COFRET
Carbon Footprint of Freight Transport

Results Report

Introduction

The European Union (EU) has stated[1] that global temperatures should not exceed pre-industrial levels by more than 2°C in order to keep impacts of climate change at a manageable level. To achieve this target, industrialised countries and regions, including the EU, are expected to reduce their total annual greenhouse gas emissions by 30% up to 2020 and by 60-80% by 2050, compared to 1990 emission levels. However, transport and logistics currently contribute up to 25% of overall global CO_2 emissions and energy use and the associated carbon emissions from the freight transport sector grew faster than in almost any other sector between 1995 and 2005. This is despite the greening of freight transport at the operational level in recent years, as commercial stakeholders began to implement technical and operational concepts to improve overall efficiency and reduce greenhouse gas emissions. Increasing supply chain lengths and the direct link between emissions and the consumption of expensive fuel mean that there is a strong interest from both governments and the commercial sector to improve efficiency of supply chains.

For targets and actions designed to improve freight transport efficiency to be meaningful, there must be a clear baseline, a recognised method for calculating comparable emission values and a range of mechanisms by which emissions might be reduced.

COFRET, which has been part-funded by the European Commission, has taken a collaborative approach: The project partners have engaged the transport industry and its stakeholders focused their work on removing the uncertainty faced by carriers, shippers and logistics providers when calculating the carbon footprint of freight transport.

[1] See MEMO/07/16; Brussels, 10 January 2007; Limiting Global Climate Change to 2 degrees Celsius http://europa.eu/rapid/press-release_MEMO-07-16_en.htm?locale=en Later confirmed at the UN climate conference in Copenhagen in 2009

The Need for Harmonisation

A wide range of initiatives to calculate the carbon footprint in transport exist, but currently, there is no single globally-recognised and accepted standard for the calculation of the carbon footprint of a freight transport supply chain. Hence internationally applicable guidelines, supporting tools, data quality standards and methods need to be developed and implemented. There are numerous initiatives that could contribute to such a standard. In 2012 the European Committee for Standardisation (CEN), published the European norm EN 16258 “Methodology for calculation and declaration of energy consumption and GHG emissions of transport services (freight and passengers)”, which is most probably the closest thing to a standard applicable to supply chain emission calculations at the moment. However, problems remain in terms of comparability and accuracy of the various carbon footprint calculations.

The European Commission has requested an approach that would harmonise the calculation of the carbon footprint of transport supply chains. COFRET is working with existing initiatives, shippers, carriers and logistics providers, who all play a part in the supply chain and recognise the importance of this issue, to work towards a harmonised approach for the carbon footprinting approach for supply chains and their individual elements.

Scope of the COFRET Project (taking account of latest developments)

The publication of EN 16258, and subsequently the French national decree for “Information about CO_2 Emissions from Transport Services”, further raised the profile of measuring and improving the environmental performance of freight transport supply chains. This required an update of the scope of COFRET, resulting in the following:

- reviewing existing methodologies for the calculation of carbon footprint and greenhouse gas emissions (GHG) of freight transport and logistics in the context of supply chains and evaluating their compatibility with EN 16258
- identifying gaps and ambiguities in the calculation guidelines within the EN 16258 standard relating to coverage of freight transport and logistics, supported by the means of real-life case studies
- prioritising suggestions for possible approaches to achieve comparability for the calculation of emissions along supply chains
- comparing CO_2 calculation tools and methodologies with EN 16258 at a neutral level

