



## Guidelines on how to increase the existing potential of e-mobility in urban logistics | D4.3

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# 1. ABOUT SMARTSET

Transport of goods, both over long distances and within cities, contributes to a substantial part of the total emissions generated from the transport sector, as well as congestion. Up to 20% of traffic, 30% of street occupation and 50% of greenhouse-gas emissions are generated by freight.

The SMARTSET project will develop and show how freight transport in European cities and regions can be made more energy-efficient and sustainable by a better use of freight terminals. To reach this overall goal, the project will provide examples of good practice that can support cities, regions and countries to contribute to the European Union „20-20-20“ targets<sup>1</sup> for reduction in carbon dioxide emissions and improvement in energy-efficiency.

SMARTSET targets	Reduction by 2016	Reduction by 2020
Reduction of CO <sub>2</sub> emissions in tonnes	9,051 tonnes per year	23,418 tonnes per year
Reduction of energy consumption in tonnes	3,104 tonnes per year	8,056 tonnes per year
Reduction of energy consumption in GWh	34 GWh per year	449 GWh per year

Table 1: SMARTSET targets during project duration (by 2016) and beyond (by 2020)

SMARTSET is structured around three core aspects for creating successful and attractive terminals:

- **Market based business models** provide an outline for various strategies and distribution solutions to be implemented through organisational structures, processes and systems.
- In order to make city centres more attractive, the **introduction of clean and energy-efficient vehicles** for last mile distribution and the use of intermodal transports are also facilitated.
- **Incentives and regulations** improve the possibility to make the business models profitable and financially sustainable

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<sup>1</sup> The climate and energy package is a set of binding legislation which aims to ensure the European Union meets its ambitious climate and energy targets for 2020. These targets, known as the "20-20-20" targets, set three key objectives for 2020:

- A 20% reduction in EU greenhouse gas emissions from 1990 levels
- Raising the share of EU energy consumption produced from renewable resources to 20%
- A 20% improvement in the EU's energy efficiency

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SMARTSET is a project, co-funded by the Intelligent Energy – Europe programme of the European Union (IEE) and is composed of 14 partners, coming from Austria, Germany, Italy, Sweden and the United Kingdom. It runs from 01.05.2013 until 30.04.2016.



## 2. PROJECT STRUCTURE

SMARTSET is divided into 8 work packages, all integrated into each other, in which the leadership will be spread among the project partners:

- WP 1 Project Management
- WP 2 Cooperative market-driven business solutions
- WP 3 Incentives and regulations
- WP 4 Clean vehicles in transport
- WP 5 Networking & Exchange of Experiences
- WP 6 Evaluation
- WP 7 Dissemination & Target Group Communication
- WP 8 IEE Dissemination

