Factsheet

MILAN: impacts, potential and barriers of electric vehicles in fleet schemes.

Will car sharing customers be ready to welcome an electric fleet? The eBRIDGE Milan pilot has been asking to the people what they think about it.

eBRIDGE: Empowering e-fleets for business and private purposes in cities

Programme	STEER
Project number	IEE/12/713/SI2.644746
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	August/September 2014
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At a glance

The urban area of Milan, considered the economic capital of Italy, with its three million inhabitants, has atavistic traffic problems, but it also offers innovative sustainable mobility solutions, such as the congestion charge Area C, the best public transport system in Italy and integrated car and bike sharing systems. For this reasons, it's considered as one of the ideal areas to test the potential of electric cars in Italy.

GuidaMi, the car sharing service provided by ATM – Azienda Trasporti Milanesi (the transport company of the city of Milan), is the appropriate tool to test electric vehicles to a wider group of users, which are more sensitive and open to innovations. In addition, ATM gives official status to the project and institutional access to a very large group of testers: the customers of public transport in Milan.

The project, through the use of new digital technologies with a social and gaming approach, analyses the different experiences of using electric vehicles in car sharing, in order to obtain information on the barriers to its use and thus learn new concepts on how to promote the knowledge and the use of these low emission means of transport.

During the months of May and June 2014 a pilot pre-test was conducted. A questionnaire was sent to a selected group of GuidaMi clients to test the level of knowledge about electric vehicles and to promote adherence to the pre-test of using electric vehicles offered by the car sharing fleet. Twenty customers have agreed to participate in the pre-test, but only twelve have actually used the electric cars and filled in the online questionnaire.

The feedback was useful, but the sample obtained was too limited. Given the modest levels of participation in the first phase, the eBRIDGE pilot in Milan will be re-launched from October to December 2014 with a different strategy.

First, not only the GuidaMi customers, but all the customers of ATM residents in the city (approx. 200,000 contacts) will be considered in the new approach. Secondly, a greater visibility will be given to the project, thanks to the partnership established by GuidaMi with Ikea and through some incentives like a free bonus to use the electric vehicles.

Milan and its metropolitan area

Milan is the second largest urban hub in Italy with over 3 million inhabitants in the metropolitan area. There are 1,3M inhabitants of the city of Milan, while the number of people daily experiencing the city is 1M. The number of trips per day is 5,279,000; 2,235,000 of them are between Milan and its suburban area, 58% made by car and 34% by public transport. On the other hand, a more balanced modal split occurs inside the city (only 30% by car, while 56% by PT), although it can be verified that there is a high level of vehicle ownership: 55 vehicles/100 inhabitant[1].

Milan is considered to be a fertile ground for start-ups due to the universal Expo2015, which attracts a considerable amount of investment transforming the city into an ideal experiment and showcase arena for pioneering projects and innovation activities. The activities and investments linked to Expo2015 will leave a footprint in the city that will outlive the event itself and will keep Milan at the forefront of urban life experimentation and innovation.

Milan is among the few European cities to have introduced a road pricing measure. This measure was introduced in January 2012, following a referendum in which the 79.1% of voters supported the upgrade of an existing limited charged zone to cover more vehicles and also a wider area. The programme reduced congestion: vehicle accesses to 'Area C' fell by 28%; the demand for on-street parking dropped by 10%. Emissions were also reduced: Particulate Matter (PM10) by 10% and Carbon Dioxide (CO_2) by 35%, and the cars entering 'Area C' are now less polluting (-49%, -2,400 pollutant vehicles entering every day). The speed of public transport also increased (bus: +6.9%; tram: +4.1%). The Municipality of Milan is the winner of the 2014 Transport Achievement Award for its 'Area C' urban congestion charge scheme.

Public transport in Milan

Photo: ATM

Milan is also studying and experimenting many innovative and successful measures that are already in place or under development. The most important regards the improvement of public transport, bike and car sharing, pedestrian-cycling areas and 30km/h zones; and the reinforcement of the pricing policies (Area C, parking, urban logistic).

