

# Florence



## Local context

### City size and context

Florence is the eighth biggest Italian city, chief town of Tuscany in the centre of Italy. Considered the birthplace of the Renaissance, Florence is one of the most popular Italian touristic destination and its historical centre was declared a World Heritage Site by UNESCO in 1982. Its economy is characterised by a strong manufacturing and tertiary sector (with tourism as top income item).

Florence has a huge number of daily city users, mostly tourists, staying for an average of slightly more than 3 days.

Rated as the 2<sup>nd</sup> Smart City in Italy according to the 2019 ICity rank<sup>1</sup>, Florence can be

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<https://d110erj175o600.cloudfront.net/wp->

### KEY FIGURES

**Population:** 372,905

**Area:** 102.4 km<sup>2</sup>

**Density:** 3,641.3 people/km<sup>2</sup>

**NUTS level:** NUTS-3

**TEN-T corridor(s):** Florence is an urban node of the TEN-T Scandinavian-Mediterranean corridor. The closest core Railroad Terminal (RRT) is Prato, 20 km away from Florence.

**USER-CHI role:** replicator city

considered as the most compact and global city in Italy, focusing on transport network modernisation.

The municipality of Florence has a strong cooperation in place with the Metropolitan City in terms of mobility policies.

The high vulnerability of the historical centre and its architectural constraints are key points for the city that must be considered in the deployment of the charging infrastructure.

## Geography

Florence is located in the central part of Italy. It lies in a basin formed by several hills and crossed by the Arno river, 100 km from the west coast. The city centre is small and flat except for several low hills in the surroundings.

## Modal split

Modal split data available refers to the 2011 national census. Up-to-date modal split data is not yet available. It must be considered that the opening of two tramway lines in 2018 and 2019, that connect the city centre to two main city destinations (hospital area and airport), produced a strong shift from private to public transport that is not visible in this data and will be only measured with the future surveys.

Table 1 summarises the number of daily trips from or to Florence per mode of transport. Figure 1 shows the impact of school trips on total hourly trips on a sample in 2017, and Figure 2 gives an indication of the daily composition of trips in 2017.

TABLE 1: HOME-WORK/HOME-SCHOOL MODE OF TRANSPORT FROM/TO FLORENCE (DAILY VALUES 2011). SOURCE: ISTAT

Mode	N.	%
Train	5,235	2.5
Tram	7,207	3.4
Urban bus	23,362	11.0
Suburban bus	1,521	0.7
Company or school bus	1,580	0.7
Private car (as driver)	68,595	32.3
Private car (as passenger)	17,444	8.2
Motorcycle or scooter	38,465	18.1
Bicycle	14,040	6.6
Other	342	0.2
Walking	34,376	16.02
Missing	503	0.2
<b>TOTAL</b>	<b>212,670</b>	<b>100</b>

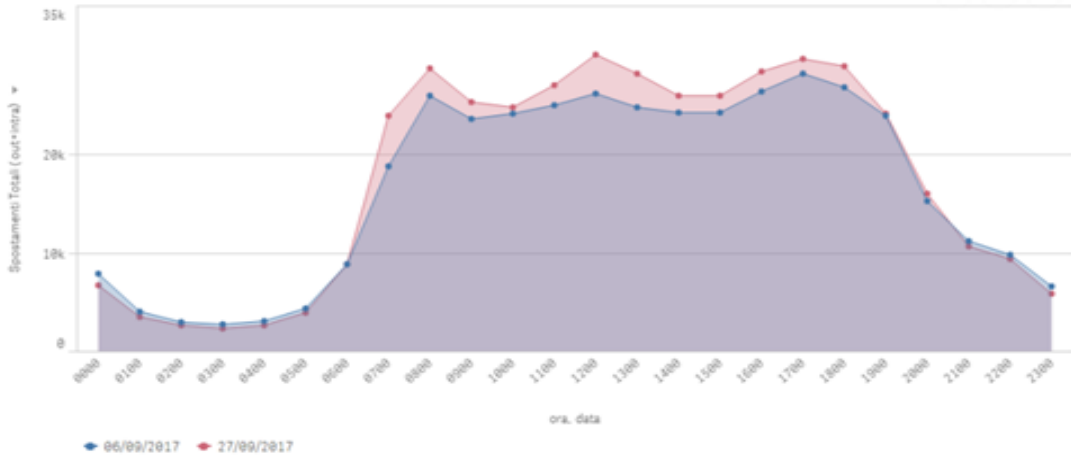


FIGURE 1: HOURLY TOT. TRIPS SCHOOL DAY (RED) AND NO SCHOOL DAY (BLEU) DURING A WORKING DAY (2017). SOURCE: CITY OF FLORENCE

