Case Study: Public-Private Collaboration Validates Methodology, Produces User-Friendly Emissions Calculator for Guiding Sustainable Freight

"Less Than Truckload" or LTL Freight

LTL freight is a form of shipping that doesn't require a retailer or manufacturer to fill an entire trailer. Instead, LTL motor carriers consolidate loads from several customers on a single trailer, striving to build economical, efficient loads. LTL shipments cover a wide range of products by weight and size, including everything from loose cargo to palletized goods.

Due to the complexities of a typical LTL freight network, it is challenging for a company to understand the emissions associated with their portion of an LTL load. In a collaboration between EPA and three of its SmartWay partners – C.H. Robinson, Estes Express Lines, and Yellow – extensive LTL network data was gathered and analyzed to estimate LTL emissions at the shipment level.

The new SmartWay LTL carbon calculator is a product of that collaboration.

This case study examines a unique collaboration that grew out of the USEPA's SmartWay program. It examines an initiative taken by three long-standing SmartWay partners and EPA to evaluate a new model developed to assess emissions at the shipment level in the less than truckload or 'LTL' freight market.

The model we evaluated was developed at the Massachusetts Institute of Technology's (MIT) Center for Transportation and Logistics (CTL) in 2014. The purpose of the model was to provide the trucking industry with a standardized approach and method that could be used to measure carbon emissions from LTL shipments.

Currently there is no publicly available method to estimate emissions from individual LTL shipments. EPA's SmartWay program does offer tools that provide an annual inventory of company-wide freight emissions at no cost. Any trucking company, logistics provider or shipper can use SmartWay's tools to calculate annual carbon emissions from a fleet of trucks, but not at the LTL shipment level. The goal of this collaboration was to establish an approach and tool to complement the fleetwide inventories that SmartWay already offers.

The LTL Collaboration

In the past decade, LTL freight has become an increasingly common form of product delivery, due to globalization, just in time inventory practices, and more recently, the growth in e-commerce. If these trends continue, and LTL freight continues to grow, it's likely that interest in shipment-level emissions from LTL freight will increase too.

C.H. Robinson is a leading global logistics provider that operates the largest LTL network in North America. In 2014, C.H. Robinson sponsored a research project at MIT's Center for Transportation and Logistics. The objective of that project was to develop a methodology to estimate carbon emissions from LTL freight shipments.

About the Partners

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

The USEPA is an executive agency that protects people and the environment from significant health risks and develops and enforces environmental regulations.

C.H. Robinson Worldwide

C.H. Robinson is a public, third-party logistics provider that annually manages $21 billion in freight across several industries, including automotive, food and beverage, health care, retail, and manufacturing. C.H. Robinson has been a SmartWay partner since 2005.

Estes Express Lines

Estes Express Lines is a private, multi-regional less-than-truckload motor carrier. It operates a fleet of 7,400 tractors and 30,400 trailers on a network of some 260 terminals. Estes has been an EPA SmartWay partner since 2004.

Yellow

Yellow Freight is a public, U.S. motor carrier that transports industrial, commercial, and retail goods. It specializes in less-than-truckload and short-haul shipping services. Yellow is a Charter SmartWay partner and has participated in EPA's SmartWay program since the program's launch early in 2004.

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Case Study: EPA's SmartWay LTL Collaboration *(continued)*

As a SmartWay partner and through engagement with its carriers, shippers and other stakeholders, C.H. Robinson recognizes freight emissions and climate change as top-ranked issues in transportation and logistics. In 2017, C.H. Robinson, along with SmartWay partners, Estes Express Lines and Yellow approached EPA to participate in a collaborative review of the LTL modelling work C.H. Robinson funded at MIT.

To support EPA's review of the model, C.H. Robinson, Estes Express Lines, and Yellow agreed to share detailed data on their LTL networks and gave EPA greater insight into their respective operations. They also shared perspectives on the value of sustainability to the freight industry. With this data and other publicly available LTL freight data, and through the collaboration, EPA was able to successfully replicate and validate the methodology used in the MIT model to estimate LTL emissions at the shipment level. EPA's analyses also yielded several options to refine and build on the initial methodological approach.

By complementing its comprehensive fleetwide assessment tools with a simple calculator capable of estimating emissions from individual LTL shipments, SmartWay's goal was to provide another way to look at freight and emissions, and to assist the industry in delivering freight more sustainably and with fewer emissions.

SmartWays's LTL Carbon Calculator

Following the basic approach and equations used in the MIT model, along with several refinements suggested by EPA, SmartWay and its collaborators took the next step, and built a new, easy-to-use calculator tool to estimate emissions from LTL shipments. The calculator applies the basic methodology used in the MIT model and the updated parameters developed by EPA through its analyses. The calculator is representative of the unique hub-and-spoke operations of a typical LTL freight network.

Importantly, only readily available data inputs, such as shipment weight, origin and destination zip codes are needed to run the calculator, making it accessible and simple to obtain carbon dioxide emissions estimates for LTL shipments. The calculator runs these key inputs through a data-driven program and generates a carbon-emissions estimate for the LTL shipment. The estimates can be obtained for one or many LTL shipments. The estimates can be used in stakeholder discussions on transparency, routing options and sustainability as well as to identify opportunities for supply chain optimization

Using the new LTL calculator, SmartWay partners active in the LTL freight market can now complement their company's annual SmartWay fleet inventories with information on the emissions generated by their individual LTL shipments.

For LTL motor carriers, the calculator tool can be used to help factor sustainability into plans to improve routing and network performance. Logistics companies can use the tool to better serve their environmentally conscious shippers. Shippers may find the new calculator useful to share shipment-level emissions data with their business and consumer customers.

Conclusion

Through this collaboration, EPA and its SmartWay partners took a step forward to advance LTL emissions accounting. Working together, we produced a simple calculator tool that offers a new sustainability metric for better transportation and logistics management. Carriers, logistics providers and their shippers now have access to a basic, easy-to-use calculator for estimating LTL shipments.

The calculator is available online through EPA's SmartWay partner portal and can be accessed at any time. The results can complement other truck and operational data that is used to establish annual inventories of carbon emissions from shipping and fleet activity. It also can be used as a planning tool to create and compare shipping scenarios for individual LTL shipments that emit less carbon.

As emissions from transportation and goods movement continue to grow relative to other economic sectors, consumers, shippers, and public agencies are putting increasing demand on the freight sector to quantify and reduce its emissions and climate impacts. Through its LTL calculator and other emissions modeling and assessment tools, SmartWay will continue to support the industry in meeting that demand.

Please visit the SmartWay website at www.epa.gov/smartway to access more case studies.

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