In Italy the knowledge and use of electric vehicles is very low. Despite some government incentives to purchase them (which are not very high, but focused), the market and private business is not growing. There are various barriers regarding the purchase of Electric Vehicles (EVs), namely:

- vehicle prices and running costs: the potential running cost savings offered by EVs are insufficient to offset the EV capital premium as perceived by most car buyers;

[1] "MILAN SUMP: Challenges, Strategies and ongoing actions" by Stefano Riazzola e Valentino Sevino, 1st European Conference on Sustainable Urban Mobility Plans SOPOT (POLAND), 12-13 June 2014

- brand and segment supply: supply of EVs model is limited, in terms of vehicle segments and brands;
- access to charging facilities, driving range and charging time: consumers are concerned by the EV's short range and long charging times;
- consumers' receptiveness to plug-in vehicles: reliability, safety and battery degradation issues, as well as uncertainty regarding residual values, also contribute to consumers' reluctance to purchase electric vehicles.

CIVES[2] estimates that in Italy the number of EVs or Hybrid Electric Vehicles (HEVs) might be of 6/700,000 vehicles, from now to the year 2020 (10-12% per year of the car market). According to another source[3], potential market penetration of EVs and PHEVs (Plug-in Hybrid Electric Vehicles) might be of 850,000-3,800,000 (depending on the regulatory conditions).

A strategy that could contribute to invert these trends could be the introduction of EVs through the implementation of a car sharing system.

Car sharing scheme operators could be the ideal adopters of EVs, since it allows consumers to try the vehicles on a per-use basis without needing to pay the high upfront costs of owning an EV.

The theme of the Milan pilot is to collect, with a bottom-up participatory approach, all the necessary data and information to identify new strategies for the deployment of electric vehicles on the market. Customers of the car sharing service GuidaMi represent attractive targets in terms of age, gender, profession and willingness to accept innovations.

Electric car sharing in Milan by GuidaMi

Photo: GuidaMI

The overall objective of the pilot is to collect information and trigger the awareness on the electric car sharing service by the Milanese potential market that, nowadays doesn't know it. These general objectives will help to create the conditions for achieving the specific objectives of the project: customer growth and growth in the use of electric cars on vehicle sharing schemes.

[2] CIVES is the acronym for Commissione Italiana Veicoli Elettrici Stradali (Italian Commission for Electric Road Vehicles). It's the Italian section of the European Association for Battery, Hybrid and Fuel Cell Electric Vehicles.

[3] Enel – Energy vendor (source: www.assoelettrica.it/wp-content/uploads/.../Enel-Mobilità-elettrica.pdf)

Car sharing as a way to spread electric vehicles

In Italy, to achieve the emission reduction goals, it is important to discourage the private ownership of vehicles: throughout Europe, Italy has one of the highest density of cars – ranked only after Luxembourg and Iceland - with 61 cars per 100 inhabitants in 2012[4].

In 2010, the daily commuter trips were mostly made through the usage of private cars (76.2% of people going to work), while 13.5% used public transport and 3.9% a motorcycle[5]. Walking accounted for the 10.7% of the users and 3.3% preferred cycling.

In 2012[7], as it can be seen from the table below, the modal distribution is very similar, although public transport has increased a few percentage points.

	MALES				FEMALES				MALES AND FEMALES			
	PT or collective	Car as driver	Car as passenger	Other private vehicle	PT or collective	Car as driver	Car as passenger	Other private vehicle	PT or collective	Car as driver	Car as passenger	Other private vehicle
Students	32.4%	5.2%	35.0%	7.0%	34.3%	4.5%	34.3%	5.1%	33.3%	4.9%	34.7%	6.1%
Employed	8.6%	72.1%	4.0%	12.5%	13.5%	65.1%	6.4%	7.2%	10.6%	69.3%	5.0%	10.3%

Source: ISTAT

In fact, the trend shows a decreasing of commuting due to the economic crisis: from 128 millions (2008) to 97,5 million in 2011. In the year 2012 alone, the average daily trips were almost 10 million less compared to 2011 (-8.5%)[8].

The decline in consumption of mobility was largely caused by the collapse of travel for leisure. In fact, the majority of journeys are made within a range of 10 km (70.4%), while 26.6% are made in distances between 10-50 km; long distance journeys (more than 50 km) cover only the 3% of the total.

