Measuring and managing CO2 emissions of European chemical transport

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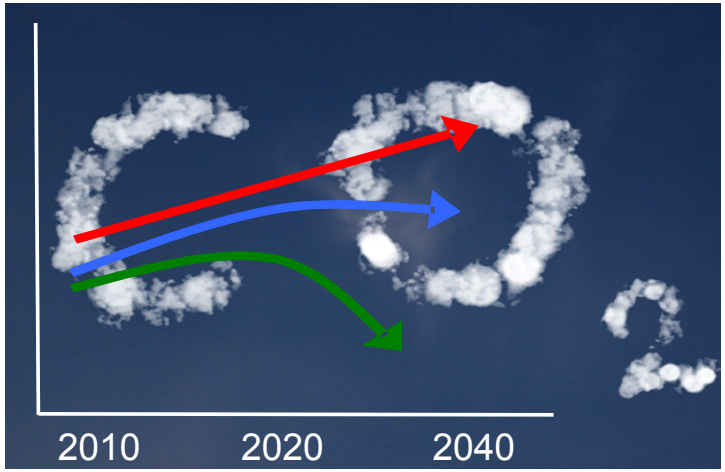
Workshop Inland Navigation CO2 Emissions
Strasbourg 12 April 2011



Agenda

1. Short introduction of Cefic and Responsible Care
2. Measuring transport CO2 emissions
3. Opportunities to reduce transport CO2 emissions

What is Cefic?

European Chemical Industry Council: ***http://www.cefic.org/***
Cefic is the voice of the European chemical industry based in Brussels
Cefic represents 27,000 chemical companies that produce 29% of the world chemical production and employ over 1.2 million people

Staff & network:
150 staff
4000 industry experts from companies & federations

- **Horizontal Programmes, Strategy Implementation Groups and Issue Teams**
- **150 Sector Groups**

Members
28 national federations in Europe
50 major international companies
450 business company members

CEFIC was founded in 1972

Responsible Care

Voluntary initiative of the global Chemical Industry

« Responsible Care is the world-wide chemical industry's commitment to continuous improvement in all aspects of Health, Safety and Environment performance of its products and processes and to openess in communication about its activities and achievements. »

RC Partnerships: Transport & Distribution

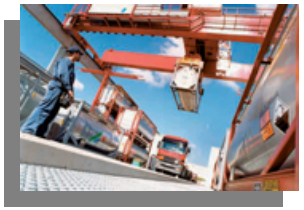
ECTA:

European RC Programme for chemical transport companies

FECC:

European RC Programme for chemical distribution companies

Main Cefic areas of attention



Development of Best Practice Guidelines

- Behaviour Based Safety (BBS)
- Logistics performance reporting
- Driver shortage
- Driver waiting times
- Transport equipment
- Security of transport
- Safety of loading/unloading
- Transperanto
- GHG emissions

