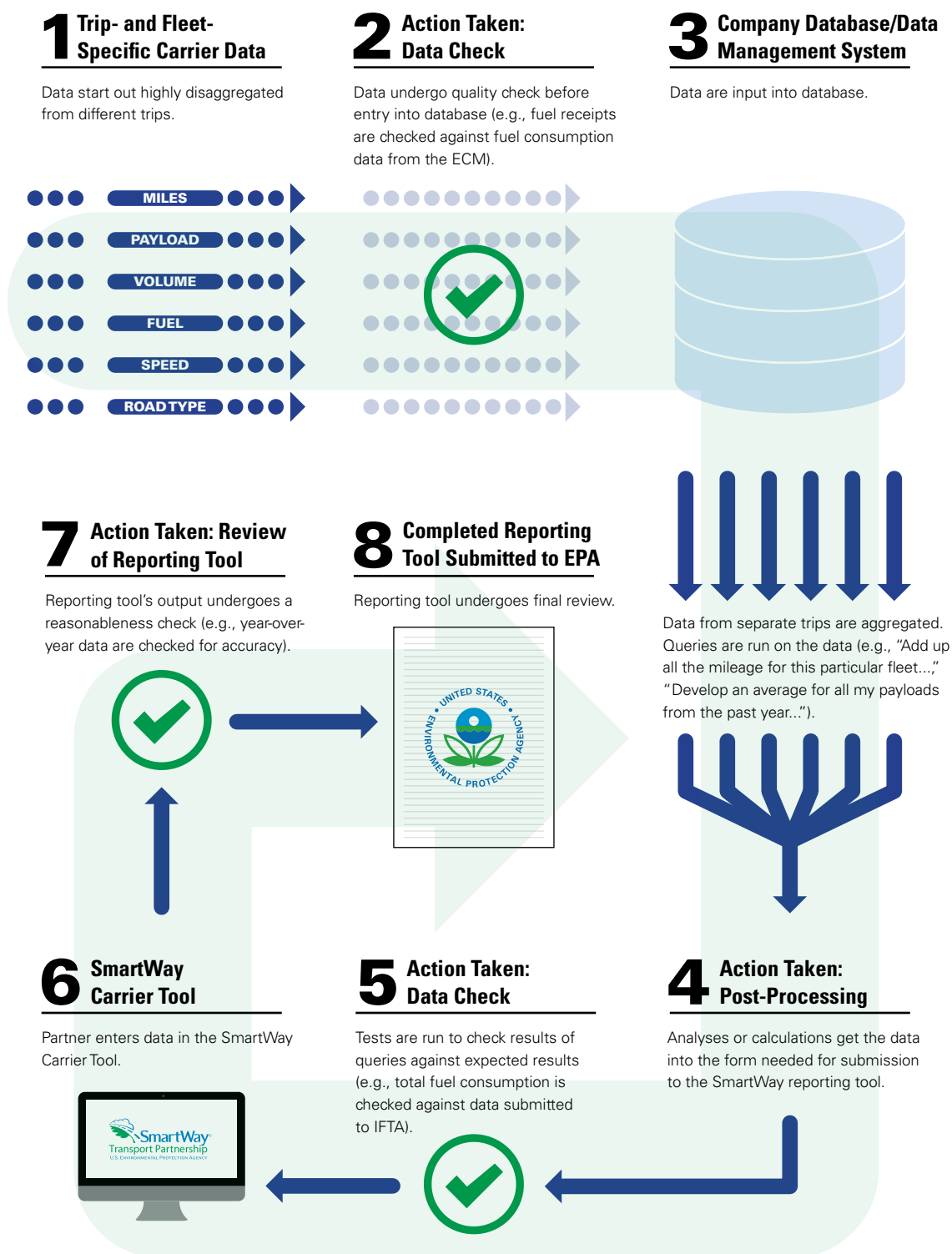
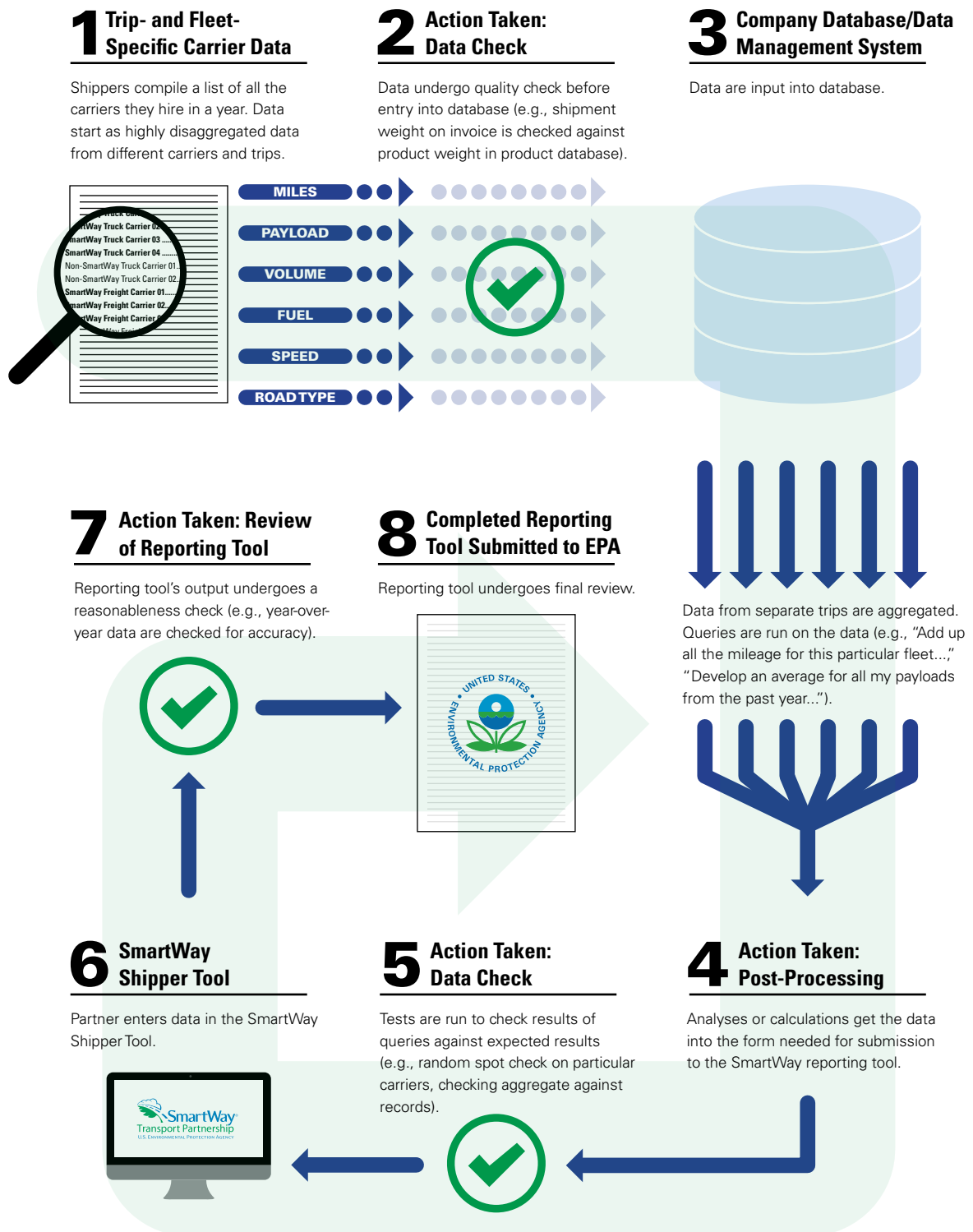


