



Smart booklet

Electric vehicles sharing schemes

E-car sharing

Smart parking

E-Vehicle Charging Points

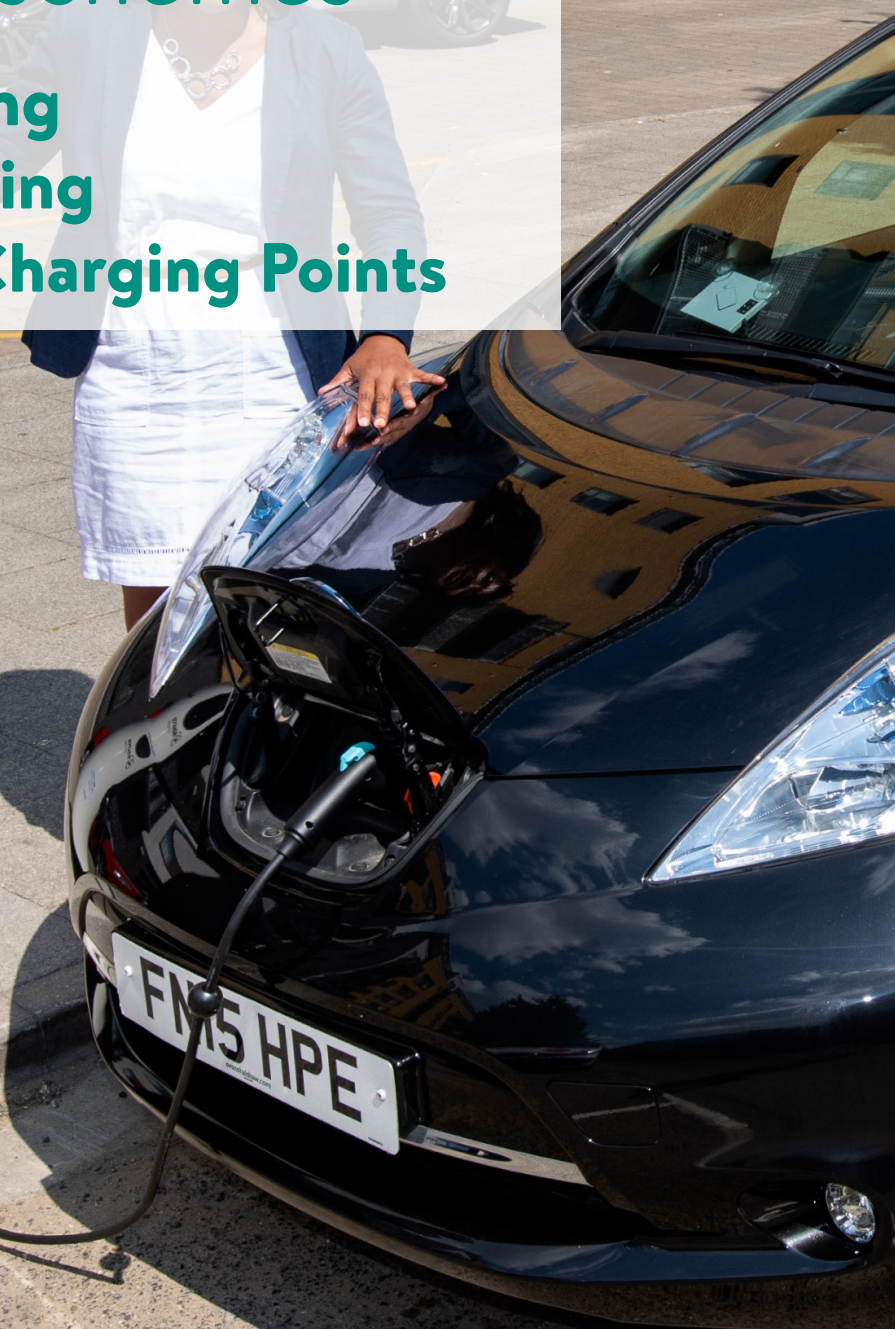


TABLE OF CONTENTS

The value of electric vehicles sharing for cities	3
Sharing Cities solutions	4
Does EV sharing respond to my needs?	6
Technical options	7
Funding and financing	8
Common challenges and recommendations	9

LIST OF ACRONYMS

CEiiA	Centre of Engineering and Product Development
EMEL	Lisbon Mobility and Parking Municipal Company
EV	Electric Vehicle
GDPR	General Data Protection Regulation
LoRaWAN	Long Range Wide-Area Network
MDC	Mobility Device Control
V2G	Vehicle to Grid (bidirectional charging)

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This booklet was prepared through the collective knowledge from Sharing Cities and building on the experience of the wider context of the SCC01 Lighthouse programmes involving 17 projects, 116 cities and hundreds of partners. More information about the Lighthouse programmes can be found [here](#).



