SCALE-UP
User-Centric & Data Driven Solutions for Connected Urban Poles

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D7.2 SCALE-UP Evaluation plan 1

Version 1.0

D7.2 – SCALE-UP Evaluation plan 1			
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0.0	13 October 2021	Template
0.1	06 January 2022	First draft version
0.2	10 January 2022	Draft for peer review
1.0	28 January 2022	Final version

List of Acronyms	
Acronym	**Meaning**
ANPR	Automatic Number Plate Recognition
EC	European Commission
CRTM	Consorcio Regional de Transportes de Madrid
EMT	Empresa Municipal de Transportes de Madrid
FUA	Functional Urban Area
GHG	Greenhouse Gas
GIS	*Geographic Information System*
LEM	Local Evaluation Manager
LEZ	Low Emission Zone
MER	Measure Evaluation Results
ML	Measure Leader
P&R	Park & Ride
PEM	Project Evaluation Manager
PER	Process Evaluation Report
PT	Public Transport
RCSWF	Regional Council Southwest Finland
SUMI	Sustainable Urban Mobility Indicators
TUAS	Turku University of Applied Sciences
vkm	Vehicle-kilometre
WP	Work Package

Legal Disclaimer

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1. Introduction

1.1. SCALE-UP

The SCALE-UP project will develop and implement data-driven and user-centric strategies to accelerate the take-up of smart, clean, safe and inclusive mobility, that will address (Figure 1): (i) vertical upscaling by working towards more integrated collaboration between governance levels and sectors (including innovation partnerships with (private) mobility providers) and beyond geographical boundaries; and (ii) horizontal upscaling through integrating different dimensions or layers of the mobility system (physical, digital and human) in a balanced way.

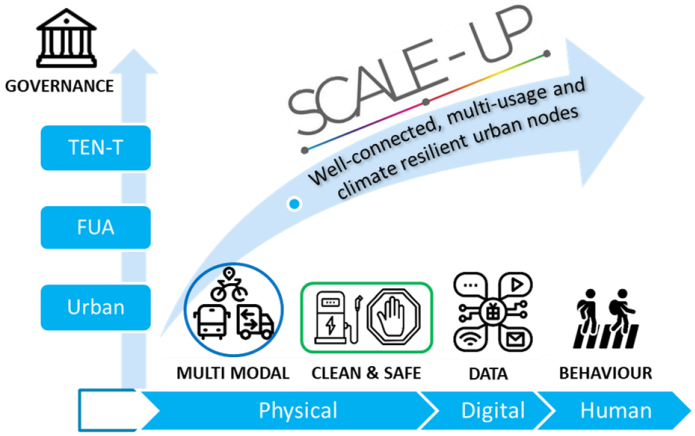


Figure 1: The SCALE-UP concept

The project's urban nodes demonstrators — Antwerp, Madrid and Turku — have already developed a functional data driven approach, something very distinct from the more limited 'gadget approach'. This means building a comprehensive and solid digital mobility layer as part of a smart, clean, safe and inclusive mobility system that connects mobility to the end user in a smart way. Using an evidence-based and data driven monitoring and evaluation framework, SCALE-UP will prove the effectiveness and efficiency of 28 innovative technological and non-technological mobility measures addressing (i) EU climate and transport policy objectives, (ii) the TEN-T revision, (iii) the reviewed action plan on urban mobility, and (iv) the challenges posed by the COVID-19 pandemic, and will push take-up forward. Furthermore, operating on the principle that smart mobility only makes sense if the focus is on the user rather than on the vehicle, these measures will fulfil the user needs for seamless multimodal transport and increase their freedom of choice.

1.2. The scope of this document

The 3 SCALE-UP urban nodes already have a long-term experience with evidence based evaluation and monitoring, resulting in strong evaluation mechanisms and data in place. To achieve the SCALE-UP goal to demonstrate evidence-based approaches, the SCALE-UP evaluation builds further on this experience and is implementing a layered evaluation approach encompassing 3 levels of evaluation:

- the level of the Functional Urban Area,
- the level of the measures implemented within the project life span, and
- the level of the strategy integration (TEN-T and multi-layered mobility system)

To have an effective and efficient evaluation, SCALE-UP is operationalising the SCALE-UP evaluation framework (see D7.1 The SCALE-UP evaluation framework) in the 3 SCALE-UP urban nodes.

This first version of the SCALE-UP evaluation plan details the complete impact and process activities planned during the project lifetime on the 3 levels of evaluation, defining the indicators to be used with efficient data collection methods.

It is the result of the intensive cooperation of the SCALE-UP Project Evaluation Team (PET) to develop and optimise the SCALE-UP evaluation approach and of the work of the Local Evaluation Managers (LEMs) with the local partners in the urban nodes of Antwerp (Emilie Sion, Sarah Van Acker and Freya De Muynck), Madrid (Andrés Monzón, Adriana Cortez and María Beltrán) and Turku (Annika Kunnasvirta and Juha-Ville Forssell).

Since not all aspects of the SCALE-UP approach are already defined at this moment an updated version will be published in May 2022 (D7.4 SCALE-UP Evaluation plan 2).

1.3. Structure of this document

This report presents the first version of the SCALE-UP evaluation plan.

In Chapter 2, an overall introduction is given of each urban node. The general characteristics (geography, population, governance, ...) of the urban node are described. The main challenges in relation to the SCALE-UP project are outlined and the key mobility elements, such as modal split, infrastructure, services, freight movements etc., are mapped.

Chapter 3 describes the evaluation approach taken — overall in the SCALE-UP project and specific for each urban node — on the level of the Functional Urban Area.

In Chapter 4, an overview is given of the 28 mobility measures to be implemented in the course of the SCALE-UP project. Subsequently, for each measure, a concise description of the measure is given, followed by an overview of the expected outputs, the objectives, the indicators selected to monitor its impact and the data collection methodology. Next, the different partners and roles and possible risks of the implementation process are described. If applicable, supporting activities and interactions with other measures are presented. Chapter 4 concludes with the planning of each measure, detailed in Gantt charts, in Section 4.30.

The basic elements of the SCALE-UP evaluation approach of the horizontal and vertical integration in the urban nodes is outlined in Chapter 5.

Chapter 6 presents the conclusions and future actions.

2. The SCALE-UP urban nodes

SCALE-UP works with the 3 advanced urban nodes of Antwerp, Madrid and Turku, all three situated at the Core network of TEN-T (Figure 2). Antwerp is situated alongside three corridors (North Sea-Baltic, Rhine-Alpine, North Sea-Mediterranean), Madrid alongside two corridors (Mediterranean and Atlantic) and Turku alongside the Scandinavian-Mediterranean Corridor.

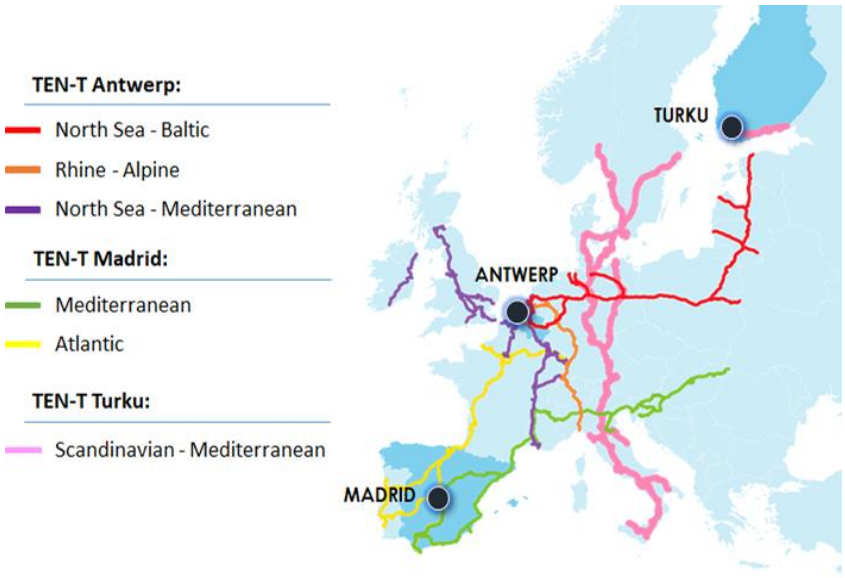


Figure 2: The locations of the 3 urban nodes and its connection to the TEN-T corridor

The 3 urban nodes present a variety of contexts, mobility behaviour and mobility challenges. This chapter details, for each urban node:

- The general characteristics of the urban node. This includes the geography, the population, the governance, policy and employment of the urban node.
- The main mobility challenges in the perspective of the SCALE-UP project.
- The key mobility elements, such as the modal split, the mobility infrastructure and services, mobility management initiatives, communication with the public in relation to mobility (e.g. citizens' panels, fora) and the infrastructure and services for goods and freight movements.

2.1. Antwerp

2.1.1. General characteristics of the urban node

2.1.1.1 Geography and population

Figure 3: Location city of Antwerp within Belgium

Source: Google maps

The city of Antwerp is located in the north of Belgium, close to the Dutch border. It is the second-largest Belgian city, after Brussels and it holds a strong economical, regional role, partly because of hosting Europe's second-largest port (Figure 3). The city itself is located within a larger transportation network. Firstly, the city of Antwerp forms the centre of the Antwerp Transport Region, our relevant functional urban area on which we focus in the SCALE-UP project. Very recently, in 2015, the Flemish government introduced the concept "Basic Accessibility" leading to the division of the Flemish Region into Transport Regions or **functional urban areas (FUAs)**. Those transport regions provide a framework for regional cooperation concerning transport and mobility. The Antwerp Transport Region includes 33 municipalities (Figure 4 and Figure 5).

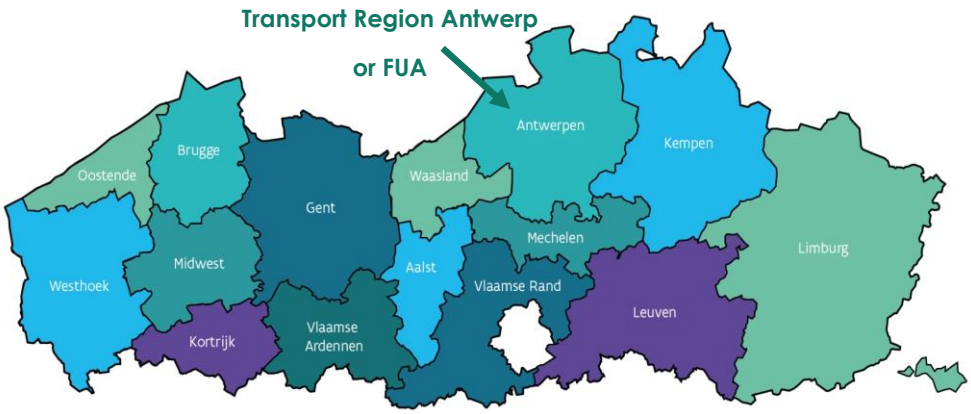


Figure 4: Transport Regions or Functional Urban Areas within Flanders

Source: https://www.vlaanderen.be/basisbereikbaarheid/vervoerregios

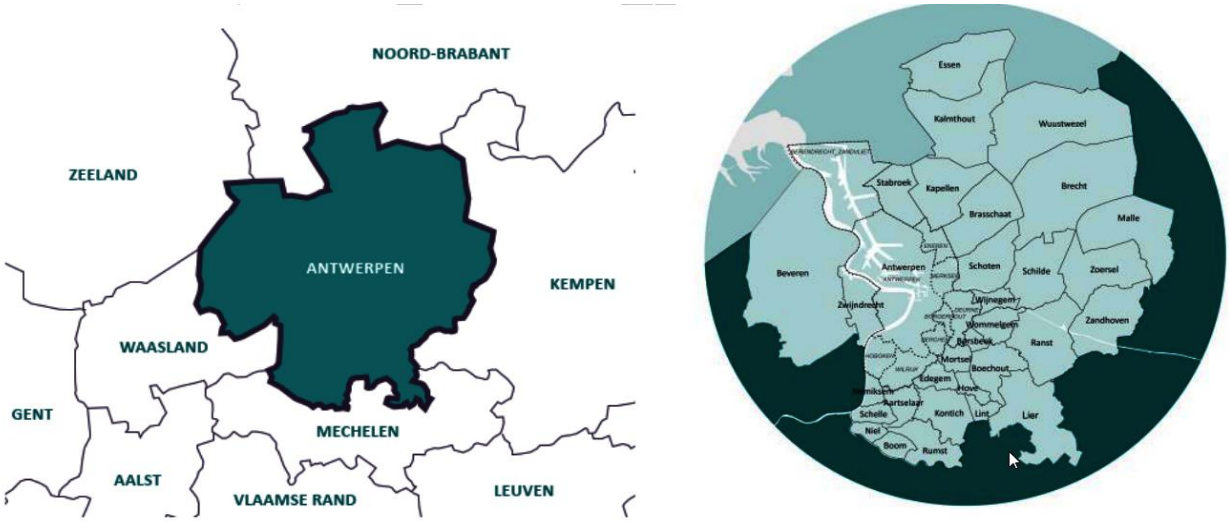


Figure 5: Transport Region Antwerp in detail

Source: *http://www.antwerpenmorgen.be*

Secondly, the functional urban area of Antwerp is situated at the Core network of TEN-T.[1] Three corridors are situated alongside Antwerp: the North Sea-Baltic corridor, the Rhine Alpine corridor and the North Sea-Mediterranean corridor. (Figure 6)

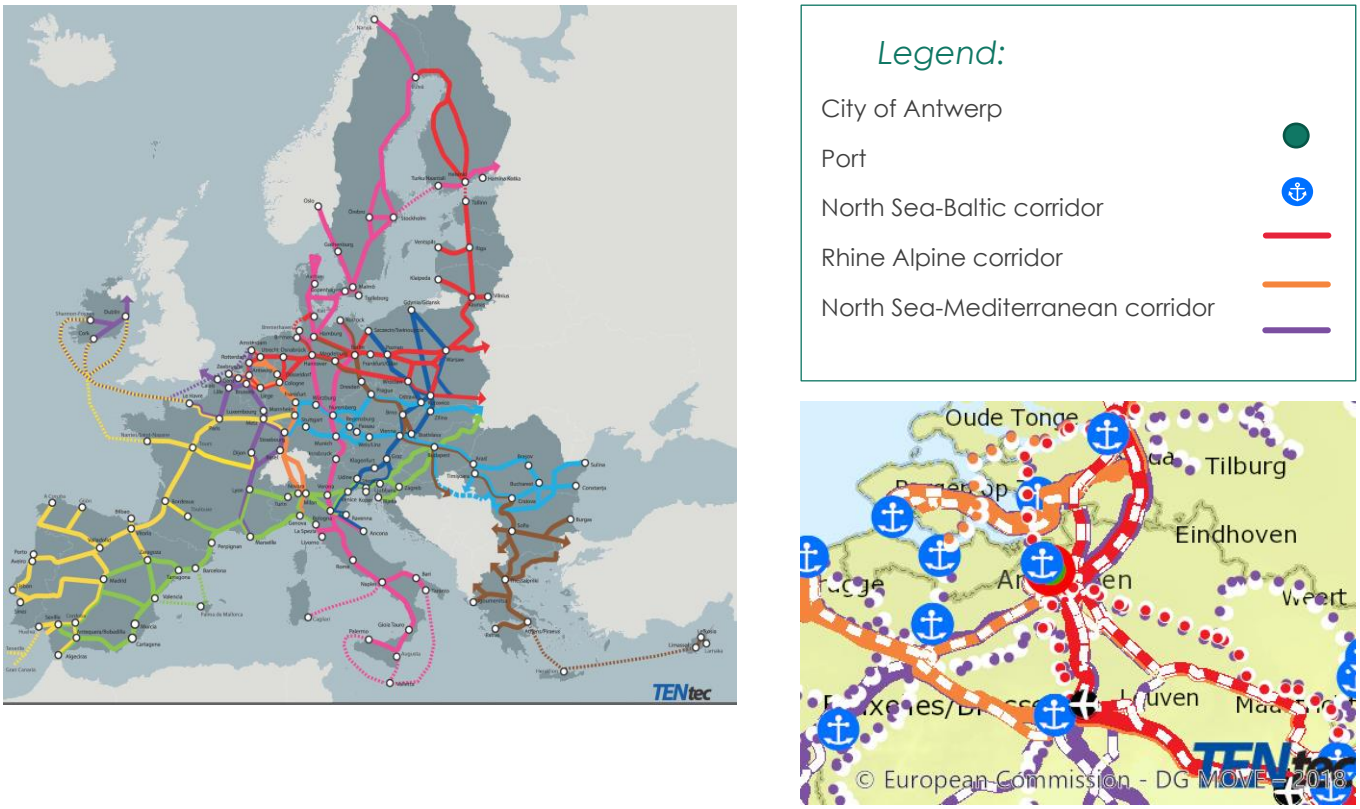


Figure 6: TENT-T network near the Antwerp Transport Region, micro and macro level

Source: European Commission

The Transport region of Antwerp is a highly urbanized area and therefore houses a large population. More than 1.1 million people live within this functional urban area, the majority situated within the city of Antwerp.[2] In 2020, 530 104 people lived within the city of Antwerp and 73 938 solely in the city centre. Figure 7 and Figure 8 show the population growth of the city of Antwerp as well as the Antwerp Transport

[1] TEN-T comprises two network 'layers':
1. The Core Network includes the most important connections, linking the most important nodes, and is to be completed by 2030.

The Comprehensive Network covers all European regions and is to be completed by 2050.

[2] Exactly 1.149.079 live within the Transport Region Antwerp, source: https://provincies.incijfers.be/databank

Regions. According to forecasts of Statistics Flanders, these numbers will rise even more. Statistics Flanders predicted an increase of 70 000 inhabitants and 33 500 households by 2030, almost reaching 600 000 inhabitants.

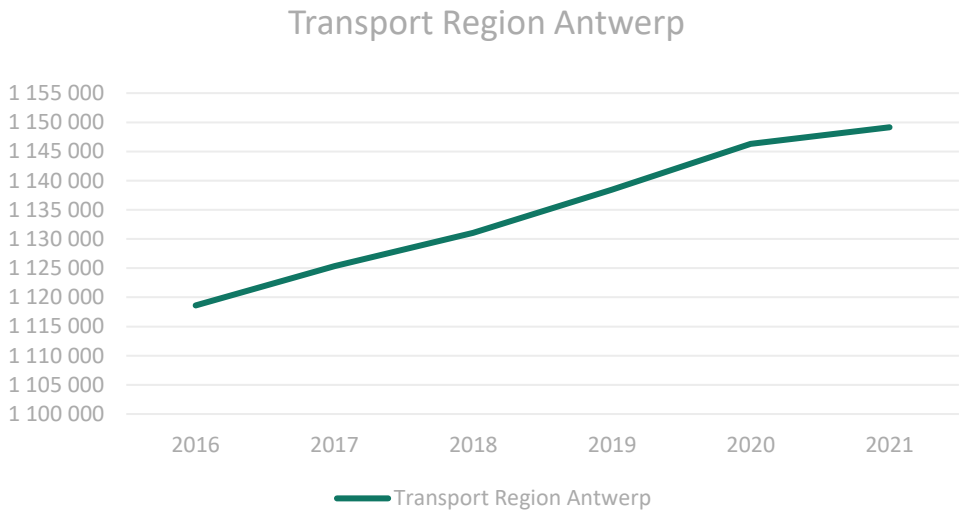


Figure 7: Population growth in the Transport Region Antwerp

Source: https://provincies.incijfers.be/databank

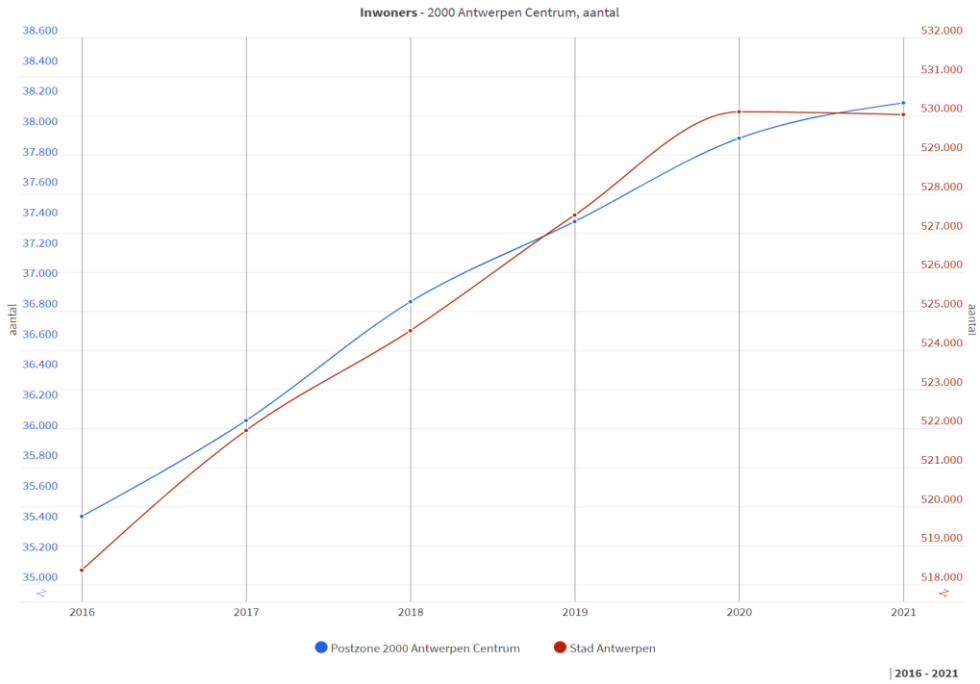


Figure 8: Population growth in the city of Antwerp

Source: stadincijfers.antwerpen.be

2.1.1.2 Governance and policy

In 2019, over 300 municipalities and cities of Flanders were subdivided into15 transport regions. These new transport regions give an official political voice to municipalities within the decision-making process of mobility policy within that specific region. Each transport region has a transport regional council that monitors, directs, and evaluates the implementation of basic accessibility in a transport region, so in this case the Transport mobility regional council of Antwerp.

This transport regional council will be the cockpit for the mobility policy in the transport region. Not only regular public transport by bus or tram but also the before and after journeys with (shared) bicycle, (shared) car and all other modes of transport are facilitated. In addition, the transport regional council also examines the infrastructure (roads, bicycle roads, etc.) and freight transport within the region. The transport regional council consist of:

- All municipalities in the region, represented by their mayor or mobility alderman
- The Flemish Department of Mobility and Public Works (MOW)
- Relevant stakeholders for that region: The Flemish Agency for Roads and Traffic, De Lijn[3], De Vlaamse Waterweg[4], the Agency for Maritime Services and Coast, De Werkvennootschap[5], Lantis[6],….

The transport regions always have two chairmen, a chairman of the team of MOW and a political chairman. For the Antwerp Transport Region, the chairmanship is held by Filip Boelaert (Secretary-General of MOW) and Koen Kennis (Alderman of Mobility for the City of Antwerp).

These transport regional councils have been commissioned to draw up a mobility plan for the entire region and will also monitor and evaluate that plan. For the Transport Region of Antwerp, this resulted in Roadmap 2030.[7]

The Roadmap 2030 is the multimodal mobility plan for the Antwerp Transport Region and reflects the mobility policy that will be pursued/implemented at the regional level, both for passenger and freight transport. It constitutes the framework for the

[3] Flemish bus operator
[4] Agency of the Flemish government that manages the waterways in Flanders.
[5] Project of the Flemish government to coordinate the road and mobility related infrastructure works.
[6] The organisation that realises and manages mobility projects of regional importance in the Antwerp region.
[7] https://www.slimnaarantwerpen.be/nl/over-ons/vervoerregio-antwerpen-routeplan-2030, consulted 27/10/2021

subsequent development of projects and programmes at the regional (and local) level. It is geared towards achieving an accessible, competitive, and liveable region. Also, here the principle of cooperation still stands firmly, acknowledging that mobility issues must be tackled through collaboration between the various policy levels, the local authorities, the transport modes and all public and private stakeholders involved. A strong evaluation framework monitors the progress towards the 50/50 modal split. Furthermore, the Roadmap 2030 ties in neatly with the new Climate Plan that is currently made up, aiming to reduce emissions by 50% by 2030 and 100% by 2050, from the city and the ambition of the Port to become the first European climate-neutral port by 2050.

2.1.1.3 Employment

The transport region Antwerp is an economically strong region, responsible for a large number of jobs in Flanders. The port alone accounts for 150 000 jobs. Across the area, 85 000 companies create 500 000 jobs. The graph in Figure 9 shows the steady growth of jobs within the region. On average, every year a steady amount of 10 000 new jobs enter the job market.

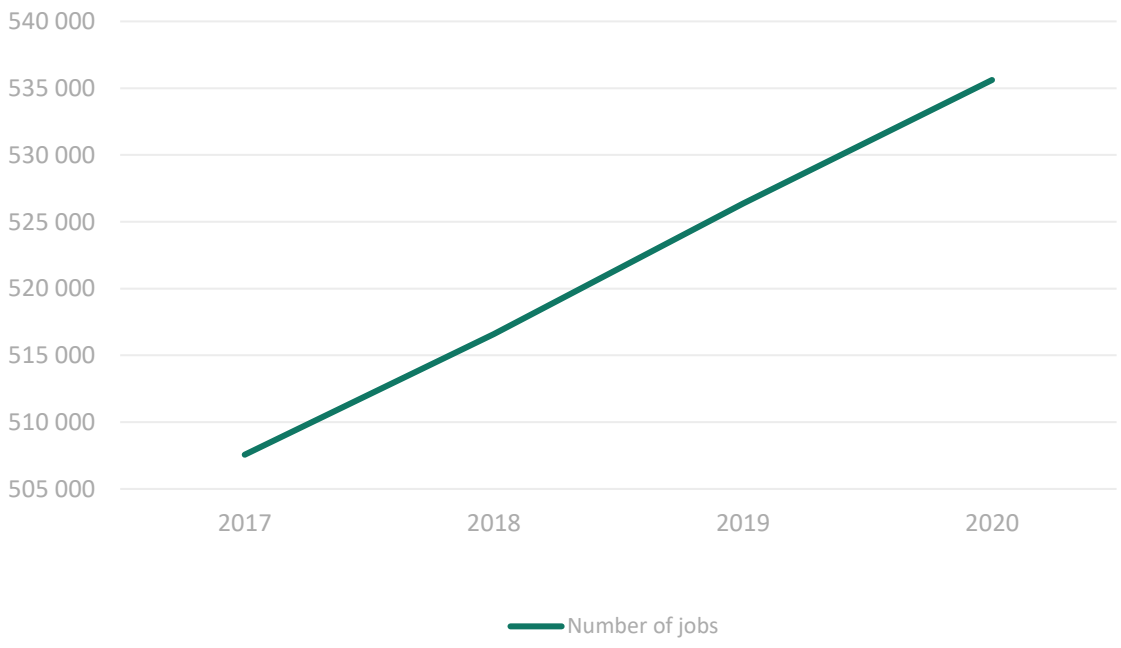


Figure 9: Growth in the job market

Source: https://provincies.incijfers.be/

2.1.2. Challenges in relation to SCALE-UP

The Transport Region Antwerp is a brand-new policy construction, and this evidently has its advantages and disadvantages. First, the mobility related data is often available on a city level, as the city of Antwerp has a rich history of European projects and managing and evaluating mobility initiatives. However, on the level of the Transport Region, the data is often not as well-collected. Secondly, the regional mobility plan is only recently developed which means that some of the mobility initiatives are still within their first steps. This allows us to follow those measures from the beginning and to create a baseline measurement. However, this also means that the development and the data collection of some of these measures might not always follow the ideal pre-defined scenario and might not give the data necessary for the evaluation. Data collection issues per measure are explained in later chapters.

A second obstacle related to the urban node Antwerp is the complex structure of the mobility landscape in Flanders and Belgium. Creating mobility policy and initiating mobility projects often involves a lot of partners, which reinforces the need for corporation and consultation. This can be expressed as a strength, because it guarantees the involvement of multiple voices, but can also manifest itself as a challenge to consult every partner and to align visions.

2.1.3. Key mobility elements

2.1.3.1 *Modal split and ambitions for modal split*

The transport region aims to have a modal split of 50-50, whereby 50% of all journeys on the level of the transport region will rely on sustainable transport methods. Currently, the Antwerp Transport Region has already reached its goal for employee commuting. As shown in Figure 10, 50% of the employees commute in a sustainable way.

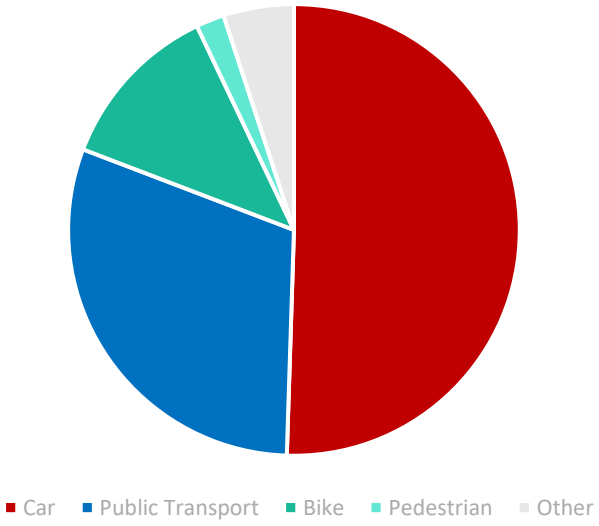


Figure 10: Modal split commuting Transport Region Antwerp, 2020
Source: Transport Region Flanders

In addition to the focus on improving the modal shift of commuters, the Port of Antwerp is simultaneously focusing on the sustainable organisation of freight transport to, from and within the port. By 2030, the port of Antwerp is aiming to bring about a modal shift from road transport to modes of transport that put less strain on the roads. With a modal shift in favour of rail, inland navigation and pipelines, among others, they can avoid increasing road congestion. The further expansion of night logistics is one of the solutions for coping with peaks in container transport at terminals and by road. Port of Antwerp also encourages parties in the hinterland to introduce night-time opening and make maximum use of the opportunities created in the port area. Figure 11 represents the modal split and modal split ambitions of the port of Antwerp.

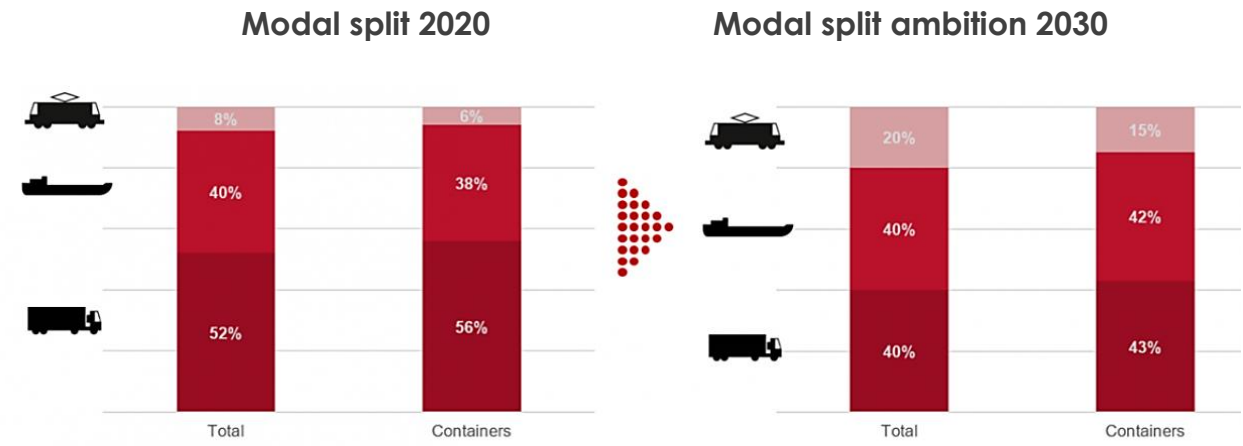


Figure 11: Modal split and modal split ambitions freight transport
Source: https://www.provincieantwerpen.be, consulted 03/11/2021

2.1.3.2 *Infrastructure and services*

When describing the mobility infrastructure and services of the Transport region of Antwerp, the large infrastructure and mobility network solely of the city of Antwerp easily takes the spotlight. However, merely focusing on the city of Antwerp would exclude not only specific mobility infrastructure but especially mobility-related issues within the Transport Region Antwerp, e.g., the flight of cut-through traffic to local roads and villages when there is too much pressure on the highways.

The Antwerp Transport Region is strategically located on important water, rail and motorways from the north (The Netherlands) to the south (France) and from the east (Germany) to the west (Ghent, Bruges and the United Kingdom). The transport region includes both international motorways (such as A12, E313, E17, E19), important waterways (such as the Albert Canal, Scheldt, Rupel, Kempische kanalen), as well as locally relevant regional roads (such as N1, N171, N115, N11).

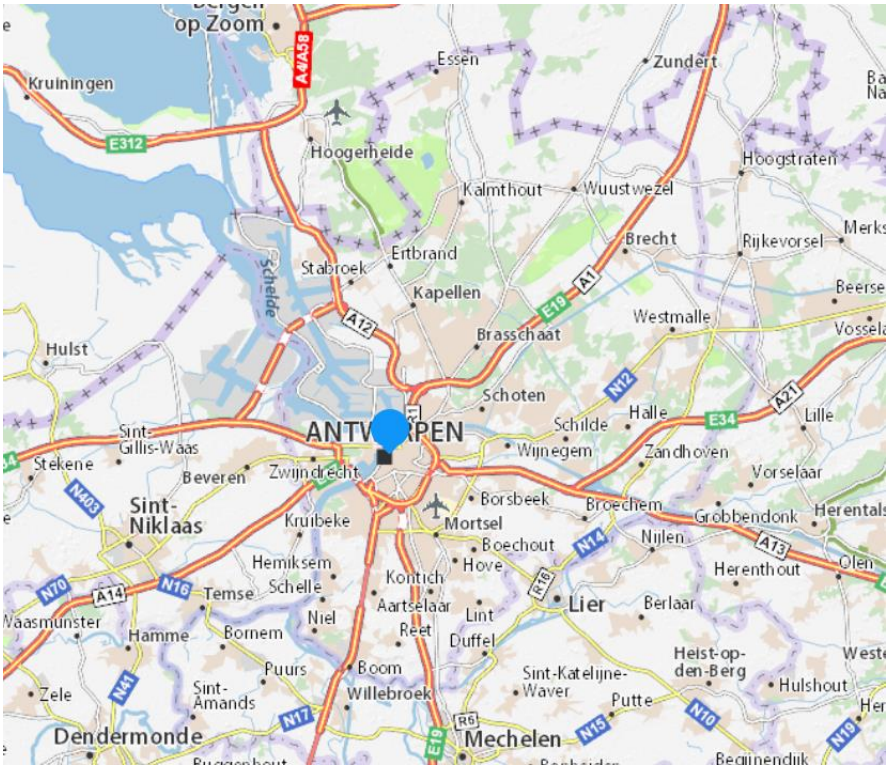


Figure 12: Important traffic roads in and near the Transport Region
Source: ViaMichilin.be

This strategic location results in the Antwerp Transport Region being in the midst of a large number of logistics flows. Bearing in mind the booming economy, it is clear that the transport region is home to a high amount of incoming employee mobility during their commute. This fast-growing road traffic causes the road network to become increasingly congested, meaning traffic diverts to underlying roads and causes insecurity and nuisance there. The most recent data from the Flemish Traffic Centre show that the local traffic congestion is structurally increasing because of the oversaturation of large parts of the Flemish motorway network.

Those (inter)national roadways are connected with a six-lane motorway bypass which encircles large parts of the city of Antwerp. This connection is known locally as the 'ring'. In 2016, after a long intensive process of co-creation involving citizens and many stakeholders, the Flemish government and the city of Antwerp decided on covering parts of this ring road within the ambitious project "*the Big Link*". In addition to covering the ring, this ambitious project also creates new green spaces for communities and a more cohesive and connected city. Additionally, the city of Antwerp also implemented a Low Emission Zone (LEZ) on February 1st 2017. Those LEZ-rules are regularly adjusted and tightened.

Apart from the roadways, the city of Antwerp is also well-connected railroad-wise. Antwerp is the focus of train lines to the north to Essen and the Netherlands, east to Turnhout, south to Mechelen, Brussels and Charleroi, and southwest to Ghent and Ostend. It is served by international trains to Amsterdam and Paris, and national trains to the biggest Belgian cities. The city has an extended web of tram and bus lines operated by De Lijn and provides access to the city centre, suburbs and the Left Bank. The tram network has 12 lines, of which the underground section is called the "premetro" and includes a tunnel under the river. Other regions within the transport region however show (strong) potential for the improvement of public transport. The Transport region has expressed the ambition within their Roadmap 2030 to improve the public transport connection, especially those to and from the city of Antwerp.

A small airport, Antwerp International Airport, is located in the district of Deurne, with passenger service to various European destinations. A bus service connects the airport to the city centre.

The river Scheldt flows right through the City and is the backbone for the Port of Antwerp. It is a major barrier for all traffic to, from and through the city and the port. Especially for cyclists and pedestrians, the travel distance to cross the river is a major barrier.

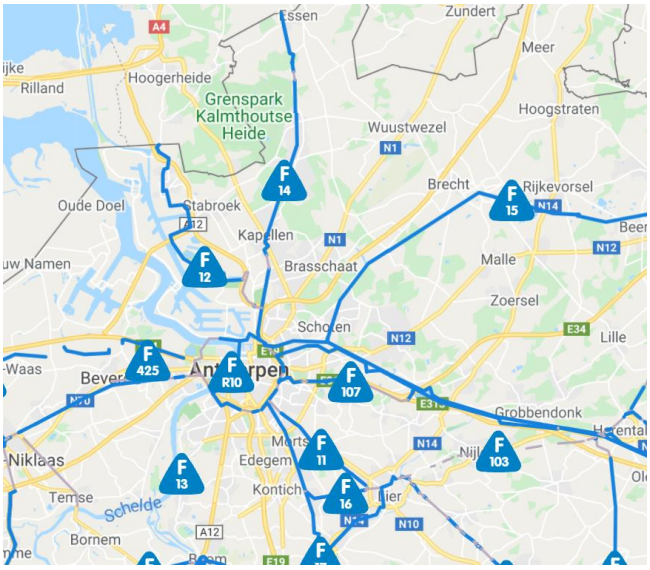


Figure 13: Cycle Highways within the Transport Region
Source: Fietssnelwegen

Lastly, the cycle infrastructure within the region is well-developed, although there is still potential for improvement. The most relevant cycle infrastructure is the cycle highway network, locally known as the *fietsostrades*. Figure 13 shows the cycle highways in the Transport Region Antwerp. The cycle highway network has the ambition to guide cyclists safely and comfortably to the mobility hubs, their homes and workplaces. The current network has several missing links, unsafe crossings and not all tracks have the same level of high-quality infrastructure.