Figure 1.2: Best Practices Example of Shipper SmartWay Data Flows



1.2

SmartWay Partners submit transportation data for the supply chain carbon footprint

All SmartWay Partners agree to voluntarily report information to SmartWay about their freight-transportation-related environmental performance by completing and submitting information every year into the SmartWay reporting tool. Partners include descriptive quantitative information about their fleet, company or business unit, fleet activity, and changes in performance with regard to vehicle miles traveled, fuel consumption, and payload.

Truck and multi-modal carriers submit the following data:

- Total miles driven
- Revenue miles versus empty miles
- Road speed and operational characteristics
- Total fuel consumed
- Alternative fuel (e.g., biodiesel, natural gas) consumed
- Number of trucks by class
- Fuel and payload by truck class
- Truck model engine year
- Payloads
- Trailer capacity volume and utilization
- Average idle-hours per truck

Shipper and logistics companies submit some combination of the following information for each of their carriers:

- Ton-miles driven
- Total miles driven
- Payload
- Number of loads
- Type of cargo by commodity group

Shippers and logistics companies all need to specify the percentage of their freight shipments that are provided by SmartWay and non-SmartWay partners in order to calculate their percentage SmartWay value. The percentage SmartWay value reflects the percentage of total emissions attributable to SmartWay carriers. These values are calculated based on miles or ton-miles driven. Shippers have the additional option of calculating their SmartWay value based on the percentage CO₂ generated by their carriers, or by a custom metric.

These data elements enable shippers and logistics companies to calculate their carbon footprints. They also serve to:

- Encourage greater use of high-performing SmartWay carriers, thereby increasing the shipper or logistics company's contributions to SmartWay program benefits (i.e., higher SmartWay values).
- Encourage carrier or mode shifts to improve the shipper or logistics company's composite emissions score.

1.3

Accuracy is critical to data quality across all industries that move goods

SmartWay collaborated with stakeholders and industry experts in developing the SmartWay Partner reporting tools. EPA conducted an Agency peer review on the beta versions³ of the reporting tools. This peer review process included a review of the data sources, calculation methodologies, usability, and guidance for partners on how to collect and submit data to ensure that submissions are consistent and accurate.

SmartWay has also implemented a number of data quality control checks to ensure data integrity. After partners submit data using the reporting tools, SmartWay performs a comprehensive review and cross-check of partner data before accepting the data submission. The reporting tools that partners use to submit their data also have rigorous automated internal data quality assurance controls, which include reasonableness checks based on industry norms and annual data comparison reports to ensure year-over-year consistency. These data quality assurance controls help partners recognize data input errors before submitting the reporting tool.

SmartWay has developed a data verification program to assess the quality of partner data collection and verification procedures. To verify the integrity of SmartWay data submissions, a sample of partners from a cross-section of freight industries is invited to participate in data verification interviews. EPA staff visit these partners to observe and record the processes and safeguards they maintain to collect, handle, check, manage, track, and preserve the data they submit to SmartWay. During these visits, EPA

3. A beta version is a program or an application that contains most of its major features, but is not yet complete. Often these versions are released to a select group of people for testing purposes. Testers generally report any errors they encounter or changes they would like to see before the final version is released to the public.

meets with key staff involved in data collection and reviews how their data management and quality assurance measures function. EPA also shares its SmartWay data verification best practices with these partners to ensure that they understand SmartWay expectations for verifying the integrity of their data submission.

Using the information shared during the site visits, EPA assesses whether its SmartWay guidance or tools need to be refined. As part of its overall data integrity system, EPA also obtains industry-wide data from a variety of credible sources against which to compare and validate partner data.

EPA is always looking for ways to recognize SmartWay Partners that take the lead in ensuring transportation supply chain data quality. Participating in the data verification program is a way for partners to demonstrate their commitment in this area.

