



# UNIFE Vision Paper on Urban Mobility

## Urban Rail for cities and metropolitan areas

**UNIFE** - The European Rail Supply Industry Association

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## About UNIFE

Based in Brussels since 1992, UNIFE is the association representing Europe's rail supply industry at the European Union (EU) and international levels. UNIFE's members include more than 100 companies – from SMEs to major industrial champions – active in the design, engineering and manufacture of rolling stock (i.e. trains, metros, trams, freight wagons), as well as rail signalling and infrastructure equipment. UNIFE also brings together the national rail industry associations of 11 European countries.

## Introduction – The urbanisation megatrend and the mobility challenge

The global population has tripled over the last 100 years to over 7 billion people and it will continue to grow in the years to come. Urbanisation, coupled with population growth, will prove to be one of the world's most staggering mega-trends over the next decades. By 2030, over 60% of the world population will live in cities, up approximately 50% from today's total number of metropolitan residents<sup>1</sup>. The EU is no exception with almost 75% of Europe's residents already living in urban areas, as of 2015. By some estimates, this figure could climb to just over 80% by 2050<sup>2</sup>. The dizzying rate of urbanisation that we are currently experiencing will not be without medium- and long-term consequences. For example, while cities host the majority of societies' economic activities and output, they also consume most of their resources and energy supplies. This is especially worrying as the world struggles to orchestrate sufficient responses to the mounting climate crisis.

Mobility plays a decisive role in ensuring growth, economic dynamism and social cohesion in cities and their suburban areas. As cities and their surroundings become major hubs for education, innovation and knowledge-based economies, the ability to access these benefits, through mobility, is increasingly affected by an and other related societal changes, such as aging demographics. Naturally, across Europe and the world, there are big differences in the way cities are built and run, affecting how goods and inhabitants move. However, urban areas share traits and face many of the same challenges. To name just one of the universal characteristics of rising urbanisation, urban populaces are struggling to address the unprecedented growth of urban traffic, manifesting in all manner of transportation ranging from personal vehicles to heavy freight. This problem illustrates an overarching concerns facing the world's s and Europe's cities as they attempt to ensure a fundamental rite of life: getting around rapidly and safely.

Against this backdrop, the creation of new mobility paradigms - capable of delivering high-quality, accessible-to-all urban and sub-urban mobility services fit for peoples' day-to-day lives - is required. Technological advances and their commercialisation, increased funding, intelligent policies, and business-model innovation are pivotal to the establishment of sustainable urban mobility schemes. Moreover, no mode of transport alone – no matter how technologically advanced or attractive – will be able to stand alone and deliver against the urbanisation challenge. Digital-based solutions and forward-looking concepts – like “Mobility-as-a-Service” – are already paving the way for new tools and services based on a seamless door-to-door mobility chain by means of integrated multimodal transport systems.

1. “2018 Revision of World Urbanization Prospects”; Population Division of the UN Department of Economic Social Affairs (UN DESA) Research and Innovation;

2. <https://www.arcadis.com/en/global/our-perspectives/sustainable-cities-index-2016/>

In this Vision Paper, UNIFE aims to present the view of the European rail supply industry on the future of urban mobility and highlight why cities and local authorities must invest in rail-based public transport solutions. The strengths of metros, tramways and suburban trains will be presented from different perspectives to illustrate why urban rail is an essential instrument in our collective effort to address the most pressing mobility challenges brought on by the emerging urbanisation mega-trend.

- I. First and foremost, the paper's first chapter will present the crucial contribution of rail to a sustainability-based model for urban transport.
- II. Subsequently, UNIFE will devote the second chapter to investigating the significance of urban rail projects to metropolitan social and economic regeneration of cities, as well the opportunities offered by urban development.
- III. Third, urban rail projects will be evaluated as key components of a urban mobility mix, digitally & physically connecting modes, new business models and transport services.
- IV. Finally, this publication will conclude with a presentation on funding programmes, or tools, and financing actors to help promote best practices needed to implement the discussed urban rail projects.

The European rail supply industry is fully committed to clean, safe, integrated, accessible and competitive urban mobility, while remaining devoted to delivering for the end-customers – both passengers and goods. Ever-growing cities are indeed shaped by people and goods moving across them, therefore much of the future of mobility is being played out on urban and suburban stages. Cities represent the stage where the present opportunities for, and barriers to, sustainable development

## Summary of main messages and recommendations

**Municipalities and cities' authorities should keep Urban Rail at the heart of their mobility policies by investing on metro and tramway projects:**

### CHALLENGES

#### Traffic Congestion

- Traffic congestion has serious environmental, economic and social costs

#### Land use

- Urban land space is a rare resource in increasingly denser cities

#### Air Quality and pollution

- The average air pollution levels in cities and suburban areas can be 4 to 15 times higher than WHO air quality guideline levels.
- Transport is the sector accounting for almost 25% of total emissions.

#### Safety

- Mobility and traffic safety are perceived as a priority by citizens.
- Authorities often struggle to reduce their city's accident rate.

### SOLUTIONS

- As public transport allows people to get around without adding to the congestion, high capacity urban rail solutions show tremendous potential in freeing up urban infrastructure.
- Metros and trams remain the most effective mode of mass transport to move large number of users/per hour over a given distance, especially during peak-time hours.

- Urban Rail solutions allow smart land management both in the construction of the stations and the operation of its services, coping with both social and geographical challenges such as high population density and uneven ground levels.

- Urban rail solutions can drastically decrease all types of emissions, allowing considerable improvement of air quality in metropolitan areas.
- Rail is the only mode of transport which has reduced its emissions while increasing passenger and freight volumes. Mainline and Urban Rail combines energy-efficient mobility with fewer emissions.

- Statistical evidence shows that traveling by underground or tram is about six times safer than car travel, improving the safety record and accident rate of the city.
- Technical, operational and technological improvements will make the safety rate of metro-lines and trams increasingly better.

**CHALLENGES**

**City planning and  
Urban/Sub-Urban  
development**

**SOLUTIONS**

- Investments on a project for a new, modern rail-borne public transport system can be seen as an opportunity to redefine goals in terms of urban planning and land use, through the rehabilitation, modernisation or restructuring of the entire urban context.
- Urban rail projects offer the reorganisation of residential areas, recreational and work zones. It can also be the reconquering of urban space by the reduction of car pressure and the provision of more space usable by active modes of mobility, like cycling and walking, as well as the renovation of houses and facades that enhance the area's architectural and urban heritage.

**Economic regeneration  
and investments  
leverage**

- Tram and metro line projects are tremendous incentives for urban developers, stimulating investments for the local economy and boosting the increase in property values.
- The physical permanence of Urban Rail projects – both under and above ground – cannot be removed from one day to the other. This pledges to continued investment in an area, giving long-term certainty to any potential investors.

**Social Revivification  
and Cohesion**

- Urban Rail solutions can foster economic cohesion and social balance by reconnecting peripheral zones with the heart of the city.
- The extension of a metro or tram line to outskirts suburban zones can boost or improve accessibility to workplaces, schools, universities and leisure facilities, contributing as well to a more positive perception towards the area among its own inhabitants.

