



Urban Freight research roadmap

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EXECUTIVE SUMMARY

This document is a research roadmap on urban freight and logistics delivered jointly by ERTRAC, the European Road Transport Research Advisory Council, and ALICE, Alliance for Logistics Innovation through Collaboration in Europe. The goal of the roadmap is to identify research priorities related to urban freight delivery, returns and urban logistics to improve the efficiency, sustainability and security of these activities. The contents will contribute to the definition of research programmes addressing the main stakeholders of the sector (cities, industry, retail, logistics service providers), including Horizon 2020, the European Framework Programme for Research and Innovation for 2014-2020.

The **scope of the roadmap** is urban freight transport, defined as all movements of goods into, out of, through or within the urban area, made by light or heavy vehicles, including:

- Delivery of goods (business and home);
- Service transport and demolition traffic;
- Shopping trips made by private households;
- Reverse logistics for waste removal and for returns management;
- Service vans for maintenance, supply and removal of parts.

The **vision** is to achieve a full integration of freight flows in cities' operations and activities that allow citizens to access the goods they require and the goods to reach the citizens, while at the same time supporting sustainable development. Research areas identified aim to:

- Increase **energy efficiency**, which can be achieved by improving the efficiency of the whole urban logistics system, and added to the expected gains in the energy efficiency of vehicles;
- **Improve the urban environment** by increasing air quality and reducing noise;
- **Increase customer satisfaction** by delivering the goods on time and improving the reliability of the systems;
- **Increase safety and security**, reducing injuries and fatalities as well as cargo loss or damage.

When preparing the roadmap, the following issues were taken into account:

- Concentration of population in cities (72% EU population live in cities, towns and suburbs, 80% in 2020);
- Urban freight as an important traffic component in cities (10 to 15% of vehicle equivalent miles);
- Very low load factors for delivery vehicles in cities (e.g. 38% for vans in London);
- Urban freight is responsible for 25% of urban transport-related CO₂ emissions and 30 to 50% of other transport-related pollutants (particulate matters (PM), Nitrogen Oxide (NO_x);
- Urban freight service companies are generally very small (85% of short distance truck companies have fewer than five employees);
- Urban freight accounts for a significant part of ambient noise;
- Changing urban freight patterns due to teleworking, ageing population, more densely populated urban areas, growth of e-commerce;
- European policy for zero CO₂ emissions in cities by 2030.

The roadmap includes research challenges in the following five areas of intervention with the following expected impacts:

Challenge	Impact
Identifying and assessing opportunities in urban freight	<ul style="list-style-type: none"> • Increase load factors • Reduce freight vehicle movements • Increase effectiveness • Reduce congestion
Towards a more efficient integration and management of urban freight in the transport system of the city	
Towards a more efficient integration of urban freight in the urban transport system	<ul style="list-style-type: none"> • Increase the number of available loading/unloading zones • Reduce the average number of kilometres per vehicle • Increase asset utilisation
Better understanding of the impact of land use on urban logistics activities	<ul style="list-style-type: none"> • Increase the number of available loading/unloading zones • Reduce the average number of kilometres per vehicle • Create opportunities for the use of shorter-range, but more energy and emission-efficient vehicles • Increase the load factor of vehicles • Properly locate the available loading/unloading zones
Enabling a more efficient management of goods	<ul style="list-style-type: none"> • Reduce the number of kilometres per vehicles • Increase the load factor of vehicles • Increase the rate of available loading zones
Improving the interaction between long distance freight transport and urban freight	<ul style="list-style-type: none"> • Reduce the average number of kilometres per vehicles • Optimise the network of consolidation/transshipment centres • Allow the use of electric vehicles for last mile deliveries
Better adapting the vehicles to innovative urban freight delivery systems	<ul style="list-style-type: none"> • Increase the load factor of vehicles • Reduce the number of kilometres per vehicle • Increase the availability of loading and unloading areas

Challenge	Impact
Business models and innovative services	
Value creation logistics services and more efficient operations	<ul style="list-style-type: none"> • Increase load factors • Increase asset/infrastructure utilisation • Reduce freight vehicle movements • Increase first time delivery • Increase customer satisfaction
E-commerce implications: Direct to consumer deliveries and functional logistics services	<ul style="list-style-type: none"> • Maintain/increase load factors • Reduce private vehicle movements • New business opportunities increase employment • Increase first-time delivery • Increase customer (including ageing) satisfaction
Reverse logistics and transport of waste and recycling material	<ul style="list-style-type: none"> • Increase load factors • Increase asset/infrastructure utilisation • Reduce freight vehicle movements • Increase customer satisfaction • New business opportunities increase employment • Improve urban transportation policies
Designing and operating urban freight delivery infrastructures	<ul style="list-style-type: none"> • Increase the load factor of vehicles • Reduce the average number of kilometres per vehicles • Reduce the environmental impacts of logistics buildings
Safety and security in urban freight	<ul style="list-style-type: none"> • Reduce cargo loss • Reduce accidents involving vulnerable road users
Cleaner and more efficient vehicles	<ul style="list-style-type: none"> • Reduce the emissions of pollutants from the vehicles • Increase the energy efficiency of the vehicles • Increase the availability of loading and unloading areas • Reduce the noise of urban freight • Enable night distribution

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1. INTRODUCTION

ERTRAC, the European Road Transport Advisory Council, and ALICE, the Alliance for Logistics Innovation through Collaboration in Europe, have identified the need to pool resources and jointly develop a research roadmap on urban freight and logistics. It complements the ERTRAC work on urban mobility, which so far had mostly focused on passenger transport and only marginally addressed freight, and the ALICE roadmaps on **1. Sustainable and Secure Supply Chains**; **2. Corridors, Hubs and Synchromodality**; **3. Information Systems for Interconnected Logistics** and **4. Global Supply Network Coordination and Collaboration**. This roadmap fills the gaps and covers an activity which is also essential for the competitiveness of the European economy and important for the efficiency of the transport system. It is estimated that urban freight represents 10 to 15% of vehicle equivalent miles travelled on city streets and two to five percent of the employed urban workforce. Urban freight transport mainly represents road-based transport and will continue to do so.

The goal of the roadmap is to identify the research priorities related to urban freight, returns and urban logistics and contribute to the definition of research programmes for the actors of the sector, including Horizon 2020, the European Programme for Research and Innovation.

The implementation of the research topics and activities identified in this document are required to achieve the objectives of the ERTRAC and ALICE Strategic Research Agendas.

	Indicator	Guiding objective
Decarbonisation	Energy efficiency: urban passenger transport	+80% (pkm/kWh) *
	Energy efficiency: long-distance freight transport	+40% (tkm/kWh) *
	Renewables in the energy pool	Biofuels: 25% Electricity: 5%
Reliability	Reliability of transport schedules	+50% *
	Urban accessibility	Preserve Improve where possible
Safety	Fatalities and severe injuries	-60% *
	Cargo lost to theft and damage	-70% *

* Versus 2010 baseline

Figure 1 : Guiding objectives of the ERTRAC Strategic Research Agenda for 2030

Experts from all important stakeholders group involved in urban freight operations and research activities have been invited to contribute to this work¹.

In order to best relate to the societal goals of the ERTRAC Strategic Research Agenda, this roadmap proposes additional indicators and guiding objectives which are better fit for the urban freight sector.

¹ See the list of members of the core group and additional experts consulted at the end of the document.

The research topics identified in this roadmap are, for instance, expected to contribute to other societal goals, including reducing the impact on the local environment (air quality and noise).

This roadmap is a living document that covers the main research priorities in the field of urban logistics identified so far. New concepts and elements that may impact urban freight will need to be considered in future revisions of this roadmap. Specifically, the impact of e-commerce and the potential implementation of an ALICE vision on Physical Internet and its implications on urban freight will need to be further assessed in the near future.

1.1. Guiding objectives for 2030 for urban freight

1.1.1. Decarbonisation

As in the ERTRAC Strategic Research Agenda, the roadmap recommends using **energy efficiency as an indicator for decarbonisation, measured in tkm/kWh**. Energy efficiency gains can be achieved by improving the efficiency of the whole urban freight and logistics system and added to the expected gains in the energy efficiency of vehicles.

Gains on the vehicle side are expected to come from the increased efficiency of **internal combustion engine (ICE)** vehicles, as well as the progressive deployment of alternative fuel vehicles, in particular, but not only, electric vehicles (EVs) for urban freight². This means that the potential gains in energy efficiency of the vehicles performing urban freight transport will also depend on the development of the urban transport system as a whole and, more specifically though not uniquely, the urban freight system. Indeed, the introduction of EVs is conditioned by the deployment of a charging infrastructure, which probably includes fast charging points, potentially shared in some cases with public transport vehicles. It will also depend on the ability to progressively deploy solutions enabling the consolidation of the delivery of goods, which would reduce the comparative additional cost of using EVs for freight delivery.

Energy efficiency will also be improved by the overall improvement in the efficiency of the urban freight system. Solutions enabling the load factor of vehicles or load units to be increased, the number of kilometres driven per kg/good delivered to be reduced, empty runs to be reduced that increase the effectiveness of deliveries, empty trips to be decreased that reduce the number of shopping trips in particular, all contribute to increasing the energy efficiency of the system.

The expected impacts of the research topics identified in this document indicate how they are expected to contribute to more energy efficiency.

1.1.2. Local environment

The various contributors to this roadmap stress the importance of setting the improvement of the impact of urban freight activity on the local environment as one of the guiding objectives for this document.

² The Clean Vehicle Portal – www.cleanvehicle.eu

It is expected that the research topics identified in the roadmap will contribute to the improvement of **air quality** in European cities. It should be noted that the factors contributing to local air pollution can vary significantly from city to city, and that the relative contribution of transport to air pollution in cities varies as well. It is therefore not possible to set a target for the improvement of air quality.

The topics proposed in the roadmap are expected to enable a reduction in the concentration of PM in the air, as well as the emission of NO_x from the road transport sector. This can be achieved by a reduction in the emissions of the vehicles themselves due to the improvement of their emission performance, as well as the evolution of the vehicles' usage and operation in the urban environment. For instance, their better integration into a traffic management strategy that includes local emissions as a parameter could lead to reduced emissions from freight fleets.

It is considered that if we compare a city with a fleet including only euro 6 vehicles in 2030 with the same city in 2010 which is composed of an average euro 4 fleet, the reduction of emissions from the vehicles, all things being equal, could be 80% for PM and 90% for NO_x.

This only gives a very partial picture of what could be the gradual development of the actual emissions from urban freight. This also depends on the development of the volume of goods transported, the average number of kilometres per goods (weight/volume) transported, etc. It also depends on the penetration of vehicle technology in the market, in particular electric vehicles, which itself also depends on the way vehicles are used, explained above.

It can be stressed though that the greater the efficiency in the urban delivery system and logistics operation, the lower the emissions per units transported are expected to be.

Noise is another important local emission to which urban freight contributes significantly. Lowering noise emissions from delivery activities is important to reduce their impact on the health of citizens and enable the extension of night deliveries whenever and wherever they can be introduced in the logistics chain. This requires reducing the noise of the vehicles and auxiliaries, as well as continuing to lower the noise related to the handling of goods and loading and unloading activities.

1.1.3. Reliability

The objective to improve the reliability of the road transport system has been translated in the scope of this roadmap by the improvement in the effectiveness of deliveries in the urban environment. Deliveries are considered effective when the goods are delivered and there is a person or place where they can be delivered at the anticipated delivery point.

For business-to-business (B2B), the percentage of effective deliveries has already reached a sustainable target close to 95%. It is estimated that 70 to 75% of deliveries are successful for business-to-consumer (B2C) in the urban environment.

The objective should be to rely upon the increasing efficiency of logistics and the urban delivery system to tend towards 100%. The rapid and very important increase in e-commerce is a challenge in this respect. It should be supported by initiatives which could be enabled by the research topics identified in the roadmap and the application of just-in-time policies.

1.1.4. Safety and Security

There is a growing concern about fatalities and injuries involving commercial vehicles and vulnerable road users (VRUs) in the urban environment. It is therefore proposed to focus on this indicator relating to road safety.

While the European Union (EU) has kept ambitious road safety goals, some cities are moving towards the definition of a vision zero. The research community is making big efforts to focus on VRUs and commercial vehicles, which require strong political support and address all the dimensions of the problem – infrastructure, vehicles and the behaviour of people. It is therefore expected that they can lead to a very significant reduction in this specific group of fatalities and injuries, possibly reaching 90% by 2030 (some cities are already taking actions towards this objective).

An efficient urban freight transport system must rely on secure deliveries and a minimum amount of cargo lost to theft and damages. The objective should be to reduce this amount as much as possible and a decrease of close to 90% in the amount of cargo lost to theft and damages can be expected thanks to the progress of research initiatives and systems.

For each of the research challenges identified in this document, the expected direct impacts of the projects are listed. These impacts contribute to achieving these objectives. Important policy objectives such as the reduction of congestion are among these impacts. Their further definition may be the focus of further work.

1.2. Background

1.2.1. A key activity in an increasingly urbanised Europe

Within this roadmap, it is important to bear in mind some facts on cities in Europe and urban freight transport in these cities.