Finally, EPA provides aggregated SmartWay program data to its program participants, and to the public through various means, including the EPA Trends, Indicators, and Partner Statistics (TIPS) Web page.⁴ This ensures the transparency of SmartWay program data. By disseminating SmartWay program data to stakeholders and across industry, academia, governmental agencies, and the general public, EPA provides additional opportunities for assessment, analysis, and commentary of SmartWay program data.

4. Visit the SmartWay TIPS Web page at <http://www.epa.gov/smartway/tips/index.htm>.





2.1**Physically secure transportation supply chain data**

SmartWay Partners using best practices in data quality assurance/quality control (QA/QC) have a set of policies and procedures in place to ensure the physical security of their transportation supply chain data. Strategies employed include the following:

- Limit access only to those who input the data and those who use the data. Give other employees, at most, read-only access to this information.
- Require a password to access the data, and regularly change the password (e.g., every 90 days).
- Employ a rigorous data backup process and have a data recovery system in place.
- Cite data sources so that users know where to go to retrieve the information should a computer malfunction or disaster occur (e.g., a system crash or some other physical or natural calamity).

- Maintain computer-generated backup copies of all SmartWay-related data and data sources regularly (e.g., every month), and store copies at one or more remote locations. For example, the data might be stored on a jump drive that is kept in a security box where the company does its banking.

Kimberly-Clark Best Practices Increase Efficiency and Security

Kimberly-Clark Corporation (K-C), with its North American Transportation team in Knoxville, Tennessee, has been a SmartWay Partner since 2006. Upon joining SmartWay, K-C's most immediate objectives were to improve communications and gain efficiencies among the fleets it hires. Today, 99 percent of K-C's miles and 96 percent of its shipments are made with SmartWay carriers. K-C made a significant new investment in its transportation management system (TMS) software, enabling the company to improve freight mode selection and increase intermodal utilization and savings. K-C has expanded intermodal utilization by 117 percent, going from 42,141 loads in 2006 to 91,353 by the end of 2012.

K-C has established a set of principles that govern all applications and user access. Violators of those principles are subject to disciplinary action, up to and including termination

“ 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 at Kimberly-Clark

Kimberly-Clark Best Practices

Increase Efficiency and Security *(cont.)*

of employment and legal action. Security incident and event management solutions monitor for unauthorized access or events and are reviewed in a timely manner. Access to systems, applications, and data is granted only after approved authorization from system owners for each respective system or application. All production servers and telecommunications equipment are in segregated, secure locations that meet physical control standards.

K-C is a three-time SmartWay Excellence Award winner.

Lowe's Employs a Variety of Measures to Secure Transportation Data

Lowe's Companies, Inc., has been a registered SmartWay Partner since 2005. Lowe's has taken extensive measures to protect the security and integrity of its data. Lowe's has controls in place to limit data transfer via both external hardware and email. Lowe's has a formal disaster recovery system in place as well.

2.2

Establish effective systems to ensure that data gathering, input, and SmartWay reporting processes are consistent, reliable, and timely

Quality methodologies

SmartWay Partners employing data QA/QC best practices have policies and procedures in place to ensure data quality in all business processes, specifically in the areas of data collection and storage, recording, and reporting. SmartWay-related data review and verification are integrated into the quality management methods as well. Quality methodologies used by partners include registration to ISO⁵ standards. Many also implement Lean practices⁶ and Six Sigma,⁷ along with other institutional practices and controls developed to ensure and enhance corporate governance and accountability. Some of these may be specific to a given industry. Quality methodologies used in combination with the SmartWay reporting tool help ensure an efficient and robust operation.

Standard operating procedures (SOPs)

SmartWay Partners using best practices in data QA/QC also have comprehensive, up-to-date documented SOPs in place for collecting,

5. ISO is the International Organization for Standardization, located in Geneva, Switzerland. ISO promotes the development and implementation of voluntary international standards, both for particular products and for environmental management issues.

6. Lean practices target and eliminate the expenditure of resources for any goal other than the creation of value for the end customer. Lean is a set of practices and procedures that assist in the identification and elimination of waste. (Lean manufacturing. In Wikipedia. Retrieved July 12, 2013, from https://en.wikipedia.org/wiki/Lean_manufacturing.)

7. Six Sigma is a set of tools and strategies to improve the quality of process outputs by identifying and removing the causes of errors and minimizing variability in manufacturing and business processes. (Six Sigma. In Wikipedia. Retrieved July 12, 2013, from https://en.wikipedia.org/wiki/Six_Sigma.)

storing, and reporting data. These SOPs include worksheets that document the queries and tables used to fill out the reporting tool pages. The worksheets also show how to input the data into each reporting tool page, with accompanying step-by-step instructions. Having SOPs makes it very easy for anyone to step in and complete the SmartWay reporting tool with minimal prior training on the program.

In addition, standard work instructions are developed to document the step-by-step process in greater detail, including screen shots of key reporting tool screens, to ensure comprehensive process understanding.

Succession planning

Succession plans ensure a seamless transition in collecting and storing data should there be staff turnover in these areas. Quality-driven SmartWay Partners have trained backup staff ready to assume the duties of collecting

“ In 2009, Dow became the first major chemical company to join SmartWay. SmartWay brings government, shippers and carriers together to drive improved transportation, energy and environmental initiatives. Dow’s participation in this program makes good business sense as well as reaffirms our company’s commitment to the planet.

—Don Taylor, Dow’s corporate Vice President for Supply Chain, EH&S Operations & Operations Services ”

and submitting SmartWay data if the primary SmartWay contact has a change in duties or leaves the company. Additionally, these partners inform SmartWay of the new contact.

