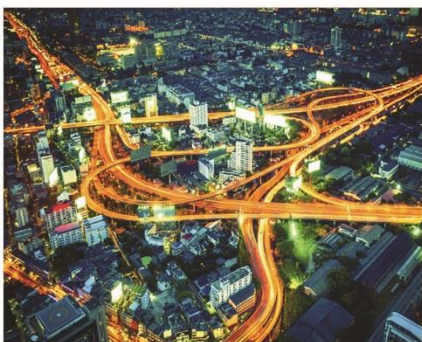




# Smart Truck Fleet Management

A holistic and systematic approach for truck  
fleet energy efficiency



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### About Smart Freight Centre

Smart Freight Centre is a global mission-driven organization dedicated to a more efficient and low-emissions global freight sector. We bring together the global logistics community to drive transparency and mobilize multinational companies and their logistics partners to take action. This is done through global industry guidelines and solutions for emissions calculation, reporting and reduction, the first of which is the GLEC Framework, and by recognizing Smart Freight Leaders. To scale our impact we are present in Europe, the Americas and Asia and collaborate with existing initiatives, partner organizations and experts worldwide.

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# Executive Summary

Significant efforts are necessary to curb emissions from global freight. While no mode should escape efforts to curb carbon emissions, road freight represents two-thirds of global freight emissions, and therefore trucks is where big gains are to be realized.

A key piece of the puzzle is mobilizing road transport operators. Improving energy efficiency and reducing emissions from truck fleets will take more than the availability of technologies and measures and legislation and standards.

A holistic and locally adaptable approach to energy management of truck fleets – Smart Truck Fleet Management - consists of five pillars: fuel management; driver and staff skills development; vehicles and maintenance; performance monitoring; and utilizing information technology. This is put into practice through Smart Transport Manager training to develop an action plan, knowledge products, and a community of Smart Transport Managers together with shippers as their customers, suppliers and other stakeholders they interact with.

Upskilled transport managers make better decisions on technology and best practice interventions. Freight operators that employ them benefit from more efficient fleets and reduced operating cost and emissions. They are likely to be preferred by leading shippers and logistics service providers that care about mitigating the climate impacts from freight.

Given the global nature of logistics supply chains, a harmonized approach to truck fleet efficiency can help to convince multinational shippers to support trucking initiatives around the world. It is recommended that the Smart Truck Fleet Management framework is adopted globally by multinationals and programs and initiatives. The approach can be adapted to the local situation to maximize local impact and global exchange.

Smart Freight Centre's aim is to work together with leading businesses, initiatives and key stakeholders towards professionalized road freight operators for fleet energy management. Efforts to decarbonize the global freight sector cannot succeed without them.



# 1. Introduction

Freight transport serves the global economy by transporting goods from producers to a growing consumer market. It is demand-driven and heavily influenced by multinational corporations (MNCs) that mostly outsource to logistics partners. According to the International Transport Forum (OECD/ITF, 2017) the sector generates 7-8% of global and 42% of transport greenhouse gas (GHG) emissions and is a major contributor to air pollution. A 19-64% reduction by 2050 is required compared to 2015 in line with the 1.5-2°C scenario agreed under the Paris Climate Agreement, and over 80% if freight growth is considered.