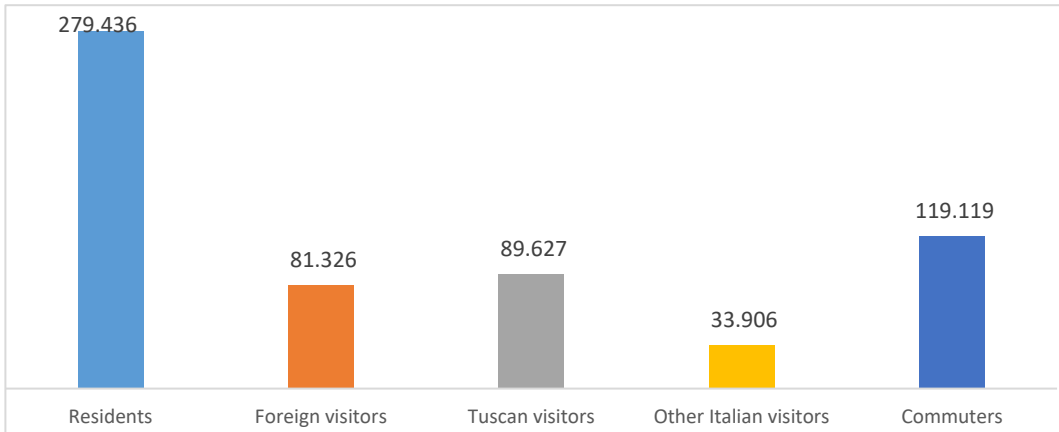


FIGURE 2: DAILY PRESENCES COMPOSITION (2017). SOURCE: CITY OF FLORENCE

### Electric vehicles

The data below refers to Florence territory in 2018. Hybrid vehicles represent 75% of the total of electric vehicles in Florence in 2018,

with almost the total (99%) being LEVs. When it comes to BEVs, LEVs and LDVs represent 40,3% and 38,6% of the total respectively.

TABLE 2: REGISTERED VEHICLES IN FLORENCE (2018). SOURCE: MUNICIPALITY OF FLORENCE

Registered vehicles (2018)	Total	Light Vehicles (LEVs)	Electric	Light duty vehicles (LDV)	Heavy duty vehicles (HDVs)
BEVs	640	258		247	135

PHEVs	1,949 (hybrid both plug in and not)	9 (hybrid both plug in and not)	1,931 (hybrid both plug in and not)	9 (hybrid both plug in and not)
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## Charge point characteristics

The charging points available on the whole city road network and other parameters connected to e-mobility are summarised in the Table 3 below. 52% of the charging points in Florence are slow (3-7 kW) and 43% are semi fast (11-22 kW)

operators (e.g. Enel X) and app developed by EMSP.

### Total RES supplied

No renewable energy sources are supplied for vehicles charging at present.

TABLE 3: CHARGING POINTS TYPES. SOURCE: MUNICIPALITY OF FLORENCE

Slow EVSE (3-7 kW)	95 (2 plugs 3kw) available for users plus 90 available for the municipality staff only
Semi-fast EVSE (11-22 kW)	78 (2 plugs, 1 plug 22kw and 1 plug 3kw)
Fast EVSE (50 kW):	8 (of which 6 reserved to taxis) (3 plugs)
Ultrafast EVSE:	0
Total electricity supplied by the points (kWh/year):	439,948 (2018)

## Payment options

The payment was initially available only through a user card released by the municipality and linked to an energy provider account (chosen by the user).

Thanks to the interoperability of the charging network, this mode continues to be available but is complemented by several mobile apps through which the user can access the charging point and pay with prepaid card, credit card or PayPal. There are both mobile apps developed by other

## Electromobility strategies and initiatives

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### 1.1.1. State of play

Florence is active in collaborative networks (New Covenant of Mayors, Global Covenant of Mayors, Conference of Parties COP21) created to face social, environmental and sustainability challenges. The city is working on a comprehensive project, integrating technologies and “info mobility”, to ultimately transform Florence into an environment-friendly and compact city.