2.1.3.3 Mobility management and traffic management initiatives

The largest mobility management and traffic management initiative within the transport region is Smart Ways to Antwerp, a large mobility and communication project of the city of Antwerp which aims to keep the city accessible by a modal shift. Smart Ways to Antwerp does this through concrete company support from mobility experts within the Smart Ways to Antwerp team, as well as with concrete projects for the inhabitants of Antwerp as well as the employees travelling to Antwerp: The route planner, the mobility map, communication on current road works etc.

While Smart Ways to Antwerp might be a project of the city Antwerp, because it is aimed at everyone travelling to Antwerp, this project has an impact on the inhabitants and the mobility of the transport region as well. In addition, Smart Ways to Antwerp tries to discourage using local roads to avoid congestion within their mobility advice and therefore reduces the traffic pressure on local roads.

A second relevant traffic monitoring system is the earlier mentioned LEZ-zone, in which over-polluting cars are banned from the city. This LEZ-zone covers the complete city of Antwerp. The zone is monitored by ANPR cameras, cameras that automatically recognize license plates.

A third important traffic monitoring initiative is the Traffic computer Antwerp. In the coming years, the Traffic Light Coordination Computer (VLCC) will gradually take over the control of 373 traffic lights in and around Antwerp. These new traffic light controls make road traffic safer and more efficient. The entire renovation operation must be completed by 2025.

2.1.3.4 Transport related communication with the public, e.g. fora, citizens' panels

The finalization of 'the ring' and more importantly the related discussions, formed the basis of a thorough participation process in which citizen organisations like Ringland, Ademloos en stRaten-generaal worked together with the city of Antwerp and the Flemish government to create a realistic solution for the city and an environment that takes into account the health of its citizens.

In 2017, the **Treaty of the Future** was signed between the city, the Flemish government and the civic movements setting out the principles for the ring road project: an inner ring road for the city (local traffic), a cap on top of the ring road, a modal split of 50/50 by 2030, a more northerly located ring road for traffic related to

the Port activities and/ or passing through and solid cooperation between all stakeholders (local, regional, national governments, infrastructure planners, Port, public transport (PT) operators, civic movements and others) involved. The name for this project was: **The Big Link.**

This whole process became one of the biggest examples of citizens' involvement and even today, the relevant stakeholders such as the civic movements (stRaten-generaal, Ademloos and Ringland) are involved.

2.1.3.5 Goods and freight movements: infrastructure and services

As mentioned earlier, the transport region of Antwerp plays an important role in freight transport. The port of Antwerp, as well as Antwerpen-Noord, play an important role here.

About 900 private enterprises are active on the so-called superstructure e.g., the terminals in the **Port of Antwerp**. This refers to big (petro)chemical industry complexes, container terminals and big transit warehouses, but also small-scale ship agencies. These companies not only load and unload vessels but also store goods, process and transport them further into Europe. In 2021, the Port of Antwerp provided 144 183 jobs and handled a total freight of approximately 235 million tonnes.

The Port of Antwerp also forms an important centre in the Western European pipelines. There are 1 000 kilometres of pipelines in the port for the transport of fluid goods from the petrochemical industry. The pipelines connect with the German and Dutch ethylene chemical industry (ARG-net) and connect to Rotterdam, Terneuzen, Feluy and Rhine-Ruhr area.

The transport region is also home to **Antwerpen-Noord**, the largest classification yard for freight in Belgium and the second largest in Europe. The majority of freight trains in Belgium depart from or arrive here. It has two classification humps and over a hundred tracks.

2.2. Madrid

2.2.1. General characteristics of the urban node

2.2.1.1 *Geography and population*

Madrid is the capital and most populous city of Spain. The city has 3 334 730 inhabitants as of 2020 of which 1 553 899 are men and 1 780 831 women. 88% of the population is Spanish, with a 12% of foreigners as of 2017. The metropolitan area has a population of approximately 6.7 million. The following graph shows the population of the city of Madrid per age group and gender as of 2020.

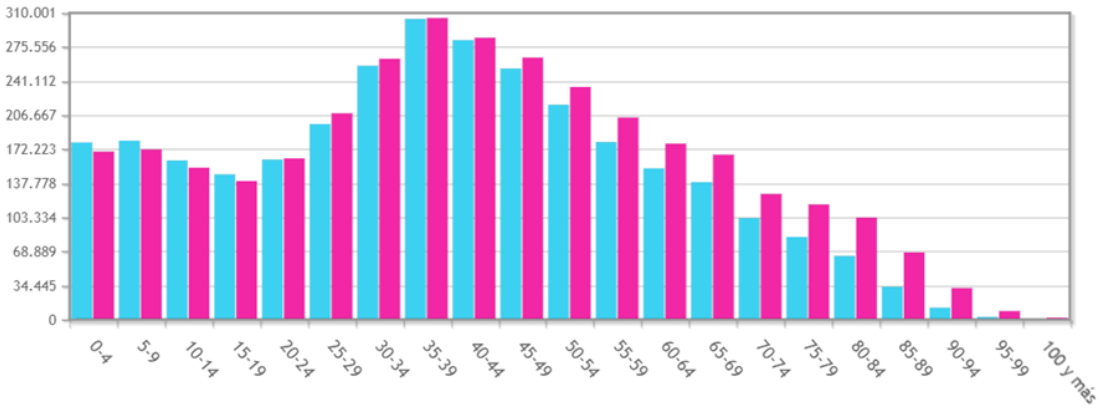


Figure 14: Population of Madrid (2020) by age group and gender (INE)

For the last 10 years the city has suffered a rise in population, as can be seen in the following graph:

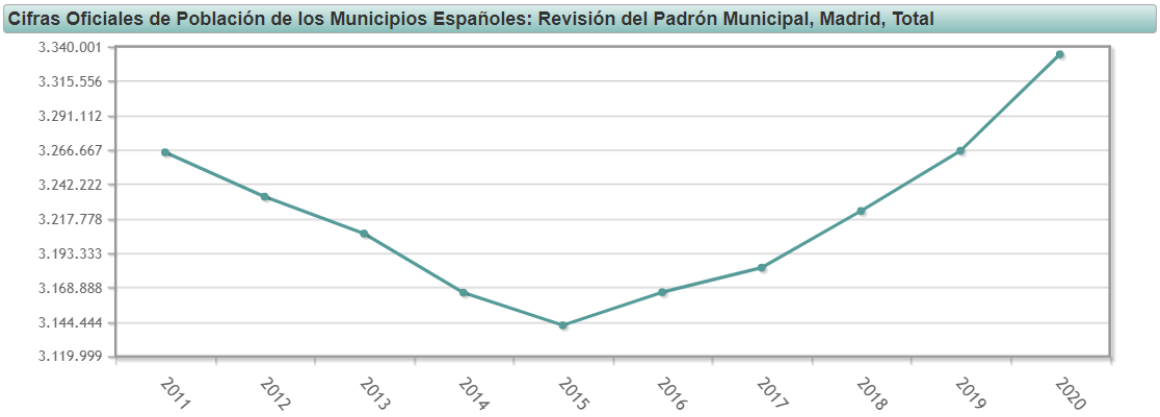


Figure 15: Madrid City Population evolution of the last 10 years (INE)

It is the second-largest city in the European Union (EU), surpassed only by London and Berlin. Its monocentric metropolitan area is the second-largest in the EU. The municipality covers 604.45 km2 geographical area.

Figure 16: Community of Madrid

The Madrid metropolitan area has an estimated population of 6 321 398 people and covers an area of 5 335.97 square kilometres. As with many metropolitan areas of similar size, two distinct zones of urbanisation can be distinguished:

- Inner ring (primera corona): Alcorcón, Leganés, Getafe, Móstoles, Fuenlabrada, Coslada, Alcobendas, Pozuelo de Alarcón, San Fernando de Henares.
- Outer ring (segunda corona): Villaviciosa de Odón, Parla, Pinto, Valdemoro, Rivas-Vaciamadrid, Torrejón de Ardoz, Alcalá de Henares, San Sebastián de los Reyes, Tres Cantos, Las Rozas de Madrid, Majadahonda, Boadilla del Monte, Collado Villalba.

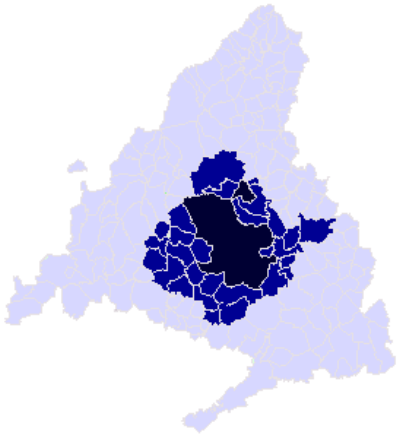


Figure 17: Functional Urban Area of Madrid

The following graph shows the evolution of population in the whole region during the past 10 years. As can be seen, after a drop in 2014 and 2015, the population is on the rise for the last several years.

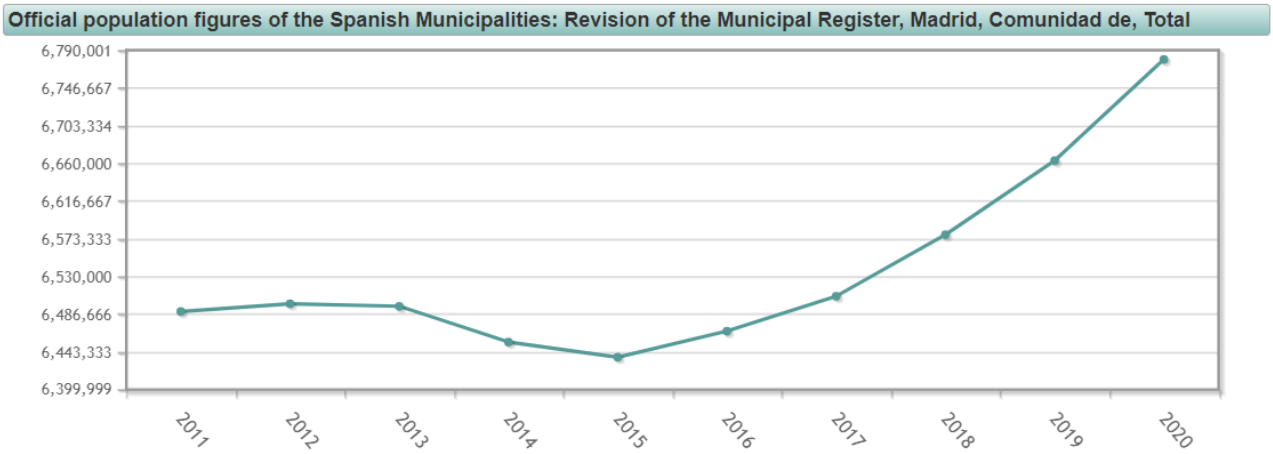


Figure 18: Madrid Region population evolution of the past 10 years (INE)

Madrid City is administratively divided into 21 districts, which are further subdivided into 131 neighbourhoods. This is detailed further in Section 2.2.1.1.

Figure 19: Madrid's 21 districts

Madrid is also part of The Trans-European Transport Network (TEN-T), a planned network of roads, railways, airports, and water infrastructure in the European Union. Specifically, it is part of the 2 following Core Networks: The Mediterranean Corridor (in green) and the Atlantic Corridor (in yellow), as seen in the following map.

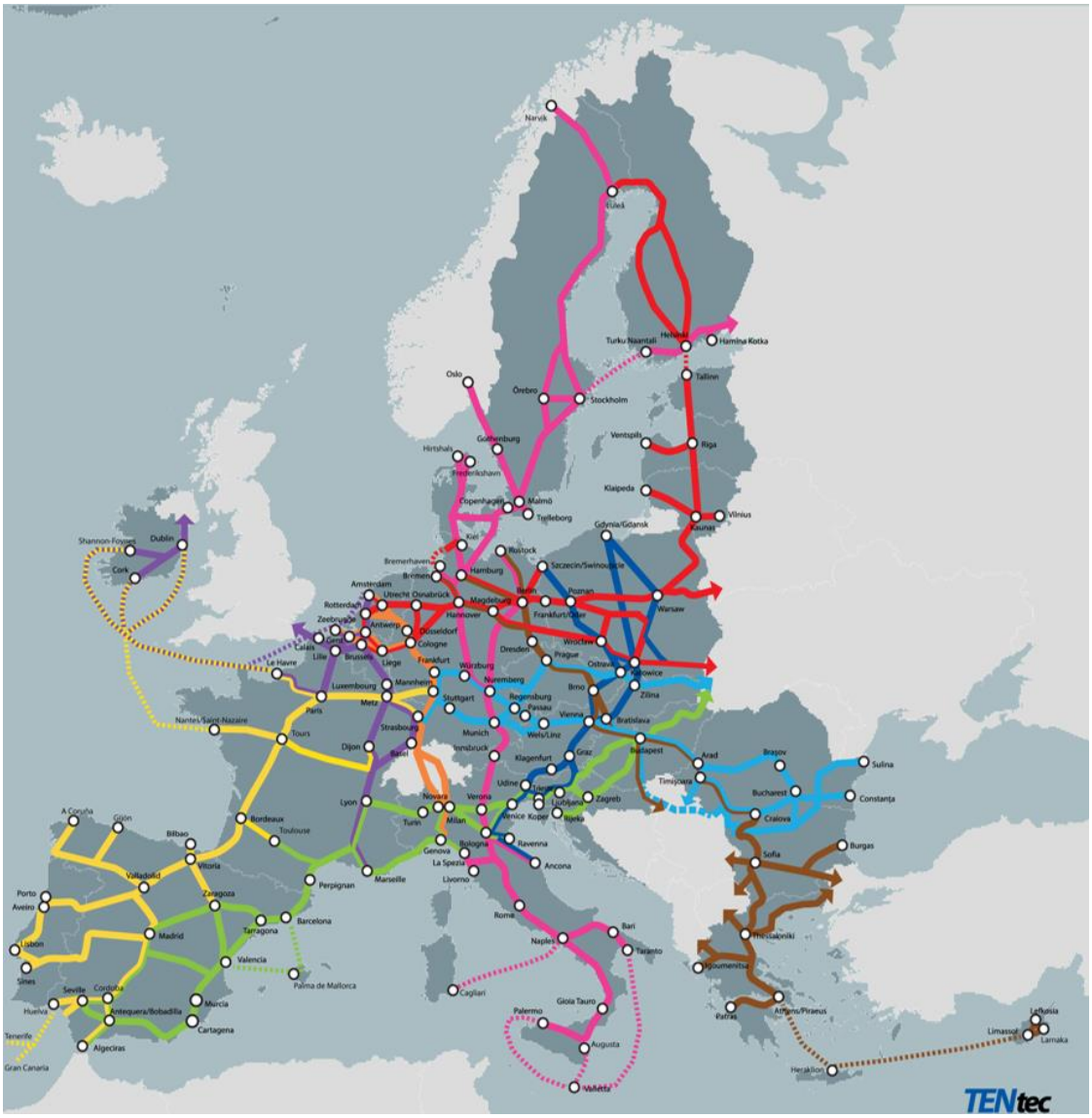


Figure 20: TEN-T Core Networks

2.2.1.2 Governance and policy

The City Council (Ayuntamiento de Madrid) is the body responsible for the government and administration of the municipality. It is formed by the Plenary (Pleno), the Mayor (alcalde) and the Government Board (Junta de Gobierno de la Ciudad de Madrid). Madrid is administratively divided into 21 districts, which are further subdivided into 131 neighbourhoods (barrios). Each district has the following population:

01. Centro	141 236
02. Arganzuela	154 243
03. Retiro	118 557
04. Salamanca	146 016
05. Chamartín	145 700
06. Tetuán	159 849
07. Chamberí	138 667
08. Fuencarral-El Pardo	247 692
09. Moncloa-Aravaca	120 834
10. Latina	240 155
11. Carabanchel	258 633
12. Usera	142 454
13. Puente de Vallecas	239 057
14. Moratalaz	93 810
15. Ciudad Lineal	216 818
16. Hortaleza	193 228
17. Villaverde	154 808
18. Villa de Vallecas	114 733
19. Vicálvaro	75 485
20. San Blas-Canillejas	160 258
21. Barajas	50 077

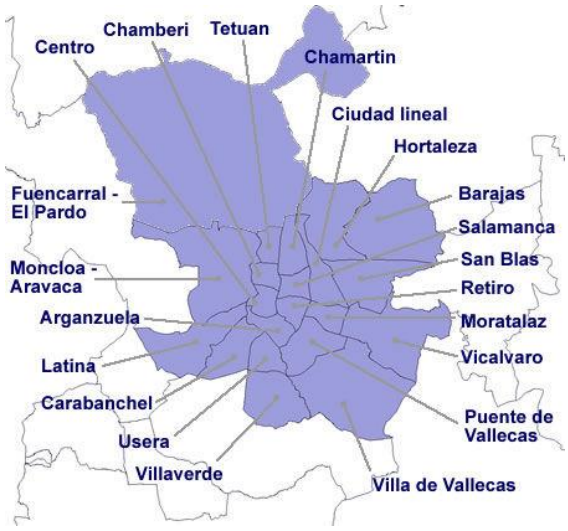


Figure 21: Madrid's districts

At National level, the Spanish Government has recently drafted (May 2020) the first Climate Change and Energy Transition Law to achieve carbon neutrality by 2050, aligned with the EU Green Deal. The Law underlines the role of cities in achieving the Climate objectives, thereby favouring the creation of more liveable and healthy spaces, with improved air quality. In this sense, it establishes that the municipalities with more than 50 000 inhabitants and the island territories will introduce, in urban planning, mitigation measures that allow reducing emissions from mobility, including the implementation of low-emission zones no later than from 2023; it includes also the request of implementing actions to facilitate travel on foot, by bicycle or other means of active transport; and the improvement and promotion of the use of the public transport network. Shared electric mobility and the use of private electric means or transport should also be promoted.

At Regional Level, Madrid Regional Government (Comunidad de Madrid) has the Air Quality and Climate Change Strategy, so-called "Plan Azul +", in line with the Sustainable Development Goals set by the European Union. This plan includes measures to be applied in several sectors. Regarding transport, the aim is to help

the decarbonization of transport to achieve zero emissions, thus complying with the international agenda set by the Paris Agreements and the European Commission for 2050. The strategies are divided in five main areas: Less polluting technology and fuels, providing alternatives to private vehicles, alternative public transport modes, freight and goods distribution, and measures related to the airport.

Also at Regional level, the main strategic mobility framework is the one set by the Sustainable Mobility Strategic Plan of the Madrid Region which details measures that will be developed in terms of more than 200 programmes, fed by the latest Mobility Household survey with data from 2018.

At city level, there are three main strategic frameworks for mobility:

- The first one is the new sustainability strategy "Madrid360", implemented in March 2021(which also includes objectives for Empresa Municipal de Transportes de Madrid (EMT) the public transport operator owned by the city). This strategy will substitute the former Air Quality and Climate Change plan (so called "plan A"), and aims to be the tool with which the Madrid City Council will definitely comply with the air quality limits established in Directive 2008/50 / EC of the European Parliament and of the Council of May 21, 2008. Madrid360 addresses air quality through three axes: transforming the city, mobility and administration, and focusing on six strategic lines: a sustainable Madrid; an efficient Madrid; an intelligent Madrid; a global Madrid; a healthy Madrid, and an accessible Madrid. Among some of the targets we could point out those specific to electric mobility, such as reaching a network of 150 fast charging points by 2023 (today there are 45) or reaching a full electric bus fleet of 1/3rd (668 buses out of 2076) by 2027 (today, there are 85).
- The second one is New Madrid 360 Sustainable Strategy, implemented in September 2021. This plan develops the strategic mobility lines set out in Madrid 360 strategy with a timeframe of 12 years (2013-2025). Madrid 360 SUMP will set ambitious Safety, Health and Sustainability targets for 2030 and include more than 200 programmes comprising 12 measures to increase the share for sustainable modes (public transport, walking and cycling) up to 65%, tying neatly with the Strategic plan for the Madrid Region.
- Last but not least, Madrid City Council is also working on the new Road Safety Plan, included in Article 9 of Madrid 360 Strategy. The current one has the horizon up to 2020.

2.2.1.3 Employment

In terms of employment, Madrid region is also the Spanish number one generator, with 3 174 500 jobs and 157 000 companies registered (official headquarters). In the last quarter of 2019, Madrid region generated 85% of all new jobs created in Spain. However, COVID-19 has had a significant impact in unemployment rates in 2020, as can be seen in the table below. Nonetheless, as shown in Figure 22, it is recovering quicker in the region of Madrid than in the whole of Spain.

Table 1: Madrid employment (in percentage of working age population)

	Both sexes
	National Total
2021QIII	
Activity rate	59.14
Unemployment rate	14.57
Employment rate	50;52
2021QII	
Activity rate	58.58
Unemployment rate	15.26
Employment rate	49.63
2021QI	
Activity rate	57.69
Unemployment rate	15.98
Employment rate	48.47
2020 QIV	
Activity rate	58.19
Unemployment rate	16.13
Employment rate	48.81
2020 QIII	
Activity rate	57.83
Unemployment rate	16.26
Employment rate	48.43
2020 QII	
Activity rate	55.54
Unemployment rate	15.33
Employment rate	47.03
2020 QI	
Activity rate	58.18
Unemployment rate	14.41
Employment rate	49.80

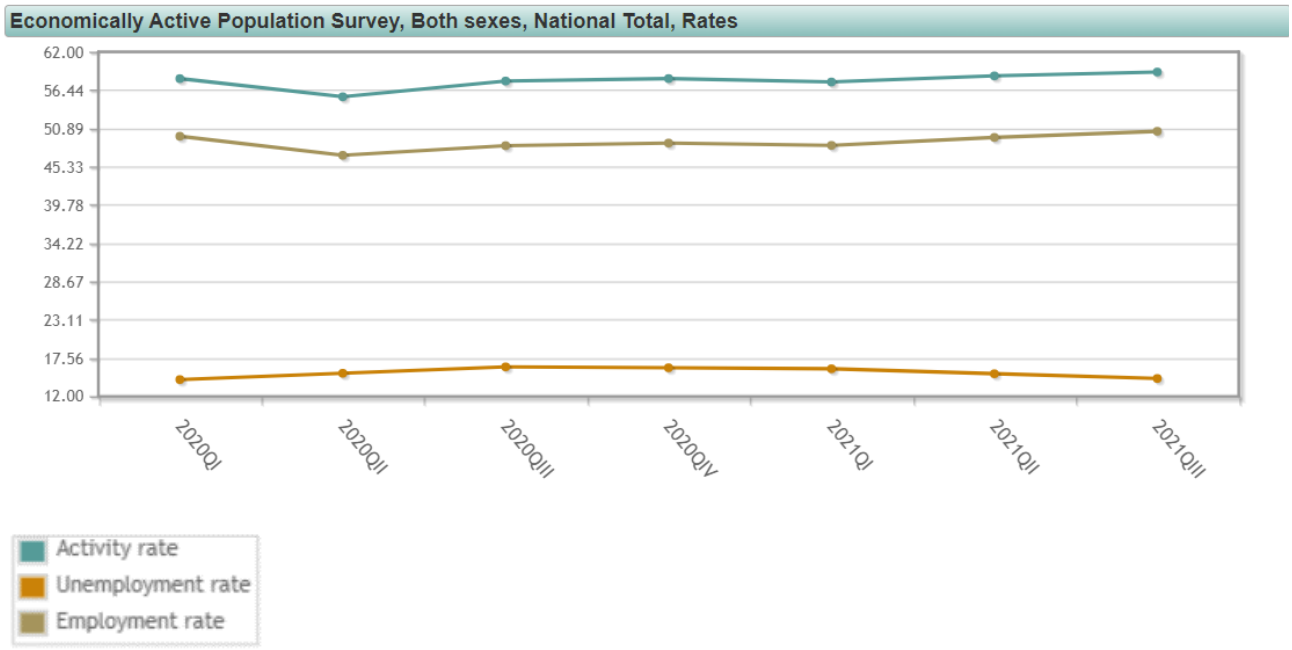


Figure 22: Employment rates Madrid by quarter in percentage (%) of working age population (INE)

The economy of Madrid has become increasingly based on the service sector. In 2011 services accounted for 85.9% of value added, while industry contributed 7.9% and construction 6.1%. Services to business, transport & communications, property & financial together account for 52% of total value added.

The GDP of the metropolitan area of Madrid was estimated to be 189 billion euros in 2009 and represents over 90% of the GDP of the region of Madrid. The GDP per capita was 37 758 euros in the metropolitan area while it reached 30 453 euros for the Madrid region. The city of Madrid had a GDP of €124 780M in 2011. GDP per capita in 2011 was 74% above the national GDP per capita average and 70% above that of the 27 European Union member states. In comparison to the remainder of the Madrid region, the city is also substantially richer: although housing just over 50% of the Community of Madrid's population, it generates 65.9% of its GDP.

2.2.2. Challenges in relation to the SCALE-UP project

The overall mobility structure of Madrid was analysed to foster Madrid 360. Four areas of study were selected, two relating to public transport and two to private vehicle use:

- Public transport
  - Demand: There has been a 13% rise in demand for public transport in the city during the last 4 years (see Figure 23).
  - Infrastructure: Currently there are 269.5 km of Metro lines and 3834.5 km of bus lines. However, taking into account the rise in public transport demand it is of vital importance to study if the current infrastructure can take more users.

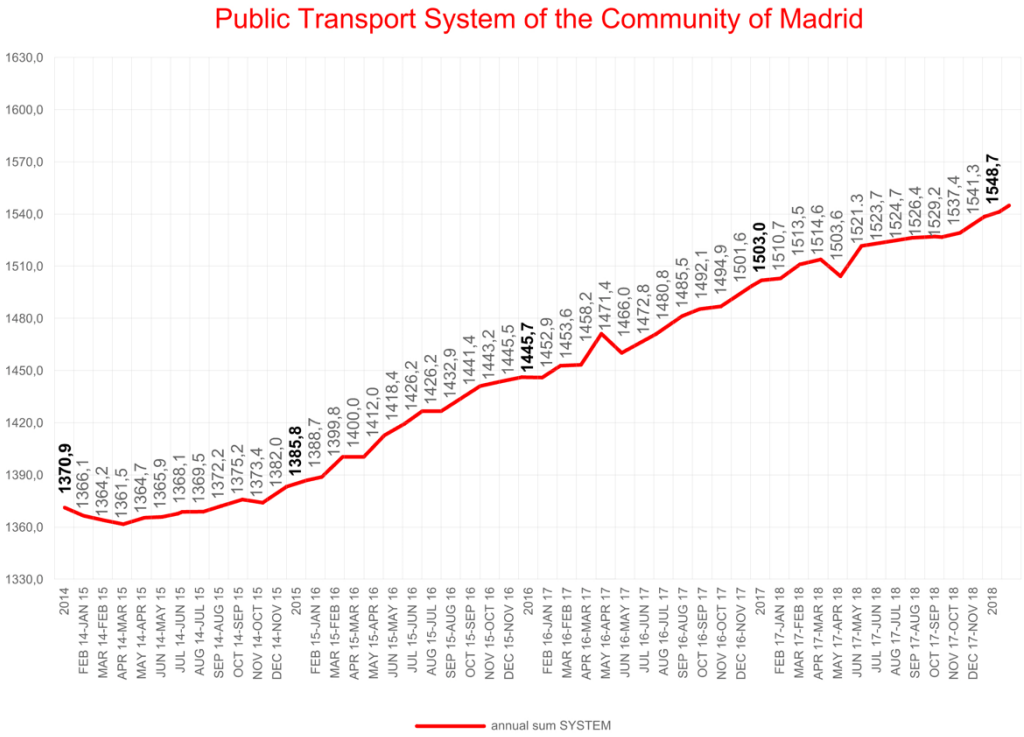


Figure 23: Rise in public transport demand. Madrid City Council

- Private vehicle:
  - Average Daily Traffic: There has been a fall in average daily traffic, more notable in the areas nearer the city centre.
  - Number of private vehicles: There has been a reduction in vehicle ownership, except for motorcycles which have seen a 25.4% rise.

In the last five years, a revolution has been initiated in urban mobility. And that is just the beginning. From a city where the car was the king, we must evolve to a city that truly focuses on people, on the citizens, and with a new, more sustainable mobility model. New possibilities, new initiatives by established actors in mobility, new initiatives by large companies from sectors that are also involved in defining this new mobility model (energy, infrastructures, technology companies, financial institutions, insurers), start-ups… And challenges, many challenges: technological, social, business-related, regulatory…

Madrid is one of the European cities that is most decisively embracing this innovative effort for change. To be sure, one of its great advantages is the large number of major companies that are based in the city: 72% of important Spanish companies are based in Madrid, many of them with something to say in the future of the new sustainable urban mobility. Madrid is a privileged scenario for encouraging collaboration between corporations, public administrations, start-ups and citizens to jointly define the new paradigm of urban mobility.

Madrid 360 sustainable mobility strategy has identified the major problems in several thematic groups regarding sustainable mobility, which are briefly mentioned in the following list:

1. Pedestrians: Some of the main issues detected are a bad connectivity with the outer M30, insufficient pedestrian space in some areas and a lack of information and data regarding pedestrians, considering they make up 29% of the modal split on an average workday.
2. Cycling: Most of the cycle lanes are located outside the M30 ring, meaning that in the centre cyclists are forced to use the roads and streets used by motorized vehicles. Those cycle lanes that do exist are often discontinuous and have obstacles. It is not one of the preferred modes of transport by citizens.
3. Other Modes of Personal Mobility, such as electric scooters: They take up pedestrian space and there is not enough data available regarding demand and offer to study them in further detail.
4. Public Transport: It is slower than other modes of transport and concentrated mainly in the inner M30.
5. Carsharing and carpooling: Shared vehicles are becoming increasingly popular, and are having an impact on the use of private vehicles and public transport. However, they are not available in the whole of the city yet.
6. Private vehicles: There is a car per 5 inhabitants at the moment in Madrid. Although there has been a fall in the Average Daily Traffic it must be noted that most of these vehicles run on traditional fuels such as petrol and diesel.
7. Electromobility: There is a lack of public charging points or plugs and only 0.1% of the total taxis are electric.

8. Smart mobility: A strategic plan is needed to promote smart mobility. It is important that different platforms and apps are unified in order to provide a better service regarding Mobility as a Service. The City Council should invest and promote this sort of initiatives more.
9. Goods and freight distribution: Lack of parking space, unclear planning and high emissions are some of the main issues.

2.2.3. Key mobility elements

2.2.3.1 Modal split and ambitions for modal split

As mentioned before, Madrid is, by population, the third-largest city in Europe, with 3 334 730 inhabitants. If we look back to 1950, its population was then 1 553 338 inhabitants. In other words, the city's population has doubled over this period.

The following graphs (Encuesta Domiciliaria de Madrid 2018) show the modal split depending on the area, from the inner M30 to the whole of the region of Madrid; green represents pedestrians; red, public transport; blue, private vehicle and grey other modes of transport.

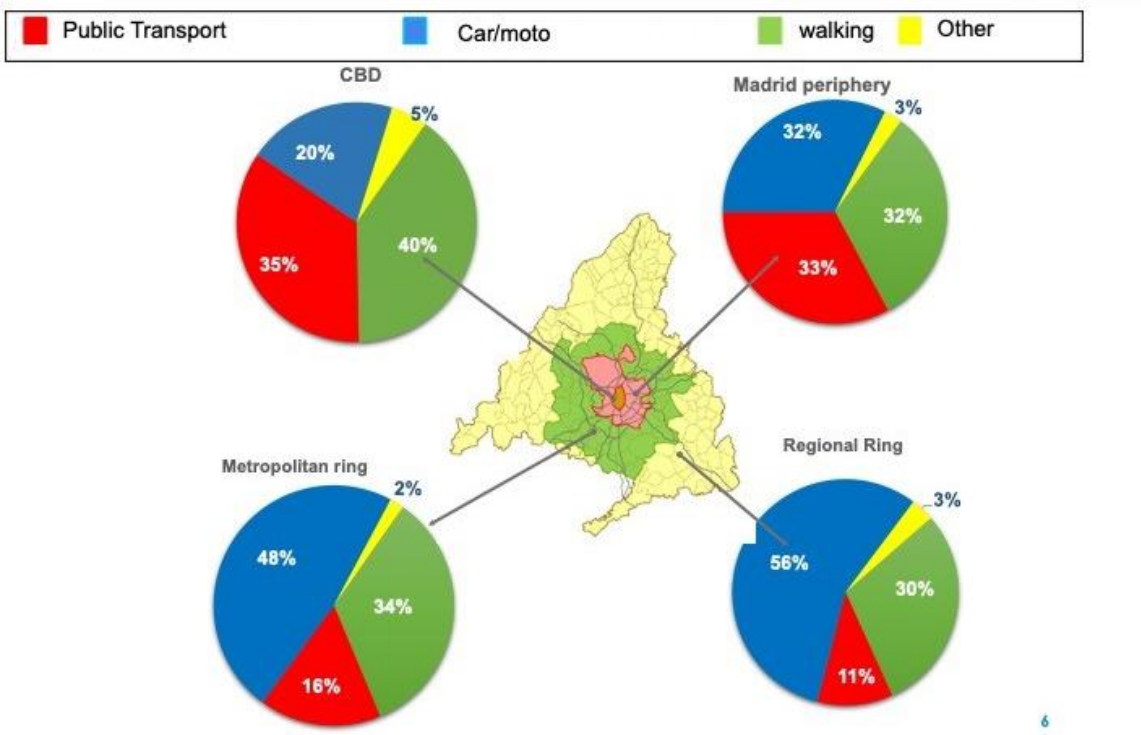


Figure 24: Madrid´s modal split

Other modes of transport involve the use of motorcycles (blue), taxi and VTC[8] (yellow), bicycles (light green), bus (green), trains (red) and other (grey):

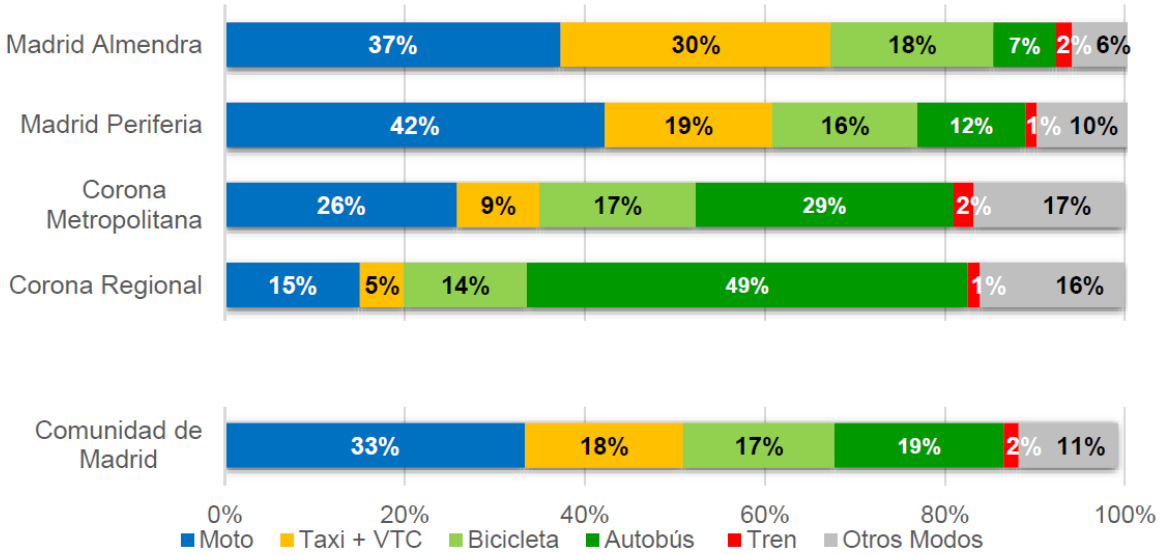


Figure 25: Detailed modal split of other modes of transport in the different areas of Madrid

In summary, there have historically been mainly two options, either a private vehicle (car, motorcycle) or public transport (buses, suburban trains, metro, taxi). This urban mobility model has remained fundamentally unchanged for almost 100 years. The increase in population has been reflected in the growth of the private car fleet and in the enlargement of the public transport system. Technological advances have led to offering users better-quality, more comfortable, and safer vehicles.

New digital technologies and the digitization of society have come into play, as well as new social trends in how we understand and consume mobility and new and urgent environmental needs. These diverse forces are together driving a momentous shift in the paradigm of sustainable urban mobility. In the last five years alone, shared mobility services without a fixed base have proliferated in the city. Now, in addition to traditional options, everyone has available a broad range of possibilities for moving around the city: car sharing (Car2Go, Emov, Zity, Wible), ridesharing cars (Cabify, Uber, Bolt), motorcycle sharing (eCooltra, Muving, Movo, IoScoot, COUP), BiciMad public service bicycles or shared bicycle companies (Ofo, oBike, Donkey Republic, Mobike), scooters from among the 18 companies to which

[8] Vehículo de Turismo con Conductor

licences have been granted… more vehicles, more mobility services are available to us. At any given time, we can choose the mode of transport that we believe is the most convenient and pay only for its use. This is the MaaS model, Mobility as a Service, more personalized, more sustainable (electric vehicles) and digital: all of them can be accessed via an app.

Digitization is also propitiating the emergence of all kinds of urban-mobility-related digital services, whether these be initiatives by established companies or by start-ups. From applications that make it easier for us to find a free parking space to apps that integrate all available mobility options to show the user the different possible alternatives to move from point A to point B within the city, such as for example the EMT Maas Madrid app or the Wondo app by Ferrovial.

In parallel, Madrid City Hall is expanding the cycle lane network and the BiciMad bicycle fleet and stations, it is increasing the infrastructure of charging points for electric vehicles, it is introducing zero-emission buses and has implemented the Madrid 360 initiative. All these actions are being taken with the ultimate major goal of reducing emissions in the city.

The ambitions regarding the modal split of the Consorcio Regional de Transportes Madrid (CRTM) are focused on increasing the use of PT by at least 10% by 2025 (see Figure 26).

