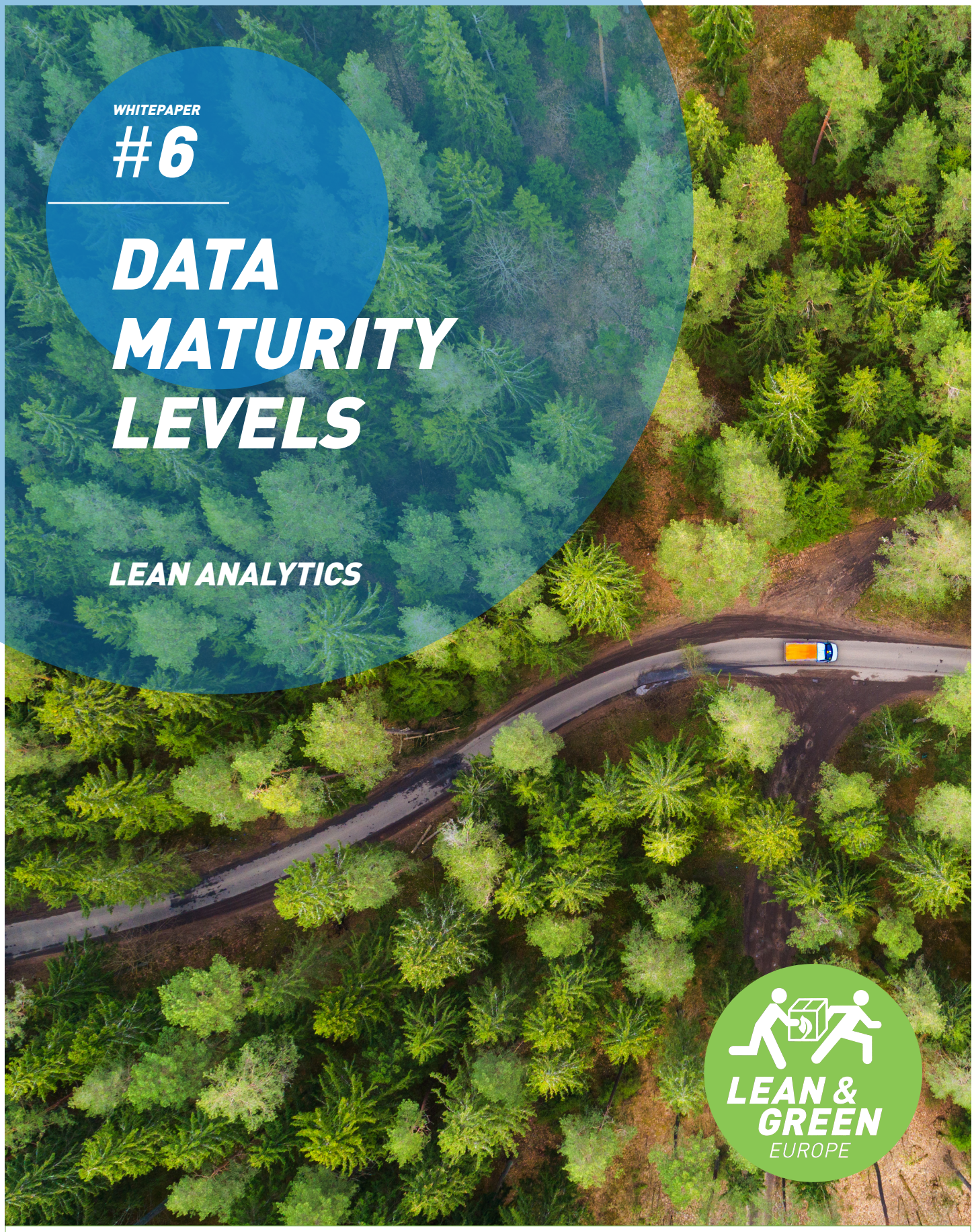

WHITEPAPER

#6

DATA MATURITY LEVELS

LEAN ANALYTICS

LEAN & GREEN EUROPE

ECR ČESKO-SLOVENSKÁ INICIATIVA EFFICIENT CONSUMER RESPONSE

GS1 Switzerland

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CONTENTS

1 INTRODUCTION

The increasing demand for decarbonization of transport and logistics has led to the development of several methods to estimate the GHG emissions of any given supply chain, each with their own pros and cons. Carbon reduction schemes and programs all around the world stimulate companies to not only report emissions but to take action to reduce them.