**Digital integration of  
urban transport**

- The rail sector can unlock a wide range of opportunities presented by emerging digital technologies in urban transport. Through Shift2Rail's IP4 "IT solutions for attractive railway services", rail is going to be part of a digital ecosystem for MaaS and its all-encompassing web composed of all available transport modes.

Individual users will be able to access live traffic notifications based on predictive models based on information sourced directly from rail assets. It will also give users alternative solutions in the event of service disruptions.

**Physical integration of  
urban transport**

- Rail can rapidly and sustainably bring people and goods into and out of cities, thanks to its versatility in enabling high-capacity, long-/medium-/short-distance transport.
- As points of entry, departure and transit Railway stations and rail freight terminals can become multimodal hubs linking all urban and suburban transport modes, while seamlessly integrating passenger and cargo traffic flows.
- Real-time information about all transportation options to be displayed to passengers at the rail station. This is given evidence of rail as the backbone of a potential physically and digitally integrated urban mobility paradigm.

## The EU Policy Context

Within a broader EU policy context, UNIFE's Vision Paper takes fully into account the European Commission's (EC) latest initiatives and ensures that the European rail supply industry's priorities are aligned with the objectives and targets of EU institutions.

First and foremost, UNIFE strongly advocates for the implementation of the 2011 Transport White Paper. By endorsing the assertion that modal shift is key to achieving a more sustainable and competitive transport system in Europe, the White Paper sets the notably ambitious objective of 50% shift of medium distance intercity passenger and freight journeys from road to rail and waterborne transport by 2050 60% cut in transport emissions by the middle of the century.

Several goals enshrined in the Transport White Paper are related to urban mobility. The ambitious document calls on EU Member States to: halve the use of "conventionally fuelled" cars in urban transport by and achieve near CO<sub>2</sub>-free city logistics by 2030, with the end goal being the complete exclusion of these vehicles in cities by 2050; establish a fully functional and EU-wide multimodal TEN-T Core Network by 2030, adjusting and recognising key city nodes on the network; move towards the full application of the "user and polluter pays" principles in urban road and public transport pricing.

Building on the Transport White Paper, the 2013 Urban Mobility Package aimed at significantly strengthening the urban dimension of the EU's existing transport policy. Notably, it displays a strong focus on the implementation of the Sustainable Urban Mobility Plans (SUMP), renewed attention to urban logistics and greater understanding of the need for a coordinated deployment of urban intelligent transport systems. A review of the 2013 Package is likely to take place in 2020.

More recently, the 2016 Communication titled "European Strategy for Low-Emission Mobility", acknowledges the "responsibility" of urban transport in EU's greenhouse gases emissions. That admission led the Communication to endorse low-emission mobility and smart city planning as essential components of the broader shift to a low-carbon economy that accounts for the mobility needs of all people and goods.

Following this further, the "A Clean Planet for All – A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy" 2018-Communication sets the long-term climate policy of the EC. It places comprehensive cross-sectorial greenhouse gases emissions reduction as its cornerstone. Notably, urban areas and smart cities are recognised as the first centres of innovation in mobility, not least because of the predominance of short-distance journeys and air quality considerations.

Finally, several expectations have been raised by the forthcoming "Green Deal" initiative, announced by European Commission's President Ms. Ursula von der Leyen as the cornerstone of her mandate and aimed at setting the basis for a climate-neutral Europe by 2050.

## A sustainable urban mobility: the role of urban rail solutions

Today's cities face challenges in terms of traffic increase, population growth, liveability, social inclusion and health as well as economic development. Concurrently, transport authorities, industry and operators – in Europe and the world over – are under pressure to effectively serve the evolving mobility needs of expanding cities and increasingly populous suburban areas. An ongoing challenge for public transport is successfully adapting to the developing mobility landscape generated by steadily denser cities and congested suburban areas. Additionally, air pollution, traffic jams and lack of space are some of the most pressing nuisances faced by city and mobility planners. Failing to respond to such overriding concerns would risk substantially worsening the quality of present and future urban living.

Several initiatives are being pursued by public authorities and industries. At the city level, schemes like congestion charges or limited traffic zones attempt to reduce the pressure of private vehicles in historically and/or commercially sensitive districts. Commendable as these actions are, their coercive nature has made them politically unpopular options after they were met with public disapproval – i.e. drastically limiting the use of private vehicles can be politically very sensitive

On the other side, when it comes to industry's activities, the growing development of the market for electric vehicles (EVs) market is triggering significant technological progress on Connected-Automated vehicles (CAVs). However, the actual arrival of EVs and CAVs on our roads would not fix some of the aforementioned problems, notably traffic jams and lack of urban space. On the contrary, they risk introducing even more vehicles on already crowded city infrastructures. It appears clear that those public- or industry-led initiatives alone – although noteworthy – will be insufficient to address nuisances linked to urbanisation and the traffic increase that come with it.

In this context, investments on public transport come across as the essential missing piece in answering the concerns of denser, more crowded cities. Urban rail solutions investments, such as tramways and metro-lines, stand out in the fight against the gridlock due to their ability to provide a sustainable mobility paradigm in the broadest sense, tackling several areas of concern: traffic congestion; emissions and air quality; public health and the efficient use of energy, public space and raw material.

### TRAFFIC CONGESTION AND LAND-USE

Traffic congestion remains the focus of countless debates over mobility. Frustratingly heavy road use has high economic and environmental costs, not to mention the emotional toll it takes on individual drivers which at times manifests as "road rage". It is undisputed that the economic impact of traffic congestion can be particularly harmful, in terms of wasted time and fuel or elevated shipping prices caused by delays. This is followed by increased pollution and the deterioration of public spaces. In the EU, road congestion in and around urban areas costs nearly €100 billion every year<sup>3</sup>, equivalent to 1% of the EU's GDP.

3. Panayotis Christidis, Juan Nicolás Ibáñez Rivas; "Measuring road congestion"; JRC Scientific and Policy Reports; 2012; <https://core.ac.uk/download/pdf/38626544.pdf>

Certainly, the reduction of traffic congestion is a medium-long-term objective which is linked to multiple factors and requires a necessary shift in individual behaviour. Citizens must change their commuting habits, by switching from their own private vehicles to mass transit. It is undisputable that public transport allows people to get around without adding to congestion. Therefore developing and modernising public transport is key to foster such behavioural change.

Urban rail solutions show tremendous potential in freeing up cities' infrastructure, in part due to their high capacity. Metros and trams remain the most effective mode of mass transport to move a large number of users per hour over a given distance, especially during peak travel times. According to the Norwegian Centre for Transport Research <sup>4</sup>, the capacity per hour of a rail system based on hinged 70-meters-long trams amounts to 17.000 passengers.



Source: UITP

Following this further, investments on urban rail solution will help local authorities and municipalities to cope more effectively with the lack of urban land space, a diminishing resource as cities become increasingly denser and crowded. The figure above illustrates the benefit an urban rail track-bed for a metro-line can bring in terms of urban land management – thanks to the high capacity of urban rail.