The EU is a largely urban continent. “Today, approximately 359 million people – 72% of the total EU population – live in cities, towns and suburbs.”³ Although the speed of transformation has slowed down, the share of the urban population continues to grow and will reach 80% by 2020. “Europe is characterised by a polycentric and less concentrated urban structure compared to, for instance, the USA or China. There are 26 cities of more than 1 million inhabitants and additional 373 cities of more than 100.000 inhabitants in the EU, representing around 165 million people.”⁴ The demographic evolution of the cities on the continent varies greatly. Some such as London or Brussels are expecting a very significant growth of their population over the coming decade, while others are shrinking.

As economic centres, cities are not only the place of delivery of goods but also the place of shipments: outgoing freight represents 20 to 25% of truck-kilometres in urban areas, incoming freight 40 to 50%, and the rest originates from and is delivered within the city. Waste transport also represents an important activity in urban logistics. Three to five percent of urban land is devoted to freight transport and logistics.

³ Annex of Cities issue paper, the urban agenda, European Commission, 2014

⁴ ibid

1.2.2. Urban freight: a responsive and flexible sector

Urban logistics is an extremely flexible activity. It adapts to the current profound changes in demographics, urban economy, new shopping and distribution behaviours, new demands from consumers and businesses.

Transport companies providing urban freight services are generally very small. In Europe, 85% of short distance truck companies have fewer than five employees. They usually work as subcontractors of bigger umbrella organisations but integration is not always achieved. Every year €100 billion, or 1% of the EU's Gross Domestic Product (GDP), are lost to the European economy as a result of delays and pollution related to urban traffic. Urban freight is also characterised by a very significant informal sector, the so-called white vans, estimated in many countries to represent around 25-30% of urban deliveries.

1.2.3. A significant contributor to the negative impact of transport on the urban environment

In Europe, urban freight is responsible for 25% of urban transport related CO₂ emissions and 30 to 50% of other transport related pollutants (PM, NO_x, etc.).⁵

In large cities, while commercial vehicles represent a small proportion of traffic, they are involved in the majority of accidents that also involve VRUs.⁶

Urban freight transport accounts for a significant part of ambient noise in cities and mainly causes discomfort to people during the night (disturbed sleep, ...), when no appropriate measures are taken.

These negative impacts of freight activities influence the attractiveness of the city and its liveability.


The load factors for delivery vehicles in cities are very low, e.g. Transport for London reports an average load factor for vans in London of approximately 38%.

1.2.4. Political objectives anticipating technological developments and the implementation of innovation

The White Paper on transport and Horizon 2020 sets ambitious targets for the reduction of CO₂ emissions from city logistics. The White Paper sets the goal to achieve “essentially CO₂-free city logistics in major urban centres by 2030 with the aim of an ‘essentially carbon free’ city logistics by 2030.”

All these facts have led over the past 15 years to a significant number of research and innovation initiatives to improve the efficiency of urban freight which have not so far resulted in a broad gain in efficiency in the sector (annex).

⁵ Conference Proceeding, City Logistics Research, A Transatlantic Perspective, Summary of the First EU-U.S. Transportation Research Symposium, Andrea Meyer and Dana Meyer, Working Knowledge rapporteurs, Transportation Research Board, 2013
⁶ According to Transport for London, for instance, between 2008 and 2012, 53% of cycling fatalities involved heavy goods vehicles (HGVs) in London



When trying to tackle the above-mentioned challenges, urban logistics should be considered as part of a geographically broader logistics activity. Urban logistics is where most supply chains have the end consumer as its primary end target. Therefore, a holistic approach should be followed to understand what can be done upstream to the supply chain to optimise urban logistics. But the peculiarities of cities and the differences (in legislation, regulation, infrastructure network, urban configuration, social habits, etc.) also call for a focus on the urban logistics itself. Different business models, new processes and technologies should be researched and implemented.

To become more efficient and better answer the needs of citizens and businesses, urban transport system are becoming more integrated. This also leads to the need for better integration of freight activities in the urban transport system and beyond in the urban environment. Such a development should allow more consideration for intermodal and multimodal solutions for urban freight.

The development of urban freight transport will be influenced by the deployment of vehicle technologies in the coming years. Research and innovation will have to identify how new technologies will influence urban freight and how to best take advantage of them.

The electrification of road transport, for instance, is an important factor to take into account. The pressure for improving air quality in urban areas is likely to be an important driver for the deployment of electric delivery vehicles. This will mean that goods will be transferred to these electric vehicles in or around the city. It will be important to assess how this transfer can be integrated in the logistics chain and how it can also represent an opportunity for cooperation and consolidation.

More and more vehicles will be connected with each other and with infrastructure managers using, for instance, Cooperative Intelligent Transport Systems (C-ITS), which will enable a significant improvement in the management of urban freight for greater efficiency. It should also be understood how the automation of vehicles and some operations can be best used for urban freight.

Finally, one should not forget that freight transport serves human activities. The development of the city and people's lifestyles will have a significant impact on urban freight patterns. Factors such as the development of teleworking, an ageing population, the development of land use towards more densely populated urban areas, or the growth of e-commerce will have a direct and potentially very significant impact on urban freight patterns.

1.3. Scope

Urban freight transport is defined as all movement of goods into, out of, through or within the urban area made by light or heavy vehicles, also including service transport, construction material transport and demolition traffic, shopping trips made by private households and reverse logistics for waste removal and also for returns management⁷, thus excluding all personal movement with the exception of shopping trips.

The inclusion of shopping trips in the scope of the roadmap implies that interactions with passenger transport are very important and should be considered. However, vehicles not designed specifically for freight transport, such as passenger cars, are outside the scope of the roadmap.

Construction material transport and demolition traffic are relevant traffic components in urban areas. Specific topics on how to optimise and reduce the impact of this type of traffic will be addressed and analysed in this roadmap.

Other traffic movement related to freight movement, such as maintenance and service vans for the supply and removal of parts, are considered.

The scope of this roadmap covers all components of the system: **vehicles, infrastructure and services**.

It should also cover the efficient integration of urban freight delivery into the urban transport system, and the integration of urban logistics in broader scale logistics operations.

The roadmap identifies data collection and knowledge building for urban logistics as the first step for a relevant urban logistics research agenda.

1.4. Overview of relevant projects and initiatives (Annex 2)

In Annex 2, the roadmap includes a list of the most relevant national and European projects which have covered urban freight research since the EC's fifth Framework Programme (FP5). Only projects which have a significant share of their activity relevant to the urban delivery system are listed.

The goal of this list is to help create a picture of the current state-of-the-art with a list of reference activities.

It should also help to better assess the gaps and research needs, as well as understand the reasons for failure when project proposals have not survived over project life or project public funding.

This tool can be updated and used to monitor the implementation of the roadmap.

It should also be used for the update of the roadmap and to further assess gaps and research needs.

⁷ Maria E. Lindholm, Enabling Sustainable Development of Urban Freight from a local authority perspective, Chalmers University

1.5. Complementarities with other ALICE and ERTRAC roadmaps

This document takes into account relevant roadmaps developed in the framework of the European Green Cars Initiative (EGCI), Logistics for Life (L4L) project, and ERTRAC, and the CIVITAS position paper. It is aware of the two newly created centres of excellence in urban freight research involving several European institutes (www.vref.se).

It is also considering initiatives such as the Joint Programming Initiative (JPI) Urban Europe and Smart Cities European Innovation Partnership (EIP).

Among other references, the preparation of the roadmap relies upon the work done in the Coordination Action on ppp Implementation for Road-transport Electrification (CAPIRE) project, in particular its urban freight roadmap, and the EGCI roadmap on logistics.

Urban freight is fully part of the urban transport system. There is therefore a strong need to ensure the coherence with the ERTRAC **roadmap on the integration of the urban mobility network**. This materialises in particular in topics related to freight traffic and the exploration of potential synergies between passenger and freight transport at the urban level.

There are important challenges related to the use of land for urban freight and the location of logistics activity in and around the urban environment. This document therefore provides a complementary approach on this issue to some of the research topics identified in the ERTRAC document **on land use and transport**.

This roadmap will be complemented with other ALICE roadmaps ([Figure 2](#)). Specifically, the roadmap on Corridors, Hubs and Synchromodality will cover the link between long distance transport and the last mile. To elaborate this roadmap, ALICE, ERRAC, ERTRAC and WATERBORNE are joining efforts to achieve a holistic end-to-end co-modal approach.

The ALICE roadmaps on Information Systems for Interconnected Logistics and Supply Network Coordination and Collaboration will complement specific research needs in these areas, keeping focus on the implementation of the long-term vision on the Physical Internet.

This also requires ensuring the coherence of the research related to land use and the road infrastructure described in this roadmap with the **joint European Technology Platform (ETP) roadmap for cross-modal transport infrastructure innovation**.

The need to gain efficiency and contribute to both the decarbonisation of road transport and the improvement of the local environment requires more research on cleaner vehicles for urban logistics. It is important to note that most of the relevant research topics on this matter are identified in the joint ERTRAC/EPOSS/Smartgrid roadmap on the **electrification of road transport** and ERTRAC roadmap on an **infrastructure for green vehicles**.

Finally, the roadmap has to be coherent within the framework of the ALICE ETP work. Urban Logistics research has to provide other logistics research areas with the necessary completeness to guarantee an efficient and sustainable supply chain right to the end and whenever it is necessary to remove goods or materials (such as waste), in general upstream for recycling, reuse, refurbishment or destruction.

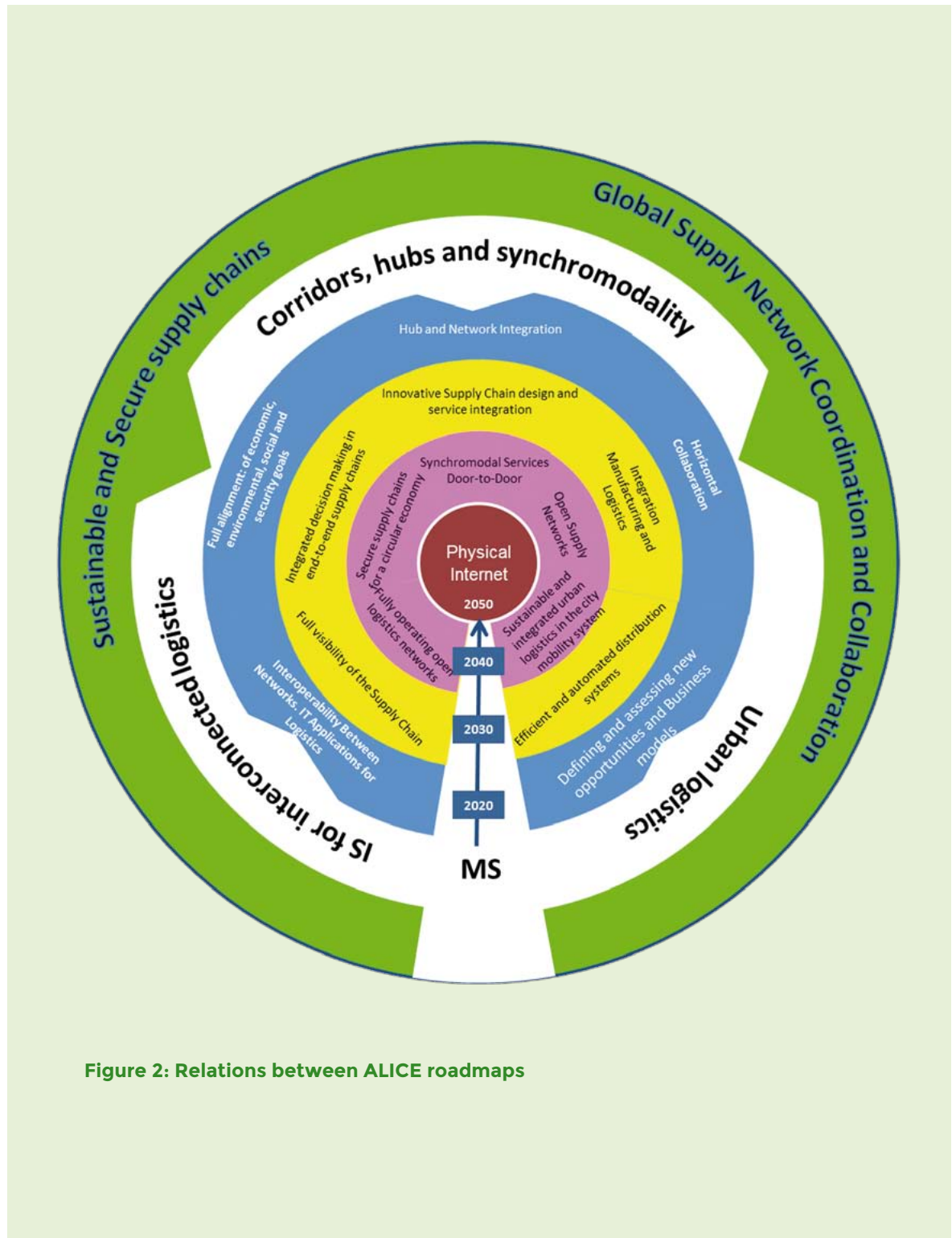


Figure 2: Relations between ALICE roadmaps

2. CHALLENGES, THEMES AND TOPICS

2.1. Identifying and assessing opportunities in urban freight

Although urban freight transport is broadly recognised as a fundamental part of economic trade and impacts severely on the life of cities (contributing to worsening congestion, air quality and noise), there is no satisfactory and comprehensive qualitative and quantitative evaluation of this impact. This is partly due to the difficulties to measure freight traffic separately from the rest of traffic. Polls and surveys are also more difficult given the many different types of freight traffic, service demands, sizes of companies acting in urban deliveries, and types of clients. Fierce competition among service providers opposes the need and opportunity to share and communicate data. Collaborative transportation systems have become an increasingly popular practice due to the crisis. Collaborative transportation is appearing as a good city logistics alternative to classical urban consolidation centres, however the concept of cooperation and competition and data-sharing still requires further development. There is therefore a strong need to acquire targeted consistent and homogeneous data in order to properly assess the problem and monitor the evolution of the different Key Performance Indicators (KPIs) as different sets of measurements are adopted. It is expected that better data, knowledge and information will make it easier to identify opportunities for improvement.