[4] Osservatorio Autopromotec: http://www.autopromotec.com

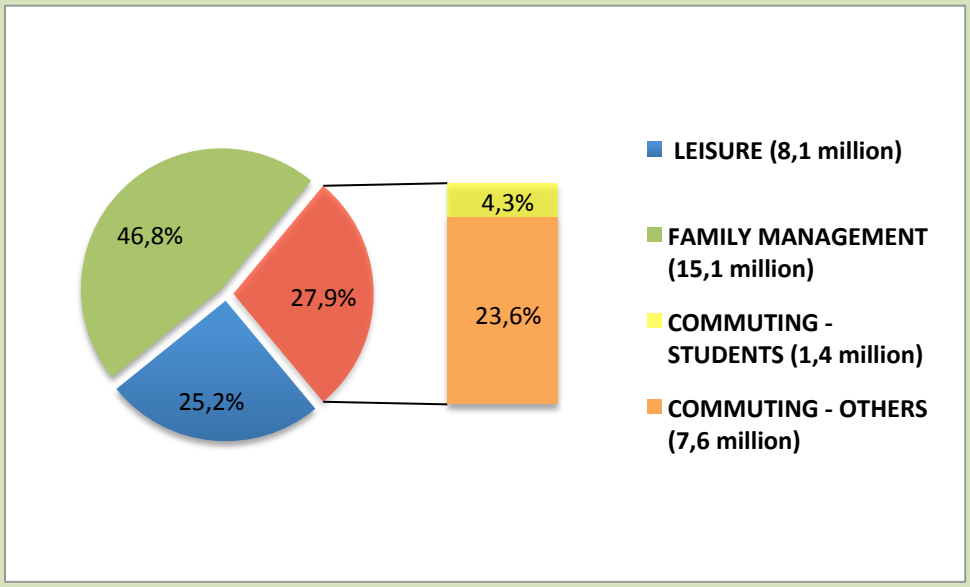
[5] Istat – Italia in cifre (2010 data)

[7] Istat : http://noi-italia.istat.it/index.php?id=7&user_100ind_pi1[id_pagina]=481&cHash=7660fdfa3c04ff979677bed4d9de5e73

[8] Decimo rapporto sulla mobilità in Italia (10th Report on mobility in Italy): http://www.ricerchetrasporti.it/tag/motivi-dello-spostamento/

In 2012, the purposes of journeys in the Italian urban areas are the following:

Urban journey purposes

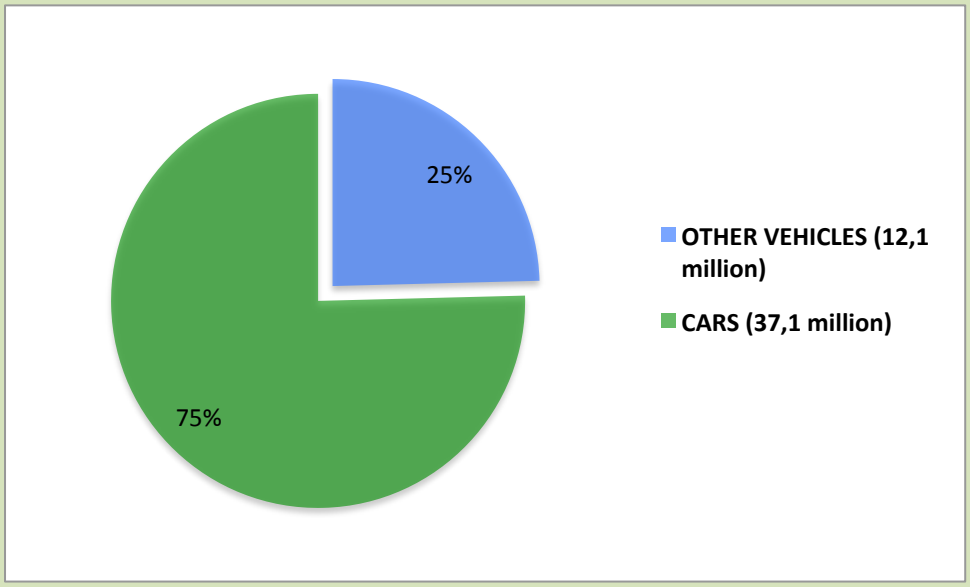


Source: ISTAT

The number of passenger cars and light transport vehicles has steadily increased from 39,19 million in 2008 to 40,35 million in 2011.[9]

The total number of vehicles circulating in 2012 in Italy is around 49,2 millions:

Vehicles circulating in Italy



Source: ISTAT

[9] No data available for light transport vehicles 2012

Electric vehicles only account for 1,978, which corresponds to the 0.01%[10] of the total. Of all the registered vehicles in this period, 92.05% were passenger cars. In 2011 the average age for these cars was 8.6 years.[11]

In 2012, the 6.99% of the total passenger vehicles were alternative powered vehicles, being 93.01% conventional vehicles.