### **Case Study Llefià Metro Station; Badalona (Barcelona, Spain)**

Source: Transports Metropolitans de Barcelona TMB ([www.tmb.cat](http://www.tmb.cat)) ; Generalitat de Catalunya ([www.gencat.cat](http://www.gencat.cat)); TrensCat ([www.trenscat.cat](http://www.trenscat.cat))

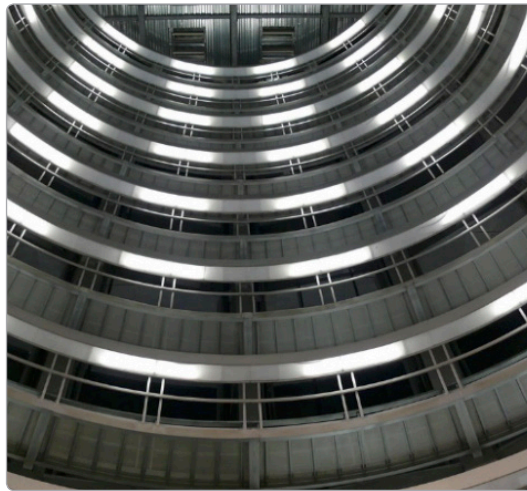
Opened to public in 2010 and part of Transports Metropolitans de Barcelona (TMB) Metro Network's automated Linea 10, Llefià station is located in the city's north-eastern Badalona suburb. The majority of Badalona's population works in and commutes daily to Barcelona. A rapid and high-capacity connection to the metropolitan capital has long been desired. However, the area presents two main challenges: very high population density and uneven ground at different levels. Space is, consequently, scarce and precious, forcing planners to exercise smart land management during the construction of the metro station.

<sup>4</sup>. The Institute of Transport Economics (Transportøkonomisk institutt, TØI) <https://www.toi.no/about-toi/category26.html>



The station is 54-metres-deep and is divided into 4 levels: the upper lobby, the pre-platform, the upper platform and the lower platform. The upper lobby is located at street level, with ticket vending machines and a TMB Control Centre. The well runs down to the level of a double-sided tunnel, over which the trains run. Six high-capacity lifts connect the upper lobby with the pre-platform. The well also has two sets of fixed stairs that can only be used in an emergency. From the pre-platform level, a stairway leads to the platform, upper-level and lower-level.

View of the well from the pre-platform toward the upper lobby.



Building a deep station in such limited available space brought two challenges in the design: avoiding the feeling of claustrophobia and the effect of vertigo when navigating the well down to the platform. By using a horizontal fragmentation of the space, some of the walls are backlit so that the space seems more permeable and attenuates vertigo through a sequence of perforated steel lighted walkways, that also provide different qualities of light.

## AIR QUALITY & GREENHOUSE GASES (GHG) EMISSIONS

In rapidly growing cities, air quality has become a severe concern for health authorities, particularly in developing countries but in Europe, too.

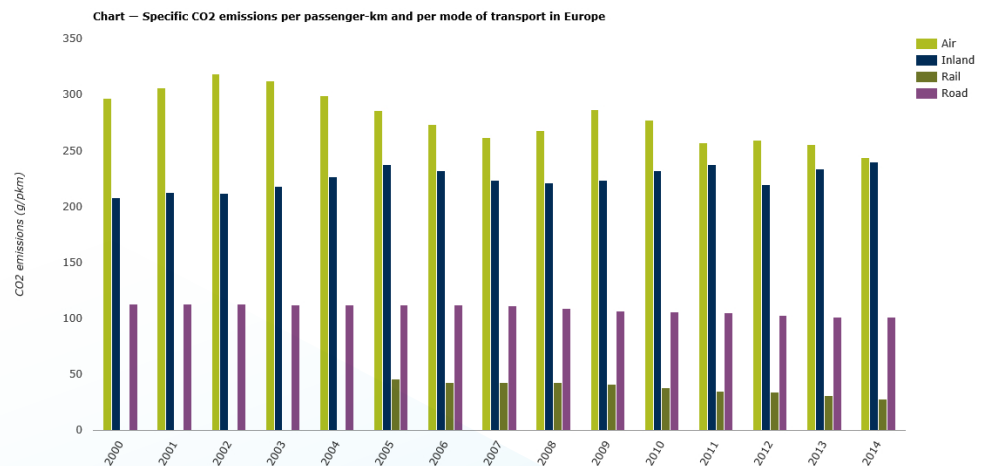
According to the World Health Organisation's (WHO) most recent survey of more than 4300 cities worldwide<sup>5</sup>, only 20% of the urban population surveyed live in areas that comply with WHO air quality guideline levels. The average air pollution levels in many cities and their suburban surroundings can be 4 to 15 times higher than those recommended by the WHO, putting many at risk of long-term health problems. The main concerns with air quality in these areas is the abundant presence of fine particulate matters (PM<sub>10</sub>; PM<sub>2.5</sub>), nitrogen oxide (NO<sub>x</sub>), sulfuric dioxide (SO<sub>2</sub>), carbon monoxide (CO), ozone (O<sub>3</sub>) and VOC (Volatile Organic Compounds) emissions. These pollutants are released when operating fossil fuel-powered vehicles, calling the transport sector into question. Urban rail solutions drastically decrease NO<sub>x</sub>, CO, SO<sub>2</sub> and VOC emissions, while contributing limited PM emissions and improving air quality in their cities.

5. WHO Global Urban Ambient Air Pollution Database, 2016.

The particulate matter emissions of urban rail is limited to and caused by friction between steel wheels and rails attributable to the wide-spread use of electrodynamic braking. In comparison, road vehicles generate emissions at all stages of operation: the combustion of the engine when in use; friction brakes when stopping and tyre abrasion as it moves.

Moreover, transport remains the second largest GHG-emitting sector after energy production<sup>6</sup>. It is currently responsible for nearly 24% of Europe's GHG emissions<sup>7</sup>. According to the European Environment Agency (EEA), transport is the only sector in which emissions have been increasing in Europe over the past 20 years. Road transport appears as the biggest polluter, with 40% of those road emissions being emitted in urban and suburban areas<sup>8</sup>. Rail, on the contrary, is the exception. It is the only mode of transport which has reduced its emissions while increasing passenger and freight volumes. Investing on energy-efficient, low-emission rail projects, especially in cities and metropolitan areas, appears to answer the acute need to ease air pollution and close the emissions gap.

**Specific CO2 emissions per transport mode**  
Source: European Environmental Agency (EEA); 2017



6. Namely, through fuel combustion and fugitive emissions from fuels.

7. Marketa Pape; "Towards low-emission EU mobility"; EPRS | European Parliamentary Research Service; Briefing March 2017; PE 599.356; [http://www.europarl.europa.eu/RegData/etudes/BRIE/2017/599356/EPRS\\_BRI\(2017\)599356\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/BRIE/2017/599356/EPRS_BRI(2017)599356_EN.pdf)

8. Source: the European Commission; [https://ec.europa.eu/transport/themes/urban/urban\\_mobility\\_en](https://ec.europa.eu/transport/themes/urban/urban_mobility_en)

9. IEA-UIC Railway Handbook; 2017; [https://uic.org/IMG/pdf/handbook\\_jea-uic\\_2017\\_web3.pdf](https://uic.org/IMG/pdf/handbook_jea-uic_2017_web3.pdf)

10. Union internationale des transports publics; Knowledge Brief "Light Rail: a tool to serve customers and cities"; June 2016; [https://www UITP.org/sites/default/files/LRT\\_Knowledge%20Brief\\_LQ.pdf](https://www UITP.org/sites/default/files/LRT_Knowledge%20Brief_LQ.pdf)

Mainline and urban rail combines energy-efficient mobility with fewer emissions. Furthermore, the sector has established its own sustainable mobility strategy on a voluntary basis. This shows rail's ambition to provide society with a climate-neutral transport alternative and contribute to the wider move towards decarbonised transport. The rail sector has pledged to reduce total passenger and freight transport CO2 emissions by 30% by 2030, compared to 1990. According to the latest data reported by the International Railway Union (UIC) and the International Energy Agency (IEA), European railways are fully on track to meet this target<sup>9</sup>.

