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European urban freight transport policies and research funding: are priorities and Horizon 2020 calls aligned?

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Abstract. The European Commission has recently developed a growing awareness with respect to the challenges urban freight transport (UFT) poses to cities and, consequently, has started defining specific policies and promoting dedicated tools to address them. Transport is a shared responsibility between the European Union and the Member States, where the subsidiarity principle applies. Accordingly, the former provides European local authorities with support in different areas, including research and innovation funding. This paper aims to assess the linkage and consistency between European policy priorities for UFT and the corresponding calls of the Horizon 2020 (H2020) Research Programme, created to foster research and innovation. The paper identifies and extrapolates in a comparable format ten UFT priority solutions and estimates their degree of correspondence with the H2020 Work Programmes using the amount of research funds allocated to each of them as a proxy. Findings show that, generally, the European Commission addresses UFT through a systematic and coherent approach. Moreover, all the identified solutions are covered by at least one H2020 call, although the extent of the coverage is heterogeneous. Four of the UFT solutions present an overall consistency when it comes to comparing the extent of the scope of the solution and the number of policy documents addressing it, on the one hand, and the number of calls considering it and the budget (potentially) available, on the other.

Key words: Horizon 2020, urban mobility, urban freight transport, European Union, transport policy

1 Urban freight transport challenges and opportunities for research

European cities host 72% of the European Union population (80% in 2020) and generate over 80% of its GDP. About 25% of CO2 emissions produced in urban areas are attributable to the transport sector, as well as 30-50% of other transport-related pollutants, such as particulate matters and Nitrogen Oxide (ALICE/ERTRAC 2014). Congestion causes inefficiencies producing losses of around 80 billion €per year (European Commission 2011). The 2011 White Paper on Transport identifies the need to take additional steps to ensure that cities contribute to reducing Europe's dependence on imported oil and cutting carbon emissions in transport by 60% by 2050 and achieving essentially CO2-free city logistics in major urban centres by 2030 (European Commission 2011).

During the last two decades, the European Commission has developed a growing awareness with respect to the challenges of the urban transport sector, and, consequently,

has started defining specific policies and developing dedicated tools to tackle them. Transport is a shared responsibility between the European Union and Member States (MSs) where the subsidiarity principle[1] applies. Urban mobility is essentially a local responsibility. However, in the light of the challenges mentioned above, there is an increasing demand for strengthening cooperation. In fact, urban mobility policies are too heterogeneous, both between and within MSs. For this reason, the European Union provides local authorities with support in the following areas: i) setting a common policy framework; ii) funding for implementation; iii) funding for research and innovation; iv) facilitating the exchange of experience and best practice; v) raising awareness.

Concentration of economic activities and population in European cities are both high and rising. The two phenomena produce new challenges for goods distribution. Public authorities have recently developed a growing, yet still insufficient, awareness of the crucial role urban freight transport (UFT)[2] policies play within the overall urban mobility system. European MSs need to further integrate UFT in the general city mobility management system. The European Commission is setting up coordinated UFT initiatives and actions. One of these supporting actions is to promote research and innovation to deliver innovative and effective solutions to tackle urban mobility challenges. This is realised through Horizon 2020 (H2020), the European research and innovation programme for the period 2014-2020.

This paper aims to identify the most important UFT policy solutions proposed in the relevant European policy documents, and to evaluate how policy priorities result in funding. In more detail, the paper describes UFT challenges for policy-makers and how policy priorities are defined and assesses whether H2020 funds are consistently allocated to the identified UFT policy solutions according to the weight attributed to UFT in the policy documents.

The paper is structured as follows: section 2 illustrates the methodological steps and the logic behind the analyses performed. Section 3 discusses the main topics and the corresponding solutions reported in the policy documents with respect to UFT. Section 4 shows the results of the consistency evaluation between policy priorities and research funding. Section 5 concludes highlighting future research endeavours.

2 Methodology

The methodology adopted consists of three main steps: (1) selecting policy documents; (2) identifying the most relevant UFT policy solutions; (3) assessing consistency between policy priorities and H2020 research funding.

Three criteria have been used for selecting policy documents. The first criterion refers to the type of documents. A premise on legal aspects is necessary to motivate the choice made. At European level, there are various forms of action: recommendations, directives, communications and acts concerning the organization and functioning of the institutions. Their qualification, structure and legal effects result from various provisions of the treaties or the rules adopted in their application. Also of note is the importance of White Papers[3], Green Papers[4] and Action programmes, through which agreements

[1] Its legal basis is Article 5(3) of the Treaty on European Union (TEU): "Under the principle of subsidiarity, in areas which do not fall within its exclusive competence, the Union shall act only if and in so far as the objectives of the proposed action cannot be sufficiently achieved by the Member States, either at central level or at regional and local level, but can rather, by reason of the scale or effects of the proposed action, be better achieved at Union level".

[2] The European Commission defines UFT as "the movement of freight vehicles whose primary purpose is to carry goods into, out of and within urban areas" (MDS 2012). But the it also provides a very similar definition of 'urban logistics': "[...] the movement of goods, equipment and waste into, out, from, within or through an urban area" (European Commission 2013a). For this reason, the choice here is to consider the two expressions as synonyms and to use only "UFT", systematically replacing "urban logistics" with "UFT" every time the research incurred in the former expression.

[3] White Papers communicate a decided Commission policy or approach on a particular issue. They are chiefly intended as statements of Commission policy, rather than a consultation or starting point for debate.

[4] Green Papers are usually used to launch a consultation process. They present Commission policy orientations for debate to interested parties who may wish to comment. The Commission will generally prepare a subsequent proposal.

on long-term objectives among MSs are made. The European Commission prepares and publishes guidance documents relating to the areas over which it has (full or residual) jurisdiction. In the case of urban mobility, the binding power resides in the hands of the MSs, but, in some cases and for certain types of actions, the European Union can intervene through the subsidiarity principle. Since the aim of the paper is to focus on the relationship between UFT policies and the research programmes financed by H2020, the types of acts considered are non-binding guidelines, which can take different forms (e.g. White Papers, Green Papers, Communications[5]), while binding legislative provisions are out of the scope.

