Shared electric mobility in Lyon-Confluence

Deliverable D3.5.1
Version 2

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# Revision Chart and History Log

## Versions

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Glossary

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EXECUTIVE SUMMARY

This document describes sustainable mobility solutions deployed in the Lyon-Confluence area within SMARTER TOGETHER (the autonomous driverless electric shuttle “Navly”, and the electric vehicles charging stations “Bluely” and “CNR”), and its connection to the Lyon Metropolis’ smart city strategy, and the zero carbon action plan for the Lyon-Confluence area.

The features of the sustainable mobility in the Lyon-Confluence area are:

▪ partly an evolution from a previous experimentation (the electric vehicles car-sharing system SunMoov)
▪ partly a new experimentation (Navly).

The topics treated in this document concern shared electric mobility, data collection and data management by the city, public and private collaboration for designing and operating transportation modes, and business models.

This report also raises possible evolutions of the electric mobility solutions tested in the Lyon-Confluence area.
1. The zero emission transportation within the Smart City Strategy of the Lyon Metropolis

1.1. The Smart City Strategy of the Lyon Metropolis

Lyon Metropolis began its smart city initiative in 2011 (http://www.business.greaterlyon.com/smart-city-lyon-process-47.html), to improve the overall welfare for its citizens by using new information and communication technologies. With a population that has grown by 10% over the past 10 years, finding new solutions to improve living conditions, preserve resources, energy and the environment, reduce air and noise pollution, traffic, accidents and congestion while stimulating economic growth were the fundamental objectives.

Lyon Metropolis seeks to implement smart city solutions to reduce the use of conventional cars and conventional fuels, and to set up the conditions for a successful long-term operation of an electric-vehicles car sharing system. With SMARTER TOGETHER, the Lyon Metropolis continues to develop and improve solutions of sustainable mobility in the Lyon Confluence area, with shared electric transportation systems contributing to reduce the environmental impacts of the city.

Strongly supporting Lyon Metropolis’ ambitious energy management policy, the smart city transportation project sought to help reduce congestion and achieve carbon free transportation methods, to shift excessive use of individual car to public transport and other means of transportation.

The Lyon Metropolis’ Smart City initiative received a dramatic boost with the “Lyon Smart community” project, a joint initiative by Lyon Metropole and the Nedo (a Japanese public R&D organisation addressing energy and global environmental problems, and enhancing industrial technology). The latter invested, between 2011 and 2016, 50M€ in the Lyon-Confluence area to test Japanese technologies and smart city solutions in Lyon for buildings, mobility, energy production and data management. Several partners were involved of the Lyon Smart Community Consortium, including for the mobility-related topics: the Lyon Metropolis, the SPL Lyon Confluence, Toshiba, Proxiway/Transdev.
1.2. The Lyon Metropolis Urban Pass

The Lyon Metropolis “Urban Pass” is a unique means of payment for all kinds of public transport systems (bus, tram, metro, regional bus, regional train, etc.) in order to facilitate and improve the use of the different mobility services including EV car sharing services, public transports,

**From March 2016 to early 2017.** Lyon Metropolis, Sytral (Public transport operator), City of Lyon, LPA (public parking operator, also in charge of shared mobility services), Vélo’V (bike sharing program), Bluely, Tourism Office and cultural facilities (museum, stadium,) worked together on the definition of the service offer and the busyness model of the Urban City pass. Marketing studies have been carry out in parallel of the technical deployment of the IT platform. Those studies were the first step before the public experimentation phase that will be led by TUBA (Lyon Metropolis Living Lab).

**Next Step, 2018**
Phase 1: Experimentation on a focus group of 300 volunteers from January to June 2018.

Phase 2: Experimentation on a focus group of 4000 volunteers from September to December 2018

Phase 3: Launching on Metropolis scale 50 000 users Jan 2019
1.3. The Lyon-Confluence urban project and zero emissions transportations

The Lyon-Confluence urban project takes place in the center of Lyon, in an area of 150 ha of redevelopment land. Once the whole urban finished, it will double the size of Lyon City Center.

