Low-carbon freight transport services

The offering of low-carbon freight transport services, in the current industrial state-of-the-art, includes three main kinds of solutions:

- Modal shift solutions, i.e., transport by "greener" modes (rail, motorways of the sea, inland waterways) as alternative to long-haul road freight transport. Significant adoption is so far circumscribed to inland waterways services, with consequent very limited impact in terms of modal shift on the total of European road haulage. The market appears as immature, with only a 5% of internal EU freight traffic going through alternative modes[1].
- Brokerage services aimed at reducing empty haulage, operated by specialized providers, often private-public partnerships, attempting to match transport demand and supply to increase load factor and reduce emissions. These appear still as experimental initiatives, often co-funded by regional bodies, e.g., the regional logistics broker launched by the Emilia-Romagna region on results of the Corelog Interreg project or a similar private initiative in Germany[2]. Real impact on the market appears so far very limited.
- Certified "green" deliveries from leading service providers. For example, the *GOGREEN* service from DHL offers certified CO_2 accounting for each shipment, product, tradelane or customer, and compensation of the generated emissions trough support to carbon reduction programmes. Being based on indirect compensation, these schemes do not directly relate to the actual environmental performance of the shipment service itself. Furthermore these services are primarily addressed to large customers, facing the need to certify their supply chain emissions and to increase their products' and processes' environment-friendliness.

In general it appears that low-carbon services, focused on environmental as well as on delivery performances, have currently a very low market penetration. Significant limitations, business- but also ICT-related affect the above approaches, and need to be overcome for the situation to change on the medium to long term.

Modal shift has not reached a significant level but, as shown in a 2006 study[3], the potential for modal shift is greater if the cost ratio of door-to-door intermodal services improves in comparison to the road alternatives. In this regard, ICT might be the key to a further expansion of this market, since there are several ways in which ICT can make the intermodal solutions less expensive and thus attractive to a larger number of customers, e.g., by increasing wagons utilization and reducing time and costs for planning, monitoring and administrative duties.

Brokerage services have demonstrable environmental efficiency gains, resulting from increased load factors and resources utilization. Nevertheless, these business models appear costly and unattractive in a SME's populated sector, where additional intermediation levels inevitably bring additional costs, increase the complexity and threaten customer-relationship assets. Current ICT approaches, based on marketplace portals and B2B interoperability platforms, have failed to address the main issues concerning SMEs participation, namely: (i) cost and effort required to link company systems and to take part in cooperative processes, and (ii) transparent handling of commercially sensitive data.

Finally, for environmental performances to become a decisional factor in planning, comparison and acquisition of logistics services, common emissions calculation methodologies and standards are needed covering the entire transport chain. Existing green house standardisation initiatives such as from ISO 14064 on corporate carbon foot printing and CEN/TC 320/WG 10 on "Energy consumption and GHG emissions in relation to transport services" should publish their final results in 2012. Other major initiatives as the GHG protocol[4] and the Carbon Discount Project[5] have to be taken into account, as general frameworks to assess and communicate environmental performances. Currently various methods are used to support the

[1] European Shippers Council "Intermodal Transport: an illusion or a driver of innovation?", Panel Discussion at SITL Europe exhibition in Paris, May 2010.
[2] www.clickapoint.de
[3] "Freight flows in an enlarging Europe - From facts to visuals", 2006 report, NEA.
[4] http://www.ghgprotocol.org/
[5] https://www.cdproject.net

calculation, avoidance and compensation of CO_2 emissions[6] of freight transport services. The lack of a common approach makes it difficult for logistics companies to communicate and integrate their offers, as well as for clients to compare alternative solutions using environmental as well as logistics performance attributes.

Improvements

By 2030 the largest share of door-to-door freight transport services will be optimized for emissions reduction, as well as for speed, reliability and price.

Flexibility will be the key to capture mass demand, going beyond the current niche market of “green” logistics solutions. Shippers, either large companies or SMEs, will have available highly customized services, adapting to the individual customer’s expectations in terms of both reliability and environmental sustainability.

This will be achieved through planning and seamless execution of multi-modal routes combining environment-friendly long-haul transport with efficient local services for pick-up and last-mile delivery. Maximization of load factor on all modes, based on visibility of available transport resources, will be fundamental to offer competitive services at affordable price.

Cooperation will be a further key element in the transformed market of logistics services. To achieve the required levels of flexibility and efficiency, especially in inter-modal and urban freight management, the main stakeholders will have to take part in cooperative business processes, ranging from demand management, to tracking to business-to-administration transactions.

In particular, lowering the barriers for SMEs participation in the new cooperative business ecosystem will be fundamental to achieve a significant foothold in the marketplace, as transport logistics is a fragmented sector with a majority of small operators[7]. SMEs provide cheap and easy-to-use road solutions for continental transport, currently preferred by users to cleaner but more expensive and burdensome intermodal services. As the cost and complexity barriers will be reduced, small carriers will have to change their business model as well, finding a role in the new market of low-carbon services.