Carbon productivity is an excellent indicator of the effectiveness of transport. Carbon productivity is defined as the ratio between the useful transport of goods, and the GHG emissions generated by that demand for transport. This ratio is the key performance indicator to be monitored in detail and on aggregate levels.

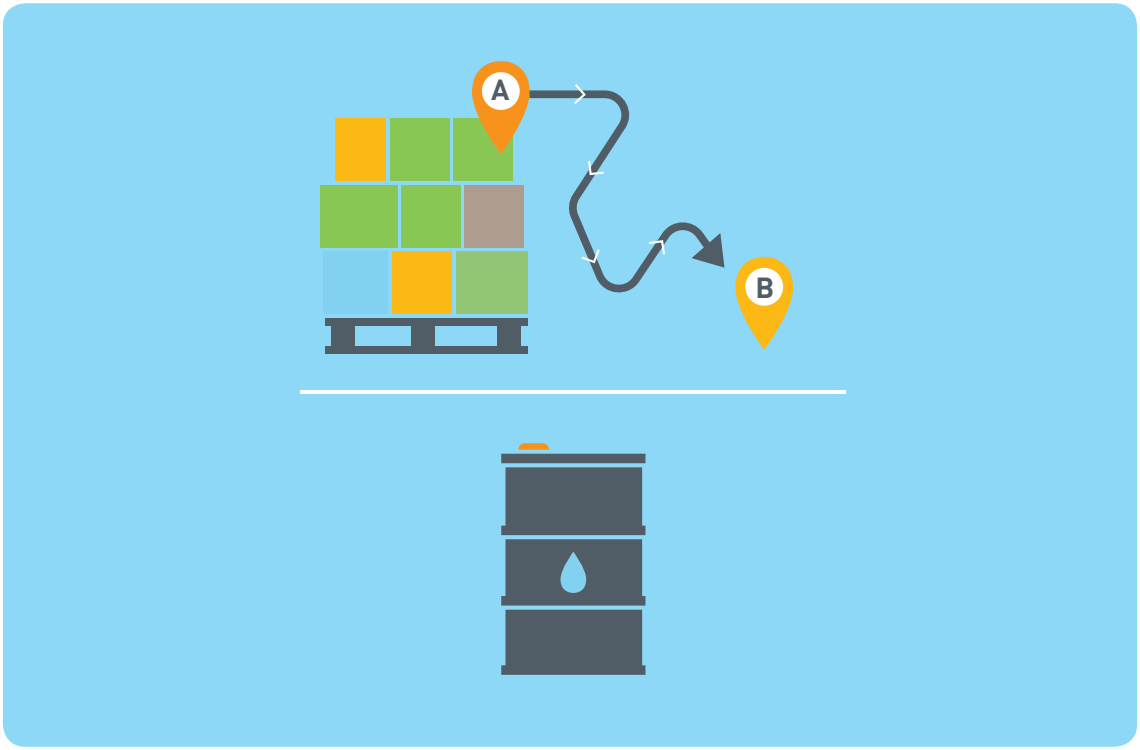


Figure 1 Carbon productivity: the ratio between useful transport of goods, and GHG emissions

As explained in previous Lean & Green papers[1], measuring the carbon productivity of supply chains, both in detail per part and integrated at a global level is the best approach for identifying actions that will reduce GHG emissions. Lean Analytics[2] has been introduced in 2016 as an excellent method to analyze carbon productivity in the context of operational excellence.