## SAFETY

Finally, urban rail has proven to be, by far, the safest mode of urban transport available. Statistical evidence shows that traveling by underground or tram is approximately 6 times safer than car travel. According to the 2014 accident rate comparison of the 15 sampled cities completed by the<sup>10</sup> Union Internationale des Transports Publics (UITP), the accident rate for trams ("light rail transit") amounted to 0.47 per million persons per kilometre compared to 2.86 for cars.

Technical, operational and technological improvements will make the safety rate of metro-lines and trams even better. For instance, segregated rights-of-way and priority at traffic lights reduce the risk of collisions with road transport and “Driver-Assistance-Systems” – a collision and overspeed monitoring and prevention system – will help increase safety through early driver-warning.

Urban rail therefore contributes substantially to reducing accidents in cities and suburban areas. Therefore, investing in metro-lines and tramways is likely to positively increase a city’s overall traffic safety record.

## Urban Development and Socio-Economic Dimension

Urban mobility is as much about developing transport infrastructure and services as it is enhancing mobility justice<sup>11</sup> by removing social, economic and physical barriers to movement. In this regard, one of the greatest assets of urban rail, in the form of tramways and metro lines, is their ability to play a decisive role in urban development policies and improve dramatically the image of a city or a district, centre or periphery, while contributing to their socio-economic regeneration as well. A modern city and its metropolitan areas are therefore shaped by the public transport system. A metro or light rail system can define and improve a city’s image – as it is the case for London, which is at least partly characterized by its iconic metro system colloquially called “The Tube”.

We should think of metro-lines and tramways more as a global urban/sub-urban development project, rather than as solely a transport scheme. Investment on a new, modern rail-borne public transport system can be seen as an opportunity for cities and local authorities to redefine their urban planning and land use objectives through the rehabilitation, modernisation or restructuring of the entire urban context.

The trams, in particular, interact with the city in many different ways as they are open to and visible from the city. To this extent, the significance of a tram-line – or an underground – project goes even beyond the pure mobility dimension. Such projects give architects, designers, urban planners and landscapers the opportunity to concretely shape the abstract concept of sustainable urban development, whose benefits can be seen only in the medium-long term.

More specifically, what urban rail projects offer the possibility to reorganise residential areas, recreational and work zones, reduce car pressure while consequently the reconquering urban space, the provision of more space for active modes of mobility like cycling and walking, and renovate houses and facades that enhance architectural and urban heritage.

### Case Study Bordeaux; France

Sources: Bordeaux Métropole ([www.bordeaux-metropole.fr](http://www.bordeaux-metropole.fr)); Transports Bordeaux Métropole ([www.infotbm.fr](http://www.infotbm.fr)); Club de la Presse de Bordeaux ([www.club-presse-bordeaux.fr](http://www.club-presse-bordeaux.fr)).

In 1995, when Mr. Alain Juppé and his new political majority took over the city’s administration, the metropolitan area of Bordeaux counted 700.000 people in a territory of 55.000 hectares. At the time, several socio-economic challenges required an urgent answer. Among other, the impoverishment of formerly industrial districts on both sides of the Garonne river – particularly

11. Sheller, Mimi. (2018). Theorising mobility justice. *Tempo Social*, 30, 17-34. 10.11606/0103-2070.ts.2018.142763 [https://www.researchgate.net/publication/327385759\\_Theorising\\_mobility\\_justice/fulltext/5b9d06b5a6fdcc3cb587659/Theorising-mobility-justice.pdf](https://www.researchgate.net/publication/327385759_Theorising_mobility_justice/fulltext/5b9d06b5a6fdcc3cb587659/Theorising-mobility-justice.pdf).

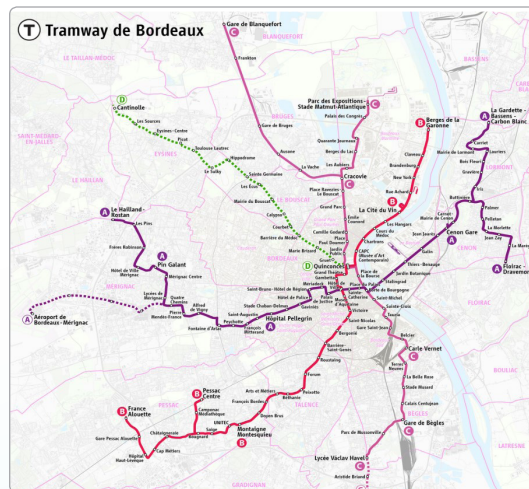
on the right bank, opposite the city centre. The city was also committed to countering steady population decline in the city centre due to the appeal of suburban areas and the general isolation of socially disadvantaged areas.

Between 1995 and 1999, Bordeaux studied and implemented a tram network with three specific urban regeneration objectives, thus transcending the pure mobility dimension:

1. Enhancing the architectural heritage of the 17th century city centre by having cars would make way for the trams;
2. Reconnecting the eastern districts, such as the Bastide neighbourhoods, with the rest of the city;
3. Connecting the periphery with the city centre, building a concrete link for farther, poorer neighbourhoods.

Map of the Tramway network of Bordeaux Metropole

Source: TBM – Transport Bordeaux Metropole



Furthermore, landscape architects and designers were invited to be part of the project and work alongside engineers. Accordingly, to limit the visual impact of tram catenaries, an untested system of trams drawing power from underground was deployed in the central part of the city.

Today, the three lines of trams represent 64% of all travel in Bordeaux’s metropolitan area, with a steadily increasing ridership of +9,1% between 2017 and 2018. The network is in continuous expansion: a fourth tramway line is expected in 2019, connecting the north-western districts with the centre and, by 2023, – following a further extension – with the central railway station.