Cities are complex environments which have inherited a certain structure (both in terms of social, economic, political and infrastructural conditions) based on a particular historical evolution. Solutions easy to replicate, or at least potentially replicable, across cities are very tempting and useful, since previous efforts can be reutilised. However, cities have proven to be almost unique and solutions very difficult to replicate. The definition of KPIs and a benchmarking tool will allow the process of replication to be simplified by identifying potential similarities among cities and thus permitting an adequate subset of previously demonstrated tools to apply to a particular city or district. Even if entirely new solutions have to be developed, the KPIs will show the real impact of these new solutions and the extent to which they can be replicated in other cities.

The development and use of modelling tools is necessary to better understand the economics and behaviours and assess the impact of a number of variables, including policy measures, on the KPIs. For this purpose as well, data and information collection are essential.

Demand triggers services and one of the difficulties and complexities linked to urban logistics is the different demand that is generated by so many different types of urban logistics services. Understanding the demand and, even more, being able to anticipate or influence it would help to create more efficient services.


Innovative urban distribution concepts have already been developed, often within the context of research projects. Many of these real-life implementations die a silent death shortly after the project (and funding) ends. It is suggested that these solutions address the objectives of only one or two stakeholders, whilst urban freight is characterised by the large number of stakeholders with often diverging objectives. During a project, this can be camouflaged by the commitment of the actors participating in the project. Once the project is finished, however, the lack of overall stakeholder support and the real barriers emerges. Identifying the stakeholders, their objectives and the barriers will help extend the project implementation and project extension into real life.

Therefore, the following challenges need to be addressed:

- Assessing urban logistics in cities:
 - > Urban freight KPIs and assessment models pursuing international standards (to ensure the quality, safety and security, social and environmental management, etc.) and benchmarking tools should be developed to define types of cities/districts, governance schemes and suitable solutions for specific cities/districts and situations
 - > Identify urban freight stakeholders, governance models and objectives of key actors and link these to deployment barriers to innovative solutions (i.e. willingness to pay, etc.) and ways to overcome them
- Develop a framework for data collection to properly analyse urban freight movements in cities and their impact (structure of the sector, delivery characteristics, load factor, type of operations, relative share of different type of freight (retail, food, construction, maintenance and service vans, post, etc.), expected impact of home deliveries, etc)
 - > Economic and behavioural modelling
 - > Urban freight transport demand/supply. Understand the trends of the freight transport demand and supply depending on the regulatory framework and megatrends: increasing e-commerce, increasing population in cities, increasing ageing population, effects of logistics sprawl (e.g. impact of decentralisation of logistics facilities on transport movements, etc.) and how they influence the demand, its evolution and forecasting, its characteristics according to sector of activities, etc
 - > Explore further the potential gain from international cooperation between researchers, cities and industry on this topic
- Analyse data and identify opportunities:

Data adequately acquired and structured is the basis for proper analysis and the source to identify opportunities for improvement. In this sense, potentially new urban logistics services may be identified, load factors increased and the effects of certain trends or measures anticipated.

 - > Data collection methods and use for urban freight transport optimisation
 - > Potential of new services associated to available data (big data)
 - > Identify and demonstrate opportunities to increase the load factor
 - > Potential for improving procurement and benefits for joint procurement
 - > Assess the potential impact of 3D printing on freight distribution, in particular in urban areas



To increase the efficiency of urban logistics, it is necessary to engage all actors of the system. For this purpose, it is therefore necessary to understand the potential for cooperation between these actors, from the public and the private side, and explore the frameworks which can create incentives for this cooperation.

Research in this respect should address the following topic:

- Understanding the potential for stakeholder cooperation, including business models
Different interests of actors involved in urban logistics (local authorities, shippers, retailers and logistics service providers and consumers) need to be addressed to find commitments satisfying all of them. This topic refers to new collaboration formulas and concerted actions between actors, financing and governance structures, and new policies and regulation measures that benefit public and private parties. This would, for instance, provide the relevant knowledge to identify solutions to address the challenge of so-called white vans, including maintenance and service trips.
- Stakeholder awareness and involvement: new ways of collaboration and concerted actions between local authorities, shippers, retailers and logistics service providers, cooperative decision-making and cooperative planning processes
- Financing/business models, roles, governance structure, supporting new services and cooperation
- Assessing the impact of policy regulation and frameworks
 - > Legal issues: urban public policy in the framework of European competition law, single market versus access restriction
 - > Translating public benefits to private: less congestion benefiting private business: incentives not to drive in peak hours and use of green vehicles
 - > Impact on freight of the implementation of Sustainable Urban Mobility Plans (SUMP)

Policy initiatives have the potential to drive change in some cases and encourage the deployment of efficient solutions from a system and collective perspective. It is, however, important to better understand the impact of public policies on urban freight. It is also important to identify the limits of public policy in the current European legal framework and analyse the concerns and implications of European competition law for the cooperation and consolidation of goods deliveries.

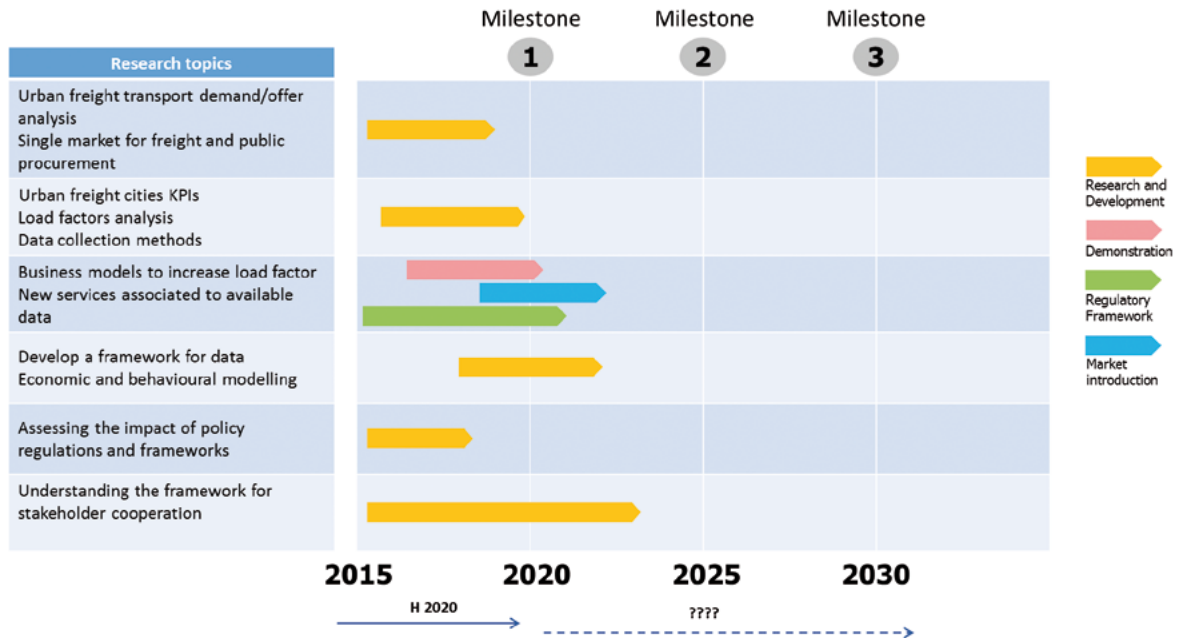


Figure 3: Identifying and assessing opportunities in urban freight

[IMPACT]

- Increase load factors
- Reduction of freight vehicle movement
- Increase effectiveness
- Reduce congestion
- Reduce environmental impact

2.2. Towards a more efficient integration and management of urban freight in the transport system of the city

Achieving a cleaner and more efficient urban logistics system requires a better integration of urban freight in both the transport system and city. This means moving from an activity that is trying to find its place in regulations and networks designed for other purposes towards an activity that is fully recognised and provided for.

The full integration of urban freight in the city therefore also depends on the development of the city and lifestyle within that city.

Indeed, the demand for passenger and goods transport may be complementary or antagonistic, depending on the model of urban development and the development of trends such as teleworking or e-commerce, ageing society, etc.

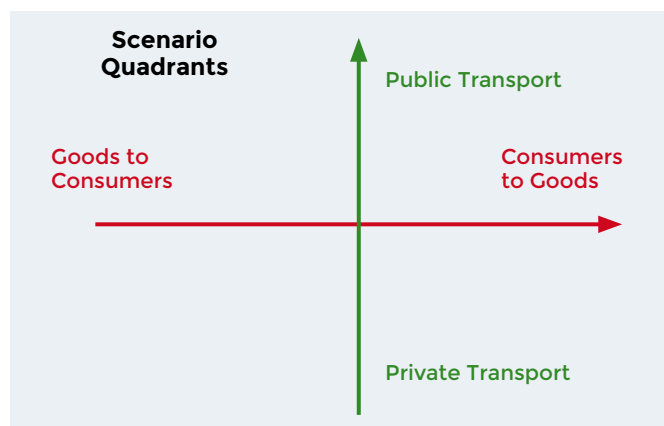
It should be taken into account that there is a relationship between the demand for passenger transport for certain type of activities, in particular commuting to work, and the demand for goods transport.

Teleworking, for instance, reduces the demand for passenger transport but may increase the demand for shopping trips or home deliveries.

Home delivery itself, including e-commerce, may replace shopping trips but increase the travel required for delivering goods. The relationship between both should be better understood.

This touches upon issues such as land use and freight delivery, as well as the idea of accessibility. In this respect, the consideration of the provision of transport for goods and consumers and their relationship with other forms of transport, as suggested by the quadrants developed in the CAPIRE project, can help to understand these various factors.⁸

Other transport activities within the city transport system may have an influence and be influenced by urban freight transport. Maintenance and service activities, for example, carried out by craftsmen are also to an extent goods transport (repair parts and damaged parts), and it could be useful to understand whether service and maintenance activities could be integrated within urban goods delivery or return and how.



Waste is another fundamental part of city transport. Can waste removal processes be integrated with the delivery or, more likely, the return of certain product categories?

Additionally, it is important to consider the relationship between tourism and urban freight. Tourism is a relevant economic sector in a high number of EU cities and its influence on both passenger and freight transport in cities, including potential seasonal scenarios, should be studied.

2.2.1. Towards a more efficient integration of urban freight in the urban transport system

The greater integration of urban logistics activities in the urban mobility systems requires further research and deployment of solutions for **optimising the use of the road infrastructure in space and time for urban freight activities**. This includes exploring the potential for a more dynamic use of dedicated lanes and lane prioritising, relying upon ITS when relevant. It also requires much work to explore the potential for a more advanced management of parking spaces in relation to loading activities, addressing issues such as enforcement, up-scaling, business models and pricing.

⁸ École des Mines for CAPIRE

The opportunities to differentiate the use of road space and time according to the type of activities should also be further researched, with significant work required for innovation on the better use of road space at off-peak hours and nights, considering the challenges related to the business models, size and structure of consignees and constraints on operators. This may also involve the definition of service levels of the infrastructure.

This research on optimising the use of the infrastructure should be complemented by investigations into how to best use the infrastructure for purposes other than the original ones.

The current urban road network was built with little consideration for logistics activities. The challenge today is therefore to assess how this same road space can also be best used for this purpose.

This requires addressing questions such as the integration of urban freight with public transport on the road infrastructure, both from a vehicle and public transport interchange perspective. The best use of these interchanges for urban freight delivery is, for instance, a question to investigate.

When it comes to the integration of different activities on the road infrastructure, research should aim to enable their integrated management at the strategic, tactical and real-time level.

This means working on how to open bus lanes to other vehicles with a minimum impact on public transport operations and how to define the road transport infrastructure that can be available for freight activities. This should rely upon the knowledge gathered on better understanding the barriers for this joint use of the infrastructure.

Lane prioritising by the smart use of traffic lights, depending on the type of traffic or the moment of the day, also requires further research.

The potential impact and interaction of some policies, in particular related to access restriction and infrastructure charging for both freight vehicles and passenger vehicles, also requires further understanding to move towards an optimised management of the infrastructure. This type of research should not only consider the public road infrastructure, but also explore the potential of private infrastructures (parking, shopping centres, etc.) and infrastructure enabling the use of rail or water (lakes, rivers, etc.) for urban logistics.

While work is required to enable this joint use of the infrastructure, it should be supported by activities to build support for this among stakeholders. It should therefore be supported by work on public acceptance and the involvement of the different actors, in particular the freight operators.

The extent and conditions of some forms of public-private partnerships (PPPs) to enable this should be investigated.

Finally, the work should also address the challenge of integrating deliveries in the increasing number of infrastructures developed as shared space. Significant research is still needed to ensure that the best is made of the integration of urban freight in the urban mobility system, the development of tools and methods, including scenario planning and models, for fully taking urban freight into consideration at all stages of the sustainable urban mobility planning process. This should identify opportunities to also assess the potential for using other modes and infrastructures than road for improving the urban freight system.

