

No. 1 Vademecum (guidelines) on main best practices, infrastructures standard and services for the intermodality bike – public and collective transport at nodes in the CBC area Italy-Croatia

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Abstract

This document reports on the International Best Practices concerning cycling intermodality with other transport modes, with specific regard to transport nodes. Thus, it is intended to provide guidelines on these aspects to decision-makers, public transport operators, mobility/bicycle planners and mobility managers, in the form of a “Vademecum”.

Since this work is included in the MIMOSA Project, following a brief introduction, the MIMOSA deliverables which directly affect cycling mobility are briefly recalled. Subsequently, the International Best Practices are presented, starting from those reported by the MIMOSA Project partners and then broadening the investigation.

The presentation of the International Best Practices, divided according to cycling intermodality at airports, seaports, railway stations and bus terminals, provides an overview of the actions which should be undertaken to enable and enhance cycling intermodality. Clearly, these practices widely vary across the considered countries and depend on local regulations.

In the context of the MIMOSA Project, the analysis of International Best Practices was useful to provide some potentially useful recommendations on how to improve cycling intermodality at transport nodes, through both physical and non-physical actions concerning accessibility, signs, and services.

1. Introduction

The Puglia Region is a partner of the “Maritime and Multimodal passenger transport services (MIMOSA) project financed by the Interreg Italy Croatia 2014–2020 Programme - Specific Objective “Enhancing quality, safety and environmental sustainability of coastal and maritime transport services and nodes by promoting the passenger sustainability in the program area”.

Within the MIMOSA project, the Puglia Region has focused its contribution on the integration between bicycles and other means of transport and on the cycle accessibility of stations, ports and airports, capitalizing on the results obtained from the participation in previous cooperation projects on cycle mobility such as CYRONMED (Mediterranean Cycle Network, funded by PIC Interreg ArchiMed 2000-2006), CiELO (City-port Eco Logistics) funded by the European Cooperation project Italy-Greece 2007-2013, INTERMODAL (INTERmodality MODEL for the Development of the Adriatic Litoral zone)) funded by the international cooperation project IPA ADRIATIC 2007-2013, and EV5-VRF funded by the European project COSME 2014-2020.

1.1 Objectives of this document

Combined transport of bicycles with other means of transport is essential for daily mobility and tourism, because it is an important component of a multimodal, integrated, and sustainable mobility system aimed at reducing road congestion, as well as environmental and health impacts.

Through modal integration, bicycles acquire the possibility of covering long distances or difficult and demanding routes in limited time and at low cost, with advantages for the environment and modal rebalancing.

This is the case of cycle tourism, one of the most resilient and sustainable forms of vacation available to European travelers, that is growing rapidly, thanks in part to the development of long-distance cycle networks, such as Bicalia and EuroVelo.

In this framework, the modal integration between cycle networks and other transport is crucial for the continuity of the routes and the accessibility of the territories. Cycle tourism is unthinkable without cycle intermodality.

In the Cross-Border Area of the Italy-Croatia Programme, the integrated transport of bicycles and other means of transport is still lacking in the planning and management of infrastructure as well as in transport systems, because it is not yet considered a useful service for travellers.

Integrated transport and cycle accessibility of interchange nodes must increasingly become an essential element of the local, regional, and national transport system.

The document presented here is intended to be a handbook (“Vademecum”) for decision-makers, public transport operators, mobility/bicycle planners and mobility managers. In particular, this document aims at providing the proper indications for implementing new solutions, physical structures/infrastructure and improving existing ones, with specific regard to:

- the transport of bicycles on board the various means of transport (plane, ferry/ship, train, bus);
- the accessibility by bicycle to modal interchange nodes (airports, railway stations, bus terminals, seaports);
- services for cyclists (e.g., cycle parks, rental / sharing systems, maintenance stations, cycle paths, signs and information signs, etc.).

Hence, the vademecum reports on International best practices for how to address these three specific needs. It is structured as follows: 1) a brief presentation of the specific pilot interventions related to these topics within the MIMOSA Project itself; 2) an overview of the best practices promoted by the MIMOSA Project partners, which is the result of a collection of surveys to define the state of the art in the Programme area; 3) the description of other relevant International best practices, independently of the MIMOSA Project and on the contributions provided by its partners. For each type of intermodality, some specific structures and infrastructure have been analysed and described, relating them to the needs of travellers. In the last part of the vademecum, based on the actual information and future scenarios, practical recommendations are proposed through an executive summary, and final conclusions are drawn.

2. MIMOSA Project specific interventions

In this section, in order to link the following presentation of International best practices on cycling intermodality with the MIMOSA Project, the MIMOSA Project specific interventions which have some connection with cycling mobility are briefly presented, with specific reference to the related Project deliverables.

2.1 MIMOSA Deliverable D.5.3.5. “Set of solutions for easy access to Bari and Brindisi airports for passengers travelling by bicycle”

Within the MIMOSA Project, the Puglia Region has implemented the following actions, in order to provide optimized cycling accessibility to the airports in the Region:

- Design and implementation of two Bike Facility Points (henceforth referred to as BFP) for both Bari and Brindisi airports;
- Design and subsequent implementation of bike paths to connect the airport area equipped with cycling facilities and the existing/planned bike paths for both Bari and Brindisi airports;

- Design of a specific logo for BFPs, recalling the Aeroporti di Puglia (Apulia Airport Authority) logo;
- Design and subsequent implementation of horizontal signs to highlight the paths connecting BFPs to airport stations;
- Identification of tools and amenities for the two BFPs, composed of:
 - an assembly/disassembly area, with tyre pumps;
 - pedestrian bollards for cycle parking, with customized colours and the BFP logo;
 - multifunction electronic information totem (with touchscreen);
 - specific illuminated logo sign to identify BFPs;
 - trash bin;
 - trolley to carry disassembled bikes.

Within the scope of the MIMOSA Project, the Apulian Airport Authority should include links in its official website to new web pages reporting all useful information for the cycling-air intermodality, in order to facilitate cycle tourism, cycling-air intermodality and sustainable tourism within the Apulia Region. Online content should be displayed through the BFP information totem as well, placed in Bari and Brindisi airports. The essential content and functions of both the webpage and the information totem are reported as follows:

- 1) at least bilingual contents (Italian and English);
- 2) section for facilitating cycling-air intermodality, providing information on
 - a. how to reach by plane the Bari and Brindisi airports travelling with bikes:
 - i. updated list of airlines flying to/from the two airports, allowing bike carriage;
 - ii. updated bike transport cost for each airline;
 - iii. requirements for bike transport (i.e., disassembling/packing) for each airline;
 - iv. specific bike packing indications;
 - b. how to reach Bari and Brindisi airports by bike:
 - i. updated map of existing cycleway, paths and lanes;
 - ii. updated map of planned cycleway, paths and lanes;
 - iii. tourist paths provided with links to downloadable maps and Road Books;
 - iv. list of lines and timetables of local public transport allowing bikes on board;
 - v. specific bike packing indications;
 - c. the structures dedicated to cycling mobility at the regional or provincial level:
 - i. updated map of bike-friendly hotels;
 - ii. updated map of cycle parking stations;
 - iii. tourist attractions for cyclists, provided with supplementary links;
 - d. how to correctly use the BFP bike maintenance facilities:
 - i. user manuals;
 - ii. advice for the proper use of both the facilities and the BFP;
 - e. airport thematic maps with indications of the BFP-departure area and arrival area-BFP preferable routes;
 - f. thematic maps of cycle routes and cycle parking areas close to the airports.

2.2 MIMOSA Deliverable D.4.3.2. “Maritime and Multimodal Sustainable passenger transport solutions and services“

The Friuli Venezia Giulia Region has implemented the Trieste – Grado – Lignano – Istrian Coast (HR) maritime service, which includes both a National and International (Italy-Croatia) service. The maritime service Grado-Lignano connects the two main seaside resorts in the Friuli Venezia Giulia Region through a pleasant journey of about an hour and a half between the sea and the lagoon. It was supported through previous Interreg projects (Ea Sea Way, Moses) and it allows bike transport, thus connecting the CAAR cyclepath to the town of Lignano. This service was the pilot for the MIMOSA Deliverable D.4.3.2. The Grado-Lignano service is also linked to the Grado-Trieste maritime service and to the Trieste-Istria connection (by bus or boat). The service is seasonal, between July and October. During the 2021 season, 2682 passengers and 1025 bicycles were transported between Trieste-Grado and Lignano.

2.3 MIMOSA Deliverable D.4.3.3. “Pilot cross border intermodal service“

Within the MIMOSA Project, the Friuli Venezia Giulia Region has implemented Bike&Bus, a cross border intermodal service to foster cycling intermodality between Italy, Slovenia and Croatia. In particular, the bus line service: Trieste-Parenzo/Poreč allows bike transport. In fact, thanks to the ICARUS project, the Friuli Venezia Giulia Region improved the Bus&Bike pilot project by connecting Trieste and the Istria Region in Croatia, with the aim of also connecting it to the Parenzana cycle path, appreciated by cyclists. This service was the pilot of the MIMOSA Deliverable D.4.3.3.



Figure 1 - Cross-border bike bus Trieste-Parenzo (picture provided by the Friuli Venezia Giulia Region)

2.4 MIMOSA Deliverable D.4.4.1. “Innovative light electric vehicle sharing service supported by a “Mobile Hub” in Emilia-Romagna Region“

Within the MIMOSA Project, the Institute for Transport and Logistics has implemented an e-bike rental service in Cervia (Emilia Romagna Region), equipped with GPS tracking systems. In particular, the service has 32 electric bikes and related equipment (GPS, lock systems and helmets). The first MIMOSA electric bikes were provided to selected hotels in order to start the first testing phase during summer 2021. This service is the pilot reported in the D.4.4.1 MIMOSA Deliverable.

Moreover, following this action, another related MIMOSA service is to be implemented (MIMOSA Deliverable D.5.3.3), that is the “Innovative Hub” pilot, a virtual platform connecting different aspects. In fact, it is not merely a platform for e-bike management and free renting, being:

- an innovative public-private cooperation scheme with selected hotels;
- a legal framework allowing management of an e-bike renting service with no/low legal risks for the hotels and responsible partners;
- an insurance scheme (involving civil responsibility only, since theft insurance is the responsibility of the hotels);
- a data collection system, thanks to on-board GPS (“Bike Square” platform).

2.5 MIMOSA Deliverable D.5.3.7. “Set of solution for upgrading bike lanes in Dubrovnik-Neretva county“

This MIMOSA deliverable also includes information on the investment made by the Dubrovnik-Neretva County (stakeholders: City of Korčula, Korčula Tourist board, Municipality of Trpanj, Trpanj Tourist board, Municipality of Orebić, Orebić Tourist board, Municipality of Janjina, Janjina Tourist board, Municipality of Ston, Ston Tourist board, Municipality of Mljet, Mljet Tourist board, Municipality of Lastovo, Lastovo Tourist board, Municipality of Lumbarda, Lumbarda Tourist board, Municipality of Blato, Blato Tourist board, Municipality of Vela Luka and Vela Luka Tourist board) in bike service sets and equipment for bicycle parking in 14 municipalities and cities, which interact with the European Cycle Paths: D3 Dinar Route, D4 Adriatic Route, D9 Neretva Slavonia Route and D10 Adriatic Islands Route. The equipment should be implemented in areas critical for intermodal transport connections, between sea and road transport, because the involved area is mainly coastal. In particular, the bike service set is a service pole with a tool for repairing bicycles and scooters and a tyre pump, while lighting is provided through solar panels. Moreover, it is planned to place a QR code on pillars with a link to a website that will be developed at the county level with information about bike paths and other necessary information. A mobile phone charging port will also be provided. Out of a total of 19 bike service sets, 12 of them will be installed in the area of the county islands and peninsula of Pelješac, which are directly related to sea transport. Although the use of this equipment is also available to the local population, this

implementation is mainly coherent with County transport policies which, in the past 15 years, have been focused on cycle tourists (recreational, athletes and professionals), with the aim of raising the quality of the tourist offer and increasing the development of cycling awareness in the county. The equipment implementation was planned to start on November 2021.