It is, therefore, easy to understand how a tram- or metro-line project can be a tremendous incentive for urban developers, especially when one remembers how these initiatives can be stimulating investments for the local economy and help increase property values. Arguably, it is the “immobility” of tram and metro infrastructures that serve as one of most significant enablers of such remarkable urban regeneration potential. In fact, what an urban rail project gives is

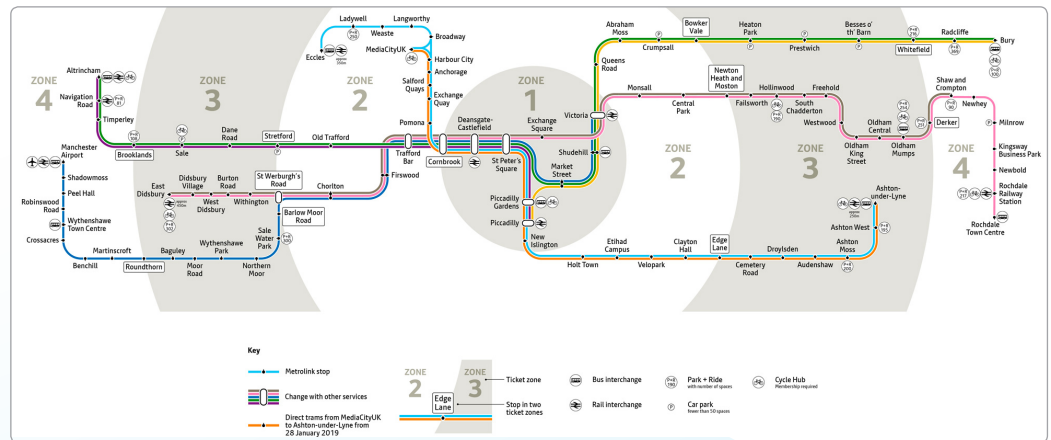
a sense of permanence as these systems cannot be removed from one day to the other because of the extraordinary public works that would be required, the need for new transport plans or the potential political ramifications. On the contrary, the flexibility and changeability of other modes of public transport, such as buses, can become a weakness from a broader urban development perspective. The physical permanence of the rails, under or above ground, is a visible, tangible way to show that a determined area is being invested in for the future, giving long-term certainty to any potential investors.

### Case Study Manchester, United Kingdom

Sources: Transport for Greater Manchester TFGM ([www.tfgm.com](http://www.tfgm.com)); Lloyds Banking Group (<https://www.lloydsbankinggroup.com>) Nationwide Building Society ([www.nationwide.co.uk](http://www.nationwide.co.uk)).

Manchester’s Metrolink is the most extensive tram/light rail system in the United Kingdom. Initiated back in 1992, the network nowadays includes seven lines, stretches along 100 kilometres of track and notably connects the international airport with the city centre. In the biennial 2018-2019, the ridership accounts to 43,7 million passenger journeys.

Map of the Metrolink’s Tram network of Greater Manchester  
Source: TFGM – Transport for Greater Manchester



In Manchester, 7 million residents are within an hour’s drive of the city centre – a figure which comes second only to London – and many of them commute into the heart of the city each and every day. The extension of the Metrolink’s network to populated districts in the metropolitan areas, such as Wythenshawe or Failsworth, has been essential to give thousands of users the alternative to the private car and traffic jams. Furthermore, Manchester’s Metrolink stands as the perfect example of how a tram-line project can drive economic activity and raise employment rates in the areas it serves. This is because many potential tenants – who may have once ignored the outskirts of the city would take advantage of the improved tram-line links and opting to move to those parts of Greater Manchester metropolitan area now served by the Metrolink.

A Study by Lloyds Banking Group has calculated that, in the first two years of opening a new tram connecting, average property values increased by 11% in the immediate areas around the tram stop. The same study points out that, since 1995, the average property value along the Metrolink’s network saw an increase of 273%.

Furthermore, Manchester's Metrolink's connections have been pivotal to drive investments for landmark commercial and real estate projects – with positive repercussions within the whole area interested by the project. MediaCityUK, in this regard, is appropriate example. A 200-acres project along the Manchester Ship canal in the borough of Salford, MediaCityUK hosts 0 media studios and more than 400 flats. When BBC decided to relocate part of its staff from London to the north, Manchester's MediaCityUK was selected especially due to its efficient public transport connection. In fact, MediaCityUK is fully accessible via Metrolink's tram network, connecting riders to central Manchester and Piccadilly Station – where trains can reach London in about two hours.

Following this further, as our cities experience relentless expansion and cluttered population growth, the building or extension of a metro or tram-line can help restructure both urban and suburban areas by creating physical links between the city centres and peripheral districts. In this regard, urban rail solutions display another crucial edge in their potential to foster economic cohesion and social balance through connectivity. Extending a metro or tram-line to metropolitan areas' outskirt zones represents a major bet on the future of those neighbourhoods. Given the immovability of urban rail infrastructure, it is seen as a stable, long-term and nearly permanent investment. Urban rail projects can be the essential facilitator to give or improve accessibility to workplaces, schools, universities, facilities and leisure facilities, contributing as well to a more positive perception towards the area among its own inhabitants.

### Case Study **Palermo, Italy**

Sources: AMAT Palermo S.p.A. ([www.amat.pa.it](http://www.amat.pa.it)) Palermo Mobilita' – Comune di Palermo ([mobilitasostenibile.comune.palermo.it](http://mobilitasostenibile.comune.palermo.it)) Trenitalia S.p.A. ([www.trenitalia.com](http://www.trenitalia.com))

Until its discontinuation in 1947, the Sicilian capital boasted a tramway network which, in its apogee, covered 38 kilometres of line. Nearly 50 years later, in December 2015, a new tramway network was inaugurated. Palermo's tram system now includes four lines, covering 18 kilometres overall. Noteworthy, the 4 lines do not cross the centre of the city, rather they flow from different peripheral areas to central nodes of the Sicilian metropolis. A great degree of attention has therefore been given to the zones of the city away from the commercial and touristic buzz, where most of the nearly 600.000 inhabitants of Palermo live. Notably, the eastern Roccella and Brancaccio neighbourhoods are connected to the Central Railway Station, thus giving the interchange access to regional and long-distance railway lines. The other lines serve the western metropolitan area, connecting them with the Notabartolo railway station.

Palermo's tramway network is fully integrated with the city's metropolitan railway service – a 39-kilometres long, 2-line network, including the Central and Notabartolo railway stations – ensuring the coherence and systemic approach of the city's multimodal public transport service.



Map of the current Palermo's tramway network, including the existing metropolitan railway service  
Source: Comune di Palermo

The whole urban and suburban transport system of Palermo is undergoing a remarkable development, with urban rail playing a pivotal role. Extensions of the existing lines and 3 new tram lines are expected to be in place by 2021, bringing the tramway system to a total of 33 kilometres. The connecting of further peripheric districts directly with the centre of the city will reaffirm the prevailing function of the tram network as tool to foster economic and social cohesion.

At the same time, modernisation and extension of the metropolitan railway service is also taking place, preserving the vision of an integrated public transport plan.

## Rail as the backbone of integrated urban mobility

Urban mobility is becoming increasingly integrated and multimodal, bringing together a combination of different modes, solutions and services. Such approach is fully complementary to the efforts of promoting a sustainable urban mobility paradigm, reducing traffic congestion. A viable and attractive alternative to private automobile use must be the most comprehensive and flexible service possible if users are to adopt more sustainable, yet less autonomous options. The new network must be seen by users as one that offers rapid, accessible and cost-effective solutions. The integration of the urban transport chain follows a dual path, being both digital and physical. In this first regard, recent developments in information and communication technologies hold the potential to foster the integration of data and information. This will facilitate integrated, end-to-end, customer-centred travel options. In the physical realm, the design of multimodal hubs assumes a crucial importance as it acts to integrate the infrastructures of different modes on a network-wide scale. These two dimensions of urban mobility integration – the “digital” one and the “physical” one – must be rolled out simultaneously and urban rail stands at the very heart of this deployment as its main key-enabler. As a matter of fact, rail transport is based on inclusiveness and accessibility, therefore the digital and physical integration of urban transport solutions will facilitate the access for passengers of varying age, social categories, culture and language, life characteristics and level of mobility.