Dow Chemical Uses Management of Change Procedures to Ensure Consistency in SmartWay Submission

The Dow Chemical Company (Dow), based in Midland, Michigan, has been a SmartWay Partner since 2009. Dow created and uses a quality management system to ensure the quality, reliability, and integrity of Dow's products and services. The system was designed to help ensure strict adherence to specifications, as well as regulatory and quality requirements.

Dow also has a formal management of change (MOC) procedure that is applied to all personnel, process, and procedure changes, including formal succession plans for key positions. MOC requires a formal, documented hand-off of responsibilities from the person leaving the position to the new person entering the position. This process applies to SmartWay data management responsibilities as well and helps ensure that the person handling SmartWay's annual data reporting requirement understands the program.

2.3

Ensure accurate and reliable SmartWay data reporting

SmartWay Partners committed to ensuring the integrity of their SmartWay data take extra steps to ensure that SmartWay data are accurate and reliable. They:

- Provide training for staff assigned to perform SmartWay data collection and entry into the reporting tool. This training should include a review of SmartWay user guides and a review of screen demos in the reporting tools.
- Conduct periodic internal reviews on SmartWay-related data, including having multiple trained staff review the reporting tool data.
- Ensure that the SmartWay reporting tool includes data for their entire fleet. This includes all types of carriers (e.g., rail, contract, private) and all types of fleets (e.g., drayage, less-than-truckload, package delivery, refrigerated [including fuel for the refrigerator unit]).
- Perform a year-to-year comparison on the SmartWay-related data before submitting the report. Look for major discrepancies or changes in year-to-year data and analyze them. Unless the company has undergone a major expansion or has had a serious decline in business, major discrepancies (e.g., in vehicle miles traveled) may indicate data entry errors.

- Consult with the SmartWay executive contact and jointly review the SmartWay reporting tool before submitting it. The executive contact performs a detailed review of the various tool reports, asks probing questions about company data trends, and provides official approval to submit the reporting tool.
- Involve company senior management in the year-over-year review (this is also a great way to get them involved in SmartWay). Sharing this information with company senior management serves as a catalyst for crafting new environmental performance goals for the company.

“Menlo is committed to improving the sustainability of our operations. The data provided through the SmartWay partnership has enabled creative new ways to provide value to our customers by reducing freight emissions while managing cost and other service requirements. The first step to reducing the freight footprint is understanding what it is, and SmartWay has laid a foundation of understanding. Now it is the responsibility of shippers, 3PLs, and carriers to work together to make decisions that will reduce emissions today.”

—Ashton Shaw, Sustainability Engineer for Menlo

Menlo Incorporates Transportation Data into ISO Processes to Ensure Data Integrity

Menlo Worldwide Logistics (Menlo), a subsidiary of Con-way Freight, with its Transportation Analytics Department headquartered in Aurora, Illinois, has been a SmartWay Partner since 2007. Menlo is committed to reducing its carbon footprint and the carbon footprint of its supply chain.

Menlo's goal is to achieve a sustainable business model while being a good steward of the environment and the communities where it operates. Menlo strives to ensure that its sustainability principles are realized by integrating applicable processes into its lean operating culture. The results of these principles are realized through specific actions aimed to:

- Procure the most resource-efficient mode of transportation and carriers where possible.
- Partner with organizations that share comparable long-term objectives.
- Continuously improve the resource efficiency of the assets and processes Menlo controls.

Menlo Incorporates Transportation Data into ISO Processes to Ensure Data Integrity (*cont.*)

- Contribute zero waste to landfills through prevention, minimization, re-use, and recycling.
- Contribute to the communities where employees live and operate.

A SmartWay Excellence Award winner, Menlo operates 85 percent of its network miles using SmartWay carriers, with 75 percent carrier participation. Menlo has implemented a no-idling policy at its distribution centers.

Menlo is certified under ISO 14001, the standard for environmental management systems at its Aurora facility. This provides external assurance to Menlo's carbon management system, CarbonNet, which it uses for transportation emissions reporting. SmartWay data collection, tracking, reporting, reviewing, and submission procedures will become part of Menlo's ISO 14001 process in 2013 and part of its ISO auditing procedures in 2014. Finally, data from the SmartWay Logistics Tool are compared, year-over-year, by senior management before being submitted to EPA.

Best Practices for Truck and Multi-Modal Carriers



3.1**Have processes in place to ensure that freight transportation data are valid**

SmartWay Partners committed to SmartWay data integrity use accuracy checks to ensure the validity of their transportation data. They:

- **Verify satellite records against odometers, dynamic truck routing, and mileage software**

Truck routing software is not error-proof. Quality-driven SmartWay Partners know this and double-check their satellite data against their truck hardware or other dynamic mileage and routing software. Most SmartWay carriers use dynamic truck routing and mileage systems that yield better delivery mileage predictions and real-time tracking capability than traditional (i.e., static, fixed, zone, “pins on a map”) routing software programs.

- **Check data against International Fuel Tax Association (IFTA) records, fuel receipts, Electronic Control Modules (ECMs), or other verification sources to ensure accuracy**

Typically, carriers will periodically perform validation checks. Quality-driven carriers will validate their data at least quarterly, if not monthly. Some carriers take the additional step of verifying their truck records against geo-coded customer locations.

- **Check fuel use against fuel receipts or electronic fuel metering for accuracy**

This includes drayage fuel usage as well as auxiliary power unit and refrigerator unit fuel use. Carriers should verify these data on a monthly basis to ensure that records of fuel expenses are accurate. This could save the company money as errors in reported fuel usage are reduced, if not eliminated.