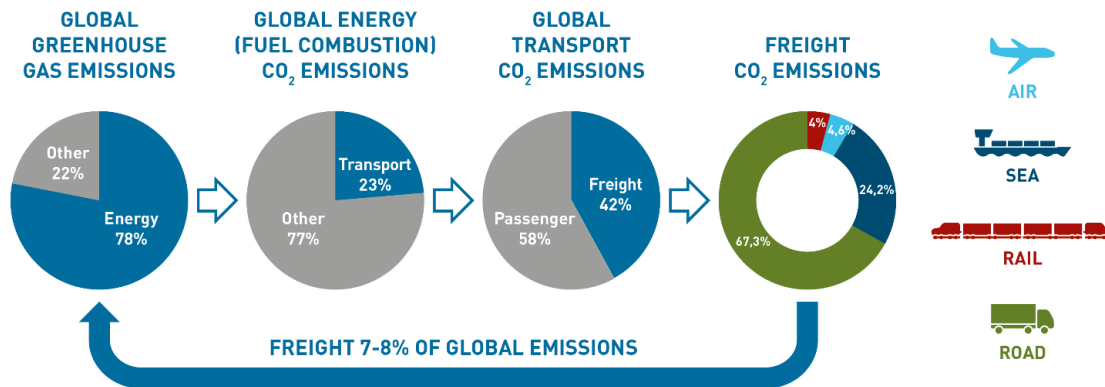


Figure 1 – Freight contribution to global GHG emissions

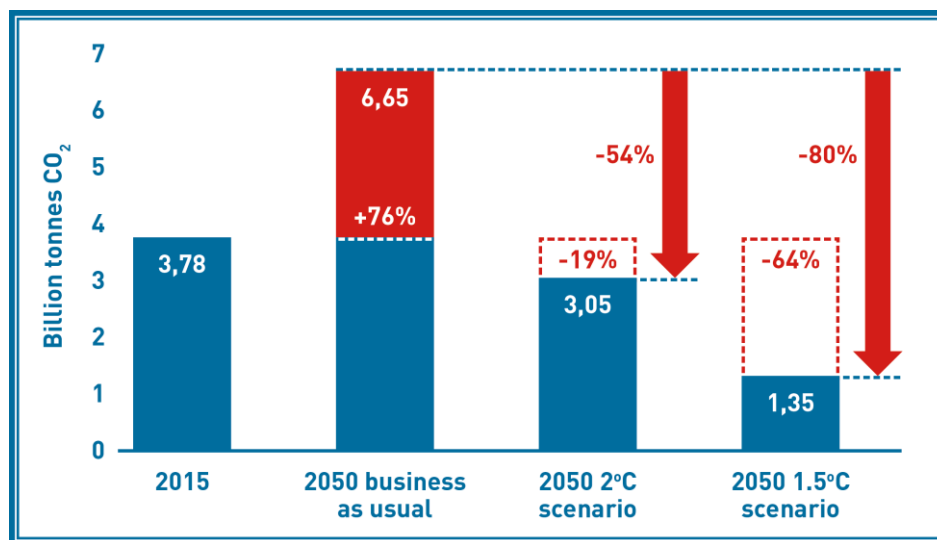


Figure 2 – Freight GHG reductions by 2050

While road holds 18% of freight tonne-km globally, two-thirds of freight GHG emissions are attributable to trucks (OECD/ITF, 2017). The truck market is changing focus towards emerging economies; by 2050, the US and EU will account for only 10% of the global truck sales, down from 20% today. Furthermore, 7% of international trade occurs within national borders, yet about 30% of total trade-related CO<sub>2</sub> is emitted here (OECD/ITF, 2017; IEA, 2013). Without further policy efforts, trucks will account for 40% of the oil demand growth to 2050 and 15% of the increase in global GHG emissions from oil (IEA, 2017). Road freight operators are predominantly large in number and small in fleet size. That fragmentation results in inefficiencies – and opportunities for savings through performance improvements. While no mode should escape efforts to curb carbon emissions, trucks is where the biggest gains are to be realized.

Under a modern truck scenario of the International Energy Agency, trucking fuel use could reduce by 50% and emissions by 75% in 2050 compared to 2015. By 2030, approximately 28% emission reductions could be achieved, but this still excludes modal shift from trucks to less carbon-intensive modes (IEA, 2017).



Solutions to reduce emissions across modes exist and include: reduce demand for freight transport, optimize freight transport modes, increase transport asset utilization, improve fleet energy efficiency, and reduce carbon content of energy (McKinnon, 2018).