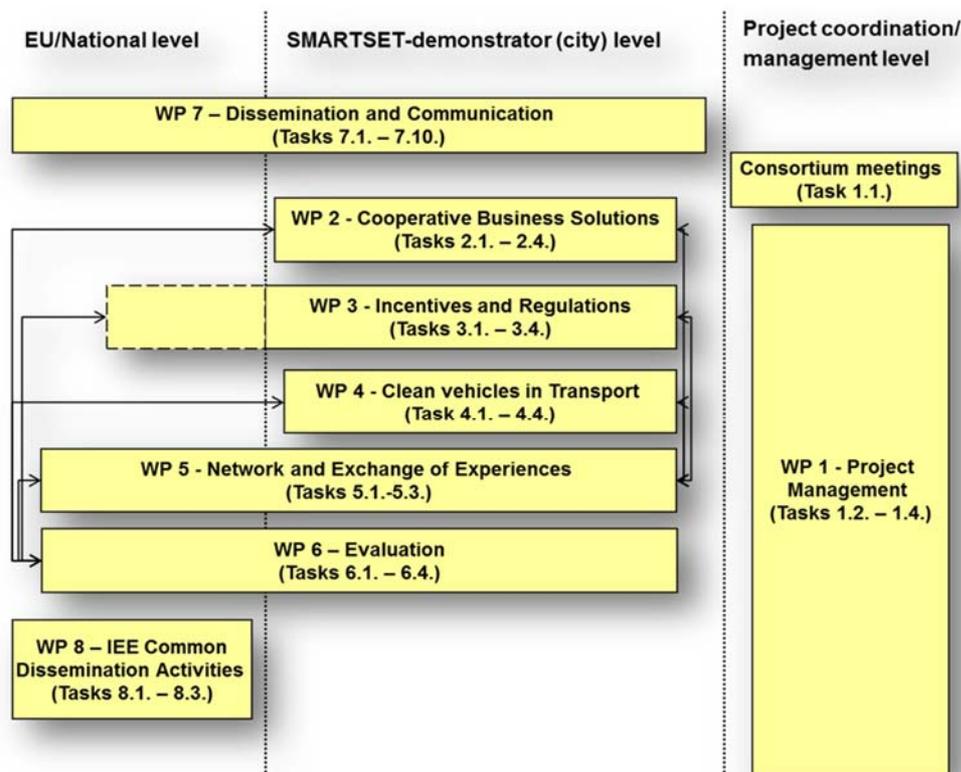


FIGURE 1: WP STRUCTURE

In SMARTSET, WPs 2, 3 and 4 focus on measures to be undertaken by cities, encompassing business solutions, incentives and regulations, as well as clean vehicles. In SMARTSET all cities

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start from different local situations and, to develop sustainable business models for freight distribution and increase the use of clean vehicles, the transfer of knowledge is an absolute key issue, which will be taken care of in WP 5. This is where the actions and knowledge in “leader cities” can be transferred to “follower cities”, and experience regarding these issues can be exchanged. WP5 is a key work package for SMARTSET, to ensure that information and knowledge is spread throughout the consortium to create the best prerequisites for successful implementation of sustainable freight systems. The conclusions drawn from the project will be shared through target group communication and dissemination, covered in WPs 7 & 8

- WP1 encompasses the project management and the tasks on technical and administrative coordination of the SMARTSET project. It will be led by the city of Gothenburg with the participation of all partners.
- In WP2 the objective is to develop business and market based solutions for last mile distribution and to make the project viable and self-sustaining after the duration of this project. Market based business models are a crucial part of the development in energy efficient distribution solutions. The SMARTSET project contains a number of different sites, with different conditions, from smaller towns to medium and big size cities, from different parts of Europe, with different types of challenges and different potential solutions. All these sites have one thing in common: the need for a sustainable business model that is comprehensive and enables existing market barriers to be overcome.
- The objective of WP3 is to develop and make clear what incentives are needed and necessary to steer towards increased use of micro terminals for last mile distribution for energy efficient freight transport.
- The objective of WP4 is to make possible the introduction of clean vehicles in last mile distribution. By distributing with e.g. small electric vehicles, the local environment will be drastically improved in terms of greenhouse gas and particle emissions, road safety and congestion.
- WP5 strives to ensure that the advancements stirred by the project activities feed the discussion, as well as knowledge exchange and development with different sectors and on a regional, national and international level, in order to break the current impasse and mobilise action toward a fully-fledged up-take of optimised city logistics.
- WP6 will provide the means to compare experiences and impacts among the project partners and at city level.
- WP7 (Dissemination & Target Group Communication) and WP8 (EACI Dissemination Activities) disseminate the findings of the project with the goal of reaching the main target groups, key actors and potential multipliers. The two work packages will mobilise activities at the EU level but will also support the participating regions in dissemination and communication efforts at the national and local level. In doing so, a variety of target



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group-tailored tools will be employed (e.g. folder, website, e-updates, press-releases, etc.).

- WP 8 will secure the IEE Dissemination activities and make sure that, upon request by the EACI, contribution to common dissemination activities will increase synergy.



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### 3. OBJECTIVE OF WP4 AND THIS DELIVERABLE

The objective of this WP is to facilitate the introduction of cleaner vehicles for last mile distribution and the use of intermodal transports. By distributing with e.g. small electric vehicles, the local environment will be drastically improved, in terms of greenhouse gas and particle emissions, road safety and congestion. We are interested in any cleaner alternative to diesel and petrol powered vehicles – apart from electric vehicles, this includes hybrids, cargo bikes and other forms of modal shift.

Investment in the vehicles is NOT included in this project.

Deliverable D4.3 gathers conclusions from the cleaner vehicle tests which took place in different conditions across a number of SMARTSET locations in Europe, in order to propose a set of guidelines on how to increase the proliferation of cleaner vehicle solutions in freight transport and logistics. The initial assessment showed there is no “one-size fits all” solution, so the guidelines may not be applicable in every set of circumstances. We are offering a set of key factors divided into two groups: enabling factors and main obstacles, with proposed solutions to overcome them, according to practitioners.