AD Transport Best Practices Include Verifying Miles and Fuel Data

AD Transport Express, Inc., (AD Transport) based out of Canton, Michigan, has been a SmartWay 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 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 Uses Satellite Systems to Ensure Data Accuracy

Swift Transportation (Swift) is a SmartWay Charter Partner⁸ and has been a SmartWay Partner since 2004. Swift has also been a SmartWay Excellence Award winner every year since 2007. All of Swift's trucks have satellite systems installed, and these systems continuously log all operational and trip-related information (e.g., Global Positioning System [GPS] position, empty and revenue miles traveled, and 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.

8. SmartWay Charter Partners are a select group of 15 organizations that helped EPA develop and evaluate the core principles, tools, and design of the SmartWay program.

3.2 Use effective methods to ensure data integrity

SmartWay carriers using best practices in data quality assurance/quality control employ a number of strategies to ensure the integrity of their SmartWay data. They:

- **Accurately record, track, and assess carrier fuel use**

Some carriers provide their drivers with fuel cards that automatically track their fuel purchases. Larger carriers have their own fueling facilities and dispense fuel directly to the trucks, thereby keeping all fuel use data in-house. Others use card-less fueling systems that are electronically integrated with their transportation management systems (TMSs). All of these strategies help the companies save on fuel expenses, as they can better identify and use lower-cost fueling stations. They also use this information to identify those carriers that need education and training on adopting better fuel efficiency strategies such as reduced idling.

- **Keep engine model year and truck model year information together for recordkeeping and SmartWay reporting purposes**

A truck engine does not necessarily have the same model year as the truck in which it is installed. Keeping both pieces of information together ensures accurate reporting when the time comes to enter the data into the SmartWay reporting tool.



Tip: The engine model year is not typically found in the vehicle identification number (VIN). Instead, this information is on a permanent label affixed to a visible portion of the engine. This label will contain the phrase “Important Engine Information” (or something similar) and will clearly state the model year of the engine.

- **Transmit data via satellite to software that organizes and stores ECM data (i.e., idle time, fuel use, miles driven, and other emissions-related data)**

Data are transferred directly to the company’s TMS. This minimizes the possibility for human error in the transmission of the data. Although these data transmission errors may occur, companies validate and verify those processes regularly as well.

- **Computerize shipment records to capture accurate shipment weight, dimensions, and volume**

This enables these quality-minded carriers to quickly access shipment data without having to sift through paperwork. This saves them time and money and reduces billing errors due to misinterpreted handwritten shipment documents.

ABF Freight System Uses Forklift Truck Scales and Other Best Practices for Data Accuracy

ABF Freight System, Inc. (ABF), headquartered in Fort Smith, Arkansas, has been a SmartWay Partner since 2006.

An early adopter of conservation efforts, ABF is active in programs designed to reduce both fuel consumption and carbon dioxide emissions. Since 1976, the company has been conserving fuel and reducing emissions by voluntarily limiting the maximum speed of its trucks. To promote efficiency, a strictly followed equipment maintenance/replacement program means the average age of ABF line-haul tractors is less than two years.

To ensure accuracy in data collection, shipment records are created automatically when the ABF billing department enters a bill of lading.⁹ To further reduce the possibility of data submission errors, ABF forklifts are equipped with scales to weigh shipments and computers transmit the data instantly to the company's central data system.

9. A bill of lading is a legal document between the shipper of a particular good and the carrier. It details the type, quantity, and destination of the goods being shipped. It gives title to the goods, and directs the carrier to deliver the goods to the appropriate party. The bill of lading can be used as proof of shipment for customs and insurance purposes, and as proof of having completed a contractual obligation.

“ The EPA SmartWay Transport Partnership has helped ABF gauge our actions using EPA SmartWay emissions models and reinforces our decisions to update our equipment on a regular basis. ”

— Gary Hunt, ABF's Vice President of
Equipment and Maintenance

Dedicated Fueling Cards Help Schneider National Accurately Track Fuel Purchases

Schneider National (Schneider) is a SmartWay Charter Partner in Green Bay, Wisconsin. Primarily a truck carrier, it also manages some intermodal shipping. Schneider tracks and manages fuel purchases for some 13,000 drivers. Twenty percent of the fuel is dispensed at Schneider's terminal locations. The remaining 80 percent is purchased with dedicated fuel purchase cards at negotiated prices at truck stops. As a result, information for offsite fuel purchases, including amount of fuel, is captured electronically in a central location.

Best Practices for Logistics Companies



4.1

Incorporate quality control into data input processes

SmartWay logistics companies committed to data integrity employ a number of data quality checks and processes to ensure the validity of SmartWay data. They:

- **Obtain Standard Carrier Alpha Codes (SCACs), Motor Carrier Numbers (MCNs), and U.S. Department of Transportation (DOT) numbers from their SmartWay carriers**

These SmartWay logistics companies match the carrier SCACs, MCNs, and/or DOT numbers provided to them by their carrier fleets against the associated number in the SmartWay Carrier Performance Rankings.¹¹

This process is more effective and less time-consuming in ensuring that the correct carrier fleet has been selected for entry into the SmartWay reporting tool than if the logistics company tries to identify the carrier fleet by name only.

10. Logistics companies include both third-party logistics providers (3PLs) and consultants (4PLs). Logistics companies charge a fee for supply chain services, including but not limited to transportation, distribution, warehousing, and customs clearance services. 3PLs are non-asset-based logistics companies.

11. Other ways to find the SCACs, DOT numbers, and MCNs for carriers: The National Motor Freight Traffic Association, Inc., assigns SCAC codes and publishes a directory of SCACs. Visit them at <http://www.nmfta.org>. A carrier's DOT number and MCN can be found by visiting DOT's Safety and Fitness Electronics Records (SAFER) System at <http://safer.fmcsa.dot.gov/>.