Figure 2 - Bike service set and rack for bicycle parking (picture provided by the Dubrovnik Neretva County)

2.6 MIMOSA Deliverable D.5.3.4. “Website for cycle tourism in Dubrovnik-Neretva county”

In another MIMOSA Project deliverable, the Dubrovnik-Neretva County reports on another investment (in this case a service): the development of a county-wide cycling website. The goal is to provide information on a single website, because currently all data for cyclists are divided by areas (municipalities and cities). Hence, it is planned to create a website with all the data on bicycle paths and the possibility of interaction with users of the website, both for the entire county and for individual areas, through links. Different stakeholders are involved, both at the national and the local level. As already stated for the first best practice implementation, county policies in the last 15 years have been focused on cycle tourists (recreational, athletes and professionals), with the aim of raising the quality of the tourist offer and increasing the development of cycling awareness in the county, considering that the current offer for cyclists is limited to individual areas (cities and municipalities) and there is a need

for a complete product/service for both cycle tourists and locals. The service implementation was planned to start in November 2021. It can be seen as an intermodal service, with specific regard to ports, airports and bus stations.

2.7 MIMOSA Deliverable D.5.3.6. “Pilot actions and Investment report”

This MIMOSA deliverable reports on a planned intervention including e-bikes and digital info points in the port of Rovinj. When arriving at Rovinj port, passengers need information about cycling routes, places to go, weather and the transport arrivals/departures schedule. For this reason, digital info points can be useful. They can also inform users about whether or not bikes are available and/or if they are in use by Port of Rovinj staff. Moreover, since there is the new 21 km long Rovinj – Kanfanar cycle route near the port (where there is a train station which represents an interchange transport node). Furthermore, an e-bike service in the port is planned to provide a sustainable means of transport for the wider area. The future plan is to conduct market research into the number of boats/operators offering bike transport.



Figure 3 - E-bikes at the Rovinj seaport (picture provided by the Rovinj Port Authority)

3. Best practices from the MIMOSA Project partners

The MIMOSA project partners are listed as follows:

- C.E.I. – Executive Secretariat;
- Friuli Venezia Giulia Region;
- Ca' Foscari Venezia University;
- Institute for Transport and Logistics;
- Central Adriatic Sea Port System Authority;
- Abruzzo Region;
- Puglia Region;
- Ministry Of Regional Development and EU Funds - Department for Islands;
- Regional Development Agency of Primorje Gorski Kotar County;
- Istrian Development Agency – Ida Ltd;
- University of Rijeka, Faculty of Maritime Studies;
- Dubrovnik Neretva Region;
- Hz Passenger Transport Ltd;
- Split Port Authority;
- Rovinj Port Authority;
- Public Institution Development Agency of Lika-Senj County – Lira;
- County Port Authority Zadar;
- Sibenik Port Authority;
- Emilia Romagna Region;
- Costa dei Trabocchi Flag.

Among the project partners, feedback on best practice for cycling intermodality was provided by the following partners who responded to the survey: Friuli Venezia Giulia (in collaboration with C.E.I.), Fondazione Istituto sui Trasporti e la Logistica, Regione Abruzzo, Dubrovnik Neretva Region, Rovinj Port Authority. Autorità di Sistema Portuale del Mare Adriatico Centrale, Split Port Authority and Sibenik Port Authority have provided their feedback, but they have not reported any best practice details .

The feedback was acquired by means of a template which was sent to all the MIMOSA project partners, asking for the following information:

- Title of the best practice
- Location
- Pictures
- Web links (if available)
- Type of intervention/best practice (infrastructure, equipment, signage or service)
- Description of the intervention
- Background and needs to which it responded

- Type of interchange node (port, airport, railway station, bus station, metro station, other)
- Level of implementation (planned, ongoing, operative)
- Starting date (if available)
- Budget (if available) and funding measures
- Transport operator responsible
- Included stakeholders
- Impacts (actual or expected) and/or feedback
- Interaction (if any) with National and European Cycle Network

All the templates completed by project partners are attached to this document, while the surveyed best practices are summarized as follows, divided according to each project partner.

3.1 Friuli Venezia Giulia Region

The Friuli Venezia Giulia Region (FVG) and the C.E.I. provided comprehensive feedback including seven best practices/interventions:

1. Extension to Trieste of the Cross-border IT-AT train MICOTRA (Villach-Udine) (C.E.I.)
2. Wheeling ramps implemented on railway stations (FVG)
3. CROSSMOBY strategic project for cross-border mobility (FVG)
4. BIKEBUS connection (FVG)
5. Bike&Bus service (FVG)
6. Trieste – Grado – Lignano – Istria (HR) maritime service (FVG)
7. Manual of reception facilities (accessibility by bike to stations, ports and airports) (FVG).

1) Extension to Trieste of the Cross-border IT-AT train MICOTRA (Villach-Udine). This concerns a pilot service in the framework of the CEI-led and EU Funded CONNECT2CE project (Interreg Central Europe), aimed at extending to Trieste the cross-border rail service Mi.Co.Tra. (operated by FUC - Ferrovie Udine-Cividale- which provides the locomotives and OBB - Österreichische Bundesbahnen- on the Austrian side, which provides carriages for bikes and passengers) with 2 train services Trieste-Udine-Villach (return journeys) on a daily basis during weekends and holidays. This train is composed of 2 passenger carriages and at least one carriage for storing more than 100 bikes. Throughout the testing phase (June 2018-June 2019), 117 operation days and 468 performed rail services were carried out. The success of the initiative has also led to keeping the service in operation beyond the one year test period, thus the intervention implementation is considered “ongoing”. The best practice is valid for the integration of both railway stations and airports, since the Mi.Co.Tra. train stops at the Trieste Airport.

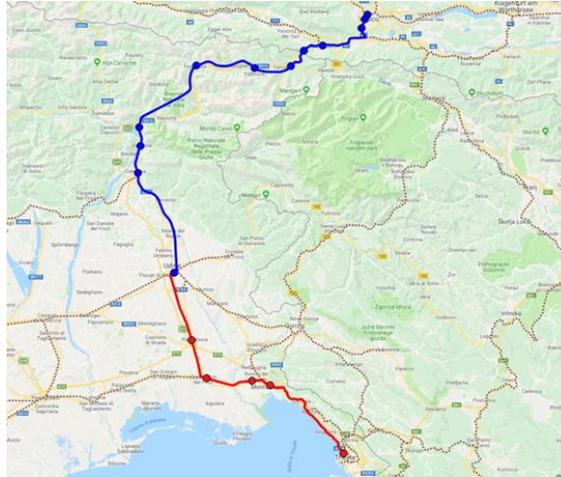


Figure 4 - Extension to Trieste of the Cross-border IT-AT train MICOTRA (picture provided by FVG Region)

2) Wheeling ramps provided at railway stations. This was realised thanks to the ICARUS project: the Friuli Venezia Giulia Region, in agreement with Rete Ferroviaria Italiana (RFI Spa), i.e. the Italian railway infrastructure manager, has positioned corrugated aluminum wheeling ramps on the access stairs to each railway track at nine railway stations (Udine, Tricesimo, Tarcento, Arterga, Gemona, Venzone, Carnia, Pontebba and Ugovizza-Valbruna). In this way, all cyclists can easily have access to trains by pushing their bicycles along the route without having to load them on their shoulders. This infrastructure acts to ease the connection between the Alpe-Adria Cycle Route and the Mi.Co.Tra. (Trieste-Udine-Villach) railway line.

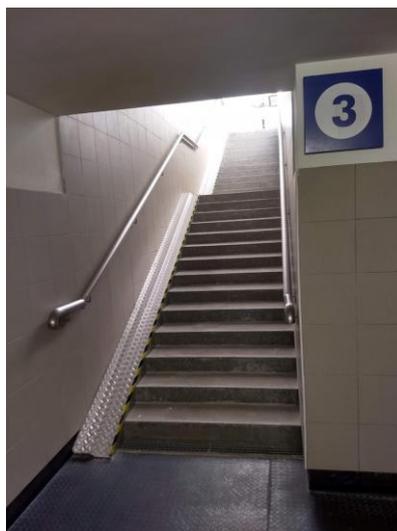


Figure 5 - Staircase wheeling ramps provided at the stations on the Mi.Co.Tra railway line (picture provided by the Friuli Venezia Giulia Region)

3) CROSSMOBY project train service Udine/Trieste-Ljubljana. This service is in operation related to the CROSSMOBY strategic project for cross-border mobility co-funded by the Italia-Slovenia Cross-Border Cooperation Programme 2014-2020. This project aimed at making mobility in the cross-border area more sustainable by investing in more environmentally friendly services and modes of transport and in new approaches to mobility planning. In summary, one of the main goals of the project was contributing to higher quality, safer, more sustainable, and less polluting cross-border mobility of people between Italy and Slovenia. This result was achieved by increasing the connections between the two countries, by activating new cross-border rail passenger services along the Udine - Trieste – Ljubljana railway line (with two return journeys per day). The train made available is an ETR 563 ‘Civity’, which is a five-unit electric train, built by CAF and owned by the Friuli Venezia Giulia Region, which has the following main features: 276 seats; 30 bicycle housings; 2 toilets suitable for disabled people; bilingual information (Italian/Slovenian); and an internal video surveillance system. Besides the cross-border public transport services, the project activities focused on setting up new sustainable mobility options, boosting intermodality (bicycles with trains, buses and boats) and acting at a strategic level too, developing a cross-border action plan for sustainable cross-border mobility.



Figure 6 - Carriages equipped for bicycles on the Udine-Trieste-Ljubljana trains (picture provided by the Friuli Venezia Giulia Region)

4) BIKEBUS connection is an intermodal initiative between bicycles and buses, particularly devoted to cycle tourism. The Bike&Bus service is provided on the buses of the public transport company TPL FVG Scarl, initially launched on an experimental basis within some Interreg projects (of the current and past programming period) and the successful ones have become currently operating continuous seasonal services offered during the summer season. The four bus lines involved which allow bike transport are: Udine-Palmanova-Aquileia-Grado, Grado-Gorizia-Cormons, Udine-Latisana-Lignano, Maniago-Gemona. The interaction with bicycles is particularly relevant given the presence of the Eurovelo 8-Ciclovia Adriatica, which is shared by the bus lines.

5) The Bike&Bus Service has already been described in the previous chapter (MIMOSA specific interventions).

6) The Trieste – Grado – Lignano – Istrian Coast (HR) maritime service has already been described in the previous chapter (MIMOSA specific interventions).

7) Manual on the accessibility by bike to stations, ports¹ is a planned intervention, potentially applicable to ports, airports, railway and bus stations in terms of infrastructures, equipment and services. The Manual of reception facilities pursues a twofold objective, On one hand it analyzes and verifies whether the main modal interchange nodes of the Friuli Venezia Giulia Region are accessible for cyclists and are provided with the appropriate signs and services. On the other hand it proposes a set of actions to transform the interchange areas from places dedicated only to "change of vehicles" to welcoming spaces for cyclists, through the implementation of equipment and services, directional and tourist signs and the improvement of the accessibility system. For each regional intermodal point, the following conditions were systematically reviewed:

- accessibility by bicycle to the station and the trains;
- directional and tourist information signs;
- services for cyclists.