The Lyon-Confluence area is the setting of various experimental settings regarding environment and smart city; it is recognized since 2010 by the WWF (World Wide Fund for Nature) as the first French "sustainable neighbourhood". With the WWF sustainable action plan, the Lyon-Confluence area strives to become carbon neutral: the annual CO₂ emissions at the end of the urban project (around 2025-2030) must not be superior to the annual CO₂ emissions at the beginning of the project (in 2000). This implies to find solutions to balance production and consumption from renewable energy sources.

The neighbourhood integrates a multi-modal platform that provides various modes of public transports operated by public and private partners: subway, tramway, buses, train, a hybrid (fuel and electricity) water shuttle, bike-sharing system. The features of the sustainable mobility developed within SMARTER TOGETHER are complementing the already existing offer with electric-vehicles charging stands (Bluely and CNR), and an electric autonomous driverless shuttle (Navly).

Figure 1: The Lyon-Confluence area (credits: SPL Lyon Confluence)
2. Features of the shared electric mobility in the Lyon-Confluence area

On top of the existing means of transportation in the Lyon-Confluence area (tramway, bike-sharing system, bus, subway, water shuttle), several electric shared transportation systems have been and are experimented in the Lyon-Confluence area:

- a zero emission electric vehicle sharing service: SunMoov (between 2013 and 2015), then Bluely and CNR charging stands
- an autonomous driverless electric shuttle: Navly.

2.1. Electric vehicles charging stations: from SunMoov to Bluely and CNR

2.1.1. Lessons learnt from a previous electric car-sharing project: SunMoov

“SunMoov”, a first zero emission car sharing service, was conceived within the Lyon Smart community project (see 1.1). Inhabitants and companies could subscribe to use 30 solar powered shared vehicles parked on 6 charging stations within the Lyon Confluence district (3 normal charging stand and 3 fast-charging stands). The SunMoov fleet consisted in 30 electric vehicles (Mitsubishi, Peugeot, Citroën).

Figure 2: The 6 SunMoov stations (credits: Lyon Metropolis)
The SunMoov experimental project began in October 2013, and lasted until December 2015 (when the Lyon Metropolis decided to stop the experimentation). The SunMoov service offer exceeded demand and lacked flexibility. Indeed, the vehicles were operating within a closed loop, whereupon users needed to pick up and drop off vehicles with the confines of the Lyon Confluence area only. The technology was not flexible enough, and the business model was not sustainable.

However, in Lyon-Confluence, the resident subscribers to the SunMoov service (in proportion to the number of inhabitants) were superior to all other data on car sharing programs in Lyon. Given this positive response to the use of shared electric-vehicles solutions, it has been decided to benefit from the SMARTER TOGETHER project to develop new electric-car services in the Lyon-Confluence, by adapting the former SunMoov system.
2.1.2. Deployment of an electric car-sharing system at a broader scale: Bluely and CNR

The electric-car sharing service “Bluely” was launched by the Bolloré corporation in October 2013 in several cities that are part of the Lyon Metropolis. It represents 50 charging stations, with a fleet of 150 cars, each able to carry up to 4 passengers with an autonomy of 250 km. This service is accessible with a weekly, monthly or annual fee. The Bluely electric car sharing system consists in a fleet of Bluely vehicles and Bluely charging stations. However, part of the Bluely charging stands are also accessible to both Bluely and non-Bluely vehicles. Bluely is now operated in Lyon, Villeurbanne, Champagne-au-Mont-d’Or, Bron, Caluire et Cuire, Ecully, Sainte-Foy-lès-Lyon, Tassin-la-Demi-Lune, Vaulx-en-Velin and Vénissieux. Since its launch, the first results of Bluely implementation in the territory of the Lyon Metropolis are:

- 4,100 subscribers
- 1,350,000 Km travelled
- 215,000 rentals
- an average rental span of 30 minutes and 6 Km
- an average of 2,2 people per vehicle and per rental (superior to the average vehicle occupation; this implies more people are car-pooling)

The CNR charging stations for electric cars are operated by the Compagnie Nationale du Rhône. The service is different from Bluely. Indeed, there is no CNR electric vehicles fleet linked to the CNR charging stations. The CNR charging stands are usable by any type of electric cars. To this day, the CNR has operated 5 stations in the territory of the Lyon Metropolis, in different cities: Ecully, Givors, Lyon (Lyon-Confluence & the Edouard Herriot Harbour), and Rillieux.
In the Lyon-Confluence area, different solutions have been implemented within SMARTER TOGETHER using infrastructure from former solar powered shared electric-vehicles (SunMoov):

- 3 former SunMoov stations have been converted into one way electric-car sharing stations with a total of 16 slots and 16 vehicles operated by Bluely using renewable energy from the CNR Company (hydroelectricity, solar and wind power). The three new Bluely stations are all in operation since November 2016.
- 1 former SunMoov station has been shifted to a charging station with 3 quick chargers, operated by CNR, using renewable energy from CNR. One charger is in use, whereas the two others will begin service in February 2017.
- 2 former SunMoov stations have been closed.

Figure 5: The 6 former SunMoov stations and what they have become (credits: Lyon Metropolis)
Figure 6: The CNR station “Ravat” (credits: SPL Lyon Confluence)

Figure 7: The Bluely station “Musée des Confluences” (credits: SPL Lyon Confluence)
Figure 8: The Bluely station “Suchet” (credits: SPL Lyon Confluence)

Figure 9: The Bluely station “Patinoire” (credits: SPL Lyon Confluence)
2.2. Electric driverless autonomous shuttle: Navly

Navly, a complimentary zero-emission project began a one-year experimental period in Lyon Confluence in September 2016. The aim of the Navly experimentation is to provide an effective and sustainable transportation mode for “first and last-kilometre” travel.

Two “Navly shuttles” (electric driverless and fully autonomous vehicles) can, each one, carry up to 15 passengers on a 1.3 km itinerary (with 5 stops), free from dedicated infrastructures, road lights, crosswalks and intersections. The average speed is around 11.5 Km/hour and the round trip (2.6 Km) takes around 13 minutes.

The Navly vehicles are fully connected, equipped with sensors to interact with its surroundings. Directly linked to public transportation, and starting at a large retail facility, Navly serves retail, business and tourist destinations along the Saône River.

For the moment, the Navly service is operating from Monday to Friday, between 7:30 am to 7:00 pm (except public holidays). The frequency of passage of the shuttle is every 10 minutes in peak hours (morning, noon, evening) and every 20 minutes the rest of the day.

The partners involved in the implementation of Navly are Lyon Metropolis, Sytral (public transportation authority), Keolis (public transportation operator), Navya (the company that developed the vehicle) and the SPL Lyon Confluence (urban developer of the neighbourhood).

Observations since the launch of Navly:
- 200 passengers transported per day.
- A majority of passengers during lunch time (when employees travel to large retail complex for shopping and restaurants), and in the afternoon (tourists and families).
- Technician based on vehicle answers passenger queries.
- Excellent international visibility with delegations visiting weekly, which contribute to the business development of Navya. The company is already commercializing its services in various locations (United States, Asia, and Oceania).
- Some technical issues to resolve on sudden stop (when vehicle detects an obstacle).
Figure 10: The Navly electric shuttle (credits: SPL Lyon Confluence)

Figure 11: The Navly route along the Saône River (credits: Navya Technology)
Figure 12: The Navly electric shuttle (credits: SPL Lyon Confluence)
2.3. Electric Mobility and data

For the different electric shared mobility services experimented in the Lyon-Confluence area within SMARTER TOGETHER, data about usage and energy consumption will be collected via smart meters to the Lyon Metropolis’ data platform (www.datagrandlyon.com). The CMS (Community Management System developed in the task T3.4. “Integrated Infrastructure and connected district” of the Lyon Lighthouse Project) will be used to visualise the energy and mobility data collected in the Lyon-Confluence area on the Lyon metropolis’s data platform. This will provide information to assess the electric mobility services (regarding energy consumptions and conditions of use), and to improve these transportation means and the conditions of the replication.