- **Use SmartWay data verification processes to check for accuracy**

Systematic checks typically include the following:

- Comparing current year SmartWay tool data against data reported for prior years to identify discrepancies in year-to-year data reported. (This can indicate errors in data collection or data reporting.)
- Using an Enterprise Resource Planning (ERP)¹² system that compares shipment, payload, and paperwork to transportation management software data to ensure that the values match.
- Checking invoiced miles against company truck routing and mileage software.
- Checking invoiced payload against product weight recorded in the ERP.
- Comparing less-than-truckload actual data against the ERP standard route data to ensure accuracy.
- Performing regular accuracy checks on carrier identification in the SmartWay reporting tool.
- Enhancing ERP systems with more searchable fields, for ease of data validation and data checks.

12. ERP is business management software that enables a company to integrate all operational processes.

Processes including manufacturing, distribution, sales, and marketing are shared to enable the smooth flow of data across all operations. Common ERP systems include Oracle, SAP, and QAD. These companies are mentioned for illustration only; this list does not constitute an EPA endorsement.

Ardmore Power Logistics Ensures Data Accuracy Through Freight Bill Audit and Pay

Ardmore Power Logistics (Ardmore), based in Westlake, Ohio, has been a SmartWay logistics partner since 2009. Ardmore provides freight management services to the energy industry and creates logistics programs tailored to the unique requirements of the energy industry.

Ardmore uses a freight bill audit and pay system in which actual data from bills of lading are used to calculate payload information. This unique freight bill audit and pay system enables the company to compare contract data to the freight bill to ensure accuracy. The system is designed to check for errors and over-charges, and actual shipment data are based on what was ordered and billed. This helps ensure that the information entered into the SmartWay reporting tool is accurate.

“Ardmore Power Logistics serves an industry which emphasizes measuring and reducing carbon emissions. The SmartWay Data Quality best practices project has been an opportunity to participate in an initiative firmly aligned with client priorities.”

—Dave Cottenden, Ardmore General Manager

4.2

Establish systems and practices to minimize errors in transportation supply chain data

Many SmartWay logistics companies use ERP systems with built-in data validity checks across all company operations. This is preferable to using multiple standalone systems covering independent operations. An ERP system enables users to better track orders, from acceptance to fulfillment. It also can match purchase orders, inventory receipts, and vendor invoices to reduce data errors. Using an ERP system will greatly improve efficiencies and reduce errors in data input into the SmartWay reporting tool. Additionally, a centralized database makes it easier to track and verify orders, from acceptance to fulfillment. Ideally, an ERP system would have multiple searchable fields in the database that link to the supporting documentation. This would allow for increased accessibility to conduct additional data validation and checks.

To calculate an accurate carbon and emissions footprint, these quality-driven logistics companies also report all carrier fleets in the SmartWay Logistics reporting tool, including private and non-SmartWay fleets.

Finally, these logistics companies record actual weight, dimensions, and volume for *all* products shipped (including the packaging). They also record actual payload (i.e., gross weight, including product, package, and pallet weight), not an estimate. This enables them to submit comprehensive actual data in the SmartWay reporting tool rather than estimated data. They choose the ton-mile option in the tool to calculate the percentage of SmartWay carriers rather than the mile option. This enables them to accurately assess their carbon footprint.

4.3

Work closely with carriers and customers to ensure that carrier transportation supply chain data are accurate and consistent

Quality-driven logistics companies work closely with their carriers and customers and employ strategies and practices to ensure that transportation data are accurate and complete. They:

- **Encourage, incentivize, or require their carriers to participate in SmartWay**

This helps in several ways. First, SmartWay carriers are more likely to keep accurate records on SmartWay-related data because of the partnership's standardized reporting requirements. Accurate carrier data ensure that the SmartWay logistics composite score will be accurate. They are also a strong indication that the carrier has internal controls in place relating to its business practices and corporate transparency. Such controls can increase a logistics company's confidence in that carrier's corporate governance and commitment to sustainability.

Encouraging, incentivizing, or requiring carriers to register with SmartWay also tends to help logistics firms submit their reporting tool on time, since carrier reporting due dates occur before logistics tools are due. This enables logistics firms to easily obtain SmartWay-related data on their carriers by finding them in the SmartWay Carrier Performance Rankings file.

- **Work with SmartWay carrier partners to complete and submit their SmartWay reports**

This practice enables SmartWay logistics companies to locate their carrier partners in the SmartWay Carrier Performance Rankings. Logistics companies that do not work with their carriers to get their data submitted on time may have difficulty in getting their own reporting tools completed because some carriers may delay submitting their information. Once the deadline has passed for the carrier to submit its tool, the carrier is dropped from the SmartWay Carrier Performance Rankings and is no longer in good standing with SmartWay. If that occurs, logistics companies may not count those carriers as SmartWay carriers.

- **Reward carrier partners for best practices in data quality**

Another strategy used by some SmartWay logistics companies is a carrier scorecard. These SmartWay Partners reward carriers that score high in error-free invoicing and error-free payload submissions.

- **Encourage shipper customers to join SmartWay**

This ensures that shipper-contracted carriers managed by the logistics company are also encouraged to join SmartWay. Once a company is registered, it will be more likely to keep accurate records.



Best Practices for Shippers



SECTION 5

Best Practices for Shippers

5.1 Quality-check SmartWay data inputs

Shippers committed to data integrity employ a variety of practices to ensure that their freight transportation data are accurate and complete. They:

- **Obtain Standard Carrier Alpha Codes (SCACs), Motor Carrier Number (MCNs), and U.S. Department of Transportation (DOT) numbers from their carriers**

These shippers match the carrier SCACs, MCNs, and/or DOT numbers provided to them by their carrier against the associated code or number in the SmartWay Carrier Performance Rankings for their company-named fleets.¹³ This process is more effective and less time-consuming in ensuring that the correct carrier fleet has been selected for entry into the SmartWay reporting tool than if the shipper tries to identify the carrier fleet by name only.