These considerations for passenger transport and urban freight transport should also enable the opportunities for the cross-fertilisation of innovative and best practices between the two types of activities.

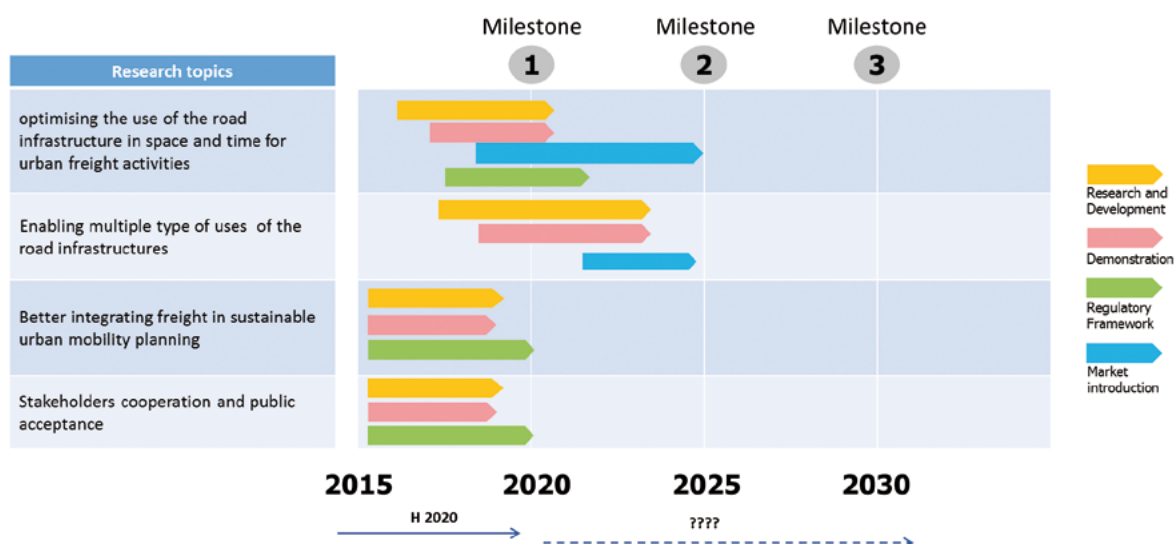


Figure 4: Towards a more efficient integration of urban freight in the urban transport system

[IMPACT]

- Increase the number of available loading/unloading zones
- Reduce the average number of kilometres per vehicle per delivery
- Increase asset utilisation
- Reduce environmental impact

2.2.2. Better understanding of the impact of land use on urban logistics activities

The better integration of urban freight in the urban transport network and the urban environment requires a better understanding of the impact of land use on urban logistics activities.

Research and innovation on this topic should help to increase the knowledge related to spatial patterns and urban freight facilities. It should lead to tools for measuring the role, location and impacts of warehouse, freight terminals and urban logistics platforms in metropolitan areas. On this topic, it is also necessary to assess and map locational trends and the impacts of “logistics sprawl” on freight flows, CO₂, local pollutants and congestion.

The location of logistics activities may also have an impact on the social cohesion of the territory and should be better understood.

Finally, some research should be carried out on measuring the accessibility of networks and terminals for various types of actors. This should also cover public transport accessibility.

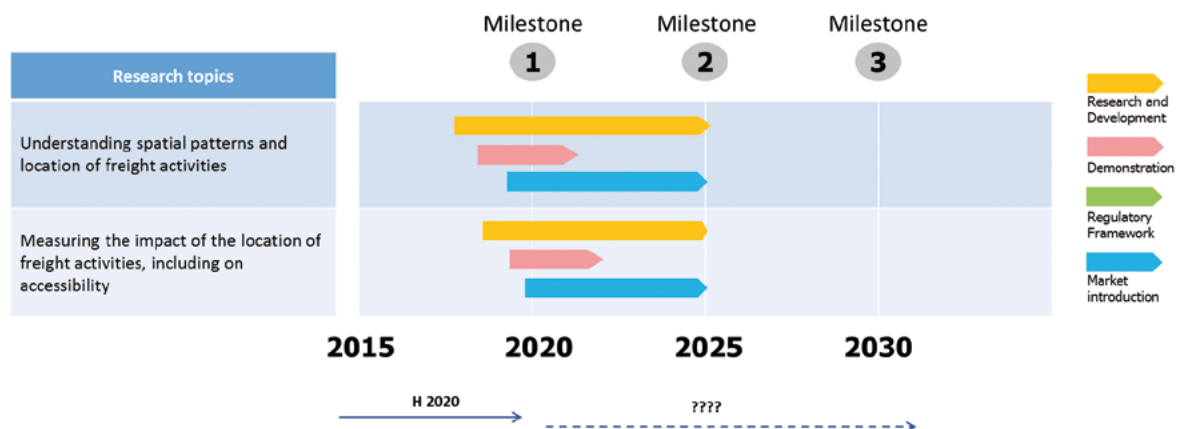


Figure 5: Understanding the impact of land use on urban freight activities

[IMPACT]

- Increase the number of available loading/unloading zones
- Reduce the average number of kilometres per vehicle per delivery
- Create opportunities for the use of shorter-range, but more energy and emission efficient vehicles
- Increase the load factor of vehicles
- Properly locate the available loading/unloading zones

2.2.3. Enabling a more efficient management of goods

Research focusing on the infrastructure dimension of urban freight activities should lead to managing the infrastructure to enable a more efficient movement of goods in the urban environment. Connectivity and telematics solutions are enablers for many logistics and transport evolutions in the 21st century.

ITS to better manage the movement of goods

ITS can offer a wide pallet of services that will improve the overall efficiency of goods distribution in cities. This ranges from access control and privileges granted to specific vehicles (low noise, low or zero emissions, etc.) to dynamic routing, lane sharing, load index control, information about other road users, delivery space availability or information related to logistics. However, the key focus of any research is to identify appropriate business models for technology adoption and market deployment.

The integration of urban freight into urban network management can rely on new improved traffic management operations and a better use of data on urban freight. This requires the potential of increased exchange of data on urban freight to be explored, and the possible deployment of C-ITS, in particular vehicle to infrastructure (V2I).

To support this approach, research work should be carried out on data definition/identification/ collection/accessibility for planning and policy and urban freight plans. Models for data sharing and cost efficient data collection on urban freight should be considered. This also requires legal research related to privacy and competition issues. It should also involve the definition of incentives for exchanging data.

These activities should aim, among other things, at significantly improving the management of loading and unloading areas. It should enable a better enforcement of the regulations for their use, and information provision to drivers and operators to find and occupy them. Increased knowledge on how improved access to freight receivers and improved loading/unloading areas may contribute to improved efficiency and reduced emissions is also needed. This also influences future land use planning in cities.

Finally, the potential of e-Freight should be explored to accelerate this development towards a more efficient management of the network which better considers the movement of goods.

In-vehicle systems and connectivity

In the vehicle, the addition of messages and signals to an already overburdened mental environment must be carefully monitored to propose specific solutions for information to be delivered safely and efficiently.

Regarding these vehicles, research supporting the development of ITS solutions for the efficient management of goods on the urban network should address the development of communication interfaces to manage all information related to vehicle operation, data exchange with infrastructure and logistics operations, load management, mission profile.

The target should be a step-by-step market introduction of these vehicle developments between 2020 and 2025.

The limit of the scope of the roadmap towards vehicles is also defined by the scope of the EGVI. ETRAC and the European Green Vehicles Initiative Association (EGVIA) focus on the electrification of road transport and heavy duty trucks mainly for long distance transports. The content concerning research needs for urban applications are limited beyond the more obvious carry over effects from research activities into alternative drivelines.

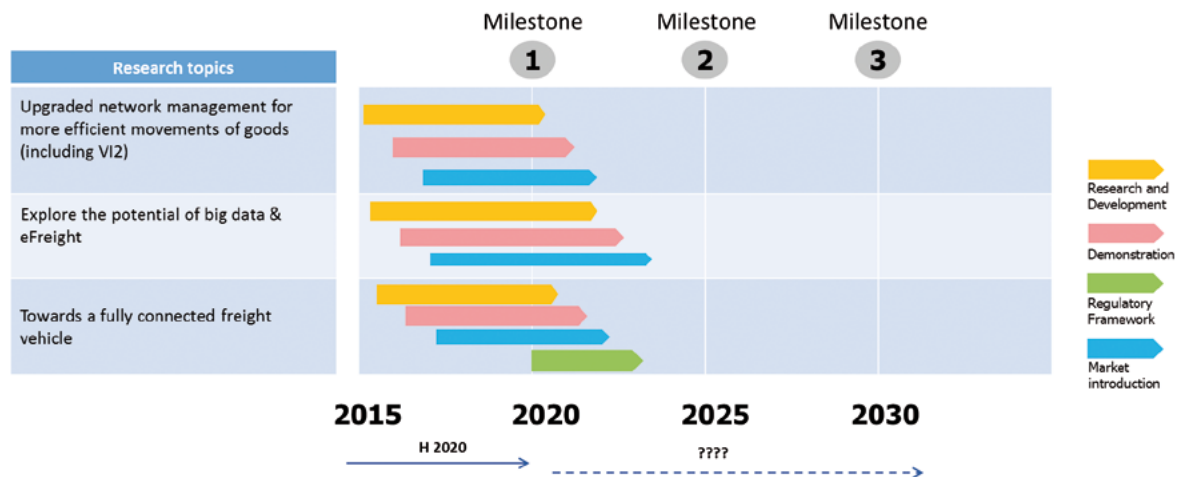


Figure 6: Enabling more efficient movements of goods through the management of the infrastructure

[IMPACT]

- Reduce the number of kilometres per vehicles per delivery
- Increase the load factor of vehicles
- Increase the rate of available loading possibilities

2.2.4. Improving the interaction between long distance freight transport and urban freight

Increasing the efficiency of urban logistics requires improving the integration between networks and operations, including the interaction between long distance freight transport and urban freight.

This research topic covers the interface and interactions with long distance freight transport services and infrastructures (airports, seaports, intermodal terminals, dry ports, logistics platforms, etc.).

In long distance freight transport, efforts to increase efficiency and make the transport more sustainable often lead to scale increases, such as the use of longer and heavier vehicles or mega vessels, and a more diversified use of transport modes. On the other hand, within many European cities a downscaling of transport modes used for urban deliveries, such as cargo bikes, is witnessed to decrease the nuisance. A major challenge therefore is the coordination of these very different trends. For instance, it raises the question of optimising the management and location of long time parking spaces for trucks in or around urban areas.

In this regard, the Physical Internet concept in which logistics and supply chain networks are open and integrated, including warehouses and hubs, should enable the proper consolidation of freight transport in the last mile delivery in urban areas.

Additionally, space for temporal storage is often required, which is not easy in an urban setting where space is limited and expensive. A major role is reserved for intermodal transshipment locations and different types of consolidation centres. Those can include, for instance, concepts of mobile depots.⁹

It should include studies on land use and freight transport/logistic operations interaction and the impact of the multiplicity of logistics hubs and networks. This should lead to developing solutions for optimising the use of postal/small parcel hubs/infrastructure in cities. It could also help to design freight corridors in cities/regions, including the intention of providing a better management of long distance freight transport through the urban transport network. Special attention should be paid to the possibilities of establishing publicly-controlled consolidation centres operated by private companies.

Besides, new trends in long distance transport such as the increasing alignment of different transport services, for example synchro-modality, necessitates additional alignment with the transport activities in the city centre.

The multimodal dimension of freight transport should be considered in this topic, for instance optimising the use of inland ports and developing the use of intermodal terminals and freight villages, as well as the link between interregional and local transport flows.

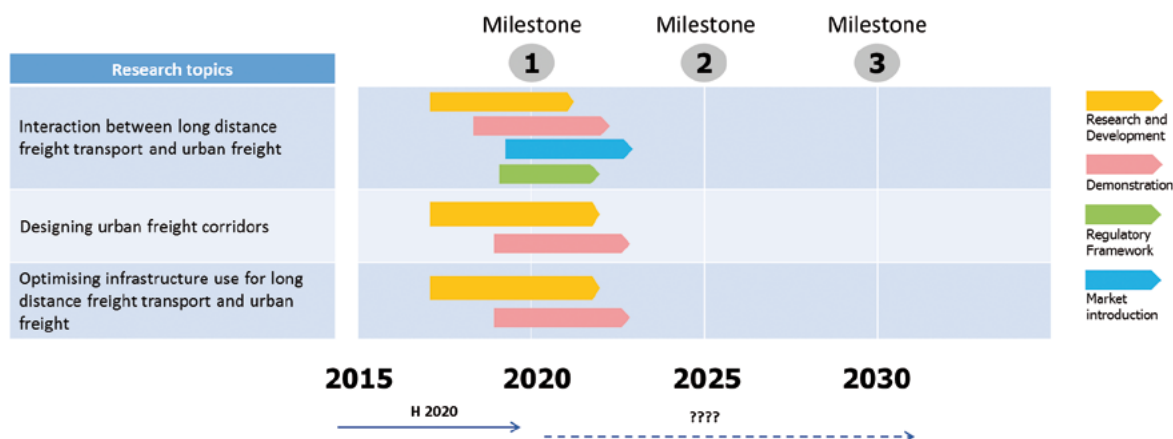


Figure 7: Improving the interaction between long distance freight transport and urban freight

[IMPACT]

- Reduce the average number of kilometres per vehicles
- Optimise the network of consolidation/transshipment centres
- Allow the use of electric vehicles for last mile deliveries

⁹ Straightsol project, www.straightsol.eu

2.2.5. Better adapting the vehicles to innovative urban freight delivery systems

The better integration of urban freight activities in the urban transport system also requires the development of innovative vehicle solutions that are better fitted to innovative urban freight delivery systems, due to flexibility and modularity.