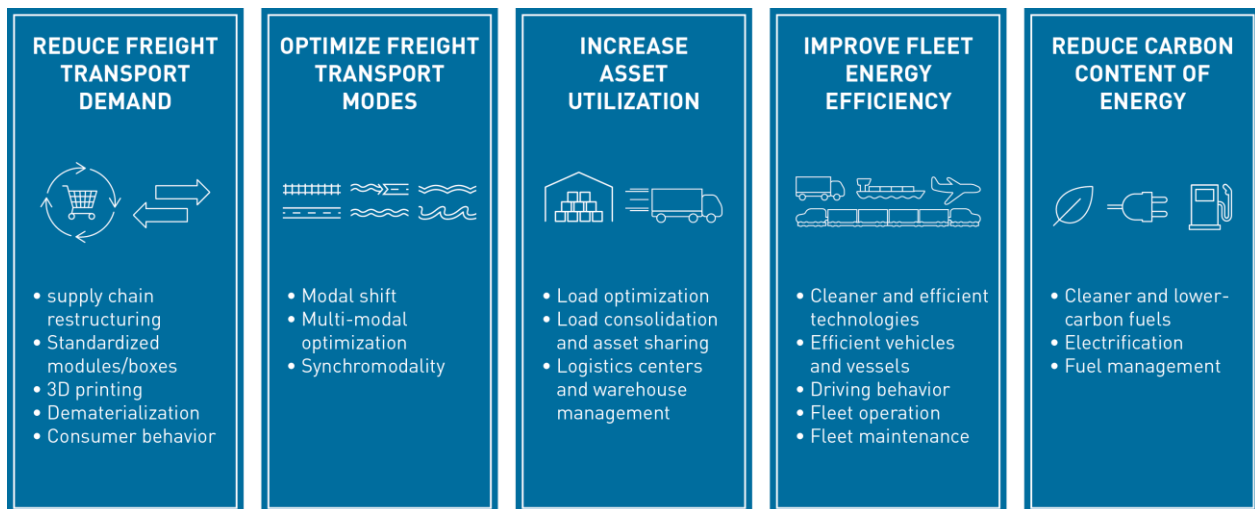
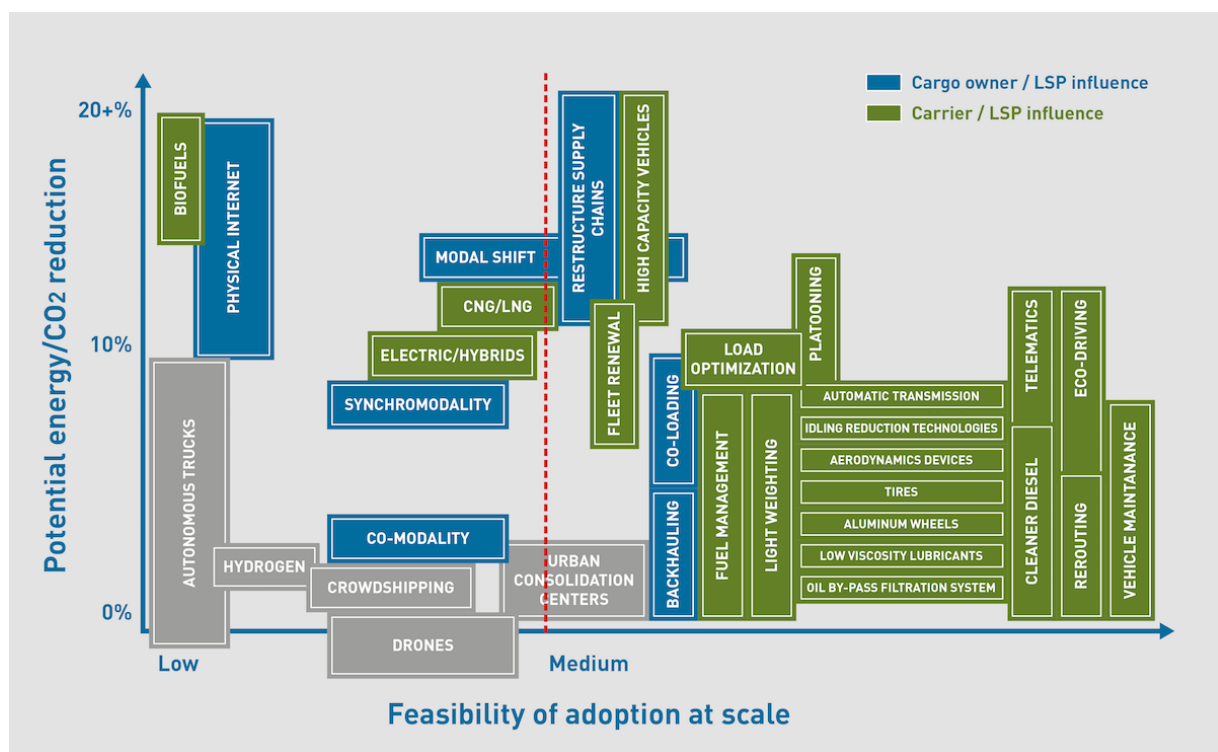


Figure 3 shows a Smart Freight Solutions Map for road freight, whereby solutions are mapped based on their potential energy or CO<sub>2</sub> reductions and the feasibility of their adoption at scale (Smart Freight Centre, 2017, based on Greening, 2016 and Cebon, 2016).