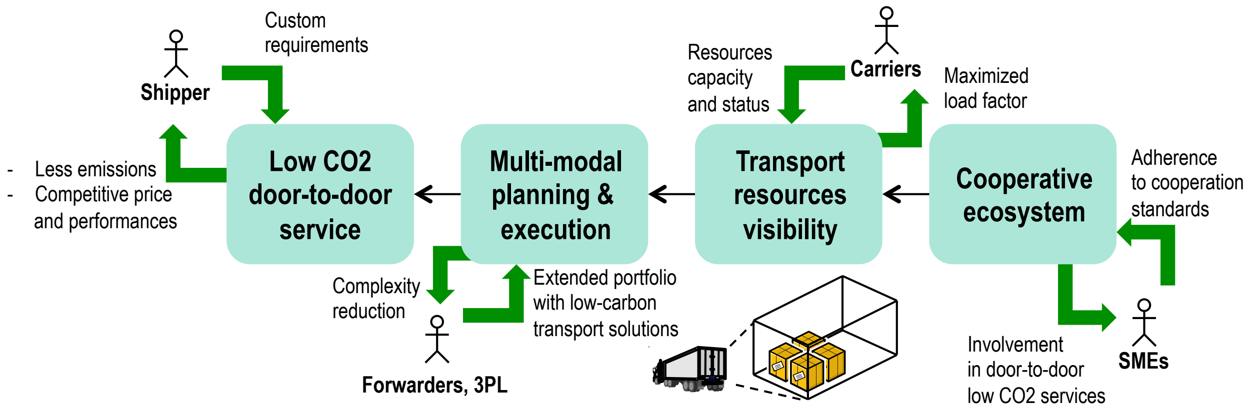

Figure 1 Low-carbon logistic services, 2030 scenario

The following Table lists the main improvements and consequent benefits expected in the above scenario:

[6] A range of emission calculation methods, often mode-specific, are available from IT applications on the market. The project RISING developed emission factors for inland navigation while Ecotransit (http://www.ecotransit.org/) is providing applications for the calculation of CO_2 emissions for all transport modes based on a comprehensive integrated calculation method.

[7] Freight transport companies have 430 k€ average turnover in EU (DG MOVE, “Road Freight Transport Vademecum”, 3/2009).

	Environmental	Economic	Societal
Significant market share of flexible, door-to-door freight transport services	− Reduction of GHG (GHG, ozone-depleting and POPs) emissions; − promotion of modal shift.	− Increased competitiveness of the European logistics industry.	
Integrated planning and seamless execution of multi-modal routes, with load maximization on all modes.	− Reduction of GHG (GHG, ozone-depleting and POPs) emissions; − reduction of energy consumption; − increased load factor.	− Reduction of cost, time, human, and material resources.	
Availability of an ecosystem infrastructure, with low entry cost, for LSPs, carriers and infrastructure operators to share visibility of transport demand and resources, and to cooperatively manage freight transport services.		− Reduction of costs and resources to support cross-organizational processes like, e.g., transport demand aggregation and intermodal route planning.	− Secure market shares and related jobs for SME logistics providers that may easily integrate their offerings into efficient chains.

ICT-related challenges

To achieve the above improvements, the following challenges will have to be met by ICT research and development:

- *Exchange platforms for environmental data of freight transport services*

  Companies need to share environmental performances data on logistics services (carbon footprint, energy efficiency) with external stakeholders, including customers, supply chain partners, regulatory bodies and authorities. To this purpose, measurement approaches and ICT tools are needed to support companies in collecting relevant input data and using these for auditing and reporting purposes.
- *Quality-of-service monitoring of the supply chain*

  In order to develop a mass market for co-modal solutions (whether used by small or large actors), systematic capturing is needed of the quality (track record) of services delivered, both for individual services as well as for end-to-end chains delivered as bundled services. These should allow assessment of different QoS (Quality of Service) levels from which the buyer can select the service that he needs given his requirements. QoS include environmental performance indicators but other dimensions as well (e.g. speed, reliability).
- *Multi-actor, multi-criteria freight transport planning*

  Approaches and tools are needed for multi-actor freight transport planning, supporting supply-chain wide evaluation and planning of door-to-door transport solutions, including different modes, carriers and logistics operators. Planning methods are required that:
  - Plan co-modal transport chains to increase the load factor across all transport modes, optimizing both emissions reduction and logistics performances;
  - Effectively and dynamically synchronize road transport with the other transport modes to boost adoption of eco-friendly transport modes.
- *Widespread cooperation infrastructure for logistics stakeholders*

  The envisioned cooperative environment for logistics information services requires for logistics companies to have available a shared technological infrastructure and standards to provide, combine and use freight information services. Such an infrastructure will allow individual actors in the chain to publish, access and combine each other's services to support transport planning and execution. SMEs will have a determinant role as services users and providers in this new market, provided the necessary cost conditions are met. Cost and burden barriers shall have to be consistently lowered, in comparison to current interoperability solutions, to ensure that SME shippers are able to utilise the low-carbon logistics services and that SME logistics providers may easily integrate in the new business ecosystem.

Other challenges

The following represent challenges not directly related to ICT, but that need to be met to realize the above-described improvements:

- *Standard indicators and methods for environmental performances of freight transport services*

  A main pre-requisite for low-carbon services affirmation on the market is the availability for standards for environmental performances calculation and publication. There are initiatives on course (e.g., ISO 14064, CEN/TC 320/WG 10, "green" SCOR, GHG protocol from WRI and WBCSD) but not yet a well-defined framework for industrial users in the transport logistics sector.
- *Visibility and accessibility of low-carbon alternatives*

  To be included in door-to-door solutions, low-carbon alternatives must first be visible on the market and accessible to both shippers and forwarders. This includes modal-shift alternatives (e.g., rail or motorways of the sea) as well as eco-friendly uses of the same mode, e.g., slow-steaming or its road-analogues that might result from better utilization of vehicles and infrastructure.