Truck and van operations suffer from and participate to congestion, even if they represent a minor part of the overall traffic. Vehicles that are stopped in traffic jams or have to drive unwanted kilometres to find a place to park represent a major lack of efficiency for transport companies, as well as the other road users who are blocked by vehicles stopped to deliver goods. Vehicles that carry out double parking as a quick solution to faster delivery create traffic problems that severely affect the quality of service of other public or goods-related transport and stress drivers in private vehicles.

There needs to be a decrease in the unwanted miles driven, unnecessary stops and time wasted in order to improve the overall efficiency of the system and decrease its impact on congestion. This involves addressing the following topics:

- Define future optimal urban freight vehicle sizes and architectures from a multi-stakeholder perspective
- Work on developing innovative alternative vehicles such as cargo bikes should continue to be supported
- Develop loading rate measurement systems (weight, volume, etc.), to be linked with overall city access control and network management
- Develop standardised and modular logistics units (compatible with regular containers) for a better load factor and interoperability among different transport systems and modes
- Develop technologies to transfer loads between (large and small) vehicles, as well as with other transport modes (holistic multimodal approach), for example regarding the architecture of vehicles, load units etc., to allow a decoupling of the delivery processes between mass transport and last mile operations
- Lower the noise related to handling, loading and unloading of goods to enable night deliveries
- Facilitate access to delivery areas: semi-automation/automation of vehicles (vehicle manoeuvrability and driver assistance). The first step will consist of the development and provision of increasing driver support, which will be followed by semi-automation.¹⁰

¹⁰ The automatisisation of vehicles will be addressed in a separate ERTRAC initiative

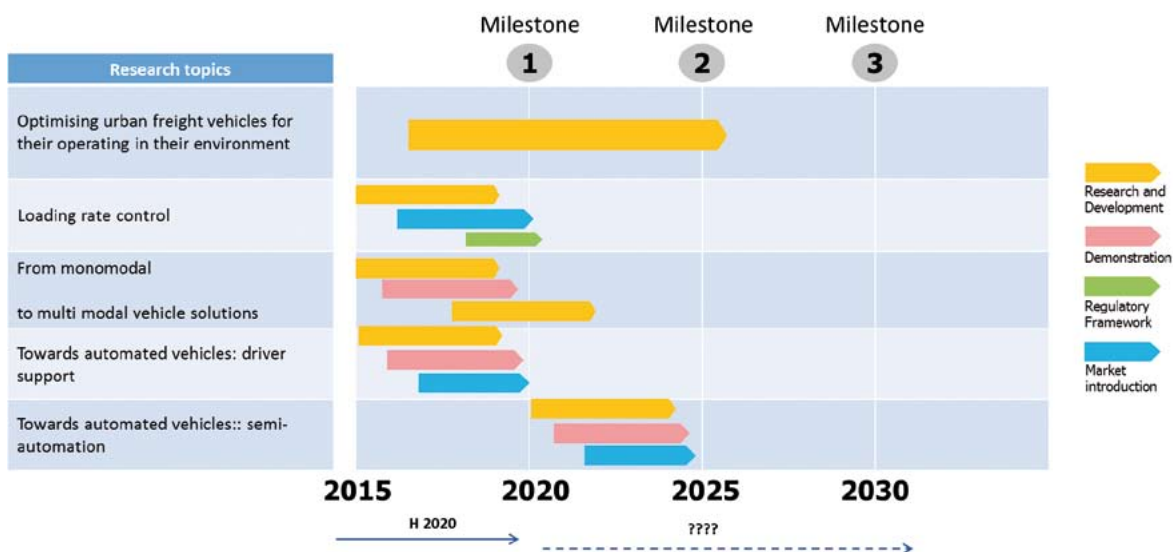


Figure 8: Better adapting the vehicles to innovative urban freight delivery systems

[IMPACT]

- Increase the load factor of vehicles
- Reduce the number of kilometres per vehicle per delivery
- Increase the availability of loading and unloading areas
- Enable night freight deliveries

2.3. Business models and innovative services

Research and development on new business models associated to the smart urban logistics needs to tackle economic, environmental and social aspects that allow growth and industry to run businesses, and at the same time guarantee well-being for citizens.

2.3.1. Value creation logistics services and more efficient operations

Supply chains evolve quite rapidly, adapting their service specifications to constant changes in consumer and client requirements, while taking advantage of opportunities for improved efficiencies offered by new technologies. In order to fully optimise the efficiency of most supply chains, a better look has to be taken at the final delivery of goods done in urban environments. Traditionally, due to a lack of resources or local knowledge or pure cost issues, the last mile delivery has been outsourced to specialised companies (mail or express companies, local agents, etc.) and somehow the direct control of the physical operations gets lost or at least handed over to someone else. The shift in consumer trends towards e-commerce and the current demand for better environmental conditions in cities call for a closer look into this part of the supply chain, to try to find new ways to improve efficiency. In this context, local regulations have a big influence on the results to be obtained. New types of services and new ways of performing the operations are areas to be explored under this topic.

Also to be considered is the ever-growing fragmentation of orders, particularly at final delivery point, which represents a trend reinforced by e-commerce. If freight traffic is to be reduced, there needs to be an investigation into consolidation schemes and models to increase the load factor, while at the same time considering the urban supply chain.

This requires a consideration of business models for consolidation schemes, including fleet and freight sharing and pooling. Research should also address new concepts for the design of distribution centres in cities for last-mile distribution (e.g. cross-docking methodologies), and the impact on the optimal utilisation of the infrastructure.

A better use of land space is also required, considering the scarcity and high costs of urban land. However, it is not a straightforward task to share vehicles and infrastructures, since several issues have to be tackled, including common ICT infrastructures, the sharing of critical information related to clients and internal processes, service compliance with different service requirements, cost sharing, etc. Collaboration between operators/supply chains/shippers, load factors and competition challenges should be investigated.

This degree of sharing translates into new opportunities for collaboration across the supply chain and among competitors.

Other logistics models specific for urban distribution (for example, night distribution) need further analysis to find ways to extend it to smaller business and non-dedicated supply chains. Efforts are needed to further develop solutions for out-of-office hour delivery strategies to retail, and for specific logistics chains such as the Hotel/Restaurant/Café (HORECA) sector. This requires an improvement in the measurement of opportunities and the provision of night delivery technology for all businesses, including, for instance, small shops. This may involve the simultaneous development of solutions and opportunities for consolidation for the same target group of businesses.

ICTs can be a critical tool in this context, enabling the sharing and integration of data, which should also be considered across the different supply chains.

In this respect, research should explore the potential of the Internet of Things (IoT) and Future Internet for logistics. It should, in particular, investigate measures to improve and maximise the availability and (cross-border/cross-system) interoperability of transport data and information systems. This involves studying the definition and monitoring of data quality, while considering data security and integrity-related challenges.

There is a need for further work on improving current freight models and the better integration of urban freight in main traffic models. The goal should be to move towards real-time information exchange; highly accurate, dynamically-updated maps and positioning systems.

Together with C-ITS for instance, this should enable green driving support systems.

There is also a challenge regarding packaging in the last mile distribution, in particular around fresh, refrigerated and frozen goods. Reverse logistics associated to this packaging is also an issue which needs to be tackled with a view to minimising waste and optimising reverse flows.

The optimisation of load units could contribute to this effort, with the optimisation, modularisation and standardisation of packaging and load units for business and home deliveries.

The packaging and delivery of fresh products should be researched specifically, as they represent a significant share of the goods transported on the urban network.

Finally, the potential for deploying further certification schemes in urban logistics should be investigated, as well as further developing approaches such as Lean & Green, for instance, as they could support the freight operators to move towards Total Quality Management (TQM) for continuous improvement.

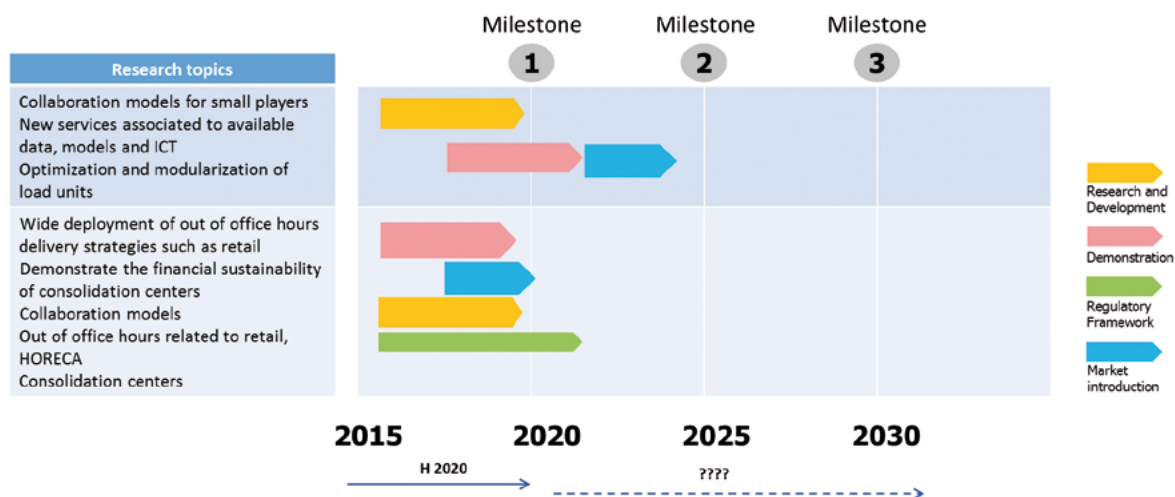


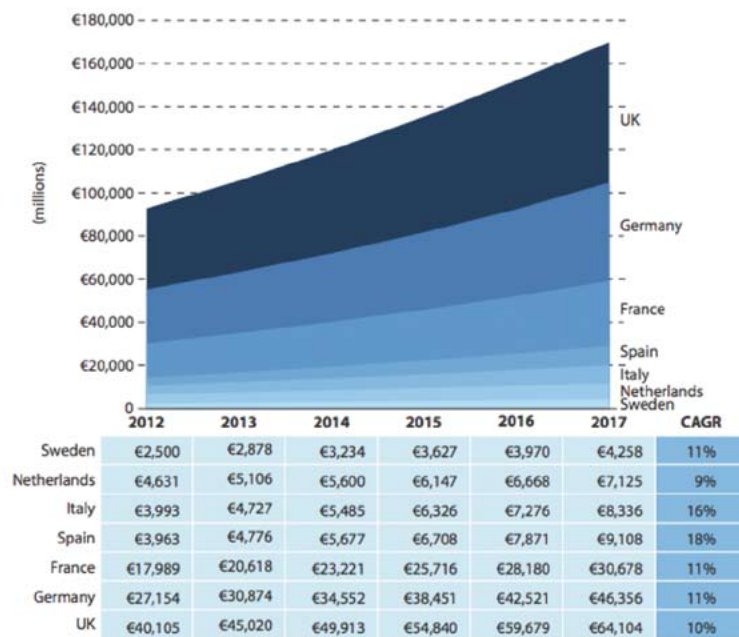
Figure 9: Value creation logistics services and more efficient operations

[IMPACT]

- Increase load factors
- Increase asset/infrastructure utilisation
- Reduction of freight vehicle movements
- Increase first time deliveries
- Increase customer satisfaction

2.3.2. E-commerce implications: Direct to consumer deliveries and functional logistics services

E-commerce is becoming the new paradigm in retailing. Beyond being a new channel of sales for retailers, the internet gives the consumer new powers to influence what is sold and how. Consumers now have a soft easy way of accessing products, avoiding physical travelling to shops, and this gives new opportunities for shoppers with limited mobility (eg ageing or sick people, people living far away from shopping areas, youngsters or people without a private car, etc.) to acquire goods. The problem with e-commerce is that it multiplies the number of deliveries, since trips saved by consumers have to be done by the commercial vehicles. There is also a total dispersion of delivery points and an additional difficulty in planning the times for delivery, which have to adapt to each different shopper. For example, returns as frequent as 50% of purchases in clothing and textiles in some countries add to the dimension of the problem. Logistics operations for e-commerce have different requirements and solutions than those for traditional retailing, but research is needed to obtain a better insight into the problems and possible solutions to apply.



Source: Forrester Research Online Retail Forecast, 2012 To 2017 (Western Europe)

93341

Source: Forrester Research, Inc.

Figure 10: Forecast: European online retail sales by country, 2012 to 2017

Specific logistics models for e-commerce which resolve the problem of delivery to the final customer (do it right first time) have to be analysed and their impact in terms of cost, service, use of space and environment have to be measured. In this field, solutions for the efficient management of home deliveries need to be developed. They involve, for instance, multi-user-multi-provider pick-up point stations. But further solutions can be researched in decoupling delivery and reception. Research should, for instance, cover flexible pick-up point networks (offices, public transport hubs, parking, neighbourhoods for retired people, private and public vehicles, etc.). Such flexibility gains would have impacts on costs, sustainability, payment schemes and delivery times that have to be investigated.