13. Other ways to find the SCACs, DOT numbers, and MCNs for carriers: The National Motor Freight Traffic Association, Inc., assigns SCAC codes and publishes a directory of SCACs. Visit them at <http://www.nmfta.org>. A carrier's DOT number and MCN can be found by visiting DOT's Safety and Fitness Electronics Records (SAFER) System at <http://safer.fmcsa.dot.gov/>.

- **Use SmartWay data verification processes to check for accuracy**

Best practices in systematic checks typically include the following:

- Comparing current year SmartWay tool data reported against SmartWay data reported for prior years to identify discrepancies in year-to-year data reported. (This can indicate errors in data collection or data reporting.)
- Using an Enterprise Resource Planning (ERP)¹⁴ system that compares shipment, payload, and paperwork to transportation management software data to ensure that the values match.
- Checking invoiced miles against company truck routing and mileage software.
- Checking invoiced payload against product weight recorded in the ERP.
- Comparing less-than-truckload actual data against the ERP standard route data to ensure accuracy.
- Performing regular accuracy checks on carrier identification in the SmartWay reporting tool.

14. ERP is business management software that enables a company to integrate all operational processes.

Processes including manufacturing, distribution, sales, and marketing are shared to enable the smooth flow of data across all operations. Common ERP systems include Oracle, SAP, and QAD. These companies are mentioned for illustration only; this list does not constitute an EPA endorsement.

5.2

Use tools to minimize errors in transportation supply chain data

Many shippers that employ data quality best practices use ERP systems with built-in data validity checks across all company operations. This software tool enables users to better track orders, from acceptance to fulfillment. It also can match purchase orders, inventory receipts, and vendor invoices to reduce data errors. Having an ERP system in place will greatly enhance data quality and will reduce SmartWay reporting tool data input errors.

Submitting actual data is also the only way shippers can assess their transportation carbon footprint accurately. Quality-driven shippers maintain records of actual weight, dimensions, and volume for *all* the products they ship (including the packaging). These shippers also record actual payload (i.e., gross weight, including product, package, and pallet weight), not an estimate. This enables them to submit comprehensive actual data in the SmartWay reporting tool rather than estimates. They also calculate their percentage of SmartWay carriers using miles or ton-miles, rather than on dollars spent on SmartWay carriers or based on the percentage of weight allocated to SmartWay carriers.

Sharp Electronics Uses ERP System to Ensure Data Validity and Effective Business Processes

Sharp Electronics Corporation (Sharp), based in Mahwah, New Jersey, has been a SmartWay Partner since 2004. Sharp has a strong environmental focus, is ISO 14001 certified, and requires all of its carriers to participate in SmartWay.

Sharp uses a comprehensive ERP system to store all of its business process data. Customers' orders are submitted directly into this system, processed, and transmitted directly to the transportation management system (TMS) where the order is optimized, routed, and assigned to a carrier. The shipment information is then electronically submitted to the warehouse management system for shipment and returns shipment-specific information back to the ERP system.

Sharp Electronics Uses ERP System to Ensure Data Validity and Effective Business Processes *(cont.)*

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 within the ERP system when there are discrepancies. These errors are investigated to determine the nature of the problem, root-cause analysis, and implementation of countermeasures to 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. As a result of these many controls, Sharp is able to confidently and efficiently analyze these data and identify, plan, and execute strategies that reduce greenhouse gases and strengthen its bottom line.

5.3

Work closely with carriers to ensure the validity of carrier freight transportation supply chain data

Quality-driven SmartWay shippers work closely with their carriers and logistics companies and employ strategies and practices to ensure that transportation data are accurate and complete. They:

- **Encourage, incentivize, or require their carriers to participate in SmartWay**

This helps in several ways. First, SmartWay carriers and logistics companies are more likely to keep accurate records on SmartWay-related data because of the SmartWay reporting requirement. Accurate carrier and logistics company data ensure that the SmartWay shipper composite score will be accurate. It is also an indication that the carrier or logistics company has internal controls in place relating to its business practices and corporate transparency. Such controls may increase a shipper's confidence in that carrier's corporate governance and commitment to sustainability.

Finally, encouraging, incentivizing, or requiring their carriers and logistics company partners to participate tends to help shippers submit their SmartWay reporting tool on time; carriers and logistics companies must submit their data to SmartWay before shippers submit their data to SmartWay. This enables shippers to easily obtain SmartWay-related data on their SmartWay carriers and logistics company partners by finding them in the SmartWay Carrier Performance Rankings.

- **Work with SmartWay carrier and logistics company partners to complete and submit their SmartWay reports**

These SmartWay shippers also work closely with their SmartWay carrier and logistics company partners to get their SmartWay reporting data submitted. Shippers that do not work with their SmartWay carriers and logistics companies to get their data submitted on time could have more difficulty getting their own tools completed. This is because some carriers and logistics companies may delay submitting their information. Once the deadline has passed for the carrier or logistics company to submit its tool, the company is dropped from the SmartWay Carrier Performance Rankings and is no longer in good standing with SmartWay. If that occurs, shippers may not count those carriers or logistics companies as SmartWay Partners in their SmartWay reporting tool.

- **Reward carrier and logistics company partners for best practices in data quality**

Another common best practice is the use of a carrier scorecard. Some SmartWay shippers reward those who score high in, for example, error-free invoicing and error-free payload submissions.

IKEA Incorporates SmartWay Carrier Review in Bi-Annual Audits

IKEA Distribution Services, Inc. (IKEA), Westampton, New Jersey, 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, IKEA carriers must confirm that they are up to date on their SmartWay reporting tool submissions, and they must also walk IKEA staff through their SmartWay reporting tool.