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LIGHTHOUSE CITY KEY

	Lisbon
	Royal Borough of Greenwich, London
	Milan

THE VALUE OF ELECTRIC VEHICLES SHARING FOR CITIES

WHAT?

Electric vehicles (EV) sharing schemes are a model of car rental thanks to which people can rent an electric car for short periods of time. They are often managed by mobility sharing service providers. Public and/or private charging infrastructure is indispensable for operating EVs.

WHY?

From the municipalities' perspective, EV sharing is an instrument which provides the local community with an alternative mobility service for their daily or occasional commuting, reducing the number of private vehicles in the city. The electric mobility market is fairly new and has potential to develop in many different ways, also thanks to many different revenue sources. Findings from analysis into early EV market developments show that the availability of chargers emerged as one of the key factors for contributing to the market penetration of EVs. Additionally, integration of smart parking sensors at EV charging platforms increases the service efficiency.



Carbon reduction
Noise reduction
Decreased dependence from fossil fuels

EV sharing can reduce the ownership of private vehicles circulating in the city and contribute to an increase of EVs' market share. In the long term this can have significant implication for the city's environmental conditions.

EV sharing has experienced rapid growth over the last few years, especially in bigger cities. In 2016, Europe represented over **50%** of the global car sharing market, according to Deloitte, which continues to grow.¹

ECONOMIC VALUE



Emissions savings
Reduced congestion
Corporate branding
Increased property value
Increased tourism activities
Car ownership cost reduction
District attractiveness
Health cost savings
Increased energy security thanks to technologies such as V2G and stationary storage that will help to promote smart grids and distributed generation
Market development of new mobility services

Inclusive and increased mobility
Noise reduction
Improved health and wellbeing
Increased road safety
Reduced congestion (including reduced parking congestion)
Parking usage optimisation
New mobility regulations in place

SOCIAL VALUE



As of October 2016, EV sharing was operating in an estimated **2,095** cities in **46** countries on six continents. Approximately **15 million** EV sharing members shared over **157,000** vehicles.²

1. Deloitte, 2017

2. Shaheen, S., Cohen, A. and Jaffee, M. (2018). Innovative Mobility: Carsharing Outlook. UC Berkeley: Transportation Sustainability Research Center. Available at: <https://escholarship.org/uc/item/49j961wb> cited in Transport and climate change global status report 2018, page 83, available online at <https://bit.ly/2SCaFCq>

SHARING CITIES SOLUTIONS

Here are three examples of how cities in the Sharing Cities project are using this technology. These different use cases all respond to local conditions and consider financial (revenues, savings), environmental (air quality, reduced CO₂), social (health, safety) and economic (local business development) values.



Milan is testing a new model of EV sharing in a closed community, a condominium.

The service started with two EVs and two EV charging points operated by ReFeel Mobility in Condominio Bacchiglione 21, a complex with 658 apartments, and more than 100 people interested in the use of the service.

This pilot project in the condominium is working in parallel with all other schemes run by private companies operating in the city, with the ambition to proliferate EVs.

These have been also improved by Sharing Cities with the installation of 10 mobility areas with 60 chargers, 20 of which are rapid chargers.



Within the scope of Sharing Cities, Lisbon Municipality has procured 160 EVs in an operational leasing scheme which stipulates that the vehicles must remain technologically updated. 20 are dedicated to the e-car sharing pilot, which reduces the municipal fleet's cost. The vehicles are monitored with GPS and managed through the smart fleet management platform of Centre of Engineering and Product Development (CEiiA). An EV sharing app has also been developed for the drivers to use the service - keyless and fully monitored.

Different smart parking technologies have been tested by 12 different companies in one of the most congested streets in the city, covering a pilot with 125 parking slots. Data from those sensors will be integrated with data from the rapid chargers developed by CEiiA to improve control of the parking spots dedicated only to EVs that are charging. This aims to mitigate improper occupation of parking slots dedicated to EVs.