New types of shops, show rooms, etc. in urban areas due to e-commerce could also affect the distribution patterns within the urban area. There may be less need for products in the shops or the other way round, depending on the structure of supply chains.

Finally, the quality of service should be better understood, for instance the difference between the service carried out and perceived (requirements, traceability, etc.) or the social benefits of such a system, which marks the emergence of a new urban freight paradigm.

The integration of click-and-mortar distribution channels should also be researched.

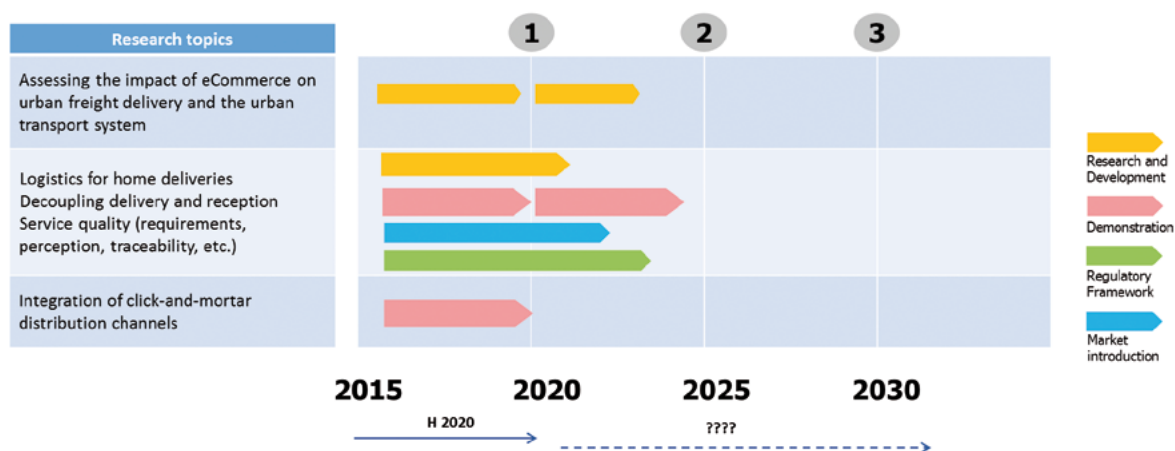


Figure 11: E-commerce implications: Direct to consumer deliveries and functional logistics services

[IMPACT]

- Maintain/Increase load factors
- Reduction of private vehicle movements
- New business opportunities, increasing employment
- Increase of first-time delivery
- Increase customer (including ageing) satisfaction

2.3.3. Reverse logistics and transport of waste and recycling material

Cities are facing an increasing volume of waste, recycled materials and returns (for example from e-commerce) that needs to be managed. This topic focuses on the analysis of niches and opportunities to integrate direct and reverse flows, and the research on new integrated logistics models to increase the global efficiency.

Flows that currently work separately could be optimised if opportunities for synergies are identified and new business models developed. Reverse logistics associated to e-commerce also have to be considered for this potential flow integration. It is therefore necessary to research the following questions related to reverse logistics and the transport of waste and recycling material:

- Measuring trends for direct and reverse volumes: implications of e-commerce
- Current versus new paradigms and business models of direct and reverse flows (recycling and returns)
- Direct and reverse logistics models, integration and cargo pooling: avoidance of empty runs
- Logistics management models in an increasing urban environment society of recycling
- Combining flow waste from industry (construction material and others) and domestic waste.

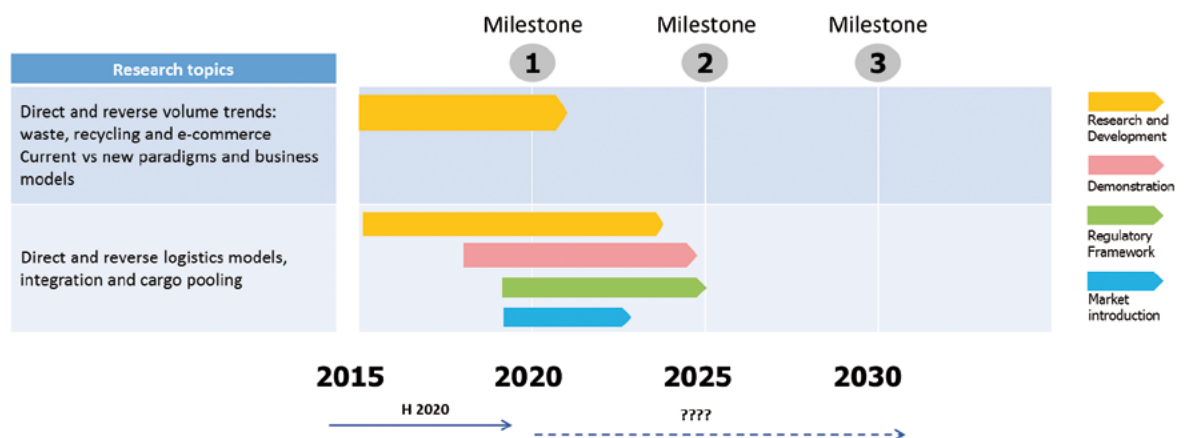


Figure 12: Reverse logistics and transport of waste and recycling material

[IMPACT]

- Increase load factors
- Increase asset/infrastructure utilisation
- Reduction of freight vehicle movements
- Increase customer satisfaction
- New business opportunities, increasing employment
- Improve urban transportation policies

2.3.4. Designing and operating urban freight delivery infrastructures

This research topic focuses on better understanding how to best build and manage infrastructures dedicated to freight delivery in the urban environment, such as loading/unloading areas, consolidation centres, pick-up points, warehouses, etc. It covers issues such as the use of brown fields for urban freight deliveries or the architectural design and integration of logistic facilities in urban areas, as well as the business models supporting them. This would involve studies on the design and architectural issues related to freight facilities in cities. It should help to develop tools to support industrial brownfields for urban logistics spaces. Research into the improvement of freight infrastructure should also include research on the vertical exploitation of space, such as the extent to which verticality can be interesting for goods storage and transport.

This topic also includes all research activities specific to the building, financing and operation of the facility. This covers financing and business models for building and operating the facility, and the research for greater efficiency in the management of the infrastructure for different purposes, logistics chains and at different times of the day.

Finally, the design and operation of freight infrastructure also covers the integration of this infrastructure into other types of infrastructures and building, for instance in the framework of greenfield development. This is, among other things, related to the better integration of the freight dimension in the planning of urban infrastructures in general.

The scope could include the definition and research on the requirements, conditions, needs, etc. for a preferential use of the infrastructure by clean vehicles (including the timetable and wider range for the use of infrastructure, supports, etc.).

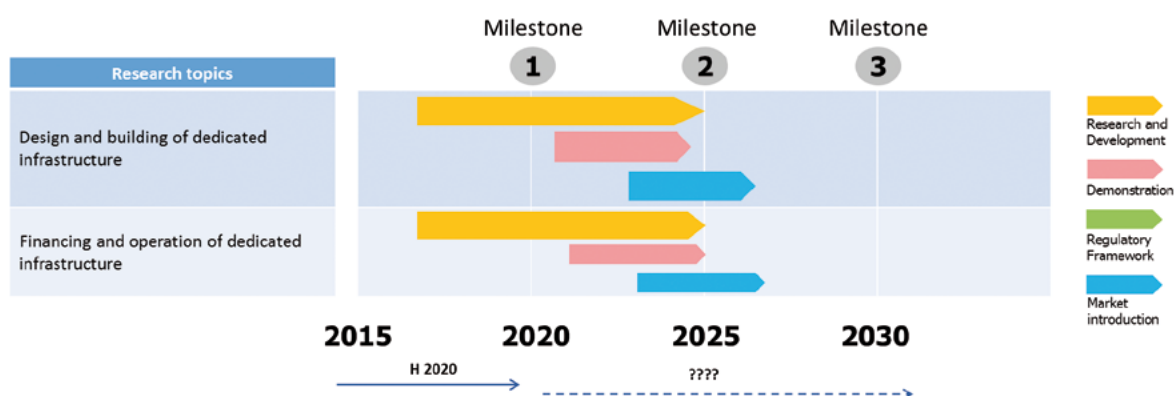


Figure 13: Designing and operating urban freight delivery infrastructures

[IMPACT]

- Increase the load factor of vehicles
- Reduce the average number of kilometres per vehicles
- Reduce the environmental impacts of logistics buildings

2.4. Safety and security in urban freight

The **security** of freight and freight operations in the urban environment remains a challenge in too many cases. A significant amount of goods are lost following security breaches. It is therefore important to identify solutions to guarantee a safe urban delivery system which minimises the risk for the freight operators. Research efforts should be extended to systems enabling the decoupling of the delivery and collection of the goods, such as pack stations, in-vehicle delivery, etc. These systems will only deliver their full potential if they are proven and perceived as safe and reliable by citizens.

To achieve the objective of reducing the amount of goods lost or stolen by 90%, research should cover the following topics:

- Affordable technology/processes to achieve load unit traceability and visibility
- Locks and seals to guarantee vehicle integrity
- Secure and reliable automated parcel lockers and delivery units
- Increasing integrity of goods (perishable, electronic, high value)
- The opportunity to extend the eCall system to provide drivers with a reliable tool for declaring a theft in progress with risk to their personal integrity
- Automated monitoring of surrounding traffic with software capable of identifying potentially threatening behaviour from other vehicles.

The delivery of goods in cities may lead to safety concerns for both VRUs and the drivers. There is indeed a high share of accidents of VRUs involving commercial vehicles in the urban environment. This is due, among other things, to the lack of visibility of VRUs in the urban environment when driving and manoeuvring. Tail lift use can be dangerous for pedestrians and cyclists. It is risky for the driver to leave the vehicle and manipulate packages and pallets close to heavy traffic.

Research should therefore address the following additional topics on road safety and driver security in traffic:

- Driver support and visibility equipment for 360° safety around the vehicle when driving and manoeuvring
- Include messages to vulnerable users, communication via lights, beeping sounds when backing up as in heavy-duty vehicles and when operating tail lifts, etc
- On a longer term basis, assess the opportunity to “virtually” separate dynamic commercial vehicles from VRUs
- Vehicle architecture for a safe and easy entry/exit, as well as load handling (to be considered while taking into account the variety of usages and the affordability of solutions), including goods security when delivering
- Risk analysis and research for some specific supply chains (constructions)
- Assessment of the opportunity to integrate road safety measures in urban freight policies.

Work on vehicle architecture for safety purposes can also integrate the conditions for a better public acceptance of delivery vehicles, through enhanced integration of the city landscape, while maintaining or even improving the efficiency attributes of delivery vehicles (design acceptance, VRU protection, no visible moving parts, etc).

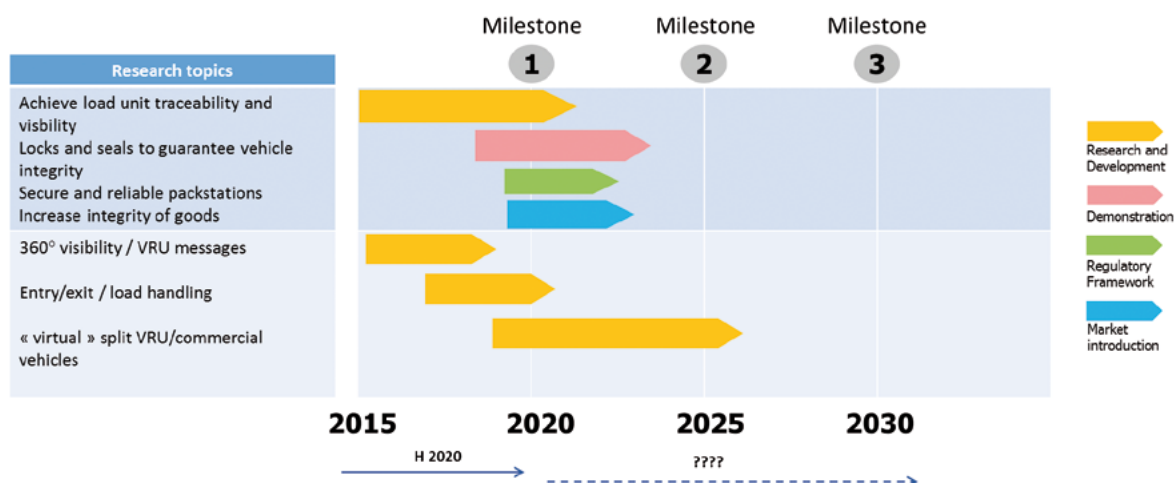


Figure 14: Safety and security in urban freight

[IMPACT]

- Reduce lost or damaged cargo
- Reduce accidents involving VRUs

2.5. Cleaner and more efficient vehicles

The scope of this roadmap regarding research and innovation on vehicles includes all types of vehicles used to transport and deliver goods. These are mainly vans and trucks.

The main size of the vehicle is a 3.5 tons (Gross Vehicle Weight) van, as well as a rigid truck which weighs up to 26 tons (global deliveries and refuse collection) and even a 32-ton rigid truck for construction. Semi-trailer and/or truck + trailer are also used in lower volumes.

This chapter focuses on trucks as 3.5-ton vans are a different market.