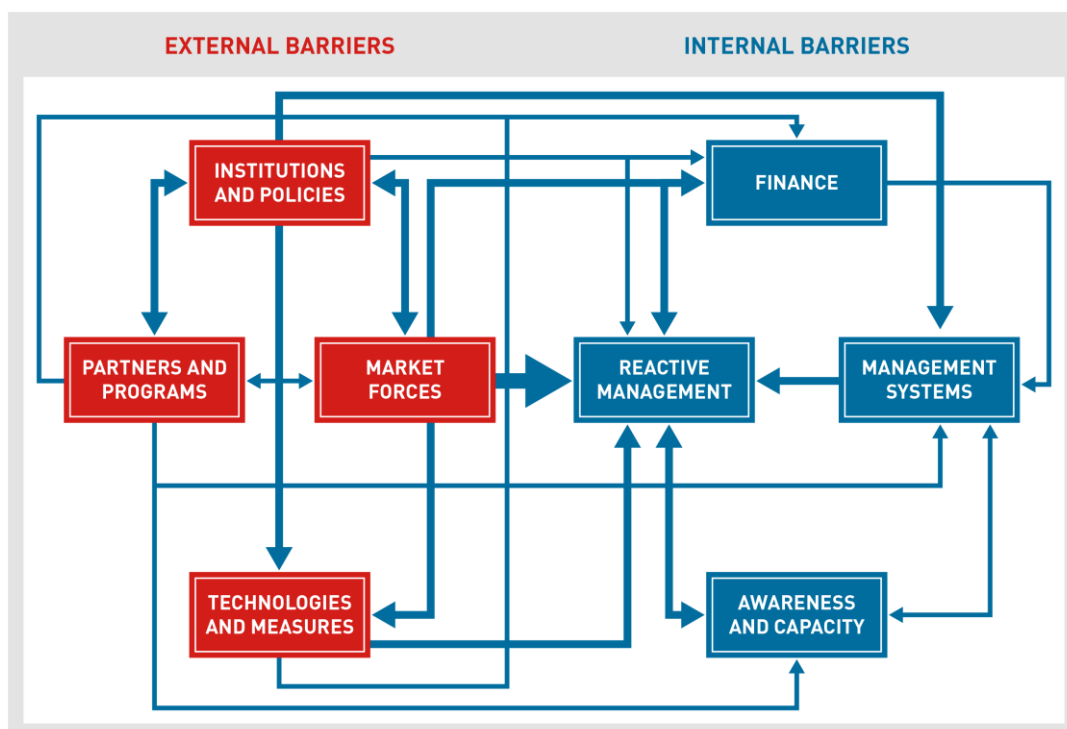
**Figure 3 – Smart Freight Solutions Map for Road Freight**

Road freight operators have the greatest influence on their fleet utilization, efficiency and choice of fuel. It is essential to mobilize transport operators to improve energy management of their truck fleets. They can benefit from fleet efficiency in numerous ways, all of which contribute to profitability: better vehicle, driver and fuel resource utilization, reduced empty running, maximizing loading by weight, volume and deck length, minimizing duplicate or lost mileage. This paper explores the barriers road freight operators face, the Smart Truck Fleet Management (STFM) framework, what is needed to implement it, lessons learned from existing initiatives, and conclusions and recommendations.

## 2. Barriers for road freight operators

Multinational shippers and logistics service providers that want to reduce their carbon footprint are to a large degree dependent on what their subcontracted transport operators do. While this is the case for all modes, this especially applies to road freight due to the many layers of subcontracting and carrier fragmentation. For example, small contractors using old vans for urban deliveries. To this end, SFC developed a map and analysis of barriers that road freight operators face to adopt fuel saving and emission reducing technologies and measures as shown in Figure 4 (Smart Freight Centre, 2017b, based on own research and ICCT, NACFE and CSS, 2013; ICCT and CE Delft, 2012; Huang et al, 2008; Zhang et al, 2014).

Barriers exist, both internal and external. Internal barriers relate to obstacles within the organization boundaries and that are mostly within management's control. There are four categories of internal barriers: reactive management, management systems, finance, and awareness & capacity. External barriers relate to outside factors and players over which road freight operators have little or no direct influence. The four categories of external barriers are: market forces, institutions & policies, partners & programs, and technologies & measures.



**Figure 4 – Barriers for Road Freight Operators**

All these barriers are interconnected and often re-enforce each other. To get a holistic understanding of existing barriers we must realize that the global freight sector is first and foremost a commercial and demand-responsive sector. Market forces, an oversupply of road freight operators and high fragmentation have created a cut-throat competitive sector that puts road freight operators under an enormous pressure to survive. This in turn contributes to reactive management within road freight operators, their ability to finance technologies and measures and invest in management systems and internal capacity building. The other external barriers further weaken road freight operators' ability to become more fuel efficient.