For basic information about the SmartWay Transport Partnership, call the SmartWay hotline at (734) 214-4767 or email smartway_transport@epa.gov.

For information on leading freight movement industry indicators and quick facts about current SmartWay Partner performance metrics, visit the SmartWay TIPS Web page at www.epa.gov/smartway/tips/index.htm.

For the latest SmartWay Partners fleet ranking categories and emissions rates, visit www.epa.gov/smartway/partnership/performance.htm.

User and technical guidance documents are available for shippers, truck carriers, rail carriers, and logistics companies at www.epa.gov/smartway/partner-resources/index.htm.

EPA is committed to protecting human health and the environment. The SmartWay Transport Partnership was developed with this goal in mind. EPA collaborated with the community to ensure that SmartWay achieves environmental, economic, and energy security benefits. EPA invites interested companies to join this voluntary partnership. Please visit www.epa.gov/smartway for information on how to register as a SmartWay Partner.

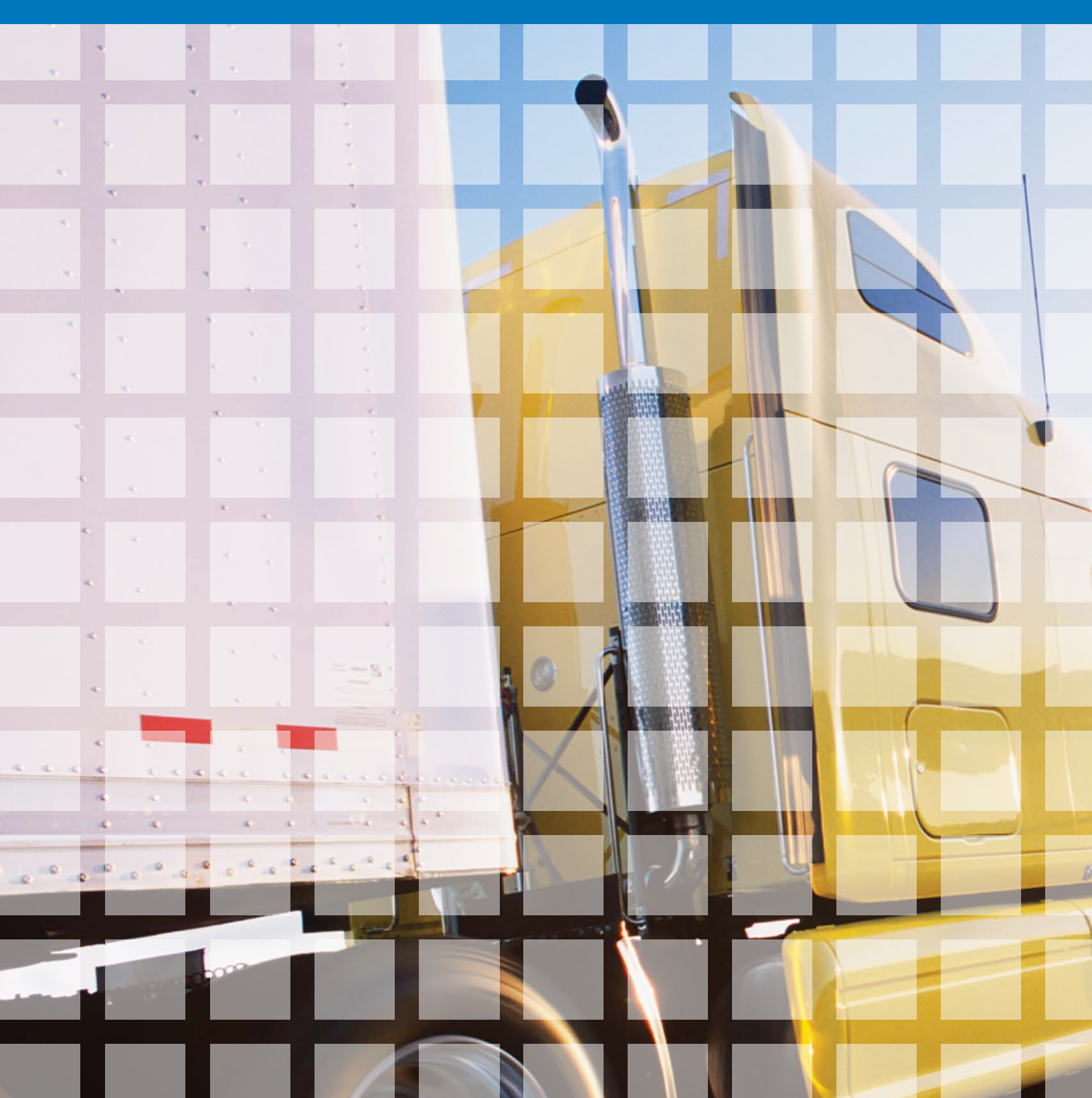
Any way you ship it, move it the SmartWay.



APPENDIX B

List of Abbreviations

APU	auxiliary power unit	MOC	management of change
CCAC	Climate and Clean Air Coalition	MPG	miles per gallon
CO₂	carbon dioxide	QA	quality assurance
DOT	U.S. Department of Transportation	QC	quality control
ECM	Electronic Control Module	SCAC	Standard Carrier Alpha Code
ERP	Enterprise Resource Planning	SOP	standard operating procedure
EPA	U.S. Environmental Protection Agency	SWI	standard work instructions
4PL	fourth-party logistics provider	3PL	third-party logistics provider
GPS	Global Positioning System	TIPS	Trends, Indicators and Partner Statistics
IFTA	International Fuel Tax Association	TMS	transportation management system
ISO	International Organization for Standardization	VIN	vehicle identification number
MCN	Motor Carrier Number	VMT	vehicle miles traveled



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