Since the 90's, Florence strongly invested in e-mobility thanks to the development of charging infrastructure for EVs focusing on both private and shared cars and taxis, the latter being served by six ultra-fast recharging station reserved to them. Nowadays, Florence counts with nearly 200 public multivendor charging stations. This network uses open protocols for communication, availability data are published as open data on the city web portal. Two e-car sharing companies operate in the city with a total of 220 e-vehicles while the licensed e-taxi fleet counts 74 units.

The most relevant projects in the domain of e-mobility are summarised below.

#### **Public charging stations network deployment** (completed)

Through a project funded by the Tuscany region with Regional Operational Programme (ROP) funds, 173 public multivendor charging stations were installed on the municipal road network with a total of 350 plugs available.

#### **EVA+** (completed)

EVA+ (Electric Vehicles Arteries in Italy and Austria)<sup>2</sup> is a project co-financed by the European Union's Connecting Europe Facility programme which aimed at building a comprehensive, cross-border network of public fast charging stations for electric cars in Italy and Austria. This network is based on multi-standard chargers and include innovative ICT solutions to provide easy access and service to all vehicles and customers. Florence is one of the cities that is taking part as pilot location. Two stations were installed in this framework.

#### **REPLICATE (REnaissance of Places with Innovative Citizenship and TEchnolgy)** (installed but not already active, almost completed)

REPLICATE<sup>3</sup> is a European Union research and development project funded by the Horizon 2020 Programme that aims to deploy integrated energy, mobility, and ICT solutions in city districts. Florence is one of the lighthouse cities alongside San Sebastian (ES) and Bristol (UK). The project is focused on increasing the quality of life for citizens across Europe by demonstrating the impact of innovative technologies used to co-create smart city services with citizens and prove the optimal process for replicating successes within cities and across cities. One of the main objectives is the implementation of e-mobility with regards to taxi fleet, recharge points and implementing the mobility services. 6 fast recharge stations for taxi drivers, a booking app for taxis for fast recharge stations, e-

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<sup>2</sup> <https://www.evaplus.eu/>

<sup>3</sup> <https://replicate-project.eu/>

mobility info-point managed by the taxi associations to raise awareness among their members about the opportunities given by choosing electric vehicles, 27 multivendor recharging stations in the city, are four of the project outputs.

#### **Municipal e-car sharing** (completed)

A municipal e-car sharing project was funded by the regional local council in the framework of the air pollution reduction plan. The municipal fleet has been renewed by replacing 85 vehicles with electric vehicles and 60 reserved charging stations have been installed.

#### **Municipal e-bike sharing – partnership with Ducati Energia spa** (completed)

This is a pilot project for a corporate e-bike sharing system, promoted by the Ministry of the Environment in partnership with Ducati Energia spa, to encourage the use of alternative and ecological means of transport for the journeys necessary to carry out the work activities of the municipality. The Ministry has provided the municipality of Florence with 50 e-bikes, equipped with recharging racks that have been placed in parking areas of the municipal offices. The project involved the deployment of a data acquisition system for monitoring the parameters of use and consumption of the bikes.

#### **Ele.C.Tra project**, funded by IEE programme. (completed)

The overall objective of the Electric City Transport (Ele.C.Tra.)<sup>4</sup> project was promoting a new urban mobility model. The EleCTra project's goal was to give useful solutions to accessibility needs of citizens

(house-work, house-school, house-keeping transfers, etc..) that cannot be fully solved by public transport local systems.

### **Supporting policies for zero emission vehicles**

The municipality supported the introduction of electric vehicles by paying the cost of the recharge for its citizens for the first period (more than 10 years). Moreover, a specific call for 70 e-taxi licences has been published by the Municipality of Florence with special conditions (around 30% cheaper than the traditional conditions) to increment the number of electric fleet and public services in the city. There are not specific city regulations regarding the deployment of public charging infrastructure. Regarding private charging infrastructures development, the municipality allows to deduct the cost incurred for the infrastructure from the due infrastructure costs.

#### **Regional and national frameworks**

The national electric mobility framework is the PNIRE (*Piano nazionale infrastrutturale per la ricarica dei veicoli alimentati a energia elettrica – E-vehicles charging infrastructure National plan*) released in June 2016.