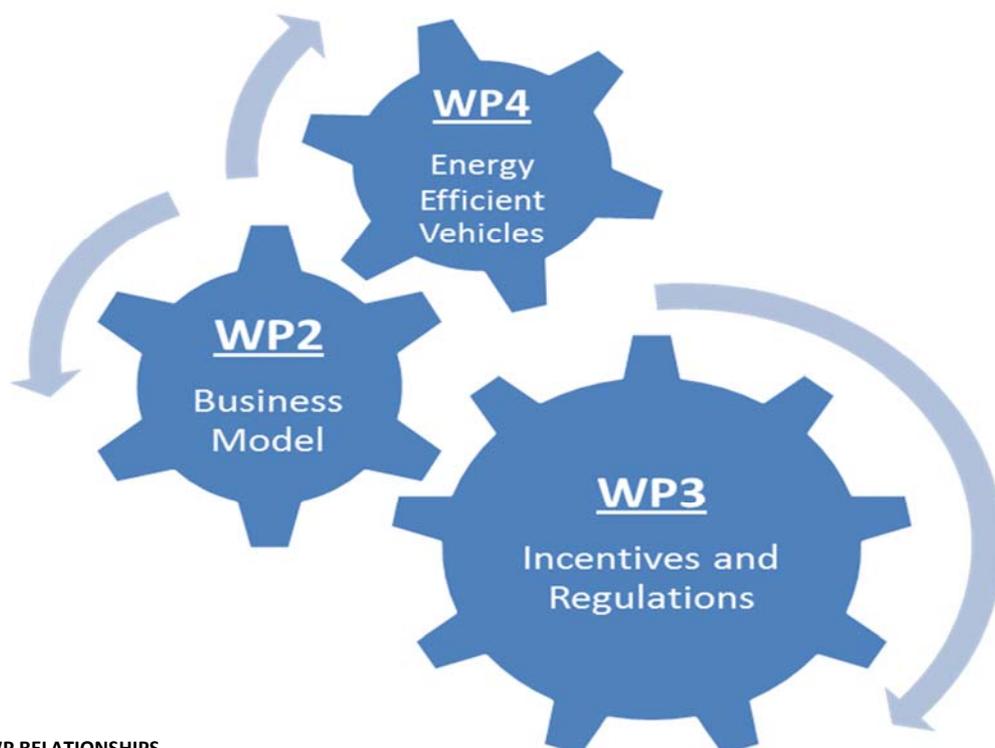


FIGURE 2: WP RELATIONSHIPS

## 4. VEHICLE TESTS IN A NUTSHELL

TABLE 2: VEHICLE TESTS IN A NUTSHELL

	BERLIN	GOTHENBURG	GRAZ	NEWCASTLE	PADUA	ROME
Reporting partner	Technische Hochschule Wildau	City of Gothenburg	City of Graz	Newcastle University	Interporto Padova	Rome Mobility Agency
Name of test	KV-E-CHAIN	STADSLEVERANSEN & FISKELEVERANSEN	Bring ME	Coherent Campus Delivery Service Plan	Cityporto Padova	Electric van sharing for urban freight distribution
Cleaner vehicle(s) tested	Fully electric 40t truck TERBERG YT202EV	Fully electric small urban distribution vehicles: Melex 390; Alké XT280E; Esagono Energia Gastone; Alké XT320E, with wagons (1-3t payload)	e-Cargo bike – Christiania P-BOX	Fully electric truck Smith Newton 7.5t	CNG powered IVECO DAILY (5t for express deliveries; 6.5t in the spa area; New service of perishable goods: 5t; 6.5 T)	3 bimodal electric and diesel: 1 Renault Master + 2 IVECO (675kg payload)
Traditional vehicles being replaced	2 VEHICLES: 40t diesel trucks	Various diesel powered vans	Many customer private cars	Dozens of diesel vehicles - from vans to articulated lorries	Diesel powered vans and trucks	Diesel powered vans and trucks
Source of funding	German Federal funding	Combined: fees; advertising; city funds	Private	FP7	Mixed: Province; Municipal; Chamber of Commerce and own funds	Mixed Environment Ministry and Municipality
Start of test	June 2014	November 2012	August 2014	September 2014	April 2004	November 2014
End of test	June 2016	None planned	None planned	None planned	None planned	July 2015
Overall perception	VERY GOOD	SUCCESS - positive perception of the concept, widely copied	MIXED - the volumes are still too low to call it success	POSITIVE – deemed innovative, unique, efficient. Awards won.	A BIG SUCCESS	Positive results: reduction in kilometres travelled and of emissions
Comment	Well publicised trial; already resulted in next orders for the vehicle	Electricity from renewable resources; clear goal to make it fully self-sustainable	No public support for the operation other than marketing	Consolidation effect: 146 EV trips replaced 859 diesel trips	Operation ongoing without subsidy, start in 2004 was subsidised	Operation involving UFT Prenestina going on



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## 5. KEY ENABLING FACTORS

We asked the people involved in SMARTSET vehicle trials to specify what were the critical factors that allowed the successful implementation of their cleaner vehicle trials. They could list factors that were internal to the trial or external – in other words, both *strengths* and *opportunities*.