Managing SQAS

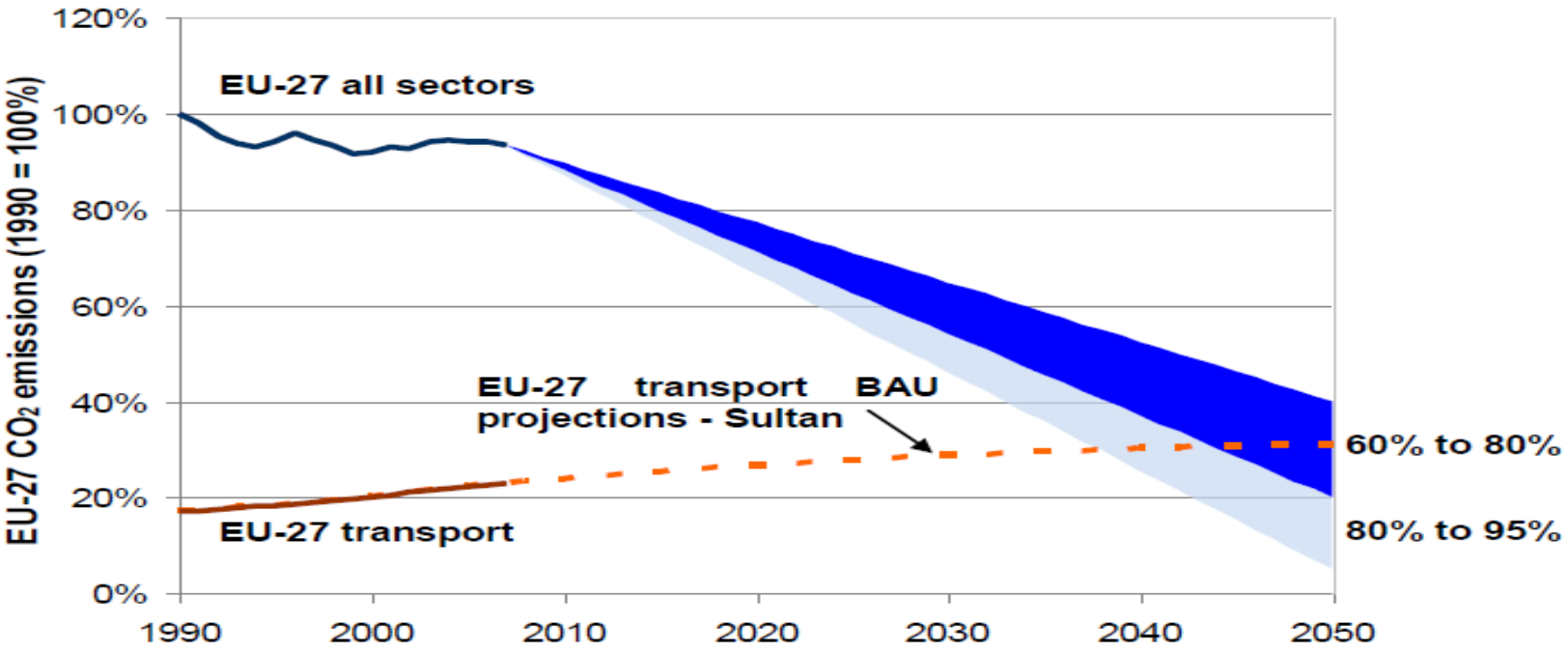
A world class assessment system for LSP's:

- 5 SQAS modules
- 70 accredited assessors
- 4,500 assessments
- 16,000 consultations
- CDI for sea transport
- EBIS for barges

Advocacy of chemical industry positions

- Dangerous goods regulations
- European transport policy
- Rail Single Wagon Transport
- Vehicle weights (44T)
- Sustainable logistics

EU overall emissions trajectories



Source: SULTAN, Development of an Illustrative Scenarios Tool for Assessing Potential Impacts of Measures on EU transport GHG; www.eutransportghg2050.eu