This paper introduces version 2 of Lean Analytics, broadening the maturity levels of cargo data that can be used in the analysis. In practice some shippers have limited-to-zero access to detailed fuel data from their transporting companies, let alone allocated fuel data to shipments. They have to rely on estimated amounts of fuel derived from length of trips and/or standard consumption factors, or use sophisticated tools and models that can predict the amount of fuel needed for a given trip and route. Transporters sometimes only have aggregated amounts of cargo available. Version 2 of Lean Analytics allows for a broad range of data maturity levels to be combined in one analysis.

[1] Published on http://lean-green.eu/

[2] http://lean-green.eu/wp-content/uploads/2017/08/3-Analytics.pdf

2 LEAN ANALYTICS AND CARBON PRODUCTIVITY

Let's start with a recap of the principle of Lean Analytics.

Lean Analytics[3] uses the fundamental drivers of the business as input: the actual movement of goods combined with the amount of energy (currently mostly diesel fuel) expended to fulfill this particular demand.

The amount of energy is not only useful for calculating GHG emissions: it is also a proxy for the resources used to fulfill the demand: the costs of assets and consumables and labor expended.

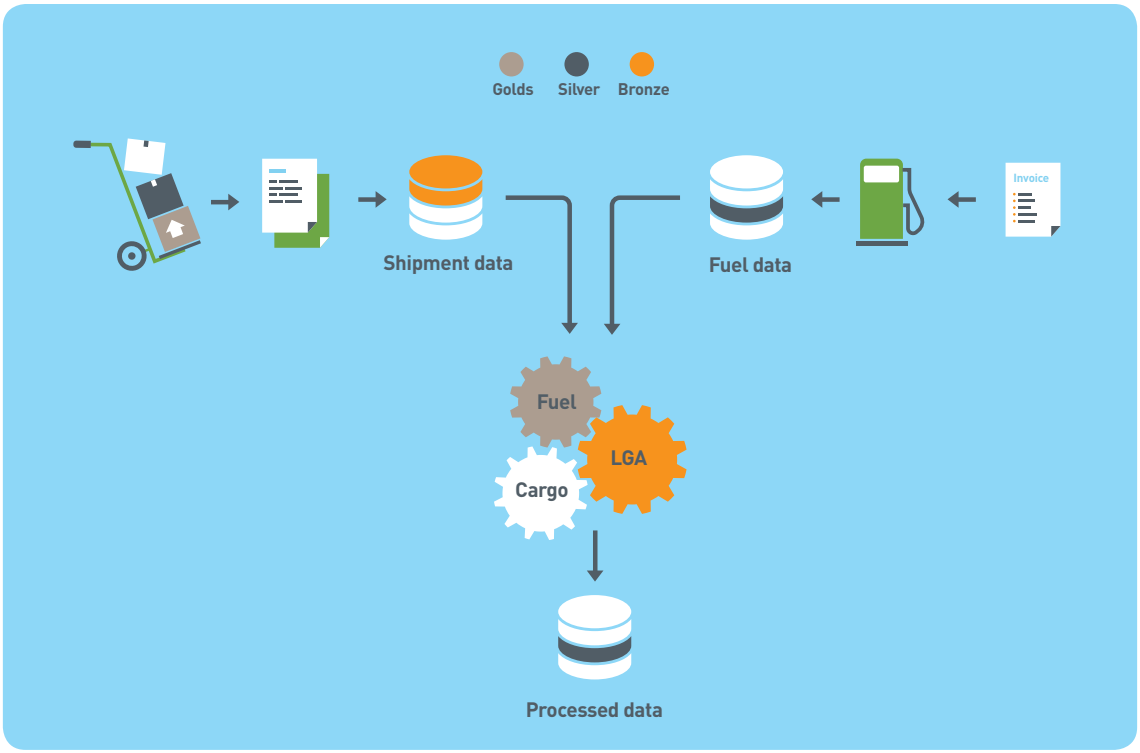


Figure 2 Lean Analytics

The data is combined and enriched, delivering a valuable data set that can be mined for various purposes. The result is both valuable operational information that enhances standard financial information from financial systems and allows for ex-ante and ex-post analysis, and GHG reporting in any format desired.