It is important to focus on what barriers can be realistically addressed, in a concerted effort that looks at all identified barriers holistically, while involving road freight operators, their immediate partners such as OEMs and technology suppliers and broader stakeholders such as trade associations and government authorities. First, while it is tempting to focus on market forces, this is not realistic. A better approach is to focus on barriers that road freight operators have more control over, such as management systems or awareness and capacity, or that partner NGOs and government agencies can address, such as policies and programs. Second,

addressing one barrier in isolation is not going to solve the problem. For example, a combination is needed of clear policies and technology standards which can a) build trust in technologies available on the market; b) increase fleet managers' ability to assess which technologies and suppliers are the best fit; c) improve management systems that generate data for a strong business case to management; and d) provide a solution to overcome cash flow challenges to invest. A similar approach will help the uptake of operational opportunities for fleet energy efficiency.

Many initiatives exist to help road freight operators, most importantly:

- Existing industry-backed efforts in support of technology research, testing and adoption (e.g. Centre for Sustainable Road Freight, and the University of Montevideo); an initiative backed by cargo owners/shippers European Technology Platform ALICE; and work by ACEA/IRU on the Commercial Vehicle of the Future.
- Existing platforms that promote adoption of road freight technologies and measures (e.g. Truck van de Toekomst, or "Truck of the Future" in the Netherlands (now completed), Trucking Efficiency in North America, Low Carbon Vehicle Partnership in the UK, and Green Trucks Partnership in Australia.
- Green Freight Programs that companies can join to work together on emissions measurement and reduction. Worldwide there are about 13 operational green freight programs (Smart Freight Centre, 2017c). The Global Green Freight Action Plan of the Climate and Clean Air Coalition (CCAC, 2015) aims to harmonize and spread these programs worldwide, and SFC is a leading partner in this. Some of the programs with supporting information on truck and fleet technologies and measures, and the benefits that they bring, are EcoStars in the UK and Europe (providing written and video case studies), ObjectifCO2 in France and SmartWay in the US and Canada.



### 3. Smart Truck Fleet Management

A holistic and integrated approach to energy management of truck fleets – Smart Truck Fleet Management (STFM) - consists of five pillars: fuel management; driver and staff skills development; vehicle, system and component specification and preventive maintenance; performance monitoring; and utilizing information technology. This framework was developed drawing from various programs and initiatives.

Having such a framework can help with the harmonization of different schemes for road freight operators, as well as facilitate exchange between existing local initiatives. What makes this framework unique is that it looks at the management of fleet, and not merely at the deployment of technologies. What is apparent is that that road freight operators are not equipped or experienced in managing their fleet to fully address the challenge: selecting the right vehicles, looking at the 'right' KPIs, or training drivers and staff, to name a few.