### 5.1. INFORMATION/KNOWLEDGE/AWARENESS

Our partners in Berlin reported that sufficient information was available to make the right decisions regarding their unique trial. Our partners in Gothenburg discovered that there was sufficient information available from the manufacturers and suppliers in order to set up the trial (this has mainly concerned the operators of the vehicles). A relatively small amount of information has been used for external communication, mostly pertaining to electric, zero emission etc. In Graz, the nature of the trial was quite revolutionary. Since this was the first trial implementing a delivery service carried out with cargo-bikes in the city, no experience-reports were available at the beginning. An important step was to consult people who went shopping and ask them what transport mode they use for entering the inner city. As a result, first behavioural patterns were indicated. The technical university of Graz carried out a study about the willingness of people to pay for a delivery service by cargo-bike. The results showed a significant number of people answering yes, which was essential for the decision to implement a delivery service in Graz. Later on, the technical university became a stakeholder and was also responsible for the evaluation of “bring mE”, after the first testing phase. With the help of the freight forwarder Fuhrwerk, information was gathered about the use of cargo bikes for the transportation of goods. Additionally, discussions with Fuhrwerk helped to organise the new service. Partners in Newcastle found only partially accurate purchasing and delivery data in the University’s SAP systems. To supplement these, they carried out traffic surveys annually and surveyed the University staff about purchasing habits and quantities, using Survey Monkey. They found a high level of embedded knowledge in purchasing, estates, security and logistics staff. The level of awareness of the actual operational issues was low, but easily understood. In Padua, the information available for testing the clean vehicles in the project framework was accumulated over a longer period of time, because the IVECO Daily model had been chosen when the Cityporto service was implemented, in 2004 (after a feasibility study). Interporto Padova personnel, who are the managers of Cityporto, are sufficiently skilled and all the key stakeholders, including logistics operators were sufficiently aware, because all signed the Protocol of Agreement, in 2004. In the opinion of our partners from Rome, the available information was sufficient to set up the trial.

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## 5.2. TECHNOLOGY MATURITY/MARKET AVAILABILITY

Our partners in Berlin reported that, in their view, the technology was mature enough to have no major impact on the trial. Our partners in Gothenburg were happy to report that all aspects of the technology were proved to support the trial, and that the market conditions (less bulky goods, small area) proved to be an excellent field of application. In Graz, a mature (and clean) technology was used initially, with the introduction of electrified bicycles a later extension. The cargo bikes used for the delivery service are standard version and are already used for the transportation of goods. With the new delivery service “bring mE” it is possible to achieve a higher level of utilisation of cargo bikes. The idea of using the technology of electric vehicles is very helpful, as it supports the driver going through the hilly areas of Graz. In Newcastle, the availability of a second hand Smith electric 7.5t Newton truck was essential. In Padua, the IVECO Daily model has a mature technology, both in terms of power and mechanical aspects. There is also a high availability of CNG filling stations in the area. In Rome, the bimodal technology could support the trial phase. In this phase of the project the real condition that could increase the use of electric vehicles, was the incentives that Public Administrations and National Institutions could grant to the logistic operators. In short, the technology is mature enough, but still too expensive.

## 5.3. FUNDING POSSIBILITIES/PROCUREMENT POLICY

Our partners in Berlin reported that their trial was possible due to funding from the German Federal initiative “showcase electric mobility”, stressing the need for public funding. Our partners in Gothenburg could find funding support only for the Alké XT320 (from a national project); no specific funding for vehicles had been available. The pilot and development phases of Stadsleveransen were co-funded by transport companies, the city, real estate owners, the merchant organisation, regional funds, and some other private companies - however vehicle costs were not considered critical, since they are small compared to the staff costs, which are in general comparable with conventional vehicles. In Graz, with the help of a number of marketing efforts, it was possible to support the service and raise the awareness of the project. The city of Graz did not take advantage of other financial funding, as one of the main targets was that the project be able to finance itself in future. In Newcastle, the pilot was co-funded from parallel project funding and the University, whose procurement policy was the key critical success factor driving the project. In Padua, the vehicles had been already bought at the time of implementation of the trial, using mixed sources of funding (Public/Own). No other funding possibilities were available during the trial, due to the lack of public financial resources devoted to city logistics policy. Due to Interporto’s legal status a public procurement policy has not been implemented in regard to the acquisition of cleaner vehicles. In Rome the available funding sources were Municipality funds and the Environmental fund.