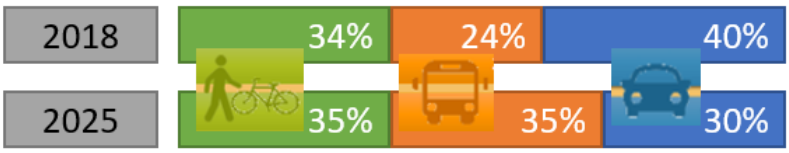


Figure 26: Modal Split ambitions according to CRTM

Aligned with these ambitions the Madrid 360 strategy has been established as a goal by 2030: a 30% limit for private car use and that at least 85% of trips of less than 2 km to be made with active mobility (by foot, bicycle).

2.2.3.2 *Infrastructure and services*

Infrastructure for cars

The basic structure of the Spanish road network is radial, with its centre in Madrid. There are six main roads: A-1, Madrid-Burgos-Irún; A-2, Madrid-Barcelona-La Junquera; A-3, Madrid-Valencia; A-4, Madrid-Seville; A-5, Madrid-Badajoz and A-6, Madrid-A Coruña as can be seen in Figure 27.

- Accessing by any of the six main roads it is possible to find three successive rings called M-50, M-40 and M-30, which will facilitate access or transit through the capital.
- M-30 is a ring road, with characteristics of a motorway that surrounds the centre of Madrid city. It is 32.5 km long.
- M-40 is a Madrid bypass motorway with a length of 62 km and an average radius of 10.07 km with respect to Puerta del Sol. It is part of the European routes E-5 and E-90.
- M-50 motorway is one of the ring roads of Madrid and its metropolitan area. The highway is 85 km long and forms a horseshoe open to the north, running at an average distance of 135.5 km from Puerta del Sol.

Figure 27: Madrid´s main roads

Public Transport

Mobility in Madrid is characterized by a highly integrated and well-structured multimodal public transport system, which is the result of a set of policies that have promoted the extension of the metro lines and suburban networks, the improvement of bus networks, the construction of transport interchanges and the provision of subsidies for public transport services. Even though, Madrid´s public transport system is the backbone of its mobility system, it is continuously threatened by the ongoing process of suburban sprawl.

In Madrid's Regional Area there is one passenger airport, 2 high-speed train stations, 13 different interchanges (7 of them can be considered as main interchanges and one of them, Méndez Álvaro bus station, is exclusively for long-distance travels), 18 intermodal areas, metro and several roads which connect Madrid with the rest of the TEN-T network. All high-speed train stations, airport, interchanges, intermodal areas are in the city of Madrid.

Figure 28 includes the most representative intermodal points within the city of Madrid (interchanges and multimodal areas), which in turn should be provided with unique public spaces, designed to facilitate pedestrian and public transport movement, and achieve safety, environmental quality, accessibility, design and intermodality.

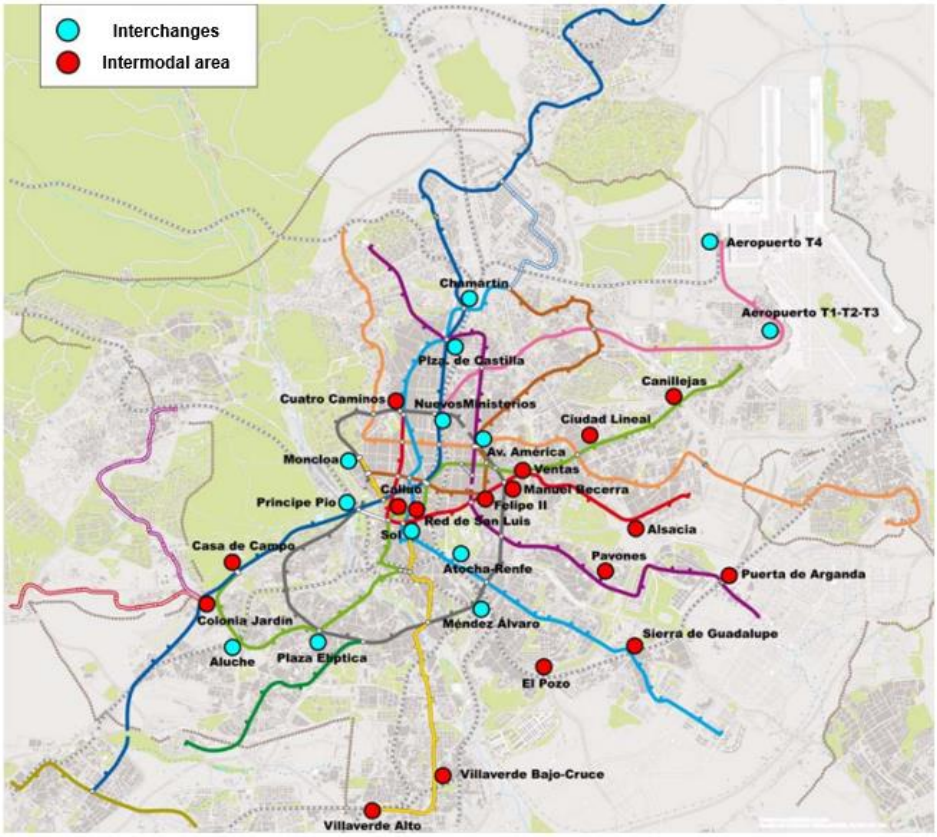


Figure 28: Intermodal points within the city of Madrid (interchanges and multimodal areas)

There are 12 metro lines, 212 bus lines, and 9 suburban train lines:

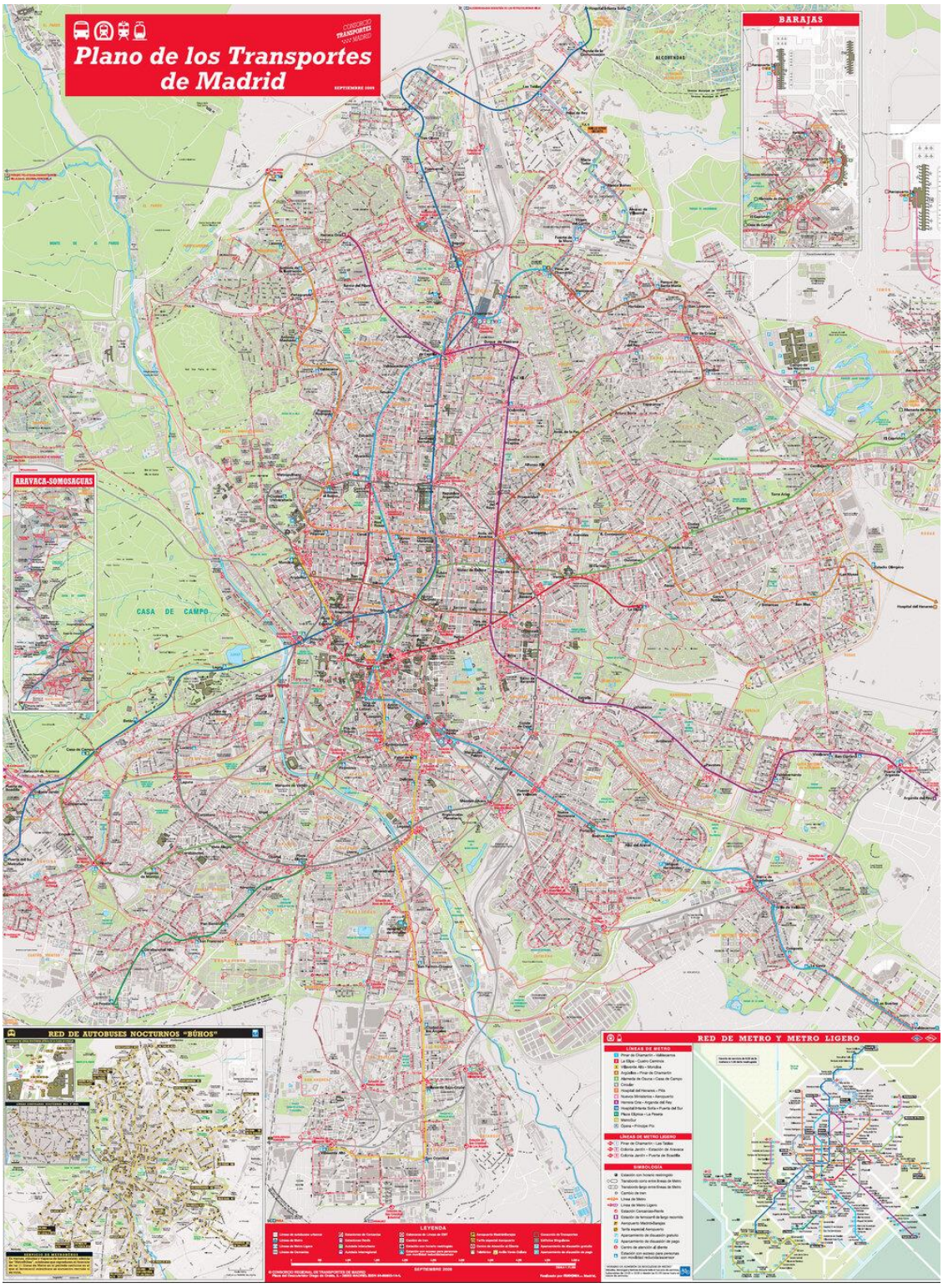


Figure 29: Public transport in Madrid

Metro, light rail and inter urban trains

There are 12 metro lines with a total length of 269,5 km. Ten interurban train lines and 3 light rail lines.

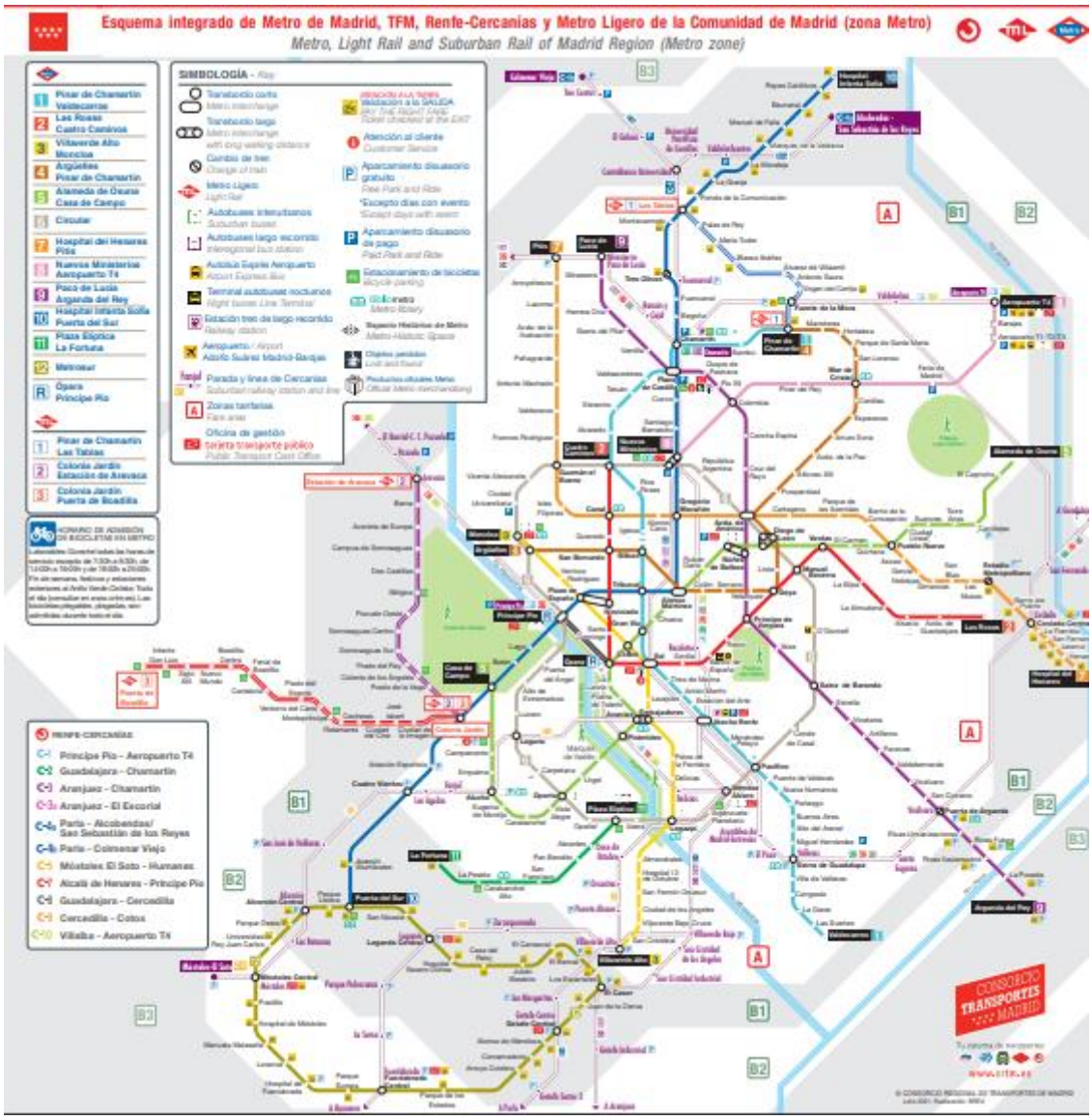


Figure 30: Madrid´s rail network (metro, light train, interurban train)

Table 2: Rail mode characteristics

	Number of lines			Length of the lines (km)			Stops		
	Metro	Ligth rail	Cercanías	Metro	Ligth rail	Cercanías	Metro	Ligth rail	Cercanías
Madrid	12	4	9	288,5	35,8	357,9	242	57	92

Urban and interurban buses

The following tables present in detail the bus network characteristics:

Table 3: Madrid´s bus network characteristics (OMM,2021)

	Number of lines			Length of the lines (km)			Bus stops/lines			Average length of lines		
	Urban buses	Other urban buses	Metropolitan buses	Urban buses	Other urban buses	Metropolitan buses	Urban buses	Other urban buses	Metropolitan buses	Urban buses	Other urban buses	Metropolitan buses
Madrid	211	117	341	3857	1841	19462	11074	4429	17530	18	16	57

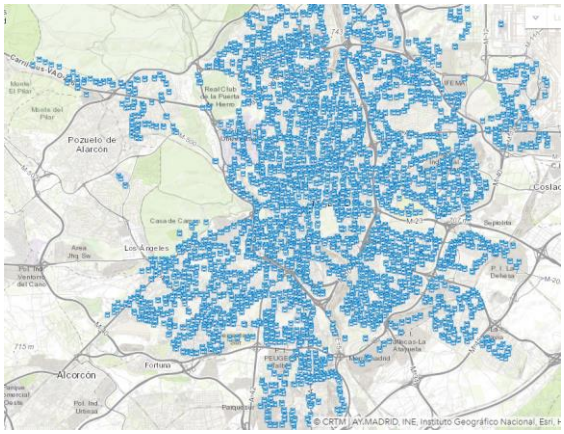


Figure 31: Urban buses network of Madrid city

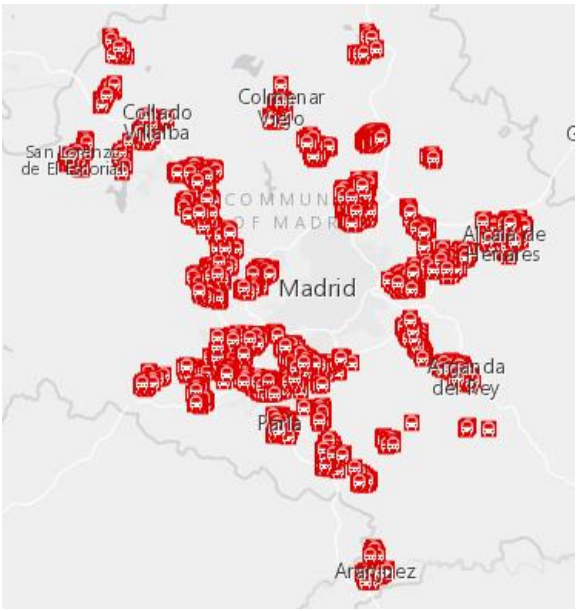


Figure 32: Urban bus network of the Community of Madrid

Table 4: Bus service operators

	Number of public operators			Number of private operators		
	Urban buses	Other urban buses	Metropolitan buses	Urban buses	Other urban buses	Metropolitan buses
Madrid	1	1	0	0	6	27

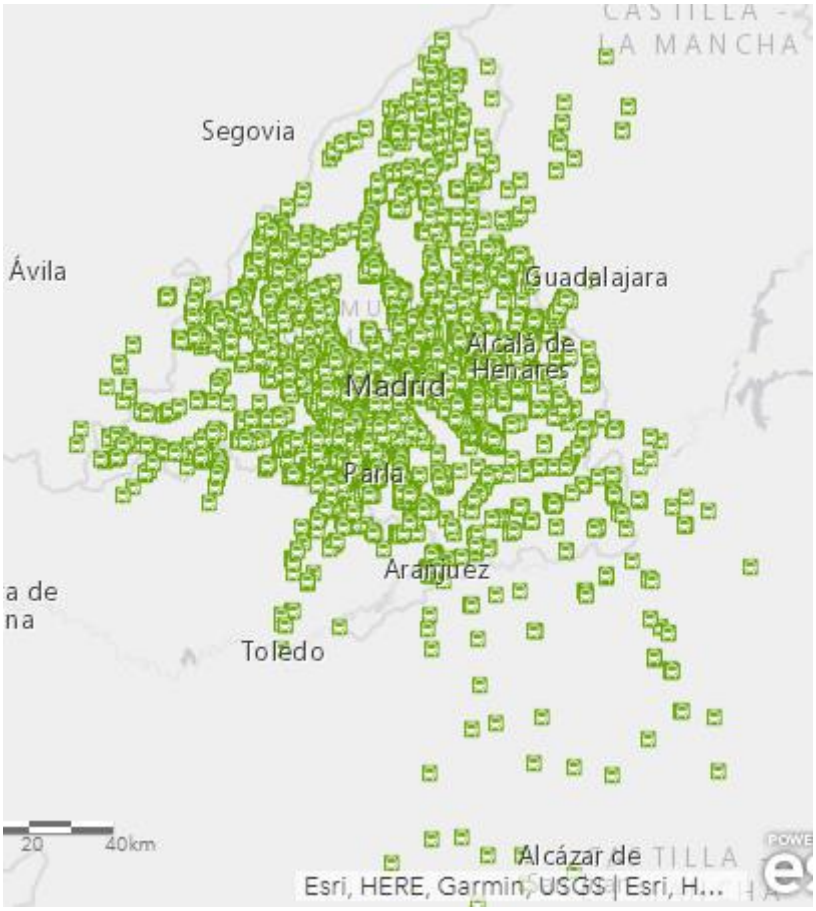


Figure 33: Inter urban buses network of Madrid

Cycling

In Spanish cities, the use of bicycles is still not very significant, when compared to the amount of cycling in other European cities. It should be noted that the interest of local authorities by this mean of transport is increasing, given the multiple benefits that the bicycle has, both at the user level as well as at a social level.

Madrid has 319 km of cycle lanes, 47 km of cycle lanes not segregated from traffic and 243 km of cycle lanes segregated from traffic. Madrid also has a network of green routes connected to public transport presented in Figure 34.

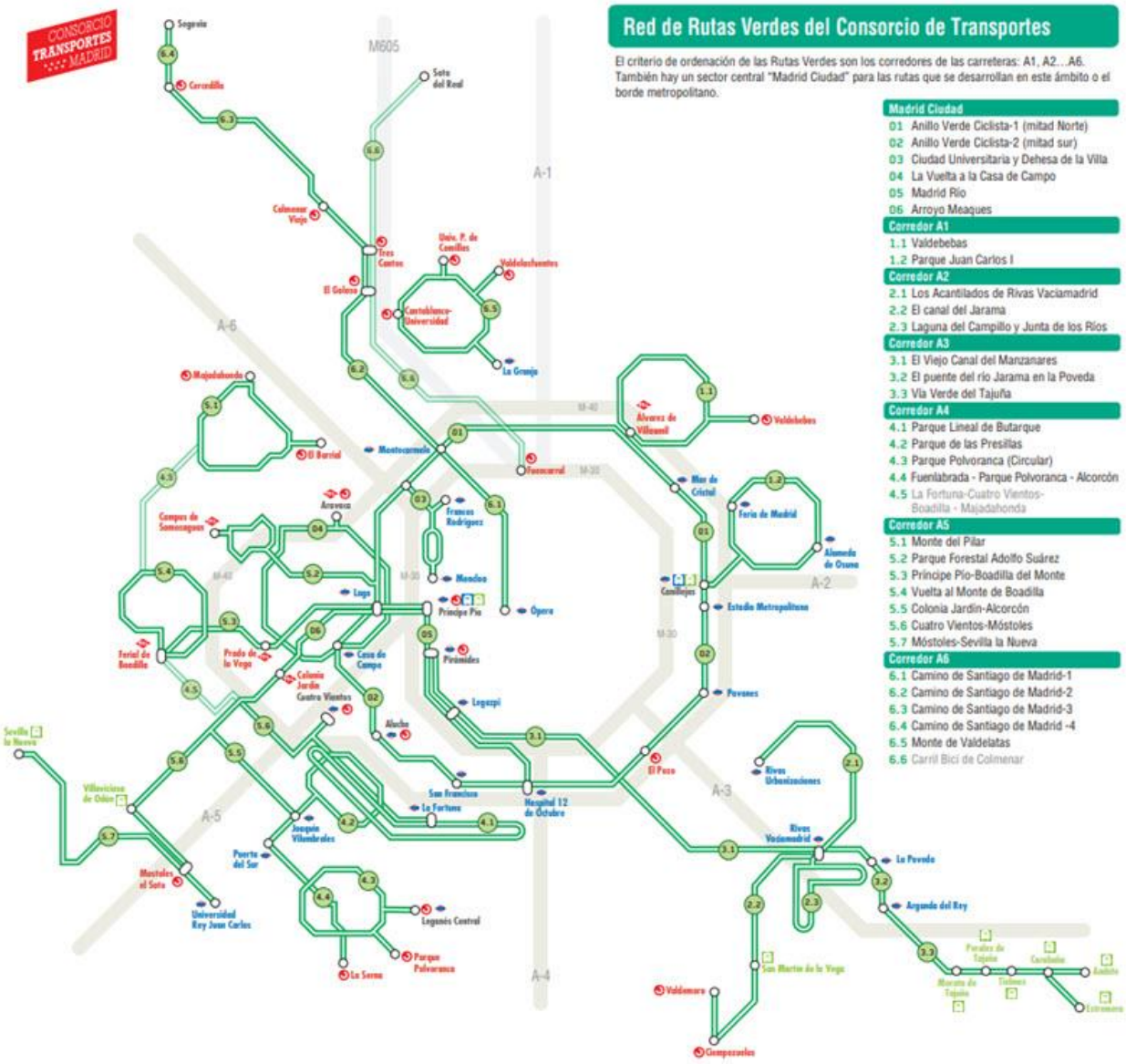


Figure 34: Madrid´s green cycling routes

2.2.3.3 *Mobility management and traffic management initiatives*

Urban mobility is an increasingly complex challenge for the cities and involves many different aspects. An aspect central to the problem is the management of mobility data in the cities. The traditional approach has resulted in data silos implemented and mostly valid only for the city for which they were developed.

In the case of Madrid region, the public transport system is made up of over 40 public and private operators with a wide range of transport services and infrastructures.

The Consorcio Regional de Transportes de Madrid (CRTM) is the single Transport Authority in charge of coordinating all these companies and it establishes the conditions under which services must be provided to clients.

The majority of public transport users are multimodal passengers (over 50%) who need dynamic, timely information at system level, in order to optimize their trips. Other reason that has increased the tendency to multimodality between Madrid PT users has been the implementation of a travel pass which allows users to take any transport mode for the same price. Over 70% of trips with PT is done using this multimodal travel pass. In this context, multimodal information in real-time is an increasing demand to which the CRTM must respond.

In the case of Madrid, CRTM, has taken several steps to tackle these challenges. The main step has been the creation of a Smart Mobility Management Centre, CITRAM. Fully operational from August 2013, CITRAM supervises on real time the public transport system of the whole region. It is a project lead by CRTM in which all the 40 companies involved in PT, have collaborated. CITRAM allows, with an intensive use of Information and Communication Technologies (ICTs), improving coordination and supporting decision making.

An important part of the data management structure of the CITRAM was the development of a multimodal toolkit that integrates all the data from different transport modes in the same platform. This effort goes in line with that of many other cities, trying to harmonize the information available to the transport manager. Moreover, lately there has been an interest from the European Commission to promote this harmonization, as current urban data management systems in the cities have been implemented according to each city's needs and environment.

2.2.3.4 Transport related communication with the public, e.g. fora, citizens' panels

The main channel for information related to public transport is CRTM's webpage www.crtm.es, with over 7.5 million visits in 2017. There is also a CRTM app, called "Mi Transporte" downloaded over 145 000 times and used 6.8 million times. This app has the information of the 40 private operators involved in public transport and makes it possible to find waiting times, look for bus stops etc.

There are also specific apps and webpages for Metro (www.metromadrid.es) and EMT (www.emtmadrid.es) with similar uses.

Other services available are Puntos de Información al Viajero, electric boards located in bus stops with useful information regarding waiting times and bus lines.

2.2.3.5 Goods and freight movements: infrastructure and services

As mentioned, Madrid is the capital of Spain and the epicentre of the national network of roads and railways, being the best connected node of the country's transport network.

The radial highways, as well as the main branches of the high-speed rail system and the largest airport in Spain is located in Madrid.

The excellent land and air connectivity of the region, together with the traditional historical, cultural and economic links with the rest of Europe and Latin America, make the Community of Madrid an ideal destination for the business triangulation between these two major world regions and the rest of the planet.

The Community of Madrid is located in the centre of the Iberian Peninsula, which allows supplying from here, in a highly competitive time, to the entire market of Spain and Portugal, made up of more than 57 million consumers.

Madrid has 38 million m^2 of logistics area, the largest dedicated to this sector in Spain.

75% of logistics companies operating in Spain (both Spanish and international) are based in Madrid.

The main logistics corridors of the region are located around the A-2 motorways (towards Zaragoza, Barcelona and France), A-3, A-4 (towards Andalusia and the port of Algeciras) and A-42. The Dry Port of Coslada (customs warehouse) is located at 10 min. from the airport and is connected in a few hours with the main ports (Algeciras, Valencia, Barcelona, Bilbao).

Freight distribution in the city is another matter. To start with there is not clear planning regarding logistic distribution points in the city, creating problems particularly in residential areas. There is also a big problem regarding parking space, with 13.5 businesses per parking spot. This results in vehicles having to use loading and unloading bays, sometimes incorrectly producing a bad effect in the city. It must be taken into account that 90% of vehicles used for distribution are diesel and are in average 10 years old, contributing to emissions in the city.

2.3. Turku

The Turku urban node consists of the city of Turku and 12 other municipalities in the region. In this section the characteristics of the node are described.

2.3.1. General characteristics of the urban node

2.3.1.1 Geography and population

Turku is located in the southwestern coast of Finland at the mouth of the river Aura. In addition to the distinctive river landscape, the city is characterized by seven hills located in and out of the city centre. The total land area of Turku is 245.7 square kilometres. Population is around 195 350 (09/2021) of which 82.2 % speaks Finnish as native language, Swedish 5.5 % and other languages such as Russian 12.3 %. The city has spread out to a long and narrow land area: the distance between the northernmost and southernmost tips is 45 kilometres while the city is only 15 kilometres wide at its widest. Turku has several islands of which the largest ones are inhabited. Out of the total land area 97.7 square kilometres have been planned. Turku shares municipal borders with Aura, Kaarina, Lieto, Masku, Mynämäki, Naantali, Nousiainen, Parainen, Pöytyä, Raisio and Rusko.

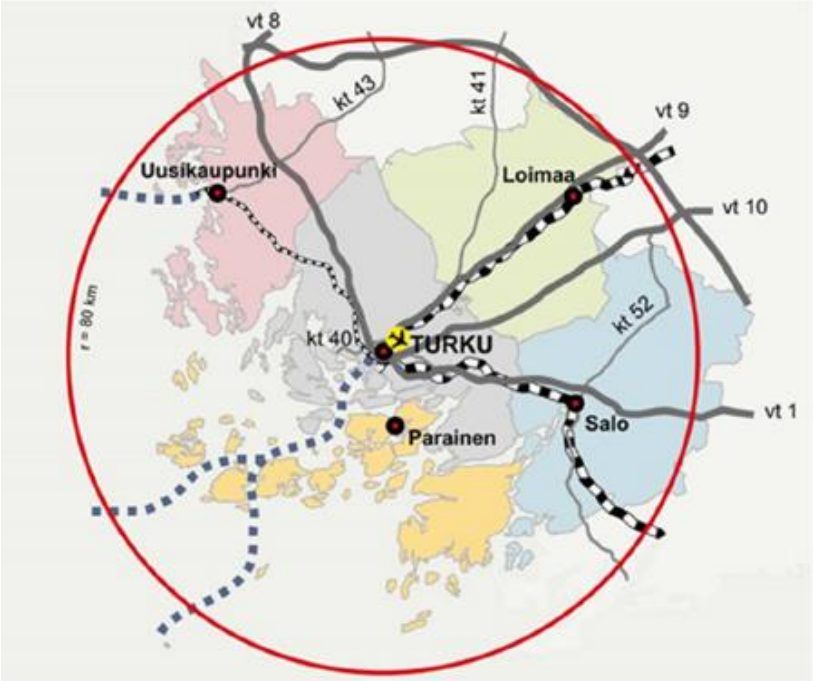


Figure 35: Turku region main corridors.

The Functional Urban Area includes altogether 13 municipalities: The city of Turku and the municipalities of Naantali, Raisio, Kaarina, Lieto, Paimio, Sauvo, Rusko, Nousiainen, Mynämäki, Masku, Parainen and Aura.

With its 195 511 residents (November 2021), Turku is the sixth largest city in Finland after Helsinki, Espoo, Tampere, Vantaa and Oulu. A great portion of inhabitants in Turku are students. The city has two universities and four higher education institutions with over 35 000 students altogether. Turku is the heart of the region which has altogether over 332 000 residents. In September 2021 the total population density was 795.2 residents per square kilometre.

The population of Turku has a growing trend, though the growth has slightly slowed down from earlier figures. From the end of 2020, for instance, the population of Turku grew by 0.58 %. According to the Structural Model of Turku, the population is expected to grow by 75 000 inhabitants by 2035, of which 80 % will be living in the core urban areas and 20 % outside the urban areas. 20 000 new jobs are also expected by 2035.

The FUA has a total population of 356 806 residents (November 2021), ranging from the biggest city in the area, Turku, to the smallest municipality Sauvo with its 2962 residents. According to preliminary data from November 2021, a slight population rise could be observed in all the FUA municipalities but Mynämäki and Parainen.

Table 5. Population by municipality in the FUA

Population by municipality in the FUA 11/2021 (preliminary data)	
Municipality	**Population**
Turku	195511
Kaarina	35452
Raisio	24766
Lieto	20254
Naantali	19513
Parainen	15097
Paimio	11009
Masku	9595
Mynämäki	7603
Rusko	6363
Nousiainen	4707
Aura	3974
Sauvo	2962
	356806

2.3.1.2 Governance and policy

In Turku the City Council, which is elected by the city's residents, exercises the highest authority in the city. The City Council is elected for a four-year-term in an election taking place every four years. The Functional Urban Area consists of 13 separate municipalities that share no official governance structure. The Regional Council of Southwest Finland is a regional authority, with a larger area than the FUA, with 27 municipalities as members and owners. The Regional Council is the regional development body whose decisions are made democratically by the Regional Assembly and the managing board.

Turku city and its five neighbouring municipalities (altogether 310 000 inhabitants) created the Regional Public Transport system (Föli) in 2014 covering 6 municipalities. In 2018, over 26.6 million bus trips were made in the region. The aim of the Region of Southwest Finland is to become a carbon neutral region by 2035 with the share of

sustainable modes raised to 66 % by 2035 as now the share is 38 % (51 % in the city of Turku).

A regional SUMP for Southwest Finland is being planned and in it more focus will be put on the development of smooth travel chains. In order to reach this, a new governance model needs to be developed.

In Turku, several agreements, strategies, plans and spearhead projects guide mobility development on different administrational levels.

On national level the Finnish state concluded agreements concerning land use, housing and transport (MAL) with the main city regions of Finland. These agreements enhance cooperation among the municipalities in the respective city regions and between the municipalities and the state in the steering of community infrastructure and coordination of land use, housing and transport. In the current Turku region MAL agreement (2020-2031), a sustainable and low carbon urban structure and traffic system is developed with the goals of achieving a lively and attractive walking and cycling city, an increased share of sustainable transport and decreased share of passenger car transport by 2030.

On regional level the planning of the transport systems of South-West Finland (to which the Turku region belongs) is guided by the Turku Region Transport System Plan and the Southwest Finland Transport System Strategy, which have been updated during the past year. The Turku region and Southwest Finland transport system plans 2040+ will be approved in autumn 2020. The updated plans contribute to the development goals of the regional transport system, such as sustainable and low-emission transport, safe and healthy transport, and a transport system that supports competitive and attractive areas. The transport system plan for Southwest Finland deals with both internal and external connections in the province. The Turku region's transport system plan deals with special issues in urban transport, such as the development of pedestrians, cycling and public transport. It defines the key measures for the future development of the transport systems in Turku region and the province. The measures will be implemented through regional cooperation and the MAL agreement.

On urban level the Turku Climate Plan 2029 has been prepared in accordance with the common model of the European Union (SECAP, Sustainable Energy and Climate Action Plan) and it includes climate policies and milestones for years 2021, 2025 and 2029. The plan includes both climate change mitigation and adaptation. The objective is to collectively implement the goal of a carbon neutral city area 2029 laid out in the city strategy and to consolidate Turku's position as an international pioneer of climate solutions. In the plan sustainable mobility is promoted via several

measures, including active mobility and development of public transport, which have an important role in the implementation of a carbon neutral Turku. Simultaneously, they have a positive impact on the healthiness and safety of the urban environment, the physical and psychological wellbeing of citizens and quality of life. New mobility solutions also represent a significant development target and platform for innovations and business. The city strategy is supported by two strategic programmes, Wellbeing and activity and Competitiveness

2.3.1.3 Employment

Traditionally the city of Turku has been a commercial centre originated from strong and widespread agriculture. There has been a strong linkage to foreign trade, too. The heavy industry (except ship building) has never been the most important branch but light industry, services and trade have been the most important sources of income. In general, the economic structure of Turku and its sub regions is very diverse and it's supported by an extensive education and training provision that make the city vibrant.

The Confederation of Finnish Industries (EK) recently ranked Turku region as Finland's second best area for companies. In 2021, the annual mean unemployment rate in Turku was 12.4 %.

The Turku region is currently undergoing a positive structural change which is led by the marine and manufacturing industries. With all the spill-over effects, the employment impact is expected to be as high as 30 000 people by the mid-2020s. In addition to maritime and light manufacturing industries, construction, bio-industries, logistics, tourism and creative industries also have a strong presence in Turku. According to statistics, Turku has altogether 20 000 companies and most of them are small and medium-sized enterprises.

2.3.2. Challenges in relation to the SCALE-UP project

There are several challenges related to the five intervention fields identified in SCALE-UP: Governance, Multimodal hubs, Data, Clean-Safe and Inclusive, and Behaviour.

In terms of governance, mobility development in the FUA is hindered by the lack of common administrative structure between the FUA municipalities. The final decisions regarding transport and mobility are always made in the councils of the municipalities. As the interests of the municipalities do not always coincide with those of the region as a whole, a negative impact on the regional sustainable urban mobility objectives can occur. For instance, there is no organization that has the mandate or the budget for measures including infrastructure or decision-making at regional level rail commuting. So far none of the municipalities in the region has volunteered to steer this development process. It should also be noted that although a regional SUMP has been developed, it has been devised following the traffic system management plan and as such does not fulfil sustainable mobility criteria in all parts. It contains e.g. road planning schemes.

When it comes to developing multimodal hubs, similar challenges can be found. As there is no common administrative structure in the FUA, it is up to the municipalities to develop mobility hubs and connected service structures or infrastructure. In addition, the municipalities do not necessarily own the slots of land most suitable for mobility hubs. Potential resistance from land owners may thus influence the successful implementation of hubs. This conundrum was already faced in Turku during the project CIVITAS ECCENTRIC and boiled down to the issue of how the city is able to assign some of its functions on privately owned land.

Similarly, when it comes to data, the challenge lies within the lack of a common owner for mobility-related data. The city of Turku does collect mobility data but the other FUA municipalities do not have established data collection practices in the same extent. Some data is collected by the Centre for Economic Development, Transport and the Environment. So data, when available, is somewhat dispersed and data ownership issues abound. The quality of the data sources varies. The situation will hopefully be improved via SCALE-UP measures focusing on showcasing real time data on a variety of mobility and transport topics in the online mobility data platform.

Providing clean, safe and inclusive mobility solutions for citizens still requires heavy emphasis on the development of viable business models as well as the identification for the right level of service and the right locations. There are no established

practices for reaching some of the important stakeholders, e.g. vulnerable groups. The development general traffic safety has not been systematic, and work to create a traffic safety plan was only started in fall 2021.

Behaviour change approaches are demanding to start with in the mobility context and so far, incentives/nudges in the mobility context have not been carried out in Turku, let alone the FUA. Hence the needed service design, identification and profiling of user segments is still in the very early stages. The COVID-19 pandemic has brought a further challenge to this issue by reducing the share of PT usage.

2.3.3. Key mobility elements

2.3.3.1 Modal split and ambitions for modal split

In the Turku region cars are the most common mode of travel (Figure 36). Compared to the whole region people in the city of Turku travel more on foot, by bicycle or by using public transport: travel modes other than cars make up about half of the whole.