There are around 244 charging points currently available in Lisbon. In the Sharing Cities' pilot area there are up to 40 charging points. All the chargers are connected to the electric mobility network (MOBI.E) and monitored by the CEiiA platform.



The borough procured a back-to-base model, a model in which vehicles have dedicated parking pays that they are taken back to. This is for seven vehicles, linked to the charging infrastructure which is provided to support an existing car sharing scheme known as the 'car club'. Through a procurement process, Enterprise Car Club has been appointed as the supplier and operator. The car club is being delivered in partnership with the Greenwich Low Emission Neighbourhood programme and is available to any member of the Greenwich-wide car club (over 1,000 members). The car club is a pilot, once it has been completed and evaluated the intention is to electrify the borough-wide car club (which currently has 31 vehicles) and expand it.

The vehicles can use the smart parking spaces available, which are equipped with sensors integrated into the road surface and which communicate occupancy in real time (either available or occupied) to a local network via

a communication hub installed on a lamppost. The data is sent to the London Data Store. This data will help the borough to prevent illegal parking in charging bays, which results in the charging points being out of use.

The delivery of charging points is essential to the uptake of EVs. Greenwich currently has 14 standard charging points and five rapid charging points. Greenwich's standard charger supplier installs points at no cost to the borough; they operate the points and receive all revenues, and points are integrated into the wider Source London network.

In addition to the car sharing scheme, six electric vans were added to Greenwich council's fleet. These vehicles are in regular use carrying out Council business on Greenwich's streets. They are used by a number of council services, including: waste advisors, disability and home improvement, enviro-crime enforcement, and wardens.

DOES EV SHARING RESPOND TO MY NEEDS?

Your local context, including legislation and cultural conditions, affects the kind of EV sharing system that is ideal for your city, and the adjustments to the standard model that you may have to make. Here is a brief overview of key factors you will have to consider when planning your approach.



TECHNICAL OPTIONS

To deploy an EV sharing scheme, there are some fundamental technical requirements to ensure the success of the measure.

The efficiency and autonomy of the battery is critical, and, if sufficient, will alleviate anxiety among current and potential users (especially for car clubs and private/corporate schemes). An efficient and autonomous battery will also reduce management costs for scheme operators.

When implementing a public EV sharing scheme within a busy urban context, it is important to select smaller cars. These help to ease parking pressures and are easier to handle in a congested city or during rush hours. However, small cars may not be the ideal option for private or corporate schemes or for car clubs where people may have alternative purposes for travel, such as longer trips.

In terms of service, the user interface is usually a platform, an app and/or a dedicated card. In the case of all digital interfaces, they should be user-friendly and easy to sign up to. Moreover, a 24-hour service is strongly advised to ensure an effective shift from private to shared vehicles.

Any EV sharing scheme requires some critical elements:

Electric vehicles



User interface



Platform for data exchange



A device for connecting the user, the car and the data acquisition platform



EV charging point

The power supplied by a charging point is another important characteristic. The EV market is evolving and increasingly supports rapid charges, for this reason, a rapid charger (50kW) with capacity to recharge a battery in less than half an hour is preferable to ensure a full utilisation of the car and economic sustainability of the scheme.



Dedicated parking spots for EVs



Service management

- » Redistribution of vehicles
- » Battery charging and replacing



FUNDING AND FINANCING

Ownership:

- » Greenwich: 100% Private
- » Lisbon: 100% Municipality
- » Milan: 100% Private

Selection of a business model:

- » Greenwich: dedicated parking spots (a sign-up fee of €59* then members can hire vehicles for €7.30 per hour or €61 per day). The municipality assures access to the EV charging infrastructure and also dedicates bays for the scheme. The scheme is then operated by a private operator.
- » Lisbon: Leasing corporate model, the fleet is available only for the municipality staff.
- » Milan: District dock station model. In organising the car sharing condominium in Milan, the private operator has received full freedom in terms of business model and pricing. In a context of experimentation, in which the most effective business model has not yet emerged, the operator had the freedom to try the strategy considered the best by them and the possibility of changing it in the course of experimentation.