[3] Supported by the 'Topsector Logistiek', a program for innovation in logistics made possible by the Dutch Government

3 LEAN ANALYTICS VERSION 2: ADDING DATA QUALITY LEVELS FOR CARGO

In the first version of LGA the movement of goods is measured by collecting itemized freight bill data for a given period (for instance a month). The energy used is measured by the total amount of fuel (energy) used in the same period for the transport of these particular goods.

The more granular the fuel data is, the better the information that is generated. The best possible information quality is achieved if fuel consumption is recorded per vehicle per day or trip, and combined with the freight bills for that vehicle. This level of data quality is already seen in the market, as some transporting companies collect detailed daily data from their fleet.

However, in practice some shippers have limited-to-zero access to fuel data from their transporting companies, let alone allocated fuel data to shipments. They have to rely on estimated amounts derived from length of trips and/or standard consumption factors, or use sophisticated tools[4] and models that can predict the amount of fuel needed for a given trip and route.

The LGA version 1 (published in 2016)[5] therefore allows for 4 levels of data quality for fuel: Bronze, Silver, Gold, and Gold+ for those companies that can achieve the highest possible level of granularity. The minimum requirement for the Bronze level is that fuel usage is estimated per 'Transport Service Category' (TSC), aggregated per year or more often. A TSC is used within the GLEC Framework to describe a group of transport activities that are more or less comparable, like distribution, or international FTL. Averaging out fuel usage across different categories and modalities would lead to a very low information value, therefore fuel data collection would need to be specific for a given TSC.

[4] For example a tool like EcoTransIT

[5] http://lean-green.eu/wp-content/uploads/2017/08/3-Analytics.pdf for a detailed explanation of version 1

4 AGGREGATED INFORMATION ON CARGO

Although freight bill data is widely used in a digital format, getting access to the digital data for the purpose of LGA analysis in all levels of the supply chain can be a challenge for various reasons: lack of cooperation between shippers and transporters and subcontractors, low priority in IT-departments, reliance on paper-based procedures, and so on.

Furthermore various carbon reduction schemes allow participants to start with an aggregated level of data on fuel (GHG emissions) related to aggregated levels of cargo (tonnes). This data is already collected so it would be desirable to use that data for analytical purposes.

The 4 levels of data quality for cargo data can be described as follows:

- **A** Freight bill information, itemized per trip or stop
- **B** Aggregated amounts per month, on a specific leg (part of supply chain) per destination
- **C** Aggregated amount over a supply chain per destination
- **D** Estimated amounts per year