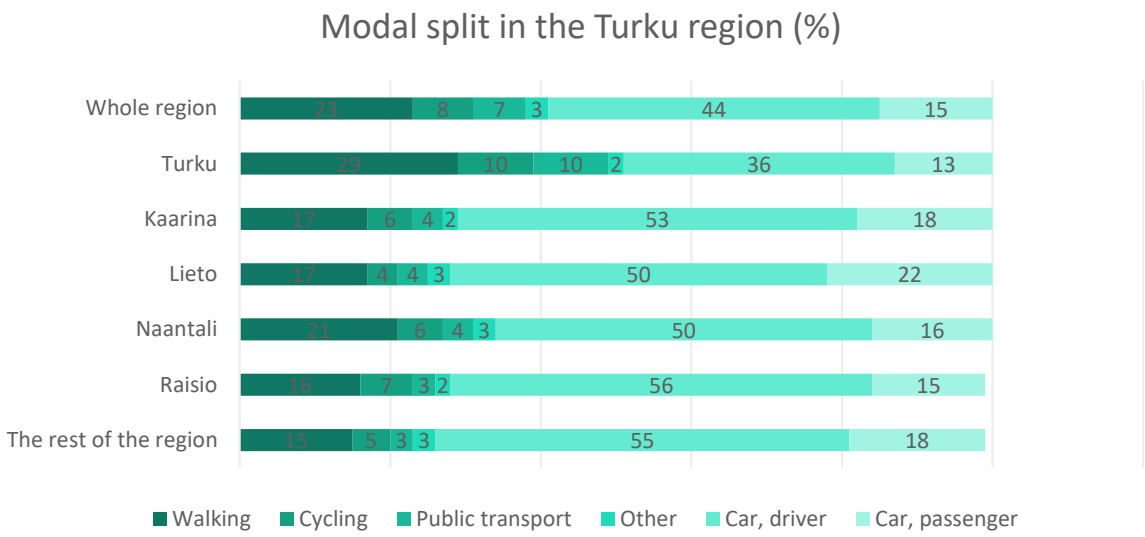


Figure 36: Modal split in the Turku region (National travel survey 2016)

Modal split varies according to the length of trips (Figure 37). Walking is the dominant mode of travel in the shortest trips, while the usage of cars rises steadily with increasing trip length, until the usage of public transport starts to pick up in the longest trips. Cycling is not the most used mode in trips of any length, but it is more popular than public transport in trips under 3 kilometres.

The share of walking, cycling and public transport will be increased through active measures in accordance with objectives of Turku master plan 2029 with uninterrupted main connections of high quality, safe routes and convenient city centre arrangements. The objective for the share of sustainable means of transport according to the Turku master plan and the Structural Model 2035 for the Turku Urban Region is over 66% in 2035.

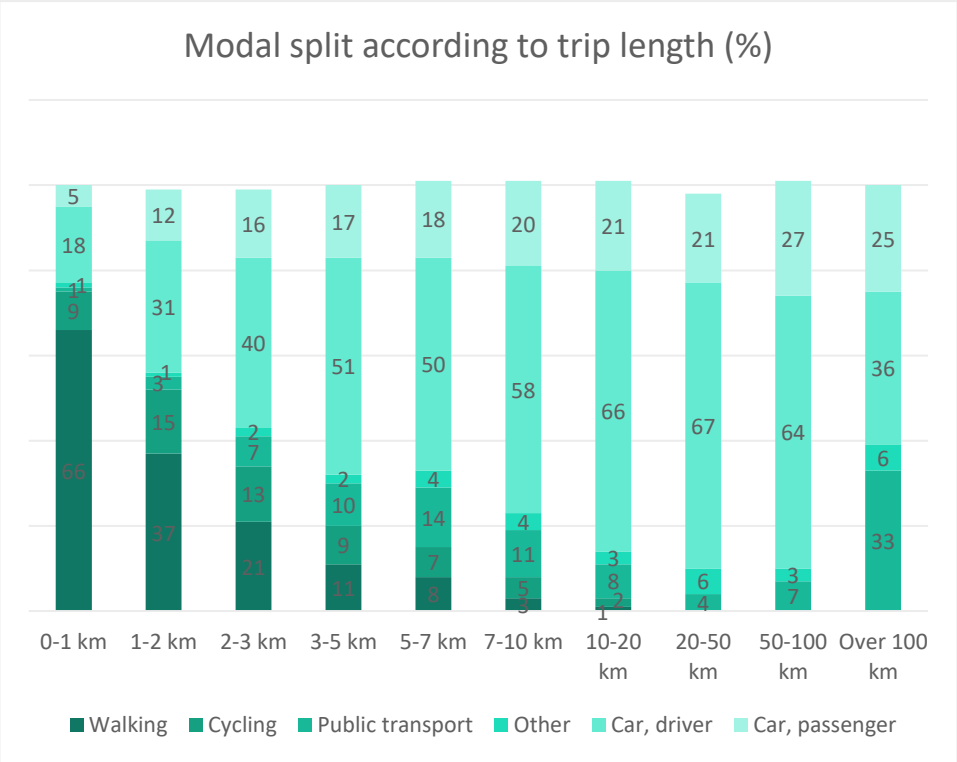


Figure 37: Modal split in the Turku region according to trip length (National travel survey 2016)

2.3.3.2 *Infrastructure and services*

Transport and mobility in the Urban Node

The road system in central Turku is defined by a grid plan. The largest roads to and from Turku are the radiating highways which are numbered 8 (E-road 8) towards north, 9 (E63) towards north-east and 2 (E18) towards Helsinki and eastern Finland. The future urban development will concentrate on main roads and the development of public transport is following that development. Commuting between Turku and Salo (distance ~55 km) as well as to the capital region is common and growing steadily.

There are three railway stations in Turku: the central railway station, Kupittaa railway station, and the railway station at the harbour. Railway traffic is organized by a fully state-owned company. Main railways head to northeast and east.

Local or regional buses form the core of the public transport system in Turku and the surrounding region. Turku and five neighbouring municipalities (Kaarina, Raisio, Naantali, Lieto and Rusko) use a joint public transport system named Föli. The system started on 2014 and the same tickets, prices, and benefits apply for all people travelling in the Föli region regardless of the municipal borders.

The future model of city structure for 2035 highlights the following measures: 1) compacting the urban structure, 2) concentrating new housing and workplaces along the main roads, 3) strengthening the role of the city centre as a commercial centre, 4) favouring public transport in all urban planning.

Motorways from Turku go in the direction of the biggest nearby cities, most importantly, Helsinki. Turku has railway connections to Tampere and Helskinki (Figure 38).

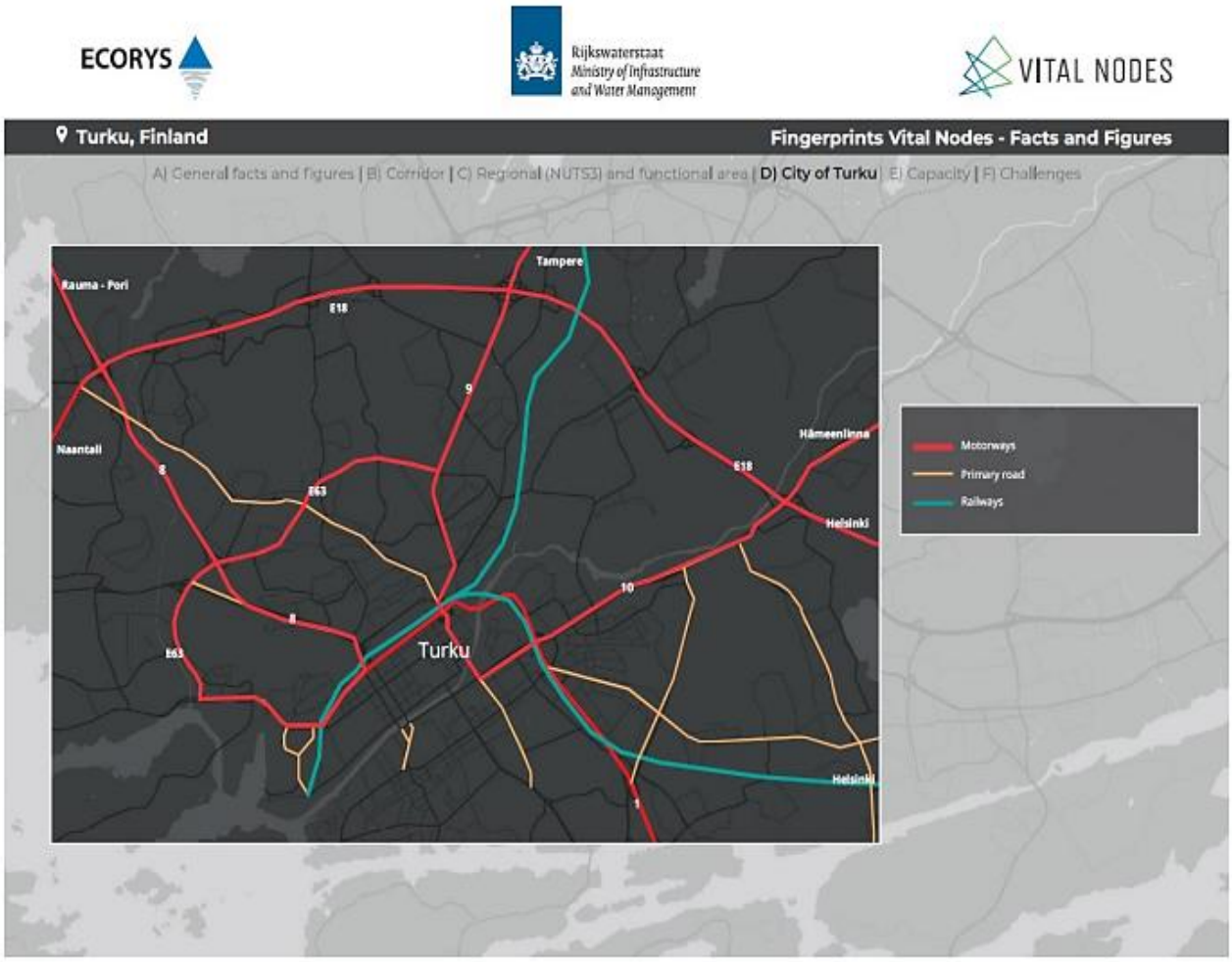


Figure 38: Motorways (red), primary roads (orange), and railways (teal) in Turku (Vital nodes, Workshop urban node Turku, 2018).

The public transport service in the Turku region is Föli. Its bus lines network reaches quite widely in the region.

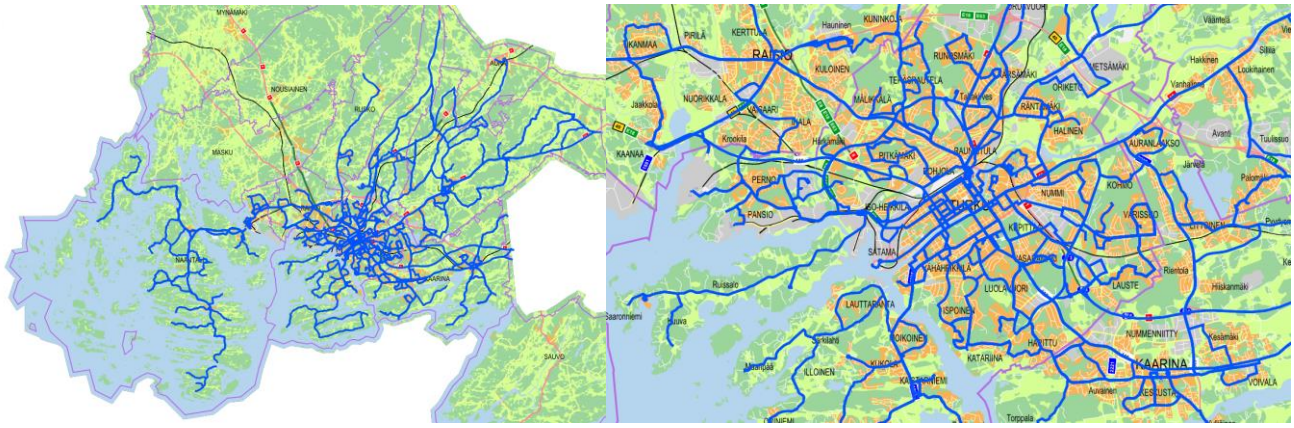


Figure 39: Bus lines in the Turku region and in the city of Turku

Turku had a city bike service that was discontinued in September 2021. A new shared bike service has been tendered out and the company Donkey Republic chosen as the service provider. The system will have 700 bikes and 70 stations, covering 55% of the city's population in terms of geographical coverage. The system is planned to be introduced in May 2022.

Turku has three biogas filling stations, two of which can service heavy goods vehicles in addition to cars. The station near the port was the first of its kind in Finland.

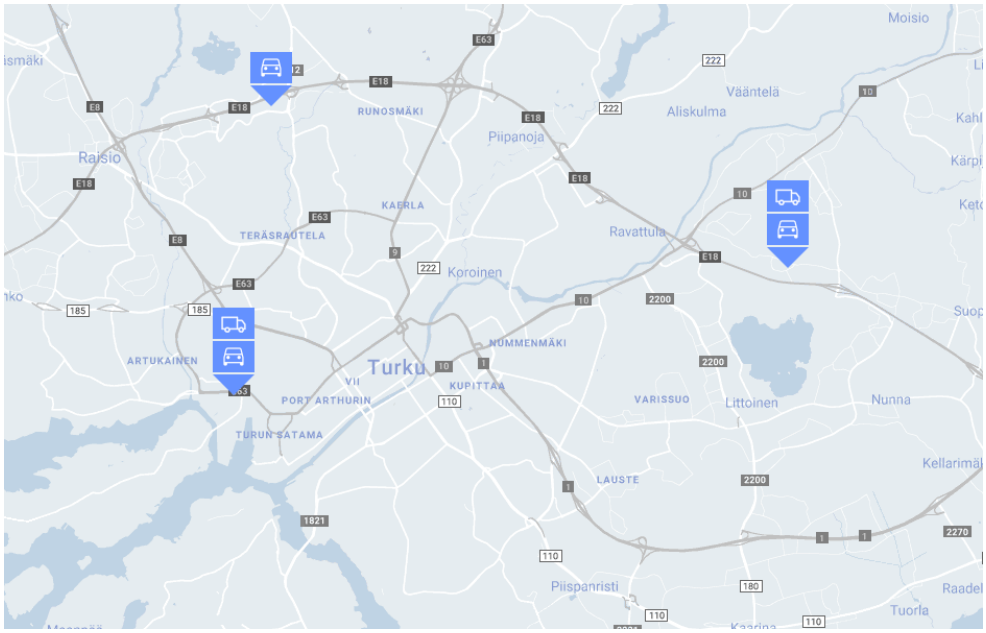


Figure 40: Biogas filling stations in Turku

The city of Turku already has quite a few charging stations for electric vehicles, in the surrounding regions there are fewer stations, but fewer people and vehicles too.

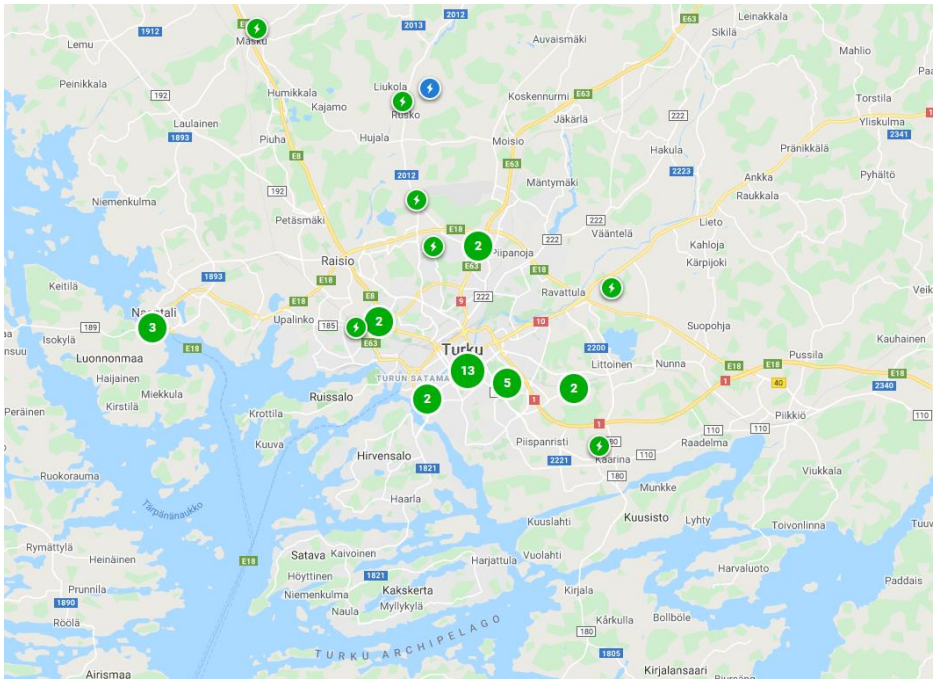


Figure 41: Charging stations in Turku

The Turku region connects to the Scandinavian-Mediterranean corridor via ports in Turku and Naantali and the airport in Turku.

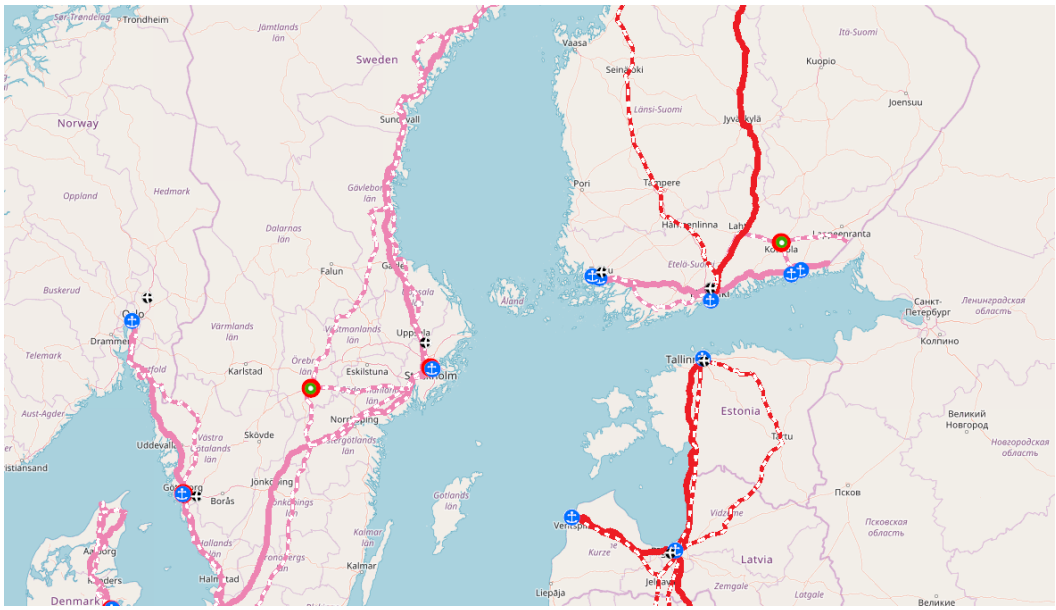


Figure 42: TEN-T transport corridors

The most important axis for the Turku region is the Helsinki-Turku axis. The most significant traffic flows along this axis include the transport of goods and people through the ports in Naantali and Turku and logistical operators operating in the vicinity of the ports (Vital Nodes, 2018). The ports make Turku an important part of Finland's foreign trade: over seven million tons of cargo and nearly three million passengers pass though the ports.

2.3.3.3 Mobility management and traffic management initiatives

The aim of Turku is to become carbon neutral by 2029 and smart mobility plays an important role in this process. The aim is that mobility in 2029 will consist primarily of walking, cycling, electric public transport and sharing of vehicles. This aim is supported by initiatives, plans and strategies. The Turku Climate Plan 2029 includes climate policies and milestones for years 2021, 2025 and 2029, among them several actions for the promotion of low carbon sustainable mobility. The share of walking, cycling and public transport will be increased through active measures in accordance with objectives of Master plan 2029.

A walking and spending time programme for the city of Turku is being devised in the scope of another H2020 project and will be published in spring 2020. The Turku city cycling development strategy for 2029 provides the framework for developing cycling conditions in the city, entailing both actions and concrete goals. It is recognized, for example, that the potentials of winter cycling in the city are not fully harnessed, providing a good justification for wintertime active mobility promotion in SCALE-UP.

Public transport in Turku will be turned into a carbon neutral service by 2029. This development is supported especially by the trunk route renewal of PT and the gradual electrification of bus lines. In addition, in April 2020, the Turku City Council decided on continuing the planning of a tramway to the city, including a general plan and an implementation plan for the Science Park and Port lines. In a previous phase, three options were examined and compared for the improvement of PT in the city: a trunk bus system, a tramway and a superbus. The tramway was found to most effectively meet four out of the five objectives set for the service. When the general plan and implementation plan are completed, the City Council can make an investment decision on the construction of tramway (estimated 2024).

The update of the parking policies in the city of Turku in 2019 served to increase car-sharing friendly parking policies and temporary subventions, including zoning solutions and prioritized parking for shared vehicles.

The regional traffic system plan was updated and approved in 2020. Regionally, the main development efforts in terms of sustainable mobility and traffic are the regional train development (in focus in measure T1) and the so-called One Hour Train. Planning of the One Hour Train between Turku and Helsinki has commenced but is still in the very early stages. If realized, it would bring a new high-speed, double-track railway line between the cities that will reduce travel time significantly, creating a common commuting area for 1.5 million Finns in the western part of South Finland.

2.3.3.4 Transport related communication with the public, e.g. fora, citizens' panels

The main communication channel for projects and plans regarding transport and mobility in the city centre is provided by the spearhead project "Development of the City Centre" (*https://www.turku.fi/en/development-city-centre/transport-and-mobility-city-centre*). The PT authority Föli provides information on Turku region traffic (*https://www.foli.fi/en*).

The citizens of Turku and the PT region (Turku + five surrounding municipalities) can give feedback on the PT system and traffic conditions via the city's online feedback service (*https://opaskartta.turku.fi/eFeedback/en/PublicSearch*). In the "Voice your opinion" tool (*https://kerrokantasi.turku.fi/?lang=en*)the city asks residents for their opinions on issues in preparation. Things and opinions can be seen and commented on by everyone. In 2021, for example, the citizens got the chance to comment and give feedback on the cycling network plan, which aims to form a smooth network of one-way cycling routes to central Turku.

The Turku citizens also have an opportunity to influence mobility-related decision-making via participatory budgeting efforts. People in Turku are able to propose, develop and vote on how EUR 1 million is used per year.

An online deliberation on a future transport system was conducted in 2020 as part of the development of a new master plan. The city of Turku sought to engage its citizens in the planning process and contracted Åbo Akademi University and Tampere University to perform a deliberative mini-public, with the intention of uncovering an informed public opinion on the transport system in the city centre.

2.3.3.5 Goods and freight movements: infrastructure and services

A significant amount of cargo and people move through the ports in Naantali and Turk. About 7.5 million tons of cargo and 180 000 people through Naantali and 2.2 million tons of cargo and 3.1 million people through Turku. The ports and the nearby areas are undergoing developments – in Naantali, for example, there are plans to install intelligent buoys to help guide ship movements (and also one to measure emissions), the port also takes part in projects such as Intelligent Sea, an EU project focusing on digital solutions and remote control. Turku, too, will see change in the coming years as the now separate terminals of Tallink Silja and Viking Line will be combined in 2025, a new parking garage is also going to be built in the area and automooring technology installed, to name a few examples. Operators in Naantali have expressed the need for more dock spaces in the port, and in Turku it is seen as important to enhance intermodality by improving the port's connection to the railways. The train connection to Naantali's port is planned to be electrified. Transport by train is likely to see further development in general: there are plans for a new train connection between Turku and Helsinki and possibilities for local railways have been studied (Liikenne- ja logistiikkaselvitys Turun seudulle 2020).

Air traffic through Turku's airport is important for the area and Finland and has been on the rise: two new routes were opened in 2020. A weakness with the airport is that it is only accessible by one road, and possibilities for another road have been so far dismissed as not financially viable. However, there are several valid reasons for the second road, but it remains to be seen how the situation develops in the future (Liikenne- ja logistiikkaselvitys Turun seudulle 2020).

3. Monitoring and evaluation on the level of the Functional Urban Area (FUA)

The objective of the evaluation on the level of the FUA is to monitor the overall changes of the urban node and to understand these changes. This is important to validate the overall SCALE-UP mobility policy in EU urban nodes and to describe the evolving context for the evaluation of the SCALE-UP measures implemented in the SCALE-UP urban nodes.

To enable this, two sets of indicators are defined:

- **FUA indicators** that **monitor the evolution at FUA level** in the perspective of the SCALE-UP objectives. This are qualitative and quantitative indicators. They capture the mobility related changes in each of the 6 CIVITAS impact categories: society-governance, society-people, transport, environment, economy and energy.
- **Indicators** to **understand the context for change** in the FUA. The definition of and methodology to collect information on these quantitative indicators is inspired by the indicators and the approach developed in the CREATE project.

In the following sections, a description is given of the selected indicators and the approach taken by the urban nodes to collect and monitor these indicators. In Section 3.1, the FUA indicators are defined and the methodology for data collection at FUA level and city level is outlined. Section 3.2 describes the approach taken by the SCALE-UP project to gather information on the context for change.

3.1. The FUA indicators

The aim of the FUA indicators is to capture the mobility related changes in the 6 CIVITAS impact categories — society-governance, society-people, transport, environment, economy and energy — in each of the urban nodes.

The SCALE-UP urban nodes aim to collect the indicators **on the level of the Functional Urban Area**, as well as **on city level**. However most indicators are traditionally only available on city level. In line with the European guidelines on the collection of urban mobility indicators and taking into account the SCALE-UP objectives to work on the integration of the different urban levels, SCALE-UP will do a strong effort to collect similar data on the FUA level. Furthermore, collecting and monitoring these indicators on both levels is important to understand the diversification between city and FUA and to have good context data for the measure level evaluation. In the tables below, unless indicated otherwise, the same data collection method is used for collecting the data on the FUA and city level.

The overall changes in the urban nodes will be described with indicators in the different CIVITAS impact categories, with the goal to monitor and to understand why we observe this changes. This changes can be (fully or partly) attributed to :

a) the general evolution of the city/FUA,
b) the implemented SCALE-UP measures, or
c) the implementation of other measures.

Different techniques exist to assess the level of influence of each factor, such as stakeholder workshops with expert judgement or the City Level Evaluation tool, as developed by (Wright, et al. 2019).

In the SCALE-UP project, stakeholder workshops will be organised, in each urban node, near the end of the project, to understand the observed change and isolate the impact of the SCALE-UP measures. The participants are presented with the observed trend in the FUA indicator and are then asked to identify which measure(s) or general trend could be attributed to explain the observed evolution in the indicator, based on their initial reflection and the discussion with the other stakeholders.

In the following sub-sections, the FUA indicators to be collected and monitored by the 3 urban nodes are presented and discussed for each CIVITAS impact category. This selection is the result of an intensive process involving multiple discussions with the Project Evaluation Team and between the Local Evaluation Managers and the local partners in the urban nodes.

The SCALE-UP urban nodes aim to be **as consistent as possible** in their **data collection approach**. In the society-governance impact category, a SCALE-UP common approach is taken by the urban nodes, as outlined in Section 3.1.1. In the other CIVITAS impact categories, all urban nodes start from a common generic definition of the indicator which is detailed further depending on data availability and the need of each urban node to keep consistency with previous data collection campaigns in the city and the FUA. If relevant, the **Sustainable Urban Mobility Indicators (SUMI)** methodology[9] to define and calculate the indicators is used.

For some of the indicators the local fine-tuning of the definitions in relation to feasible data collection methods is still ongoing and will be reported in the next deliverables (D7.3 Mobility baseline in the SCALE-UP FUAs and D7.4 SCALE-UP Evaluation plan 2).

Planning

Data will be collected in **January 2022** - to be published in D7.3 Mobility baseline in the SCALE-UP FUAs – and during the end phase of the SCALE-UP project in **January 2025**. A partial update of the FUA indicator data will be available in May 2023 as part of the intermediate measure evaluation (D7.5 Impact and Process evaluation of the SCALE-UP measures 1).

[9] https://transport.ec.europa.eu/transport-themes/clean-transport-urban-transport/sumi_en

3.1.1. Society-governance

Four qualitative indicators are selected to measure the evolution in the impact area society-governance. Information on these indicators can be collected through observations (e.g., reports, websites...), questionnaires (e.g. to the administrations of different FUA departments, mobility experts, etc.) and/or discussions with local stakeholders (e.g. different administrations).

A common SCALE-UP approach to collect this information is detailed in Annex 1: FUA indicators in the impact category society-governance by defining, for each indicator, a list of items to question. Based on the observations a score is given to the indicator (low, medium, etc.) and its evolution is monitored in the course of the project.

Table 6: FUA indicators monitored by each of the urban nodes in the CIVITAS category society-governance

Indicator	Definition
Quality of cooperation structures	Quality of the cooperation between the different city/FUA departments and stakeholders
Quality of planning approaches	Quality of the SUMP/SULP/planning approaches in the FUA
Quality of the data layer	Quality and type of data collected on the FUA level, specifically data on active modes
Level of data driven	Availability and quality of mechanisms that are data driven

Table 7 gives more details on the data collection method of each urban node on city and FUA level in relation to the common SCALE-UP approach to collect information on these 4 qualitative indicators.

Table 7: Data collection methods of each urban node of society-governance indicators;

Indicator	Data collection method on city and FUA level (*)		
	Antwerp	**Madrid**	**Turku**
Quality of cooperation structures	Qualitative interview with stakeholders (e.g. ML of measure A1 Franziska Kupfer) via a list of questions based on the vertical integration	Qualitative interviews with personnel involved in governance & stakeholders	Integration into stakeholder survey (measure T1)
Quality of planning approaches	Qualitative interview with stakeholders (e.g. ML of A1 Franziska Kupfer) via a list of questions based on the vertical integration	Included in the qualitative interview to personnel involved in governance & stakeholders	Integration into stakeholder survey (T1)
Quality of the data layer	Based on a grid combining the type of data and the data users (from Stijn Vernaillen), we will evaluate qualitatively on what level data is used within Antwerp	Interviews with personnel involved in data management from Madrid City and Madrid Region.	Interviews with regional data services (Lounaispaikka) and Turku City data
Level of data driven	Evaluation methodology: The 4 most important relevant fields are chosen for Antwerp. Then, the most relevant mechanisms are listed. We plan to do this in cooperation with Stijn Vernaillen, data-expert within the city of Antwerp.	The 4 most relevant fields will be chosen for Madrid. The evaluation of these 4 fields will be included in the interviews with the personnel in charge of data management from Madrid city and Madrid Region.	Interviews with regional data services (Lounaispaikka) and Turku City data

(*) Unless indicated otherwise, the same data collection method is used for collecting the data on the FUA and city level.

3.1.2. Society-people

The impact of the implemented SCALE-UP measures may have effects on society, which in turn, may have further effects on other factors such as employment opportunities, usage levels of the different modes, etc. Table 8 lists the 8 FUA indicators in the impact category society-people, to be monitored by the urban nodes on FUA and city level. The data collection method of each urban node is detailed in Table 9.

Table 8: FUA indicators monitored by each of the urban nodes in the CIVITAS category society-people

Indicator	Definition
Awareness	Share of the target group aware of the key elements of the mobility approach in the city/FUA
Attitude and acceptance	Share of the target group favourably in receiving or approving the key elements of the mobility approach in the city/FUA
Operational accessibility to the transport network	How accessible is the PT network?
Operational accessibility to the transport network for mobility impaired people	How accessible is the PT network for mobility impaired people?
Financial accessibility (related to social cohesion)	The cost of service relative to the average personal income
Persons mobility demand	Average number of trips per person
Freight mobility demand	Number of goods movements, internal and to/from the city/FUA
Contribution of mobility on health	Average walking and cycling time per day/week

Table 9: Data collection methods of each urban node of the society-people indicators.

Indicator	Data collection method on city and FUA level (*)		
	Antwerp	**Madrid**	**Turku**
Awareness	City: Survey Smart Ways to Antwerp FUA: No data on Antwerp Transport Region (ATR) level	City: Citizens survey (check if possible to make the survey) FUA: Survey not possible for all FUA municipalities	City: To be included in the city mobility survey, key elements need to be defined FUA: Survey not possible for all FUA municipalities, only for Uusikaupunki & Loimaa (measure T1)
Attitude and acceptance	City: Survey Smart Ways to Antwerp FUA: No data on ATR level	City: https://www-s.munimadrid.es/SYR_003_WACiudadanos/iniciar.do?procedimiento=200 FUA: https://gestiona3.madrid.org/suqe_inter/run/j/QuejaAlta.icm (probably biased since most people use these platforms for complaints)	City: To be included in the city mobility survey FUA: Survey not possible for all FUA municipalities, only for Uusikaupunki & Loimaa (T1)
Operational accessibility to the transport network	FUA: Study of VITO (Flemish institute of technology)	The population residing <500 metres from a public transport stop (%) based on GIS data	City: Available in the sustainable development indicator reports (every four years, the last one 2015-2018 (city planning office) FUA: Data not collected systematically, simplified SUMI methodology to be applied
Operational accessibility to the transport network for mobility impaired people	Detailed data collection method inspired by SUMI still to be defined	Detailed data collection method inspired by SUMI still to be defined	City: Some data available from the PT office (satisfaction surveys etc.) FUA: Data not collected

Indicator	Data collection method on city and FUA level (*)		
	Antwerp	Madrid	Turku
Financial accessibility (related to social cohesion)	SUMI calculation	SUMI calculation The different prices of the transport card (for all the profiles and tariff zones) according to the Regional Transport Consortium (CRTM) will be used for the estimation of financial accessibility.	SUMI calculation - price of PT and its relation to average income of people
Persons mobility demand	Combination of Mobility survey city of Antwerp and OVG (Research travel behaviour Flanders)	Data from the Home Mobility survey of the Community of Madrid (edM2018)	City: City mobility survey + national travel survey (previous from 2016, upcoming to be published in 2022) FUA: National travel survey
Freight mobility demand	Details to be further clarified with measure leader of A8	Method still to be defined. Possible resources: https://www.mitma.gob.es/recursos_mfom/comodin/recursos/observatorio_mercancias_julio_2021.pdf https://observatoriotransporte.mitma.es https://apps.fomento.gob.es/BDOTLE/indicadores/index.aspx?c=0	City: Some data possible available, to be inquired later in more detail FUA: Data not available
Contribution of mobility on health	HEAT calculations with simulation of walking and cycling-km	HEAT calculations. Input data will be extracted from the Home Mobility survey of the Community of Madrid from 2018.	City: HEAT calculations available for Turku city FUA: HEAT calculations available for Turku city + 4 FUA municipalities

(*) Unless indicated otherwise, the same data collection method is used for collecting the data on the FUA and city level.

3.1.3. Transport system

The CIVITAS impact category transport system focuses on the performance of the mobility system in terms of usage and its technical characteristics. The main objective is to understand the evolution of the performance of the different modes of the mobility system. The different selected indicators in this impact category and are listed in Table 10. Details on the data collection methods are shown in Table 11.

Table 10: FUA indicators monitored by each of the urban nodes in the CIVITAS category transport system

Indicator	Definition
Modal split persons	• Percentage of trips in the city/FUA for each mode during a day (overall or for a specific target group)
Modal split goods	• Percentage of goods using each mode during a day
Road safety	• Number of accidents • Number of collisions with seriously injured and deaths per trip or distance driven for each mode or per inhabitant • Number of road deaths and seriously injured
Multimodal integration of transport offer for persons	• Number and quality of multi-modal hubs in the city/FUA (SUMI definition)
Multimodal integration of freight transport	• Number and quality of multi-modal freight hubs in the city/FUA • Number of freight movements combing different modes
Congestion levels	• Delays in road traffic during peak hours versus free flow traffic
Quality of cycling network	• Quality score of the cycling infrastructure • User satisfaction of the cycling network

Table 11: Data collection methods of each urban node of the transport system indicators.

Indicator	Data collection method on city and FUA level (*)		
	Antwerp	Madrid	Turku
Modal split persons	Combination of Mobility survey City of Antwerp and OVG (Research travel behaviour Flanders)	Home Mobility Survey from 2018 (possibility to evaluate the evolution between the results of the surveys from 1996, 2004 and 2018)	City: City mobility survey + national travel survey (from 2016, upcoming to be published in 2022) FUA: National travel survey 2016
Model split goods	Data available for the port of Antwerp as major economic player. Further to investigate for the whole city and the FUA.	No data available	Inquired from the city/RCSWF if needed for specific measures
Road safety	Data available by the province	City: Data from Madrid´s city Council FUA: Data from the General Direction of Traffic (DGT)	Data available from Statistics Finland
Multimodal integration of transport offer for persons	SUMI methodology	SUMI methodology	SUMI methodology
Multimodal integration of freight transport	Selecting 4 freight transport hubs and giving a qualitive description of these hubs	No data available	Data not available for freight movements. Hubs can be calculated.
Congestion levels	Select corridors and analyse certain points via car floating data	Select corridors and analyse certain points via car floating data	City: Data available from 2015-2016. Inquired if this will be repeated during the project. FUA: Data not available

Indicator	Data collection method on city and FUA level (*)		
	Antwerp	Madrid	Turku
Quality of cycling network	Provincial Bicycle barometer	• Quality cycling infrastructure: percentage total distance city's streets with good quality for cycling versus total length city road network (GIS analysis) • Bicycle lane density (km cycling lane/inhabitants) • Cycling perception: Attitude towards cycling conditions based on survey	City: Data not available (although satisfaction in cycling lanes and maintenance etc. has been surveyed in 2016 & 2019) FUA: Data not collected in FUA
(*) Unless indicated otherwise, the same data collection method is used for collecting the data on the FUA and city level.			

3.1.4. Energy

In the CIVITAS impact category energy, the indicator **share of renewables** is monitored. This is the percentage of electric vehicles and hybrid vehicles in the car, bus and trucks fleet operating in the city and/or FUA. Table 13 details the data collection method of this indicators for each urban node.

3.1.5. Economy

In the CIVITAS impact category economy, the indicator **the number of jobs** is monitored. Starting from the idea that "good mobility helps our economy", a positive evolution in the number of jobs is expected. The overall number of jobs is monitored, not only transport related activities. The data collection method for this indicator for each urban node is given in Table 14.

3.1.6. Environment

The impact category environment evaluates the improvement of the environment by using clean vehicles and alternative fuels and by reducing the modal share of private motorized transport by monitoring the pollution/nuisance and resource consumption. The air quality and greenhouse gas (GHG) indicators monitored are listed in Table 12. The data collection details of each urban node are outlined in Table 15.