## DIGITAL INTEGRATION OF URBAN TRANSPORT – THE ROLE OF RESEARCH AND INNOVATION

The rapid evolution of digital technologies is triggering the creation of new business models and services in the transport sector, placing urban and suburban rail transport within a broader multimodal mobility chain. As a new mobility market is emerging, transport services are now offered in an integrated way, beyond the “one single-mode” solution, and are covering many regions and areas simultaneously for a fully seamless mobility experience.

Mobility-as-a-Service (MaaS) is one of the recent concepts based on the integration of different urban systems. MaaS utilises the benefits of technology-driven transport services to improve access and efficiency of the existing transportation networks, all within a single payment platform. This represents a notable shift in how people interact with, use and consider their transport options within cities and beyond.

The traditional urban freight and logistics business is another area which is being deeply transformed by digital applications and new mobility services. The transition from paper to digital documentation, supported by the digital exchange of data, is the way forward for improving efficiency, reliability, simplification and productivity while reducing costs. Digitalisation would enable urban logistics actors to maximise benefits from a digitised logistics process with intelligent services like end-to-end logistics planning and visibility, and efficient sharing of information within the supply chain.

We believe that the rail sector can unlock a wide range of opportunities brought by digital technologies in urban transport, one of which is strengthening its end customer-centric approach. The goal is to provide end-customers – passenger and freight, alike – with seamless, customised (i.e. personalised), and cost-effective end-to-end journeys, whatever the mode of transportation. The focus would be on providing an adaptive multi-modal traffic management system to operators that allows for seamless end-to-end journeys. Finally, real-time information and standardisation of data communication processes in a multi-modal system environment would be key for designing new, customer-tailored solutions.

In this framework, it is important to highlight Research and Innovation’s (R&I) role supporting rail as the backbone of a digitally integrated urban mobility. UNIFE is fully committed to the Shift2Rail Joint Undertaking, the rail’s collaborative-research programme under Horizon 2020 – bringing together the supply industry, operators, infrastructure managers and academia from across EU Member States. In particular, Shift2Rail’s Innovation Programme 4 “*IT Solutions for attractive railway service*”<sup>12</sup> is contributing to building a digital ecosystem for MaaS, encompassing all available transport modes. Individual users will be able to access live traffic notifications based on predictive models using information received directly from the rail assets, and . They will also automatically be given suggestions for alternative solutions in the event of any transport service disruptions.

The European rail supply industry strongly advocates for the continuation of the Shift2Rail Joint Undertaking beyond 2020, within the Horizon Europe Framework Programme. The future rail collaborative-research instrument will embrace the urban transport dimension. UNIFE has developed a vision for the next wave of collaborative R&I activities in the Joint Undertaking based on nine pillars known as “key-enablers”. One of these key-enablers tackles the disruptive innovations for mobility pushed by digitally-based solutions under the name of “*Mobility as a seamless service*”.

12.  
<https://shift2rail.org/research-development/ip4/>



Shift2Rail Innovation Programme 4  
Sources: Shift2Rail Joint Undertaking

<https://shift2rail.org/research-development/ip4/>



**Shift2Rail** Joint Undertaking, established in 2014 under Horizon 2020, is the first European rail collaborative-research initiative to seek focused R&I and market-driven solutions by accelerating the integration of new and advanced technologies into innovative rail product solutions.

Shift2Rail IP4, titled *"IT Solutions for attractive railway services"*, aims at fostering rail's digital interoperability with other transport modes, mobility services and key elements of the supply chain. Door-to-door, or "anytime" & "anywhere", intermodal journeys, which encompass several distinct modes of transportation are at the heart of the IP.

In this respect, IP4 acknowledges that it is essential to ensure that sufficient data is made available from all relevant actors in the rail sector to properly reap the benefits of these innovative IT services. This is key to the establishment of a fully functioning Single European Railway Area (SERA) and, at a broader level, a Single European Transport System.

The activities of the Shift2Rail IP4 are organized according to the Technological Demonstrators (TDs) as follows:

- Setting-up an interoperability framework based on open, standard and machine-readable language automatically exchanged by computers;
- Providing a travel shopping application enabler that combines all transport modes, operators and geographies;
- Orchestrating multiple and parallel interactions with several booking, payments and ticketing engines;
- Giving travellers in-trip assistance when navigating transport modes, up-to-date statuses reports on subsequent legs of the journey and support in case of disruption;
- Providing the traveller with full access to all travel services needed for the journey and booking;
- Managing effectively all data which will be generated by the services related to individual travels and to additional sensors.

## PHYSICAL INTEGRATION OF URBAN TRANSPORT – THE ROLE OF RAILWAY STATIONS

The digital interconnection of different modes of urban transport must be supported, and completed, by the physical linkage of the individual infrastructures of the various urban modes. In this context, the versatility of Rail in enabling high-capacity long, medium and short-distance transport makes it crucial to rapidly, efficiently and sustainably bring -- people and goods into and out of cities. Railway stations and rail freight terminals become the multimodal interfaces potentially linking all modes while integrating seamless passenger and cargo traffic flows.

Railway stations, in particular, are becoming the quintessential hubs at the heart of cities and their suburban areas, keystones of an advanced economy's urban infrastructure. Being simultaneously points of arrival, departure and transit, railway stations provide the efficient interface for connecting

all other transport modes' infrastructures. This is how railway stations can quickly and smoothly handle large amounts of passengers, visitors and goods.

The station should be accessible by public transport, by active mobility modes – i.e. through sharing bike facilities attached to the station –, have nearby parking space and ideally be equipped with recharging points for electric vehicles (EVs). Eventually, real-time information about the transportation options should be displayed at the station – given tangible evidence of rail as the backbone of a physically and digitally integrated urban mobility.

Moreover, seizing social and commercial opportunities, recent projects around Europe are turning railway stations into splendid examples of contemporary architecture and new meeting places, offering numerous commercial and leisure facilities. These railway stations become another element driving socio-economic development in cities by connecting citizens and goods, while improving the urban space through design.

### Case Study **Utrecht Centraal Railway Station; The Netherlands**

Sources: Gemeente Utrecht ([www.utrecht.nl](http://www.utrecht.nl)); ProRail ([www.prorail.nl](http://www.prorail.nl))

Located in the heart of the Netherlands, Utrecht is the country's fourth largest city and its most important railway hub. With more than 1000 departures a day and over 80 million passengers passing through per year – more than Schiphol International Airport sees during the same period – Utrecht's Centraal is by far the busiest Dutch railway station.