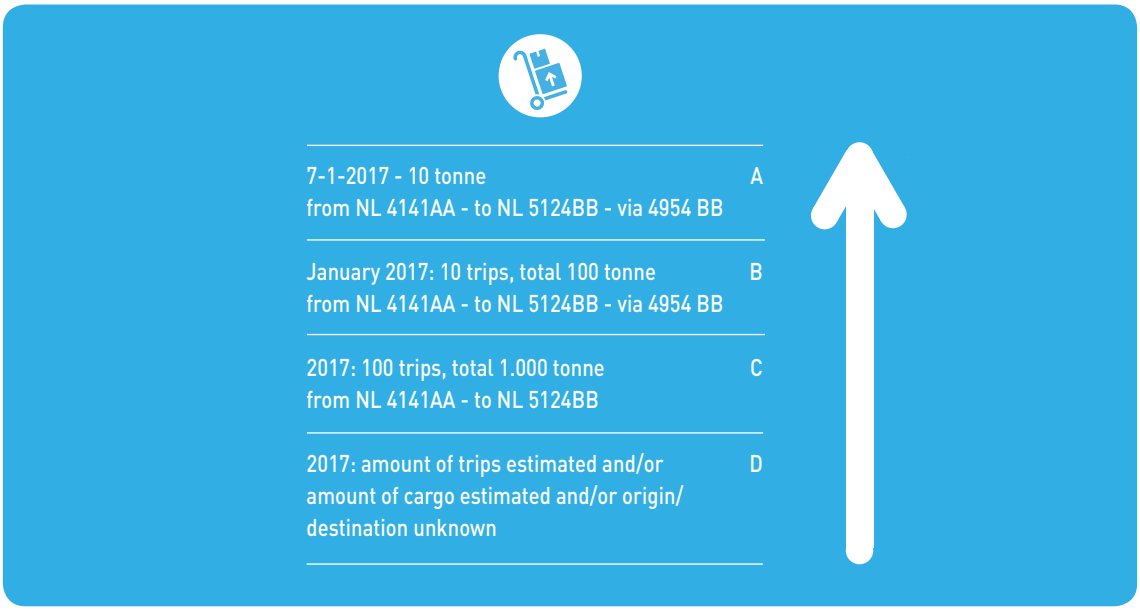


Figure 3 Simplified example of the 4 data levels for cargo

Again the minimum requirement for the D level is that cargo shipped and on fuel used is collected per 'Transport Service Category' (TSC), aggregated per year or more often.

The 4 levels have been defined based on the information value of a level: collecting more detailed data demands effort, therefore the effort should result in better information.

When the cargo levels are combined with the 4 levels of fuel data, it leads to the following combination of levels.

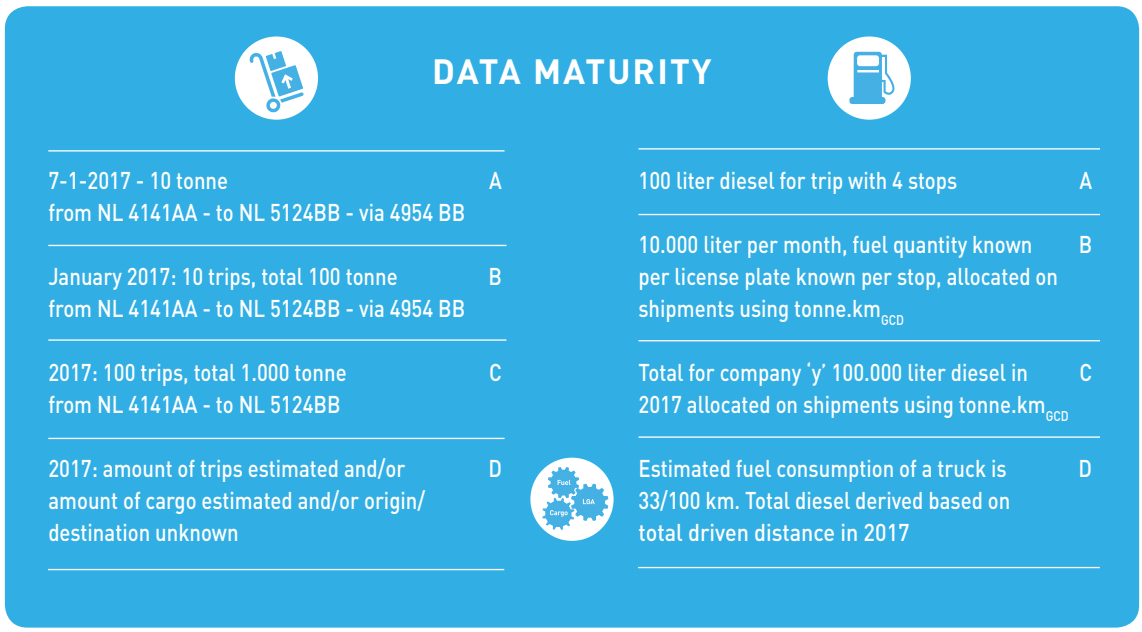


Figure 4 Maturity of cargo and fuel data

These 4 levels each would lead in theory to 16 different combinations. In practice some combinations are non-sensical, others give in practice more or less the same information value. The result is 4 levels of Data Maturity for the combination. The rule-of-thumb is that the lowest quality (either of cargo or energy/fuel) determines the level.