More efficient organisation can lead to a decrease in the number of kilometres driven. But cleaner and more efficient vehicles can further enhance the positive trend to fuel consumption reduction and an improved urban environment.

It is therefore necessary to carry out further research:

- Develop alternative fuel proposals (including electricity) with direct cost/life cycle costs and overall system business models as a target. Fuel availability and distribution must be addressed, considered in the framework of the business model to build a comprehensive deployment model
- Integrate management of vehicle auxiliaries for a wider scope of implementation (for example, for loading systems, pumps, tippers, refuse vehicles, etc)
- Develop alternative fuel proposals for autonomous body modules (refrigerating unit, street sweepers, etc)
- Investigate the second-hand market of alternative fuel vehicles and their impact on the residual value of the vehicle. The same could be done for batteries of electric vehicles
- Making eco-driving easy for drivers
- Further research into the reduction of particulates from brakes and tyres
- The deployment of a charging infrastructure for electric freight vehicles operating in urban areas (cargo bicycles, two-wheel vehicles, etc.), the integration of this infrastructure and the charging into the management of freight vehicles and the business model supporting the use and financing of these vehicles and the charging infrastructure
- Develop new materials for vehicles, improving the characteristics of the vehicles (less weight, resistance, etc.).

Besides air pollutants, vehicles also impact the urban environment with noise emissions. Noise is one of the most harmful pollutants impacting citizens in a city, as confirmed, for instance, by the World Health Organisation. Therefore, the reduction of vehicle noise is an important research priority. The reduction of vehicle noise is also a condition for shifting deliveries to off-hours.

Deliveries carried out early in the morning, or during the evenings (even at nights in some cases) lead to specific requirements for low noise concepts, following the early implementation of the Dutch “Piek” principles (a certification scheme and technology development programme for vehicles and equipment operating under 60dB).

Research topics:

- Definition of a EU standard methodology for noise measurement for the overall delivery process
- Development of “affordable” low noise solutions (not only electric vehicles (EVs), including full vehicle equipment (truck/van body, lifting/loading equipment, etc). This is linked with overall city access control and ITS management.

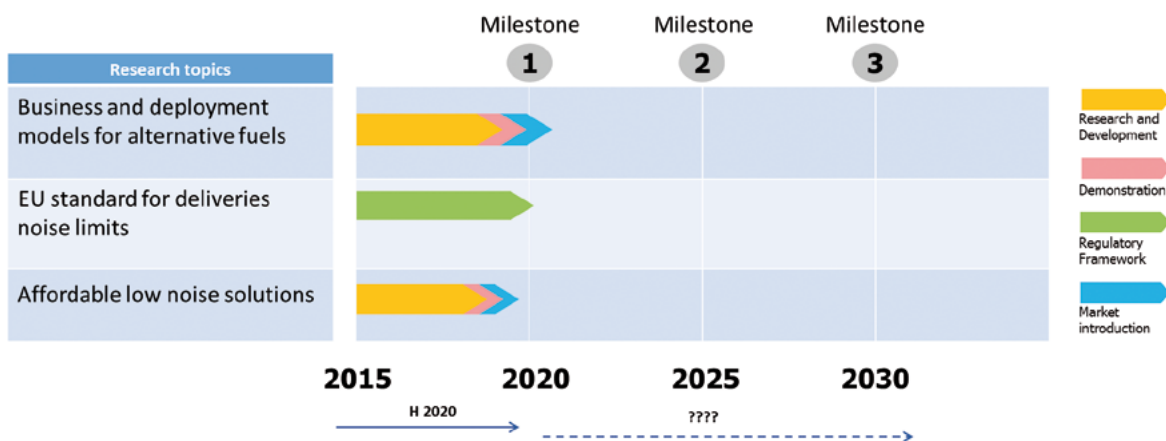


Figure 15: Cleaner and more efficient vehicles

[IMPACT]

- Reduce the emissions of pollutants from the vehicles
- Increase the energy efficiency of the vehicles
- Increase the availability of loading and unloading areas
- Reduce the noise of urban freight
- Enable night distribution

ANNEX 1 – CONTRIBUTORS AND PEOPLE CONSULTED

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ANNEX 2 – OVERVIEW OF RELEVANT PROJECTS AND INITIATIVES

Acronym	Full Title	Description	Duration	Website	EU/ National initiative
BELOGIC	Benchmarking Logistics for Co-modality	Development of benchmarking and KPI concepts and solutions for establishing performance measurement mechanisms for co-modal logistics chains.	September 2008 – February 2011	www.be-logic.info	EU FP7
BESTFACT	Best Practice Factory for Freight Transport	Aims to develop, disseminate and enhance the utilisation of Best Practices in 3 clusters: Urban freight transport, Green Logistics and Co-modality, and eFreight.	January 2012 – December 2015	www.bestfact.net	EU FP7
BESTUFS I, II	Best Urban Freight Solutions	Best practices for city logistics.	January 2000 – December 2004. September 2004 – August 2008	www.bestufs.net	EU FP5 and FP6
CITYFREIGHT	Inter- and intra- city freight distribution network	Logistics technology and solutions, and also traffic and parking management methods aiming to dissuade certain categories of goods vehicles to enter the city centre; new urban planning principles aiming to influence positively the freight transport demand patterns.	January 2002 – December 2004	http://cordis.europa.eu/projects/index.cfm?fuseaction=app.details&TXT=urban+freight&FRM=11&STP=10&SIC=&PGA=&CCY=&PCY=&SRC=&LNG=en&REF=60454	EU FP5
CITYLOG	Sustainability and efficiency of city logistics	The CITYLOG main objective was to increase the sustainability and efficiency of urban delivery of goods through an adaptive and integrated mission management and innovative vehicle and transport solutions.	January 2010 – December 2012	www.city-log.eu	EU FP7

CITYMOVE	City multi-role optimised vehicle	Innovative integrated vehicle solution fitting with the integrated city transport solution approach for a secure, flexible, reliable, clean, energy efficient and safe road transportation of goods across European cities.	January 2010 - December 2012	www.citymove-project.eu	EU FP7
CIVITAS -Urban Freight Logistics and Clean Fuels and Vehicles		Support cities to introduce ambitious transport measures and policies towards sustainable urban mobility.	2002-2016 (CIVITAS-CIVITAS plus II)	www.civitas-initiative.org	EU CIVITAS Programme
CIVITAS-CAPITAL		Will contribute significantly to the goals of the EU's Transport White Paper by capitalising systematically on the results of CIVITAS and creating an effective "value chain" for urban mobility innovation. It will help CIVITAS to build the bridge towards a more advanced identity within Horizon 2020. Clean Fuels and Vehicles/Urban Freight logistics thematic groups.	Started 2013	www.civitas-initiative.org	EU FP7
CIVITAS-CATALIST Urban goods thematic group		CIVITAS cities measures in relation to urban goods distribution and how these could be transferred to take-up cities.	August 2008 - June 2011	www.civitas-initiative.org	EU FP6
CLEAN VEHICLE PORTAL		The portal will be updated to offer broad information on public procurement of clean vehicles, detailed overview of EU legislation, EU programmes and projects related to procurement rules and the endorsement of low-emission vehicles in the EU, as well as a number of procurement cases from around Europe.	2012-2015	www.cleanvehicle.eu	EU IEE tender

C-LIEGE	Clean last mile transport and logistics management	C-LIEGE aimed to promote cleaner and energy efficient freight movements in urban areas. A novel set of integrated solutions and "push-and-pull" demand-oriented measures were due to be tested and shared in roadmaps for the implementation in European cities.	June 2011 – November 2013	www.c-liege.eu	EU IEE
COFRET	Carbon footprint of freight transport	COFRET's main objective was to develop and test a methodology and framework for the accurate calculation of carbon emissions in the context of supply chains. COFRET provided for a methodology to calculate and monitor carbon emissions based on their component CO ₂ -emissions and if applicable further GHG gases such as CH ₄ and N ₂ O as well as so-called F-gases deriving from cooling processes.	June 2011 – November 2013	www.cofret-project.eu	EU FP7
Co-Gistics	C-ITS for urban freight	CO-GISTICS will deploy C-ITS services for logistics. CO-GISTICS will deploy 5 services: <ul style="list-style-type: none"> • Intelligent parking and delivery areas • Multimodal cargo CO₂ emission estimation and monitoring • Priority and Speed advice • Eco-drive support 	January 2014 – December 2017	www.cogistics.eu	ICT PSP CIP

CONCOORD	CONsolidation and COOR-Dination in Urban Areas	CONCOORD investigates an integrated urban freight simulation environment, a unique measurement framework for the environmental footprint of transport and logistics, and the performance measurement of new innovative urban transport and logistics concepts. Its results, simulation tools, and insights are, among others, disseminated via an important CONCOORD deliverable: the European Urban Transportation Experience Lab.	January 2013 – December 2015	www.dinalog.nl/en/projects/international/conCOORD	EU Joint Programme Initiative-National (Netherlands Dinalog)
CCP21	Connecting Citizen Ports 21	It brings together 7 major inland ports and intends to promote connectivity and sustainable transport by optimising the organisation of freight logistics and sustainable spatial development of inland ports. Lille and Brussels ports focus on city distribution.	October 2011 – ?	www.citizenports.eu	EU INTERREG IVB
CONNEKT LEAN & GREEN international		Lean and Green encourages and supports businesses in their efforts at drastically reducing the CO ₂ emissions from their transport and logistics activities.		http://lean-green.nl/en-GB/international	EU: The Netherlands, Italy, France, Wallonia, Flanders, Germany
CVIS	Co-operative vehicle-infrastructure Systems	Innovative technology solution for vehicle communication and cooperation with roadside infrastructure and other vehicles.	February 2006 – January 2010	www.cvisproject.org	EU FP6
CYCLELOGISTICS		CycleLogistics aimed to reduce energy used in urban freight transport by replacing unnecessary motorised vehicles with cargo bikes for intra-urban delivery and goods transport in Europe.	May 2011 – April 2014	www.cyclelogistics.eu	EU IEE

DELIVER	Design of electric light vans for environment-impact reduction	Innovative Electric Light Commercial Vehicle concepts for mass application by 2020 and market penetration by 2030. Part of the Green Cars Initiative.	November 2011 – October 2014	www.deliver-project.org	EU FP7 (Green Cars Initiative)
DISCwise	Digital Supply Chains for European SMEs based on the Freightwise Framework	Aims to improve the competitiveness of the transport & logistics sector in Europe, through the smart use of ICT. It seeks to improve the supply chain management in the sector and get stakeholders more connected, in particular smaller sized enterprises, by assisting their integration into efficient co-modal supply chains. Supports the EU's Freight Transport Logistics Action Plan.		www.discwise.eu	Supported by Directorate General Enterprise and Industry
ECOMOVE	Cooperative and Mobility and Services for Energy Efficiency	eCoMove aimed to develop core technologies and applications based on vehicle-to-vehicle and vehicle-to-infrastructure communication or so called "cooperative systems", where vehicle eco-relevant data can be shared real time with other vehicles and traffic controllers as a basis for fuel-efficient driving support and traffic management.	April 2010 – March 2013	www.ecomove-project.eu	EU FP7
ECOSTARS		ECOSTARS set different fleet schemes that will rate vehicles and operating practices using star rating criteria, to recognise levels of environmental and energy savings performance. Operators will then receive tailor-made support to ensure the fleet is running as efficiently and economically as possible, to help them progress to higher ratings within the scheme.	June 2011 – May 2014	www.ecostars-europe.eu/en	EU IEE

E-FREIGHT	European e-Freight capabilities for Co-modal transport	An e-Freight platform supporting the design, development, deployment and maintenance of e-Freight Solutions which will be validated in business cases and pilots involving representatives from all relevant stakeholders in surface transport including large and small businesses and authorities. e-Freight deals with Framework, Single transport Document and Single Window.	January 2010 – June 2013	www.efreightproject.eu	EU FP7
ENCLOSE	Energy efficiency in city logistics services for small and medium-sized European historic towns	ENCLOSE main objective of raising awareness about the challenges of energy efficient and sustainable urban logistics in European Small/Mid-size Historic Towns.	May 2012 – November 2014	www.enclose.eu	EU IEE
EURIDICE	European inter-disciplinary research on intelligent cargo for efficient, safe and environment-friendly logistics	Created concepts, technological solutions and business models to establish an information services platform centred on the context of individual cargo items.	January 2008 – December 2010	www.euridice-project.eu	EU FP7
FIDEUS	Freight Innovative Delivery of Goods in European Urban Space	Optimisation of vehicle load capacity by improving transshipment operations and integrating delivery operation with city traffic management and control.	May 2005 – April 2008	www.transport-research.info/web/projects/project_details.cfm?ID=20318	EU FP6
FREIGHTVISION		Vision and Action Plans for European Freight Transport until 2050: a long-term vision and robust and adaptive action plans for sustainable long-distance freight transport in the EU.	September 2008 – February 2010	www.freightvision.eu	EU FP7

