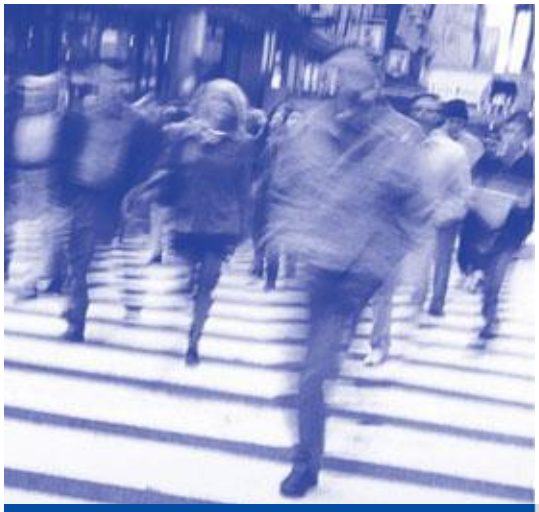

CIVITAS 2020
Cleaner and better transport in cities

DESTINATIONS

Measure Evaluation Results

LPA 4.2 – Fast Charging EV

Project Acronym:	DESTINATIONS
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Executive Summary

The CIVITAS DESTINATIONS project supported Sagulpa, the managing entity for parking in Las Palmas, in overcoming some of the existing barriers for the uptake of e-mobility in Las Palmas de Gran Canaria.

With the support of the DESTINATIONS project, it was possible to co-fund **6 new Electric Vehicle (EV) charging points** to boost the visibility of public recharging, and therefore to encourage existing drivers of combustion cars to switch to electric alternatives. These EV charging points were supplied by a local company (*Microeólica Canarias SL*) and were installed throughout the city (two EV chargers at each of the following parking facilities of Sagulpa: El Rincón, Subida de Mata, and Fast Park). The EV chargers are only available for Sagulpa's clients who do not pay a fee for using them.

Each of the EV charging points provides a power output of 7kWh per phase, which typically fully charges an EV in 3-4 hours. Their location was decided by taking into account the electric power availability at Sagulpa's parking facilities.

The project also supported the transition to public electrified fleets by **co-funding 3 electric vans** that replaced the previous diesel van fleet. These e-vans (Nissan ENV200) are being used in the daily operations of Sagulpa's staff (parking management enforcement, maintenance of parking facilities, etc.).

After the project, Sagulpa remained in contact with some key stakeholders in order to continuously improve the EV charging network in Las Palmas de Gran Canaria. Sagulpa involved representatives of the association of EV users (*Asociación de Usuarios de Vehículos Eléctricos*, https://www.auve.org/) in the key steps of the decision-making process regarding updating the business model, enlargement of the EV charging network, etc.

This enlargement and improvement of the EV charging network awoke the interest of key local stakeholders such as local authorised EV dealers and rental car companies, with which Sagulpa maintained contact. This encouraged new synergies such as the mobility island that Sagulpa implemented in 2019 in partnership with Nissan.

This measure contributed to savings in energy consumption and CO_2 emissions, thanks to the provision of e-charging points for citizens and the substitution of gasoline-fuelled vans by electric ones in Sagulpa's fleet. Overall, the savings in fuel and CO_2 emissions during the period of measurement (2019) were 68,343 litres of gasoline and 90.7 tons of CO_2. Moreover, this measure also contributed to the reduction of noise levels in the city.

These savings were calculated following a methodology that compared fuel consumption and CO2 emissions of a diesel-fuelled car traveling the same number of kilometres to the electric vehicles. In the case of the electric vans, the CO_2 emissions and litres of diesel consumed were monitored by the company (Sagulpa). In the case of the e-charging points, the company monitored the kWh charged in each facility, and these were converted into kilometres. The savings were obtained by comparing the theoretical consumption of diesel-fuelled cars with the consumption of electric vehicles travelling the same distance (the total kilometres that can be travelled with the kWh recharged at these points).

A Description

Before the implementation of this measure, Las Palmas de Gran Canaria had 3 fast charging points in one of its public parking facilities. There was a need to offer more e-charging points in public parking facilities around the whole city, so they could be available to more citizens. The main beneficiaries were the owners of electric vehicles, but the visibility of public recharging encourages current drivers of combustion cars to switch to electric alternatives.