The second criterion relates to the field considered. European policies, when addressing any area where concrete intervention is required, very often imply a certain overlapping with other fields. For example, the White Paper on Energy, when dealing with transportation fuels, may provide recommendations that indirectly influence the transportation sector. Such considerations could lead to an analysis of all other sectors' policy documents, having even the slightest potential impact on UFT. However, in order to define an accurate picture, the paper concentrates solely on the documents drafted by the European Directorate-General for Mobility and Transport (DG MOVE) of the European Commission and directly related to UFT[6]. In fact, since each DG has a key role in the definition of the H2020 affecting its sphere of influence, it is considered appropriate to assess the alignment between policy documents and H2020 calls produced by the same DG in the first place. The only exception is the Freight Transport Logistics Action Plan, since it specifically analyses UFT, delving into a significant aspect of logistics in general.

The third criterion simply assumes that only publicly available documents are considered.

Adopting the criteria illustrated above produces the list of documents reported below:

1. Transport White Paper 2001
2. Green Paper "Towards a new culture for urban mobility"
3. Freight transport logistics action plan
4. Action Plan on urban mobility
5. Transport White Paper 2011
6. Urban Mobility Package
7. A call to action on urban logistics

The second methodological step is the identification of the most important UFT policy solutions so to successively link them with H2020 Work Programmes. A qualitative analysis of the above-mentioned policy documents, investigating the entire set of relevant topics addressed, was carried out. An in-depth description is provided in section 3. The selection of the policy solutions is based on the following factors: i) how many, among the seven documents investigated, advocate these solutions (must be at least two), ii) the elements of continuity throughout all the seven documents, and iii) a qualitative assessment of the specific weight and degree of priority within each document.

The list of UFT solutions detected is reported here:

1. Including UFT in Sustainable Urban Mobility Plans (SUMPs) + guidelines for local authorities
2. Deployment of ITS systems for (urban) freight
3. Clean Freight vehicles

[5]Communications usually set out a Commission action plan and may include concrete proposals for legislation.

[6]Although many are the policy documents DG MOVE has published in the last 20 years, partly addressing urban mobility, this paper refers only to those explicitly dealing with UFT that are also listed on the DG move urban transport webpage: http://ec.europa.eu/transport/themes/urban/urban_mobility/index_en.htm

4. UFT demand management
5. eFreight
6. Integration between long-distance freight transport and last-mile distribution
7. Shift Modes (bike, boat, rail)
8. Integration between passenger and freight transport
9. Eco-labels
10. Public procurement for freight

The third step refers to the evaluation of the consistency between UFT priorities and H2020 funding. Firstly, a quantitative analysis of the "weight of freight" in the policy documents and H2020 Work Programmes is performed. As it is for the former, a matrix is produced counting the number of recurrences of the following words and combinations of them: i) urban ii) urban logistics; iii) city logistics; iv) urban freight; v) logistics; vi) freight; vii) passenger; viii) public transport. The logic behind the choice of these words is the following:

- "Urban": the paper narrows the scope of the analysis to the urban dimension of the goods distribution.
- "(urban/city) logistics" and "(urban) freight": according to a complete literature review, these are the most commonly used terms in the literature to refer to urban goods distribution.
- "Passengers" and "public transport": many studies (Lindholm 2010, Lindholm, Browne 2013, UN-Habitat 2013) have underlined the insufficient attention public authorities and European institutions pay to UFT operations. For various reasons, they seem to pay more attention to movements of people, rather than freight, i.e. undertaking policies for public transport and other passengers-related modes (Lindholm 2014). Therefore, the count of these words is used to compare the weight of the freight sector compared to the weight of the passenger sector in the European policy documents and H2020 Work Programmes.

This analysis indiscriminately considers how many times the specific words are mentioned in the documents, including titles, index and tables. A similar quantitative analysis is performed to provide an estimate of the weight urban logistics/freight topics hold in the H2020 programme considering the various calls, within "Mobility for Growth", directly or indirectly addressing UFT. The analysis is based on the calculation of the funding share actually allocated to UFT projects' proposals.

Finally, the paper both analyses the linkage between UFT policy solutions and H2020 Work Programmes and ranks the selected UFT policy solutions according to the weight, in monetary terms, resulting from the research funds allocated to each of them.

3 European strategy and UFT policy solutions

This section considers the seven policy documents listed in section 2, and highlights the policy priorities related to UFT, identifying ten corresponding solutions proposed by the European Commission.

The first European policy proposals in the area of urban mobility, the "Citizens' Network", date back to 1995 and 1998. They resulted in the launch of a series of initiatives based upon a "best practice" approach. However, the documents do not present any direct reference to UFT.

In 2001, the 1st White Paper on Transport was released (European Commission 2001). In Part 3 - Placing users at the heart of transport policy, section 4 specifically addresses the rationalisation of urban transport. The White Paper strategy for urban mobility essentially pursued two main objectives: 1) the promotion of a diversified energy portfolio

for transport, by establishing a new regulatory framework for substitute and sustainable fuels and stimulating demand by experimentation; 2) the promotion and exchange of good practices, aiming at taking better use of public transport and existing infrastructure.

This White Paper didn't specifically address UFT. However, the CIVITAS initiative, launched in October 2000 to support the development of innovative projects on clean urban transport, represented an important step for research in this field, aiming at reducing private car use in city centres and promoting clean urban transport. The solutions envisaged went in three different directions: demand management measures, the integration of urban transport services, and the promotion of low and zero emissions vehicles, also for freight.

In 2007, a European policy document made explicit reference to UFT for the first time. In fact, the Green Paper "Towards a new culture for urban mobility" (European Commission 2007b) suggests local authorities to consider all urban logistics related to passenger and freight transport together as a single logistic system. Urban distribution needs for an efficient integration between long-distance freight transport and last mile distribution. To this end, the use of smaller, more efficient and clean vehicles is encouraged. When addressing UFT, local authorities should ensure the active involvement of all relevant stakeholders. UFT should be better integrated within the local policy-making process and institutional setting: freight transport distribution is often neglected and considered a mere responsibility of the private sector. Moreover, the role of intelligent transport systems (ITS) for freight becomes essential in order to improve efficiency, especially through better timing of operations, higher loading factors and more efficient use of vehicles. Finally, the document suggests (joint) green procurement of clean and energy-efficient vehicles by public authorities as a new solution to boost the deployment of clean vehicles.

The urban dimension of freight logistics is further developed in the Freight Transport Logistics Action Plan (European Commission 2007a). It reiterates that local authorities should focus their attention on transport demand management, supported by the deployment of innovative ITS-based solutions. In order for this to happen, a roadmap for the implementation of eFreight[7] should identify the critical areas where European actions are required (e.g. standardisation). The European Commission also commits to help establishing a set of recommendations, best practice and standards for urban transport logistics, aiming to define common benchmarks or performance indicators for the measurement of efficiency and sustainability of UFT solutions. This aims to reinforce the freight section of CIVITAS fostering the coordination and integration between passenger and freight transport, and between interurban (long-distance) and urban transport logistics.