Table 12: FUA indicators monitored by each of the urban nodes in the CIVITAS category environment

Indicator	Definition
Air pollutant emissions (NO_x, PM2.5, PM10)	Emissions from transport modes based on the vehicle-km per vehicle type in the city/FUA
Greenhouse gas emissions (CO_2)	Emissions from transport modes based on the vehicle-km per vehicle type in the city/FUA
Air quality (NO_x, PM2.5, PM10)	Air concentrations of NO_x, PM2.5 and PM10

Table 13: Data collection methods of each urban node of the energy indicators.

Indicator	Data collection method on city and FUA level (*)		
	Antwerp	**Madrid**	**Turku**
Share of renewables	Car statistics for the city/FUA (data DIV)	City: Percentage of PT low emissions vehicles FUA: Percentage of low emissions vehicles	Data from Statistics Finland, registration data
(*) Unless indicated otherwise, the same data collection method is used for collecting the data on the FUA and city level.			

Table 14: Data collection methods of each urban node of the economy indicators.

Indicator	Data collection method on city and FUA level (*)		
	Antwerp	**Madrid**	**Turku**
Number of jobs	Data available by the province	City: open access data Madrid´s city Council FUA: From the Community of Madrid: • Labour Market Statistics • Monthly statistical administrative records of Jobseekers and Registered Unemployment • Employment contracts and contracted persons	City: Data from Statistics Finland, city accounting FUA: Data from Statistics Finland, regional accounting
(*) Unless indicated otherwise, the same data collection method is used for collecting the data on the FUA and city level.			

Table 15: Data collection methods of each urban node of the environment indicators.

Indicator	Data collection method on city and FUA level (*)		
	Antwerp	**Madrid**	**Turku**
Air pollutant emissions (NO_x, PM2.5, PM10)	SUMI calculation	Emissions estimated based on the vkm from the traffic model available in Madrid	VTT Lipasto database, modelling
GHG emissions (CO_2)	SUMI calculation	Emissions estimated based on the vkm from the traffic model available in Madrid	VTT Lipasto database, modelling
Air quality (NO_x, PM2.5 and PM10)	Measurements of VMM (Flemisch Environment Agency)	City: data from 24 automatic Remote Stations managed by the Madrid City Council FUA: Data from 24 fixed stations of the Air Quality network of the Community of Madrid	City: Measurement data available for PM2.5 and PM10. Modelling for NO_2. FUA: From 4 FUA municipalities (Kaarina, Raisio, Naantali, Parainen) measured and modelled data available but not from the other FUA municipalities.
(*) Unless indicated otherwise, the same data collection method is used for collecting the data on the FUA and city level.			

3.2. Indicators for the context of change

3.2.1. Definitions

A good insight into the **context for innovative change** is an important element in the overall understanding of why some cities are successful in the implementation of new strategies and measures and others are not.

To assess the context for change in the SCALE-UP urban nodes, a selection of relevant indicators is defined, inspired by the results and approach of the CREATE project[10].

Within the SCALE-UP project, 4 indicators are used to analyse the context for innovative change and to map the enabling conditions for innovative solutions. The following indicators are assessed:

- **Mood and Motivation**: level of acceptance of a new type of transport policy and the quality of the governance and organisational structures that drive a change in transport policy
- **Mass:** capacity to make change happen
- **Momentum:** elements to speed up change
- **Mechanisms**: strong processes to control and manage change

3.2.2. Knowledge gathering activities

In order to understand the status of the city in relation to a favourable context for change, the level of maturity for each of these aspects will be captured at the start of the project, and, in the end phase of the project. In this way possible evolutions can be observed and assessed. The understanding of these context for change will be also used in the measure related evaluation as a context with drivers and barriers for implementation and the success of a measure.

[10] The CREATE project was a 3-year Horizon2020 CIVITAS project, which ended in May 2018. It examined how 5 Western European capital cities have dealt with growing car use and congestion, over the past 50-60 years, to provide lessons for growing urban economies in Central and Eastern Europe and the EuroMed region. http://www.create-mobility.eu/

The status on each of the four indicators is assessed from:

• **Questionnaires and focus groups** to/with cities and important stakeholders at the start and end of the project

• **Identification of what is happening and published** in the community and what is formulated in urban policy

Annex 2: Indicators for the context of change gives a range of questions to assess the status for each indicator and examples from EU cities on their level of maturity on each aspect. This list of questions will be used by the Local Evaluation Managers to organise knowledge gathering activities (e.g. focus groups with local stakeholders (e.g. MLs, representatives of different society groups, etc.)) in the local language. The approach was already outlined in a SCALE-UP Knowledge Exchange webinar (10 November 2021) for all partners to get a common understanding of the indicators and the type of questions to be answered in focus groups with local stakeholders.

3.2.2.1 Antwerp

Those 4 indicators for the context of change are measured during the start phase of the SCALE-UP project through a focus group with the most important stakeholders. These interviews will be held at the beginning of January (17/01) with Michiel Penne, project coordinator Smart Ways to Antwerp, Katia Kishchenko (responsible for communication within Smart Ways to Antwerp), Franziska Kupfer, policy adviser in the Antwerp Transport Region and Stijn Vernaillen, expert MaaS and Mobility data within the city of Antwerp. To provide an external view on the context of change in Antwerp, these stakeholders were asked to invite relevant colleagues who aren't involved in the SCALE-UP project within this focus group.

In the end phase of the SCALE-UP project a similar stakeholder workshop will be organised to see the evolution of the context change.

3.2.2.2 Madrid

To provide an understanding of the context for innovative change these four indicators are addressed in Madrid. The baseline for these indicators for the context of change is collected in a stakeholder workshop that took place in the second week of January 2022. For this activity, some key participants are involved, including: SCALE-UP personnel from the city, the region, EMT and CRTM, plus other persons from the city and the regional administration.

The purpose of the workshop is to create a baseline for the Madrid urban node at the start of SCALE-UP in terms of where the urban node stands in the evolution of each indicator to support and enable change and innovative solutions. At the end of the project, a similar stakeholder workshop will be organised to see the evolution in the context of change.

3.2.2.3 Turku

To provide an understanding of the context for innovative change, the 4 indicators (Mood + Motivation, Mass, Momentum, Mechanisms) are addressed in the Urban nodes. The baseline for the 4 indicators for the context of change in Turku was collected in a stakeholder workshop organised on the 10th of December 2021. Persons invited to the workshop include SCALE-UP personnel from the city, the region, Vinka Oy and Turku University of Applied Sciences (TUAS), plus a few key persons from the city and the regional administration. The purpose of the workshop is to create a baseline for the Turku urban node at the start of SCALE UP in terms of where the urban node stands in the evolution of each CREATE aspect to support and enable change and innovative solutions. In the end phase of the SCALE-UP project a similar stakeholder workshop will be organised to see the evolution of the context change.

4. Evaluation of the SCALE-UP measures

4.1. Overview

The three urban nodes Antwerp, Madrid and Turku will implement **28 innovative mobility measures** within **5 intervention fields**: i) GOVERNANCE, ii) MULTIMODAL HUBS, iii) DATA, iv) CLEAN, SAFE AND INCLUSIVE, and v) BEHAVIOUR. These intervention fields are directly linked to the first 5 strategic objectives of SCALE-UP, as shown in Table 16.

Table 16: The 6 objectives of the SCALE-UP project

O1. Improve multi-level governance and multi-stakeholder cooperation enabling seamless multimodal transport across TEN-T urban node area **(GOVERNANCE)**
O2. Develop well (inter-) connected and multimodal nodes for passengers and freight as the backbone of a resilient mobility system, including network optimisations **(MULTIMODAL HUBS)**
O3. To develop data driven mobility strategies and tools to stimulate seamless multimodal transport of passengers and freight and optimise network capacity across the functional urban area **(DATA)**
O4. Provide access to clean, safe and inclusive mobility solutions **(CLEAN, SAFE and INCLUSIVE)**
O5. Change travel behaviour with a focus on inclusive, clean, active and healthy modes of transport **(BEHAVIOUR)**

Table 17 lists the 28 measures to be implemented in the 3 urban nodes, linked to the most relevant intervention field. However, in the integrated approaches of the SCALE-UP urban nodes most measures contribute also in other intervention fields. In the following paragraphs, for each measure, an overview is given of the intervention fields to which that measure contributes.

Table 17: Mobility measures to be implemented in the three SCALE-UP urban nodes within the 5 fields of intervention

	Antwerp urban node	Madrid urban node	Turku urban node
 Multi-level and multi-stakeholder governance (~**GOVERNANCE**)	**A1:** Scaling up multilevel governance and cooperation to the Antwerp Transport Region **A2:** A MaaS ecosystem and collaborative Governance framework	**M1:** Multilevel governance and stakeholder cooperation in Madrid metropolitan area	**T1:** Multilevel governance and cooperation to develop sustainable travel chains in Turku region and Southwest Finland
 Multi-modal transport systems for passenger and freight (~**MULTIMODAL**)	**A3:** Multi-modal mobility hubs and network optimisation in Antwerp transport Region	**M2:** Improving multimodal hubs with Park & Ride + public transport at regional level **M3:** Fostering sustainable first and last mile logistics by mobility hubs	**T2:** Implementing mobility hubs in the Turku region **T3:** Introducing MaaS ticket combos and adaptive parking in Turku region
 Data driven strategies and tools (~**DATA**)	**A4:** NxT Mobility data strategy management tool for multi-modal mobility **A5:** Towards a better intra-port flow freight management by using smart data	**M4:** Data driven mobility management Integration of data, digitalisation, and MaaS in the Madrid metropolitan area	**T4:** Creating a mobility portal combining personal transportation and logistics **T5:** Implementing a real time regional mobility data platform
 Clean, safe and inclusive mobility solutions (~**CLEAN SAFE AND INCLUSIVE**)	**A6:** The Ring road as a highway for green energy **A7:** (Electric) bike sharing scheme for the Antwerp Transport Region **A8**: Safe routing for freight transport including collection of freight data	**M5:** Scaling up shared (and active) e-mobility services in Madrid metropolitan area **M6:** Promoting clean mobility (zero emissions) with supply/storage solutions **M7:** Promoting active mobility by deploying car-free areas	**T6:** Speeding up inclusive cycling in Turku **T7:** Fostering carbon free city logistics and construction sites
 Behavioural change with a focus on active and healthy mobility (~**BEHAVIOUR**)	**A9:** Nudging and incentivising sustainable travel **A10:** Active travel campaigns and events as a catalyst for sustainable travel	**M8:** Nudging multimodality at regional level	**T8:** Incentivization of mobility services in Turku **T9:** Mobility guidance in connection with events and exceptional circumstances **T10:** Winter as a mobility season

In the following sections, the 28 mobility measures and their evaluation approach are presented. First, a concise description of the measure is given and possible interactions with other measures are cited. Then, an overview is given of the expected outputs, the objectives, the impact indicators and data collection methodology. Lastly, important elements for the implementation process evaluation — the different partners and roles and possible risks — are discussed. If applicable, supporting activities are outlined. In Section 4.30, the planning of each measure is detailed in Gantt charts.

As highlighted before, each measure contributes to one or multiple intervention fields. Prior to the general description of each measure this is indicated by a colour tab, as shown in the example below. The most relevant intervention field is indicated by the dark green tab and the other intervention fields to which the measure contributes are highlighted in light green. For the intervention fields indicated in white, no specific contribution is expected from the measure. In the example below, the measure contributes to the three intervention fields: data; clean, safe & inclusive and behaviour. The measure contributes most to the intervention field clean, safe & inclusive.

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

The CIVITAS reporting tools, the Measure Evaluation Results (MER) sheet and Process Evaluation Report (PER), will be used for internal reporting and follow-up of the evaluation of the SCALE-UP measures.

The first results of the evaluation of the SCALE-UP measures will be reported in D7.5 Impact and Process evaluation of the SCALE-UP measures 1 in May 2023, in which the baseline and first intermediate results will be presented of the impact indicators, as well as a first analysis of the barriers and drivers of the implementation process. D7.8 Impact and Process evaluation of the SCALE-UP measures 2 will report the final impact and process results of the evaluation of the SCALE-UP measures, and will be published in January 2025.

4.2. Measure A1 "Scaling up multilevel governance and cooperation to the Antwerp Transport Region (FUA)"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.2.1. General description

Measure A1 aims to scale-up the existing plan "Slim naar Antwerpen" of the City of Antwerp to the level of the Functional Urban Area (Antwerp Transport Region). Furthermore, **the SUMP and SULP of City will be integrated in the regional SUMP "Roadmap 2030" on the ATR/FUA level.** The final objective is to ensure **a strong multilevel governance structure and sustainable cooperation between public and private stakeholders on the level of the ATR.**

As the actions of the Roadmap 2030 are building further upon the legacy of local and Flemish initiatives, the team ATR aims to scale up a number of such initiatives to the FUA level. Examples are: the programme of soft measures focused on behavioural change towards sustainable alternatives (based on the Smart ways to Antwerp approach), the full use of the layered mobility network integrating the different levels (linking local to regional to TEN-T), as well as the innovative (financial) cooperation mechanisms with other (private) sectors to find new mobility and sustainable (urban) freight transport solutions e.g. the Marketplace for mobility.

4.2.2. Interaction with other measures

This measure has a link with most of the other measures because this is the basis of cooperation.

4.2.1. Impact indicators

Table 18: Output and objectives of measure A1 and selected impact indicators to monitor the impact of measure A1

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
A1.1 Governance **A governance and cooperation model for the ATR**	A strong multilevel governance structure scaled up to the FUA	Quality of cooperation structures (see also FUA indicator)	ATR	FUA	-	Interview with ML	Each MER / PER round
A1.2 Planning **A revised local SUMP (including SULP) for the City integrated in the regional SUMP and an evaluation framework** **A1.3 Operational** **Cooperation mechanisms/partnerships with other (private) sectors** **At least 5 existing initiatives scaled up to the ATR**	Improved cooperation between stakeholders	Number of cooperation platforms Way of cooperation: formal advices, participative design, … Quality of cooperation (efficiency of cooperation)	ATR	FUA	-	Interview with ML	Each MER / PER round
	Improved decision making procedures	Way of decision making	ATR	FUA	-	Interview with ML	Each MER / PER round

4.2.2. Implementation process

4.2.2.1 Partners and stakeholders

Table 19: Overview of partners and stakeholders and their roles for measure A1

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
ATR	P	O	L	ML: Franziska Kupfer
City of Antwerp	P	C	P	
Flemish Region, Department Mobility and Public works	S	O	O	
Province of Antwerp	S	O	O	
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.2.2.2 Risk analysis

Table 20: Overview of potential barriers and drivers for measure A1

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Involvement of stakeholders: Belgium has a mobility landscape with many actors and different levels of policy making	-	**Involvement of stakeholders:** Structural consultation of different stakeholders by a clear leader (transportation region counsel)	**Medium risk for SULP/SUMP not be granted within the timeframe of SCALE-UP**

4.3. Measure A2 "A MaaS ecosystem and collaborative Governance Framework"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.3.1. General description

The City of Antwerp will align, coordinate and **optimise different initiatives at different levels** which are initiated around stimulating data driven mobility and facilitating MaaS in the city and Region of Antwerp, whilst respecting the specific objectives and outcomes for all of them. All these initiatives are innovative (financial) cooperation models:

- **NXTMobility**, the **digital framework** behind Smart Ways to Antwerp, using data for: policy design and evaluation, real time monitoring, route planning and travel advice, facilitate MaaS, incentivise sustainable travel and regulation and compliance (legislation-as-a-code);
- **the MaaS ecosystem connecting public and private operators** to further facilitate the development of MaaS in the city and region, both the Flemish government and the Antwerp Transport Region are part of this network;
- the Flemish government prepared a tender to launch a **Mobility Central, bringing together different mobility services** (including demand responsive services for vulnerable groups) in one central platform;
- **a MaaS Collaborative Governance Framework** for Flanders linking up to the Antwerp Transportation Region and the National Access Point (NAP) for mobility data.

4.3.2. Impact indicators

Table 21: Output and objectives of measure A2 and selected impact indicators to monitor the impact of measure A2

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
• **A MaaS Collaborative Governance Framework for Flanders linking up to the ATR** • **A MaaS ecosystem** • **Joint solutions/ projects to facilitate the uptake of MaaS** • **At least 15 additional co-creation projects**	5% increase of use of shared mobility solutions	Number of used shared mobility solutions	Inhabitants Employees	City of Antwerp FUA	Number of used shared mobility solutions	Mobility survey question about usage of shared mobility Monitoring tool shared mobility Monitoring tool total number of shared mobility trips	Every 3 year (next one beginning of 2022)
	2% decrease of car ownership	Car ownership	Inhabitants Employees	City of Antwerp FUA	Number of people who own a car	Mobility survey Question about car ownership	Every 3 year (next one beginning of 2022)
		Modal share	Inhabitants Employees	City of Antwerp FUA	1) Number of used shared mobility solutions and 2) Number of people	Mobility survey Question about transport mode Question about usage of shared mobility	Every 3 year (next one beginning of 2022)

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
					who have a car as primary vehicle		
	80% increase integration of mobility providers in MaaS offer	Integration of mobility providers in MaaS offer 80%					
	50% increase of users of MaaS applications	Number of MaaS users	B2B B2C		Number of MaaS users		
		Number of co-creation projects		FUA	Number of co-creation projects	Benelux Living Lab	
	At least 1 incentive integrated in the MaaS offer	Number of incentives integrated in the MaaS offer	B2B B2C			Detailed info about incentives per MaaS project	
	Increased satisfaction levels users of MaaS	MaaS user satisfaction	People doing multimodal trips	Flanders region	Satisfaction-level	Survey of De Lijn: Question about satisfaction about multimodal trips	

4.3.3. Implementation process

4.3.3.1 Partners and stakeholders

Table 22: Overview of partners and stakeholders and their roles for measure A2

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
Flemish Region Department Mobility and Public works	P	other	L	ML: Paul Theyskens
City of Antwerp	P	C	P	
Antwerp Transport Region	S	other	O	
Province of Antwerp	S	other	O	
Be- Mobile	S	PR	O	
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.3.3.2 Risk analysis

Table 23: Overview of potential barriers and drivers for measure A2

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Technical: • Data standardisation and sharing • Open use of data : limited usage data available from operators and MaaS providers **Involvement of stakeholders:** • Cooperation between broad spectrum of stakeholders	-	-	**Low risk**

4.4. Measure A3 "Multi modal mobility hubs and network optimisations in Antwerp Transport Region"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.4.1. General description

The network of multimodal mobility hubs for passenger transport defined within Roadmap 2030 will function as a backbone for the regions transport system. Their operation, accessibility and service level will be the cornerstone of a more sustainable way of transport. The multimodal hubs need to have a common definition, understanding and (physical and digital) user experience, and they need to meet a certain service level. The different entities such as public transport operators, municipalities, cities, regional entities, etc. within ATR are involved. The challenge is to align all initiatives into one concept and user experience as well as to implement the concept and monitor the usage.

This measure especially focuses on three sub-measures concerning the **network of multimodal mobility hubs**:

- the design and implementation of the hubs, including the detection and solution of bottlenecks that hinder an effective use of the multimodal hubs;
- the digital presence of the hubs including the implementation of a specific use case;
- the connection of the cycle highway network to the multimodal hubs.

4.4.2. Impact indicators

Table 24: Output and objectives of measure A3 and selected impact indicators to monitor the impact of measure A3

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
A3.1 • **A ATR network of multimodal hubs** • **Monitoring plan for the implementation, including financial and management framework** • **A pre-defined service level for each of the hubs** • **A uniform concept for the hub user experience** **A3.2** • **Data collection tool for the hub use** • **List of hubs that do not meet the required service levels, their causes/bottlenecks + a remedy plan** • **A machine-readable digital presence for each multi modal hub**	5% increase in multimodal/sustainable travel	Modal share	Inhabitants Employees	City of Antwerp FUA	%	Question about usage of multimodal mobility	Every 3 year (next one beginning of 2022)
	10% increase of the number of people using the multimodal hubs	Number of multimodal hub users			Number		
	20% increase safety on cycle highway crossings	Number of (near-) accidents on cycle highway crossings		FUA	Number	Monitoring of 4 locations via technology	
	Increase of the Multimodal Integration	SUMI Multimodal Integration Indicator			Percentage of integration	Use SUMI methodology	
	Decrease travel time of PT by road	Road travel time PT		FUA			

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
• **Demonstration of multimodal travel companion application**		Travel companion app usage					
A3.3 • **A safe and secure cycle highway network connecting the hubs** • **A methodology to detect underachieving areas and points in the cycle highway network** • **In depth analyses + improvement plan of at least 4 to be upgraded areas in the cycle network**		Accessibility of multimodal hubs for mobility impaired				Qualitative: Description of improvement at multimodal hubs selected	
		Satisfaction levels of multimodal hubs	Users of multimodal hubs	City FUA		Exercise city --> scale up to FUA Qualitative assessment	
	Better cycling network	Bikeability index		FUA / Province		Provincial cycle barometer	
A methodology to detect underachieving areas and points in the cycle highway network				FUA / Province		Qualitative description of the methodology	
In depth analyses + improvement plan of at least 4 to be upgraded areas in the cycle network				FUA / Province		Qualitative description of the analyses and the improvement plans	

4.4.1. Implementation process

4.4.1.1 Partners and stakeholders

Table 25: Overview of partners and stakeholders and their roles for measure A3

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
Antwerp Transport Region	P	O	L	ML: Franziska Kupfer
Flemish Region – department Mobility and Public works	P	O	O	
City of Antwerp	P	C	P	
Province of Antwerp	P	O	P	
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.4.1.2 Risk analysis

Table 26: Overview of potential barriers and drivers for measure A3

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Involvement/Communication: Coordination of the various visions and ideas with regards to mobility hubs of the different stakeholders **Technical:** Data availability on the use of public transport and the multimodal hubs. It is important to take into account the different levels on which the data are available.	-	-	**Low risk**

4.5. Measure A4 "NxT Mobility data strategy: management tool for multi modal mobility"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.5.1. General description

One of the main use-cases within NXT Mobility is the development of a Management tool for Multi Modal Mobility. Its aim is to render insight, monitor and steer the multimodal mobility system of Antwerp. It is selected as a case of innovative public procurement by the Flemish government. Scalability towards the Antwerp Transport Region is one of the selection criteria for the system. Ultimately, measure A4 will contribute to the acceleration of the modal shift towards more sustainable and shared mobility and the take-up of Mobility as a Service (MaaS), reduction in private car dependency and alleviation of traffic congestion. Both the city/region and the Port are actively working on implementing a smart data driven strategy by setting up a data platform. The focus of both platforms is different (passenger versus freight, micro versus macro flows), yet overlapping (as none of both platforms will focus exclusively on one or the other type of flow). (Some) data sources and the architecture behind both schemes can have common grounds. Therefore this project is the perfect opportunity to work together on this and share expertise. Requirements such as working with open source code and agreements on data sharing and standardisation guarantee the maximum take up and efficiency.

4.5.2. Interaction with other measures

The data collection for the SCALE-UP evaluation in measure A5 and A8 will also feed into the platform.

4.5.3. Impact indicators

Table 27: Output and objectives of measure A4 and selected impact indicators to monitor the impact of measure A4

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
• **The development of a multimodal management tool with real time monitoring and regulation in the city and region** • **A data broker platform to share data with other parties** • **A compliance check on active mobility services that hold a license to operate in the city/region** • **Standardised policy reports with insights in mobility nodes, transfers and travel behaviour of users**	5% increase shared use in modal split citizens	Use of shared mobility options in modal share	Inhabitants Employees	City of Antwerp FUA		Mobility survey: question about usage of shared mobility	Every 3 year (next one beginning of 2022)
	Decrease of car ownership through an increase in the use of shared mobility options	Car ownership within the Antwerp urban area and qualitative evaluation of the context and link with the use shared mobility options	Inhabitants Employees	City of Antwerp FUA		Mobility survey: question about car ownership	Every 3 year (next one beginning of 2022)
	< 50% single car-use traveller movements	Modal split (as percentage of traveller movements with single car-use)	Inhabitants Employees	City of Antwerp	%		Every 3 year (next one beginning of 2022)
	100 % compliance rate of shared mobility license holders	Number of shared mobility license holders that are compliant with quality standards			Number	Via compliance policy	
	95% standardization rate of shared mobility data feeds accessible to third parties	Number of data feeds on shared mobility accessible to third parties through a standardized format/protocol			Number	Via compliance policy	

4.5.1. Implementation process

4.5.1.1 Partners and stakeholders

Table 28: Overview of partners and stakeholders and their roles for measure A4

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
City of Antwerp	P	C	L	ML : Stijn Vernaillen
Antwerp Transport Region	P	O	P	
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.5.1.2 Risk analysis

Table 29: Overview of potential barriers and drivers for measure A4

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Involvement/Communication: Cooperation and willingness between all stakeholders **Technical:** Standardisation, open use/availability of data	-	-	**Low risk**

4.6. Measure A5 "Towards a better intraport flow freight management by using smart data"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.6.1. General description

The port authority invested and will invest further in smart data sensors such as OCR gates for trains, a wide network of ANPR cameras for road transport, the use of security cameras at lock complexes and a smart network of bike counting sensors. Where possible these data of rather fixed measuring sensors will be complemented with more flexible data sources, such as floating car/bike data, drone images, etc. **Bringing together all these data will give better insights in the capacity usage of the network and will enable the detection of potential bottlenecks, and modal shift opportunities within this network and can be used to prioritise investments.** The goal of this task is therefore twofold: firstly, map all data and **detect potential bottlenecks in terms of capacity and modal shift opportunities**; secondly, to use the results to **actively guide different flows**. More effective lock and train bundle capacity planning and 'on call' system for trucks at a container terminal (including waiting times) are outcomes.

4.6.2. Interaction with other measures

There is a clear link with measure A4 and A8 as those measures aim to capture, structure, link and use mobility data in a smart way and use insights to further optimise this network. The focus is different yet sometimes overlapping. Cross-fertilisation between both measures will be done in terms of data sharing, data standardisation, open source applications, etc., guaranteeing a maximum take up and efficiency. The data collection in SCALE-UP evaluation and in measure A4 and A8 will also feed into the platform when considered appropriate.

4.6.3. Impact indicators

Table 30: Output and objectives of measure A5 and selected impact indicators to monitor the impact of measure A5

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
• **A data platform bringing together the transport flows and network capacity** • **An evaluation framework to evaluate the capacity of the transport network** • **Infrastructure capacity monitoring tool** • **Effective capacity planning tools (Guiding tools for port orchestrators such as lock personnel, traffic managers, etc.)**	Contribute to a 10% modal shift towards rail and barge	Modal share freight		Port of Antwerp	%	Modal split logistics Reporting tool PoA	Every year
	Contribute to the climate neutral port ambition by 2030	Qualitative evaluation. Comparing the goals of the climate neutral port ambition and describe if the SCALE-UP measure A5 will improve those ambitions		Port of Antwerp		Environmental Department tool Sustainability Report PoA	Every year
	80% of all transport moves in the port are being captured by the data platform	Number of transport moves included in data platform		Port of Antwerp	Number	Monitoring per transport mode	Every year
	20% of identified bottlenecks have been ameliorated	Number of ameliorated bottlenecks		Port of Antwerp		Report per each transport mode	
	5% decrease in waiting time at locks for all modes of transport	Waiting time all transport modes at locks			Seconds		
	10% decrease in waiting time at terminals for trucks	Waiting time trucks at terminals			Seconds		

4.6.1. Implementation process

4.6.1.1 Partners and stakeholders

Table 31: Overview of partners and stakeholders and their roles for measure A5

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
Port of Antwerp	P	O	L	ML: Jan Buytaert
City of Antwerp	P	C	O	
Railport	S	PR	P	
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.6.1.2 Risk analysis

Table 32: Overview of potential barriers and drivers for measure A5

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Technical: Lack of data for some transport modi	-	-	**Low risk**

4.7. Measure A6 "The Ring road as a highway for green energy"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.7.1. General description

In line with the city's Climate plan and the European Green Deal, Antwerp will investigate how the Ring road can function as a carrier for sustainable energy, heat and water to deliver to the city/region. The (high) energy demand for the ring road infrastructure would for instance be fostered through sustainable energy sources integrated within the new landscapes that will be developed on top of and along the covering of the Ring road. This ambitious plan requires a lot of study work before actual implementation can take place. The ring road has been divided into different zones. **For each zone, the potential in terms of energy, heat and water generation is carefully calculated based on available technologies (e.g. wind, solar energy, water capturing techniques, residual heat sources, …) and set out against the local needs (including the Ring road infrastructure needs).** For each zone, a plan will be made and integrated into The Big Link, a concept and plan for covering the Ring road, which brings together mobility, spatial planning, energy and environment into one project to contribute to a climate neutral city by 2050.

4.7.2. Impact indicators

Table 33: Output and objectives of measure A6 and selected impact indicators to monitor the impact of measure A6

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
Concept and implementation plan of the ring road as a high way for green energy	Potential CO_2 reduction: • By green energy production • By the re-use of industrial residual heat from the North (Port of Antwerp) and South (waste incinerator) of Antwerp	Expected CO_2-reduction of the roll-out of the plan		FUA City of Antwerp			
	Potential energy production the Big Link versus the energy need: • Energy need for the new Ring road infrastructure • Energy need for new urban development projects • Potential energy need for new, electricity-driven transport modes	Expected energy production and expected energy need		FUA City of Antwerp			
		Qualitative description of the roll-out of the plan		FUA City of Antwerp		City Of Antwerp Fluvius/Dash-board energy production scenario calculations CO_2 reduction	Every MER/PER reporting

4.7.3. Implementation process

4.7.3.1 Partners and stakeholders

Table 34: Overview of partners and stakeholders and their roles for measure A6

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
City of Antwerp	P	C	L	ML: Britt Verhesen
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.7.3.2 Risk analysis

Table 35: Overview of potential barriers and drivers for measure A6

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Involvement/Communication: • Timing of implementation and possible temporary measures • Developing feasible business models in co-operation with the private market **Technical:** • Balancing energy demand and supply	**Technical:** New energy-generating technologies that influence demand and supply	-	**Low risk**

4.8. Measure A7 "Electric bike sharing scheme for the Antwerp Transport Region"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.8.1. General description

The ATR and city are planning **the set-up of an e-bike sharing system throughout the entire Antwerp Transport Region (and beyond), also serving areas where sustainable transport alternatives are currently underrepresented.** The coordination of such a system in an area, crossing different municipal boundaries is challenging and makes procurement exigent. As bicycle sharing systems so far mostly have been implemented in cities, implementation at such scale is new and an opportunity for the region to implement clean transport in the different areas of the transport region. The success of such a system depends heavily on the organisation of the access points to the cycle networks and the safety of the networks. Both aspects are part of the measure A3 multimodal hubs. Ultimately, the system should be accessible and inclusive to all users (inhabitants, commuters, tourists, students…) and income groups.

4.8.2. Interaction with other measures

The launch of the system will be accompanied with a promotion and incentives campaign (linking to measure A10) to raise awareness and promote uptake within the Antwerp Transportation Region.

4.8.3. Impact indicators

Table 36: Output and objectives of measure A7 and selected impact indicators to monitor the impact of measure A7

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
• **ATR e-bike system of at least 2.500 bikes** • **Promotion and incentives campaign** • **The integration of the e-bike scheme in the multi modal mobility platform (A4) + multimodal hubs network (A3)** • **The integration of the e-bike scheme into at least 2 MaaS applications**	Modal shift towards shared e-bike	Modal split commuters	Commuters	FUA	%	Mobility survey / Question about usage of bike	Every 3 year (next one beginning of 2022)
		Number of people substituting trips by car with trips using the e-bike system	Commuters	FUA	Number	Mobility survey / Question about usage of bike	Every 3 year (next one beginning of 2022)
	CO_2 avoided based on modal shift away from car	Modal shift (commuters + citizens?) away from car	Commuters	FUA	%	Mobility survey / Question about transport mode	Every 3 year (next one beginning of 2022)
	Increased accessibility and density of the system	Number of vehicles and system			Number	Dashboard Donkey Republic / Monitoring tool	
		Density according to network logic and proximity logic		FUA		Dashboard Donkey Republic / Monitoring tool	
		Financial accessibility		FUA			

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
		System usage: • Number of users • Number of subscriptions in the different user groups (inclusive)	Users of system	FUA	Number	Dashboard Donkey Republic / Monitoring tool	
	High level of usage: target= Minimum 0.25 trips a day/vehicle, year 1, minimum 0.5 trips a day/vehicle, year 2	System usage: Average daily trips per registered user	Users of system	FUA		Dashboard Donkey Republic / Monitoring tool	
	High operational reliability: target= max 20% of vehicles out of operation	System usage: Operational fleet Amount of e-bikes within the operational fleet		FUA	Number	Dashboard Donkey Republic / Monitoring tool	
	High level of awareness and satisfaction of the end-users.	Level of awareness and satisfaction of the system by end-users. If possible, the awareness of the e-bike system with non-users	Users and non-users of system	FUA	Satisfaction level	Dashboard Donkey Republic / Question in app about satisfaction after usage	
Evaluation framework for the take up of the bicycle system							

4.8.1. Implementation process

4.8.1.1 Partners and stakeholders

Table 37: Overview of partners and stakeholders and their roles for measure A7

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
Antwerp Transport Region	P	other	L	ML: Candide De Bruyn
City of Antwerp	P	C	P	
Donkey Republic	S	PR	O	
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.8.1.2 Risk analysis

Table 38: Overview of potential barriers and drivers for measure A7

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Involvement/Communication: The implementation of such a e-bike sharing scheme needs to go hand in hand with a broad communication and raising awareness campaign as well as an incentives scheme to guarantee take up	-	-	**Low risk**

4.8.2. Supporting activities

The launch of the system will be **accompanied with a promotion and incentives campaign** (linking to measure A10) to raise awareness and promote take up within the Antwerp Transportation Region.

4.9. Measure A8 "Safe routing for freight transport including collection of freight data"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.9.1. General description

This measure will **develop a dynamic routing tool** and scale it up to the Functional Urban Area of Antwerp. The tool will be based on a pilot currently being carried out by the City of Antwerp, which defines parameters to calculate **safe and efficient freight routes addressing the most appropriate road hierarchy.** This happens in close collaboration with two food retailers (supermarket chains). The (public-/private) cooperative aspect of this project is very valuable as it generates practical input from the sector and raises acceptance on the use of preferred routes and other traffic safety measures. Within SCALE-UP, the dynamic routing tool will be **extended on different levels**. This will be done by not only **involving other sectors than food retail, but also by scaling up the geographical level to the Antwerp Transport Region including the port area.**

4.9.2. Interaction with other measures

Better structuring, collecting and sharing of freight data between the different stakeholders will be also part of this measure and feed into the data frameworks set up in measure A4 and A5, as well as the monitoring and evaluation framework of the Roadmap 2030 (measure A1).

4.9.3. Impact indicators

Table 39: Output and objectives of measure A8 and selected impact indicators to monitor the impact of measure A8

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
• **A route-network with preferred safe freight routes** • **Preferred routes (policy) translated into machine readable code** • **Real-time route-planning API** • **Interactive ATR logistic map** • **Better cooperation collection and sharing of freight data amongst stakeholders.**	10% decrease of traffic accidents with freight	Number of traffic accidents with freight	FUA City of Antwerp	FUA City of Antwerp	Number	FUA: FUA itself or Statbel (per municipality) City of Antwerp: local police / Monitoring tool	Each year
	20% decrease of number of trucks on non-preferential roads	Number of trucks on (non-) preferential roads	FUA City of Antwerp	FUA City of Antwerp	Number	City of Antwerp/FUA: Cropland study (based on GSM data) + ANPR-cameras	Each year
	Maximise the use of the dynamic routing tool	Acceptance: Number of take ups of preferred routes into existing navigation tools from private partners and traffic management tools	FUA City of Antwerp	FUA City of Antwerp	Number	Clarification needed from ML if this indicator will be monitored - Interview between ML and stakeholders	Reporting in MER / PER

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
		Acceptance: Number of retailers/companies that have adjusted their routing according to the new data	FUA City of Antwerp	FUA City of Antwerp	Number	Interview between ML and stakeholders	Reporting in MER / PER
Setting up a collaboration between logistics stakeholders and the municipality in minimum 5 different municipalities of the Antwerp Transport Region	Increase collaborations	Number of collaboration between logistics stakeholders and the municipalities				Interview ML	Reporting in MER / PER
Minimum 3 collaborations with stakeholders from different logistics sectors (i.e. construction logistics, cold chain, retail).	Increase collaborations	Acceptance: Number of retailers/companies that have adjusted their routing according to the new data	FUA City of Antwerp	FUA City of Antwerp	Number	Qualitative: via pilot projects	Reporting in MER / PER

4.9.1. Implementation process

4.9.1.1 Partners and stakeholders

Table 40: Overview of partners and stakeholders and their roles for measure A8

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
City of Antwerp	P	C	L	ML: Tim vervoort
ATR	P	Other	P	
Port of Antwerp	P	Other	O	
Be-Mobile	P	PR	P	
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.9.1.2 Risk analysis

Table 41: Overview of potential barriers and drivers for measure A8

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Involvement/communication: Not clear that the take-up is guaranteed/monitored because of no foreseen communication **Political:** Uptake of the tool by different stakeholders (FUA, municipalities in FUA, logistical parties, ..) **Technological:** Car recognition with ANPR-camera might be difficult	**Technological**: ANPR-camera break-through		**Low risk**

4.10. Measure A9 "Nudging and incentivising sustainable travel"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.10.1. General description

Different incentive and rewarding schemes are already available and tested in the city (bike discount, MaaS discount, bike service box,…) but this process is not yet automated, leaving opportunities to work together with mobility providers and MaaS providers to reward and incentivize the end user. The aim of this measure is to **better reach out to the end user by nudging and providing more personalised incentives and routing advice**. A **central identity manager** for the mobility profiles of end users linking up to a back office for incentive schemes allows for a **more effective and personalised approach towards end users,** a systematic follow up of compliance for the incentives criteria, **the collection of (tracking)** data from the end users (e.g. bike discount), and the evaluation of the performance of such schemes in relation to the policy ambitions.

4.10.2. Interaction with other measures

The launch of the system will be accompanied with a promotion and incentives campaign (linking to measure A4) to raise awareness and promote take up within the Antwerp Transportation Region.

