

2020
CiViTAS
Cleaner and better transport in cities

DESTINATIONS



Measure Evaluation Result

MAD 4.1 - Promote the uptake of clean vehicles by fleet operators

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Executive summary

In the Autonomous Region of Madeira (ARM), the transport sector is responsible for more than 50% of the total final energy demand. Within this scope, electric mobility represents itself an relevant way to improve energy efficiency, to raise the share of renewable energies and, therefore, to reduce energy dependence on fossil fuels and carbon dioxide emissions.

This measure aimed to promote electric mobility, to create incentive schemes for the purchase of electric vehicles (EV), to promote the expansion of the e-charging network, to launch an information platform about electric mobility, to develop a municipal regulation to promote EV and lastly to study electric transport impact in electricity production and use of renewable energy.

To achieve these objectives, AREAM (Regional Agency for the Energy and Environment in Madeira), had the support of the following local partners: HF (Horários do Funchal, the main public transport operator), CMF (Municipality of Funchal), SRETC (Regional Secretariat for Economy, Tourism and Culture), DRETT, (Economy and Land Transportation Authority), Municipalities, Regional Electricity Company (EEM), charging point operators, and finally private and public companies with transport fleets.

The implementation of the measure started with assessment works to identify the starting points concerning electric mobility, including problems and needs related to the expansion of the EV e-charging network. It followed the preparation of municipal regulation for e-charging points in new buildings, the promotion of the expansion of the electronic charging network and development of the Strategy for the Promotion of Electric Mobility in Madeira (Resolution of the Government Council No. 180/2017, of March 28, 2017). As a tangible result of these activities, 34 e-charging stations were installed in Madeira Island, of which 17 e-charging stations in municipal public domain.

To promote awareness of electric mobility among the general population and stakeholders, it was organized 5 raise awareness actions for the promotion of electric mobility, it was also conceived and produced a brochure to promote EV among the sector residential and business. It was also promoted the installation of e-charging stations in the tourism sector (accommodation, restaurants, shopping centres and airports) and the development four incentive schemes, including two joint procurement mechanisms for EV.

To the Campaign for Acquisition of EV in Madeira (CAEVM) and to raise awareness about electric mobility, one electric mobility information platform was developed. The platform includes material to unfold electric mobility, to provide the needed information to access the available incentives to promote electric mobility, including charging stations, types of accessibility for e-charging points for EV, installation of charging points and legislation on electric mobility.

To help to prepare the electric power grid for the future scenarios including the impact of electric mobility, it was developed one evaluation report about the impact of the EV in the Madeira Island electricity load diagram, taking in consideration the baseline situation of EV actually in circulation.

As result of these activities, 556 new light EV, in private and public fleets, were in circulation between January 2017 and December 2020, including three light EV owned by HF. At environmental level the activities implemented achieved a reduction of 1.276 t of CO₂, more 1.075 t than baseline, with an average reduction of 73% compared to the combustion vehicles that were replaced, with a reduction of 5.563 MWh in energy consumption, more 4.715 MWh

than baseline, with an average reduction of 83% compared to the combustion vehicles that were replaced.

The expected impacts and indicators, related to energy, environment, economy, society were assessed comparing the baseline data collected, before measures implementation, in 2016, with the Ex-post figures, after measures implementation, until December 2020. The evaluation performed the comparison between similar diesel vehicles, to estimate the energy, environmental and economic benefits of EV.

The measure took advantage from the integrated approach of the DESTINATIONS project, joining local, regional and national strategies to leverage EV promotion at higher level, to encourage the purchase of new EV. At political level, the vision of energy and mobility sustainability for the coming years appears as part of the political agenda. In addition, the National legal framework allowed to provide several financial benefits for citizens who intends to purchase EV. In parallel, the ongoing awareness campaigns to foster the use of bike and the introduction of bike sharing schemes, represented also a strong driver to reduce the car dependence.

On the other hand, at a cultural level, the social resistance to mobility habits change had a significant impact. Despite the awareness-raising campaigns and the like hood to change their transport habits, there was still strong resistance in acquiring clean vehicles and adopting sustainable mobility habits. In addition, other barriers have an important role on mobility options, in particular the hilly geography of the region discourages the use of bicycles. The high EV costs and the low interest of the beneficiaries also represented a significant obstacle to the implementation of a mobility change.

Given that in Funchal, there is still a considerable lack of knowledge and social resistance regarding sustainable mobility, it is important to put more efforts to inform and promote about such topic. More dedicated information and engagement campaigns involving residents and tourists can be important to achieve the objective of mobility transition to less pollutant transport modes. The political involvement plays an instrumental role in promoting the events in this measure.

This measure has a strong up-scaling chances after the CIVITAS DESTINATIONS project conclusion. The local partners can follow the methodology used during the Campaign for the acquisition of EV carried out by AREAM, making available discounted prices for the acquisition of EV.