Among the alternative powered vehicles, almost all - 99.68% (6.96% of the total) - use liquefied petroleum gas (LPG) or compressed natural gas (CNG). The total amount of LPG and CNG registered vehicles has significantly increased by 57.85% between 2008 and 2012. In the same period, BEVs, PHEVs and HEVs have decreased by 6.00%.

[10] AIRP on ACI Data: www.asso-airp.it/ew/ew.../2013-07ParcoAutoEcologicheITALIA.pdf

[11] Automobile Club d'Italia (ACI) – Report "Analisi dell'anzianità del parco veicoli in Italia" (2013)

The Milan pilot report

The project pilot focuses on the Area C, where GuidaMi offered ten E-vehicles (four full electric and six hybrids) to be used in a car sharing system by the citizens. The full electric vehicles are Citroen C-Zero and the hybrids are Toyota Prius.

Here below, it is possible to have an idea of the congestion charge area (Area C) in the heart of the city of Milan:

The Milan Area C

Photo: Comune di Milano and AMAT

At the beginning of the project, a total of ten electric vehicles were planned, but because of changes to the market in Milan (by the end of 2013 new competitors have appeared with free flow car sharing systems), and the consequent disengagement of ATM on car sharing, the 100% electric vehicles were reduced to only four.

Considering the constraints so far, and to better understand what are the barriers and

potentials of e-vehicles in car sharing, it was decided to implement an interactive survey, targeted to a group of alpha testers, for a deep understanding of user needs and requirements to better define the service.

In addition to the survey, the involvement of customers participating to the project have been designed through the use of the "logbook" technique, where the different needs or suggestions of customers - related to concrete actions to improve the E-sharing service - could be collected. In practice, a small sample of users should agree to share their experiences in real time in order to provide a focused and effective contribution to the customization of the service.

Main goals

During the months of May and June 2014 a pilot pre-test was conducted. A questionnaire was sent to a selected group of GuidaMi clients to test the level of knowledge on electric vehicles and to promote adherence to the pre-test of using electric vehicles offered by the car sharing fleet.

A total of 20 customers have agreed to participate in the pre-test, but only 12 have actually used the electric cars and filled in the online questionnaire. The results are presented in the following paragraphs.

The feedback was useful, but the sample was too limited. Given the modest results of participation in the first phase, it was decided to re-launch the pilot from October to December 2014 with a different strategy. It was decided to broaden the scope of action, in terms of the clients to be involved, as well as the area of interest. In this sense, the potential expressed by the ATM group, which has about 800,000 customers, and a partnership with Ikea, played a key role in the revival of the project. The strategy to be adopted in the next moths comprises the following activities:

- not only the GuidaMi customers but all loyal customers of ATM residents in the city (approx. 200,000 contacts) will be asked to participate to the survey;
- a greater visibility will be given to the project through a competition (that also includes some free use of electric vehicles), in partnership with Ikea.

The questionnaire

Here below, it is possible to have a look to the questionnaire submitted to customers:

Questionnaire Electric Cars

Name ....., Customer Number .....

1) Did you use at least once a 100% electric car fleet Ion GudaMi?
- Yes
- no

2) If you answered No. Why did not you use it? (even more than one answer)
- The parking area was distant or inconvenient
- When I tried the car was booked
- I'm not interested in the use of the electric car because it has little autonomy
- The system of access to the electric car sharing is too complicated

If you answered yes to the first question in the questionnaire continue.