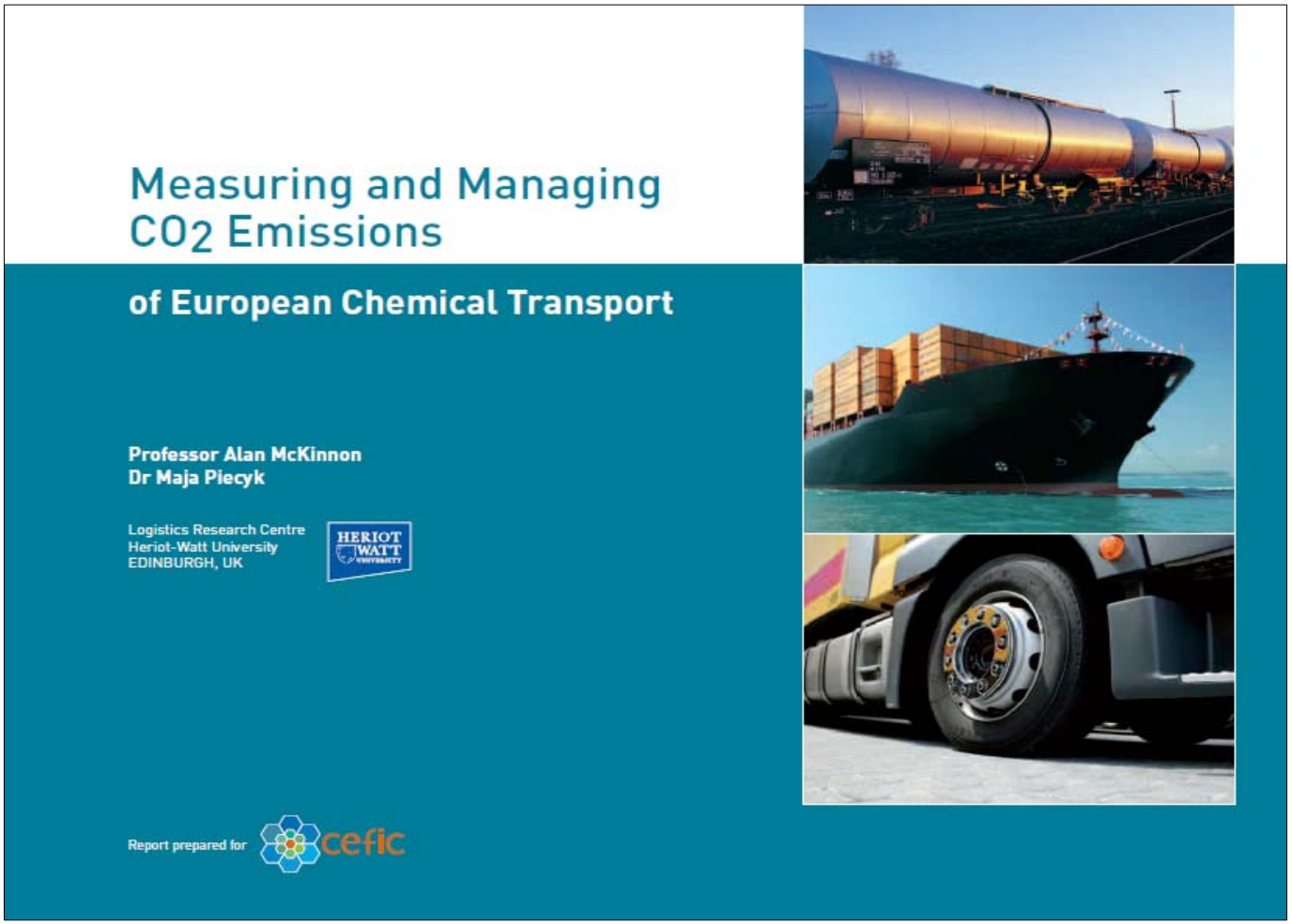
- **The EU-27 GHG emissions from transport have been increasing by 1,4%/year over the past years and are projected to continue to do so.**
- **The growth rate of transport GHG emissions has the potential to undermine the EU's efforts to meet long-term GHG emission reduction targets, if no action is taken.**

Sustainable transport – GHG emissions

Actions already undertaken by Cefic

- Cefic sponsored study by Prof McKinnon (Edinburgh) on transport carbon measurement and management for chemical transport
- Cefic Guidelines for measuring and reducing transport CO2 emissions
- First rough estimate of chemical transport carbon footprint

McKinnon Report – July 2010



The report can be downloaded at http://www.cefic.be/en/sustainable-logistics.html

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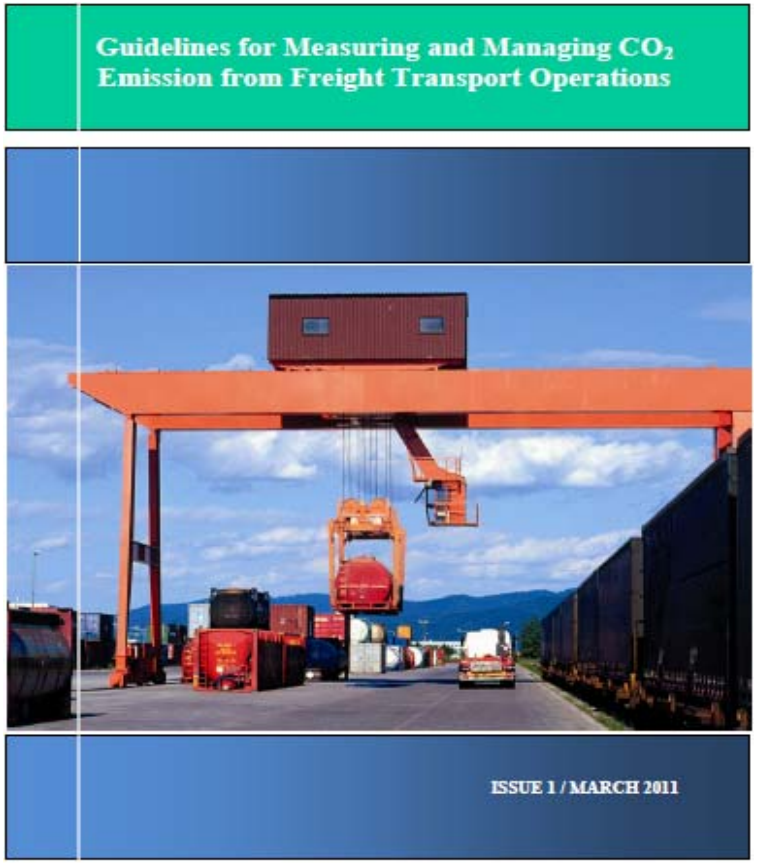
Cefic/ECTA Guidelines for Measuring and Managing CO_2 Emissions from Freight Transport Operations April 2011