Based upon the results of the consultation of the Green Paper, in 2009 the Action Plan on urban mobility was adopted (European Commission 2009), presenting for the first time a comprehensive support package of 20 measures in the field of urban mobility. This stresses again the importance of urban areas as efficient interconnection points for the trans-European transport network and places for a well-organised last mile transport. Action 1 introduces the concept of Sustainable Urban Mobility Plans, aiming to cover all types of transport, including UFT. Action 19 specifically addresses UFT, requiring to better incorporate it in the local transport strategy and to "better manage and monitor transport flows". Finally, the Plan aims to find new ways for improving and sharing data collection and statistics for urban transport and mobility (Actions 16 and 17).

In 2011, the 2nd White Paper on Transport was released (European Commission 2011). This document represents the current official position of the European Commission for transport in Europe, and sets a roadmap of 40 initiatives for the next decade to build a competitive transport system to increase mobility, foster growth and employment, reduce Europe's dependence on imported oil and cut carbon emissions in transport by 60% by 2050. It includes the specific objective of achieving "essentially CO2-free city logistics in major urban centres by 2030". The initiative n. 33, "a strategy for near-'zero-emission urban logistics' 2030", encourages again the realisation of best practice guidelines to "better monitor and manage urban freight flows", and promotes joint public procurement for low emission freight vehicles. Inspired by the above-mentioned Freight

[7]The concept of eFreight refers to the favouring of the multimodal transport of goods by creating the appropriate framework to allow tracing goods in real time and ensure intermodal liability.

Transport Logistics Action Plan, it claims a more efficient interface between long-distance and last-mile freight; the deployment of ITS for real-time traffic management, to increase efficiency for last mile distribution, and the definition of strategies for off-peak deliveries, to reduce air emissions and noise. The document also reinforces the concept of eFreight. The initiative n. 28, "vehicle labelling for CO2 emissions and fuel efficiency", launches a review of the labelling directive and also extends its scope to light freight vehicles.

The Urban Mobility Package (UMP) document (European Commission 2013b) promotes two non-regulatory initiatives related to the urban mobility sector. On the basis of the subsidiarity principle, it addresses initiatives 31, 32 and 33 of the 2011 White Paper. Initiative n. 33, as described before, refers to best practice guidelines to improve urban freight flows monitoring and management. The central element of the UMP is the Communication "Together towards competitive and resource-efficient urban mobility", complemented by an annex that sets out the concept of Sustainable Urban Mobility Plans (Wefering et al. 2013), as well as four Staff Working Documents (European Commission 2013a), one of which is dedicated to UFT. The central Communication, stressing the importance of the coordination between the public and private sector, claims the coordinated deployment of urban ITS and the importance of urban nodes, considered the "starting point or the final destination (first/last mile) for passengers and freight moving on the trans-European transport network". It fosters more action on UFT (aspect further developed in the Staff Working Document), promoting measures for the procurement of freight clean vehicles in the framework of the Clean Vehicle Portal[8]. It also defines the future scope of action of the CIVITAS initiative, which will focus on "tackling urban road congestion, reducing the use of conventionally-fuelled vehicles in urban areas, reducing UFT impacts and costs, and strengthening the capacities of local authorities to develop and implement sustainable urban mobility plans". All these topics directly or indirectly refer to UFT.

Finally, the most specific document on UFT is the "Call to action on urban logistics", Staff Working Document of the UMP. The document discusses the main challenges related to UFT and identifies possible solutions, also clarifying the role of each governance level (European, National, local) in the process. It highlights that the European research programmes have been supporting and will support research and dissemination for UFT vehicles and solutions, such as the CIVITAS projects. Some of them are focusing particularly on UFT, in testing innovative policy and technological solutions. As regards the challenges at stake, the document identifies e-commerce and online services; comprehensive UFT strategies for cities; cooperation and understanding amongst stakeholders; information and understanding of freight flows; information for urban transport operators about UFT policies, regulations and services; joint procurement of low emission urban freight vehicle; proper consideration of UFT in SUMPs. The solutions should follow four main directions: i) Manage urban logistic demand (service and delivery plans); ii) Shift modes (bike, boat or rail); iii) Improve efficiency (better selection of modes and vehicles, increasing load factors, new ITS solutions, eFreight initiatives, driver training); iv) Improved vehicles and fuels: new types of vehicles and operational models (e.g. electric vehicles, off-peak deliveries), deployment of alternative fuels infrastructure".

To sum up, the main policy solutions are summarised in Table 1.

4 Evaluation of policy priorities and funding

4.1 Quantitative analysis of the "weight of freight" in policy documents and H2020 Work Programmes

This sub-section reports the results of a quantitative analysis performed using the the seven selected policy documents and the two H2020 Work Programmes (2014-2015 and 2016-2017) published so far.

It is divided into two parts. The first provides a quantitative estimation of the "weight of freight" based on the number of recurrences of specific UFT-related words in the

[8] www.cleanvehicle.eu [27-08-2016 – offline]. The Clean Vehicle Portal as a new web-database aims to ensure a level of demand for clean and energy-efficient road transport vehicles and encourage manufacturers to invest in development of vehicles with low energy consumption CO2 emissions and pollutant emissions.