The regional council is committed to support municipal authorities, for example, Florence received funding (through the ERDF) for the deployment of a big part of the operating charging network (173 charging points), as explained above.

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<sup>4</sup> <http://www.electraproject.eu/>



## Deployment approaches

Up until today, the municipality of Florence tendered out the deployment of interoperable networks while operates and maintains it through an in-house company.

The largest part of the network (173 charging points) has been deployed in response to a public tender totally funded by the Tuscany region through ERDF funds. The municipality asked for a multivendor system and kept the ownership of the stations, due to the type of funding. Charging was initially free for users and the only energy provider was identified by the municipality, while today the user can choose to buy energy from the providers available on the market.

The municipality manages and maintains the charging stations through an in-house company.

Several other groups of charging stations have been installed by projects partners in the framework of EU Projects as explained above. REPLICATE, for example, installed 6 fast recharge points for taxis and 27 non-fast available to every user (the latter are not yet operational); EVA+ installed 2 ultrafast points.

## Good practices

The municipality has always put great attention on having a multivendor approach with regard to energy providers and to Mobility Service Providers (MSPs) in order to avoid any monopoly position.

Furthermore, providing for the maintenance of the infrastructure has been a strategy to keep the charging price to user as low as possible.

Since 2017, Florence is a success story for free-flow bike sharing. The municipality has

invited market operators to provide a free-flow bike sharing service by authorising the deployment of a fleet of maximum 8,000 bikes within the municipal area, with no charge for the municipality. Today, there are about 4,000 bikes in use, with a daily average of 4,700 journeys.

## Challenges and barriers

Florence has strongly invested in the development of the charging infrastructure that today covers the city road network with a density that seems to respond to the actual charging demand.

It seems that a further increase in the use of e-cars is strictly connected to their accessibility in terms of cost of the car itself. National supporting policies could be an answer to this challenge, while the city is ready to adopt soft policies such as rewarding schemes to e-vehicles users, and to zero-emission vehicles users in general to foster electromobility.

Moreover, the optimisation of the location of charging sites, to assure their availability maximising their usage and according to the smart grid capability, could be an issue.

Data from the monitoring indicates that the average trips length is quite low compared to the city size and trips are very dense in the historical centre while scattered outside and in the, even lightly, steep roads. Fostering the use of LEVs has been identified as one of the strategies to increase the average length of trips and to assure the covering of non-flat roads around the city centre.

## Learning needs

In the framework of abovementioned strategy to support the use of e-bike, Florence is interested in understanding how

to best promote private e-bike mobility particularly for commuters (charging and parking solutions at public transport terminals) and to non-resident people (mainly tourists) that could be interested in using and recharging the bike they rented from the sharing service without any loan of the battery.

## USER-CHI solution

In Florence, four USER-CHI products will be demonstrated. The USER-CHI products that will be demonstrated in Florence are the following:

- **Stations of the future handbook:** Guidelines and recommendations to design the perfect user-centric charging station of the future.
- **eMoBest – e-Mobility replication and best practice cluster:** A collaboration platform to facilitate the transfer of best practices among the demonstration and replication cities.
- **INFRA – Interoperability framework:** A package of rules, guidelines and recommendations that will support highly interoperable processes among the electromobility stakeholders.
- **INSOC – Integrated solar DC charging for Light Electric Vehicles (LEVs):** A solution combining charging, onsite production of renewable energy and theft-proof parking for Light Electric Vehicles.

At this stage, one main area of intervention has been identified in Florence as USER-CHI replication city:

### Replicator site solution: Solar DC charging for e-bikes

The solar DC charging for e-bikes solution foresees the installation of a DC charging equipment for e-bikes fed with solar energy in a theft-proof parking or dock. The e-bikes will be part of an existing public sharing service in Florence identified through a public tendering process.

#### Stakeholders involved

Municipality, e-bike sharing operator.

#### Objectives

Delivering charging solutions for e-bike sharing schemes that support users that have no access to home recharge options (i.e. tourists or daily city users).

Increasing the use of e-bikes in home to work and school to work trips and particularly in first mile transfers toward modal interchange nodes.

Offering commuters a convenient parking solution in terms of charging availability and anti-theft parking that will attract new potential private e-bike users.



Facilitating the recharging of empty e-bike batteries, without removing the bike or the battery, and using renewable energy.

**Timing**

The preparatory phase will be carried out in 2020-2021, followed by implementation in 2022.