3.2 Institute for Transport and Logistics

The Institute for Transport and Logistics has provided feedback about the Ravenna Mobility Infoboard service. This service operates in the Ravenna municipality, with specific regard to the Cruise Terminal in Porto Corsini (11 km from Ravenna). The Ravenna Mobility Infoboard is an online tool which should easily provide tourists with all the information related to the public transport and sustainable mobility solutions in Ravenna, with regard to the Cruise Terminal in Porto Corsini. The main target group of this service are the non-package tourists arriving at the Ravenna cruise terminal, but it can be used by other tourists as well. In particular, the key challenge is to present the different sustainable mobility solutions connecting the Porto Corsini area to Ravenna city centre.

¹ http://mtom.regione.fvg.it/storage//2021_713/Allegato%2031%20alla%20Delibera%20713-2021.pdf

The service has been available since September 2018, and it was financed by the Interreg Italy-Croatia EU MosesProject.



Figure 7 - Ravenna Mobility Info-board service (picture provided by the Transport and Logistics Foundation Institute)

Moreover, it is worth mentioning the e-bike rental service implemented in Cervia (Emilia Romagna Region), presented in detail in the previous chapter (MIMOSA specific interventions).

3.3 Abruzzo Region

The Abruzzo Region has provided feedback about a cycle-pedestrian path connecting coastal towns and railway/bus stations along the route. The path is called “Via Verde Costa dei Trabocchi”, which should be 43 km long (once completed), starting from Francavilla al Mare (Chieti), crossing the areas belonging to the towns: Ortona, Vasto, San Vito Chietino, Rocca San Giovanni, Fossacesia, Torino Di Sangro, Casalbordino, until the town of San Salvo (Chieti).

The cycle path will run through one of the most evocative stretches of Mediterranean coast, a few meters from the sea, immersed in the natural setting of the “Trabocchi” coast. Moreover, it offers historical experiences and nature reserves, together with hotels, campsites, bed & breakfasts and the charming restaurants on the “Trabocchi” structures. In fact, one of the aims of this infrastructure is to promote cycle tourism to combine the leisure activities that can be carried out in the area (e.g., sunbathing, eating fresh sea fish) with cycling along the path, thus using local services offered to visitors at their best, as well as encouraging tourists towards a more sustainable means of transport.

This infrastructure is part of a cycle-pedestrian connection project between the Marche and Abruzzo regions. In future, it could also be connected with the Adriatic Green Corridor (a cycle route of national importance), one of the 10 national tourist cycle routes promoted by the Ministry of Infrastructure and Transport, which will connect Trieste to Santa Maria di Leuca (length: 1500 km). Moreover, it can be

integrated within the ADRIONCYCLETOUR project framework, which plans cycle paths running along the entire coast of the EUSAIR (Adriatic-Ionian Euroregion) countries from Italy to Greece.

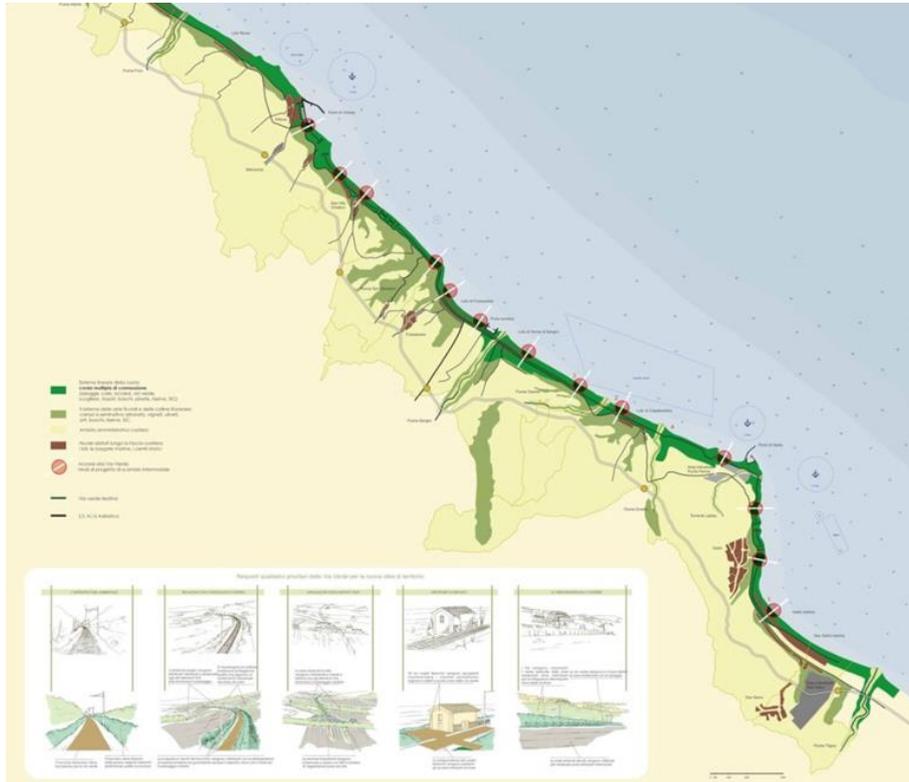


Figure 8 - Via Verde Costa dei Trabocchi cycle-pedestrian path (picture provided by the Abruzzo Region)

3.4 Dubrovnik Neretva County

The Dubrovnik Neretva County has provided feedback about two best practices, in the context of the MIMOSA project implementation, concerning both equipment and service.

They concern the implementation of bike service sets and equipment for bicycle parking, and a county-wide cycling website. These measures have been broadly described in the previous chapter (MIMOSA specific interventions).

3.5 Rovinj Port Authority

The Rovinj Port Authority has provided feedback about a best practice implementation concerning both equipment and service, including e-bikes and digital info points in the port of Rovinj. This

implementation has already been broadly described in the previous chapter (MIMOSA specific interventions).

4. Intermodality, cycling and transport nodes outside the cross-border area of the Italy-Croatia programme

In this chapter, general best practices concerning the intermodality between cycling and other means of transport in the main nodes are explored considering other sources different from the material provided by project partners.

The main transport nodes considered here are, in general, the origin/destination nodes of medium/long-distance trips, connecting two relevant urban settlements: airports; seaports; railway stations; bus terminals.

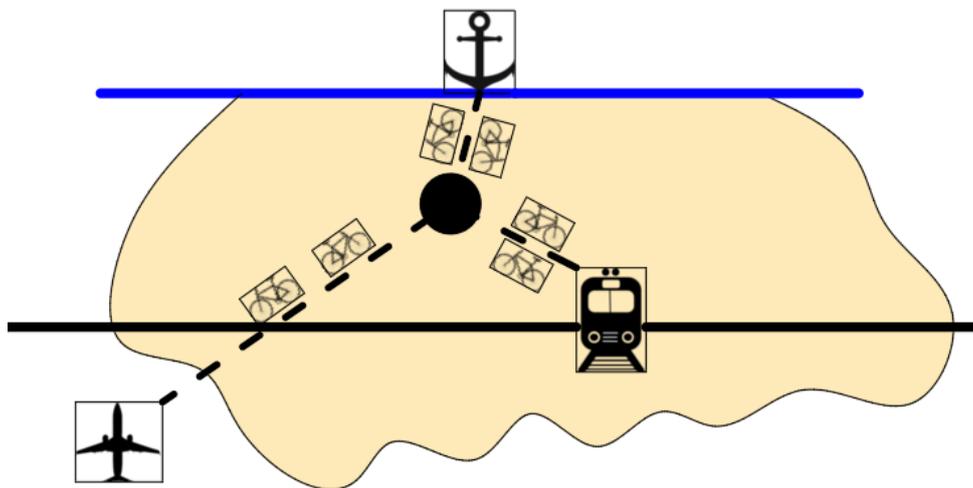


Figure 9 - Intermodality between cycling and main transport nodes

Bike trips combined with train, plane or ferry allow those who travel for study or work or those who practice cycle tourism to reach their destination over a short, medium or long distance. But it is necessary that both the means of transport and stations, ports and airports are adequately equipped. The cases shown in this vademecum concern bikes:

- carried on board;
- rented at the destination railway station (and/or for arriving at the origin station), i.e. by using local bike sharing systems;

- only used for the trip to the origin station (in case of private bicycles) and/or only for the trip from the destination station to the final destination and parked in an appropriate open space or in a closed and secure parking area;
- moved inside the intermodal node towards the boarding point, along signed routes devoid of obstacles and physical barriers.

In case of regular bike users and cycle tourists, the first option could be the most frequent. However, bike sharing systems could also be another possibility and they may be useful for workers who commute daily to/from the transport node.

The case of full intermodality between cycling and other means of transport is the most complex to be taken into account, since the traveler should reach the transport node by bike, ship or carry the bicycle on board, arrive at the destination transport node and get to the final destination by bike. In this case, each modal shift should be designed with care, to encourage intermodality and ease the travel of cycle tourists/travelers. Hence, using bike sharing for the trip from/to the transport node can be considered as a simpler case with respect to that previously described and, to a reasonable extent, included in the general case. For this reason, the general full intermodality case is considered below, unless otherwise specified.

However, it is necessary to point out that the full intermodality related to the cycle tourism specific case is not negligible. For example, it has been reported by Pantelaki et al. (2022)² that the contribution of cycle tourism to the Italian economy is equal to 4.6 million euros, that is 5,6% of the total Italian tourist consumption. Most of these tourists are foreigners, thus likely to be using long-distance means of transport to reach Italy. The authors of this study divide cycle tourists into three groups, which can be taken into consideration when designing multimodal actions:

- tourists who use bikes for fun and relaxation and use apartments, campsites or hostels for accommodation;
- tourists who use bikes to visit mountains and prefer low-cost holidays;
- tourists interested in multimodal accessible tourist destinations and prefer cultural places and B&B accommodation.

Clearly, it should be pointed out that, as already indicated, in order to achieve full and proper intermodality, accessibility is a crucial prerequisite for each intermodal node (independently of the connected modes of transport). This means that no physical barriers or obstacles should be present on the access routes. In this sense, the principles of “Universal Design” (see e.g., Goldsmith, 2007)³ should

² Pantelaki, E., Crotti, D., & Maggi, E. (2022). Cycling tourism in Italy: Multimodal transport behaviours in a latent class analysis. *Research in Transportation Business & Management*, 100861.

³ Goldsmith, S. (2007). *Universal design*. Routledge.

be met for the design of these spaces, which means that they should be accessible to all people, independently of their particular characteristics (e.g., old people, specific disabilities or other factors).

Several measures which are compatible with Universal Design principles are analyzed in the following text, for the different intermodal nodes. In fact, some international best practices for each of the intermodal connection train/bicycle, plane/bicycle, ferry/bicycle are described in the following sections.

4.1 Cycling and airports

Cyclists who independently travel long distances with their bicycle and with their luggage to reach distant locations even outside their own continent, cannot help but bring their bicycle in the hold of the plane. All the better if the airport can be reached easily and safely by bicycle or by train (or bus) equipped for transporting bicycles. But undoubtedly it is better if the airport is free from physical and organizational obstacles and equipped with adequate facilities to help the access of bicycles within the airport.