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## 5.4. REGULATORY FRAMEWORK

Our partners in Berlin reported that no regulatory framework was necessary to set up and execute their trial. By contrast, in Gothenburg, the regulatory framework was essential for the feasibility of the trial, in particular the time windows and access restrictions. In Graz, it was not necessary to introduce new regulations for the service “bring mE”, however the existing regulations were helpful in introducing it. There are specific designated locations for the loading and unloading of goods, that are time restricted and can be used only by trucks, up to a maximum of 7,5 tonnes. The idea of “bring mE” was to create a delivery service that was allowed to enter the inner city without restriction, but the challenge was that that cargo bikes were not allowed to enter the main pedestrian zone (Herrengasse) outside of the loading time. In Newcastle, no regulation needed to be used. The Municipality of Padua approved the official traffic regulations in 2003, amended them in 2006, and again in 2008. (Official regulation 83/2008 is currently in force). These regulate the access of vehicles to the Limited Traffic Zone. The entry to the city centre of freight vehicles (up to 3.5 tonnes, or 6 tonnes if transporting perishable foods, including frozen), is allowed upon the purchase of a permit, though only during certain time-windows: on working days, from 08.30 to 09.30, from 13.00 to 16.00, and from 19.00 to 20.00. For vehicles between these weights transporting other types of goods, a special permit must be purchased, before temporary access to a further limited traffic zone is then allowed. Access to the LTZ and the pedestrian zone for the 11 vehicles of Cityporto is permitted 24H/day and they are furthermore allowed use of the reserved lanes for buses and taxis. The use of reserved parking spaces for loading/unloading operations has been studied but, at the moment, the parking of Cityporto vehicles inside the LTZ operations is temporarily permitted close to the shops where the parcels are to be delivered. In Rome, the policies set up by official resolutions impose a restriction on circulating vehicles, including lorries, through time windows, cleaner vehicles and increasing cost of permits, as well as by reducing the numbers that may access the central LTZ.

## 5.5. STAKEHOLDER SELECTION AND INVOLVEMENT

Our partners in Berlin reported that the vehicle operator was key to the success of the operation. In Gothenburg, various stakeholders were addressed and selected on the basis of their role in the distribution system, and in the development of the inner city area, which means that a lot of different stakeholders became involved in different ways. The key stakeholders were: the municipality – providing regulation and support; transport companies – having access to the major customer base and the possibility to subcontract hauliers for last mile distribution; and the merchant organisation and joint inner city company, who formed a platform for communication

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and development of the concept and also a neutral party to host a consolidation service. In Graz, the range of stakeholders was very wide, as there were different experts from different fields of interest involved. Within several local, regional and national meetings the personal strengths of the stakeholders were discovered, leading to a good cooperation and a good working atmosphere. On the basis of their experience, gained in previous projects, the technical university of Graz was integrated. As an experienced multiplier, with a connection to the shop owners, the City Management was selected as a stakeholder. The company B.I.M. was a valuable external expert, in questions concerning mobility. The different stakeholders selected had already proved their ability to work well together, in previous projects. Later on, cooperation with the Österreichischen Städtebund (Austrian platform of Cooperation between cities) could be initiated, in order to spread the information across Austrian cities. In Newcastle, a range of stakeholders needed to be involved within the University: purchasing department; estates department; executive board; researchers at NewRail and, externally, a logistics provider. In Padua, the main stakeholders were the signatories of the Protocol of Agreement that formed the basis of the Cityporto service, while the rest were the customers of the service who shared it on a voluntary basis. In Rome, the key stakeholders were the logistics operators and Unindustria Lazio - an enterprise association.