Table 1: Selected UFT policy solutions and their descriptions

Policy Solution	Description
Including UFT in SUMPs + guidelines for local authorities	Member States should ensure UFT is given proper consideration in their national approaches to urban mobility and in SUMPs guidelines. Local authorities should include specific UFT provisions in their own SUMPs and enhance UFT stakeholder engagement in the planning/implementation process.
Deployment of ITS systems for (urban) freight	New ITS solutions can help to optimise routes, improve service and reduce costs and impacts. ITS allow for optimised trip planning, better traffic management and easier demand management.
Clean Freight vehicles	The operational characteristics of UFT can often be suitable for the early introduction of new types of vehicles (e.g. electric vehicles). Improvements in vehicles can make UFT quieter, safer, cleaner and more efficient.
UFT demand management	- new operational and business models: e.g. off-peak deliveries, reverse logistics, consolidation, increase load factors, logistic hotels, etc. - incentives and regulations: parking policies, traffic and access regulations and charges, rewarding schemes, information and awareness raising.
eFreight	The concept of eFreight refers to the favouring of the multimodal transport of goods by creating the appropriate framework to allow tracing goods in real time and ensure intermodal liability. As part of the eFreight initiative, attention is given to the optimisation of information exchange for UFT as part of longer (international) logistics chains.
Integration between long-distance freight transport and last-mile distribution	Urban nodes are key elements for the construction of a comprehensive European transport network. Action by European cities is crucial for achieving the objectives of TEN-T policy. The European Commission recognises the need to "provide for the development of the comprehensive network in urban nodes, as those nodes are the starting point or the final destination ('last mile') for passengers and freight moving on the trans-European transport network and are points of transfer within or between different transport modes".
Shift Modes (bike, boat, rail)	Framework solutions provided by city authorities to create favourable conditions for freight shift modes, e.g. strategy, dedicated space, enforcement, privileged access, planning conditions, free parking etc., in order to achieve economic viability in addition to overall improvements.
Integration between passenger and freight transport	Local authorities need to consider all UFT related to passenger and freight transport together as a single logistics system.
Eco-labels	Introduction of a "labelling"' scheme to recognise the efforts of pioneering cities to combat congestion and improve living conditions.
Public procurement for freight	Support to projects and exchange of best practices to understand and facilitate joint procurement of urban freight vehicles and of public services and goods by public administrations.

policy documents. The second part focuses on H2020 Work Programmes, illustrating the most relevant information linked to the calls specifically dealing with UFT providing an overview of the resources allocated to the various projects.

4.1.1 European policy documents

In order to support and reinforce the qualitative analysis performed in section 3 that enables selecting the main UFT-related policy solutions, a simple and straightforward quantitative approach is proposed here. The number of recurrences of specific UFT-related words have been systematically counted in the seven policy documents selected, so to provide a snapshot of the "weight of freight" for each of them.

In order to calculate the relative weight of UFT within the policy documents, the paper establishes a simple criterion: all the identified key words are standardised with respect to "urban" (last column in Table 2), which represents the minimum common denominator encompassing all the other ones. "Urban" is central in this analysis, since it represents the physical and conceptual dimension of both the freight and passenger transport sector policies at stake. In other words, the number of times "urban" is mentioned represents the "proxy" which allows us to quantify the relative "weight of freight".

Noticeably, in some cases and for single documents, the number of recurrences of some key words is higher than the number of recurrences of "urban" (in particular in Transport White Paper 2001 and Freight transport logistics action plan). This reflects the fact that those are broader documents addressing not only the "urban" dimension, but the whole transportation panorama in Europe. Therefore, key words such as "passengers" and "freight" quantitatively prevail, since they also refer to long-distance, extra-urban aspects of transportation.

The results of the quantitative analysis of the "weight of freight" in the policy documents is shown in Table 2 which reports, in absolute terms, the number of times given words or their combinations, directly or indirectly referring to UFT, appear in the documents considered.

As expected, the most frequently mentioned item is "urban" (547), followed by "freight" (241), while "logistics" (165) has fewer occurrences with respect to "passenger" (176). These items only partially address the specific topic considered in this paper. "Urban logistics" appears 72 times, whereas "urban freight" and "city logistics" 28 and 8 times, respectively, obtaining an overall result of 108 recurrences. It is interesting to note that most of the documents use both "urban logistics" and "city logistics", without explaining whether they are considered synonyms or different concepts. Moreover, an interesting result is that "passenger" and "public transport" occur, combined, the same number of times as "freight" (241). This result suggests a greater attention the freight sector has constantly gained among the European policy-makers over the last 20 years. However, when focusing the analysis at the urban level, the gap is still significant.

4.1.2 H2020 Work Programmes

H2020 is the European Research and Innovation programme, a source of nearly €80 billion[9] for European research activities for the 2014-2020 programming period. H2020 takes over the Seventh Framework Programme for Research and Technological Development (FP7)[10], and the Innovation section of the Competitiveness and Innovation Framework Programme (CIP).

The programme is based on three pillars: Excellent Science, Industrial Leadership and Social Challenges. The largest share of the budget (38.5%, €29.7 billion) is dedicated to the "Social challenges" pillar, which is, in turn, divided into seven thematic areas including "Smart, Green and Integrated Transport". A budget share of 8.2% (€6.3 billion) was allocated to the transport sector (Gavigan 2014). The challenge of H2020 is to create

[9] https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020

[10] FP7 was the main research programme for the 2007-2013 period, to give financial support to European initiatives promoting research, innovation and technological development for the creation of a European research area (ERA). With a budget of 50.521 billion euro, FP7 funded projects relating to research and technological development with the aim of stimulating growth, competitiveness and employment.

Table 2: Recurrences of UFT related words in the seven policy documents (absolute terms)

Policy docs* / Key word(s)	1	2	3	4	5	6	7	Total	Weight wrt "urban"
Urban	42	44	10	105	38	186	122	547	-
City logistics	0	0	0	0	2	2	4	8	1%
Urban logistics	0	1	0	1	2	13	55	72	13%
Urban freight	0	2	1	4	1	1	19	28	5%
Σ city logistics + urban logistics + urban freight	0	3	1	5	5	16	78	108	19%
Logistics	10	6	52	3	5	18	71	165	30%
Freight	84	19	53	10	37	2	36	241	44%
Passenger	110	20	2	10	32	1	1	176	32%
public transport	32	13	0	12	5	3	0	65	12%

*The documents taken into account are: 1) Transport White Paper 2001; 2) Green Paper "Towards a new culture for urban mobility"; 3) Freight transport logistics action plan;4) Action Plan on urban mobility; 5) Transport White Paper 2011; 6) Urban Mobility Package; 7) A call to action on urban logistics.
Source: Self-elaboration

a transport system making efficient use of resources, which is environmentally friendly and safe. H2020 supports the research for new methods to obtain these results, and identifies two key topics, i) technology and ii) behavioural analysis, to develop innovative intervention strategies.

The budget is allocated every two years via a biannual Work Programme. Table 3 and Table 4 provide a budget overview of the H2020 Work Programmes 2014-2015 and 2016-2017, respectively, and an estimation of the (potential) financial support allocated for UFT in the framework of the "Mobility for Growth" call. With respect to FP7, the budget was increased by about 30%, considering the same topics (Gavigan 2014).