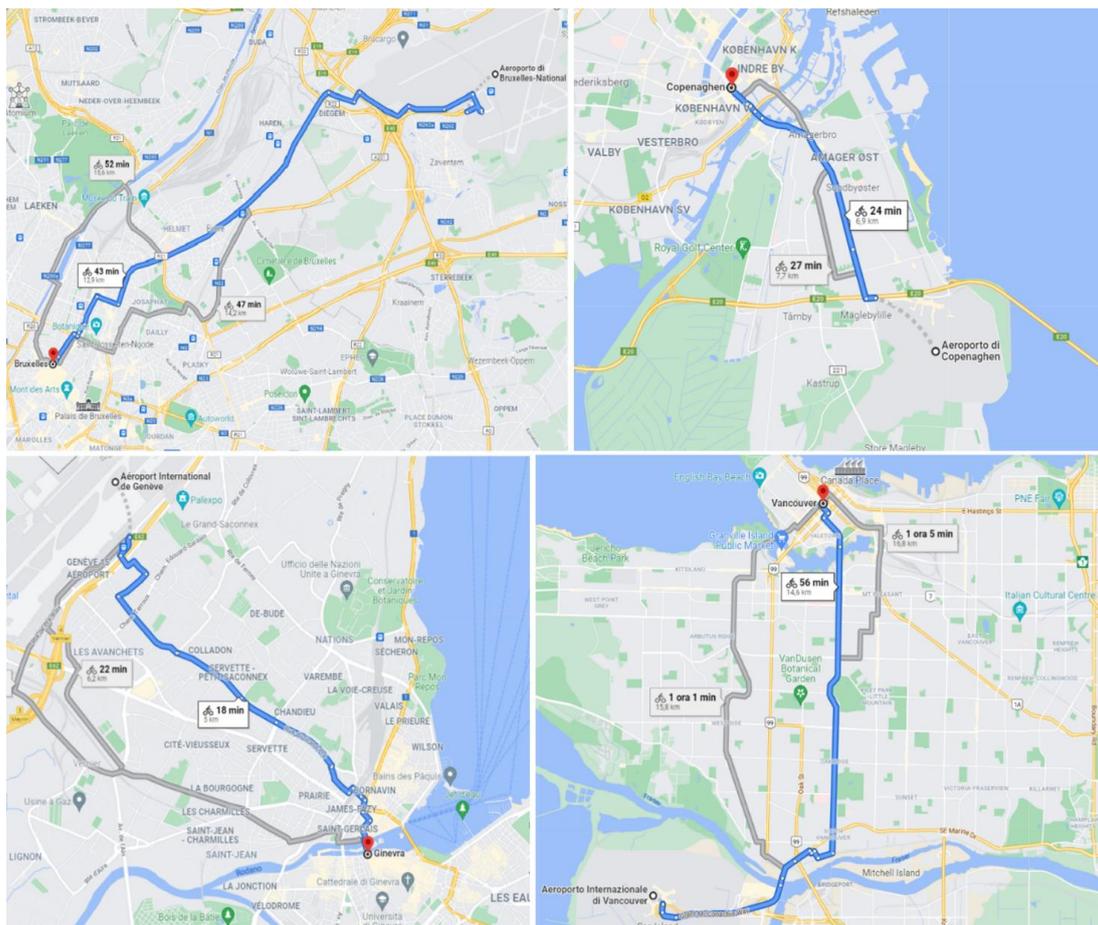


Figure 10 - Examples of airports located within a radius of 15 km from the city centre (upper left: Bruxelles, upper right: Copenhagen, lower left: Geneva, lower right: Vancouver), source: Google Maps.

A bike friendly airport is also more attractive for its workers who can reach it by bicycle rather than by car because they will find guided and signposted routes, bicycle parking spaces and perhaps even showers and changing rooms.

Carrying bicycles on board often requires some packing steps, depending on the airline company. For example, in several cases pedals and wheels should be removed and tyres should be deflated, since they could be damaged during the journey. The dismantled bike should then be put into a bag or box. Some airline companies⁴ include bicycle carriage in the maximum weight allowed on board, without charging extra fees, whereas some others do not, while a form of reservation can be needed in some cases.

Some examples of bike facilities related to some international airports are shown below.

Faro (PT) - In order to support the Cycling & Walking tourism sector sustainability, improving Faro Airport's passengers' experience and fulfilling the demanding needs of this new product in the Algarve, three areas with equipment to assemble and dismantle the bicycles were created: the first is located in the public area of the check-in hall and the other two are in the luggage collection area.

This initiative, supported by ANA Aeroportos de Portugal and the Faro Airport, integrates the Cycling & Walking Program — Algarve 2016-2019, launched in March by Turismo de Portugal, Região de Turismo do Algarve, ATA and AMAL⁵.



⁴ <https://www.skyscanner.net/news/airline-bike-fees-cost-bringing-your-bike-onboard>

⁵ <https://www.routesonline.com/airports/8474/ana-aeroportos-de-portugal-faro-airport/news/267810/new-bike-assembly-areas/>

Figure 11 - Assembly area for bikes (Faro Airport website).

Reykjavik (IS) - Keflavík International Airport is the main international airport in Iceland, about 50 km from the capital Reykjavík. Isavia, its operator, has set up a Bike Pit area to welcome cyclists to Iceland. It is located outside the main building and cyclists can bring their luggage there and assemble their bikes with the tools provided. It is open 24/7 and free to use⁶.

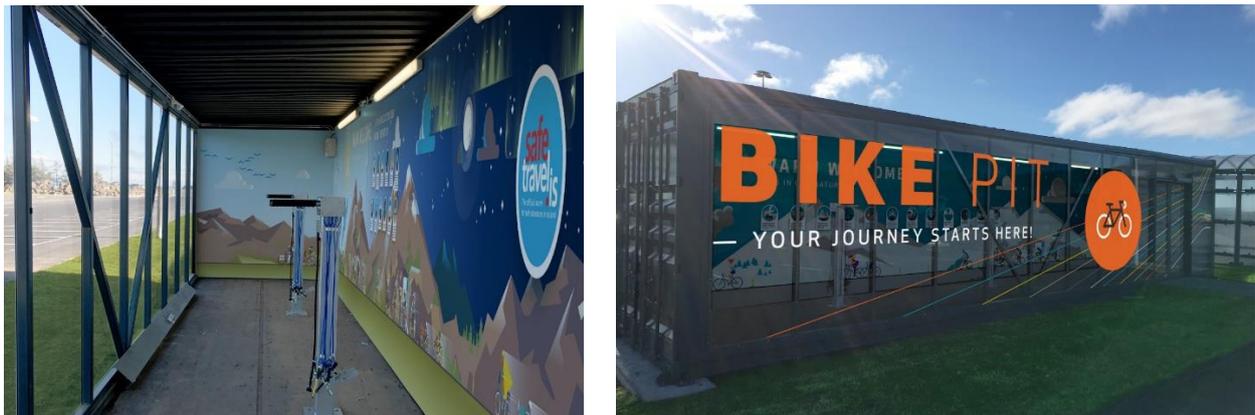


Figure 12 - Assembly area for bikes (Reykjavik Airport website)

Christchurch (NZ) - When flying out of Christchurch Airport (NZ), the bicycle should be properly packaged. Any traveller should contact the airline before the flight or at check-in for bike boxes, which can be purchased, subject to availability. In particular, the Travel Store offers a bicycle packing service using recycled bicycle boxes and sealed straps. However, owners should dismantle their bicycles by themselves, in order to fit into the box. To this aim, the airport provides some free Bicycle assembly areas, equipped with tools, bike pumps and stands⁷.

⁶ <https://fjallahjolaklubburinn.is/the-country>

⁷ <https://www.christchurchairport.co.nz/travellers/at-the-airport/information-and-services/travelling-with-bicycles/>



Figure 13 - Assembly area for bikes (Christchurch Airport website)

Portland (USA) - Portland International Airport (Oregon, USA) offers a bike Assembly Area to travellers and Airport employees who bike to work, which is indicated by the sign shown below⁸. The bike assembly station is available 24/7 and it offers a work stand with two clamps, basic tools (e.g., pedal wrench, pump), maps and other information about biking resources in the region. Tools can be loaned out through the Welcome Oregon kiosk.

⁸ <https://bikeportland.org/2010/06/28/pdx-airport-now-offers-bike-assembly-station-35768>

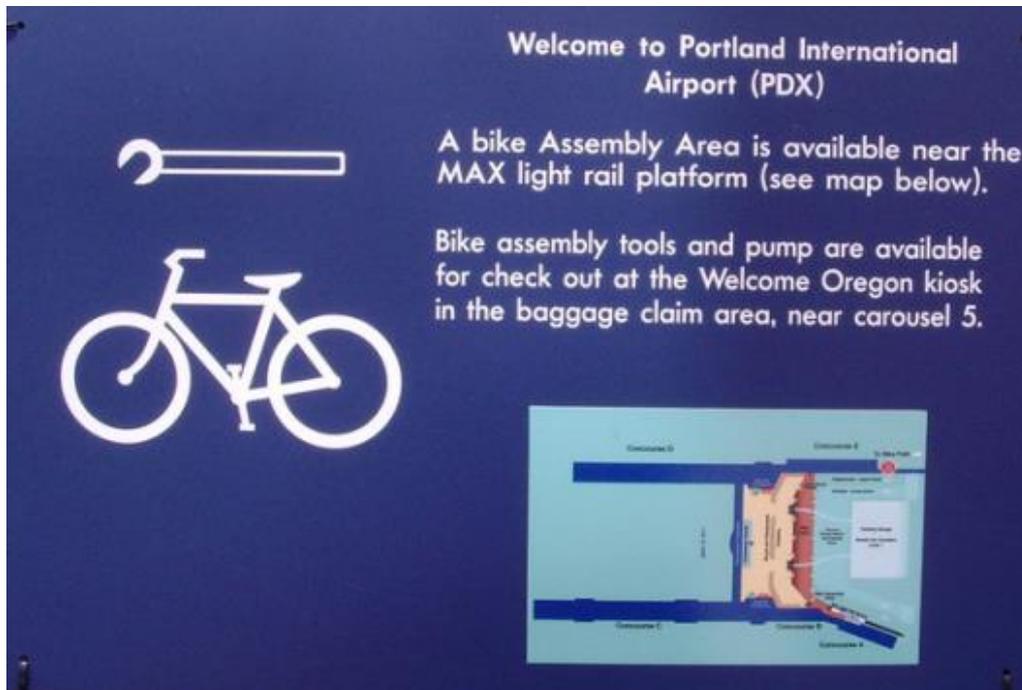


Figure 14 - Assembly area sign (Portland Airport website)

Seattle (USA) - Since December 2014, the Seattle-Tacoma International Airport has provided a bicycle assembly/disassembly station, with other services for cyclists and located close to the baggage claim area. The station offers bicycle boxes for sale, various tools and a bike pump to help passengers to assembly/dismantle their bikes. Moreover, there are additional services such as new bike racks, storage options (short/long-term storage), improved signage and an updated bicycle resources webpage⁹.

⁹ <https://www.portseattle.org/news/sea-tac-airport-unveils-new-bicycle-assembly-station-celebrates-bike-month>



Figure 15 – Bicycle storage and parking map (Seattle Airport website)

These actions imply that it is necessary to provide spaces in airports for dismantling/assembling bikes on arrival at the airport. In fact, some airports provide assembly areas for bikes (providing basic tools and pumps), such as for example Faro Airport (Portugal) but also other European (e.g., Nice airport), American (e.g., Portland, Pittsburgh) and Oceanian (e.g., Adelaide, Christchurch) airports. Boxes and bags for bikes should be sold as well at the airport check-in. Charging stations for e-bikes can also be provided, such as e.g., in the case of Geneva and Christchurch airport.

The following figures show some bicycle packing methods and signs inside the terminals that indicate the bike assembly areas.



Figure 16 – Packing bicycle – 1 of 2¹⁰



Figure 17 – Packing bicycle – 2 of 2¹¹



Figure 18 – Bike assembly area signs¹²

¹⁰ Source: [Traveling with a bike | Velosurance](#) and [Traveling with a bike | Velosurance](#)

¹¹ Source: <https://exploringwild.com/fly-with-bicycle-airplane-tips/> and [Taking Bikes on Planes to France - A Guide for Cyclists - Freewheeling France](#)

Apart from services inside the airport, immediately outside the airport, it should be possible to easily reach the main cycle route directed towards the city centre and the surroundings (such as in the example below).