3) Do you find it difficult having to estimate the time of booking km to go?
- Not at all difficult
- Hard enough
- Impossible

4) The information manual that you received was comprehensive to access and use the car?
- It is completely
- Yes, but should be improved
- No

5) Did you find the complicated procedure of taking delivery of the car and at the pedestal (power cord, pedestal and tile A2A)?
- No
- Yes

6) If you answered Yes to 5, what did you find difficult? (more than one answer)
- Activation column A2A (interface clear)
- Activation column A2A (malfunctioning or off)
- Inserting and Removing charging cable on the pedestal
- Inserting and Removing charging cable in the car

7) Did you find clear information on the display and audio messages in the on-board computer
- It is completely
- Yes, but should be improved
- No

More suggestions: …

The vehicles involved

Citroen C-Zero: one of the E-cars in the GuidaMi Fleet

Photo: GuidaMi

Citroen C-Zero is driven by an electric motor generating 49 kW (or 67 bhp EEC) powered by a lithium-ion battery with a capacity of 14.5 kWh. The battery supplies the power for the motor, air conditioning and heating. The C-Zero has a top speed of 100km/h and a range of around 100 km.

Launched in 1997, **Toyota Prius** was the world first mass-produced hybrid car and became a genuine alternative to petrol and diesel engines.

Prius uses the hybrid technology to optimise fuel consumption, resulting in low CO2 emission, particularly in city driving, during congestion, stop-start traffic and at slow speeds. When stationary, the petrol engine switches off to lower fuel consumption even further. Prius can also run on pure electric power for 2km at up to 50km/h delivering a silent and emission-free drive.

The 10 main GuidaMi car sharing parking areas in the Area C are full-electric provided. The charging system is the traditional one, with columns and connecting cable. The charging time from zero is about 6 hours, but, on average, within two hours after the last use, the vehicle is ready for the next trip (the average trip is about 30 km).

The user profile

The users involved in the pre-test are private customers (80%), mainly single or small families, living in Area C, and business (20%), mainly small professional firms and freelancers (fashion and design).

The target people are attentive and open to innovation and conscious of the need to rationalize expenditures (given the economic situation).

CHARACTERISTCS	
Men	58%
Women	42%
18-35 years	30%
35-55 years	51%

AREA OF RESIDENCE	
Area C	31%
Paid parking	56%
Owners of garages	25%

MEANS OF TRANSPORT USED	
Bike	10%
Private car	16%
Pubblic mean of transp.	55%
Foot	5%
Motorbike/scooter	14%

QUALIFICATION	
Middle school	8%
Diploma	41%
University degree	51%

PROFESSION	
Employee/teacher	24%
Freelancer	9%
Manager/entrepreneur	31%
Housewife/pensioner	3%
Student	14%
Other	17%
Unemployed	2%

ACCESS TO NEW TECHNOLOGIES	
Daily internet usage	82%
Smartphone usage	42%

Barriers and potentials of EVs in Milan

The pre-test has focused on the analysis of the cultural and psychological barriers to the access and use of electric vehicles by the end-users. The final objective is to give feedback, both to the producers and managers of services, so that useful information to improve the approach and the results can be defined.

In this first phase, the activities developed have seen the involvement of a limited number of users who participated in the survey. Although the findings were positive, for a statistical analysis the sample was considered unrepresentative; so far, reliable conclusions and recommendations are difficult to be drawn.

Instead, future activities will imply the collection of useful methodological results, concerning the identification of a broad and significant target, and the compilation of the best techniques (and technologies) of involvement.

The usage of vehicles during the pre-test can be described by the following figures:

C-ZERO		N. of rented cars in a month	Driven hours	% of use	Trips	Distance
2014						
Jan		3	16	4.0%	3	357
Feb		3	106	12.1%	18	407
Mar		3	169	11.6%	31	457
Apr		3	149	8.5%	32	590
May		4	384	13.0%	41	845
Jun		3	187	12.0%	38	636
Jul		3	208	10.8%	46	778
Total	N. of cars used by the testers in the period: **5**		**1,219**	**10.7%**	**209**	**4,070**

PRIUS		N. of rented cars in a month	Driven hours	% of use	Trips	Distance
2014						
Jan		5	816	22.3%	113	5,664
Feb		4	300	12.0%	77	2,051
Mar		5	371	13.3%	67	3,258
Apr		5	718	26.3%	74	4,960
May		5	524	15.4%	94	3,499
Jun		5	526	15.8%	92	3,260
Jul		6	674	16.6%	96	4,714
Total	N. of cars used by the testers in the period: **6**		**3,929**	**17.5%**	**613**	**27,406**

The 12 citizens participating to the survey (questionnaire and interview), after using the vehicles declared the following:

- there's a strong relation between the use of electric vehicles and commuting (92% of the sample);
- indicated the ease/difficulty of interaction with the charging system as the determinant factor of choice (30%);
- also pointed out that the certainty of the availability of the vehicle with a 100% charge at the start of the trip is a good feeling factor.