The first H2020 Work Programme (European Commission 2015a) was adopted on 10 December 2013 and structured in four broad cross-cutting lines of activities (i.e. resource efficient transport that respects the environment; better mobility, less congestion, more safety and security; global leadership for the European transport industry; socio-economic and behavioural research and forward looking activities for policy making) and three Calls for proposals (i.e. Mobility for Growth; Green Vehicles; Small Business Innovation for Transport) for an overall budget of €792.5 mln. Different calls for proposals directly or indirectly addressed UFT, but the call MG.5.2-2014 was specifically dedicated to this topic. In particular, it aimed at (i) improving basic knowledge and understanding on freight distribution and service trips, (ii) implementing innovative policies and solutions to ensure a better use of infrastructure (e.g. delivery spaces, off peak deliveries, non-road modes, urban waterways) and vehicles, (iii) testing consolidation and distribution centres. This call was directly linked to MG.6.1-2014 which looked for the right business models fostering (horizontal and vertical) synergies to decouple the growth of urban and inter-urban freight transport demand from its consequences on traffic and the environment. Other calls addressing UFT were MG.5.1-2014, MG.5.3-2014, MG.5.4-2015 and MG.5.5-2015. All of them generally referred to "freight", while the latter makes a specific reference to "urban freight logistics".

The Work Programme 2016-2017 was adopted on 13 October 2015, accompanied by an overall budget of €756.1 mln (European Commission 2015b). It presents the same structure and lines of activities of the previous one, with a small change in the calls for proposals. Again, in the urban mobility section there is a call dedicated to UFT, but in this case it addresses an even more specific topic. In fact, the title of the call is MG-4.3-2017 - Innovative approaches for integrating urban nodes in the TEN-T core network corridors. The solutions tested in this framework should investigate: (i)

Table 3: H2020 Work Programme 2014-2015: a budget overview

Selected Call		Budget (mln €)
MG.5.1-2014	*Transforming the use of conventionally fuelled vehicles in urban areas*	40
MG.5.2-2014	Reducing impacts and costs of freight and service trips	
MG.5.3-2014	Tackling urban road congestion	
MG.5.4-2015	Strengthening the knowledge and capacities of local authorities	9
MG.5.5-2015	Demonstrating and testing innovative solutions for cleaner and better urban transport and mobility	57.5
MG.6.1-2014	Fostering synergies alongside the supply chain, including e-commerce	32
MG.6.2-2014	De-stressing the supply chain	
MG.7.1-2014	*Connectivity and information sharing for intelligent mobility*	28
MG.7.2-2014	*Towards seamless mobility addressing fragmentation in ITS deployment in Europe*	
TOTAL (selected calls)		166.5
Share of total funds allocated to calls to be potentially used for UFT projects		(29.8%)
Total budget of Mobility for Growth calls [374.50 (2014) + 184 (2015)]		558.5

Notes: normal: calls *directly* addressing UFT; italic: calls *indirectly* addressing UFT

new approaches for linking long-distance with last-mile freight delivery in urban areas, (ii) the design of freight corridors in cities, (iii) an efficient and sustainable (e.g. using alternative fuel vehicles) solution for 'last mile' delivery, and a greater use of intermodal urban freight logistics. Nevertheless, other types of UFT innovative solutions can still be funded and tested through other urban mobility calls. In particular, the call MG-4.1-2017 includes issues such as new governance models for freight and passenger transport, better coordination and cooperation, synergies between passenger and freight transport, stakeholder engagement, etc. In the Logistics section, the first call MG-5.1-2016 is directly linked to MG-4.3-2017. In particular, it aims at connecting (sections of) the TEN-T freight network with each other and last mile delivery services, and developing prototype Modular Load Units, optimised for automated handling and high load factors in all transport modes. Although not directly related to UFT, the calls MG-5.2-2017 and MG-5.3-2016 pursue the deployment of ITS and green transport in the logistics sector. Other related calls are MG-4.2-2017 and MG-4.4-2016.

The total amount of funds allocated to the "Smart, Green and Integrated Transport" sector is €1,572.5 mln for the entire period 2014-2017. Out of this amount, the funds allocated to Mobility for Growth calls are €994.1 mln. According to the results shown in Tables 3 and 4, the share of the total funds allocated to calls that can be potentially addressed by UFT projects' proposals is €258.5 mln (26% of the total available budget), of which €166.5 mln (29.8% of the budget) for the period 2014-2015 and €92 mln (21.1% of the budget) for the period 2016-2017. This means that about a quarter of the total budget of the first 4 years of the H2020 programme is potentially available to fund UFT projects. Attention should be called to the difference in funding between the two periods: the first puts out a general call for UFT (MG.5.2-2014), and potentially allocates almost a third of the total funds to UFT projects; the second period proposes a very specific call for UFT (MG-4.3-2017) and potentially allocates only a fifth of the total funds to UFT projects.

As for the first period (2014-2015), the paper provides a further step of analysis. Since the funding period is over, it is possible to define the degree of alignment between the resources potentially available and the ones actually allocated (see Table 5). It may be noticed that 95% of the budget potentially available was actually assigned to projects (€157.4 vs €166.5 mln). Among these, considering the freight scope in general, a total of €57.5 mln has been allocated to thesetype of projects, corresponding to 36% of available

Table 4: H2020 Work Programme 2016-2017: a budget overview

Selected Call		Budget (mln €)
MG-4.4-2016	*Facilitating public procurement of innovative sustainable transport and mobility solutions in urban areas*	2
MG-4.1-2017	Increasing the take up and scale-up of innovative solutions to achieve sustainable mobility in urban areas	22
MG-4.2-2017	Supporting 'smart electric mobility' in cities	
MG-4.3-2017	Innovative approaches for integrating urban nodes in the TEN-T core network corridors	2
MG-4.5-2016	*New ways of supporting development and implementation of neighbourhood-level and urban-district-level transport innovations*	10
MG-5.1-2016	Networked and efficient logistics clusters	12
MG-5.2-2017	Innovative ICT solutions for future logistics operations	12
MG-5.3-2016	Promoting the deployment of green transport, towards Eco-labels for logistics	2
MG-6.2-2016	*Large-scale demonstration(s) of cooperative ITS.*	25[1]
MG-6.3-2016	Roadmap, new business models, awareness raising, support and incentives for the roll-out of ITS	5
TOTAL (selected calls)		92
Share of total funds allocated to calls to be potentially used for UFT projects		(21.1%)
Total budget of Mobility for Growth calls [210.10 (2016) + 225.50 (2017)]		435.6

Notes: Key: normal: calls *directly* addressing UFT; *italic*: calls *indirectly* addressing UFT

[1] Unique budget for 6.1 & 6.2.

funds. Moreover, €31.7 mln have been specifically allocated to UFT projects[11]. This corresponds to 20% share of the overall available fund for the period 2014-2015.