Figure 1: EV chargers at the Muelle de Sanapú parking facility

Sagulpa has implemented 6 charging points in their public parking facilities, co-funded by the CIVITAS DESTINATIONS project. These EV charging points were installed inside several parking facilities throughout the city and they are only available for Sagulpa's, clients who do not pay a fee for using them. Each provides a power output of 7kWh per phase, which typically fully charges an EV in 3-4 hours.

Figure 2: Detail of one of the e-vans of Sagulpa's fleet

The project also supported Sagulpa with the transition to electrified public fleets, by co-funding 3 electric vans which replaced the previous diesel van fleet. These e-vans (Nissan ENV200) are being used for the daily operations of Sagulpa's staff (parking management enforcement, maintenance of parking facilities, etc.).

A1 Objectives and outputs

City policy level objectives

- Promotion of sustainable mobility among citizens and visitors

Measure specific objectives

- Increase the use of electric vehicles
- Introduction of new e-mobility technologies
- Raise awareness amongst citizens about sustainable mobility benefits
- Increase awareness among visitors about sustainable mobility options
- Widely share and communicate the sustainable mobility experiences and outcomes with citizens and key local stakeholders
- Shift tourists' travel behaviour towards more sustainable modes

Outputs

- 6 electric charging points
- Advertising and publicity campaign to increase awareness of the new e-charging points among citizens in the city
- 3 electric mini-vans for Sagulpa
- 1 public on-street fast electric charging point installed and paid for by Nissan, available 24-hours a day. The enlargement and improvement of the EV chargers network awoke the interest of key local stakeholders such as local EV authorised dealers (Nissan in this case)[1]

Supporting activities

In the framework of this measure, Sagulpa also organised an event for private operators to explain the available technologies for fast charging points, in order to encourage them to install charging points as well.

It was also important to carry out a promotional campaign in order to obtain the maximum benefit from the measure. In Las Palmas, the following actions have been carried out within the campaign:

- Promotional campaign through videos on social media platforms and in groups or associations of electric vehicles, with the intention of increasing the use of the electric vehicle
- Communication and promotional campaigns to promote the electric vehicle. These vehicles and the recharging points were shown at thematic trade fairs
- Sharing of a video on social media in order to teach customers the right way of using e-chargers, to show the procedure of plugging the e-car into the charging station
- Daily posting of publications on the public parking company's social media
- Promotion of the service at sustainable mobility trade fairs
- Involvement in electric car associations, where relevant information may be shared among members

Under the promotion campaign, special attention has been paid to car rental companies in order to encourage them to include EV's in their fleets and to promote the existing fast charging infrastructure among their clients.

A2 Inter-relationship with other measures

This measure is related to the measure *LPA 3.1 - Attractive, safe and accessible public space at major attractions* as one of the fast-charging points has been implemented in the Laboratory Area. Moreover, this measure has also been affected by the implementation of a new parking management scheme by the Municipality of Las Palmas de Gran Canaria.

[1] *Extra-output during DESTINATIONS funded by other financial instruments*

A3 Target groups and/or affected part of the city or region

The installation of fast charging points for electric vehicles in Sagulpa's public parking lots benefits the whole city of Las Palmas de Gran Canaria as they are located throughout the city.

Regarding the target groups affected, at first sight, the beneficiaries are the owners of electric vehicles, but the visibility of public recharging can encourage existing drivers of combustion cars to switch to electric alternatives.

Tourists are not the main target group of this measure. However, as rental car companies are replacing their conventionally-fuelled cars for environmentally-friendly fleets (hybrid, electric, etc.) they would become a key target group in the coming years.

In addition, the fact that Sagulpa purchased 3 electric vans for their fleet could encourage other local companies to do so.

A4 Stakeholders: CIVITAS project partners and other important actors

Stakeholder name	Activities description
AUVA – Asociación de usuarios de vehículos eléctricos	To support Sagulpa in all dissemination activities about the benefits of electric mobility
Rental Car companies	
Car dealers	

Table 1: Stakeholder involvement

B Measure implementation

B1 Situation before CIVITAS

Before DESTINATIONS, Las Palmas de Gran Canaria had 3 fast charging points in one of its public parking facilities. However, the city had a need to offer more e-charging points throughout its territory, so more citizens could use them, and not concentrate all of them in only one parking facility.