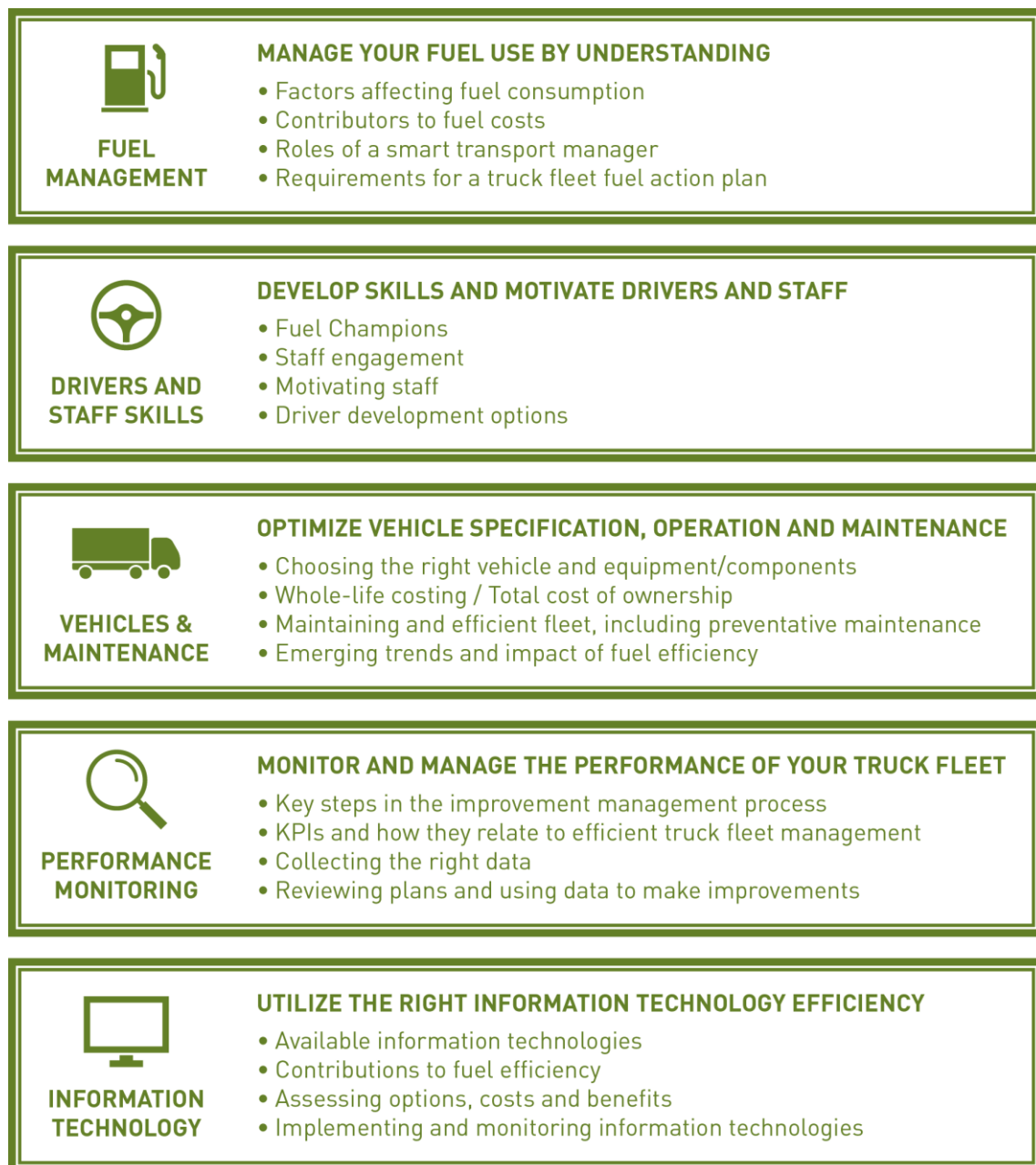


Figure 5 - Five pillars of Smart Truck Fleet Management



## 4. Implementing Smart Truck Fleet Management

Smart Truck Fleet Management can be introduced in a country or market in three ways: training course, knowledge products, and building a community of Smart Transport Managers together with their customers and partners. Evidence exists from various initiatives around the world that this works. Change at scale can be realized if it is introduced more systematically in different markets.

### 4.1 Training course: Smart Transport Manager Training

Transport managers play key roles in the operations of road freight operators as they look after the operation's resources – and are responsible for safety, compliance and customer service, as well as maximizing resource utilization and reducing operating costs. They maintain relations with customers, senior management, finance staff, maintenance staff and fitters, and drivers, amongst others. They face ongoing internal and external pressures. These include meeting customer expectations, ensuring legal compliance, minimizing their fleets' environmental impact and reducing operating costs. The key question is how do transport managers identify, evaluate and select measures and interventions to improve efficiency for their specific fleet?

A scan of existing training available to transport managers concluded that programs focus mainly on health and safety compliance issues, that programs that also deal with fuel efficiency improvement are not comprehensive, and more training exists for eco-driving which is only one element of fleet management.

The Smart Transport Manager Training was developed by Smart Freight Centre in 2017 to upskill operational transport managers. The course equips them to become elite professionals on the five pillars of efficient truck fleet management. Each participant has developed an action plan specific to the truck fleet he/she manages. An SFC specialist reviews and approves the Action Plan and prepares a supporting 'road map' to give feedback on encourage implementation of the Action Plan by the transport manager. SFC then issues a Smart Transport Manager certificate and the transport manager is admitted to the community of Smart Transport Managers.

To enable global applicability/comparability the course was developed at the European Qualifications Framework (EQF) level 4. Core training materials include a training remit, trainer guide; slide pack, case studies and an Action Plan template.

The core course can be adapted to different markets by including local examples, suppliers and relevant policies. This was done for China where the localized training has been delivered to 44 transport managers across 25 road freight road freight operators. Introducing the training in a specific market requires local partnering, content relevance review, localizing, piloting, revising and roll-out.

The training course may be sponsored or supported by stakeholders of transport operators, such as multinationals as customers of freight transportation, an industry association, or development agency. They receive an anonymized summary report for participating carriers on actions most frequently selected and the type of support needed, so that they can continue to help carriers with implementation efforts.

Smart Transport Managers continuously strive for and deliver on fuel efficiency improvements. They can do this because they have:

- The skills to assess the various aspects of fleet operations which determine fuel use
- Access to state of the art, best practice case studies
- The knowledge to develop, implement, review and promote effective fuel management action plans for their own fleets. Basic fuel management programs (like those resulting from their Action Plans), are proven to save at least 5% in the first year of implementation (UK DfT, 2009).