Finally, a comparison between the relative "weight of freight", as outlined in Table 2, and the share of resources actually allocated to UFT projects, has been carried out. Results show an overall consistency: "city logistics", "urban logistics" and "urban freight" (considered as synonyms in this paper) are mentioned 19% of times with respect to "urban" (chosen as benchmarking) in the policy documents, the same percentage related to the funding share allocated to UFT projects. Similarly, "freight" is mentioned 44% of times with respect to "urban" in the policy documents, which is a percentage relatively close to the overall funding share of 36% attributed to freight projects. However, the picture changes when considering "logistics" as a synonym of "freight": in this case, the share rises up to 74%, significantly deviating from the share of funds actually attributed to freight projects.

4.2 Comparison between UFT solutions and corresponding call(s)

This section aims at analysing the link between the ten UFT policy solutions, considered essential for the achievement of a more efficient, less polluting and less impacting urban distribution of goods, and H2020 Work Programmes considering the weight in monetary terms resulting from the research funds allocated to each of them.

Table 6 shows the ten solutions, ranked according to the total funding budget available, along with the information about the documents where they are mentioned and the extent of their scope[12], indicating the corresponding H2020 calls in Work Programme 2014-15 and 2016-17.

The ten identified solutions differ in their scope: for example, "Including UFT in SUMPs" and "UFT demand management" can be defined in many different ways,

[11] UFT projects are those whose main objective is the adoption of sustainable solutions for UFT (for example, the SETRIS and PORTIS projects have a specific work package dedicated to UFT, but the main aim of the projects does not refer to this topic).

[12] The research qualitatively attributes a weight from 1 to 3, accordingly to the extent of the scope of each solution: + (narrow), ++ (medium), +++ (wide).

Table 5: Comparison between the resources potentially available and the ones actually allocated (Work Programme 2014-2015)

Call	Acronym	European Union contribution (mln €)	Budget/call (mln €)
MG.5.1-2014	EMPOWER	4.9	
	ELIPTIC	6.0	
MG.5.2-2014	**SUCCESS**	3.2	
	NOVELOG	4.4	
	CITYLAB	4.0	
	U-TURN	2.7	
MG.5.3-2014	CREATE	4.0	
	FLOW	3.8	
	TRACE	2.9	
	CIPTEC	3.5	
Subtotal (MG.5.1, 5.2, 5.3)		39.4	40
MG.5.4-2015	SUMPS-UP	4.0	
	PROSPERITY	3.2	
Subtotal (MG.5.4)		7.2	9
MG.5.5-2015	**CIVITAS ECCENTRIC**	17.4	
	CIVITAS DESTINATIONS	17.9	
	PORTIS	16.4	
	CIVITAS SATELLITE	3.0	
Subtotal (MG.5.5)		54.7	57.5
MG.6.1-2014	***NEXTRUST***	18.1	
MG.6.2-2014	***SYNCHRO-NET***	7.6	
Subtotal (MG.6.1, 6.2)		25.7	32
MG.7.1-2014	SocialCar	5.9	
	OPTIMUM	6.0	
MG.7.2a-2014	EuTravel	3.9	
	ETC	4.5	
	MASAI	3.3	
	BONVOYAGE	4.0	
MG.7.2b-2014	ITS Observatory	1.3	
	CODECS	1.6	
Subtotal (MG.7.1, 7.2a, 7.2b)		30.5	28
Total		157.5	166.5
Total UFT projects		31.7 (20%)	
Total freight projects		57.4 (36%)	
Total non-freight projects		68.4 (64%)	

Key: bold: UFT projects; bold&italic: freight projects

according to the specific topic the applicant wishes to address. Conversely, "eco labels" and "procurement" are specific enough and they can hardly be suitable for different interpretations. The results reported show that, in principle, each of the selected solutions is covered by at least one call.

Figure 1 summarises the information provided taking into account the following variables:

1/a) the extent of the scope of the solution that was normalised with respect to 7, which is the number of policy documents investigated;

1/b) number of policy documents addressing each solution according to the results of Table 6;

2/a) number of calls considering each solution, as reported in Table 6. The maximum number of calls for a given solution is 7, thus normalisation is not needed;

2/b) budget (potentially) available for each solution. Directly linked to the calls, the amount per solution, specified in Table 6, is normalised with respect to 7.

In general, 2/a and 2/b follow the same steady decreasing trend, highlighting the consistency between the amount of funds and the related calls that make them available.1/a and 1/b both follow a more volatile path, nevertheless presenting the same fluctuations and a decreasing trend which is overall consistent with the one of 2/a and 2/b.

Four of the UFT solutions present an overall consistency when it comes to comparing 1/a) and 1/b), on the one hand, and 2/a) and 2/b), on the other: the greater (lesser) the scope of the solution and the higher (lower) the number of mentions in policy documents, the more (less) it is addressed in H2020 calls and, therefore, more (less) potential budget available for its implementation. This seems the case for "UFT in SUMPs", "clean freight vehicles", "shift modes", "integration passenger/freight".

There are five solutions, out of ten, which do not present a clear path: "UFT demand management", "eco-labels" and "public procurement for freight" seem under-funded (or over-covered), whereas "eFreight" and "ITS", on the contrary, seems over-funded (or under-covered).

These solutions are discussed in more detail in what follows. In recent years, transport demand management has been discovered to influence agents' behaviour in the urban sector (e.g. Ben-Elia, Avineri 2015, Dziekan, Kottenhoff 2007, Juhász 2013, Marcucci et al. 2007, 2013a,b, Mokhtarian, Salomon 2001, Watkins et al. 2011), through the adoption of soft policy measures (SPMs). These are gaining increasing attention in the field of sustainable mobility for various reasons, such as the lack of large budgets available or public dissent against coercive measures (Gärling, Schuitema 2007). SPMs aim to influence transport actors' mobility choices, and therefore altering the demand for mobility (Jones et al. 2011). SPMs are often low-cost, compared to the other solutions, making "UFT demand management" a very cost-effective approach. In fact, it does not require a significant financial investment for research and innovation, but rather an extensive investigation on how the implementation and exchange of UFT SPMs' best practices can be spread to ensure it is raising awareness and successfully transferring and adapting to different contexts. It is important to note that a robust demand analysis should foresee an evaluation of stakeholders' policy acceptability, behaviour change and willingness to pay measures (e.g. Gatta et al. 2015, Le Pira et al. 2017b, Marcucci, Gatta 2016). Recent trends in freight demand management includes: i) off-hour deliveries (e.g. Holguín-Veras et al. 2014, Marcucci, Gatta 2017); ii) crowdshipping (e.g. Marcucci et al. 2017c, Punel, Stathopoulos 2017).