Figure 19 - Cycle routes inside /Vienna airport (above) and connecting to the city centre and surroundings (below)¹³

The presence of cycle routes in the zone is crucial to reach the surrounding areas. However, it is important as well to build cycle routes inside the airport area, so that cyclists who arrive at (or depart

¹² Source: *Portland Airport website*

¹³ https://www.viennaairport.com/en/passengers/arrival_parking/airport_cycle_route.

from) the airport terminals can have access to dedicated routes, avoiding the congested lanes close to the arrival and departure terminal buildings, aiming at comfort and, most of all, cyclists' safety. An example is reported in the following figure (Copenhagen Airport).

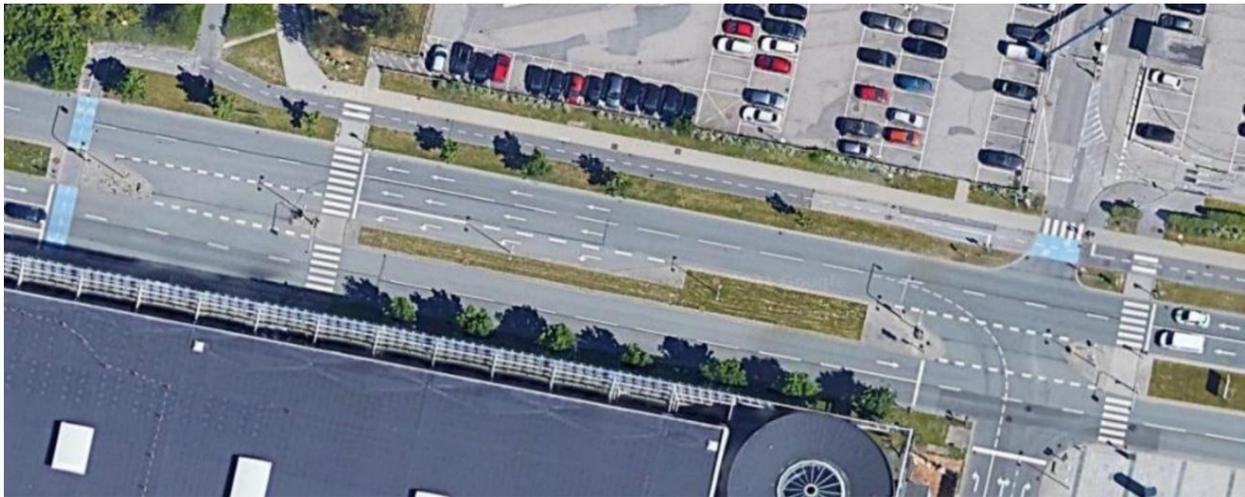


Figure 20 - Cycle routes within the Copenhagen Airport (source: Google Maps)

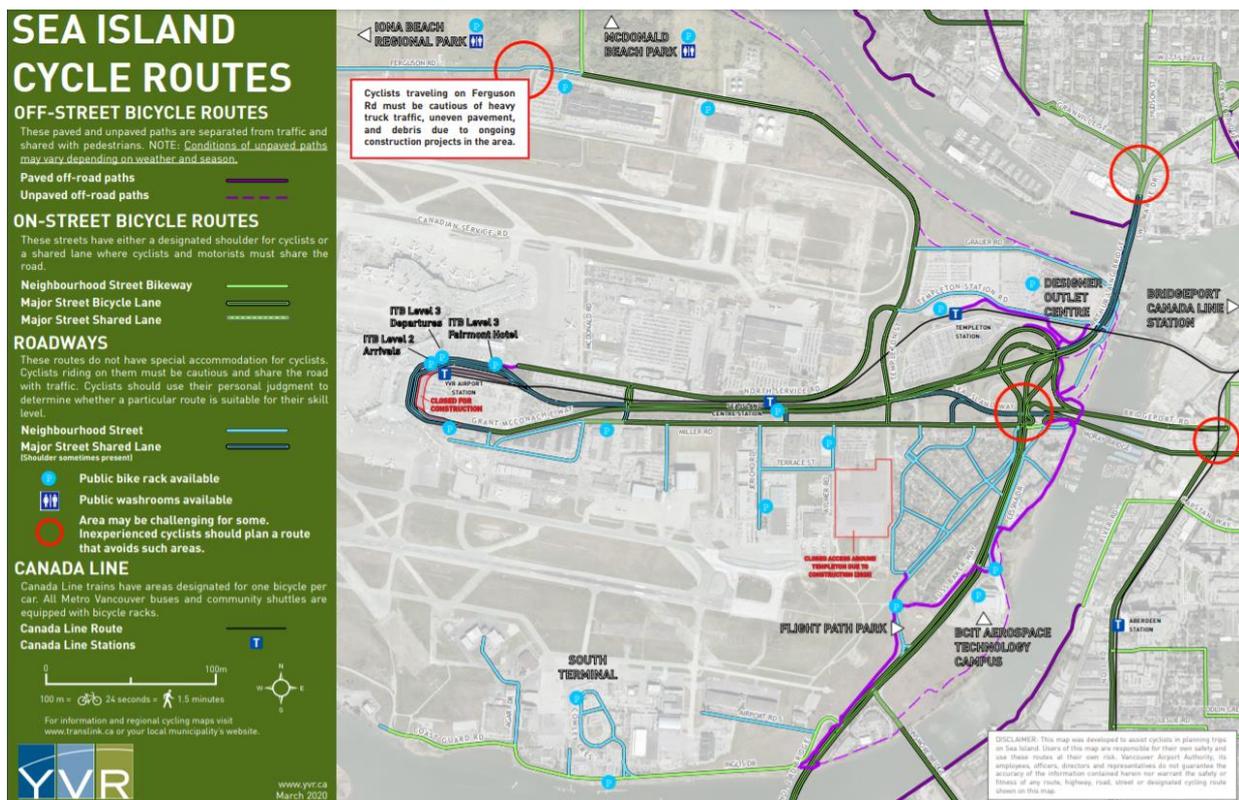
For the same reason, it is important to take care about road signs and information inside the airport and immediately outside the terminal, to guide cyclists along the cycle route and from the terminal to the closest cycle route. For safety reasons, cycle paths should be separated from the main road, with standards varying depending on local regulations.



Figure 21 - Road signs on bike routes inside the Brussel Zaventem airport (source: Google Maps)

For the same reason, it is important to take care about road signs and information inside the airport and immediately outside the terminal, to guide cyclists along the cycle route and from the terminal to the closest cycle route. For safety reasons, cycle paths should be separated from the main road, with standards varying depending on local regulations.

In any case, the presence of cycle routes and their connections to/from the airport should be clearly indicated on the airport website, so that cycling travelers can plan their journeys in advance and be informed about the local facilities. For example, this is the case of the Vancouver International Airport, which reports the type and number of cycle routes connecting the airport directly on the website in the “bicycles and cycling”¹⁴ section. When the airport is of particular interest for cycle tourism, such as the case of the Faro Airport in Portugal, tourist cycle routes in the region should be described as well.



¹⁴ <https://www.yvr.ca/en/passengers/transportation/bicycles-and-cycling>

Figure 22 - Cycle routes connecting the Vancouver International airport reported on its website

The same level of information should be guaranteed for parking at/close to airports, in order to know in advance where to leave the bicycle on arrival at the airport. This could be important for people who decide to get to the airport by bike (without carrying it on the flight) or for airport workers who commute to/from the airport and need parking spaces at the airport. However, data from the LAirA project¹⁵ reveal that the rate of commuting workers who get to the airport by bike is low (between 1% in Vienna, Warsaw and at Milano-Malpensa and 6% at Poznan airport, which it is only 7 km from the city centre). In some cases, as reported in the LAirA project, commuting to the airport was promoted by means of special campaigns, such as in the case of Vancouver Airport (which sponsored some events, including a cycle tour, to promote the “Bike to Work Week”; and launched the “Fleet Bicycle Programme”, providing six shared bikes for all airport workers for business trip purposes) or Geneva Airport (which offers discounts to their airport staff on buying and repairing bicycles and e-bikes, grants to airport workers who cycle, and sponsors a “Bike to Work” campaign).

Clearly, parking spots should be close to the airport terminals, such as in the case of railway stations. An example of bicycle parking facilities is reported in the following figure, taken from the website of Copenhagen airport. Moreover, bike rental services can be also included, in the case of cycle tourists not carrying their own bikes on board.



¹⁵ Airport Regions Conference (2019). LAirA Project Handbook “Multimodal and sustainable low carbon mobility integration of airports and their catchment areas”. Interreg Central Europe.

Figure 23 - Indication of parking for bicycles at Copenhagen airport¹⁶.

As well as in the case of railway stations, parking of bicycles can be organized in different ways, also according to the type of service which should be provided. However, in the case of airports, usually there is plenty of space where cycle stations are provided, differently from central railway stations,. Parking spaces can be covered or not covered, included in main parking areas for motor-vehicles or be separate from them.



Figure 24 - Bicycle parking outside Terminal 3 of Copenhagen Airport (source: Colville-Anderson¹⁷)

4.2 Cycling and seaports

Intermodal trips having ferries as the main means of transport for connecting cities on long-distance journeys can shift to cycling mobility in seaports for local movements.

This type of intermodality, as well as the cycling-flying intermodality is particularly relevant for cycle tourists. Moreover, in this case, differently from the case of airports, seaports are usually located within

¹⁶ <https://www.cph.dk/en/parking-transport/other-parking-options/motorcycle-bicycle-autocamper>.

¹⁷ <http://www.copenhagenize.com/2013/02/cycling-to-copenhagen-airport.html>

cycling distance of the city center and the surroundings (with some notable exceptions, e.g., Rotterdam seaport). Some commuters may also use bicycles in the case of close cities connected by ferries (e.g., several towns/cities in the Nordic countries or in Italy). On the other hand, the role of bike rentals/sharing at seaports could be important for cyclists not carrying their bikes on ferries or using bicycles only to get to/from the port. However, carrying bicycles on ferries is not always easy, even if no particular procedures need to be followed (such as assembling/dismantling as in the case of air travel). In fact, for example in Europe, differently from railways (see next section) there are no regulations providing mandatory spaces for bikes on ferries.