Benefits from the Smart Transport Manager Training and implementation of the resulting Action plan apply to:

- Transport managers that as certified Smart Transport Managers they will stand out from their uncertified peers as being more skilled, credible and professional. Over time they will be seen as attractive recruits by

the very best green road freight operators. The profession of transport managers is enhanced globally through an increased profile, respect and professionalism.

- Freight operators as employers of these transport managers as their fleets will become more efficient and operating costs are reduced. They are also likely to be preferred by leading shippers and logistics service providers that care about mitigating the climate impacts from freight.
- Multinational and national shippers and LSPs who make use of outsourced road freight services and want to find a way to mobilize reduction efforts by subcontracted carriers, ideally in collaboration with other shippers to maximize impact.
- Society, which benefits from reduced emissions and fuel consumption.

## 4.2 Knowledge products to support action plan implementation

Trained transport managers need additional knowledge products to turn their plan into practice. Support to implement action plans can take the form of, for example, guidance, fact sheets, emissions calculation tool, suppliers' lists or a combination of these. These can be tailored to different markets.

Developing these can build on the vast materials already available through existing schemes and local partners. The toolboxes of the following initiatives stand out for their practical nature and help companies make more informed purchases:

- North American Council for Freight Efficiency (NACFE) released 15 Confidence Reports that independently evaluate more than 60 fuel efficiency technologies. Technologies are rated from low to high based on the amount of information available and the payback period.
- The ObjectifCO2 program in France developed a freight best practices catalogue with 'Action Sheets' for 54 solutions tailored to four different truck types, and these were translated from French into English and Spanish.
- The SmartWay program now spans the US, Canada and Mexico. Its Technology Program tests and verifies emissions reductions and fuel savings for various available technologies, such as aerodynamics, idle reduction technologies and low rolling resistance tires. SmartWay also provides suppliers' lists for verified technologies, case studies, fact sheets, technical bulletins and educational materials on fuel-efficient technologies, fleet movement and modal shift.
- The municipality-led EcoStars program in the UK developed a fleet efficiency Road Map to help road freight operators progress through the scheme's 5-star rating system, and that covers actions in six categories.
- The SRF Optimiser, which is a web-based decision support tool that calculates GHG emissions, energy consumption and costs associated with a company's road freight transport operation. It models the effects of 29 carbon-reducing measures, the tool assesses the GHG, energy and cost implications of a range of technologies and management practices that can be applied to a transport fleet (Centre for Sustainable Road Freight).

## 4.3 Building a community

The power comes from building a growing community of certified Smart Transport Managers in different markets that can be internationally connected. Through the continued creation of knowledge products and availability through these communities, learning and exchange keeps continuing.

Interaction between transport managers will significantly enhance exchange of challenges and solutions. Events can be held online or in person, and most likely at a national level involving local partners. One possibility is workshops between (trained) road freight operators and their customers, whether multinationals or national shippers that go deeper into specific solutions that operators can implement. Depending on the solution covered in these workshops, relevant suppliers, OEMs, associations, research institutes and government agencies can be invited. These can grow into annual events coined 'Smart Trucks Day'. Another option is to hold an event linked to, for example, IRU global events, events of green freight programs, or trucking shows.