## 5.6. LOCAL SPECIFICITY (ECONOMIC OR GEOGRAPHICAL CONDITIONS)

For our partners in Berlin, a specific local feature of cleaner vehicle operation was the relatively limited demand made on vehicle range, since the operations from Westhafen terminal into the city require only short delivery trips. In Gothenburg, the implementation of the trial was supported by the time consuming nature of goods delivery into the city centre area and, in some parts, the difficulties of handling large vehicles. A pre-built customer base also helped. In Graz, choosing the inner city as the pilot area for the delivery service “bring mE” was a good decision, as the economic and geographical conditions fitted the requirements of the project well, with the delivery service aimed at the large numbers of people travelling through the city centre as part of their daily routine. The delivery service “bring mE” has added to the attractiveness of the inner city stores, helping them to compete against online shopping and out-of-town shopping centres. The results of the evaluation showed the pilot project to be also transferable to other parts of the city, for example to new housing areas. Newcastle was unusual in terms of its specific road infrastructure: low levels of congestion in the city meant little incentive for transport operators, or city authorities, to intervene. Padua was interesting in terms of economics, in that Interporto Padova is both the manager of the service and the owner of the UFT and the vehicles; furthermore, in-house personnel developed the software. In terms of geography, the Padua area is a plain, with no physical obstacles, and the UFT is close to the city centre (5 km). In Rome, the

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rules system and incentives proposed by the city administration supported the implementation of a freight distribution system that introduced the use of cleaner vehicles; their impact is measurable, in the form of CO<sub>2</sub> reduction.



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## 6. MITIGATING MAJOR OBSTACLES

We asked the people involved in SMARTSET vehicle trials to specify the main obstacles and critical factors that hindered the implementation and what measures they used to overcome them. In cases where the obstacles still hindered the implementation, we asked for partners' opinion on how to overcome them. They were asked to include factors that were both internal and external to the trial – in other words, both *weaknesses* and *threats*.

### 6.1. INFORMATION/KNOWLEDGE/AWARENESS

Our partners in Berlin reported no obstacles regarding their unique trial. In Gothenburg, some issues with vehicle batteries and control units took time to resolve, due to lack of knowledge among the supplier's service staff. Education however solved this problem. There were no, more general issues identified; the most important thing was to provide information on vehicle performance (capacity, range etc.). As this was the first implementation of a delivery service with cargo bikes in the City of Graz, there was no previous experience on which to draw and researchers found it difficult to collect sufficient data about transported goods, as freight forwarders were reluctant to reveal their company statistics, making volume, weight and distance information difficult to obtain. All reasonable marketing actions were carried out, within cost constraints, in order to raise the level of awareness. Initially, shops showed an interest in the idea of the new service; however when it came to the promotion phase, most were passive and unwilling to contribute. Another issue was how to bring all participating stakeholders up to the latest level of knowledge: with many personalities working together, the level of active involvement varied between stakeholders. The only solution was ongoing communication and working constantly to increase the level of involvement - a very time-consuming process. In Newcastle, the team found out that making decisions about changing delivery patterns on the University Campus required, as well as an understanding of the current state, an in-depth knowledge about purchasing habits among goods receivers; this information was obtained through the concerted efforts of both researchers and University estates and procurement staff, through a variety of methods, including data analysis, traffic surveys and staff questionnaires. It was also essential to find out which people were mandated to bring about changes to delivery patterns and, thanks to the investigations carried out, the right stakeholders were identified. In Padua, the main difficulties did not concern the awareness of stakeholders or citizens, but rather how to achieve the appropriate tariffs to cover the costs of operations. In Rome, no obstacles were reported.

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## 6.2. TECHNOLOGY MATURITY/MARKET AVAILABILITY

Our partners in Berlin reported no obstacles regarding the trial and in Gothenburg, no identified aspects of technology proved detrimental to the trial. Also in Graz, the use of electric operating cargo bikes was found suitable for daily use and no significant problems were detected. Newcastle found that the poor European market demand for electric trucks had limited the development of clean urban logistics vehicles of 7.5t and greater, making the originally planned (Volvo) vehicle unavailable. Fortunately, an alternative was found when a second-hand Smith truck was made available. In Padua, the choice of vehicles turned out to be appropriate, generating no technology-related problems. In Rome, it was observed that, despite the allocation of Euro 5 emissions category vehicles, some emissions exceeded the standard, due to the frequency of stop and go and a low commercial speed.