1	Fuel level A	Cargo Level A	Gold+
2	Fuel level A	Cargo Level B	Gold
3	Fuel level B	Cargo Level A	Gold
4	Fuel level B	Cargo Level B	Gold
5	Fuel level C	Cargo Level A	Silver
6	Fuel level C	Cargo Level B	Silver
7	Fuel level C	Cargo Level C	Silver
8	Fuel level C	Cargo Level D	Bronze
9	Fuel level D	Cargo Level A	Bronze
10	Fuel level D	Cargo Level B	Bronze
11	Fuel level D	Cargo Level C	Bronze
12	Fuel level D	Cargo Level D	Bronze

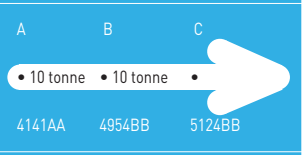
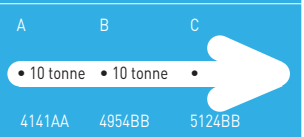
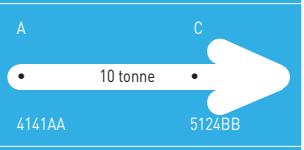
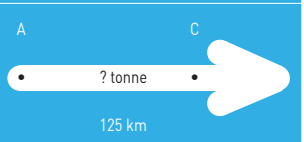
Figure 5 Logical combinations of data quality levels for cargo and fuel

These levels of data maturity can easily be audited and recalculated from original data. They allow for global supply chains to mix and match data from very sophisticated sources with estimated data based on generic consumption factors.

5 MAPPING DATA QUALITY LEVELS TO CARBON CALCULATION METHODOLOGIES AND REDUCTION SCHEMES

As these levels are derived from operational tests and feedback from companies, it was expected that the internal logic would re-appear in existing methodologies used for carbon emission calculations, and carbon reduction schemes. A quick scan of existing methodologies and schemes confirms that these levels can be mapped easily to these approaches. A detailed mapping will be developed in the future.