# References

- Cebon, D. (2016). Based on a slide by Dr David Cebon, Centre for Sustainable Road Freight, in his presentation at the IEA-JRC joint workshop, "The future role of trucks for energy and environment," November 8, 2016 (summary and presentations available online at: [www.iea.org/workshops/the-future-role-of-trucks-for-energy-and-environment.html](http://www.iea.org/workshops/the-future-role-of-trucks-for-energy-and-environment.html)).
- Centre for Sustainable Road Freight, "SRF Optimiser," <http://www.csrf.ac.uk/>
- Climate and Clean Air Coalition (CCAC, 2015), Global Green Freight Action Plan - reducing the climate and health impacts of goods transport.  
[http://www.globalgreenfreight.org/sites/default/files/downloads/GreenFreightActionPlan\\_May2015-3\\_1.pdf](http://www.globalgreenfreight.org/sites/default/files/downloads/GreenFreightActionPlan_May2015-3_1.pdf)
- Department for Transport, UK (DfT, 2009), The Fuel Efficient Trucks Driver's Handbook.  
<http://www.ritchiestraining.co.uk/wp-content/uploads/2016/01/FuelEfficientTruckDriversHandbook.pdf>
- EcoStars, <http://www.ecostars-uk.com/>
- European Technology Platform ALICE, <http://www.etp-logistics.eu/>
- FleetSmart, <http://www.nrcan.gc.ca/energy/efficiency/transportation/commercial-vehicles/fleetSMART/training/16946>
- FORS, [www.fors-online.org.uk](http://www.fors-online.org.uk)
- Green Trucks Partnership, <http://www.rms.nsw.gov.au/about/environment/air/green-truck-partnership/index.html>
- Greening, P. (2016). Based on a slide by Dr Phil Greening, Centre for Sustainable Road Freight, in his presentation at the IEA-JRC joint workshop, "The future role of trucks for energy and environment," November 8, 2016 (summary and presentations available online at: [www.iea.org/workshops/the-future-role-of-trucks-for-energy-and-environment.html](http://www.iea.org/workshops/the-future-role-of-trucks-for-energy-and-environment.html)).
- International Council on Clean Transportation (ICCT), CE Delft (2012), "Market Barriers to Increased Efficiency in the European On-road Freight Sector."  
[http://www.theicct.org/sites/default/files/publications/CE\\_Delft\\_4780\\_Market\\_Barriers\\_Increased\\_Efficiency\\_European\\_Onroad\\_Freight\\_Sector\\_def-2.pdf](http://www.theicct.org/sites/default/files/publications/CE_Delft_4780_Market_Barriers_Increased_Efficiency_European_Onroad_Freight_Sector_def-2.pdf)
- International Council on Clean Transportation (ICCT), North American Council for Fuel Efficiency (NACFE), Cascade Sierra Solutions (CSS), 2013, Barriers to the Increased Adoption of Fuel Efficiency Technologies in the North American On-Road Freight Sector. [http://www.theicct.org/sites/default/files/publications/ICCT-NACFE-CSS\\_Barriers\\_Report\\_Final\\_20130722.pdf](http://www.theicct.org/sites/default/files/publications/ICCT-NACFE-CSS_Barriers_Report_Final_20130722.pdf)
- International Energy Agency (IEA, 2013), IEA global outlook 2013.  
<https://www.iea.org/publications/freepublications/publication/WEO2013.pdf>
- International Energy Agency (IEA, 2017), The Future of Trucks – implications for energy and the environment.  
<https://www.iea.org/publications/freepublications/publication/TheFutureofTrucksImplicationsforEnergyandtheEnvironment.pdf>
- International Road Transportation Union IRU, (2017), Commercial Vehicle of the Future - A roadmap towards fully sustainable truck operations. Written by Transport & Mobility Leuven, <https://www.iru.org/sites/default/files/2017-07/iru-report-commercial-vehicle-of-the-future-en%20V2.pdf>
- Low Carbon Vehicle Partnership, <http://www.lowcvp.org.uk/>
- McKinnon, A. (2018), Decarbonizing Freight. <http://www.alanmckinnon.co.uk/publications.html>
- North American Council for Freight Efficiency (NACFE). Confidence Reports. <https://nacfe.org/report-library/confidence-reports/>
- ObjectifCO2, <http://www.objectifco2.fr/>
- OECD/ITF (2017), ITF Transport Outlook 2017. <http://www.oecd.org/about/publishing/itf-transport-outlook-2017-9789282108000-en.htm>
- SAFED. <http://www.dft.gov.uk/rmd/project.asp?intProjectID=9986>
- Smart Freight Centre (2017), Smart Freight Solutions Map. <http://www.smartfreightcentre.org/smart-freight-solutions-map>
- Smart Freight Centre (2017b). Barriers for Carriers – Insights on barriers to adopting fuel saving technologies and measures for trucks. [www.smartfreightcentre.org/main/info/publications](http://www.smartfreightcentre.org/main/info/publications)
- Smart Freight Centre (2017c), Green Freight Programs Worldwide.  
<http://www.smartfreightcentre.org/main/info/publications>
- SmartWay, <https://www.epa.gov/smartway>
- Truck van de Toekomst, <http://truckvandetoekomst.nl/>
- Trucking Efficiency, <http://truckingefficiency.org/>
- University of Montevideo, <http://www.um.edu.uy/>
- Yong Zhang, Russell G. Thompson, Xiangtai Bao, Yunjian Jiang (2014), Analyzing the Promoting Factors for Adopting Green Logistics Practices: A Case Study of Road Freight Industry in Nanjing, China. In: Procedia - Social and Behavioral Sciences
- Yueng-Hsiang Huang, Pei-Luen Patrick Rau, Bin Zhang, Matthias Roetting (2008), Truck drivers' attitudes toward feedback by technology: A quantitative approach. In: Accident Analysis & Prevention

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