FREIGHTWISE	Management Framework for Intelligent Intermodal Transport	Support modal shift of cargo flows from road to intermodal transport.	October 2006 – April 2010	www.freightwise.info	EU FP6
FREILOT	Urban Freight Energy Efficiency Pilot	The FREILOT initiative was designed to increase energy efficiency in goods transport in European urban areas. It piloted the following services in 4 cities: energy efficient intersection control (by providing priority to trucks at intersections), adaptive speed and acceleration controls, eco-driving support, real-time loading/delivery space booking.	April 2009 – September 2011	www.freilot.eu	EU ICT PSP
FREVUE	FREVUE validating freight electric vehicles in urban Europe	Will provide evidence for electric vehicles' day-to-day reliability and suitability across a wide range of urban freight schemes. 127 vehicles to be evaluated (from small vans of 3.5t up to large 18t trucks).	2013-2017	www.frevue.eu	EU FP7
FURBOT	Freight urban robotic vehicle	Novel concept architectures of light-duty, full-electrical vehicles for efficient sustainable urban freight transport and will develop FURBOT, a vehicle prototype, to factually demonstrate the performances expected.	2011-2014	www.furbot.eu/overview.shtml	EU FP7

GOFER		Gofer is a cooperative system for freight management and regulation of heavy freight vehicles in urban areas. Two live demonstrators: Oslo and Trondheim. The demonstration activities included a live demonstration on the 500 km route from Oslo to Trondheim; heavy vehicle driving simulator to study measures prioritising heavy vehicles and a simulation model for access to the Alnabru terminal area in Oslo.	2009-2011	www.sintef.no/home/Freetext-search/?query=gofer	National (Norway)
GOODROUTE	Dangerous Goods Transportation Routing, Monitoring and Enforcement	GOOD ROUTE aimed to develop a cooperative system for dangerous goods vehicles through route monitoring, re-routing (in case of need) enforcement and driver support, based upon dynamic, real time data, in order to minimise the Societal Risks related to their movements, whereas still generating the most cost efficient solution for all actors involved in their logistic chain.	January 2006 - December 2008	www.goodroute-eu.org/pages/page.php?mm=1&lnk=start.php	EU FP6
GREENLOGISTICS		Aimed to co-ordinate different logistical activities in a way that meets customer requirements at minimum cost, taking also into account the external costs of logistics associated mainly with climate change, air pollution, noise, vibration and accidents. This research project examined ways of reducing these externalities and achieving a more sustainable balance between economic, environmental and social objectives.	2006-2010	www.greenlogistics.org	National (UK)

GREEN FREIGHT EUROPE		The initiative aims to provide a single platform to which shippers and carriers input operational data necessary to calculate, validate and benchmark the environmental performance of their transport operations.	2012-present	www.greenfreighteu-rope.eu	EU: several member companies
HAVEIT	Highly Automated Vehicles for Intelligent Transport	The project aimed at the improvement of road safety, energy efficiency and comfort through the development of a virtual co-system, which will support the driver of different vehicles, including trucks.	February 2008 – June 2011	www.haveit-eu.org/displayITM1.asp?ITMID=6&LANG=EN	EU FP7
HEAVY ROUTE	Intelligent Route Guidelines of Heavy Vehicles	Link road infrastructure via electronic mapping.	September 2006 – June 2009	http://heavyroute.fehrl.org	EU FP6
ICARGO	Intelligent Cargo in Efficient and Sustainable Global Logistics Operations	iCargo will build an open affordable information architecture that allows real world objects, existing systems, and new applications to efficiently co-operate, enabling more cost effective and lower-CO ₂ logistics through improved synchronisation and load factors across all transport modes.	November 2011 – April 2015	www.euridice-project.eu	EU FP7
INTEGRITY	Intermodal Door to door Container Supply Chain Visibility	Aimed at creating supply chain visibility by providing a basis for securing intermodal container chains ("security tracing") on a door-to-door basis by evaluating information from various types of sensors, portals and other information sources, partially pre-processed by intelligent algorithms.	June 2008 – October 2011	www.integrity-supplychain.eu	EU FP7

INTRANS		To develop knowledge, concepts, models and systems for intelligent fully -automated flow of goods and information in transport system through the employment of leading-edge technologies. Funded by the Research Council of Norway.		www.sintef.no/Projectweb/INTRANS	National (Norway)
KOMODA	Co-modality – towards optimised integrated chains in freight transport logistics	KOMODA's main objective was to produce a roadmap, with associated action plans, to nurture an integrated e-Logistics platform by and between modes of freight transport across Europe.	January 2008 – December 2009	www.transport-research.info/web/projects/project_details.cfm?ID=36907	EU FP7
LAMILO	Last mile logistics	Develop innovative solutions to make urban logistics operations more effective and sustainable when delivering individual consumer goods to homes, shops and distribution centres.	January 2013 – March 2015	www.lamiloproject.eu	EU INTERREG IVB
LOGINN	Logistics Innovation Uptake	Aims at co-ordinating and supporting RTD projects in the logistics area to improve their capabilities to bridge the gap between pilot implementation and marketable solutions. To achieve this goal LOGINN will set up a collaborative platform (the Virtual Arena) to allow the main stakeholders of the logistics domain (industry, SMEs, public authorities, investors and research organizations) to work together on promoting innovative transport logistics solutions aiming at increasing efficiency and with a particular focus on intermodal transport.	November 2011 – April 2015	www.loginn-project.eu	EU FP7

LOG4GREEN	Logistics for Green	Logistics clusters of six regions – Carinthia (Austria), Ruhr Area (Germany), Wallonia (Belgium), Normandy (France), Istanbul (Turkey), and Odessa (Ukraine) perform joint analyses of the respective logistic sectors in order to develop regional strategies and a Joint Action Plan.	December 2011 – December 2014	www.log4green.eu/index.php/project-info	EU FP7
MELODYS	Medium duty and Low emission for DYStribution	Aiming at demonstrating in real conditions the usage of 3 medium size prototypes of trucks (13 to 16t) in Full Electric mode and FE+ Range Extender mode.	November 2009 – ?	www2.ademe.fr/servlet/doc?id=82307&view=standard	National (French: ADEME)
NICHES	New and Innovative Concepts for Helping European transport Sustainability	NICHES aimed to stimulate a wide debate on innovative urban transport and mobility between relevant stakeholders from different sectors and disciplines across the EU and accession countries, in order to promote the most promising new concepts, initiatives and projects from their current “niche” position to a “mainstream” urban transport policy application. Included innovative approaches in city logistics.	November 2004 – March 2007		EU FP6
PARFUM	Particulates, Freight and Heavy Duty Vehicles in Urban Environments	Implemented and evaluated a combination of innovative technologies for clean vehicles for city logistics and public transport, integrated with policy and planning approaches.	October 2006 – March 2009	www.parfum-life.ecolo-bremen.de/index.php?level=0	EU Life
PROMIT	Promote Innovative Intermodal Freight Transport	Intermodal freight transport technologies and procedures.	March 2006 – February 2009	www.promit-project.net	EU FP6

PIEK		Certification scheme for vehicles and equipment operating under 60dB(A) which will be suitable for use in night time deliveries without causing noise disturbance.	2004 - present	www.piek-international.com	EU: The Netherlands, UK, France, Germany and Belgium
RISING	River Information Systems for Transport & Logistics	The overall objective of identifying, integrating and further developing information services such as River Information Services (RIS) in order to efficiently support Inland Waterway Transport (IWT) and logistics operations.	February 2009 - January 2012	www.rising.eu/web/guest/home	EU FP7
SELECT	Suitable ELEC-tromobility for Commercial Transport	The project aims to identify potential for electromobility in commercial transport and investigates how electric vehicles could contribute to an environmentally sustainable alternative to current patterns of urban commercial transport.	July 2012 - June 2015	www.select-project.eu	ERA-NET Electromobility+
SENDSMART		Developed, tested and demonstrated innovative services and systems with international appeal for sustainable goods transports in metropolitan areas for Goods Supply, Construction, and Waste Management and Recycling transports.	September 2012 - September 2014	www.lindholmen.se/en/activities/closer/sendsmart	National (Sweden)
SILENCE	Quieter Surface Transport in Urban Areas	The SILENCE project aimed to implement the European policy objectives in a comprehensive way, by addressing all aspects of surface transport noise in cities (example Night distribution in Barcelona).	2005-2008	www.silence-ip.org	EU FP6

SMARTFREIGHT	Smart freight transport in urban areas	The main aim of SMART-FREIGHT was therefore to specify, implement and evaluate Information and Communication Technology (ICT) solutions that integrate urban traffic management systems with the management of freight and logistics in urban areas.	January 2008 – June 2010	www.smartfreight.info	EU FP7
SMARTFUSION		A public-private partnership aims to evaluate the technical and logistical feasibility of introducing fully electric vehicles and the second generation of hybrid truck technology in last mile operations and the related urban/inter-urban shipment processes. Part of the Green Cars Initiative.	April 2012 – March 2015	www.smartfusion.eu	EU FP7 (Green Cars Initiative)
SMARTSET	Sustainable Market driven Terminal Solutions for Efficient freight Transport	SMARTSET is structured around three core aspects for creating successful and attractive terminals: Market based business models, energy efficient vehicles, Incentives and regulations.	June 2013 – ?	http://smartset-project.eu/	EU IEE
SMILE	Smart green innovative urban logistics for energy efficient Mediterranean cities	Modelling city logistics and testing smart city urban logistics solutions in electric mobility, ICT, transport operations with a focus on waste, green labelling.	January 2013 – June 2015	under construction	EU MED territorial cooperation Programme
SOCOOL@EU	Sustainable organisation between cluster of optimised logistics @Europe	The project aimed to create an open European platform of excellence in the area of supply chain management and logistics in connection with hubs and gateways.	January 2012 – December 2014	www.socool-logistics.eu/	EU FP7
START	Short Term Actions to Reorganize Transport of goods	Short term actions to achieve sustainable and efficient goods distributions in cities.	February 2006 – January 2009	NOT AVAILABLE	EU IEE

STRAIGHTSOL	Strategies and measures for smarter urban freight solutions	Developed an impact assessment framework for measures applied to urban-interurban freight transport interfaces. Part of the European Green Cars Initiative. Pilots related to ITS supply chain/last mile, loading/unloading policies, night deliveries, mobile depot.	September 2011 – August 2014	www.strightsol.eu	EU FP7 (Green Cars Initiative)
SUGAR	Sustainable Urban Goods logistics Achieved by Regional and local policies	SUGAR promoted the exchange, discussion and transfer of policy experience, knowledge and good practices through policy and planning levers in the field of urban freight management, between and among Good Practice and Transfer sites.	November 2008 – February 2012	www.sugarlogistics.eu	EU INTERREG IVC
SUPERGREEN	Supporting EU's Freight Transport Logistics Action Plan on Green Corridors Issues	The purpose of SuperGreen was to promote the development of European freight logistics in an environmentally friendly manner. Environmental factors play an increasing role in all transport modes, and holistic approaches are needed to identify 'win-win' solutions. SuperGreen evaluated a series of 'green corridors' covering some representative regions and main transport routes throughout Europe.	January 2010 – January 2013	www.supergreen-project.eu/project.html	EU FP7
TIDE	Transport Innovation Deployment in Europe	Enhance the broad transfer and take-up of 15 innovative urban transport and mobility concepts throughout Europe: Electromobility-City Logistics.	October 2012 – September 2015	www.tide-innovation.eu/en	EU FP7

TRAILBLAZER	Transport and innovation logistics by local authorities with a zest for efficiency and realisation	TRAILBLAZER aimed to showcase existing good practices and promote public sector policy interventions which can bring about a reduction in energy used in urban freight transport. This was achieved by municipalities, in partnership with their suppliers and the private sector through the implementation of Delivery and Servicing Plans (DSPs).	January 2012 – June 2013	www.trailblazer.eu	EU IEE
TURBLOG	Transferability of Urban Logistics Concepts and Practices from a World Wide Perspective	TURBLOG_WW aimed at improving awareness, enhance cooperation and exchange of experiences in city logistics best practices between European countries and countries worldwide but with a focus on the transfer of experiences between the EU, Brazil and Peru.	October 2009 – September 2011	www.turblog.eu	EU FP7
UrbanZen		UrbanZen offers a centralised, collaborative solution to help free up the urban traffic of heavy goods vehicles. It is based on centralising geographical information coming from the drivers and the municipal authorities. This solution is designed to establish the existence of congestion hotspots for carriers and incorporate them into mobility policies implemented by municipal authorities. Information is passed on to the drivers via GPS so they can automatically change their route by calculating an alternative itinerary to suit the restrictions communicated by authorities.		www.logisticsinwallonia.be	National (Belgium)

V-FEATHER	InnoVative Flexible Electric Transport	The V-FEATHER project presents a complete electric vehicle architecture vision on how urban light duty vehicles will be designed, built and run in the near future. This project is led by industrial partners with emphasis on energy efficiency, commercial viability, life cycle design and development of new technologies for LDVs.	July 2012 - October 2015	http://cordis.europa.eu/projects/index.cfm?fuseaction=app.details&TXT=urban+freight&FRM=1&STP=10&SIC=&PGA=&CCY=&PCY=&SRC=&LNG=en&REF=103964	EU FP7 (Green Cars Initiative)
4C4D City Distribution		The focus of this research project is collaboration in distribution and coordination between Logistics Service Providers (LSP's) and between LSP's and retailers. The increase of collaboration will lead to innovative distribution concepts that are based on sound business models, while meeting objectives and restrictions set by municipalities.	January 2011 - January 2015	www.dinalog.nl/en/projects/r_d_projects/4c4d__city_distribution/?highlight=city+distribution	National (Netherlands Dinalog)
DISTRICAVE	Urban distribution of goods	Define a model for the assessment of the DUF net in Andalusia (Spain).	January-December 2014		Regional (Andalusía, Spain)



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