# GrowSmarter
*Transforming cities for a smart, sustainable Europe*

## FACTSHEET

# Smart taxi stand system
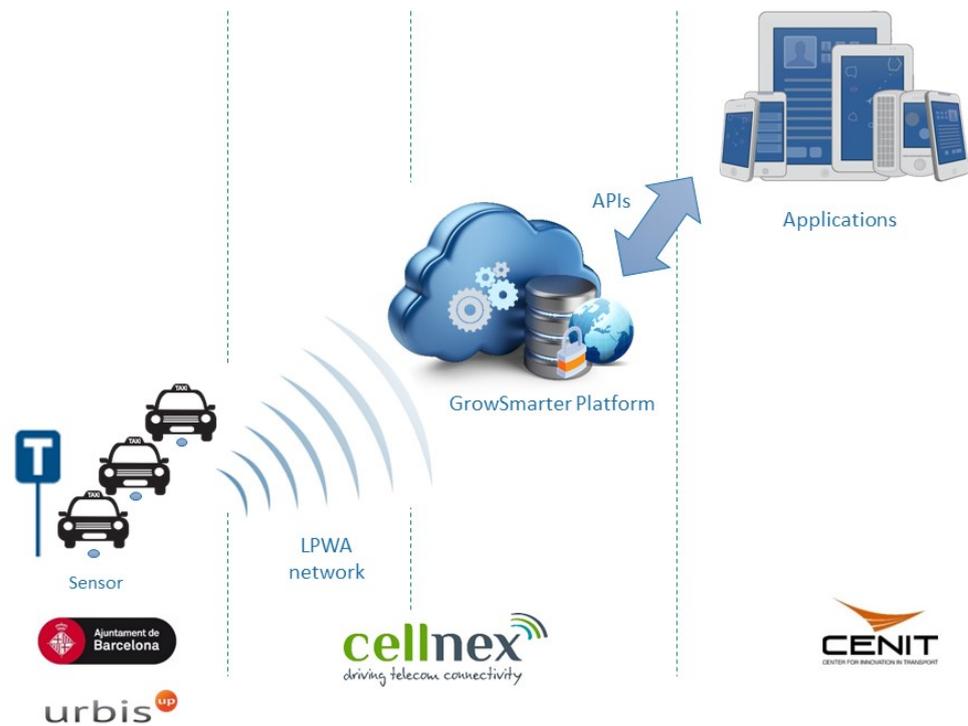
SMART SOLUTION 12: SMART MOBILITY SOLUTIONS



*Figure 1: Car-sharing e-charging station*

## SUSTAINABLE URBAN MOBILITY

- The system will provide taxi drivers and taxi clients with real time information about taxi availability at each taxi stand through a mobile app.

  The solution will reduce vacant mileage, reducing CO2 emissions and traffic congestion in the city.

- The solution will allow easy identification of the closest stand with available taxis, increasing the efficiency of the system.

## Barcelona

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## What is the solution?

The solution consists of the monitoring of three taxi stands in the city of Barcelona in order to provide valuable information to both taxi drivers and users of their services. Through the installation of parking sensors in the taxi stands and their connection to the GrowSmarter data platform it will be possible to develop an app which shows the availability of taxis in real time.

This will enable taxi drivers to head to empty stands, or to drive to those with the highest demand. The information provided by this pilot will allow an evaluation of whether a full implementation in the city is feasible.

From the client point of view, the towards the stands with the highest number of taxis and increase the possibility of taking one.

## How does it work?

In order to remotely monitor the availability of taxis, different technical solutions were analysed. The chosen solution consists of the deployment, along the taxi stands, of sensors that monitor the occupancy of the parking slots. These sensors are embedded in the road pavement and use wireless LPWA (Low Power Wide Area) technology to send data to the GrowSmarter platform. LPWA technology requires very little energy to work, meaning the batteries last for years.

Different strategies have been considered according to the type of the taxi stand. These include parallel or angled/perpendicular parking. Theoretically, the best option would be to install a sensor at each parking slot.

However, when the taxi stand is a parallel type, in which taxis move forward on a "first in first out" basis, a mo re complex strategy is required. The latter would entail placing one sensor every two meters and processing this data with algorithms to define the occupancy level of the stand.
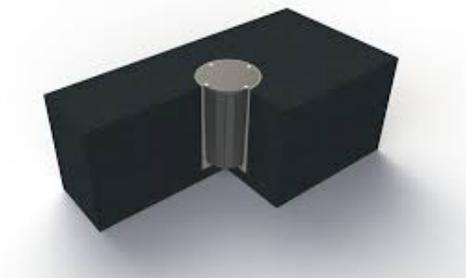


*The sensor embedded in the road pavement*

The LPWA wireless network will be used to ensure the sensors remain connected, more specifically the SIGFOX solution which has been designed for the IoT (Internet of Things) connectivity. The SIGFOX solution was selected because it fulfils the requirements of this measure such as low power consumption, coverage range and minimization of interference.

The three taxi stands which will be hosting this Smart Taxi Pilot in the Sant Martí district have been selected according to the requirements of the Taxi Institute and the network coverage to ensure unbroken communication with the sensors. In addition, two different typologies of taxi stands are represented in the selected taxi parking lots: parallel parking and angled/perpendicular parking. This will enable different types of taxi stands to be monitored show that all are secure and reliable.
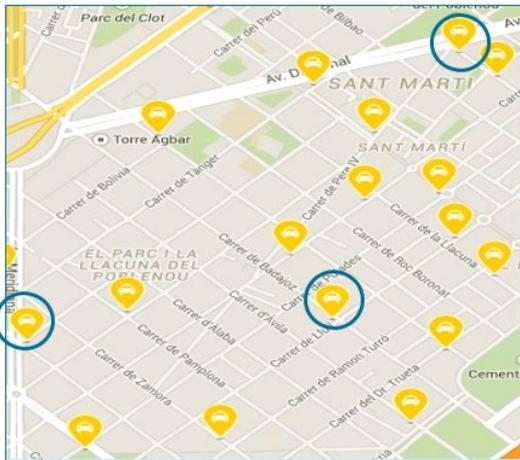
*Three taxi stands will host the measure*

Parking data will be collected and managed by the GrowSmarter platform, and applications will use standard application programming interfaces (APIs) to access and display the information hosted by the platform.

The Smart Taxi Pilot will provide an application which will be linked to the official app of the Taxi Institute of the metropolitan area of Barcelona for both types of end-users taxi drivers and taxi users (citizens, tourists, etc.)

The app will provide information on the number of taxis available at each stand as well as the rotation of taxis per time unit and waiting time. This information will be accessible to anyone with a smartphone, including taxi drivers and passengers.

## Expected Impacts

The solution brings the following impacts to the city in terms of the key GrowSmarter objectives:

- Mileage reduction of empty taxis stands in the city

- Reduction of traffic congestion thanks to the reduction of empty taxis seeking for clients

- Reduction of emissions in the urban area

- Provision of information to taxi drivers which enables them to increase efficiency and save costs

- Information is given to potential taxi clients of the availability of taxis at taxi stands

- Introduction of a new strategy to increase the use of taxi stands

## Potential for replication

This solution can be replicable in any city seeking to reduce empty mileage of taxis and to increase the use of taxi stands. The technological solution is available on the market, relatively inexpensive and easy to install. A barrier to the installation of this solution is the lack of LPWA network coverage.

The use of the GrowSmarter platform avoids technological dependencies on vertically oriented smart parking solutions, enabling scalability and replication in any other venues.