At this stage of advancement of the project, it is planned to gather the following mobility raw data (to be confirmed in the coming months, once the feasibility of the data transfer will be effective and confirmed):

- CNR and Bluely charging stations: number of electric vehicles charges at the station, number of vehicles using the charging station, energy provided by CNR to the vehicles, electric consumption of the station
- Navly: number of electric charges of the Navly shuttles, number of cycles of operations (i.e. number of round trips of each shuttle), distance travelled by each shuttle, number of passengers carried by the shuttles, electric consumption of the Navly charging station.

Based on this, at this stage of the advancement (and with the expected raw mobility data to be collected), it is planned to calculate the following mobility data:

- Average number of kilometres travelled by a vehicle using CNR charging stations
- Average number of kilometres travelled by a vehicle using Bluely charging stations
- Estimation of the contribution of Bluely charging stations to the reduction of CO₂ emissions.
- Estimation of the contribution of CNR charging stations to the reduction of CO₂ emissions.
- Estimation of the contribution of Navly to the reduction of CO₂ emissions.
2.4. Electric Mobility and business models

So far, the use of the Navly service is free of charge for the users. The experimentation phase is mainly devoted to fine-tune the technical aspects of operation of the autonomous (driverless) electric shuttles. The findings of a proper business model for the operation of Navly will be precised at a latter stage, when possible extension of the route will be confirmed.

To use Bluely services (Bluely vehicles and Bluely charging stations), the user has to pay. However, so far, the Bluely company has not found a self-sufficient business model for its services.

The CNR charging stations (opened to any type of electric cars) have been installed recently and there is still a lack of evaluation to confirm or adapt the business model.

With the generalisation of the shared electric mobility services in the Lyon Metropolis, it will be assessed in the coming years at which conditions the shared electric mobility can have a proper business model.
3. Future projects about electric mobility in the Lyon-Confluence area

Depending on the results of the electric mobility experimentations on the Lyon-Confluence area, here is, to this day, possible adaptations and improvements of the services to better meet users’ needs for Navly, Bluely and CNR charging stations. They are still to be confirmed by the operators and the Lyon Metropolis.

3.1.1. Navly

By the end of the first year demonstration period, it is currently in reflection:

▪ to extend the Navly operating hours in the evening (7:00 pm to 9:00 pm) and on Saturdays.
▪ to extend the route of Navly, from the retail facility to the Perrache rail station (which plays also an important role for the connections between different public transportation modes: tramway, subway, buses…).

In that case, this deployment phase would involve a circulation of the autonomous shuttles on public roads within regular traffic. Therefore, it will be necessary to adapt the road and software infrastructures (platforms, traffic lanes, traffic lights, road signs) to allow crossing and interaction between the Navly shuttles and the other transportation modes (trucks, cars, bikes, tramway, buses).

This second phase of experimentation will also require a special legal dispensation. Indeed, to this day, the French regulation forbids the circulation of autonomous public transport vehicles on public roads opened to cars. It is only allowed:

▪ either on public roads with no access to cars (and no crossing of roads opened to cars),
▪ either on private roads with or without access to cars (such as industrial sites, amusement parks, etc…).

3.1.2. Bluely and CNR charging stations

Depending on the results of the Bluely and CNR experimentation, and in close connection with the mobility policy of the Lyon Metropolis in the rest of its territory, it will be assessed if it is relevant to:

▪ increase the number of charging stands (and/or charging points) in the Lyon-Confluence area.
▪ modify the conditions of use and the price for the users of these services.