Moreover, Sagulpa had only one electric van and a Twizy within its fleet. The company needed more vehicles for its fleet and wanted to have a cleaner fleet, with the objective of having only electric vehicles in the future.

B2 Innovative aspects

The EV charging stations co-funded by the project provided an innovative added value to the city:

- **Possibility to define data-based policies**. The energy consumption is monitored on a regular basis and the data gathered is a valuable source for identifying charging patterns and assessing the behaviour of EV drivers (average charging time, peak and off-peak charging hours, type of vehicles that use the chargers, etc.). This information will be used to design the enlargement of the EV charging stations throughout the city.
- **Solar charging**. The EV charging station located at the *Muelle del Sanapú* parking facility is partially powered by solar panels (15% of the overall charging power). Sagulpa is assessing how solar charged EV stations could lead to a cost-effective solution for EV charging.
- **Public Private Partnerships (PPP)**. Sagulpa is collaborating with Nissan in the enlargement of the EV charging network in Las Palmas de Gran Canaria.

The e-vans that are part of Sagulpa's fleet have also provided innovative elements:

- **Lead by example**. The public electric fleet is showing the general public the benefits of transitioning to EVs.
- **Building a knowledge base**. Sagulpa is gaining experience with the full EV supply chain. This knowledge is being transferred to other public bodies of the Municipality of Las Palmas de Gran Canaria with the aim of a further EV adoption and stimulating green jobs in both the public and private sectors.

B3 Research and technology development

Sagulpa carried out market research before the acquisition of the e-charging points and the new e-vans.

B4 Actual implementation of the measure

The implementation plan of this measure took place between 2016 and 2018, and was divided into two phases. Between September 2016 and July 2016, Sagulpa received and installed the 6 e-charging points and purchased 3 electric vans for the substitution of the old conventional vehicles of its fleet.

Figure 3: EV chargers at the Muelle de Sanapú parking facility. Source: Sagulpa

Figure 4: e-van charging at the Muelle de Sanapú parking facility. Source: Sagulpa

The second phase consisted of the advertising and publicity campaign that Sagulpa carried out in order to publicise these measures. This took place over two years, between December 2016 and December 2018.

Figure 5: Promotional tweets from 2017 and 2018 on Sagulpa's twitter feed about the EV chargers

Following this, Sagulpa maintained contact with key stakeholders in order to continuously improve the EV charging network in Las Palmas de Gran Canaria, updating its business model and cooperating with local authorised EV dealers and rental car companies. For example, in 2019, another public on-street fast electric charging point was installed, initiated and paid for by Nissan. This shows that the enlargement and improvement of the EV charging network awoke the interest of key local stakeholders such as local authorised EV dealers.

C Impact evaluation

C1 Evaluation approach

Expected impacts and indicators

Impact category	Impact indicator	Unit of measure
Environment	1 – CO2 emissions reduction – electric vans	t/year
Environment	2 – CO2 emissions avoided – EV charging points	t/year
Energy	3 – Increased vehicle fuel efficiency – electric vans	Lt/year
Energy	4 – Vehicle fuel efficiency saved – EV charging points	Lt/year

Table 2: Expected impacts and indicators

Method of measurement

Impact indicator	Method *	Frequency			Target Group	Domain (demonstration area or city)
		Bef.	Dur.	After		
1 – CO2 emissions reduction – electric vans and 3 – Increased vehicle fuel efficiency – electric vans	E	2014-2016	n.a.	34	citizens / tourists	city
2 – CO2 emissions avoided – EV charging points and 4 – Vehicle fuel efficiency saved EV charging points	E	2014-2016	n.a.	34	citizens / tourists	city

* (Data collection (DC), Estimation (E), Survey (S)

Table 3: Method of measurement

Detailed description of the indicator methodologies:

- **(1) CO_2 emissions reduction – electric vans and (3) Increased vehicle fuel efficiency – electric vans**. The baseline considered the average of CO_2 emitted and the litres of diesel consumed per year, between 2014 and 2016 by Sagulpa's fleet. These values were provided by Sagulpa, who keeps track of litres of fuel consumed and kilometres travelled of its fleet, which were converted into CO_2 emissions, using a conversion factor. The ex-post value was the same, but for the period between 2017 and June 2019, when the diesel vans were substituted by electric vans, data was also provided by Salgulpa.
- **(2) CO_2 emissions avoided – EV charging points and (4) Vehicle fuel efficiency saved – EV charging points.** The ex-post value indicates the CO_2 that was not emitted and the litres of fuel that were not consumed thanks to the kWh charged at Sagulpa's EVs charging stations (savings) in 2019. Sagulpa provided the total kWh charged at each EV charging station in 2019. Using an average ratio of kWh consumed per kilometre in electric vehicles,

the total amount of kWh recharged at the stations was converted into kilometres. Then, using a ratio of the average consumption of fuel per kilometre, the “litres of fuel saved” value was obtained, and with it, the tons of CO2 emissions saved.

The Business-as-Usual scenario

Had this measure LPA 4.2 not been implemented, the CO_2 emitted and litres of fuel consumed by Sagulpa’s fleet would have remained the same, as the vehicles and estimated number of kilometres travelled remains more or less the same every year. Concerning the e-charging points, the business-as-usual scenario if they had not been installed is difficult to evaluate, but it can be assumed that the citizens would have been less likely to use electric cars if there was not a charging network available in the city.

C2 Measure results

Impact category	Impact indicator	Unit of measure	Baseline	Ex-Ante	Ex-Post
Environment	1 – CO2 emissions reduction – electric vans	t/year	15,87	14,28	9,42
Environment	2 – CO2 emissions avoided – EV charging points	t/year	-	53,19	66,65
Energy	3 – Increased vehicle fuel efficiency – electric vans	Lt/year	6.074	0	0
Energy	4 – Vehicle fuel efficiency saved gasoline – EV charging points	Lt/year	-	40.000	50.121

Table 4: Measure results

C2.1 Environment

1 – CO2 emissions reduction – electric vans

With the new electric vans, Sagulpa has increased the distance travelled by the fleet by 16%, with the corresponding greenhouse gas emission and fuel cost reduction. This increase in distance travelled was due to the progressive increase of work load in the company and also as the new vans experienced fewer maintenance problems.

Moreover, the company’s fuel expenses have been reduced (75%), as well as maintenance costs (71%), considering that the new vans are experiencing fewer breakdowns and maintenance problems than the older conventional vans. Sagulpa really values this aspect and the members of the staff are more satisfied with these new vehicles.

2 – CO2 emissions avoided – EV charging points

The installation of multiple EV charging points in different parking facilities of the city had a slightly higher than expected impact, and therefore, the tons of CO2 saved thanks to the kWh charged at these EV charging points has been 25% higher than expected in the ex-ante evaluation.

C2.2 Energy

3 – Increased vehicle fuel efficiency – Electric vans

Before the vans were substituted by electric vans, the 3 diesel-fuelled vans from Sagulpa's fleet consumed 18.222 litres of fuel in 3 years (and average of 6.074 litters per year). All those litres were saved once the vans were substituted by electric vans, which don't consume any fuel.

4 – Vehicle fuel efficiency saved gasoline – EV charging points

The installation of EV charging points had a slightly higher than expected impact, and, as with the CO2 emissions saved indicator, the kWh charged at these EV charging points resulted in savings of 50.121 litres of gasoline in two years, a value 25% higher than expected in the ex-ante evaluation.

In addition, this measure somehow had an impact on a common indicator that has been used to assess the overall performance of the project at a city level: **index (%) of people troubled by noise**. Unfortunately, it has not been possible to assess the direct impact of this measure on this indicator as its evolution is linked to several measures and it can only be calculated at a city level.[2]

This indirect impact on a common indicator (**index of people troubled by noise**) had the following evolution during the project lifetime:

Baseline (2016)	2019
95% > 55dB 37% > 65dB 1% > 75dB	69% > 55dB 13% > 65dB 0.05% > 75dB

Table 5: Noise perception before and after the implementation

[2] For more details regarding the cumulative effects under index of people troubled by noise indicator, see the "MER Introduction: Global Executive Summary and Common Indicators" document