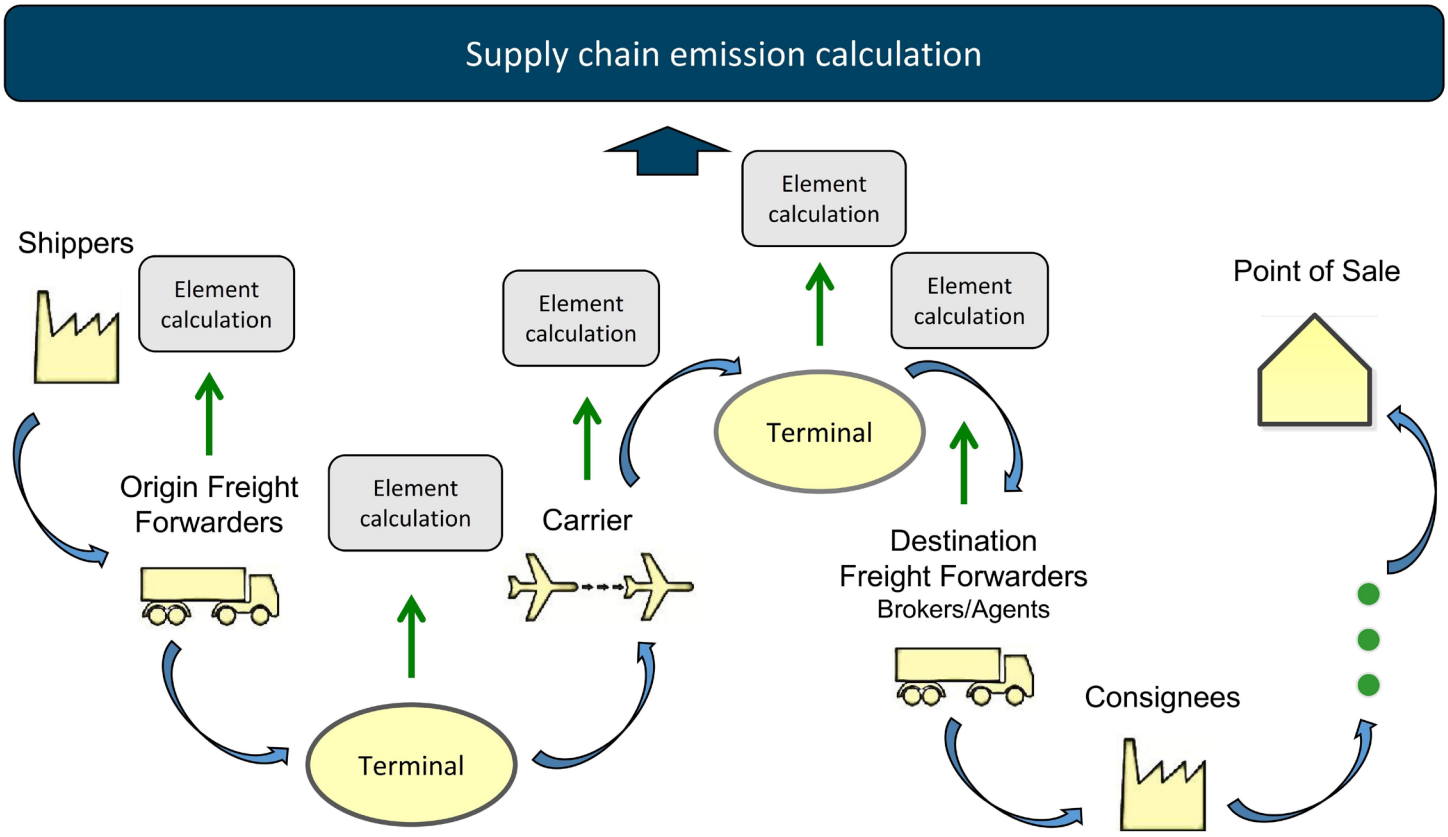
To help with this task COFRET was also granted project liaison status by CEN in respect of the carbon footprinting of freight transport.

Initial Review

COFRET conducted detailed reviews and a consultation exercise to look into user needs and the state-of-the-art relating to methods, tools and data for calculation of the carbon footprint for logistics chains as a part of supply chain management. The results, which are available to download from the COFRET website, showed that there are already elements suitable for the calculation of the carbon footprint of transport and logistics along supply chains distributed among the existing methods, tools and databases; however a truly harmonised framework was found to be missing.

Calculation Approaches - Supply Chain Elements

The COFRET project has introduced the notion of Supply Chain Elements (SCE) as a modular operation that brings the goods close to their final destination. The figure below presents an example of a transport chain composed of SCEs.



Identification of Gaps and Ambiguities

One of the key outputs from COFRET is the identification of the gaps and ambiguities of the EN 16258 standard compared to related standards (the ISO family 14064 / 14067 and the GHG Protocol) and tools such as ECO TransIT.