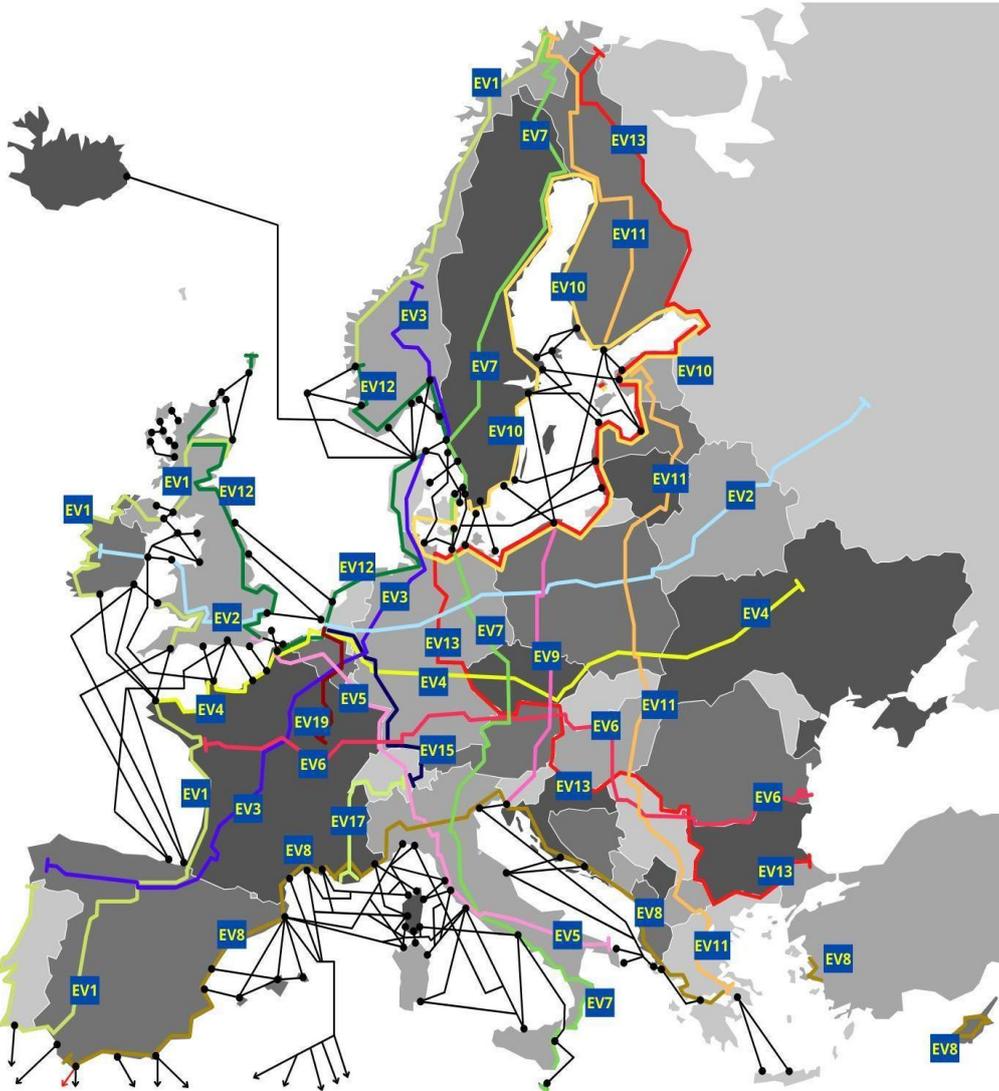


Figure 25 - Map of ferry connections of the Eurovelo cycling routes¹⁸

On the other hand, several important bike paths (European cycle routes “Eurovelo”) cross international borders, sometimes relying on connections by ferries (both at sea and on rivers). Some of these connections may also carry important passenger volumes (e.g., ferries in the Baltic Sea, Scandinavia, the English Channel) and so they may have a great potential for intermodality with bicycles.

¹⁸ <https://en.eurovelo.com/news/2021-06-24-transporting-bicycles-on-ferries-inter-modality-mini-series-1-3>

However, differently than from airports, there is little evidence of international best practices for fostering intermodality with bicycles at seaports. For example, walking and cycling to/from and within the port area is often considered (see e.g., websites of the Rotterdam¹⁹, Amsterdam²⁰ and Antwerp²¹ ports). In the following figure an example of cycle routes close to the port area is reported, as indicated on the Amsterdam port website.

Moreover, some international projects have focused on improving the accessibility of ports with particular regard to sustainable mobility measures (such as in the case of the CIVITAS PORTIS EU project²², which used the cities of Aberdeen, Antwerp, Constanta??, Klaipeda and Trieste as case studies). In this case, the particular focus is on providing or enhancing cycling and walking infrastructure for connecting the port areas with the cities (see e.g., the case of Aberdeen²³).



Figure 26 - Direct bicycle access to the boat docks in Boston (a) and in Göteborg (b) (Source: google Maps)

In the case of seaports, it is also possible to have special programs for port workers who commute to/from work by bicycle. For example, the port of Boston has a “commuter group”, which gathers several times a year for events related to cycling, when bike commuters share their routes with each other. Moreover, complimentary bike check-ups²⁴ are offered at the Boston seaport from May to October after registration. Such services may be useful to promote sustainable mobility for commuters.

¹⁹ <https://www.portofrotterdam.com/en/to-do-port/walking-and-cycling>.

²⁰ <https://www.portofamsterdam.com/en/discover/experience-port/cycling-harbour>.

²¹ <https://www.portofantwerp.com/en/cycling-port>.

²² <https://civitas.eu/projects/portis>.

²³ <https://civitas.eu/mobility-solutions/walking-and-cycling>.

²⁴ <http://seaporttma.org/bikecheckup>

Similar solutions have been implemented in various cities where commuters have to cross rivers, lakes or short stretches of sea to reach their destination.

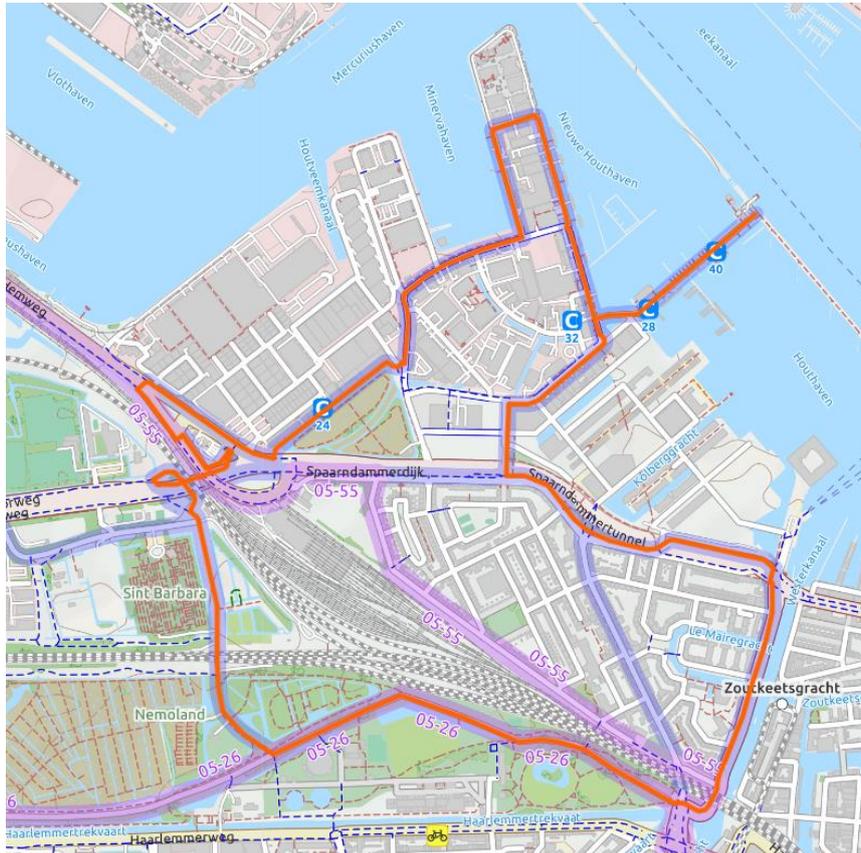


Figure 27 - The Stadhaven cycle route close to the Amsterdam Port (source: Open Street map)

4.3 Cycling and railway stations

Intermodal trips having the train as the main means of transport for connecting cities on medium/long-distance journeys can help the shift to cycling mobility at railway stations for local movements.

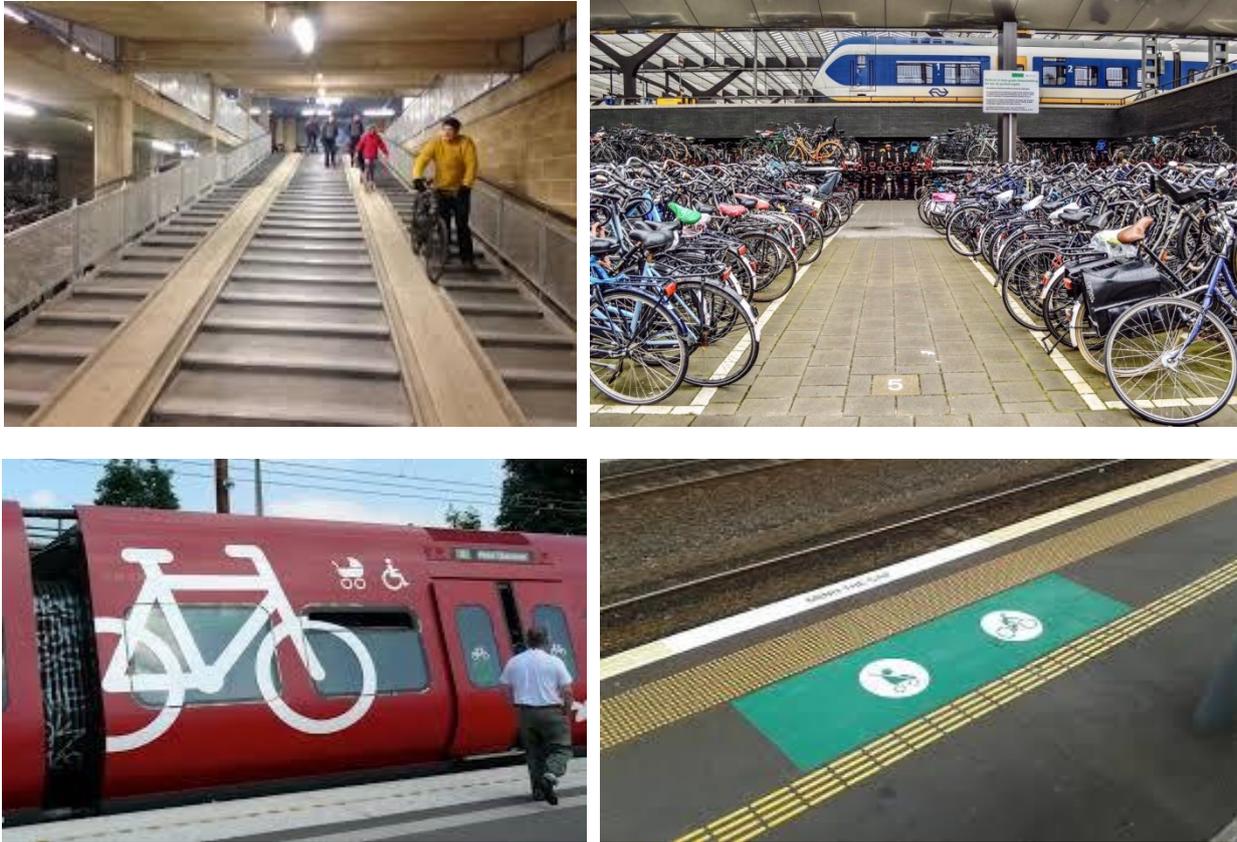


Figure 28 – Typical bike facilities at train stations²⁵

The EU Regulations²⁶ state that: “railway undertakings shall enable passengers to bring bicycles on to the train, where appropriate for a fee, if they are easy to handle, if this does not adversely affect the specific rail service, and if the rolling-stock so permits”. This means that, at least potentially, carrying bicycles on trains for medium/long trips is encouraged in the European Union. In fact, there are several railway lines in Europe where carrying bikes is possible but others where it is not allowed (e.g., some high-speed operators, or Spanish lines).

²⁵ Source: [Cambridge Railway Station's new CyclePoint opens \(+ gallery\) | road.cc](#); [Melissa & Chris Bruntlett su Twitter: "Fun fact: There are approximately half a million secure bicycle parking spaces located across the 410 train stations in the Netherlands. Parking an equivalent number of motor vehicles would require an area the size of 2,500 football fields \(or Los Angeles International Airport\). https://t.co/mAV7RhGWQZ" / Twitter; Bikes on train campaign | אופניים בשביל ישראל](#); [pram-bike-platform-marking.jpg \(845x634\)](#)

²⁶ Regulation (EC) No 1371/2007 of the European Parliament and of the Council of 23 October 2007 on rail passengers’ rights and obligations.