However, in spite of the obtained results, a more comprehensive analysis is expected by the end of 2014, with the implementation of another survey.

After interviewing the entire sample and about 50 private and corporate clients, it was possible to conclude that using digital tools (preferably via smartphone) and gaming as a form of loyalty, were both important aspects to consider for the development of an effective survey. The following picture presents the screen of the digital and interactive communication tool to manage the customer experience.

Among the digital tools the social networks are the most useful ones. The most common and well known is Facebook. A better tool to collect and share information about the user experience of electric vehicles in real time could be identified in Foursquare, due to the integration of geolocation as the core of the functionality. Based on these results, a light software framework that allows to gather information and impressions of the testers interactively and in real time via social networks could be developed. The following picture present few frames of this solution.

Social media that could be used for the eBRIDGE Milan pilot

Source: GuidaMI

Conclusions

The deployment and use of electric vehicles in the Italian context and in Milan are still scarce. Despite some promoting actions within the private customers and some projects targeted to companies, figures are still marginal. No effects have so far been produced by some public funding policies, aiming to convince people to buy private E-vehicles.

In general, the major barriers to the spread of these vehicles are verified in terms of supply and demand. The biggest domestic car manufacturers have never seriously invested in the sector, often declaring explicit disinterest. And that, in a national market still very self-referential, resulted in a tepid supply policy (although partly offset by the offer by foreign producers, which also has technological limitations: battery, charging systems, …).

On the demand side, from both private and corporate users, there is still skepticism towards the adoption and use of full electric vehicles. Generally, there are a few "blocks", largely cultural and psychological, that leverage on the security value, seen as quietness, reliability and ease of use.

The Milan eBRIDGE pilot aims to produce a deep analysis of the cultural and psychological barriers to access and use electric vehicles by the end-users, offering feedback to the providers and managers of car sharing services.

The pilot in its first phase has seen the involvement of a limited number of users. Testers appreciated a lot their driving experiences, especially the total absence of noise and the feeling perceived of distinctiveness from the mass market. In general, these first movers didn't find any problem in booking and regarding the way they get access to the E-fleet.

The results of the pre-test confirms a strong preference for E-vehicles for commuting (92% of the sample) and indicated the ease/difficulty of interaction with the charging system as the determinant factor of choice (30%), together with the certainty of the availability of the vehicle with a 100% charge.

At the half of the eBRIDGE project, the lesson learned through the Milan pilot is that the key aspects to really promote the EVs within the mass market are:

1) **easy and available fast charging points** (with economically convenient set-up costs in private spaces, even for private customers as condos);
2) **effective and wide communication that underlines the positive aspects of EVs through an emotional marketing approach** (*more convenient, more safe, more distinctive, …*).

Although the findings are positive, we have considered them unrepresentative in terms of numerical statistics. That's why we have decided to continue to engage users in an ongoing and proactive approach that will adopt for a broader second phase of the pilot scheduled to start at the end of 2014.

In addition, GuidaMi is also going to exploit its new partnership with Ikea. As part of its communication policies on sustainability, Ikea will involve a greater number of potential participants to the next phase of the pilot.

The project

eBRIDGE is a co-funded EU project to promote electric fleets for urban travel in European cities. The project aims to bring innovation and new technologies to make today's mobility cleaner, more efficient and sustainable.

The project explores alternatives to the current mobility patterns and evaluate whether electric mobility is a feasible option to make cities cleaner and more sustainable.

The seven pilots, Berlin (Germany), Milan (Italy), Lisbon (Portugal), Vigo (Spain), Valencia (Spain), a selection of Austrian municipalities and Carmarthen (Wales) are developing actions to optimise operational fleet performance, test and launch solutions to increase the convenience and ease of use of car sharing offers and finally, raise awareness among the target groups through engaging marketing approaches on the suitability of electric mobility for urban transport and commuting.

The eBRIDGE team involves technical experts, academics, associations, public administrations, mobility providers and public transport and car sharing operators.

eBRIDGE
Power to urban fleets

Co-funded by the Intelligent Energy Europe Programme of the European Union

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