Overall the standard is seen as a good starting point, although COFRET has also identified several areas where the existing methodologies could be improved and gaps filled in order to give more consistent calculations.

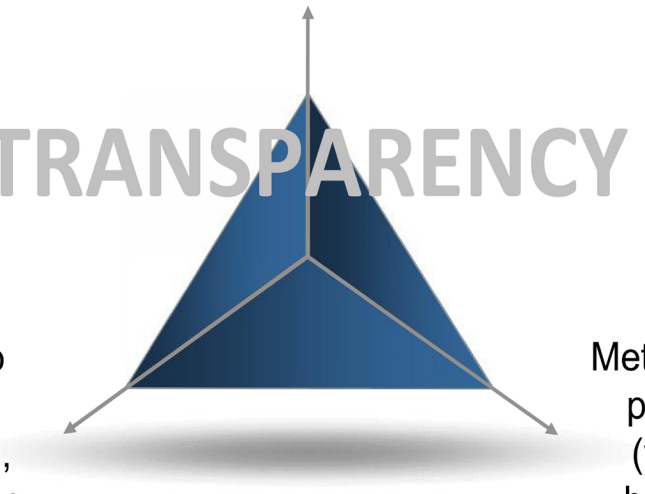
These include;

- clearer definitions and classification of the vehicle operations that are being considered to aid reliable comparisons
- a review of the allocation principles to try to optimise fair treatment of different types of cargo
- standardised approach to default emission factors from recognised sources
- the need to incorporate ports, terminals and handling operations into calculations so that the fully supply chain is captured

COFRET provides suggestions and discussion points for further advancement of a global CO_2 emissions standard, using the EN 16258 as a sound basis for the standardisation. The suggestions are related to:

- Identification and specification of the choices related to the vehicle operation system, distinguishing between micro, meso and macro levels of emission basis
- Improvement in fairness of emission allocation to partial cargo loads. This can be achieved by the introduction of the allocation weight concept, which allows using not only weight, but other vehicle dimensions such as volume and length for emission allocation
- Also, the use of direct or shortest feasible distances are encouraged as a way to make allocation a bit fairer as well to reduce data requirements for emission allocation
- Information provision and exchange within the transport chain should also be improved. COFRET suggests identification of emission owners (such as freight forwarders and / or cargo owners) and emission reporters (such as transport operators). Linking emission owners and emission reporters ensures that transport chain level emissions can be accurately computed
- Logistics nodes, such as terminals and distribution centres are to be included in harmonised CO_2 computation methods - there is active ongoing work investigating the best way of addressing this issue
- Basic data provision and estimation accuracy will be dealt with by the use of broadly accepted emission quantification as well as an indication of the accuracy level at which the emissions have been computed or estimated

Simplicity
Methodology needs to be easy to understand and use



Accuracy
Methodology needs to take all emission into account, fair allocation, changes should become visible in data

Flexibility
Methodology needs to be practically applicable (various companies, business models and modes of transport)

Working with Real Supply Chains

As a means of testing out the significance of the uncertainty in the current methodology, ten COFRET case study supply chains were defined together with industry stakeholders to identify and test further issues on the calculation of CO_2. In these test cases the application of the EN16258 methodology for the calculation and declaration of energy consumption and GHG emissions of different transport and logistics services was demonstrated with a supply chain approach that uses both transport legs and nodes as supply chain elements.

The chosen case studies cover a wide range of modes, locations and sectors. The case studies use a six step process to demonstrate the use of EN 16258, expanded to cover nodes as well as transport activities, to pinpoint the critical parts of the carbon footprint calculation process and where gaps and ambiguities may lead to incomparability. In carrying out this work it was instructive to note that:

- None of the test case industry partners had a complete overview of the activities performed in the supply chain elements. This complicated the process of data collection and CO_2 allocation

- According to EN16258 all activities related to a certain (shipment of a) product within the supply chain, should be taken into account. This often leads to a large number of supply chain elements
- Precise definitions are available in Supply Chain Management literature. However, these definitions proved to not always be practical when defining the start and/or end of a supply chain
- In most supply chains a few supply chain elements cause a disproportionate (or overwhelming) fraction of the total energy consumption to be allocated to a certain shipment
- The actual energy consumption allocated to an individual shipment is also influenced by daily changing factors like the weather conditions or the actual fuel efficiency of the truck
- Data on the energy consumption at nodes were particularly hard to collect, especially when working at the shipment level
- As EN16258 does not incorporate these, many companies developed tools that match this and do not take the emissions at nodes into account