APPENDIX 1 SHIPMENT DATA MATURITY LEVELS

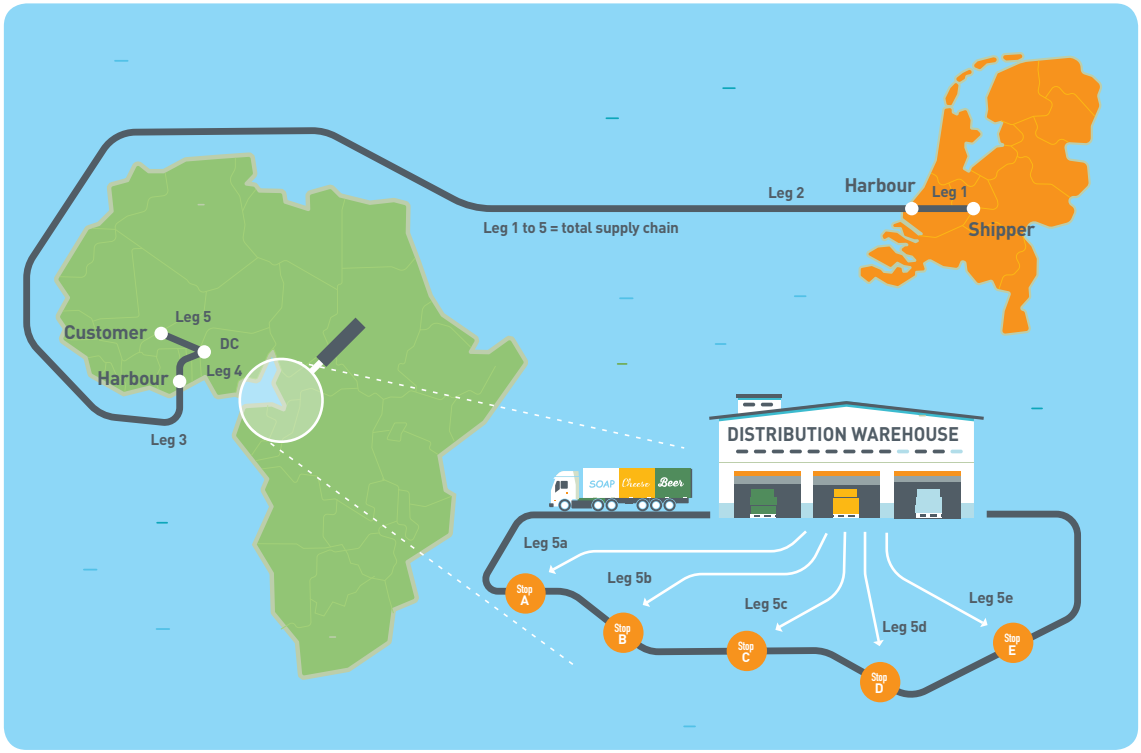
LEVEL	CARGO/LOAD	DETAILED EXPLANATION	EXAMPLE	VISUALIZATION
A	Info per stop	Per stop/line item: origin (zipcode pickup), destination (adress delivery or handover), type of transport (bulk, pallets, parcels etc.) and quantity (tonne or m3 or ...) available. (using for example CMR / freight bill information	7-1-2017: 10 tonne from NL 4141AA - to NL 5124BB - via 4954 BB	
B	Info per leg of supply chain	Per leg, cumulated per period: origin (zipcode pickup), destination (address delivery or handover), type of transport (bulk, pallets, parcels etc.) and quantity (tonne or m3 or ...) available. Linked to fuel data, preferably per month	January 2017: 10 trips, total 100 tonne from NL 4141AA - to NL 5124BB - via 4954BB	
C	Info per supply chain	Total per complete supply chain, specified in totals per origin and final destination: origin (zipcode pickup), final destination (address delivery or handover) and total quantity (tonne or m3 or ...) available.	2017: 100 trips, total 1.000 tonne from NL 4141AA to 5124BB	
D	Estimated	Estimated total amount of cargo per year, indirectly derived (for instance taking turnover or cost per year as indicator), or from generic standard data (government statistics etc.), origin and destination not necessarily known, could be replaced by driven distance	2017: amount of trips estimated and/or a mount of cargo estimated and/or origin/ destination unknown	

APPENDIX 2 FUEL DATA MATURITY LEVELS

LEVEL	FUEL/ENERGY	EXPLANATION	EXAMPLE	VISUALIZATION
A	Per stop or trip per vehicle	Per stop or trip per vehicle, measured or calculated by high quality modeling	100 liter diesel for trip with 4 stops	
B	Per month per license plate	Per month per license plate, measured or calculated by high quality modeling	10.000 liter, license plate x License plate known per stop 10.000 liter spread on shipments using tonne.km$_{GCD}$	
C	Per year	Year amount fuel. Measured or directly derived from amount of kilometers driven, for a subfleet per year (using average realised fuel consumption)	Total for company 'y' 100.000 liter diesel in 2017 100.000 liter spread on shipments using tonne.km$_{GCD}$	
D	Estimated	Estimated, based on generic consumption factors and estimated km per year	Estimated fuel consumption of a truck is 1:3 Liters diesel based on total driven distanceor government statistics	

Note: For other energy carriers, such as biofuel, electricity or hydrogen, the equivalent levels easily can be defined.

APPENDIX 3 DEFINITIONS OF LEG, STOP AND DROP



Supply chain = Total overview of all legs. Transport from raw materials, production, harbour, warehouse, distribution, until the product(s) reaches the customer. Various types of transport (modalities). Also known as transport chain in COFRET and GLEC documents.

Leg = Part of a supply chain. Movement of goods between 2 locations. Referred to as a transport chain element by COFRET and in GLEC documents.

Stop (drop) = Delivery or collection address in a route on a certain day. One route can contain more stops.

Lean & Green Europe is Europe's leading community for sustainable logistics.
Lean & Green Europe combines corporate responsibility for reducing footprints with continuous improvement of operational performance and value for customers.
Lean & Green Europe develops community-driven practical tools and guidelines for applying international emission calculation standards.
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  Carbon productivity in global supply chains
- **#6** 2018
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