In Puglia (Southern Italy) since 2007, following an agreement between the Region and the regional rail transport companies, the transport of bikes on board the train has been free for passengers and the Region reimburses the companies for the bicycle supplement ticket upon presentation of the annual report.

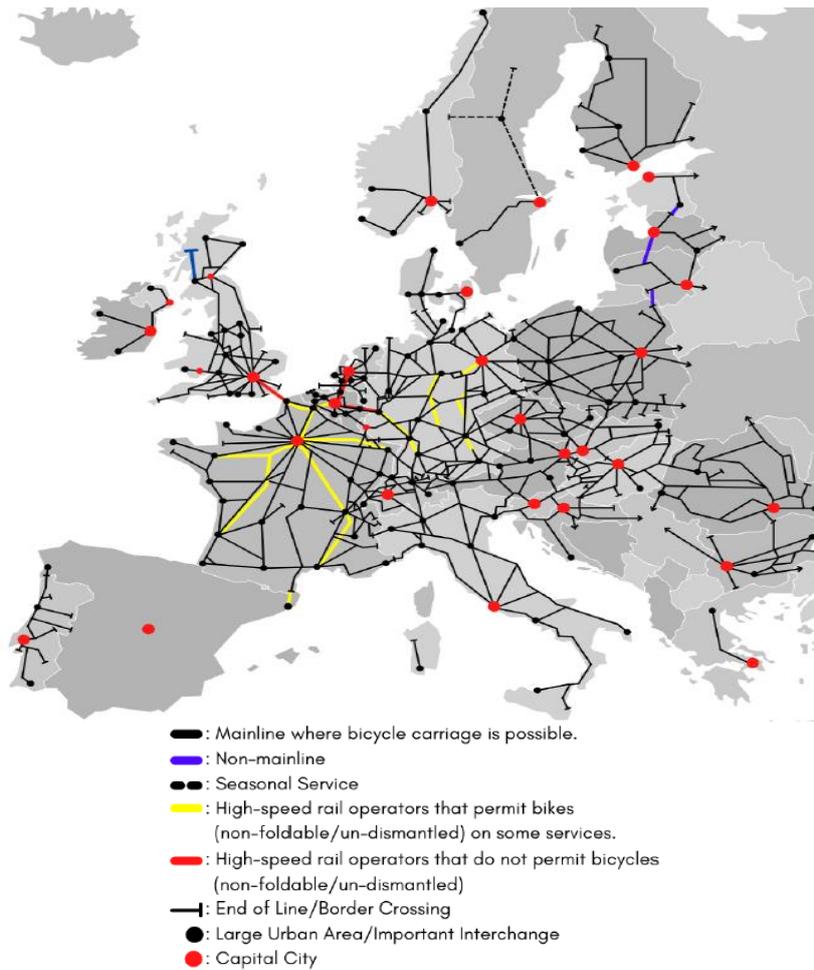


Figure 29 - Representation of the European railway network where carriage of bicycles is allowed (Carnegie et al., 2021)²⁷

²⁷ Carnegie et al. (2021). Cyclists love trains. An analysis of the bicycle friendliness of European railway operators. European Cyclists' Federation (ECF).

Based on some indicators, which include the previously listed preferred facilities for bikes on trains (bike spaces, bicycle hire scheme, cost of bicycle ticket or reservation, bike ticket/reservation channels, language provided for bicycle carriage information online and website functionality), the European Cyclists' Federation (ECF) has published (Carnegie et al., 2021) a ranking of European railway companies (69 companies included in the analysis).

Only one company is ranked as “excellent”: the NS-DB (Intercity Berlin) providing international service between the Netherlands and Germany, which offers the following services to customers²⁸:

- a dedicated bicycle carriage, with enough space for 16 bicycles, with tandems and tricycles (for people with reduced mobility) allowed;
- an international bike ticket costing € 12 one-way, and a reservation required by phone or at the international desk at stations;
- the possibility of carrying bicycles (e.g., folding bikes) packed without a ticket if they fit under the seat or in the luggage rack (maximum dimensions: 120x90 cm).



Figure 30 - Bicycle carriage (NS International website)

In fact, as reported by Kuster and Lancaster (2013)²⁹, the following services are needed to fulfill the needs of cyclists who want to switch between cycling mobility and long-distance trains:

- Bicycle carriage on board;
- Information on websites and in stations;
- Accessible platforms;

²⁸ www.nsinternational.com/en/before-you-go/taking-your-bicycle-with-you

²⁹ Kuster, F. and Lancaster, E. (2013). Bike carriage on long-distance trains: 7 basic services that give cyclists a smile. European Cyclists' Federation (ECF).

- Tickets valid for the entire journey and not for the single train, by limiting the bicycle taxes on the ticket;
- Easy ticket reservation and sale, possibly having reserved seats near the bicycles;
- Adequate bicycle parking at railway stations;
- Eventual bike sharing systems at railway stations.

Considering services needed at railway stations, information, accessibility and bicycle parking are essential.

Information is needed both before traveling and during the journey. In the first case, the role of websites is crucial, to know in advance if a railway station is provided with the necessary service for bicycles. Clearly, it is also important that railway company websites indicate routes and timetables of trains which carry bicycles. During the journey, signs are of utmost importance both:

- outside the railway station, to reach the station. Kuster et al. (2016)³⁰ advise that cycle signs should be put up on the major cycle routes within a radius of at least 3 km, in order to inform cyclists on the best route to reach the nearest railway station.
- Inside the railway station, to reach the bicycle station inside or near the station and/or the main cycling routes which depart from the station and connect to the main cycle routes in the surrounding area.

By guiding the cyclist to the route inside/outside the railway station, the modal shift is eased and expedited.



³⁰ Kuster et al. (2016). Bikes and trains: 7 basic services that give cyclists a smile. European Cyclists' Federation.

Figure 31 - Signs for cyclists on the main cycle routes (on the left, source: Pixabay) and inside the station (on the right, example of SNCF station of Villafrance sur Saône, source: Desmet 2016, taken from Kuster et al., 2016).

Another useful type of information is that related to where the train carriages dedicated to bicycles will stop at the platform. In fact, it should be considered that, especially in the case of high-speed trains for international service, operations cannot be slowed down while getting on or off the train by carrying bicycles. Hence, it is very important to place informative signs (e.g., billboards or digital images) to warn cyclists on where they should wait. Moreover, in case of a height difference between the carriage level and the platform, ramps could ease cyclists in getting on/off the train without interfering with operations.



Figure 32 - Informative signs about the waiting areas for cyclists (source: Kuster et al., 2016) and about the carriage types of DB trains (source: DB, taken from Kuster et al., 2016).

Another key point is the accessibility to the platforms. This is particularly important in the case of underground or multi-level railway stations, in order to move bicycles to the different station floors. The best choice should be the presence of elevators, compatible with bicycles, which is the most convenient option, especially for cycle tourists also carrying luggage. Other solutions may be ramps on stairways or specific escalators for bicycles.



Figure 33 - Accessibility to the railway station (bicycle stairway on the left, source: Pro Rail, taken from Kuster et al., 2016; elevator on the platform, source: Pixabay).

The other pillar of intermodality is the presence of cycle parking at the railway station (or near the station). The information about the presence (or not) of cycle parking facilities is essential and it is usually indicated on the railway company websites. The type of cycle parking facility is important as well, knowing in advance whether a subscription (or other form of access) is needed.

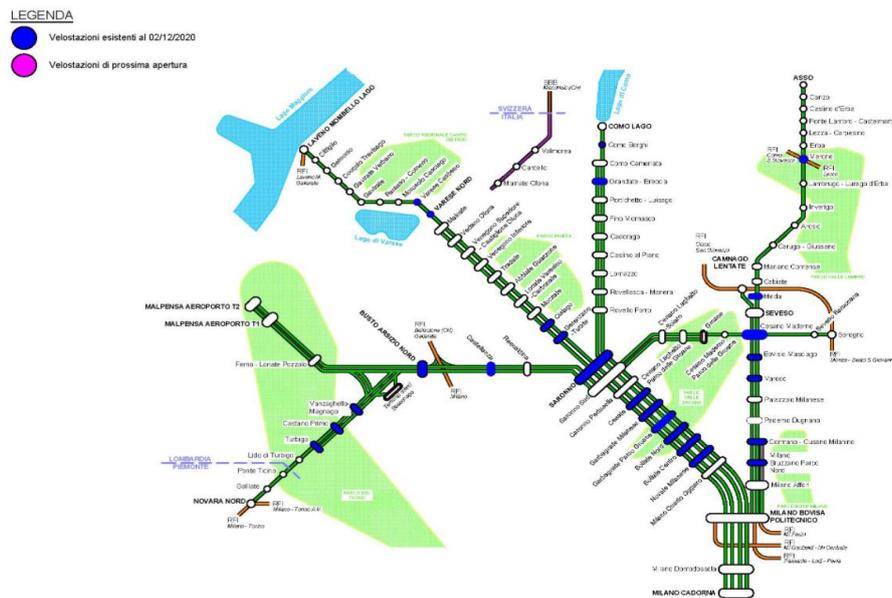


Figure 34 - Indication of the cycle stations along the railway network, in this case coloured in blue (source: FerrovieNord³¹)

³¹ <https://www.ferrovienord.it/it/velostazioni>

Cycle parking can be organized in different ways (Kuster et al., 2016):

- unguarded parking;
- parking with lockers;
- parking with automated access;
- guarded parking.

Unguarded parking is the simplest solution, since it requires sufficient space but no particular facilities. However, it is the least preferred option in terms of security. In the other cases, cycle parking could be provided with different types of dedicated facilities, allowing at least to lock bicycles (lockers). In the case of parking with automated access, the parking facility cannot be accessed by everyone (being closed to the general public) but it can only be accessed by users with a subscription (e.g., for short-term bike rentals) and/or by means of special cards (e.g., for monthly/annually subscriptions). In other limited cases, the parking can be guarded (as described e.g., on the website of the NS company³²). In these cases, there are service attendants during opening hours, which are usually from 15 minutes before the first train to 15 minutes after the last train stopping at the station. In this way, bicycles are guarded throughout the day and some basic services can be offered to cyclists, such as basic maintenance and repair services. This could be the optimal solution from the cyclists' point of view.



Figure 35 - Different parking facilities (source: Pixabay)

³² <https://www.ns.nl/en/door-to-door/bicycle-storage/storing-your-bike-safely-and-comfortably/guarded-storage.html>



Figure 36 - The “Bicibox” parking facility in Gent (source: Google Maps)

Basic maintenance services can also be offered independently from the presence of guarded stations with service attendants. In fact, there could be mobile repair stations inside or close to railway stations where the basic tools and services are available for cyclists (e.g. pumps). These types of stations are implemented in some DB stations³³ (like Darmstadt, Wiesbaden, Cottbus). Moreover, on the DB website it is reported that the service is free of charge and it will soon be a standard facility implemented at German railway stations.

As an additional note, several services were evaluated by the KITE EU project³⁴ at intermodal transport nodes, delivering a set of surveys at interchange terminals. The studied terminals were chosen based on their intermodal importance for long-distance travelers and their high intermodal standard.

³³ <https://gruen.deutschebahn.com/en/measures/repairstation>

³⁴ Grafl et al. (2008). Catalogue of Best-Practice Implementation Examples. Deliverable D13. Project: KITE. A knowledge base for intermodal passenger travel in Europe.