Sensitivity Analysis

Work has been conducted in COFRET to provide quantified examples of the variation that can result from calculations that use different tools and approaches to default data. The purpose of this was to demonstrate the difficulty that is currently faced by shippers and carriers who need to conduct this type of calculation in the current situation, even with EN 16258 in place. The extent of the variation can be significant:

- When comparing five viable supply chain configurations for an intermodal (road only or road/rail) journey between central and southern Europe the results produced by three widely applied calculation tools varied for each leg between ±6% and ±70%
- When comparing the road-only supply chain between the same points and using different default data, all in a manner compatible with EN 16258, the results varied by ±33% around the average value

Achieving Comparability for Calculations of Emissions

To achieve comparability for the calculation of emissions along supply chains, several aspects have to be respected. In general, a greater level of accurate, actual data availability combined with a clearer definition of the vehicle operating system will result in easier comparability.

Aspects to respect when comparing calculation results include:

- Establish a common understanding of how the calculation has been performed
- Agree emission calculation methodology and configuration
- Vehicle Operating System (VOS) definitions according to a common framework / set of parameters
- Approach to distances travelled by goods (direct distance or actual distance travelled) need to be consistent
- Accurate, measured data should be preferred

Future Approach to Harmonisation: Vision & Next Steps

Close co-operation between the project partners and industry stakeholders has been an integral element of COFRET; indeed one of the main achievements of COFRET has been the establishment of an active Advisory Board that plays a key role in developing and applying carbon footprint methodologies and tools to freight transport across all modes on an equal basis.

Vision

An important step towards future harmonised carbon calculation and reporting for freight transport was taken at a Workshop organised by COFRET in October 2013. At the workshop, attended by 40 representatives from a wide range of organisations, the participants unanimously agreed a vision that they believe encompasses the principles that need to be met to ensure compatibility and consistency across future work on this subject. The vision is based on several principles:

- Credibility
- Useability
- Harmonised around basic principles:
    - *use of accurately measured, actual fuel use wherever possible*
    - *using common allocation approach*
    - *common vehicle operating systems*
    - *common reporting formats*
- Applicable:
    - *Globally*
    - *Across all modes*
    - *Include terminals & warehousing*
- to be based on the best existing, established starting points

The full vision document as agreed can be found at the COFRET website. Based on this vision, a two-tier follow-up has been developed by COFRET and the COFRET advisory board.