- General framework
- Calculation method
- Average emission factors
- Calculation template
- Opportunities to reduce emissions

See www.cefic.be

Average emission factors recommended by McKinnon

Transport mode	gCO2/Ton - km
Road transport	62
Rail transport	22
Barge transport	31
Short sea	16
Deep-sea container	8
Deep-sea tanker	5
Intermodal road / rail	26
Intermodal road / barge	34
Intermodal road / short sea	21
Pipelines	5
Airfreight	602

Published Emission Factors for Inland Waterway Transport

Source: Alan McKinnon

Organisation	gCO_2 / tonne-km
INFRAS	31
TRENDS	31
Tremove	32.5
IFEU	28-35

Other Published Barge Emission Factors

* Verkehrsrundschau 44/2009

** Verkehr im Umweltmanagement - Anleitung zur betrieblichen Erfassung verkehrsbedingter Umwelteinwirkungen – Sept 2009 based on Borken et al. 1999

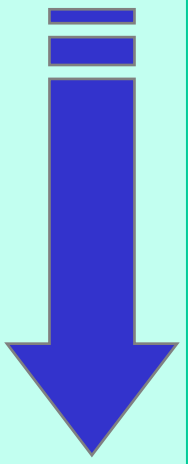
Ship type	Upstream	Downstream	Canal
Container Barges *		gCO_2/tonne-km	
Small (90TEU)	63.4	31.3	44.5
Medium (208 TEU)	28.3	14.7	17.4
Large (500 TEU)	19.6	10.2	
Tank / Solid Bulk Barges 50% load factor**		gCO_2/tonne-km	
800 t	70.8	27.3	39.3
1250 t	62.6	24.1	34.3
1750 t	57.7	22.3	31.1
2500 t	46.0	18.1	25.8

Cefic/ECTA Guidelines for measuring and managing of CO_2 emissions from freight transport operations

Generic company approach for establishing a green logistics strategy and action plan

Key steps

- Establish framework for CO2-footprint measurement
- Calculate baseline (e.g. CO2-footprint in 2010 or 2011)
- Determine realistic CO2-emission reduction target (baseline -> 2020)
- Establish action plan, identifying measures to reduce CO2-footprint
- Monitor progress and report year-on-year achievement



Methods to calculate CO_2 emissions from freight transport operations

Activity-based approach

In the absence of energy consumption data, it is possible to make a rough estimate of the carbon footprint of a transport operation by applying a simple formula:

CO_2 = tons transported x average transport distance x CO_2-emission factor per ton-km

Energy /fuel consumption-based approach

Since almost all CO_2-emissions from freight transport are energy/fuel-related, this is the simplest and most accurate way of calculating these emissions, using the following formula:

CO_2 = fuel consumption (in litres) x CO2-factor

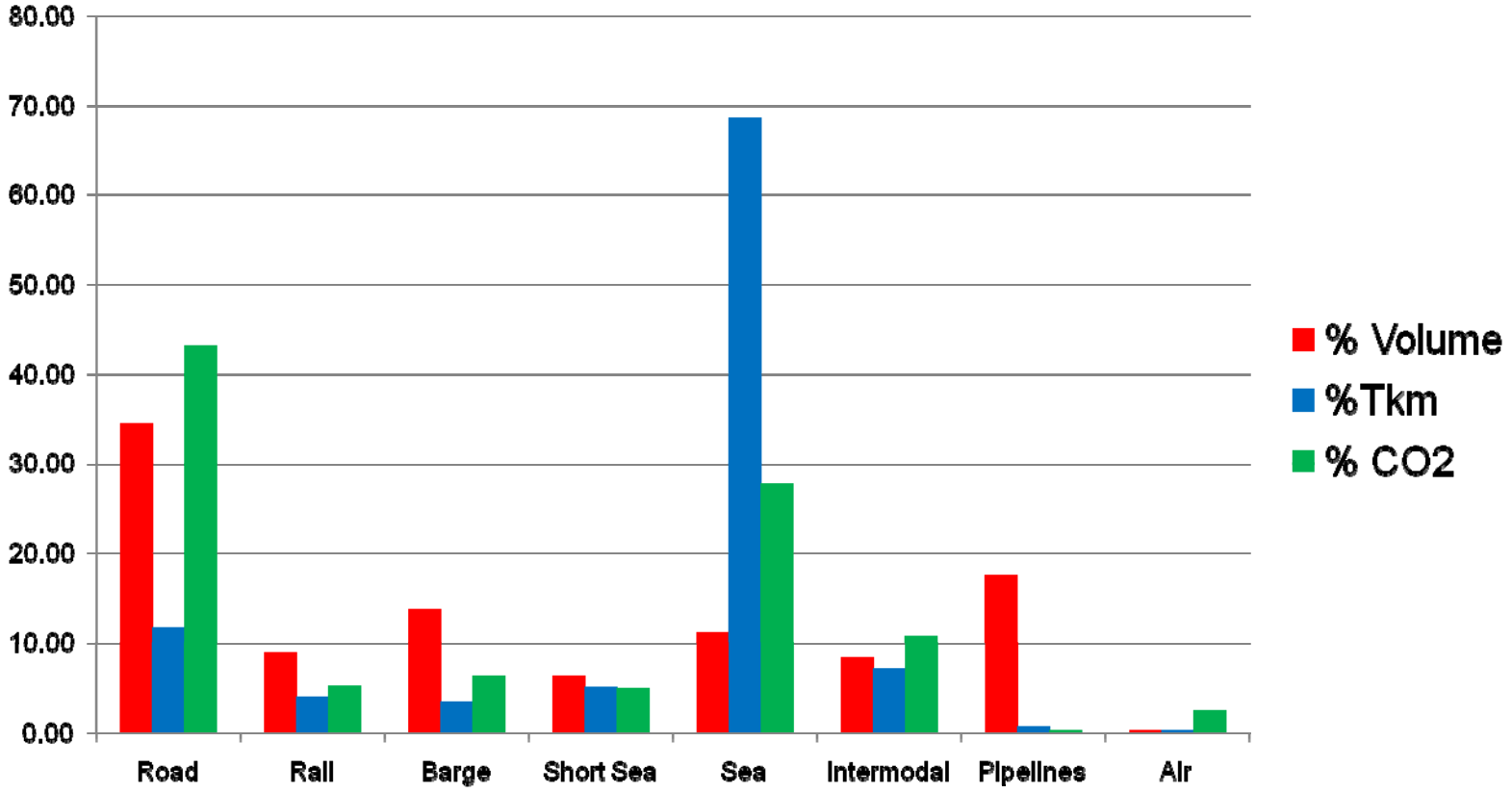
Activity-based approach
Cefic recommended CO_2 emission calculation template

Calculation Template for CO2-Emissions from Freight Transport Operations

Mode of Transport	Tons	Avg kms (estimates!)	Ton-kms	g CO_2 / ton-km	Tons CO_2
Road transport bulk	100.000	500	50.000.000	62	**3.100**
Road transport packed	100.000	500	50.000.000	62	**3.100**
Rail transport	100.000	500	50.000.000	22	**1.100**
Barge transport bulk	100.000	500	50.000.000	31	**1.550**
Barge transport packed	100.000	500	50.000.000	31	**1.550**
Short sea bulk	100.000	500	50.000.000	16	**800**
Short sea packed	100.000	500	50.000.000	16	**800**
Intermodal road / rail	100.000	500	50.000.000	26	**1.300**
Intermodal road / barge	100.000	500	50.000.000	34	**1.700**
Intermodal road / short sea	100.000	500	50.000.000	21	**1.050**
Pipelines	100.000	5	500.000	5	**3**
Deep-sea container	100.000	5.000	500.000.000	8	**4.000**
Deep-sea tanker	100.000	5.000	500.000.000	5	**2.500**
Airfreight	1.000	5.000	5.000.000	602	**3.010**
TOTAL	**1.301.000**		**1.505.500.000**		**25.563**