4.10.3. Impact indicators

Table 42: Output and objectives of measure A9 and selected impact indicators to monitor the impact of measure A9

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
• **Decentralised mobility profile which is consent driven (and private/GDPR compliant)** • **A back office for incentives schemes digitalising and standardising the process of application, awarding, monitoring and compliance of the incentive**	A 30% structural modal shift of participants of the incentive schemes	Modal share participants of the incentive schemes	Participants of incentive schemes	FUA City of Antwerp	%	Survey of participants in incentive schemes	To be determined when follow up survey would take place (after 6 months?)
	The launch of new incentive schemes in the city/region – target : at least 2	Number of (new) incentive schemes in the city/region		FUA City of Antwerp	Number	Quantitative: monitor how many incentive schemes are available	N/A
	Increase cooperation with mobility providers to create new incentive schemes to the end user – target: at least 15	Number of cooperations with mobility providers for new incentive schemes		FUA City of Antwerp	Number		
	Personalised advice (route, incentives) to at least 2000 unique users.	Number of personal advice to unique users	Unique visitors of smart travel planner tool	FUA City of Antwerp	Number	Google Analytics / Monitoring tool of Google Analytics	on demand

4.10.4. Implementation process

4.10.4.1 Partners and stakeholders

Table 43: Overview of partners and stakeholders and their roles for measure A9

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
City of Antwerp	P	C	L	ML : Stijn Vernaillen
ATR	P	other	O	
Province of Antwerp	P	other	O	
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.10.4.1 Risk analysis

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
-	-	-	-

Table 44: Overview of potential barriers and drivers for measure A9

4.11. Measure A10 "Active travel campaigns and events as a catalyst for sustainable travel"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.11.1. General description

Linking the communication actions(Smart Ways to Antwerp communication strategy) to large events and vice versa can be a catalyst to stimulate and promote sustainable and active travel. These events are used as opportunities to address the mobility challenge and include more difficult to reach (vulnerable) target groups. Examples are Car Free Sunday, Supernova, Tall Ships Races, and also the World Championship Cycling 2021 as a perfect opportunity to focus on actions and campaigns to promote active travel. The COVID-19 crisis influences not only whether events will take place, but also the travel behaviour of visitors coming to these events, making extra measures (e.g. to ensure social distancing) necessary. Even though for now it remains unclear which (longer term) effects COVID-19 will have on travel behaviour, travel campaigns will need to take into account this new reality and adapt accordingly.

4.11.2. Interaction with other measures

Interaction with the majority of the measures. A10 creates awareness and acceptance for the mobility initiatives and policy, described in the previous measures.

4.11.3. Impact indicators

Table 45: Output and objectives of measure A10 and selected impact indicators to monitor the impact of measure A10

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
• **At least 16 active campaigns linked to events focussing on active travel and realising behavioural change** • **Improved signage : Quality/number of road signs for pedestrians/bicycles towards events (qualitative measurement) Increase with 15%** • **Rewards at events for active traveling, at least 1 per event** • **Improve the quality of bike parking at events**	15% increase of the reach of campaigns/ brand awareness	Brand awareness	Inhabitants Employees Visitors	City of Antwerp		Campaign surveys	Yearly
	Increase the appreciation of campaigns to the level 'good'	Campaign appreciation					
	10% modal shift visitors events/ target groups campaign	Modal share visitors events	Visitors events	City of Antwerp	%	Visitor surveys	Number of events
	Happiness level of 7.5/10 of the bicycle (city) appreciation inhabitants	Bicycle appreciation inhabitants. However, bicycle appreciation of solely visitors of events will be estimated as well.			Satisfaction level		
	Improve the quality of bike parking at events (qualitative)	Number and quality of bike parkings (satisfaction users?) at events		City of Antwerp		Info per event Reporting	Each event

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
	At least 1000 site sessions / event on the event accessibility pages Smart ways to Antwerp	Number of visits event accessibility page/event	Website users		Number	Google Analytics	Each event

4.11.1. Implementation process

4.11.1.1 Partners and stakeholders

Table 46: Overview of partners and stakeholders and their roles for measure A10

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
City of Antwerp	P	C	L	ML: Silke Lamoen
ATR	P	other	P	
Scelta	S	PR	O	
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.11.1.2 Risk analysis

Table 47: Overview of potential barriers and drivers for measure A10

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Involvement/Communication: Multidisciplinary (internal and external) teams work around these events, sometimes with different objectives, which make good cooperation and clear communication extremely important	-	-	**Low risk**

4.12. Measure M1 "Multilevel governance and stakeholder cooperation in Madrid Metropolitan area"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.12.1. General description

At a regional level the measure´s main objective is to improve governance and to foster public-private cooperation. For this, **the existing Sustainable Mobility Strategic Plan of the Madrid Region will be reviewed**. This plan has more than 200 programs comprising 12 measures such as urban mobility studies for urban and metropolitan mobility, promotion of urban transport by bike and pilots related to sustainable urban mobility. Since this Plan is focusing on multistakeholder cooperation, this will be an opportunity for CRTM to work closely with other disciplines related to environment and climate actions. Moreover, CRTM, as the public transport authority of the Madrid Region, will be actively involved in the development of the Plan in two main ways:

With respect to the **local level**, the measure will be focused on **the full development of the new sustainability strategy "Madrid360"**, which started in September 2021, **deploying specific measures that are linked with the new SUMP of the city** which is currently under review.

At **local and regional level**, this measure will serve **to align the mobility plans from CRTM, EMT and the City council** focusing on their common measures and objectives.

To that end, Madrid´s City Council, EMT and CRTM have several committees and periodic meetings.

4.12.2. Interaction with other measures

This measure, which is more holistic and wide-ranging, has an interaction with all other 7 measures. An improvement in stakeholder cooperation and better multilevel communication will indeed have a positive effect and will be a driver for the other measures.

4.12.1. Impact indicators

Table 48: Output and objectives of measure M1 and selected impact indicators to monitor the impact of measure M1

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
M1.1 **Reviewed version of the Sustainable Mobility Strategic Plan** **New MaaS governance model** **Partnership with other public-private stakeholders**	Better governance and cooperation (public-private)	Quality of the MaaS governance model Quality of cooperation structures with stakeholders	PT authorities Stakeholders Service Providers Decision makers	FUA	-	Experts Interview	Mid term End of the project
M1.2 **Full development of the sustainability strategy "Madrid 360" i.e. Progressive car restrictions by technology**	Improve air quality	% reduction combustion car engines Air quality	Car users	City	%	Data available based on concentration of pollutants in control stations	Once a year

4.12.1. Implementation process

4.12.1.1 Partners and stakeholders

Table 49: Overview of partners and stakeholders and their roles for measure M1

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
Madrid´s City Council	P	C	L	Public authority in charge of the city management. Its role and tasks will be as facilitator, policy maker, administrative authority and land owner. It will have the leading role to improve the governance cooperation.
EMT	P	PT	P	As public transport company will be actively involved in all the measures related to multimodality, as well as a land owner, parking manager, charge point operator, etc, so will be able to provide input and feedback for achieving the M1´s objectives.
CRTM	P	PT	P	As the public transport authority of Madrid and being responsible for the implementation of different measures, CRTM has a key role for the development of MaaS governance model
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.12.1.2 Risk analysis

Table 50: Overview of potential barriers and drivers for measure M1

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Political: Slow reaction time of public administrations **Technical:** Lack of skills at the public administration personnel **Involvement/Communication:** Insufficient	**Technological**: New potentials offered by technology, new technology available, new communication channels	**Political**: Setting a successful cooperation framework among administrations **Technical**: Use new technology to raise awareness among people	**Low risk**

4.13. Measure M2 "Improving multimodal hubs with Park & Ride + public transport at regional level"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.13.1. General description

Every day, in the region of Madrid there are a total of 15.8 million trips by all means of transport. Where in the centre of Madrid city public transport and walking accounts up to 75% of the trips, these percentages drop considerably when referring to the metropolitan area (50%) or beyond (41%).

In order to ease the **transition towards more rational use of the private car and to enhance the multimodality concept**, especially among commuters, both the region and the city are working on the promotion of public transport by combining it with the Park & Ride approach. The main challenge is, as previously mentioned, the commuting flow between the city and the neighbouring municipalities located up to 40-50 km away. In this regard:

1. **CRTM** is developing **a new plan of Park & Ride in Madrid Region** called "Aparca-T". The main aim of this plan is improving the intermodality and modal shift within multimodal hubs where parking facilities are linked with public transport. People will have incentives on the public transport tickets if they leave their car at these multimodal hubs and take public transport for the last part of their trips.

2. Also at local level, Madrid is working on its "Park & Ride Program" which includes **12 facilities between the two ring roads of the city**, the M30 and M40 (and beyond the M40). The targeted users are residents of Madrid or neighbouring peripheral areas who live in the surrounding neighbourhoods and work in the central district. These facilities will **allow commuters and other people travelling to the city centre to leave their private vehicle next to a rapid transit system** that will take them fast, comfortably and cost-effectively to their destination. By this date, 3 of these 12 facilities are operating: Puente de la Mora, Aviación Española and Pitis.

3. At local level **EMT is also currently managing 3 Park & Ride facilities**: Avenida de Portugal, Nuestra Señora del Recuerdo and Wanda Metropolitano Stadium (more

than 4,000 parking lots) in which free public transport is offered to users. However, their **usage is still limited.**

The goal of the measure through SCALE-UP is to:

1. Have **at least 3** new CRTM managed Park & Ride (P&R) facilities in the region.

2. Integrate under "Aparca-T" tool those EMT existing Park & Ride facilities **to foster their usage** by giving users some facilities like booking a slot in advance.

3. **Assess the deployment of other P&R of Madrid City** considering possible new locations.

4.13.2. Interaction with other measures

This measure is connected with M4 (Data driven mobility management and integration of data, digitalisation and MaaS in the Madrid Metropolitan Area), since the technological improvements to be done in some of the P&R are related with what will be developed in M4 (for example QR reader in EMT buses and improvements in mPass, such as Plate reading capability in mPass and New ticketing options). It also has a connection with M6 (Promoting clean mobility (zero emissions) with supply/storage solutions), and its output "E-bike chargers and other e-mobility devices in at least 3 BiciPARK facilities", which may affect some of the P&R.

4.13.3. Impact indicators

Table 51: Output and objectives of measure M2 and selected impact indicators to monitor the impact of measure M2

Outputs	Objectives/ Targets	Impact indicators	Target group	Data units	Source/ Methodology	Frequency	Impact area
At least 3 new CRTM managed P&R facilities in the region. (Different services available in the park & ride facilities to make them more attractive: plugs, lockers, carsharing, bike parking lots)	Improve intermodality and modal shifts within multimodal hubs where parking facilities are linked with PT	• Multimodal Integration (SUMI indicator) • % Transfer mode of P&R users	Parking managers CRTM EMT Local citizens	• Qualitative • Number of shift modes from private car to PT • Number of P&R facilities users	• SUMI • Parking managers data (EMT, CRTM)	Midterm & at the end of the project	Local/FUA
Integration of 3EMT P&R in AparcaT tool in Madrid city	Allow commuters/users travelling to city centre to leave private vehicles next to a rapid transit system	• Satisfaction levels of P& R facilities´ users • Evolution of level of use of Aparca-T among the project lifetime	Local citizens P&R users and target users	• Number • Qualitative	• Data from hubs • Data from AparcaT Surverys	Midterm & at the end of the project	Local
Assessment for the deployment of other new Park & Ride of Madrid City Council based on the experience of the ones from Scale-Up		Potential new Aparca-T users		Number	Estimation based on case study analysis (already operating P&R)	At the end of the project	Local

4.13.1. Implementation process

4.13.1.1 Partners and stakeholders

Table 52: Overview of partners and stakeholders and their roles for measure M2

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
Madrid´s City Council	P	C	P	Public authority in charge of the city management. It is currently working on P&R Program, is the owner of several parking facilities with 3 of them operating as P&R.
EMT	P	PT	P	EMT manages 23 underground parking facilities, 3 of them are currently functioning as P&R
CRTM	P	PT	L	CRTM is developing a new plan of Park & Ride in Madrid Region called "Aparca-T". One of the objectives of the measure is to integrate under "Aparca-T" tool those EMT existing Park
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.13.1.2 Risk analysis

Table 53: Overview of potential barriers and drivers for measure M2

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Behaviour: Citizen's hesitation to use P&R and PT **Technical:** Additional technological requirements in P&R facilities **Infrastructural/physical:** Lack of space for parking in some Municipalities	**Involvement/Communication**: Raising public awareness to encourage the use of more PT (health, time). **Technological**: New potentials offered by technology (i.e. apps) **Financial:** Offering discounts in P&R if use of PT **Financial:** Public-private partnerships	**Cultural**: Public awareness campaigns **Technical & Financial**: Investment in new technologies related to P&R and PT	**Low risk**

4.14. Measure M3 "Fostering sustainable first and last mile logistics by mobility hubs"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.14.1. General description

Urban freight has become one of the biggest challenges in urban areas. Despite its crucial role for the functioning of the city and in satisfying citizens' needs, in densely populated cities urban freight causes negative external impacts, such as congestion, pollution, energy inefficiencies, decreased road safety, deterioration of road infrastructure, lack of road capacity and parking spaces, etc. As an example, in Madrid, according to the last rolling stock inventory from 2017, urban freight vehicles represent around 10% of total road traffic, around 19% of NO2 emissions and 14% of CO_2 emissions coming from road traffic.

At the same time, most of the freight movements happen in city centres, whereas most of the logistic hubs are situated in the outskirts or suburbs. On top of that, there is a clear growing trend in urban freight flows due to the growth of e-commerce and home deliveries, which was clearly evidenced during the recent COVID-19 crisis.

Since **EMT manages different parking facilities that potentially could play a key role in urban logistics, acting as consolidation centres or cross-docking stations, and providing additional services** such as charging infrastructure for electric vehicles. The measure will use these parking facilities to:

1. **Deploy at least 1 logistic hub** (including parking and added value services such as charging for electric vehicles).

2. **Assess the way of adding mobility data coming from urban freight into the new mobility model of the city**, which EMT is currently working on.

3. **Use data from the mobility hub to investigate how to optimize the processes** with a focus on last-mile logistics.

4.14.2. Impact indicators

Table 54: Output and objectives of measure M3 and selected impact indicators to monitor the impact of measure M3

Outputs	Objectives/ Targets	Impact indicators	Target group	Data units	Source/ Methodology	Frequency	Impact area
At least 1 logistic Hub for last mile distribution in the city centre Including added value services in the hub (plugs, lockers, carsharing)	Improving air quality in Madrid by reducing emissions from cargo and reduce impact of delivery traffic	Emissions avoided thanks to e-v and non-motorized deliveries	Logistic company managing the hub Customers	tons/year	Estimation based on data provided by the logistic company	every two years	Delivery area
Electric vans for last mile distribution	Increase the number of sustainable vehicles used for last mile distribution	• Number of sustainable vehicles used for last mile distribution • km driven in goods distribution using E vans • Emissions	Logistic company managing the hub	• Number • Tons	Logistic company data	every two years	Delivery area
Inputs on how to add Urban freight mobility data in the new mobility model of the city focused on last mile logistics	Assessment of the way of adding mobility data coming from urban fright into the new mobility model of the city	Quality of the data obtained from the logistic hub	Logistic company managing the hub	Qualitative	Logistic company data	At the end of the project	City/FUA

4.14.3. Implementation process

4.14.3.1 Partners and stakeholders

Table 55: Overview of partners and stakeholders and their roles for measure M3

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
Madrid´s City Council	P	C	P	As the Public authority in charge of the city management, the city Council will support all the tasks needed to deploy de logistic hub.
EMT	P	PT	P	EMT is currently working on the new mobility model of the city. The measure will serve them to assess the way of adding mobility data coming from urban freight into it. EMT also manages several parking facilities that could be used as hubs.
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.14.3.2 Risk analysis

Table 56: Overview of potential barriers and drivers for measure M3

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Organisational: Logistic companies' unwillingness to operate from there **Financial:** Logistic companies' lack of resources to replace their vehicles because of cost **Strategic/Institutional:** Logistics companies' unwillingness to give out data/ unable to by law	**Financial:** Public funding or subsidies to incentivize change to e-vehicles **Political**: Coalition between key policy companies and sustainable development agenda **Technological**: New potentials offered by data analysis and improvement of urban freight mobility	**Institutional**: Enabling data sharing **Planning**: Accurate analysis of financial impact for logistics companies	**Low risk**

4.15. Measure M4 "Data driven mobility management and Integration of data, digitalisation and MaaS in the Madrid metropolitan area"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.15.1. General description

From its creation, CRTM has been working on a strategy based on a client-oriented approach locating users at the centre of its decisions, creating a public transport system of high quality for all the users and adapted to their necessities — a strategy that is perfectly aligned with the new tendencies in mobility, the MaaS approach. Within this measure Madrid partners will study and test how different MaaS approaches and solutions will help to address different challenges related to mobility management.

This measure can be divided into 3 sub measures with the following tasks:

M4.1 Mobility data integration from a new MaaS ecosystem

CRTM will study and test some of the solutions and recommendations obtained within the multilevel governance and cooperation measure related with Mobility as a Service at regional level, "MaaS CRTM". With the support of HaCon, as CRTM technological partner, in the measure the following actions will be done:

- Performing an assessment to adapt and particularise the results of "MaaS CRTM" study to CRTM necessities. They will study together the possible pilots that will be developed within the region, taking into account CRTM priorities.
- HaCon will also make a pilot where technical integration of data from different mobility sources will be done.

At urban level:

- The use made by people leaving their car in a Park & Ride parking lot allows them to obtain incentives for the use of public transport. Analysing the data generated, information is obtained on the hours of greatest use of P&R, associated transport modes, and optimization of incentives.

- Additionally, analysis of multimodal transport with hub transfers and inter-line transfers, etc.
- Analysis of mobility, in the use of sharing bicycles, (start of the journey in one bicycle station and leave the bicycle in another), metro ticketing, other transport.

Finally, UPM will use Data Science mechanisms related with intelligence to extract and analyse potential underlying trends in mobility and transport modes, elaborate possible future recommendations and build evolution and prediction scenarios. Forecasting of the short, medium, and long-term evolution mobility demands will also be done.

M4.2 Promote multimodality through the improvement of mPass

At urban level:

SCALE-UP will be used to push the implementation of a QR reader system in all EMT buses and to integrate this QR system and also number plate reading capability in "mPass" (the EMT postpaid platform), since the new identity system affects all ticketing services. This, together with the extension of the QR system to car parks, will allow to offer fare promotions to the combination Park & Ride and bus use and therefore, promoting multimodality and also new possibilities in contactless ticketing solutions which are safer for situations such as the COVID-19 pandemic.

M4.3 Planning and management of big events

At urban and regional level:

- Preparation of studies related to the planning and management of big events with coordinated actions between stakeholders that can study innovation in the way of managing them (both technological and non-technological innovations).
- Improving multimodal real-time information to users and other stakeholders involved at large events and mobility management.

4.15.2. Interaction with other measures

Measure 4 is related with several measures since most of them will provide data to be analysed further within this measure. It will use data from the P&R facilities in M2, and from BiciMAD stations in M5, among other things. The data analytics from this measure will serve to investigate how to optimize the processes in the sustainable mobility hub from M3.

4.15.3. Impact indicators

Table 57: Output and objectives of measure M4 and selected impact indicators to monitor the impact of measure M4

Outputs	Objectives/ Targets	Impact indicators	Target group	Data units	Source/ Methodology	Frequency	Impact area
M4.1 **A MaaS ecosystem bringing together all stakeholders involved** **Assessment to adapt and particularise the results of "MaaS CRTM" study within the CRTM necessities.** **Pilot of data integration from different mobility sources (more than 40 operators of the whole region)** **Advanced big data visualization tool to support decision making** **Mobility demand study and long term trends**	**Mobility data integration from the MaaS ecosystem** including PT operators and shared mobility services providers to **forecast short, medium and long-term evolution of mobility**	• Number of PT operators and shared mobility services providers included in the MaaS ecosystem sharing their data • Number of data feeds on mobility included in the visualization tool	PT operators Mobility services providers	City FUA	Number	Data from City Council, EMT and CRTM	At the end of the project

Outputs	Objectives/ Targets	Impact indicators	Target group	Data units	Source/ Methodology	Frequency	Impact area
M4.2 **QR reader in EMT buses** **Improvements in mPass:** **Plate reading capability in mPass** **New ticketing options**	**Promote multimodality through the improvement of mPass** tool including new ticketing options for bus services, P&R facilities (contactless)	• Users satisfaction level with Mpass • Number of Mpass users (% of PT users' migration to Mpass) • Type of multimodal journeys of mPass users	Citizens	City	• Qualitative • Number • Categorical	Data from City Council, EMT and CRTM	At the end of the project
M4.3 **Studies related with planning and management of big events (New channels of information and MaaS services for mobility management and events)**	Establishing generic approaches for mobility issues in the **planning and management of big events** including new channels of information	• Quality of the generic approach • Number of stakeholders involved in the approach	PT authorities Stakeholders Service providers	City FUA	• Qualitative • Number	Expert interview Based on the approach	Midterm & at the end of the project

4.15.4. Implementation process

4.15.4.1 Partners and stakeholders

Table 58: Overview of partners and stakeholders and their roles for measure M4

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
CRTM	P	PT	L	CRTM will study and test some of the solutions and recommendations obtained within the multilevel governance related with MaaS
EMT	P	PT	P	EMT will provide all the data from the mPass
UPM	P	KI	P	UPM will use Data Science mechanisms to extract and analyse potential underlying trends in mobility and transport modes
HaCon	P	PR	L	HaCon will make a pilot of technical integration of data from different mobility sources.
ETRA	P	PR	P	ETRA will develop advanced data analytics and a big data visualization tool in several different scenarios.
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.15.4.2 Risk analysis

Table 59: Overview of potential barriers and drivers for measure M4

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Political/Strategic/Institutional: Lack of cooperation between different PT operators and shared mobility services providers; Slow reaction time of public administrations versus the speed of changes; Need of skills at the public administration personnel **Technical:** Additional technological requirements	**Technical**: Sharing accurate information in real time	**Political/Strategic/Institutional:** Convince operators **Behaviour/Communication**: Convince people to use new app **Technical**: Raising or attempting to raise additional technical resources	**Low risk**

4.16. Measure M5 "Scaling up shared (and active) e-mobility services in Madrid Metropolitan area"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.16.1. General description

This measure aims to improve the **BiciMAD bike sharing system** performance through:

- **Bringing the system beyond the inner ring city** limits either as stand-alone bike stations or linking them to existing Park & Ride facilities managed by EMT (i.e. Avda. Portugal, or Recuerdo-Chamartín), or even new ones, to foster multimodality including active modes.
- **Development of a mobile BiciMAD station** (by using photovoltaic panels or other battery solutions but also including the possibility of connecting it to the grid supply on a temporary basis) and geofence. This mobile station will be used as an alternative mode in large events and as a backup for fixed stations out of service due to any reason. For this, the partner Avanza Bikes Will develop the mobile station which would have 12 charging points (docks) providing service up to 70 bikes dock and dockless/free-float (70 users), being able to operate 24 hours without human intervention from the operations teams. It will be possible to book a dock at the destination on the station and to combine payments and rates between origin docks on a BiciMAD station and free float bikes and docks of the final station or geofenced zone. As the BiciMAD current service, this new station will be integrated into the current BiciMAD software as well as in MaaS EMT and CRTM (physical card support). The dock technology will be compatible and integrated with the dock System European Patent of BiciMAD.
- Improving BiciMAD system by adding technology that allows **free-floating action**, in order to enhance its potential in outer districts of the city.

4.16.2. Interaction with other measures

Measure 5 is mostly related with measure 4 by feeding it with data from its stations and with measure 2, as one of its goals is to assess the possibility of bringing BiciMAD bikesharing system beyond the inner ring city limits by possibly linking them to the existing P&R facilities from M2 managed by EMT.

4.16.3. Impact indicators

Table 60: Output and objectives of measure M5 and selected impact indicators to monitor the impact of measure M5

Outputs	Objectives/ Targets	Impact indicators	Target group	Data units	Source/ Methodology	Frequency	Impact area
1 mobile bike station	Improving BiciMAD users satisfaction and increasing attractiveness for new possible users Ensure service functioning under special conditions Mode shift to bike	Users satisfaction Citizens willingness to use BiciMAD Safe perception of users	Citizens	Users´ satisfaction level User´s perception	Existing survey	Every 2-3 years	City
Temporary stations when one is out of service			Citizens	Number	Existing survey	Every 2-3 years	City
New BiciMAD stations out of M30 **Free-floating operations in outer districts of the city**		Number of shifts from car to bike	Citizens				City

4.16.4. Implementation process

4.16.4.1 Partners and stakeholders

Table 61: Overview of partners and stakeholders and their roles for measure M5

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
EMT	P	PT	L	EMT will provide the places on their P&R facilities for new BiciMAD stations
AVANZA BIKE	P	PR	P	Avanza Bikes will develop the mobile station
BiciMAD	P	PT	L	BiciMAD will assess the possibility of bringing the system beyond the inner ring city limits.
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.16.4.2 Risk analysis

Table 62: Overview of potential barriers and drivers for measure M5

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Involvement/Communication: Insufficient public awareness **Technical:** Not being able to address the self-standing electricity supply to the e-bike station on a reliable way **Financial:** Possible Cost effect in relation to how long the existing station is out of order **Spatial:** Lack of Space availability near station considered previously to moment of need **Cultural:** User concerns about safety when crossing M30 ring road	**Spatial**: Availability of space, particularly in less central areas that currently offer less bike coverage **Problem related**: Pressure to avoid malfunctioning within BiciMAD	**Technical**: Addressing self-standing electricity supply issue **Positional:** Improvement of an already existing service within the city **Institutional:** Bike safety campaigns Cycle lanes in more critical areas **Planning**: Plan ahead for mentioned barriers **Spatial:** Map available free spaces near the stations	**Low risk**

4.17. Measure M6 "Promoting clean mobility – (zero emissions) with supply/storage solutions"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.17.1. General description

Madrid City Council has already 45 fast charging points for electric vehicles, 32 of them are on public land and 14 on private land. Additionally, the city has also 153 standard charging points (plus 261 charging points for the municipal fleet, which are not publicly accessible). Beyond the city objective of reaching 150 fast charging points in 2023, the city is also working on how to better manage those charging services, both in terms of operations and diversity of services.

EMT Madrid developed the "Electro-EMT" service App in early 2018. It offers information on public fast charging infrastructure (CI) managed by EMT. The platform currently offers little information about 5 chargers and has limited functionality.

The measure is composed by two sub measures:

M6.1 Promoting clean mobility by providing charging facilities and better access info

The measure would upgrade Electro-EMT with new features that will improve access to zero emissions mobility.

- For the management of EMT charging infrastructure **ETRA** will develop an integration API (Application Programming Interface) to help EMT to develop a "hub" of its own applications. EMT will take care of the user interface and will migrate the identity (user) part of ElectroEMT to our single account model mPass (EMTIng) for the management of combined collection (post-payment of different MaaS services). The rest of the API is intended to interact with the various systems that manage the charging etc.
  The app will also include the charging infrastructure scheduled to be installed in the new Park & Ride facilities, addressing also the commuters' (interurban) needs.

- To promote clean mobility, the measure also includes **piloting a solution V2G** at one Park & Ride facility (able to be integrated with renewables and stationary storage), to test the bidirectional flow of energy from commuter cars and Smart managing of charger processes, with local consumption of energy to supply the parking facility during parking times and to optimise the charging of vehicles according to their use schedule. The V2G charging stations will behave as a stationary storage for the facility but with Dynamic constraints in the state of charge. This task will be carried out by the partner AYESA. Moreover, the Gridpilot platform (Ayesa ownership developed in Netfficient H2020 project finished 2018) that enables the participation of aggregated distributed energy resources in energy markets, will be integrated with the EMT app and platform. Therefore, Ayesa will customize the algorithms already developed for other markets and assets (specifically behind the meter and front the meter stationary storage) for the case of aggregation of V2G charging stations and classic charging stations. This will allow to manage the vehicle storage and the charging infrastructure to participate in regulation services such as demand response. The participation in energy markets will contribute to the business case of this application that provides an extra value to the parking operators obtaining revenues and savings in electricity bills.

M6.2 Fostering better services for new micromobility and bikes (BiciPARK)

To foster better services for new micromobility, the measure aims to improve the services provided by the BiciPARK solution (underground bike parking at certain car parks) by installing chargers for e-bikes and other type of personal electric mobility devices in at least three 3 of 7 BiciPARK secure underground parking facilities.

4.17.2. Interaction with other measures

Measure 6 is mainly linked to measure 4 as it will feed this last measure with data from Electro-ETM app and from mPass.

4.17.3. Impact indicators

Table 63: Output and objectives of measure M6 and selected impact indicators to monitor the impact of measure M6

Outputs	Objectives/ Targets	Impact indicators	Target group	Data units	Source/ Methodology	Frequency	Impact area
M6.1 **API "hub" to integrate EMT applications improved with new futures**	Promoting clean mobility by providing charging facilities and better access info (charging availability, booking options, etc)	Rate of use of EMT apps Share of e-cars in the city	Citizens	%	Data from EMT app managers	Midterm & at the end of the project	City
V2G pilot in at least one hub		V2G energy use	e-vehicle owners	kW/h back to grid	Data from V2G	Midterm & at the end of the project	City
Improved access to charging infrastructure and charging information		Rate of use of plugs and efficiency	e-vehicle owners	Number	Data from parking manager	Midterm & at the end of the project	City
M6.2 **E-bike chargers and other e-mobility devices in at least 3 BiciPARK facilities**	Better services for new micromobility and bikes	Number of cyclist Rate of use of BiciPARK facilities (different services, parking lots, plugs)	Bike users and possible users	Number	Data from BiciPARK managers	Midterm & at the end of the project	City

4.17.4. Implementation process

4.17.4.1 Partners and stakeholders

Table 64: Overview of partners and stakeholders and their roles for measure M6

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
Madrid´s city council	P	C	L	Madrid will support all the activities related with the measure like getting the proper regulation for the V2G pilot.
EMT	P	PT	P	EMT will improve the services provide in their BiciPARK facilities
AYESA	P	PR	P	AYESA will be in charge of piloting a V2G solution at one P&R facility
ETRA	P	PR	P	Etra will develop an integration API to help EMT to develop a hub of its own applications
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.17.4.2 Risk analysis

Table 65: Overview of potential barriers and drivers for measure M6

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Institutional: Lack of Cooperation between different stakeholders. Data sharing **Cultural:** People leaving car in the charging points for longer than needed and limiting its use **Technical:** Additional technological requirements **Planning:** • Current slow penetration of MaaS platforms • Dual use i.e. charging while doing another activity, reliability of immediate access to CP (currently parking time exceed charging time) **Organisational/Financial/Involvement:** Lack of profitable business models **Strategic/Institutional:** Lack of standardization or use of different protocols for communication at charging points	**Positional**: It is part of a sustainable mobility vision **Technological**: New potentials offered by technology, new technology available	**Involvement/Communication**: Raising public awareness **Technological**: Widely available, interoperable chargers for reducing loss in driving time; optimized CI utilization **Technical**: Raising or attempting to raise additional technical resources for the measure (all kinds of equipment), all kinds of actions to solve technological problems **Institutional:** Standardization of protocols/Enable as much as possible	**Low risk**

4.18. Measure M7 "Promoting active mobility by deploying car-free areas"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.18.1. General description

The City of Madrid signed the C-40 'Green and Healthy Streets Declaration' in December 2019. One of the commitments assumed by Madrid was the implementation of several zero emissions zones in the city by 2030, the Puerta del Sol pedestrianisation being the first of these zones. Its implementation has started on August 20th, 2020, its consolidation is expected by 2021.

These actions are part of the Sustainability Strategy "Madrid 360".

Puerta del Sol pedestrianisation will mean the enlargement of Puerta del Sol zero emissions zone. A preliminary study has been carried out to analyse how to remove 6 800 daily trips in the area: 1 100 correspond to cars, 4 000 to taxis. The enlargement of the zone will also include the deviation of bus routes. The action considers especially vulnerable users' needs.

Puerta del Sol includes a pedestrian area of about 8 400 m^2. Currently, there is a street open to traffic that runs through the square, Mayor. The location, symbolism and attractiveness of the square makes this point a large pedestrian concentration centre in the city, about 85 000 people walk down Mayor Street on a public holiday. In addition, with the great commercial, tourist and labour offer, it is one of the main mobility nodes of the city, with three lines of Madrid Metro and three others of the urban rail network.

SCALE-UP support will be used to **assess the results of this first Zero Emission zone, and to conduct a study to identify and plan zero emission zones in every district of the city**, in order to replicate and to scale them beyond city centres. EMT will cooperate in reorganizing its public mobility services affected by the pedestrianisation (bus service, BiciMAD, etc.)

4.18.2. Interaction with other measures

The measure is not directly related to the other measures.

4.18.3. Impact indicators

Table 66: Output and objectives of measure M7 and selected impact indicators to monitor the impact of measure M7

Outputs	Objectives/ Targets	Impact indicators	Target group	Data units	Source/ Methodology	Frequency	Impact area
M7.1 **Assessment of the enlargement of puerta del Sol zero-emissions zone (Pedestrianization of central city areas)**	• To enhance and promote active mobility • To improve liveability in dense city areas	• Acceptance level of local business • Citizens satisfaction on liveability • Car traffic flow avoided	• Local business in the area • Planning department in charge of the measure	Qualitative (searching key words i.e. citizens complaints in public opinion platform)	Madrid city council Platform data	Before and after the implementation of the measure	Local area and surrounding area
M7.2 **New up-scaled zero-emission zones in other districts**				Number of cars (before and after) in surrounding areas	Data from DGT	Before and after the implementation of the measure	

4.18.4. Implementation process

4.18.4.1 Partners and stakeholders

Table 67: Overview of partners and stakeholders and their roles for measure M7

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
Madrid´s city council	P	C	L	Madrid will oversee the implementation of the measure together with the corresponding back up regulations. They will conduct dissemination campaigns and will solve any possible doubt from citizens.
EMT	P	PT	P	EMT will cooperate by reorganizing its public mobility services affected by the pedestrianization
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.18.4.2 Risk analysis

Table 68: Overview of potential barriers and drivers for measure M7

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Institutional: Difficulty to obtain needed information for assessment **Planning/Institutional:** • Complexity of mobility flow reorganization in surrounding areas • Ensuring mobility and accessibility of residents, shop owners and urban businesses **Cultural:** Possible opposition from residents, shop owners and businesses	**Institutional**: Good communication with City (Facilitating information needed) **Cultural**: Positive impact in living standards for residents in said areas **Problem related**: Pressure to lower emissions **Planning:** Madrid 360 Targets	**Communication/Involvement**: Raising awareness of its positive impact in city life **Problem related:** Use existing zero-emissions as examples	**Medium risk**

4.19. Measure M8 "Nudging multimodality at regional level"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.19.1. General description

Madrid Region is one of the 17 autonomous regions of Spain. Around this central and main city, the Region is structured in rings. The first ring around the city is the metropolitan area with very strong relations with the main city, and the second ring comprises the rest of the region with small and medium sized municipalities in a more rural environment.

The public transport system for the Madrid region is a complex intermodal system with more than 40 operators giving services to users.

In this complex mobility and territorial context CRTM covers the provision of public transport services to the inhabitants of the entire Madrid Region and associated municipalities. Two thirds of the trips devoted in public transport daily, more than 5 million as average, are multimodal. For this reason, the improvement of multimodality at regional level has been at the core of CRTM's strategy since its creation.

Two main sub measures will be implemented within the project in order to incentivise multimodality and sustainability at regional level:

M8.1 Fostering sustainable and active travel by improving Green Routes programme

HaCon, as a technological partner of CRTM, will develop a route planner where users can find information about green routes within the region and their connection with public transport and other sustainable modes of transport. This app will be integrated in the MaaS action plan that will be developed within the project by CRTM. CRTM will prepare campaigns and communication actions in order to increase the number of people that use these green routes.

M8.2 Improvement in communication actions with special focus on large events

This sub measure has the main objective of promoting sustainable and multimodal travel to large events within the Madrid Region. These campaigns will include the creation of leaflets, maps, creation of secure routes for arriving to the places of the event, direct communication with the users, etc.

4.19.2. Interaction with other measures

This measure is related to P&R (M2) since people can get start green route in one P&R and linked to M4 since the app will be integrated in the MaaS action plan of CRTM.

4.19.3. Impact indicators

Table 69: Output and objectives of measure M8 and selected impact indicators to monitor the impact of measure M8

Outputs	Objectives/ Targets	Impact indicators	Target group	Data units	Source/ Methodology	Frequency	Impact area
M8.1 App to provide information about bike routes and their connection to PT in Madrid Region	Fostering sustainable and active travel by improving Green Routes programme	People awareness	Citizens		Data from CRTM	Every two years	City FUA
		• Rate of use of the app • Level of bikers satisfaction with app features	Citizens	• Number of app bike users • Number of queries in the app related to green routes	Data from CRTM	Every two years	City FUA
M8.2 Communication campaigns for fostering public transport and bike use in large events	Promote sustainable and multimodal travel focused mainly on large events	Improvement in communication campaign in large events	Citizens	Qualitative	Identification of a representative sample of large events to evaluate public transport and bicycle use promotion	Every two years	City FUA

4.19.1. Implementation process

4.19.1.1 Partners and stakeholders

Table 70: Overview of partners and stakeholders and their roles for measure M8

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
Madrid´s City Council	P	C	P	MAD and EMT will cooperate with CRTM in the development of potential incentives from their transport services under their competences.
EMT	P	PT	P	
CRTM	P	PT	L	CRTM will integrate the route planner app in the MaaS action plan
HaCon	P	PR	P	HaCon will develop a route planner for the Green Routes program.

Type: P: SCALE-UP partner - S: other stakeholder
Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other
Level of activity: L: Leading role - P: Principle participant - O: Occasional participant

4.19.1.2 Risk analysis

Table 71: Overview of potential barriers and drivers for measure M8

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Involvement/Communication: Insufficient awareness of existence of the service **Technical:** Not being kept up to date. **Involvement/Communication:** Not particularising information to all the targeted groups that would attend the event/ insufficient awareness	**Technological**: New potentials offered by technology, availability of information nudging changes in behaviour **Institutional:** Increasing the use of public transport and bikes would avoid disruptions in the urban mobility due to the event.	**Involvement/Communication:** Broadcast existence of the app **Communication**: Raising awareness in targeted groups in time for the event, through channels not related only to the place where it will take place (i.e. social media, national press)	**Low risk**

4.20. Measure T1: Multilevel governance and cooperation to develop sustainable travel chains in Turku region and Southwest Finland

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.20.1. General description

Turku is one of the urban nodes in the Finnish TEN-T network and has growing passenger flows from the region and abroad. The region consists of 5 sub-regions which are not connected by regional commuter trains. This has been recognized as a potential e.g. in the Vital Nodes -project. In 2021, the electrification of the track between Turku and Uusikaupunki was finalised, enabling the operation of a passenger train between two cities in the region: Turku, the region's capital, and Uusikaupunki, a significant employment area.