## 6.3. FUNDING POSSIBILITIES/PROCUREMENT POLICY

Our partners in Berlin reported no funding obstacles regarding the trial. In Gothenburg, funding issues were not considered a crucial factor, thanks to the small and relatively inexpensive vehicles being used. This becomes far more important regarding regular trucks, where the price difference between conventional and electric options is much greater. In Graz, concerning financial funding, no negative effects or consequences were found during the project lifetime; however, since the target is for the delivery service to be self-financing in the future, a larger number of participating shops will be necessary. The participation of larger stores, such as “Kastner & Öhler”, would be a driving force for other shops to participate, to increase customer uptake, and to expand awareness of the project. “Kaster & Öhler” successfully tested the delivery service “bring mE” for four days, yet decided to use a similar service carried out by e-cars. In Newcastle, funding of the vehicle came from a parallel EU project, but the trial required a substantial modification of the procurement policy, which took a lot of effort to execute. In Padua, there seem to be no obvious funding opportunities available for the planned enlargement of the service. In Rome, it was reported that the purchasing cost of cleaner vehicles (both bi-modal and electric) is still prohibitive.

## 6.4. REGULATORY FRAMEWORK

Our partners in Berlin reported no obstacles regarding the trial. The lesson from Gothenburg is that in order to strengthen the business case for clean vehicles, and to reach the full potential of the solution, time windows and access restrictions would need to cover a larger part of the inner city area, and not only a few streets. The inner city of Graz is mainly a pedestrian zone, with the

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Herrengasse as a backbone. Cargo bikes are not permitted to enter the Herrengasse, as Austria's regulations forbid cycling in pedestrian areas. This also affected the cargo-bikes used in this project, as there are no exceptions allowed concerning the delivery of goods. Effecting a change would be a difficult step and is not likely to be put into practice. In Newcastle, no regulation was involved. In Padua, the time windows to access the LTZ are not always respected by freight couriers, so Interporto Padova is holding dedicated meetings with local police to monitor this. No issues were reported in Rome.

## 6.5. STAKEHOLDER SELECTION AND INVOLVEMENT

Our partners in Berlin reported no obstacles regarding the trial. In Gothenburg, no missing stakeholders were identified, however a more extensive involvement from the shops would have been desirable. In Graz, all necessary stakeholders were involved. In Newcastle, meeting the needs of internal customers (recipients of goods) was paramount and this slowed the conversion of suppliers from traditional practices to the new methods. In Padua, all key stakeholders were involved in the project. No issues were reported in Rome.

## 6.6. LOCAL SPECIFICITY (ECONOMIC OR GEOGRAPHICAL CONDITIONS)

Our partners in Berlin reported no obstacles regarding the trial. In Gothenburg, a zone division of the inner city made it a challenge to find efficient ways to plan routes for single vehicles operating in different zones. The local infrastructure and regulations do not allow optimal route planning, but the issue can be managed. In Graz, the economic conditions of the inner city are good, and fit the requirements of the project well, but getting the shops on board was more difficult than estimated at the beginning of the project. Some shops were sceptical and unconvinced, even though implementing and running the service was cost-free for them; nevertheless negotiations for them to participate in the service will continue. In Newcastle, the original city plans had been for a consolidation centre within the city boundary. This was discovered to be inappropriate, since it yielded no trip savings for logistics companies; indeed one such was closed by the city council in the early days. In the end, the consolidation centre used was good, but located south of the river - some 50km away from the University. While this may not have been optimal, it worked well for proving the concept. What this shows is the need for broader regional initiatives, rather than smaller city-based ones; the very local may solve a particular problem, but the solution needs to fit into a wider network. Padua is a historical city, whose centre has a lot of narrow streets included in the LTZ; goods distribution vehicles are therefore at the smaller end of the fleet. (3.5 tonnes, rather than 6.0 or 6.5). In Rome, for specific

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logistic chains, the load capacity in volume and weight of the vans was not sufficient. It will be necessary to involve the vehicle makers in designing higher load capacity vehicles, in order to optimise loads and deliveries.



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## 7. CONCLUSIONS

Achieving “zero emissions’ city logistics in major urban centres by 2030 is an achievable goal, formulated in the Transport white paper of 2011. However, it is also very ambitious, given that most European urban centres are at best only testing solutions leading to achieving that goal and that most have not even started. This makes it all the more important to learn from the results of existing tests, such as those performed at the SMARTSET sites. Here we present the related SMARTSET conclusions, in the same thematic areas as above.