Scheme revenue and payback

- » Greenwich: revenues from sign up fees and usage fees, which go to the operator.
- » Lisbon: reduction of costs in diesel, in vehicle maintenance, and in administrative management costs; efficiency and effectiveness gains of moving to a shared fleet scheme. Payback period: 6-10 years.
- » Milan: revenues from usage fee. Payback period: 24 months (the data may vary, influenced by actual use).

Indication of pricing in Greenwich

Full annual subscription (monthly)	Flexi subscription (once off fee)
€4.70	€11.80
Charging fees	Charging fees
11c/min at 22kW	14c/min at 22kW
4c/min at 7.4kW	7c/min at 7.4kW

Indication of pricing in Lisbon

Not applicable

Indication of pricing in Milan

- » €6/hr user fee addresses all costs. This fee for the Sharing Cities cars was a discount from the €9/hr fee which the service provider usually charges.

*Conversion rate: £1 = €1.18

COMMON CHALLENGES AND RECOMMENDATIONS

PARKING PERMITS FOR FREE-FLOATING PROVIDERS CAN BE DIFFICULT TO OBTAIN

Using parking spots for free-floating providers means taking those spots out of circulation for private cars. This can be controversial and conflict with local regulations.

Political buy-in and involving stakeholders responsible for parking regulations at an early stage may help. Otherwise, opt for a non-free-floating model.



FAST-EVOLVING TECHNOLOGY HINDERING LONG-LASTING CONTRACTS

The technology of EVs, especially regarding autonomy, is evolving fast, for this reason a long-lasting contract with a supplier is not anymore an option and can make the whole process longer than anticipated.

If well anticipated, this will not have any consequence on the implementation of the scheme. Although, the municipality should pay attention to keep the contract flexible enough to adapt the fleet to new technologies.



GDPR COMPLIANCE

It is not always easy to collect and retrieve data from shared vehicles, as operators are not always willing to share this. This issue was amplified with the new GDPR rules.

The exchange of data should be part of the agreement set up in the initial contract with the operator.



FINANCIAL BARRIER

The costs of running the system and at the same time keeping the solution attractive for users can hamper the development of a financially viable scheme.

Partnerships with both charging network suppliers and operators can help to find a financial sustainability of the scheme.



ACCEPTANCE FROM THE PUBLIC

The installation of an EV sharing scheme with dedicated parking spot is made at the expense of parking space for conventional cars. Residents might not be in favour of this solution.

Incentives to present it as a good alternative in times where using a car in a city centre can be difficult (less parking spots). A right balance of regular parking space and parking dedicated to shared EVs must be found.



HIGH DATA COMMUNICATION COSTS

High costs of data sharing related to the smart parking features for EVs.

To reduce the costs of data sharing, it is crucial to ensure a WiFi or LoRaWAN connection.



CONSTANT ELECTRICITY SUPPLY

Smart parking must always be powered by electricity, at all times of the day.

Equipment is usually connected and installed on lampposts to avoid extra-infrastructure, which can lead to a technical limitation: for many cities, lampposts just receive electricity from the grid during the night or dark hours. Think forward in the procurement process to ensure the system has a sufficient autonomy.



INCREASED GRID DEMAND

There can be an increase of grid demand brought by new EVs in a city.

It is possible to implement a smart energy system that reduces peaks of demand and manage the charging solutions of vehicles according to the grid demand and production.

Bidirectional charging, using cars' batteries as a source of electricity can also be implemented.



VISUAL IMPACT OF CHARGING POINTS

EV stations and charging infrastructure are bulky and have a considerable visual impact. This led to lengthy approval processes involving stakeholders from the landscape, heritage and environmental departments of municipalities.

Involve all relevant departments early on so a solution can be found and will not hinder the process at a later stage.



VOLATILE LEGAL FRAMEWORK

A new market which has a volatile legal framework and can jeopardize the sustainability of the solution.

Dialogue with the relevant public local administration and the national level to avoid any legal change that would affect the business models' sustainability.