"Public procurement for freight" and "eco-labels" are also an effective and relatively low-cost solution and, in some respects, they follow the same principles as the "UFT demand management" category: the use of the procurement leverage and recognition schemes (including eco-labelling) potentially enhance safety and reduce emissions. Indeed, public administrations might set rules to procure external services according to certain "green" standards. In this way, they i) give signals to UFT stakeholders to improve their sustainability standards in order to participate in public tenders, and ii) give an example

Table 6: Comparison between UFT solutions and corresponding call(s)

UFT solutions[1]	Corresponding call(s)[2]	Budget available[3]
1) Including UFT in SUMPs + guidelines for local authorities (focus on stakeholder engagement) Policy documents: 2, 3, 4, 6, 7 Extent of the scope of the solution: +++	MG.5.2-2014 MG.5.4-2015 MG.5.5-2015 MG-4.1-2017 MG-4.2-2017 MG-4.3-2017 **Total**	*13* 9 57.5 22 2 **103.5**
2) Deployment of ITS systems for (urban) freight Policy documents: 2, 3, 5, 6, 7 Extent of the scope of the solution: ++	MG.6.1-2014 *MG.7.1-2014* *MG.7.2-2014* MG-6.2-2016 MG-6.3-2016 *MG-4.2-2017* MG-5.2-2017 **Total**	*16* 28 28 *12.5* 5 *11* 12 **84.5**
3) Clean Freight vehicles Policy documents: 1, 2, *4*, 5, 6, 7 Extent of the scope of the solution: ++	*MG.5.1-2014* GV.4-2014 *MG-4.2-2017* GV-08-2017 **Total**	*13* *18* *11* *16* **58**
4) UFT demand management Policy documents: 1, 3, *4, 5, 6*, 7 Extent of the scope of the solution: +++	MG.5.2-2014 MG.5.3-2014 MG.6.1-2014 MG-4.1-2017 MG-4.3-2017 **Total**	*26* *16* *11* 2 **55**
5) eFreight Policy documents: 5, 7 Extent of the scope of the solution: +	*MG.6.1-2014* MG.6.2-2014 MG-5.2-2017 *MG-4.2-2017* **Total**	32 12 *11* **55**
6) Integration between long-distance freight transport and last-mile distribution Policy documents: 2, 3, 4, 5, 6 Extent of the scope of the solution: ++	MG.6.1-2014 MG-4.3-2017 MG-5.1-2016 **Total**	*16* 2 *13* **31**
7) Shift Modes (bike, boat, rail) Policy documents: *1*, 7 Extent of the scope of the solution: +	MG.5.2-2014 MG.5.3-2014	**26**
8) Integration between passenger and freight transport Policy documents: 2, 3 Extent of the scope of the solution: +	MG-4.1-2017 *MG-4.5-2016* **Total**	*11* 10 **21**
9) Eco-labels Policy documents: 2, 5 Extent of the scope of the solution: +	MG-5.3-2016	**2**
10) Public procurement for freight Policy documents: 2, 5, 6, 7 Extent of the scope of the solution: +	MG-4.4-2016	**2**

[1] normal: policy documents directly mentioning the selected solution; *italic*: policy documents indirectly mentioning the selected solution. Extent of the scope of the solution (qualitative assessment) from + to +++. Policy documents: 1= Transport White Paper 2001; 2= Green Paper; 3= Freight transport logistics action plan; 4= Action Plan on urban mobility; 5= Transport White Paper 2011; 6= Urban Mobility Package; 7= A call to action on urban logistics

[2] normal: calls directly addressing the solution; *italic*: calls indirectly addressing the solution.

[3] *italic*: estimated budget in the case more calls are grouped under a unique budget item

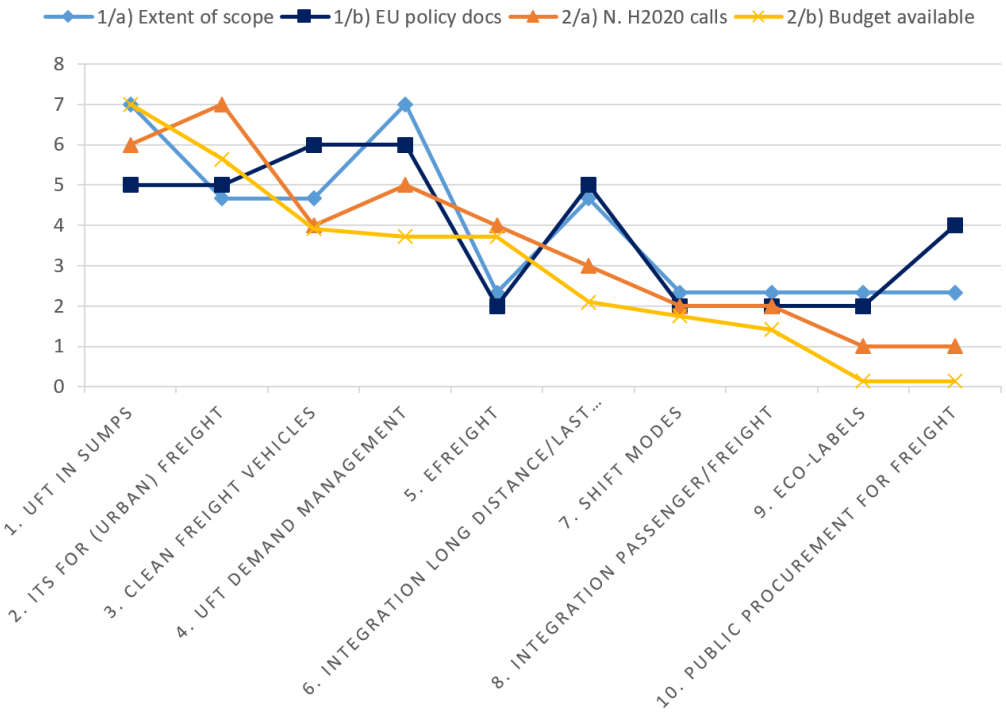

Figure 1: Analysis of the selected UFT policy solutions

of good practice, triggering a virtuous circle that allows them to frame these choices in the framework of behaviour change campaigns.

"eFreight", mentioned in four calls, obtains an average ranking position, and "Deployment of ITS systems for (urban) freight" is also present in many documents. They can be addressed in many different calls, but only some of them specifically refer to UFT, affecting the possibility that a UFT-related project gets funded, because of the strong competition of other non-UFT-related project proposals.