### 7.1. INFORMATION/KNOWLEDGE/AWARENESS

Information about cleaner vehicles is widely available across the EU. However, many improvements can be made in terms of raising awareness about the particularities of their acquisition and use. Also, business models relating to the introduction of clean vehicles should be better researched and publicised. This is true even for cleaner vehicles using mature technologies, such as natural gas powered vehicles, but it becomes paramount with regard to disruptive new technologies such as plug-in electric vehicles. Additional complexity comes from the fact that, in many cases, cleaner vehicles require a paradigm shift that happens when a “dirty’ vehicle is not simply replaced with a clean one of the same function and size. In many cases, the optimal clean solution requires switching to a greater number of smaller vehicles, including bikes and L-category vehicles, or the introduction of consolidation schemes that require change - not only in vehicle size and number - but also in business relations. Such shifts should be better described and popularised, across the continent. There is a natural resistance to change in both individuals and business and ignorance often leads to the formation of myths and negative attitudes that can and should be clarified and verified. Awareness of the role and nature of urban freight/logistics operations in general should be increased amongst city authorities, many of whom neglect this area entirely, focusing entirely on passenger transport. This is reflected in strategic documents and regulation often missing the freight component.

### 7.2. TECHNOLOGY MATURITY/MARKET AVAILABILITY

In some cases - such as with cargo bikes and natural gas powered vehicles - technologies are mature, although market availability of such vehicles differs significantly across Europe. Different tax regimes make such alternative fuels more or less attractive for businesses, and cultural/geographical conditions support or prohibit the use of human powered bicycles for freight. However, when it comes to non-polluting vehicles (of various sizes) powered by electricity, the technology is still expensive, compared to fossil fuel powered equivalents, and the availability of vehicles differs across the size groups. While bicycles, L-category vehicles, car sized

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vans and commercial vehicles of up to 3.5t are easy to find and procure, the picture becomes more complex for vehicles larger than this. Even for test use, it was quite a challenge to purchase one 7.5t truck, and there are millions of traditionally fuelled vehicles of this size in operation across European urban areas. The unique story of a 40t electric truck operated in Berlin is one of success, but it does not mean that such vehicles are readily available. The electric commercial vehicles market segment needs supporting, as currently we are in the vicious circle of demand waiting for supply and supply waiting for demand.

### 7.3. FUNDING POSSIBILITIES/PROCUREMENT POLICY

All partners reported at least some public funding to be a crucial component of setting up the cleaner vehicle test and/or operations. This is clearly a result of cleaner vehicle technologies being substantially more expensive than well-established, more polluting alternatives. However, while public subsidies are a good way to stimulate trials and demonstrations, they are not always a good way to support transition to self-sustaining long-term operations. Stricter enforcement of the “polluter pays” principle seems to lead to more sustainable freight transport solutions.

Procurement policy does not always favour the cleaner vehicle solutions, making it an area that calls for improvement. Cleaner vehicles should become purchasing priority for all public players, stimulating demand and awareness.

### 7.4. REGULATORY FRAMEWORK

In most locations in Europe, a regulatory framework is key to the introduction of cleaner vehicles. Most partners report that without access restrictions for ‘dirty’ vehicles they would not be able to set up and execute their cleaner vehicle trials. This is also an area which where it is relatively easy and inexpensive for the administration or local government to introduce new interventions. However, local government is dependent on public opinion in order to be re-elected, which ties in with the issues of awareness, myth debunking and changing the car-oriented mindset of many Europeans. Experience shows that, even in places where access restrictions were initially unpopular with citizens and businesses alike, once the benefits of higher quality of life become apparent, public opinion sways in their favour. Europe seems to need more leaders and administrators who have the courage to start the change.

### 7.5. STAKEHOLDER SELECTION AND INVOLVEMENT

All partners reported that selecting and involving the right stakeholders from the start was an absolute necessity to succeed in starting and operating a cleaner freight vehicle scheme. Many were also surprised how much time and effort these processes took. The simple lesson is that

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analysis to identify the stakeholders with both the interest and the mandate to contribute to the process of change is a must. Support is needed, not only from the politicians, executive boards and administration, who deliver strategy and regulation, but also from researchers and consultants who are able to obtain and analyse realistic data and propose the right solution for the specific local set-up. Businesses typically have an agenda that is quite remote from such goals as environmental protection and quality of life for citizens, yet in the case of freight they are a crucial stakeholder, but difficult to involve. Formation of partnerships, and neutral meeting grounds hosted by persons endowed with public trust, are therefore essential.

#### 7.6. LOCAL SPECIFICITY (ECONOMIC OR GEOGRAPHICAL CONDITIONS)

There are no universal solutions that would fit all social, economic and geographical conditions across Europe. It is therefore of paramount importance to select and tailor solutions that fit locally. Learning from best practices, such as the ones described by SMARTSET and many other projects publicised within SMARTSET, is the best way to arrive at the optimal way for any urban location in Europe.