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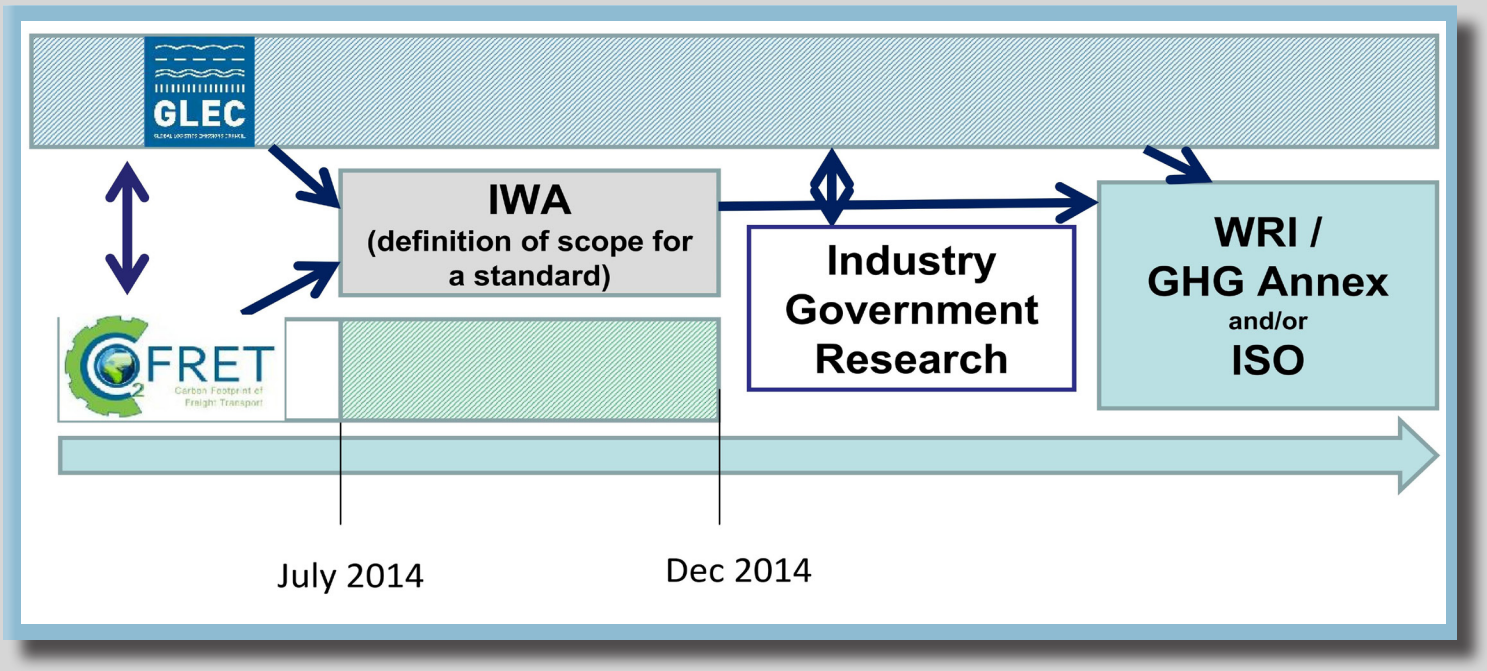
Global Logistics Emissions Council

The need for a long-term co-operation framework to continue this work and to integrate the results into future business activities, standards, calculation tools, and mode-based / governmental initiatives has been recognised by all stakeholders (government, research and industry). With members of the COFRET Advisory Board at its core, a new initiative, the Global Logistics Emissions Council (or GLEC for short) has been established with an industry mandate to ensure that a harmonised approach across modes and global regions can be maintained and further developed in order to avoid the possibility of future fragmentation of approach. The main objectives of GLEC are:

- A common industry vision statement regarding methodologies and broader green freight
- A globally harmonised framework for freight emissions methodologies for calculation and reporting of emissions from freight movement, applicable to all modes, nodes (warehousing, transfer points etc.) and global regions within the transport supply chain
- Alignment of industry led/backed initiatives across modes and global regions
- Active engagement and communication with the entire global freight sector and other key stakeholders, e.g. government, scientific/research institutes, NGOs, development agencies, which includes positioning the work of the GLEC within a wider portfolio of programmes aimed at increasing freight sector efficiency

International Workshop Agreement

In order to tie in a wider stakeholder group we have also taken steps to initiate an ISO International Workshop Agreement (IWA). The intention is that the results of COFRET together with the initial work of the GLEC will form the basis for a broad consensus regarding the steps needed to reach a future globally recognised approach for calculation and reporting of emissions from freight movement that can then be embedded within the appropriate international standards.



Conclusions

COFRET has taken big steps towards identifying gaps and ambiguities within EN 16258 and making related suggestions for possible approaches to achieve comparability for the calculation of emissions along supply chains. It has also ensured that a structure is in place to continue this work, not only at European but global level and to cover all elements in the transport supply chain.

The next steps will need to be driven by industry actors (shippers, transport operators and logistics suppliers). It is these groups who can make the decisions that will:

- Improve the efficiency of operating practices
- Switch supply chain configurations to lower emission alternative

Policy and standardisation support will be essential, but this needs to recognise the global nature of supply chains and not be implemented in isolation at national or even regional level.

COFRET Consortium

The COFRET consortium comprises fourteen partners from ten different countries. The team members are highly experienced researchers who have been at the forefront of developments relevant to the carbon footprinting of freight transport and have proven track records in the production of high-quality research work and novel solutions.

The fourteen partners of the COFRET Consortium are:

As part of the work programme we have collated information about carbon footprinting of freight transport and forging links with existing initiatives. This information is available on the COFRET website with the aim of making www.cofret-project.eu the first point of reference for information on this issue.

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