After undergoing several expansion works throughout its history, the station received a complete makeover between 2011 and 2016. The redesign took into account not only the crucial position of Utrecht as the hub of the entire Dutch railway network, but also its close interlink with all other modes of urban-suburban transport and in the framework of the city's future metropolitan development. Accordingly, the goal was to turn Utrecht's Centraal station into a high-performance, high-capacity multimodal mobility hub for the benefit of the whole Netherlands.

Aerial view of Utrecht's Centraal before and after renovation, displaying the urban development in the district.  
Source: ProRail



A high degree of attention has been given to the railway station's interaction with other modes, trying to maximise the benefit of seamless connections between different mobility providers. To support this vision, Utrecht's Centraal has two Bus stations that provide passengers with both urban and regional services. Additionally, as of 2020, two tram lines will be connected by a tunnel under the railway tracks and stop at the station's easternmost platform. Finally, with a focus on active urban mobility, Utrecht's Centraal is outfitted with 2 3-floor bicycle parking facilities – one of which is the World's largest, with space for over 20.000 bikes.

The renovation of Centraal railway station is one of the cornerstones of Utrecht's metropolitan redevelopment, which includes the expansion of its Science Park and the reconstruction of a former industrial estate into "The New Town" project. (De Nieuwe Stad).

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## Funding and financing for urban rail – key to unlock the potential

With all the above-mentioned benefits that urban rail can provide, it is necessary to ensure that the preconditions are met for the necessary investments to flow in urban rail projects. Urban rail projects being capital-intensive with low financial rates of return but with high economic rate of return, mobilisation of the relevant stakeholders at the EU, national, regional, and local level is key to ensure adequate funding and financing. UNIFE would therefore invite the public authorities and project promoters to use the available EU funding and financing opportunities, be it through grants, loans, guarantees and equity.

### EU FUNDING FOR URBAN RAIL PROJECTS

A major source of investment for urban rail projects across the EU has been the Regional Policy which is implemented with the support of five funds, also known as the European Structural and Investment Funds (ESI Funds). Among these, the Cohesion Fund (CF) and the European Regional Development Fund (ERDF) have provided significant funding for urban rail projects. In order to be supported by the CF or ERDF, the project needs to be in line with the operational programme of the particular region or country it will operate in <sup>13</sup>. Therefore, it is important to ensure that support for urban rail projects is foreseen in the Operational Programmes for the upcoming 2021-2027 programming period. At the time of this publication's release, ERDF and CF have allocated approximately € 8bn -and €12bn for urban transport, across all modes, during the 2007-2013 and 2014-2020 programming periods, respectively. These funds are jointly managed by the EC and EU Member States' national authorities, while applications can be submitted through the national Managing Authorities <sup>14</sup>.

13.  
The programmes can be accessed here:  
[https://ec.europa.eu/regional\\_policy/en/atlas/programmes/](https://ec.europa.eu/regional_policy/en/atlas/programmes/)

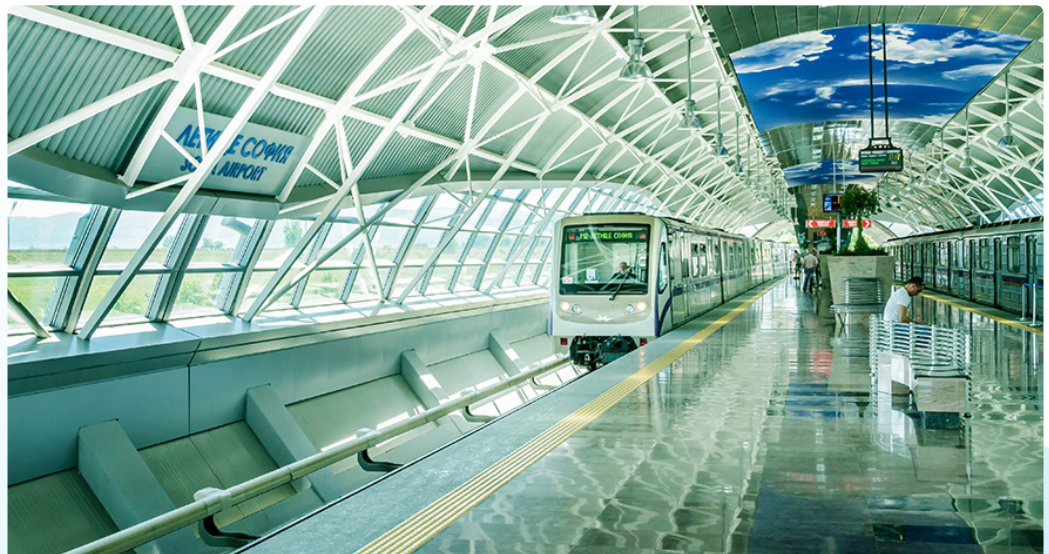
14.  
[https://ec.europa.eu/regional\\_policy/en/atlas/managing-authorities/](https://ec.europa.eu/regional_policy/en/atlas/managing-authorities/)

**Case Study Case study: Sofia Metro**

Sources: Metro Sofia ([www.metrosofia.com](http://www.metrosofia.com))

Since it began operations in 1998, the Sofia Metro has undergone an important expansion in recent years supported by EU funds. Thanks to these investments, great progress has been achieved towards making Sofia's metro the city's main transport system. Its development has reduced congestion and improved connections with other transport modes, particularly railways. During the 2007-2013 programming period, the extension of the 1 and 2 lines was made possible with € 486mn from CF and ERDF, ensuring connections to the Sofia Airport and the Sofia Business Park. In the current 2014-2020 period, EU support reached € 368mn for the new 3 line, with an additional investment package worth € 86.6mn adopted in June 2017. The metro extension has also been continuously supported by the European Investment Bank(EIB) in the form of a €105mn loan in 2008, a €56mn loan for the 3 line (Stage I) in 2017 and an additional €22mn for its second stage in 2018.

The Sofia metro has brought significant changes in the daily life of many of 1,5 million people living in or around the city. The existing 2 lines are used by almost 350.000 people a day. Saving passengers 20 minutes in just one direction, the metro lines have also reduced the number of cars circulating in the city every day by 21.000. When metro line 3 is completed, the metro will help reducing harmful emissions by 90.000 tonnes. (Data from InvestEU Portal: [https://europa.eu/investeu/projects/sofia-metro-line-3\\_en](https://europa.eu/investeu/projects/sofia-metro-line-3_en)).



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The Connecting Europe Facility (CEF), with a total budget of €24,05bn for the 2014-2020 period, has provided a significant boost to the development of rail infrastructure across the EU. Investments under the ERDF and CF are planned in close cooperation with the support of the CEF to ensure complementarity. For the 2021 – 2027 period the CEF budget is currently proposed to be the same size. However, the European Parliament is advocating an increase to €33,5bn, as UNIFE has been strongly advocating for a bigger CEF Transport budget. Examples of projects supported under CEF include the “Grand Paris Express”, Birmingham International Station, ERTMS deployment on Madrid and Barcelona commuter lines, planning of a regional rail project (RTW) in Frankfurt am Main and much more. In the future, it would be important to increase support to the urban nodes located on the TEN-T Core Network, as well as to provide adequate grants support for both sustainable transport infrastructure and rolling stock projects at the urban level.