C3 Quantifiable targets

No	Target	Rating
1	Increase of about 10% in electric vehicles after installing fast charging points in 6 public parking	***
2	Less emissions / increased air quality and less energy consumption	***
NA = Not Assessed O = Not Achieved * = Substantially achieved (at least 50%) ** = Achieved in full * = Exceeded**		

Table 6: Assessment of quantifiable targets

Target 1 was Exceeded as the number of electric vehicles in the city of Las Palmas de Gran Canaria increased 207% between 2016 and 2019. In 2016 there were 1.036 EVs in the province of Las Palmas, and in 2019, the total number of EV was 4.181 (+207%). This period coincides with the CIVITAS DESTINATIONS project lifetime and therefore, with the time where the new fast e-charging points were installed (LPA 4.2). These new e-charging points increased the number of public facilities in the city where citizens can charge their electric cars, making it more accessible for citizens to access a charging point.

Target 2 was Exceeded. The implementation of this measure contributed to a reduction of energy consumption and emissions. Concerning the energy consumption, the e-vans saved an average of 6.074 litres of fuel every year, compared to the old vans; and the EV charging points helped to save 50.121 litres of gasoline per year. Concerning the emissions, the electric vans now emit 9,42 tons of CO2/year while the conventional ones emitted 15,87 tons of CO2/year (reduction of 40%), and the EV charging points help save 66,65 tons of CO2/year.

C4 Up-scaling of results

Up-scaling of results in the case of the e-vans in Sagulpa's fleet is not possible, as all vehicles were already substituted by electric ones, meaning there are not any additional gasoline-fuelled vehicles to be substituted. However, this measure of substituting conventional vehicles by electric ones could be adopted by other municipal fleets following the example of Sagulpa (e.g. garbage collection, local police, etc.).

Concerning the installation of more e-charging points in the city, the expected results could be similar to the ones obtained up to now with the 6 new e-chargers of measure LPA 4.2 (presented in section C2).

D Process Evaluation Findings

D1 Drivers

General social and transport trends such as the growth of EV deployment over the past ten years implied the need for more charging infrastructure. In this sense, Sagulpa's strategy to expand public EV charging faculties was completely aligned with other public bodies such as the regional government (*Cabildo de Gran Canaria*).

D2 Barriers

The main barrier for the implementation of the EV charging points has been the cost of the energy supply infrastructure. It is difficult to recover the investment in upgrading local grids and this discourages investment in that field. Some up-to-date innovative solutions such as smart charging would certainly decrease the need for reinforcements and upgrades of the electric grid, however this is not yet mature enough.

Another barrier for the further development of the EV charging network in Las Palmas de Gran Canaria has been the lack of a parking lot monetisation strategy which included charging for the electricity.

D3 Main Lessons Learned

If Sagulpa were able to repeat the introduction of new EV chargers, it would include a payment system into the charging devices from the beginning. Despite the business model (fees, memberships, etc.) being still under discussion, Sagulpa is fully aware that offering free charging leads to a lack of price transparency and is not an efficient use of public funds.

E Evaluation conclusions

This measure was implemented and evaluated on time and according to what was originally planned. During the CIVITAS DESTINATIONS project lifetime, there has been a growing interest in electric mobility. This can be seen from the total number of EVs in the province of Las Palmas, which had increased to 4,181 by the end of 2019, an extra 3,145 EVs (+207%) compared to the baseline situation (1,036 EVs in 2016). This has also resulted in a significant reduction in energy consumption and emissions.

Moreover, the charging network has undergone major improvements (+6 charging stations) during the project lifetime in Las Palmas de Gran Canaria.

F Additional information

F1 Appraisal of evaluation approach

As this measure includes two different actions, they had to be evaluated separately. The company had information about the consumption of its vehicles and about the demand of the EV charging points. This data was easily transformed into litres of fuel saved and therefore into emission savings.

F2 Future activities relating to the measure

The next step for further development of the EV charging infrastructure in Las Palmas de Gran Canaria will be the introduction of a payment system, but the business model is still under discussion.

Nowadays, the e-charging points are offered for free to the users, with the aim of promoting electric mobility. However, in the long term this leads to a lack of price transparency and a gift of public funds, and this is why a payment system will have to be introduced.