Figure 37 - Mobile repair station (source: DB website)

The case of cycling intermodality with trains was particularly studied through the rating of importance of the following facility: “Availability of deposit boxes and stands for bicycles”. The availability of this facility was rated, on average, as important (2, on a scale from 1, meaning very important, to 5, meaning not important) for railway stations across the sample of stations considered (Berlin, Karlsruhe, Linz, Antwerp, Liege, Brussels, Lisbon, Frankfurt). This shows the importance of these facilities at railway stations to promote intermodality with bicycles.

4.4 Cycling and bus terminals

Intermodal journeys with buses allow cyclists, both commuters and cycle tourists to cover short, medium or long distances according to their needs, transporting their bike on board the vehicle, and then continue cycling. Similarly to bicycle and train transport, the services necessary at bus stops/terminals to support cycling mobility, include both the outdoor or indoor equipped (bicycle parking stations) or the bike sharing /rental stations.



Figure 38 - Bike racks on the front of city buses (<https://cycle-works.com/products/bus-racks/>)

Focusing on the intermodality based on bicycles carried on board buses, there are differences between bus companies in requirements for carrying bicycles. They may be not allowed, allowed with limitations or carried in special racks (in front of or on the back of buses). Racks are relatively cheap solutions for buses serving long distance travel which do not impact on capacity. Front racks are used in Russia and in the United States while they are not allowed in the European Union. They are easily controllable by the bus driver but they can host a limited number of bikes and they have raised concerns for pedestrian safety. Rear racks are instead used in the European Union, despite the weakness of longer loading/unloading times and difficult for the bus driver to control³⁵, especially in the absence of safety cameras. They can be of different types (i.e. with raised bikes or just laid in place): models with raised bikes can clearly hold a greater number of bikes (e.g., up to 6-7 bicycles) but they require more time for loading and unloading.

In Italy, the highway code has been modified by the national bicycle law No. 2/2018 with a rule that allows owners of all types of buses to install external bike racks.

³⁵ Cerny, J. and Dagers, T. (2016). Study Bicycles on Board. New forms of sustainable urban transport and mobility. Extension of bicycle transport service in public transport. CIVITAS. 2MOVE2 Project Report.



Figure 39 - Backside racks in Czech Republic with raised bicycles (source: Cerny and Daggars, 2016)



Figure 40 - Rear racks in Spain with bicycles on the racks (source: Cerny and Daggars, 2016)



Figure 41 - Italian buses of the Bus&Bici service³⁶

In Italy, the Bus&Bici service is dedicated to cyclists/sportsmen who want to move within the region on the Spoleto-Norcia line and in the area of Marmore falls, by carrying their bikes on buses equipped with racks. The Marche Region has launched a similar project (Bici&Bus) by encouraging bicycle carriage on five rural bus lines along the Pesaro-Gradara and Pesaro-Urbino routes, with 6 bike spots on a rear rack. In this case, the bike loading/unloading is allowed only at some times and some bus stops for safety reasons and the extra-service has an additional cost of 2 euros³⁷.

Similarly in Catalonia, managers of Greenways of Catalonia have agreed with operators to carry bicycles on buses, a service greatly appreciated by cycle tourists for access to nature itineraries³⁸. Another example of such practice can be found in Scotland³³, where the Border Buses which connect Scotland to England (on the routes from Edinburgh to Berwick upon Tweed, Carlisle, Melrose; also serving a EuroVelo path) allow a maximum of 2 bikes on board. Moreover, protected bike parking is provided close to the bus stops.

³⁶ <https://www.fsbusitalia.it/content/fsbusitalia/eng/tourism/bus-bici-service.html>

³⁷ Gaspardo Moro, M. (2022). "Il trasporto delle biciclette sui bus urbani. Buone pratiche in Italia e all'estero". FIAB (Federazione Italiana Ambiente e Bicicletta) presentation.

³⁸ Delgado Hernández et al. (2014). Intermodality: bikes, greenways and public transport. Best Practices Guide. Consorcio Regional de Transportes de Madrid – CRTM.

It is evident that in such cases, bus terminals do not require particular additional facilities other than appropriate spaces for easing the access/descent of bicycles and some waiting areas for cyclists. In other cases, the presence of cycle parking (with similar features to those described for railway stations) and bike sharing/rental stations can be crucial.

Moreover, it is important to highlight that, in Italy, the recent National law on cycling mobility n. 2/2018 modified the standard road regulations (Codice della Strada), by introducing the following rule: all buses (including rented, tour and public transport buses), can??must?? be provided with bicycle racks placed externally on the front or on the back of the bus. However, unfortunately, this regulation which has been valid since 2018, is often not respected either in the public or private sector, even if expenses for bicycle racks can often be compensated by public funding.

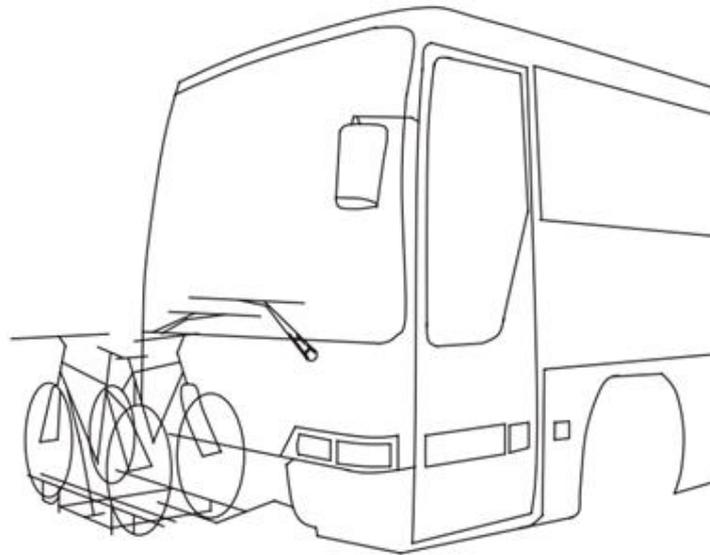


Figure 42 - Scheme of front bus rack³⁹

However, this regulation has also paved the way for the introduction of front bicycles racks which, as previously anticipated, are commonly used in the United States (see e.g. the Minneapolis MetroTransit). As previously indicated, such facilities would allow the fast loading/unloading of bikes and despite possible concerns for pedestrian safety, no specific problems have been noted due to the use of front bike racks³³ in terms of traffic safety in the last twenty years, even if pedestrians (especially some categories) have been demonstrated to potentially be at risk³⁵.

³⁹ Lawrence, G. J. L., & Brook-Carter, N. M. (2004). A study of front-mounted bicycle racks on buses. Transport Research Laboratory.



Figure 43 - Cycle parking at bus stop

Even the bikes transported on board trams represent a great opportunity for an intermodal journey. In the photo, the Stuttgart tram that can carry up to 20 bicycles thanks to the dedicated wagon⁴⁰.



Figure 44 - Bikes transported on board a Stuttgart tram

⁴⁰ <https://www.facebook.com/groups/2291565217760811/permalink/3199882140262443/>

5. Executive summary and recommendations

Based on the International Best Practices analysed in this document, a summary is provided of the practical implications which are useful to optimize cycling accessibility of transport nodes.

First, the transport node should be classified as a “first-level” node (airports, seaports, railway stations, bus terminals) or a “second-level” node (public transport stop).

Then, these places should be studied to investigate the aspects related to cycling accessibility and services.

Based on this study, some actions (physical and non) should be implemented. They can be classified according to the transport node type, the state-of-the-art actions and the most likely planned actions for the considered node.

These actions are indicated as follows.

ACCESSIBILITY ACTIONS

- **Physical actions** (*for first and second level nodes*)
 - o Enabling the infrastructural connection between the node and the local cycle network;
 - o Enabling optimal accessibility until the bike is released (ramps, vertical displacements, etc.);
- **Non-physical actions** (*for first level nodes*)
 - o If the cycling infrastructural connection is difficult, the node should be accessible by public transport (train, metro, tram, bus, with bike carriage).

SIGNS

- **Physical actions** (*for first level nodes*)
 - o Assess the existing indication signs on the cycling network and eventually assess their implementation/enhancement
 - o Assess the indication signs within the transport node and eventually assess their implementation/enhancement
- **Physical actions** (*for second level nodes*)

- Assess the presence of signs indicating the presence of cycle parking and where to find bikes and eventually assess their implementation/enhancement

SERVICES

- **Physical actions** (*for first level nodes*): spaces dedicated to cycling-public transport intermodality
 - bike facility points: if present, assess their dimensions and functions and eventually enhance them. If they are not present, assess their implementation (based on the importance of the transport node and on the present and medium-term future cycling attraction of the node)
- **Physical actions** (*for second level nodes*): spaces dedicated to cycling-public transport intermodality
 - Cycle parking: if present, assess dimensions and eventually enhance them. If they are not present, provide for their implementation.
- **Non-physical actions** (*for first and second level nodes*): information
 - Website or dedicated mobile application of the transport node/transport agency: check if rapid and easily understandable information can be provided for users. If this platform exists, assess its content and eventually integrate/optimize it. If it does not exist, assess its implementation. The minimum level of information should include:
 - how to reach the transport node (to/from the node)
 - services dedicated to cycling mobility at each relevant node
 - how to properly use dedicated services (access points, assembly/dismantling areas, packing, transfer, fares, etc.)
 - thematic maps of the network and of the relevant node
- **Non-physical actions** (*for first level nodes*): policies
 - Starting a discussion with the relevant public Administrations to highlight specific needs in order to improve the cycling-public transport intermodality
 - Request/promote/fund awareness campaigns and public participation
 - Find funding opportunities to implement both physical and non-physical actions.

6. Conclusions

The intermodality between cycling mobility and other means of transport in main interchange terminals (airports, seaports, railway stations, bus terminals) can be eased through several possible actions, shown in this Vademecum.

This document started with the specific Deliverables of the MIMOSA Project, reporting on practices related to cycling mobility.

- D.5.3.5. “Set of solutions for an easy access to the airports of Bari and Brindisi by passenger travelling by bicycle” (Puglia Region)
- D.4.3.2. “Maritime and Multimodal Sustainable passenger transport solutions and services” (Friuli Venezia Giulia)
- D.4.3.3. “Pilot cross border intermodal service” (Friuli Venezia Giulia)
- D.4.4.1. “Innovative electric light vehicles sharing service supported by a “Mobile Hub” in Emilia-Romagna Region” (Institute for Transport and Logistic)
- D.4.4.1. “Set of solution for upgrading bike lanes in Dubrovnik-Neretva county” (with specific regard to the implementation of bike racks and parking)
- D.5.3.4. “Website for cycle tourism in Dubrovnik-Neretva county”
- D.5.3.6. “Pilot actions and Investments report” (with specific regard to the e-bike rental system at the Rovinj Port).

Then, the Best Practices reported by the MIMOSA Project partners who responded to a specific survey on this topic were described. Practices/interventions from the following MIMOSA Project partners were reported: Friuli Venezia Giulia (in collaboration with C.E.I.), Institute for Transport and Logistics, Abruzzo Region, Dubrovnik Neretva Region, Rovinj Port Authority.

However, given the broad scope of this document, other International Best Practices have been reviewed in this document, to give evidence of worldwide action to promote cycling intermodality and the accessibility of transport nodes. They are classified according to the specific transport node to which they refer:

- airports;
- seaports;
- railway stations;
- bus terminals.

The implementation of such practices can encourage the use of bicycles for different scopes, from commuting (mainly considering workers at interchange terminals) to tourism, which is currently an increasing tendency. The main aim of this process is, ultimately, to promote sustainable mobility for medium/long-distance travel, such as in the urban environment.

In order to reach these aims, some recommendations were included in the previous section, as a result of the reviewed Best Practices. These recommendations have been tailored according to the importance of the transport node to which they refer and classified into physical and non-physical action. The recommendations concern action on accessibility, signs and services, useful to foster cycling intermodality at transport nodes.

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