Results Cefic survey 12 chemical companies
Share of different transport modes

%



Decarbonising logistics operations

Main opportunities

- Fuel efficiency of vehicles (design, operation & maintenance)
- Carbon intensity of fuel (fossil fuel, biofuel, electricity, …)
- Modal split (pipeline, sea, barge, rail, road, intermodal, air)
- Supply chain design
- Vehicle utilisation (payload, empty running,….)

Opportunities to reduce CO_2 Emissions

Opportunities	*Description*	*Considerations for implementation*	*Parties involved*
A. Modal shift	**Shift to 'greener' transport modes**		
1. Shift from Bulk Road to Single Wagon (SW) Rail Transport	**Bulk road transport is replaced by transport in single wagon rail tank cars.**	**Availability of a direct rail connection at dispatching and receiving location. Availability of sufficient storage capacity at dispatching and receiving location. Willingness of customer to receive bigger quantities. Frequency and reliability of SW rail service. Transit time. Cost. Product constraints.**	**- Shipper - Consignee - LSP**
2. Switch from road to intermodal short sea transport (SS)	**Road transport is replaced by intermodal short sea/road transport (road-SS-road) whereby the goods are transported over the major part of the distance by sea in ro-ro ferries or container ships. The transfer from road to SS and vice-versa is carried out at intermodal sea terminals. If a rail connection is available, the first and last mile can also be done by rail instead of road.**	**Availability of an intermodal sea terminal close to the point of origin and the point of destination. Frequency and reliability of intermodal SS service. Availability of sufficient intermodal SS capacity. Transit time. Cost. Product constraints**	**- Shipper - Consignee - LSP**
3. Switch from road to intermodal barge/road transport	**Road transport is replaced by intermodal barge/road transport (road-barge-road) whereby the goods are transported over the major part of the distance by barge in containers. The transfer from road to barge and vice-versa is carried out at intermodal barge/road terminals.**	**Availability of intermodal barge/road terminals sufficiently close to the point of origin and the point of destination. Frequency and reliability of intermodal barge service. Availability of sufficient intermodal barge capacity. Transit time. Cost. Product constraints**	**- Shipper - Consignee - LSP**

Opportunities to reduce transport emissions

- Shift from Bulk Road to Single Wagon (SW) Rail Transport
- Switch from road to intermodal short sea transport (SS)
- Switch from road to intermodal barge/road transport
- Switch from road to intermodal short sea transport (SS)
- Product swap arrangements
- Relax monthly order-invoice cycles
- Maximize direct deliveries
- Improved routing
- Flexibility of loading and unloading time windows
- Flexibility of delivery dates
- Increase availability of tank cleaning stations at key locations
- Reduce black lists of previously loaded products

Opportunities to reduce transport emissions (cont.)

- Horizontal cooperation between logistics service providers
- Shared use of dedicated fleets (tank & silo transport)
- Increase maximum authorised vehicle weights
- Expand storage capacity at delivery points
- Vendor Managed Inventory (VMI) or Haulier Managed Inventory (HMI)
- Improve vehicle design
- Improve vehicle maintenance
- Improve vehicle operation (eco-efficient driving)
- Make use of energy sources with a lower carbon intensity

Business Case for ‘Green Logistics’ in companies

Main drivers

- Efficiency improvements / cost reductions
- Corporate green image (sustainability index / CSR etc)
- Customer expectations
- Future legislation

Share of transport CO2 emissions compared to total chemical company CO2 emissions is relatively small (2- 10%)

Conclusions

- We are still at the beginning of the journey
- Most companies are still in the learning phase but awareness is growing quickly
- There is no silver bullet for reducing emissions: a combination of many actions will be needed
- Start with ‘low hanging fruit’ (dixit Alan McKinnon)
- Improving logistics efficiencies and reducing logistics costs go hand in hand with transport decarbonisation… to a certain extent
- To realize the required CO_2 emission reduction targets, shippers, logistics service providers, associations and government bodies need to engage in intensive collaboration

Thank you for your attention!