In this measure the activities thus **aim to reduce the need for private car transport in the region via creating travel chains**, developing **business co-operation and governance** for mobility development in the region. A **regional SUMP** will be approved and evaluated, and an organisational structure model developed to enable sustainable mobility development of the entire South-West Finland Region. The **possible organization of regional public transport and the network of travel chains and service entities** are also **mapped.** This will require close co-operation between municipalities, state administration and various business operators. A regional view of governance is essential as the project requires close cooperation between different parties in the area. For this purpose, **models for governing stakeholder cooperation and travel chain procurements** are developed. This has been highlighted as one of the focuses in the new Finnish state agreement concerning land use, housing and transport (MAL 2020-2031)

As part of this measure's process, the **launch of regional train traffic between Turku - Loimaa and Turku – Uusikaupunki is promoted** and further developed. The potential of regional train traffic in the Loimaa direction is especially related to the opportunities for urban train traffic between the growing urban areas of Turku and

Tampere. The promotion of regional rail transport is also one of the measures in the transport system plans of the Turku Region and Southwest Finland 2040+.

4.20.2. Interaction with other measures

This measure supports the planning process of sustainable transport solutions of the upcoming Travel and Service centre in the City of Turku and other mobility nodes in Southwest Finland (measure T2).

4.20.3. Impact indicators

Table 72: Output and objectives of measure T1 and selected impact indicators to monitor the impact of measure T1

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
T1.1 **The creation of a new governance structure model that enables sustainable mobility development of the entire South-West Region. This includes a new regional way of working/ procuring/ contracting for improved sustainable regional travel chains, and a new way of working with the businesses connected to mobility services**	Governance structure model that supports sustainable mobility development has been created	Quality of cooperation structures with stakeholders	Stakeholders	Turku + FUA	Score (0-5)	Interviews directed at local and regional decision makers LEM assessment	Baseline: early 2022 Follow-up: mid-2024

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
T1.2 **Approved and evaluated regional SUMP**	5% decrease in number of private cars commuting to Turku	Quality of the Sustainable Urban Mobility Plan Quality of policies, plans, and programs	Decision makers	Turku + FUA	Score (0-5)	Interviews directed at local and regional decision makers Review of plans, policies & programs LEM assessment	Baseline: early 2022 Follow-up: mid-2024
		Average modal split in number of trips	Turku region citizens	Turku region	%	Traffic environment survey (regional data), City level survey, data from the Centre for Economic Development, Transport and the Environment Questions about mode	Traffic env. survey: Baseline 2021, follow-up 2023 City level survey: Baseline early 2022 Follow-up mid-2024
		CO_2 and other emissions saved by modal change	Turku region citizens	Turku region	CO_2 (tons)	Traffic environment survey, City level survey CO_2 calculation based on questions on mode shift	
		Acceptance level of the governance structure model	Traffic operation working group	Turku	%	Targeted survey, questions on acceptance of governance structure model	Baseline: early 2022 Follow-up: mid-2024

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
T1.3 **Passenger / regional train promoted between Turku and Loimaa or Uusikaupunki**	A common understanding reached between the municipalities on the planning of the regional train	Citizens satisfaction with transport services at nodes (Turku, Uusikaupunki, loimaa)	Turku + FUA citizens	Turku + FUA	Score (0-5)	City level survey for Turku city; local surveys for some of the FUA municipalities Question on satisfaction with transport services at nodes	Baseline early 2022 Follow-up mid-2024

4.20.1. Implementation process

4.20.1.1 Partners and stakeholders

Table 73: Overview of partners and stakeholders and their roles for measure T1

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
Regional council of South-West Finland	P	Other	L	Lead partner
City of Turku	P	C	P	Measure partner
FUA municipalities	S	C	P	Measure cooperation partners
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.20.1.2 Risk analysis

Table 74: Overview of potential barriers and drivers for measure T1

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Mandate/budget: At the moment there is no organization that has a mandate or budget for measures including infrastructure or decision-making at regional level rail commuting. The final decisions are always made in the councils of the municipalities The interests of the municipalities do not always meet the interests of the region, which leads to conflicts and have a negative impact on the regional sustainable urban mobility objectives.	**Cooperation structures**: Joint cooperation structures are established between the region's municipalities	**Political:** Political discussion on the regional rail network governance	**High risk**

4.20.2. Supporting activities

A regional traffic environment survey has been conducted (2016, 2019, 2021) by the regional council, providing information on public preferences on transport and mobility. There are well-established stakeholder cooperation mechanisms in traffic planning with the region's municipalities.

4.21. Measure T2 ": Implementing mobility hubs in the Turku region"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.21.1. General description

The development of mobility nodes is highlighted in the current Finnish state agreements concerning land use, housing and transport (MAL 2020-2031). The creation of travel chains and mobility services as part of smooth public transportation is one of the main focuses in the SECAP plan of the city of Turku (approved 2018).

Currently the city of Turku and the Region of Southwest Finland do not have any small or large scale mobility hubs. There is a decision to **develop a larger Travel and Service centre that would serve as the main mobility hub in the city of Turku and in the Region** of South-West Finland. This is part of the current Finnish state agreements (MAL). This new travel centre is to combine the services of the current train and bus station, at the same time enabling a wide array of different mobility services. The estimated time of construction of the Travel Centre is 2024-2029.

In this measure, the focus is on **creating new mobility services** to the region together with companies and **developing the preconditions for successful services in the multimodality mobility hub.** The services are first piloted at the regional level in the Loimaa and Uusikaupunki station areas and in the city of Turku at the current long-distance bus station, which is situated in the proximity of the future Travel and Service centre location. The services to be **tested at these station areas include at least the following: shared mobility, last mile logistic delivery, repair services, parking services and information services.**

The mobility service operations will be **evaluated and scaled up** accordingly. In Turku, the mobility hub operator outcomes are then multiplied in two key mobility nodes (the harbour area and the Kupittaa business area) and the lessons learnt from the measure are incorporated into the planning and procurement documents of the Travel and Service centre. In the region of South-West Finland, the outcomes are incorporated into the future regional development plans.

4.21.2. Interaction with other measures

The measure is realized in synergy with measure T1, T3, T4 and visible on the T5 regional mobility data platform. The mobility services tested in the measure will contribute to the promotion of the regional train (T1) at the regional train hubs, as well as the MaaS services and adaptive parking solutions developed in T3. In T4, a mobility portal combining sharing of capacity of personal transportation and logistics on one platform is developed, and these outcomes can be applied at the hubs in the planning of the logistic and personal transportation within the city of Turku as well as on the regional level.

4.21.3. Impact indicators

Table 75: Output and objectives of measure T2 and selected impact indicators to monitor the impact of measure T2

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
T2.1. A multimodal mobility hub at the proximity of the bus station in Turku in use with at least 5 different mobility operators	Increase in number of users of the mobility hub during the project lifetime	System usage	Service users at hubs	City of Turku + FUA	Frequency (users/ unit of time)	System data on user frequency	2023 / 2024
T2.2. New services: shared mobility, last mile logistic delivery, repair services, parking services and information services.	More jobs around the hubs	Job/sales impact		Hub areas	€	Calculation based on secondary data from the city / municipality / Centre for Economic Development, Transport and the Environment	Baseline 2022 Follow-up 2024
	Citizens are satisfied with the services offered	Awareness level	Citizens	City of Turku + FUA	%	City level survey for Turku city, local surveys for some of the FUA municipalities Question about awareness of mobility hubs	Baseline 2022 Follow-up 2024
	Citizens are aware and using the services offered in the nodes	Acceptance level	Citizens	City of Turku + FUA	%	City level survey for Turku city, local surveys for some of the FUA municipalities Question about acceptance of mobility hubs & their services	Baseline 2022 Follow-up 2024

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
	Mobility services are used at the hubs	Modal split	Service users at hubs	City of Turku + FUA	%	Targeted survey to service users at hubs to explore possible modal choices	In 2023/ 2024 when services are running
		Citizens satisfaction with transport services	Service users at hubs	City of Turku + FUA	Score (0-5)	City level survey for Turku city, local surveys for some of the FUA municipalities; also possible to have targeted surveys in relation to the services (e.g. via apps) Question about satisfaction in transport services	Baseline 2022 Follow-up 2024
T2.3. Transport services in Turku and the region. The operations have passed the feasibility stage and are scaled up accordingly. The travel and Service centre plan and procurement plans incorporating all the lessons learnt have been developed. **Two mobility pilot nodes are tested in the region with park and ride solutions.**		Qualitative appraisal (yes/no)					

4.21.1. Implementation process

4.21.1.1 Partners and stakeholders

Table 76: Overview of partners and stakeholders and their roles for measure T2

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
Regional Council of South-West Finland	P	C	P	Partner
Turku city	P	Other	L	Lead partner
FUA municipalities	S	C	P	Cooperation parties in measure implementation
Transport service providers	S	PR	P	Cooperation parties in measure implementation (providers of mobility services)

Type: P: SCALE-UP partner - S: other stakeholder
Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other
Level of activity: L: Leading role - P: Principle participant - O: Occasional participant

4.21.1.2 Risk analysis

Table 77: Overview of potential barriers and drivers for measure T2

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Communication: Creating the concept of mobility hub **Business/economy:** Increasing the service structure available – business models, customers, integrations. Lack of economic sustainability of short-term pilots **Positional:** Land use issues (land ownership) and creating win-wins. Potential resistance from the local businesses against sustainable mobility modes **Financial:** Some infrastructure work is probably needed. Regional Council can't make the decisions about the infrastructure of the station areas of the municipalities	**Cooperation structures:** Joint cooperation structures are established between the region's municipalities. Stakeholder work is ongoing in several of city's processes e.g. related to mobility services.	**Involvement**: Heavy emphasis on stakeholder involvement to avoid risks related to positional barriers	**Medium / high risks**

4.22. Measure T3 "Introducing MaaS ticket combos and adaptive parking in Turku region"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.22.1. General description

Mobility as a Service has been identified as one of the key areas to develop in the field of mobility and transport of the city of Turku. This is indicated in the Climate Plan 2029, in the Finnish state agreement concerning land use, housing and transport (MAL), and also in the spearhead projects. So far, the Turku Regional Public transport has developed a MaaS platform that is technically able to integrate different operations together. This does not include a sales platform. Ticket integrations have also been tailor made for each individual case and are not generic. In addition, all negotiations have been carried out separately with each operator.

During 2020, the city of Turku has digitalized its parking management and thereby created an opportunity to combine data sets for introducing new innovative parking services.

This measure is divided into two sub-measures. In T3.1, **an open interface for event tickets combinations to the public ticket** system is created, tested and marketed towards different event actors. A platform enabling different mobility ticket combinations is created and tested with the combinations of park and ride tickets with public transport tickets as part of the TEN-T network, event guidance and interurban travel chains.

An important part of the measure is to create a systematic MaaS ecosystem with stakeholder engagement. This would bring up synergies especially regarding the data and marketing. As part of the development, MaaS business cases are identified, tested and evaluated in the city of Turku.

In T3.2, the city of Turku will also develop **the parking hub platform by integrating new data sets and testing 3 adaptive parking solutions** in different locations, including park and ride tests in connection with events. The pilots exploit Artificial

Intelligence, the parking hub platform and mobility data platform (T5) which indicates the current status of the pilot parking spaces.

4.22.2. Interaction with other measures

This measure is connected to T2, T5, T8 and T9. MaaS services can be piloted at the hubs (T2), and they will be integrated to the mobility data platform (T5). In T8, mobility services will be incentivized. In T9, mobility guidance in connection with events and exceptional circumstances is developed, thereby also facilitating the usage of mobility services in the city.

4.22.3. Impact indicators

Table 78: Output and objectives of measure T3 and selected impact indicators to monitor the impact of measure T3

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
T3.1 **Implementation of a generic sales platform that enables different ticket combinations** **Development of a MaaS ecosystem for operators to provide a functioning back-end for services** **Development and testing of at least 4 MaaS business cases with different service providers** **Testing of the feasibility of park and ride ticket combos** **Interface for event tickets with at least 5 actors**	25 % increase of PT ticket combination sales with event tickets	System usage	Service users	City of Turku	Frequency (users/ unit of time)	System data on user frequency, derived from PT operator Föli	Baseline 2022 Follow-up 2024
		Average operating revenue	MaaS operators		€	Calculations based on secondary data derived from operators	Baseline 2022 Follow-up 2024
	Awareness and acceptance of MaaS services has increased in the city	Awareness level	Citizens	City of Turku	%	City level survey Question on awareness of MaaS services	Baseline 2022 Follow-up 2024
		Acceptance level	Citizens	City of Turku	%	City level survey Question on acceptance of MaaS services	Baseline 2022 Follow-up 2024

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
		Citizen satisfaction in MaaS services	Citizens	City of Turku	Score (0-5)	City level survey + operator surveys Question on satisfaction in MaaS services	Baseline 2022 Follow-up 2024
T3.2 **Parking hub platform that combines datasets that support innovative adaptive parking and testing of at least 3 solutions**		Parking demand	Motorists using the parking hub services	City of Turku	Ratio (0-1)	The ratio of number of vehicles parked in a duration to the number of parking spaces available will be calculated based on information derived from different parking operators	In 2023/ 2024 when services are running
		CO_2/NO_x/PM level	Motorists using the parking hub services	City of Turku	Tons of CO2/ NO_x/PM	Calculated based on parking demand	In 2023/ 2024 when services are running

4.22.1. Implementation process

4.22.1.1 Partners and stakeholders

Table 79: Overview of partners and stakeholders and their roles for measure T3

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
City of Turku	P	C	L	Lead partner
MaaS service providers	S	PR	P	Service providers
PT operator Föli	S	PT	P	Provider of the open interface/platform
Parking operators	S	PR	P	Providers of data to the parking hub platform
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.22.1.2 Risk analysis

Table 80: Overview of potential barriers and drivers for measure T3

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Involvement/positional: Issues with systematic work with MaaS operators: Monitoring of the services/sanctions, use of street space, parking, complaints from citizens, digital platforms and how to use them in the work **Technical:** Not all of the on-street parking available as digital twin, e.g. disabled parking permit. Not all parking permits available with GPS coordinates	**Involvement/ communication:** Stakeholder work started in CIVITAS ECCENTRIC forms a good basis for further cooperation	**Involvement/ communication:** More systematic stakeholder cooperation needed	**Medium risk**

4.23. Measure T4 "Creating a mobility portal combining personal transportation and logistics"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.23.1. General description

Currently the city of Turku does not combine personal transport services with logistic transport services. All of the services are contracted separately and designed by the service providers individually.

In the measure, the city of Turku pilots a **mobility portal combining sharing of capacity of personal transportation and logistics on one platform, demonstrating the possibilities to combine freight movements.** Through the measure, different combination possibilities of different service providers are simulated, tested and analysed through. Based on the lessons learnt and their feasibility, the outcomes are applied in the planning of the logistic and personal transportation within the city of Turku and possibly also on the regional level. Development of such logistic solutions is included in the current Finnish state agreements concerning land use, housing and transport (MAL)

As part of the measure, the city of Turku will act as a facilitator for business. This is especially important to small fleet operators and individual entrepreneurs. The importance of this has risen in the current pandemic situation. The portal makes it easy to 1) offer capacity for public tendering / jobs, 2) provide access to technology unaffordable otherwise.

4.23.2. Interaction with other measures

This measure is linked with the measure T5 and T7. Data connected to this measure can be displayed on the mobility data platform developed in T5. SULP development and enhancement of freight distribution processes in T7 are connected to the development of the mobility portal.

4.23.3. Impact indicators

Table 81: Output and objectives of measure T4 and selected impact indicators to monitor the impact of measure T4

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
The creation of scenarios of different inclusion levels of combining personal and logistic transportations on city and regional level **Testing of the portal with at least 4 different transportation and logistics operations** **Different service providers are able to offer their vacant spaces on the portal for others to use as part of business facilitation.** **New services are enabled via the creation of the platform**	Reduction of freight movements	Average operating costs		Mobility portal	€	Calculation based on data derived from mobility portal owner Turku city	2024
		Total number of freight transport movements	Fleets	City of Turku	%	Calculated based on mobility portal data	In 2023/ 2024 when services are running
		Modal split in freight transport	Fleets	City of Turku	%	Targeted survey Question on mode	In 2023/ 2024 when services are running
		System usage	Fleets	City of Turku	Frequency (users/ unit of time)	Calculated based on mobility portal data	In 2023/ 2024 when services are running
		CO_2 emissions	Fleets	City of Turku	Tons of CO_2	Calculated based on information on modal split / VKT	In 2023/ 2024 when services are running
		VKT	Fleets	City of Turku	Km	Targeted survey Question on VKT driven	In 2023/ 2024 when services are running

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
		Operator satisfaction in mobility portal	Transportation and logistics operators	City of Turku	Score (0-5)	Targeted survey Question on satisfaction in the mobility portal	In 2023/ 2024 when services are running
		Multimodal integration for persons/freight	Transportation and logistics operators	City of Turku	Index between 0 and 1	SUMI methodology, data collected from representatives of local transportation and logistics operators	2022 / 2024
		Sharing of free capacity	Transportation and logistics operators	City of Turku	%	Targeted survey Question on willingness to share capacity and actual shared capacity	In 2023/ 2024 when services are running
		Occupancy/ utilization rate of fleet	Transportation and logistics operators	City of Turku	%	Targeted survey Question on occupancy rate	In 2023/ 2024 when services are running

4.23.4. Implementation process

4.23.4.1 Partners and stakeholders

Table 82: Overview of partners and stakeholders and their roles for measure T4

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
Vinka	P	PR	L	Lead partner
City of Turku	P	C	P	Partner, owner of portal
Freight and logistics operators	S	PR	P	Users of mobility portal
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.23.4.2 Risk analysis

Table 83: Overview of potential barriers and drivers for measure T4

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Involvement: Difficulties in getting stakeholders (service owners and fleet operators) to get involved. Difficulties may be due to: • contractual situation: is not possible to introduce new technology or processes due the contract between the stakeholders • lack of resources: stakeholders are not able to allocate resources in introducing new technology and processes • lack of interest: stakeholders are not motivated enough to allocate resources in taking new technology and processes as part of service production	**Financial/ resourcing:** Stakeholders buy the long term benefits: • less manual work • easier tendering processes • lower cost base	**Involvement/ communication**: Raising awareness of the long term benefits among stakeholders and involving them in the service definition process.	**High risk**

4.24. Measure T5 "Implementing a real time regional mobility data platform"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.24.1. General description

Currently the city of Turku has a guide map (https://opaskartta.turku.fi/ims/) that displays the construction sites, information on public transportation routes and parking zone areas, for example. In Autumn 2019, the city of Turku launched a new Service map. The Service Map (https://www.turku.fi/services/map) is an open information channel on the service points and services offered by the City of Turku. It helps the inhabitants of the municipality find current information on services offered by the city, as well as on the accessibility of the services. Using the Map, it is possible to provide feedback and engage in open conversations directly with the people in charge of the services and the service points. The user interface for the service map has been accessible since the end of 2020.

In this measure **an online mobility data platform is designed, implemented and marketed for the users as part of the Service map of the city of Turku.** This is part of the current Finnish state agreement concerning land use, housing and transport (MAL). The platform will be done using open source code and can therefore be scaled up easily. In the first stage the data will cover the city of Turku and after that will be enlarged to the Southwest Region of Turku.

The city of Turku has actively opened data sets and now these will be displayed on this new platform. This map showcases **real time data on a variety of mobility and transport topics, such as parking places, maintenance information especially during the winter time, construction works, traffic flows, train, plane and cruise traffic, and weather conditions.** In addition to real time data, this map shows the historic development for example on cycling measurement points in the city.

A specific focus of this measure is to use the developed mobility data platform in connection with **event guidance and during exceptional circumstances.** This requires the combination of datasets from the fire department, police and the traffic monitoring centre. An important part of the measure is the **marketing and**

integration of the mobility platform to a variety of communication channels (public and private).

4.24.2. Interaction with other measures

This measure is connected to all the measures carried out in Turku, as their outputs or data generated will be integrated onto this platform.

4.24.3. Impact indicators

Table 84: Output and objectives of measure T5 and selected impact indicators to monitor the impact of measure T5

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
An online mobility data platform at regional level. **Contribution of external service providers to the platform.** **The platform is used for event guidance and during exceptional circumstances.** **10 good quality data sets are in active use** **Integration of data platform to at least 3 applications**	Users have found the mobility platform and are actively using it.	Awareness level	Citizens	City of Turku	%	City level survey Question on awareness on mobility data platform	Baseline 2022 Follow-up 2024
		Acceptance level	Citizens	City of Turku	%	City level survey Question on acceptance of mobility data platform	Baseline 2022 Follow-up 2024
	Improved efficiency of use of mobility data and subsequent changes in travel modes	System usage	Citizens	City of Turku	Users/ unit of time	Calculated based on mobility data platform usage data	Yearly rise in use
		Citizen satisfaction in mobility portal	Citizens	City of Turku	Score (0-5)	City level survey + a user survey on the platform Question on satisfaction in the mobility data platform	Baseline 2022 Follow-up 2024
		Modal shift due to mobility portal	Citizens	City of Turku	€	Measure financial data	
		Capital investment costs	Mobility portal		%	Platform user survey Question on mode choice and the mobility data platform	2024

4.24.1. Implementation process

4.24.1.1 Partners and stakeholders

Table 85: Overview of partners and stakeholders and their roles for measure T5

Partner / other actors	Type **P-S**	Type of organisation **C-PT-KI-NG-PR-other**	Level of activity **L-P-O**	Role
City of Turku	P	C	L	Lead partner
Mobility service providers	S	PR	P	Providing data on the platform
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.24.1.2 Risk analysis

Table 86: Overview of potential barriers and drivers for measure T5

Potential barriers	**Potential Drivers**	**Activities to be taken to achieve measure aims**	**Risk level**
Involvement/Communication: Getting the users to the portal. How to avoid the information overload? **Financial:** Securing financing for the future development of such portal **Data-related:** The quality of the data sources – challenge as dealing with multi-operator information	**Technological**: The platform will be done using open source code and can therefore be scaled up easily. The mobility platform is directly integrated into the Service map of the city, thus ensuring a stable and constant exploitation of it after the project.	**Involvement/ communication:** Marketing and integration of the mobility platform to a variety of communication channels (public and private).	**Medium risk**

4.25. Measure T6 "Speeding up inclusive cycling in Turku"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.25.1. General description

The city of Turku has a bicycle development plan for 2029 (2016) that highlights the need for cycling coordination and targeted actions. Currently the only actions are carried out by the regional public transportation authority that arranges a school tour for first graders annually. For cycling or walking, however, there is no sustainable mobility activation available for kindergartens or schools. This has been recognized as a weakness that needs to be addressed holistically, focusing on inclusiveness and availability of services .

The city of Turku has had a bike sharing system operating since 2018, but no e-bikes are yet available for sharing. The need for e-bikes is indicated in the Climate Plan/SECAP 2029. Moreover, there is a lack of bicycle services that answer the needs of families, groups of children and regular cyclists.

In this measure **an inclusive sustainable mobility activation model is designed and tested in two kindergartens and in three schools** and then scaled up. The model aims to increase the **skill sets of children** and families on sustainable transport modes. In addition, the physical conditions are mapped and improved in the test units to support the activation. A specific focus is placed on **targeted communication activities in the test units, on inclusive services,** and in having a designated person to coordinate all the cycling activities in the city.

In the measure **a minimum of three new bicycle services (e-cargobikes, children bikes and repair stations) and e-bike sharing** are designed, piloted, analysed and scaled up accordingly.

4.25.2. Interaction with other measures

This measure is linked with T2, T5, T8 and T10. The cycling services developed in the measure can be upscaled in the hubs (T2) and will be integrated to the mobility data platform. The incentivisation approach in T8 will be utilized in the activation model development. Winter-time active mobility promotion (T10) is an essential part of the sustainable mobility activation model in this measure.

4.25.3. Impact indicators

Table 87: Output and objectives of measure T6 and selected impact indicators to monitor the impact of measure T6

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
Sustainable mobility activation model has been tested in 5 units (three schools and two daycares) and scaled up at least to 5 more units. **Three new bicycle services have been tested and scaled up according to the results.** **100 shared e-bikes have been tested during the project time.**	10% increase (year-round average) in the number of children and families cycling (activation model participants)	Acceptance level of sustainable transport	Daycare/school children + parents	Selected daycares / schools in Turku	%	Targeted survey directed at children and parents Question on acceptance of sustainable transport modes (year-round average as % is bound to vary between seasons)	Baseline 2022 Follow-up 2023
		Citizens satisfaction with transport services	Daycare/school children + parents	Selected daycares / schools in Turku	Score (0-5)	Targeted survey directed at children and parents Question on satisfaction with transport services offered	Baseline 2022 Follow-up 2023
		Average modal split in number of trips of activation model participants	Daycare/school children + parents	Selected daycares / schools in Turku	%	Targeted survey directed at children and parents Question on mode choice	Baseline 2022 Follow-up 2023

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
		Average walking/cycling time per week	Daycare/school children + parents	Selected daycares / schools in Turku	min/ week	Targeted survey directed at children and parents Question on average walking / cycling time	Baseline 2022 Follow-up 2023
		CO_2 and other emissions saved by modal shift	Daycare/school children + parents	Selected daycares / schools in Turku	Tons of CO_2	Targeted survey directed at children and parents Calculated based on modal split	Baseline 2022 Follow-up 2023
		Perception of safety	Daycare/school children + parents	Selected daycares / schools in Turku	Score (0-5)	Targeted survey directed at children and parents Question on perceived safety related to walking, cycling and using the bus. This is an intermediary indicator used to compare with biking skills estimations by parents	Baseline 2022 Follow-up 2023
		Biking skills	Daycare/school children of specific age groups	Selected daycares / schools in Turku	Score (most likely 1-10)	Testing of biking skills (e.g. balance, motors skills) at daycares / schools. Exact testing method to be determined.	Baseline fall 2022 Follow-up spring 2023

4.25.1. Implementation process

4.25.1.1 Partners and stakeholders

Table 88: Overview of partners and stakeholders and their roles for measure T6

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
City of Turku	P	C	L	Lead partner
University of Turku	S	KI	O	Nudge planning for the activation model
Daycares and schools in Turku	S	Other	P	Target groups of activation model
Parents and children	S	Other	P	Target groups of activation model
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.25.1.2 Risk analysis

Table 89: Overview of potential barriers and drivers for measure T6

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Funding: Business models, viability after trials **Involvement:** Identification for the right level of service and the right locations. Marketing and reaching the test users **Positional:** Scalability and operational model of the activation model with low resources available **Planning:** Planning of effective nudges especially for wintertime challenging	**Planning**: local and national programs ongoing regarding active transport modes in schools / families	**Involvement/ communication:** strong focus on stakeholder involvement work	**Medium risk**

4.25.2. Supporting activities

Ongoing Academy of Finland funded research project Climate Nudge researches the possible nudges for school children. Cooperation with this project is active.

4.26. Measure T7 "Fostering carbon free city logistics and construction sites"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.26.1. General description

So far, the city of Turku has had logistics pilots with companies regarding logistic hubs and light e-vehicles in last mile deliveries. These initiatives together with the development of the city centre, events and large construction sites have raised the need for a Sustainable Urban Logistic Plan (SULP). This has been acknowledged as one of the key areas in Turku Climate Plan 2029 in regard to larger intake of e-vehicles and improvement of safety in several areas.

This measure is divided into two sub-measures. In T7.1., the city of Turku will **develop a Sustainable Urban Logistic Plan with large stakeholder involvement.** This plan focuses on enhancing freight distribution processes **towards carbon neutrality**, i.e. electrification and use of biogas in logistics. As part of the measure, the different actions carried out by the stakeholders will be showcased through social media and communication campaigns. The measure entails a specific focus on event logistics.

The city of Turku has committed to the **Green Deal of construction sites.** This means that by 2030, 50% of all the construction transportations and sites in the city will be done fossil free. The aim is that by 2022, all the city's own construction sites will be fossil free.

In T7.2, **a road map for the fossil free construction sites will be developed.** This measure also includes testing of a measurement model for the verification of fossil free construction operations in selected sites and promotion of e-vehicles/machines and charging infra for construction purposes. The lessons learnt from it will be incorporated into the procurement criteria of the city of Turku.

4.26.2. Interaction with other measures

This measure is linked with T2, T3, T5 and T9. SULP development benefits from the mobility services tested at the hubs (T2, T3), information generated in the measure will be integrated to the mobility data platform (T5), and the e-mobility guidance concept for events (T9) will benefit from the event logistics focus of this measure.

4.26.3. Impact indicators

Table 90: Output and objectives of measure T7 and selected impact indicators to monitor the impact of measure T7

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
T7.1. An approved Sustainable Urban Logistic Plan **Number of showcased actions in sustainable logistics**		Acceptance of SULP	Stakeholders	City of Turku	%	Targeted survey / interviews, question on SULP acceptance	2024
	Increase in the number of e-vehicles in logistics	Share of e-vehicles Number of e-vehicles					
	Less emissions from logistics	CO_2/NO_x/PM level (freight)	Fleets	City of Turku	Tons of CO_2/ NO_x/ PM	Estimation based on replacement of combustion engine vehicles. Data to be derived from surveys / city statistics	TBD
T7.2. A road map for fossil free construction sites in Turku	Increase in the number of e-vehicles in construction work	CO_2/NO_x/PM emissions at construction sites	Construction companies at city construction sites	City of Turku	Tons of CO_2/NO_x/ PM	Data from a targeted survey Calculation based on types of machinery used	Baseline 2022 Follow-up 2024
Testing and usage of a calculation method for verification of fossil free construction operations		Use of clean energy resources at construction sites	Construction companies at city construction sites	City of Turku	%	Data from a targeted survey Calculation based on types of machinery used	Baseline 2022 Follow-up 2024

4.26.1. Implementation process

4.26.1.1 Partners and stakeholders

Table 91: Overview of partners and stakeholders and their roles for measure T7

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
City of Turku	P	C	L	Measure leader
Construction companies	S	PR	P	Stakeholders in developing the road map for fossil-free construction sites
Freight and logistics companies		PR	P	Stakeholders in developing the SULP
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.26.1.2 Risk analysis

Table 92: Overview of potential barriers and drivers for measure T7

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Problem-related: SULP is a new approach in the city and there may be a challenge in integrating the approach into existing work and creating a systematic line of action in the future. The "ownership" of logistics in the city of Turku and on regional level governance-wise is yet to be defined. **Positional:** The role of the city in the roadmap for fossil free construction sites is undefined at this stage. What actions can the city take when it comes to private construction companies? The city has no direct influence on construction sites. To gain influence beyond the city's own construction sites, there is a need to involve stakeholders across the whole building supply chain.	**Problem-related:** The issue has already been prepared in another project (Carbon-neutral and resource-wise solutions for industrial areas –project 2019-2021" and this will provide a good background with for the test pilot in Turku. **Political/ strategic:** Turku signed a voluntary agreement to reduce emissions at construction sites in 2020.	**Involvement/ communication:** Strong focus on communication and stakeholder involvement resourced for the measure	**High risk**

4.26.2. Supporting activities

A Master plan for e-charging and a citizen campaign to support it are devised in H2020 project USER-CHI. This process starts in Spring 2022.

4.27. Measure T8 "Incentivization of mobility services in Turku"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.27.1. General description

Direct incentivization of target groups has been found an effective method in influencing mobility behaviour. So far Turku has not carried out any incentives/nudges in the mobility context. The need to address this has been identified in the Wellbeing and activity strategic programme of the city. Turku is currently developing a centralized **Customer Relationship Management system** which will allow for the categorization of customer segments and subsequent development of target group –specific marketing, incentives and experiments with nudging to influence mobility behaviour.

In this measure, **incentive schemes and nudges will be developed and tested.** This development work requires service design, identification and profiling of user segments, stakeholder engagement, negotiations with different service providers and developing and carrying out marketing campaigns for specific target groups.

4.27.2. Interaction with other measures

This measure is connected to T5, T6 and T10. The development and testing of incentive schemes and nudges facilitates the activation model development in T6 and winter mobility promoted on T10. Data connected to this measure can be displayed on the mobility data platform developed in T5.

4.27.3. Impact indicators

Table 93: Output and objectives of measure T8 and selected impact indicators to monitor the impact of measure T8

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
Development and testing of at least 10 mobility incentive schemes **5 000 users have been categorized and analysed.**	20% rise of the share of sustainable transport modes among the tester groups	Average modal split in number of trips of participants to incentive schemes	Incentive scheme participants	City of Turku	%	Targeted survey Question on modal split	Baseline 2022 Follow-up 2024
	Sustainable mobility changes among tester groups have come about due to incentive programmes.	Average walking/cycling time per week	Incentive scheme participants	City of Turku	Min/ week	Targeted survey Question on average walking / cycling time per week	Baseline 2022 Follow-up 2024
		Acceptance level	Incentive scheme participants	City of Turku	%	Targeted survey Question on acceptance of mobility services	Baseline 2022 Follow-up 2024
		Citizens satisfaction with transport services	Incentive scheme participants	City of Turku	Score (0-5)	Targeted survey Question on satisfaction in mobility services	Baseline 2022 Follow-up 2024
		Image on the walking conditions (subjective)	Incentive scheme participants	City of Turku	Score (0-5)	Targeted survey + city level survey Question on the image on the walking conditions	Baseline 2022 Follow-up 2024

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
		Image on the cycling conditions (subjective)	Incentive scheme participants	City of Turku	Score (0-5)	Targeted survey + city level survey Question on the image on the walking conditions	Baseline 2022 Follow-up 2024

4.27.1. Implementation process

4.27.1.1 Partners and stakeholders

Table 94: Overview of partners and stakeholders and their roles for measure T8

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
City of Turku	P	C	L	Lead partner
PT operator Föli	P	PT	P	Access to PT customer base via the CRM system
University of Turku	S	KI	P	Planning of incentive schemes
Turku University of Applied Sciences	P	KI	P	Planning of incentive schemes
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.27.1.2 Risk analysis

Table 95: Overview of potential barriers and drivers for measure T8

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Technological: The CRM system is novel to the city, hence work needs to be done in utilizing it for incentive purposes. **Planning:** How to come up with viable different incentives that have the desired (long-term) impact? **Involvement/ communication:** How to reach the customers and get the needed data about them? **Communication:** How to create the shared understanding of mobility services for the citizens and media?	**Technological**: The cooperation with the research projects of University of Turku a good basis for incentivization	**Planning:** Thorough planning and pre-testing of pilots. Planning based on a proven scientific approach.	**Medium risk**

4.27.2. Supporting activities

Ongoing Academy of Finland funded research project Climate Nudge and Turku city research project City Nudge provide a solid background for developing and implementing the nudge pilots. Cooperation with these project has been ongoing from the start of SCALE-UP.

Cooperation with these projects has been ongoing from the start of SCALE-UP.

4.28. Measure T9 "Mobility guidance in connection with events and exceptional circumstances"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.28.1. General description

Currently the city of Turku is developing its physical guidance signs in the centre of the city and the process in connection with the events. There is no plan available for the **electronic guidance in the city** and a need for this has been recognized as a focus area to develop especially during events and exceptional situations in the Finnish state agreements concerning land use, housing and transport (MAL 2020-2031).

Effective mobility guidance in cities improves citizen, visitor and company experience by making mobility easier and safer. The need to develop mobility e-guidance particularly in connection with events towards visitors and service providers (logistics) has been recognized in Turku. In this measure, **an e-mobility guidance concept will be developed and tested.** This concept will take into account the needs of different mobility modes, user groups and logistics during e.g. big sport or cultural events in the city centre. Also it will focus on the need for mobility guidance under exceptional circumstances, such as during constructions works, natural catastrophes or pandemics.

In this measure **at least five different guidance solutions are piloted for visitors in large mass events.** The measure has a specific focus on the needs of **vulnerable groups such as the visually impaired and accessibility** when developing these elements.

4.28.2. Interaction with other measures

This measure is linked with T5, T7, T8 and T10. Information on guidance solutions and event logistics (T7) will be displayed on the mobility data portal (T5), and the guidance solutions can be applied in connection with the winter-time events (T10). The development and testing of incentive schemes and nudges is connected to the development of the guidance solutions.

4.28.3. Impact indicators

Table 96: Output and objectives of measure T9 and selected impact indicators to monitor the impact of measure T9

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
Creation and piloting of e-mobility guidance in connection with events and exceptional circumstances **5 smart solutions piloted for visitors in large mass events (mobile or other electric elements)** **Enabling the integration of guidance for the visually impaired citizens and visitors**	Improved awareness and acceptance of the e-mobility guidance elements in connection with events	Awareness/ Acceptance level (on mobility guidance)	Citizens	City of Turku	%	Targeted survey on the mobility data platform A question on the awareness and acceptance of mobility guidance elements	2023/2024
	Improved satisfaction on the e-mobility guidance elements in connection with events	Satisfaction in the guidance elements developed	Citizens	City of Turku	Score (0-5)	Targeted survey on the mobility data platform A question on satisfaction in the guidance elements developed	2023/2024
	Increased use of sustainable modes in the mass events	Modal shift (during events)	Citizens + visitors	City of Turku	%	Interviews during events A question on mode choice during events	2023/2024
		Perception of level of physical	Citizens + visitors	City of Turku	Score (0-5)	Interviews during events A question on experience of accessibility	2023/2024

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
		accessibility of service					
	Improved integration of guidance for the visually impaired	Physical accessibility for deficiency groups to transport services	Deficiency groups	City of Turku	Score (0-5)	Interviews during events A question on the accessibility of transport services	2023/2024
		Operational barriers for deficiency groups	Deficiency groups	City of Turku	Score (0-5)	Survey and/or interviews A question on the accessibility to mobility data portal	2023/2024
	Increased sensation of safety at mass events in Turku	Perceived sense of safety	Citizens + visitors	City of Turku	Score (0-5)	Survey and/or interviews A question on the sense of safety	2023/2024

4.28.1. Implementation process

4.28.1.1 Partners and stakeholders

Table 97: Overview of partners and stakeholders and their roles for measure T9

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
City of Turku	P	C	L	Lead partner
Finnish Federation of the Visually Impaired	S	NG	O	Feedback provider
Event organizers	S	NG/PR	P	Feedback on event guidance
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.28.1.2 Risk analysis

Table 98: Overview of potential barriers and drivers for measure T9

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Problem-related: How to avoid provider lock-in. **Political/strategic:** Ownership of guidance in the city administration Technological: How to interlink the physical guidance into the digital one. **Problem-related:** Mobile guidance as a particular challenge, in particular the accessibility for different user groups – changing information during the events/construction works. **Involvement/ communication:** How to reach the different users/vulnerable groups and get their feedback? (awareness, satisfaction and usability)	**Planning:** A good background for measure planning provided from the results of the City Guidance ecosystem project in 2017	**Involvement/ communication:** Strong focus on stakeholder communication in providing feedback for elements developed	**Medium risk**

4.29. Measure T10 "Winter as a mobility season"

Governance	Multimodal	Data	Clean, safe & inclusive	Behaviour

4.29.1. General description

Winter greatly affects the mobility patterns of Turku citizens. The varying wintertime weather and lack of light in particular influence citizens' desire to walk or cycle or even to take public transport. **Promoting a more active wintertime lifestyle requires not only improved safety via street maintenance but also conscious efforts in promoting winter as a mobility season and innovative branding.** The need to address this has been identified in the Wellbeing and activity strategic programme of the city. Currently wintertime mobility and winter as a brand is not approached in the city of Turku.