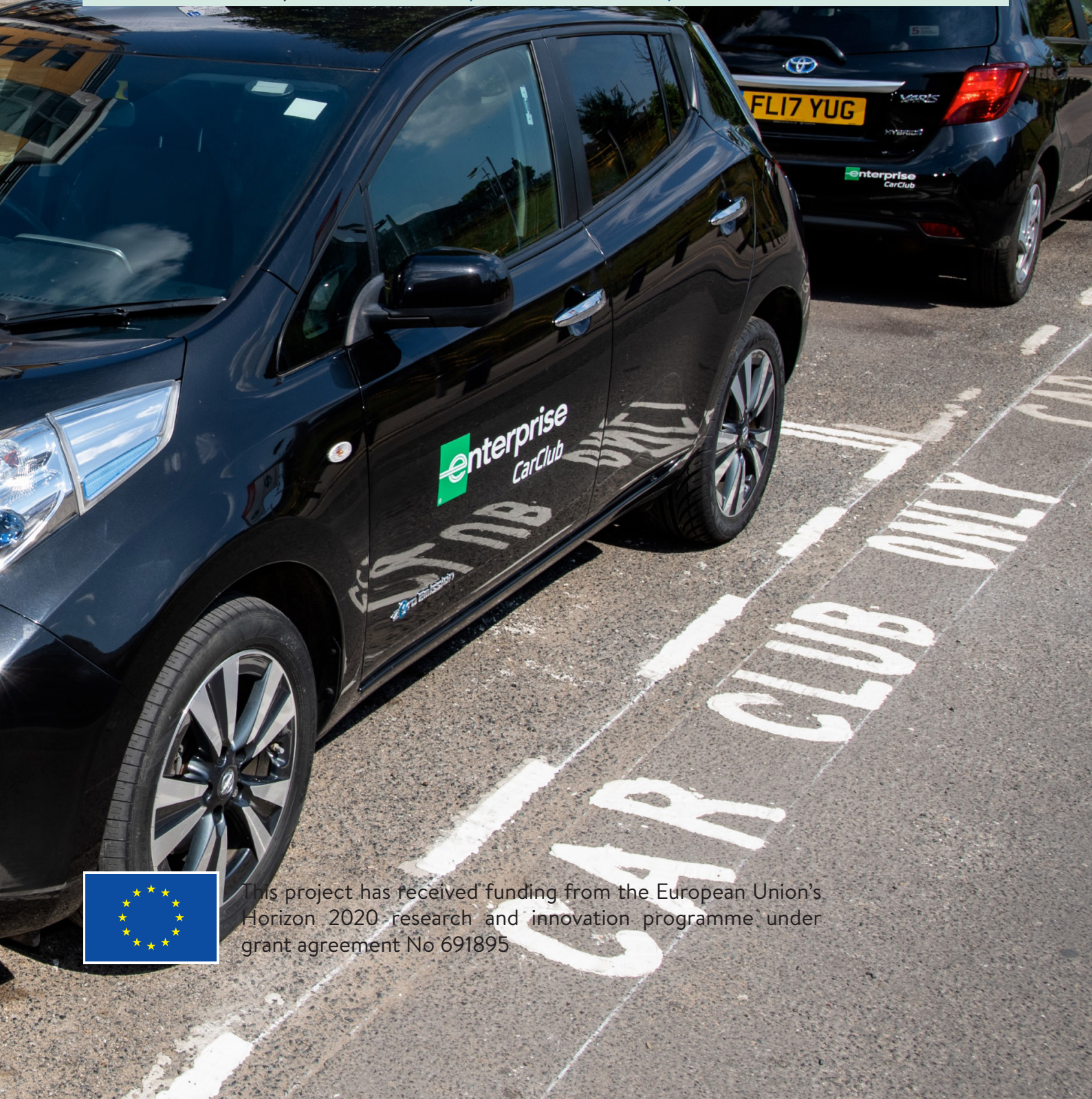
About Sharing Cities

Sharing Cities is a project to improve the lives of citizens across Europe, testing smart solutions for cleaner, more efficient cities. New systems for urban energy management, building retrofit, e-mobility and smart lampposts are cutting carbon emissions in cities as well as making everyday life more affordable, comfortable and convenient for residents. Sharing Cities is testing and evaluating these smart city solutions together with citizens and creating channels to make them more affordable and better tailored to cities' needs. They are doing this through fostering international collaboration between cities and the private sector.

Additional information on Sharing Cities can be found on the website: <http://www.sharingcities.eu>

More information

Additional information and guidance about other smart cities projects can be found on the Smart Cities Information System's website: <https://smartcities-infosystem.eu/solutionbooklets>



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