### MOBILISING PUBLIC AND PRIVATE FINANCING FOR URBAN RAIL PROJECTS

With ESIF and CEF support being mostly provided in forms of grants (apart from financial instruments), it is important to note that these can be also blended with other sources of financing. Support from the EIB is of major importance due to its management of the European Fund for Strategic Investments (EFSI)<sup>15</sup>. The EFSI is a guarantee scheme which uses a guarantee from the EU Budget to trigger additional investments, currently slated for € 500 bn by 2020. It was created to mobilise private investment in key areas such as infrastructure, making urban rail projects eligible. Unfortunately, at the moment, the number of rail sector projects remains relatively small and the grounds for is still unclear.

In the 2021-2027 period, the EC proposes to replace EFSI with InvestEU – a new, fully integrated investment fund controlling a €15,2bn contribution from the EU budget and an expected €650bn of additional investment. UNIFE will continue to work closely with the EC and the EIB to ensure that urban rail projects benefit from the InvestEU support. UNIFE further suggests that the EIB and EC more strongly promote these financing capabilities, also in conjunction with the blending of grant funding while providing more clarity on how to access such financing instruments and support. The EIB also provides significant support to urban rail projects through loans and other financing instruments which can be given for various urban rail projects<sup>16</sup>:

- Construction, extension or rehabilitation of public transport networks such as metro & tramway lines;
- Acquisition of rolling stock;
- Development of intelligent traffic management and information systems to improve public transport, such as electronic ticketing, traffic management and communication systems.

15.  
[www.eib.org/en/efsi/index.htm](http://www.eib.org/en/efsi/index.htm)

16.  
Examples of EIB financed projects include acquisition of trams in Krakow and Silesia; Crossrail and upgrade of Tube stations in London; upgrading of metro in Lille Métropole.

Urban rail projects are also eligible under the EIB's Cleaner Transport Facility<sup>17</sup> that targets transport operating on alternative fuels like electricity, hydrogen, biofuels and natural gas that have lower greenhouse gas (GHG) emissions or enhanced environmental performance.

To improve the chances that cities' plans will be able to attract external finance, the EIB and the European Commission have developed the joint ELENA facility initiative<sup>18</sup> to support investments in energy efficiency and urban transport. ELENA provides grants that can be used for structuring programmes, business plans and additional energy audits. It also supplies grants for preparing tendering procedures and contracts, as well as paying for project implementation units<sup>19</sup>.

Internationally, EIB has been developing a joint initiative with the *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) called FELICITY<sup>20</sup>. It supports several urban sub-sectors including public transport and infrastructure. It provides supports for municipalities and financial intermediaries in Brazil, China and Mexico, which often lack the knowledge, capacities for the development of bankable projects and adequate framework conditions for the fulfilment of international loan requirements.

The potential of urban rail projects to support growth, as well as housing and commercial development, should be considered when considering various financing options for a particular project. Leveraging other private sector funding, such as land value capture, could also be considered as a means to exploit land value increases in areas where urban rail projects are being developed. It is also important to emphasize that Public-Private Partnerships (PPP) have proven to be successful for the completion of many urban rail projects through the participation of European rail manufacturers<sup>21</sup>.

## FINDING THE RIGHT WAY TO PREPARE AND IMPLEMENT HIGH QUALITY URBAN RAIL PROJECTS

When it comes to project preparation, independent quality reviews of projects, capacity-building and the help with the implementation of the projects, Joint Assistance to Support Projects in European Regions – (JASPERS)<sup>22</sup>, a joint initiative between the EIB and the European Commission, has proved to be an extremely helpful in helping cities absorb EU funds. JASPERS provides technical assistance to prepare high-quality major projects to be financed by the ERDF and CF, including CEF projects. Assistance is free of charge for local authorities and promoters. Advising authorities may also assist on strategic planning, preparation of the projects and improve the capacity of administrators and promoters by transferring knowledge about preparatory steps environmental issues, EU legislation and more. There are two ways how to approach JASPERS; either through the Managing Authorities who are in contact with JASPERS or by directly reaching out to the different JASPERS Regional Offices<sup>23</sup>.

17. <https://www.eib.org/en/projects/sectors/transport/cleaner-transport-facility.htm>

18. <https://www.eib.org/en/products/advising/elena/index.htm>

19. ELENA facility was, for instance, used when considering the introduction of tramway networks in Region of Skåne (Malmö, Lund)

20. <https://www.eib.org/en/products/advising/felicity/index.htm>

21. With examples including Milan Metro Line 5 and the extension, Reims LRT or Nottingham LRT L2

22. <https://jaspers.eib.org/>

23. <http://jaspers.eib.org/get-in-touch/index.htm>

UNIFE also welcomes the establishment of URBIS<sup>24</sup>, a new dedicated urban investment advisory platform within the European Investment Advisory Hub (EIAH). It has been set up to provide municipal authorities with advisory support on urban investment projects, programmes and platforms.

Urban rail projects should be implemented based on the principles set out by the 2014 EU public procurement framework. If contractors choose to favour more qualitative, social and environmental criteria, like whether to take a life-cycle cost approach, public procurement can undoubtedly be used as an instrumental driver for the implementation of smart, sustainable and innovative technology in urban rail projects. As contractors can already decide to reject bids if more than 50% of the value is added outside the EU (Article 85 of Directive 2014/25/EU), public procurement can also be used as a lever to maintain industrial jobs within Europe.

## The way forward: the EU Green Deal

A sustainable, climate-neutral policy will be at the heart of the upcoming European Commission's initiatives for 2019-2024. This undertaking will involve all sectors in an overarching climate strategy. Ursula von der Leyen, the EC's President-elect, announced a European "Green Deal" as the hallmark of her upcoming mandate. Its objective will be to put Europe on track to become the first climate-neutral continent by mid-century.

Frans Timmermans, First Vice president of the EC and Executive Vice President-designate for the Green Deal, will be in charge of this ambitious strategy that notably foresees the first European Climate Law within the new mandate's first 100 days in office. This legislation would aim to enshrine the 2050 climate-neutrality target into law. In his "Mission Letter"<sup>25</sup>, Mr. Timmermans has been explicitly tasked with reducing the transport sector's carbon footprint-

The European rail supply industry acknowledges that the decarbonisation of transport is unambiguously expected to become pivotal in accomplishing the new Commission's ambitions and addressing the pressing challenge posed by climate change. The importance of sustainable mobility, notably and including rail transport, is poised to increase dramatically and we once again highlight the significance of the instruments which are already in place, namely the 2011 Transport White Paper and the COP21 Agreement. In the context of relentlessly growing and polluting cities, urban rail is expected to play a decisive role in the climate neutrality objective. The rail sector and its supply industry, with concrete, tangible benefits for citizens and biodiversity, are ready to take on the responsibility of building a greener, fairer Europe for future generations.

24.  
<https://eiah.eib.org/about/initiative-urbis.htm>

25.  
[https://ec.europa.eu/commission/sites/beta-political/files/mission-letter-frans-timmermans-2019\\_en.pdf](https://ec.europa.eu/commission/sites/beta-political/files/mission-letter-frans-timmermans-2019_en.pdf)



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