In this measure, the "**Winter as a mobility season" brand will be developed and introduced to local communities and businesses.** Winter sports events will be organized during the winter season, **snow-assisted mobility enabled and promoted** by keeping the snow on parts of pavement for the use of sleds, skis, kick sleds or similar, and art and lights will be used in mobility nudging.

The actions will be targeted towards different user groups with a specific focus on children and the elderly (8/80). Citizen science methods are applied to engage different user groups in developing the winter brand and mobility opportunities in connection to it.

4.29.2. Interaction with other measures

This measure is linked to T5 and T8.

4.29.3. Impact indicators

Table 99: Output and objectives of measure T10 and selected impact indicators to monitor the impact of measure T10

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
Development of a Dark season/Winter branding/strategy with a specific focus on 8/80 **Creation of a winter street concept and piloting in the city centre** **Testing of at least 5 measures during the winter season with large stakeholder involvement**	30% increase in the number of events organized in the wintertime	Number of events					
	15% increase in the wintertime modal split for walking and cycling	Average modal split in number of trips (wintertime walking & cycling)	Citizens	City of Turku	%	City level survey A question on average modal split in number of trips (wintertime walking & cycling)	Baseline 2022 Follow-up 2024
		Acceptance level	Stake-holders	City of Turku	%	A survey directed at stakeholders A question on whether the winter street concept is acceptable	2023
		Citizen satisfaction	Citizens	City of Turku	Score (0-5)	Targeted survey or interviews A question on satisfaction in winter concept & tested measures	2023

Outputs	Objectives/ Targets	Impact indicators	Target group	Impact area	Data units	Source/ Methodology	Frequency
		Average walking/cycling time per week	Citizens	City of Turku	Min/ week	City level survey A question on average walking/ cycling time per week in the wintertime	Baseline 2022 Follow-up 2024
		Image on the walking conditions in wintertime (subjective)	Citizens	City of Turku	Score (0-5)	City level survey + supplemented by interviews during events A question on the image of the walking conditions in wintertime	Baseline 2022 Follow-up 2024
		Image on the cycling conditions in wintertime (subjective)	Citizens	City of Turku	Score (0-5)	City level survey + supplemented by interviews during events A question on the image of the cycling conditions in wintertime	Baseline 2022 Follow-up 2024

4.29.1. Implementation process

4.29.1.1 Partners and stakeholders

Table 100: Overview of partners and stakeholders and their roles for measure T10

Partner / other actors	Type P-S	Type of organisation C-PT-KI-NG-PR-other	Level of activity L-P-O	Role
City of Turku	P	C	L	Lead partner
Regional council of Southwest Finland	P	Other	P	Partner
Event organizers	S	PR	O	Winter event organizing, feedback on brand development
Type: P: SCALE-UP partner - S: other stakeholder **Type of organisation: C: City - PT: Public transport company - KI: Knowledge institution (e.g. university) - NG: Non-Governmental Organisation - PR: Private company - Other** **Level of activity: L: Leading role - P: Principle participant - O: Occasional participant**				

4.29.1.2 Risk analysis

Table 101: Overview of potential barriers and drivers for measure T10

Potential barriers	Potential Drivers	Activities to be taken to achieve measure aims	Risk level
Problem-related: Winter conditions are very difficult to predict (amount of snow and ice, temperature), poses challenges for event planning. Winter maintenance focuses on controlling the level of slipperiness situation, not on benefitting from the snow. The potential of the winter is not understood, it's treated as a threat. Winter is perceived as a poor time for walking and cycling. Reduced physical activity in wintertime. Potential is not used. Most winter outdoor activities are located on the outskirts of the city (skiing tracks, ice rinks). **Communication/ involvement:** Stakeholder involvement and getting feedback is challenging. Winter maintenance information is not easily available.	**Spatial:** Heated routes in the city centre (the new market square that is to be opened in Autumn 2022 and Yliopistonkatu street)	**Technical**: Thorough benchmarking of winter street concepts and brands from around the world **Communication/ involvement:** Citizen science methods to be applied for inspiration on planning the events, hopefully leading also to an improved sense of involvement	**Medium / high risk**

4.29.2. Supporting activities

Citizen science methods are to be mapped and applied. The measure is connected to the project Space4People – the project organized a first summer street experiment in Summer 2021 and is developing a walking and spending time programme for the city of Turku. Cooperation with this project is close with the measure T10.

4.30. Planning

In the following sections, the timeline of each of the measure evaluation activities are presented in the form of a Gantt chart. The (design, implementation and operational) stages of the measures are indicated and the timing of the different data collection activities are planned along with the reporting times of the impact and process evaluation at different stages. Table 102 clarifies the different abbreviations used in the Gantt charts. This timing is still indicative and will be updated in the second version of the evaluation plans (D7.4 SCALE-UP Evaluation plan 2), to be published in May 2022.

Table 102: Legend describing the different stages, data collection and reporting activities indicated in the Gantt charts, shown in the following sections

Activities	Abbreviation to be used in the scheme	
	M	Mandatory activities: these activities should be indicated (except if not relevant)
	O	optional activities
stages		
M	**DE**	start of design, planning phase
M	**IM**	start of implementation, construction phase
M	**OP**	start of operational phase (if relevant)
O	**MS1**	milestone 1: explain in comments
O	**MS2-3**	milestone 2,3,..: explain in comments
data collection		
M	**B**	baseline data
O	**I1**	1st intermediate data
O	**I2-3-**	intermediate data 2-3-
M	**A**	after data: data at the end of the CIVITAS operational
M	**V**	validation meeting
O	**P1**	intermediate process evaluation meeting nr 1
O	**P2-3-**	intermediate process evaluation meetings nr 2-3-
M	**Pf**	final process evaluation meeting
reporting		reporting to your Project Evaluation Manager
M	**M1**	MER - version with evaluation method and baseline
O	**M2-3-**	MER - intermediate versions (version with intermediate
O	**Md**	MER- draft version of the final MER
M	**Mv**	MER- version with validated conclusions (impact&process)
M	**Mf**	MER - final version

4.30.1. Antwerp

A1

SCALE-UP Antwerp				2021							2022												2023												2024												2025				
				Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
			project months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
ANTWERP	A1	Scaling up multilevel governance and cooperation to the Antwerp Transport Region	stages																																				IM									OP				
			data collection								B												P1																								A		V-Pf		
			reporting																						M1																								Md	Mv	Mf

A2

SCALE-UP Antwerp				2021							2022												2023												2024												2025				
				Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
			project months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
ANTWERP	A2	A MaaS ecosystem and collaborative Governance framework	stages																																				IM									OP				
			data collection								B												P1																								A		V-Pf		
			reporting																						M1																								Md	Mv	Mf

A3

SCALE-UP Antwerp				2021							2022												2023												2024												2025				
				Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
			project months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
ANTWERP	A3	Multi-modal mobility hubs and network optimisation in Antwerp transport Region	stages																					IM												OP												OP				
			data collection																				B	P1																								A		V-Pf		
			reporting																						M1																								Md	Mv	Mf

A4

SCALE-UP Antwerp				2021							2022												2023												2024												2025				
				Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
			project months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
ANTWERP	A4	NxT Mobility data strategy management tool for multi-modal mobility	stages																																													OP				
			data collection								B												P1																								A		V-Pf		
			reporting																						M1																								Md	Mv	Mf

A5

SCALE-UP Antwerp			project months	2021 Jun 1	Jul 2	Aug 3	Sep 4	Oct 5	Nov 6	Dec 7	2022 Jan 8	Feb 9	Mar 10	Apr 11	May 12	Jun 13	Jul 14	Aug 15	Sep 16	Oct 17	Nov 18	Dec 19	2023 Jan 20	Feb 21	Mar 22	Apr 23	May 24	Jun 25	Jul 26	Aug 27	Sep 28	Oct 29	Nov 30	Dec 31	2024 Jan 32	Feb 33	Mar 34	Apr 35	May 36	Jun 37	Jul 38	Aug 39	Sep 40	Oct 41	Nov 42	Dec 43	2025 Jan 44	Feb 45	Mar 46	Apr 47	May 48
ANTWERP	A5	Towards a better intra-port flow freight management by using smart data	stages																																												IM				
			data collection								B												P1																								A		V-Pf		
			reporting																						M1																								Md	Mv	Mf

A6

SCALE-UP Antwerp			project months	2021 Jun 1	Jul 2	Aug 3	Sep 4	Oct 5	Nov 6	Dec 7	2022 Jan 8	Feb 9	Mar 10	Apr 11	May 12	Jun 13	Jul 14	Aug 15	Sep 16	Oct 17	Nov 18	Dec 19	2023 Jan 20	Feb 21	Mar 22	Apr 23	May 24	Jun 25	Jul 26	Aug 27	Sep 28	Oct 29	Nov 30	Dec 31	2024 Jan 32	Feb 33	Mar 34	Apr 35	May 36	Jun 37	Jul 38	Aug 39	Sep 40	Oct 41	Nov 42	Dec 43	2025 Jan 44	Feb 45	Mar 46	Apr 47	May 48
ANTWERP	A6	The Ring road as a highway for green energy	stages																																																
			data collection								B												P1																								A		V-Pf		
			reporting																						M1																								Md	Mv	Mf

A7

SCALE-UP Antwerp			project months	2021 Jun 1	Jul 2	Aug 3	Sep 4	Oct 5	Nov 6	Dec 7	2022 Jan 8	Feb 9	Mar 10	Apr 11	May 12	Jun 13	Jul 14	Aug 15	Sep 16	Oct 17	Nov 18	Dec 19	2023 Jan 20	Feb 21	Mar 22	Apr 23	May 24	Jun 25	Jul 26	Aug 27	Sep 28	Oct 29	Nov 30	Dec 31	2024 Jan 32	Feb 33	Mar 34	Apr 35	May 36	Jun 37	Jul 38	Aug 39	Sep 40	Oct 41	Nov 42	Dec 43	2025 Jan 44	Feb 45	Mar 46	Apr 47	May 48
ANTWERP	A7	(Electric) bike sharing scheme for the Antwerp Transport Region	stages																				IM																													
			data collection															B					P1																								A		V-Pf		
			reporting																						M1																								Md	Mv	Mf

A8

SCALE-UP Antwerp			project months	2021 Jun 1	Jul 2	Aug 3	Sep 4	Oct 5	Nov 6	Dec 7	2022 Jan 8	Feb 9	Mar 10	Apr 11	May 12	Jun 13	Jul 14	Aug 15	Sep 16	Oct 17	Nov 18	Dec 19	2023 Jan 20	Feb 21	Mar 22	Apr 23	May 24	Jun 25	Jul 26	Aug 27	Sep 28	Oct 29	Nov 30	Dec 31	2024 Jan 32	Feb 33	Mar 34	Apr 35	May 36	Jun 37	Jul 38	Aug 39	Sep 40	Oct 41	Nov 42	Dec 43	2025 Jan 44	Feb 45	Mar 46	Apr 47	May 48
ANTWERP	A8	Safe routing for freight transport including collection of freight data	stages																							IM																										
			data collection								B												P1																								A		V-Pf		
			reporting																						M1																								Md	Mv	Mf

A9

SCALE-UP				2021							2022												2023												2024												2025				
Antwerp				Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
			project months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
ANTWERP	A9	Nudging and incentivising sustainable travel	stages																					OP																												
			data collection								B												P1																										A		V-Pf		
			reporting																						M1																									Md	Mv	Mf

A10

SCALE-UP				2021							2022												2023												2024												2025				
Antwerp				Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
			project months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
ANTWERP	A10	Active travel campaigns and events as a catalyst for sustainable travel	stages																				IM																														
			data collection								B												P1																										A		V-Pf		
			reporting																						M1																									Md	Mv	Mf

4.30.2. Madrid

M1

SCALE-UP				2021							2022											2023											2024											2025				
CityName				Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
			project months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Activities per measure or/and Integrated Packages of measures																																																	
MADRID	M1	Multi level governance and stakeholder cooperation in Madrid metropolitan area	stages	DE																			IM											OP																
			data collection																		B		I1																			I2			A	P	V				
			reporting																												M1							M2							Md	Mv		Mf	

M2

SCALE-UP				2021							2022											2023											2024											2025				
CityName				Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
			project months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Activities per measure or/and Integrated Packages of measures																																																	
MADRID	M2	Improving multimodal hubs with Park & Ride + public transport at regional level	stages	DE										IM														OP																							
			data collection										B															I1															A	P	V				
			reporting																									M1									M2							Md	Mv		Mf	

M3

SCALE-UP				2021							2022											2023											2024											2025				
CityName				Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
			project months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Activities per measure or/and Integrated Packages of measures																																																	
MADRID	M3	Fostering sustainable first and last mile logistics by mobility hubs	stages	DE												IM												OP																							
			data collection												B																I1													A	P	V				
			reporting																		M1															M2							Md	Mv		Mf	

M4

SCALE-UP				2021							2022											2023											2024											2025				
CityName				Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
			project months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
MADRID	M4	Data driven mobility management and MaaS in the Madrid metropolitan area	stages	DE												IM																			OP																
			data collection												B									I1													I2							A	P	V				
			reporting																										M1									M2							Md	Mv		Mf	

M5

SCALE-UP				2021							2022												2023												2024												2025				
CityName				Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
			project months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
MADRID	M5	Scaling up shared (and active) e-mobility services	stages	DE											IM								OP																												
			data collection						B	I1																						I2										A	P	V						
			reporting																	M1												M2												Md	Mv		Mf				

M6

SCALE-UP				2021							2022												2023												2024												2025				
CityName				Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
			project months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
MADRID	M6	Promoting clean mobility (zero emissions) with supply/storage solutions	stages	DE													IM									OP																										
			data collection												B													I1													A	P	V						
			reporting																						M1											M2											Md	Mv		Mf				

M7

SCALE-UP				2021							2022												2023												2024												2025				
CityName				Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
			project months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
MADRID	M7	Promoting active mobility by deploying car-free areas	stages	DE										IM									OP																												
			data collection										B							I1																I2						A	P	V						
			reporting																		M1																M2									Md	Mv		Mf				

M8

SCALE-UP				2021							2022												2023												2024												2025				
CityName				Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
			project months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
MADRID	M8	Nudging multimodality at regional level	stages	DE														IM											OP																						
			data collection													B					I1												I2										A	P	V						
			reporting																								M1												M2								Md	Mv		Mf				

4.30.3. Turku

T1

SCALE-UP				2021							2022											2023											2024											2025				
Turku				Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
			project months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
TURKU	T1	Multilevel governance and cooperation to develop sustainable travel chains in Turku	stages	DE										IM									OP																											
			data collection										B										P1													A			V		Pf									
			reporting																					M1																	Md	Mv	Mf							

T2

SCALE-UP				2021							2022											2023											2024											2025				
Turku				Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
			project months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
TURKU	T2	Implementing mobility hubs in the Turku region	stages	DE										IM										OP																											
			data collection																				P1															A			V-Pf									
			reporting																					M1																	Md	Mv	Mf							

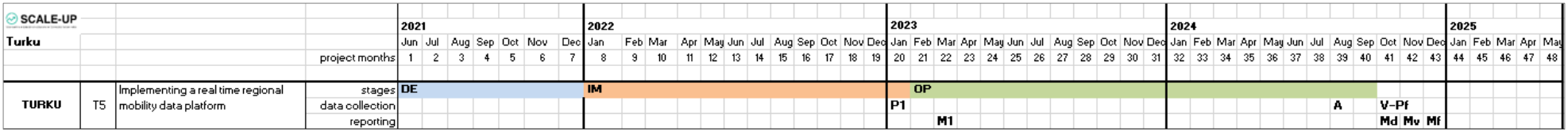
T3

SCALE-UP				2021							2022											2023											2024											2025				
Turku				Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
			project months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
TURKU	T3	Introducing MaaS ticket combos and adaptive parking in Turku region	stages	DE							IM										OP																													
			data collection																				P1													A			V-Pf									
			reporting																					M1																	Md	Mv	Mf							

T4

SCALE-UP				2021							2022											2023											2024											2025				
Turku				Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
			project months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
TURKU	T4	Creating a mobility portal combining personal transportation and logistics	stages	DE										IM									OP																											
			data collection																				P1													A			V-Pf									
			reporting																					M1																	Md	Mv	Mf							

T5


SCALE-UP
Turku
project months
2021 2022 2023 2024 2025
TURKU
T5
Implementing a real time regional mobility data platform
stages
data collection
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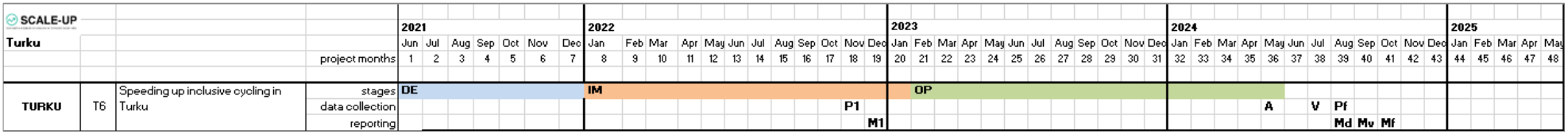
T6


SCALE-UP
Turku
project months
2021 2022 2023 2024 2025
TURKU
T6
Speeding up inclusive cycling in Turku
stages
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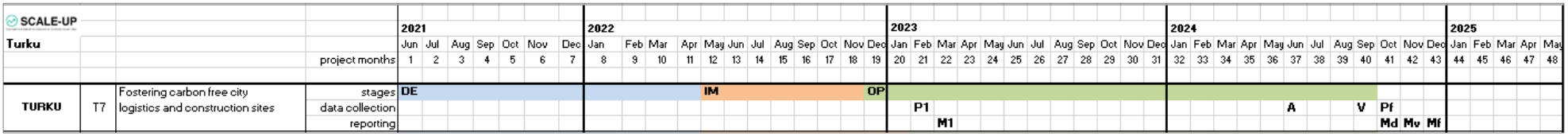
T7


SCALE-UP
Turku
project months
2021 2022 2023 2024 2025
TURKU
T7
Fostering carbon free city logistics and construction sites
stages
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reporting
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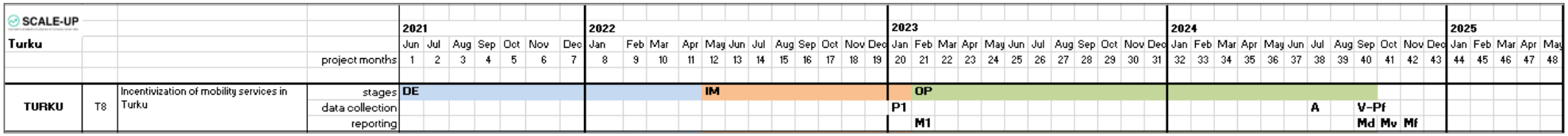
T8


SCALE-UP
Turku
project months
2021 2022 2023 2024 2025
TURKU
T8
Incentivization of mobility services in Turku
stages
data collection
reporting
DE
IM
OP
P1
M1
A
V–Pf
Md Mv Mf

T9

SCALE-UP				2021							2022											2023											2024											2025				
Turku				Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
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TURKU	T9	Mobility guidance in connection with events and exceptional circumstances	stages	DE										IM									OP																											
			data collection																				P1																		A		V	Pf							
			reporting																						M1																		Md	Mv	Mf					

T10

SCALE-UP				2021							2022											2023											2024											2025				
Turku				Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
			project months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
TURKU	T10	Winter as a mobility season	stages	DE									IM							OP																															
			data collection																				P1																A		V	Pf									
			reporting																						M1														Md				Mv			Mf				

5. Evaluation on the level of the strategies for integration

5.1. Objectives

The concept of SCALE-UP in relation to scaling-up in the urban node is twofold (see Figure 43):

- A horizontal up-scaling refers to addressing, in a balanced way, the different layers that shape the multi-layered mobility system that we see today, being a physical or infrastructural layer, a digital layer, and the human layer, referring to the central position of the end-user. To function as a data driven urban node all three layers need to be addressed in a balanced manner.
- A vertical up-scaling refers to integrating the mobility and transport strategies on multiple governance levels and beyond geographical boundaries (city, functional urban area (FUA), TEN-T) through collaboration with all stakeholders.

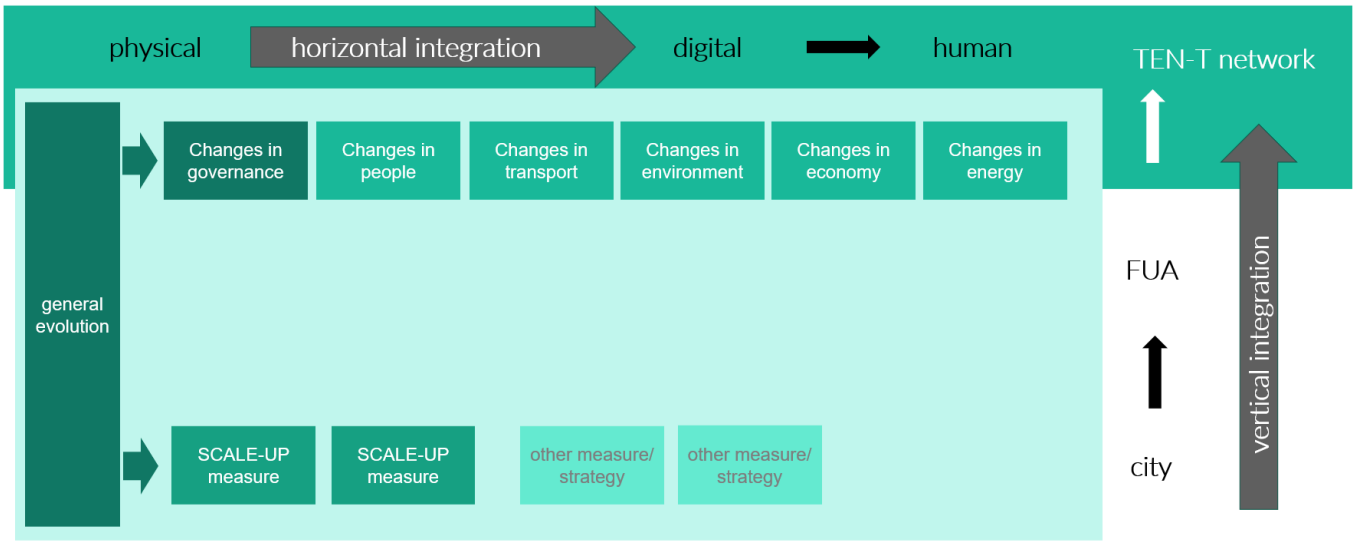

Figure 43: The vertical and horizonal integration concepts in SCALE-UP

5.2. Horizontal integration

Indicators to monitor the level of integration of the physical or infrastructural layer, the digital layer, and the human layer in the SCALE-UP city will be developed starting with a structured analysis of these 3 layers identifying the key elements linking the layers in an efficient and balanced way. The following elements are important components for this:

- The exchange of input of one layer to another guaranteeing the good functioning of each layer
- Keeping the human layer as the main driver for any interaction

Indicators will focus on understanding the interaction between the 3 layers (see Figure 44). For this the FUA indicators already defined in the category 'Governance' e.g. 'Quality of the data layer' and 'Level of data driven' (see Table 7) will be an inspiration.

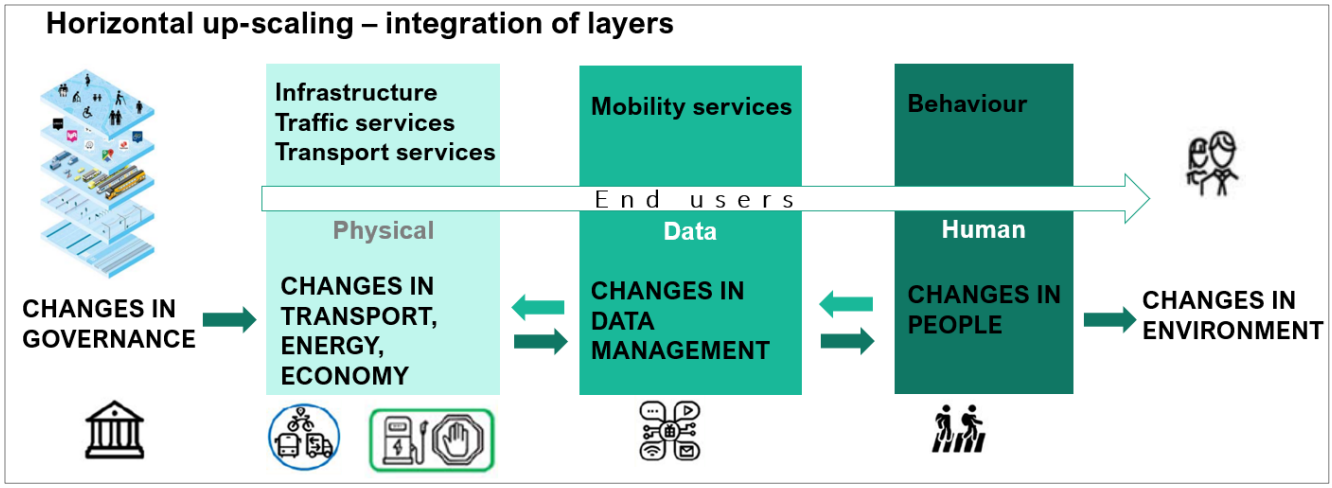

Figure 44: Illustration of the evaluation of the horizontal integration

5.3. Vertical integration

Based on the findings in the Vital Nodes project and a first analysis of the SCALE-UP concepts for integration, the SCALE-UP experts propose the first key indicators to measure the level of integration between the city, FUA and TEN-T level:

- Governance: formal and informal cooperation, decision mechanism and planning including the city and FUA level and referring to the TEN-T perspective
- Awareness: awareness of the existence of the other levels and the opportunities and barriers from the other levels (city, FUA, TEN-T)
- Connectivity: degree to which the urban node is connected to the wider region (FUA) and TEN-T corridor, existence of hubs linking city, FUA and TEN-T corridor
- Accessibility (closely linked to 'connectivity'): available capacity on the multi-modal transport network

To monitor these indicators, a detailed list of items to discuss with policy makers and technicians from city, FUA and the TEN-T corridor is under development. Both the FUA indicators already developed for Governance (see Section 3.1.1) and Awareness (see Section 3.1.2) and the efforts to further develop the integration concept (WP1) in practice for the SCALE-UP cities will be an inspiration for a feasible and efficient approach.

6. Conclusions

This version of the SCALE-UP evaluation plan is the first reporting of the evaluation approach of the 3 urban nodes Antwerp, Madrid and Turku. It details the impact and process activities planned and the indicators to be monitored during the project lifetime, on the 3 levels of evaluation:

- the level of the Functional Urban Area,
- the level of the measures implemented within the project life span, and
- the level of the strategy integration (TEN-T and multi-layered mobility system)

This report provides a solid foundation to start the data collection activities for the baseline. Those results will be published in D7.3 Mobility baseline in the SCALE-UP FUAs.

Not all aspects of the SCALE-UP approach are so far defined at this moment, therefore an updated version of D7.2 will be published in May 2022 (D7.4 SCALE-UP Evaluation plan 2). In the updated SCALE-UP evaluation plan:

- Data collection methods and definitions of the FUA indicators will be further refined based on the first experiences of the data collection activities for the baseline.
- Some elements and aspects of the impact evaluation approach will be completed or updated in relation to further developments of (the first implementations) of the measures and based on the first experiences of the data collection activities for the baseline.
- The planning and timeline of the evaluation activities will be updated based on the latest consultations of the Local Evaluation Managers with the Measure Leaders.
- The approach to evaluate the vertical and horizontal integrating will be further detailed based on continued discussions and first experiences within the SCALE-UP project.

7. Annex 1: FUA indicators in the impact category society-governance

Four qualitative indicators are selected to measure the evolution in the CIVITAS impact area society-governance:

- Quality of cooperation structures
- Quality of planning approaches
- Quality of the data layer
- Level of data driven

In the following sections, a common SCALE-UP approach is outlined, to collect information on each indicator, by defining, for each indicator, a list of items to question. Based on the observations a score is given to the indicator (low, medium, etc.) and its evolution is monitored in the course of the project. The categorisation of the score given for each indicator (low, medium, etc.) will be developed based on the results of the baseline.

7.1. Quality of cooperation structures

Analysis and appraisal of the formal and informal cooperation structures and decision-making procedures

Items to question

- Internal cooperation between the mobility department and other city departments
  - e.g. environmental, special, economic, …
  - e.g. regular common meetings, internal advice, …
- Interaction city mobility department with mobility stakeholders
  - e.g. public transport companies, private mobility service providers,
  - e.g. formal mutual advice, regular meetings, common planning of actions, …
- Organisational body on the level of the Functional Urban Area
  - Participating actors?
  - Advisory body or decision body
  - Financial resources
  - Are the representatives of the participating actors in the daily functioning?
  - ..
- Interaction with other bodies responsibilities for parts of the mobility organisation
  - e.g. the region, national bodies, …
  - e.g. formal mutual advice, regular meetings, common planning of actions, …

Appraisal

Overall synthesis of the baseline situation on the quality of the cooperation structures in order to **push and facilitate** good planning and decisions.

- Main drivers
- Observed barriers or weak(er) aspects

7.2. Quality of planning approaches

Analysis and appraisal of the planning approaches in city and FUA and above.

Items to question

- Status and quality[11] of the SUMP of the city
  - e.g. current versions of 2xxx with a time vision to 2xxx
  - e.g. sustainable vision
  - e.g. sustainable modes, walking, cycling, public transport treated as a priority
  - e.g. action list with dedicated budgets to implement the strategy
  - e.g. supported by a strong participatory process involving stakeholders and citizens
  - e.g. integrated planning of freight transport (integrated SULP)
- Status and quality of the mobility planning on the FUA
  - e.g. existing of a full SUMP on FUA level
  - e.g. other mobility related planning on FUA level
  - e.g. formal mutual advice, regular meetings, common planning of actions
  - e.g. action list with dedicated budgets to implement the strategy
  - e.g. supported by a strong participatory process involving stakeholders and citizens
  - e.g. integrated planning of freight transport
- Other mobility related plans to implement a strong sustainable mobility strategy
  - e.g. operational action plans on cycling measures
  - e.g. integrated land-use mobility vision plan

Appraisal

Overall synthesis of the baseline situation on the quality of the planning in order to push the implementation of sustainable mobility strategies and measures.

- Main strong elements
- Observed weak(er) aspects

[11] See the SUMP self-assessment tool: https://www.sump-assessment.eu/English/start

7.3. Quality of the data layer

Analysis and appraisal of the quality of the data layers with an extra focus on active modes

Inventory of data

Describe which data are collected and made available on the level of the city, FUA or at higher levels.

- Existence of integrated data platforms on city or regional level
  - e.g. platforms managed by the city, stakeholders, private bodies, …
- Mobility related data collected on integrated platforms
  - which type of data is collected, on-line or off-line,
  - purpose of these data e.g. static and real-time information, for planning and optimisation and real-time management of the multi-modal transport system
  - e.g. safety data in general and specifically on active modes
  - e.g. traffic flows in the city, on the motorways, …
  - e.g. parking data
  - e.g. cycling flows, pedestrian flows, public transport passenger flows
  - e.g. air pollution

A template table for the analysis and appraisal of the quality of the data layers is given in Table 103.

Type of data	Collected on city level	Collected on regional level	On-line (real-time)	Off-line	Provided by	Made available to	Other comments

Table 103: Template table for the inventory of data

Appraisal

Synthesis of the current status of data management in the city and FUA to plan, monitor and optimise the functioning of the multi-modal mobility system and to inform its users (and more…).

7.4. Level of data driven

Analysis and appraisal of the level to which extent the multi-modal mobility system is planned, organised and used in a data driven way. Here not the quality of the data is assessed but an analysis is done on the extent to which elements of the multi-modal system are steered based on data that is collected. Some examples are given below.

Inventory of mechanisms

- Real-time mechanisms in the management of the multi-modal mobility system that are data driven, steered and pushed by the data we collect
    - e.g. parking guidance system guiding the cars to parking places and park&rides taking into account the occupancy rates of the parkings and the traffic flows e.g. congestion level and air quality levels in the city
- Operational planning mechanisms in the management of the multi-modal mobility system that are data driven
    - e.g. closing of the city centre for cars based on measurements and predictions of the air quality in the city

Appraisal

Synthesis of the current extent in which processes in the organisation of the multi-modal system are data driven.

8. Annex 2: Indicators for the context of change

To assess the status of each of the 4 indicators for the context of change — Mood and Motivation, Mass, Momentum and Mechanisms — a range of questions are listed, and examples are given from EU cities on their level of maturity for that specific aspect.

The questions will be answered by each urban node in focus groups with local stakeholders (e.g. MLs, representatives of different society groups, etc.). The observations in the focus groups are complemented by studying what is happening and published in the community and what is formulated in urban policy.

The observations for each of the indicators are synthesised into an overall appraisal of the context for change in the urban node, thereby identifying the main drivers to push change and the observed barriers or weak(er) aspects.

8.1. Mood and Motivation

Mood identifies the level of **acceptance** of a new type of transport policy, *whether citizens are open to new ways of organising mobility and accepting new ways of living. Motivation identifies* the **quality of the governance and organisational structures** that drive a change in transport policy. Both aspects are assessed together.

Possible questions to assess the level of maturity of Mood and Motivation:

- Do the existing transport or mobility policies specifically **address sustainable urban mobility**? e.g. in a SUMP
- Is there an **ongoing discussion** about the need for new or updated transport policy, to better meet mobility needs, to increase liveability?
- Are **citizens or community groups active participants** in the discussion about transport and mobility policy?
- Are the **local authorities/ agencies with responsibility** for urban mobility open to look at new types of mobility policy?
- Are **citizens (and lobby groups)** open to look at new types of mobility policy?
- Is **car traffic perceived to be a crucial problem** that requires active mitigation?

Examples
The city has an open mind to accept new transport concepts.
The transport and mobility responsible prefer trying things out, rather than studying them further. They dare to make errors and learn from those errors, "learning by doing and trial and error".
There are multiple articles on new mobility solutions in the city publications/press.
There is a generally accepted SUMP with strong sustainable goals & actions.

8.2. Mass

Even if there is a high acceptance to introduce some changes, it is crucial there is **capacity to make change happen**. E.g. are the appropriate organisational structures and people with sufficient capacity in place to design, organise and operate new mobility services?

Possible questions to assess the level of maturity of Mass:

- Is there existing **capacity** in the area to design, organise and operate new mobility services?
- Is there **any formal or ad hoc forum** that brings together stakeholders to discuss and consider new or amended transport policies?
- Are there **working arrangements** between the institutions/agencies and mobility service providers?
- Have any of the institutional, operator or community stakeholders **participated in European projects** (other than SCALE-UP) and have they experience in know-how exchange?
- Is there a **strategy for supporting activities** to be done for changing the mobility behaviour of the population of the region?

Examples
Decision makers are aware of the fact that the related deficits are an issue especially for the elderly generation.
Private and public agencies organizing knowledge-transfer and supporting local communities by developing similar initiatives.
Political and operational cooperation platforms between city and region.
There are research groups on sustainable mobility solutions.
The city department working on citizens awareness and behavioural change.

8.3. Momentum

This aspect identifies whether elements to speed up change are available in the city. If a city wants to have a change, it needs to 'grab the moment'. For that, momentum is needed.

Possible questions to assess the level of maturity of Momentum

- Are there any **incentives** (legislation, funding,…) of the regional, national or European level that pushes the change?
- Are there **any citizens initiatives game changers** in the mindsets on urban mobility and acceptance of urban traffic factors as safety and air quality?
- Is there a specific **political momentum** of changed visions and policy goals?
- Is there any **demographic or economic momentum** that requires new approaches on mobility?

Examples
At national level, laws have recently been voted that provide incentives for people who use alternative mobility (carpooling and cycling) at least 100 days a year for their commuting, accelerating the use of alternative mobility solutions.
The COVID-19 period pushed the rethinking of mobility in the city.
The recently elected government wants to start a new direction in the mobility policy.

8.4. Mechanisms

Last but not least, strong processes or mechanisms are needed to develop new solutions, and to control and manage change.

Possible questions to assess the level of maturity of Mechanisms

- Are there specific **organisational structures** in the city and in between the city, region and national levels to **develop, monitor and manage** the implementation of new mobility strategies?
- How stable are **the working relationships and business agreements** among the city and other participating stakeholders?
- Is there a **participative process** for local communities and people **to shape the mobility solutions** in line with their needs and preferences?

Examples
City department with persons of the different city/regional sectors to manage new strategies in an integrated way.
Public-private partnerships to develop and implement integrated mobility solutions (infrastructure, management, services, promotion, ..).
Integrated monitoring and evaluation approach to optimise running policies towards the sustainable goals set.

9. Bibliography

Wright, S., S. Brooke, C.D. Cottrill, M. Kollingbaum, and J.D. Nelson. "Does clustering of transport measures enable effective evaluation?: An example from a Port City." *TSG Annual Conference, Leeds, UK*, 2019.