To conclude, unlike other solutions, "Integration between long-distance freight transport and last-mile distribution", is cited in almost all the documents but is considered only in few and very specific calls. This apparently biased result can be explained by the intrinsic characteristics this solution has, requiring more implementation than research supporting activities. In this case, other types of funding instruments which are not considered in this paper (e.g. Connecting Europe Facility[13] funds which finance the trans-European transport network projects[14]) seem more appropriate.

5 Discussion and conclusions

The paper proposes an innovative approach for the assessment of the coherence and consistency between policy priorities and funds allocated to related research activities. It provides a systematic (living) "matching" tool, capable of constantly monitoring the parallel evolution of policies and projects.

Firstly, the paper carries out a detailed analysis identifying the UFT challenges, and the related policy solutions defined at European level. Findings show that, starting from 2001, with the 1st White Paper on Transport, and, in a more comprehensive way, from 2007, with the Green Paper, the European Commission addresses UFT challenges

[13]The Connecting Europe Facility for Transport is the funding instrument to realise European transport infrastructure policy. It aims at supporting investments in building new transport infrastructure in Europe or rehabilitating and upgrading the existing one.

[14]Since 2014, some Connecting Europe Facility calls address the urban nodes i.e. the cities on the network. Over 2014-2015, up to €500 million were dedicated to urban nodes.

through a systematic and coherent approach. Most of the significant priorities (constantly updated) aim to reach the same long-term objectives. Moreover, in 2013 the European Commission decided to dedicate one of the four accompanying documents of the Urban Mobility package to UFT ("A call to action on urban logistics"). This testifies the growing attention conferred to this topic. Ten solutions are proposed for the achievement of a more efficient, less polluting and less impacting urban distribution of goods.

At a second stage, the paper illustrates the H2020 research programme, providing an overview of the total budget allocated to it and the share of funds allocated to the transport sector. Based on the main UFT priorities identified in the policy documents, the paper selects the corresponding calls from the 2014-2015 and 2016-2017 H2020 Work Programmes to quantify the funds available to (potentially) finance UFT projects. The total amount of funds allocated to the "Smart, Green and Integrated Transport" sector is €1,572.5 mln for the period 2014-2017. About a quarter of the total budget of the first 4 years of the programme is potentially available to finance UFT projects, which represents a satisfactory share of available funds. The paper also investigates, limited to the concluded funding period 2014-2015, whether and how the funds a priori allocated correspond to those actually credited. Encouraging results are found. In fact, €31.8 mln are allocated to UFT projects, representing a 20% share of the overall potentially available funds. Moreover, considering the "freight scope" in general, a total of €57.4 mln are allocated, representing a 36% share of the available funds. These findings show an overall consistency with the "weight of freight" index. In fact, "city logistics", "urban logistics" and "urban freight" hold together a relative weight of 19% in the policy documents, almost the same percentage of funds attributed to UFT projects (20%). "Freight" holds a relative weight of 44% in the policy documents, again close to an overall funding share of 36% of freight-related projects.

The approach proposed gives the opportunity to "weight" the importance of all significant UFT solutions proposed, by tying them with the H2020 Work Programmes and the corresponding budget allocated for their development and deployment. Results show that each of the selected solutions is covered by at least one call. As a consequence, there is the opportunity to undertake research and innovation projects in each of the UFT priority areas. Four of the UFT solutions present an overall consistency when it comes to comparing the extent of the scope of the solution and the number of documents addressing it, on the one hand, and the number of calls considering it and the budget (potentially) available, on the other. Other solutions do not follow a clear path. "UFT demand management" policies, "eco-labels" and "public procurement" can be considered cost-effective solutions, not requiring a significant financial investment. According to these findings, future research should identify the most promising UFT SPMs in the field of "UFT demand management", implying a behaviour changing approach, and consequently test their potential for rolling out to different local environments. This also implies a higher level of local UFT stakeholders' involvement and cooperation, led by local authorities (Lindholm, Browne 2013, Marcucci et al. 2017b, Quak et al. 2015), which can materialise into cooperative schemes, incentives and public-private partnerships. Indeed, recent literature indicates the need for including stakeholders' preferences and their interactions within a participatory planning process (Gatta et al. 2017, Le Pira et al. 2017a, Marcucci et al. 2017a).

Looking at the list of the ten priorities identified in the policy documents, it is evident there is an absence of data collection and modelling for UFT. Data collection and modelling are essential to observe and analyse the movements of goods in urban areas in a reliable and comparable way, and, consequently, to plan and implement solutions based on the real needs of each context.

The need to place greater emphasis on research in this sector is also highlighted in the aforementioned Urban Freight Roadmap of ALICE/ERTRAC (2014), which "identifies data collection and knowledge building for urban logistics as the first step for a relevant urban logistics research agenda". It also considers that the "development and use of modeling tools is necessary to better understand the economics and behaviour and assess the impact of (...) policy measures".

The H2020 call MG.5.2-2014 (see section 4.1.2) has partially addressed this issue,

promoting research on indicators, measurement and data, as well as economic and behavioral modelling. However, the related projects have not been sufficiently coordinated in terms of sharing and consolidation of results, as would be appropriate for such a topic: it is emblematic of the non-binding guidelines of the European Commission "Data collection methodologies for urban freight policy", meant to provide specific information on the data that can be collected, purposes and best practices. Initially scheduled for January 2017, they have not yet been published. Therefore, further effort is still needed to develop a clearer and stronger strategy regarding research on new methods and practices for data collection and modelling.

To sum up, over the past 20 years, the identified challenges and the proposed solutions are developed in a consistent manner and UFT is sufficiently covered by H2020 research funds. However, funds are heterogeneously allocated between the UFT policy solutions investigated. It should be borne in mind that the research funds allocated by the H2020 Work Programmes are specifically intended for research projects. The paper does not investigate other funding, in particular the structural funding, nor other related European programmes, such as the Connecting Europe Facility for Transport, created for the implementation of the identified solutions, in particular as regards infrastructure improvements.

Future endeavours could imply extending the research to other DGs, policy documents and European funds, to understand and evaluate how the urban transport sector policy fits with and is affected by the overall European policies in terms of environment, energy, growth, competition, regionalism, etc. This will require a fully dedicated new study, since details and a complete coverage of European non-binding instruments addressing urban transport is difficult to obtain and incomplete, and the amount of those is likely to be very high.

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