A Description

This measure implemented an articulated and integrated list of actions to promote electric mobility. More in detail it: created incentive schemes for the purchase of EV, promoted the expansion of the e-charging network, created an information platform about electric mobility, promoted the creation of municipal regulation to EV promotion and the finally studied of the impact of electric transport in electricity production and use of renewable energy.

This measure also included the promotion of the expansion of the EV charging network in Madeira, by promoting, among local actors and citizens, the installation of fast and slow e-charging stations in public and private spaces. The e-charging network is accessible to customers, and employees especially in tourist accommodation units, restaurants, tourist attraction points, covered and open space car parks. In this regard, electric mobility was also promoted, through the elaboration of a regulation to be included in municipal legal framework of urbanization and construction, to install EV e-charging points in collective residential buildings and services.



Figure 1: Madeira Move public presentation

Specific and targeted activities were developed to promote incentive schemes and national funds, namely for the free charging of EV at public charging stations and for the promote the purchase of EV for public fleets, companies and citizens. To support the CAEVM, a platform online was developed, including electric mobility awareness campaign, incentives to promote electric mobility, charging stations, types of accessibility charging points for EV, installation of charging points and legislation on electric mobility, a specific section dedicated to e-mobility, provides information about the location of available e-charging points to support users of EV to improve battery management.

To promote awareness of electric mobility among the general population and stakeholders, it was organized awareness actions for the promotion of electric mobility, releasing informative brochures to promote EV among the sector residential and business and to promote the electric charging stations in the tourism sector (accommodation, restaurants, shopping centres and airports).

To help prepare the electric power grid for the future considering the impact of electric mobility, it was developed one evaluation report assessing the impact of the EV in the Madeira Island electricity load diagram (production and use of renewable energy) with the baseline situation of EV in circulation, based in estimate of EV consumption in Madeira through surveys addressed to EV users and traders.

HF also played a demonstrative role by substituting three diesel regular vehicles with three EV that were intensively circulating in Funchal and around the city working as perfect showcase to display how reliable EV are.

In this measure, AREAM had the support of local partners HF, CMF and SRETC, and mainly collaboration with DRETT, (Economy and Land Transportation Authority), Municipalities, Regional Electricity Company (EEM), charging point operators, private and public companies with fleets.

A1 Objectives and outputs

City policy level objectives

The measure is in line with the Regional Government Strategy for the promotion of Electric Mobility in Autonomous Region of Madeira, contributing for the acknowledgment of Madeira as green label tourist destination. The city policy level objectives are the following:

- Improve air quality and noise reduction in urban centres improving the quality of life, health and well-being of citizens and tourists;
- Reduction of transport related emissions;
- Reduction of fossil fuel dependency;
- Diversification of energy sources in transport sector including renewable energies;
- Promotion of sustainable alternatives to transport of people and goods.

Measure specific objectives

- Promotion of electric mobility;
- Creation of incentive schemes for EV purchase;
- Expansion of the e-charging network in Madeira;
- Creation of an information platform about electric mobility;
- Promote the creation of municipal regulation to EV promotion;
- Study of electric transport impact in electricity production and use of renewable energy.

Outputs¹

- 1 Evaluation report of the impact of the EV in the Madeira Island electricity load diagram;
- Participation in 5 awareness actions for the promotion of electric mobility;
- 1 electric mobility information platform;
- 4 incentive schemes for EV;
 - *1 incentive scheme for the free charging of EV at fast public e-charging stations was supported by Regional budget;
 - *1 incentive scheme named PRIME-RAM was supported by Regional budget to co-financed EV in Porto Santo Island (2019) and Madeira Region (2020);
 - 2 joint procurement mechanisms for EV acquisition, namely for companies and citizens (CAEVM);
- ** 34 Electrical charging public stations in Madeira Island, of which 17 installation of Electrical charging stations in municipal public domain;
 - 5 fast and 1 normal e-charging stations installed with Regional Electricity Company budget, through EMACOM;
 - 11 normal e-charging in Funchal installed with ERDF funds;
 - 6 normal e-charging with municipal budget;
 - 11 normal e-charging installed with private companies' budget.
- **18 normal e-charging stations in public administration buildings and facilities in other public entities were financed by national fund Fundo Ambiental (3 normal e-charging installed in HF);
- ** 556 new EV in private and public fleets;
 - 41 light EV were co-financed by Regional Government budget (PRIME-RAM 2019-Porto Santo island)

¹ *Extra-output with DESTINATIONS budget; **Extra-output during DESTINATIONS with other funds

- 221 light EV were co-financed by Regional Government budget (PRIME-RAM 2020-Madeira Region)
- 3 Light EV in HF were financed by national fund Fundo Ambiental;
- 20 Light EV in public administration buildings and facilities in other public entities were financed by national fund Fundo Ambiental.

Supporting activities

Within DESTINATIONS project the following activities were carried out aiming to increase the level of acceptance of citizens, stakeholders and decision makers:

- Regional Government strategy for the promotion of electric mobility in Autonomous Region of Madeira.
- Madeira Move Campaign (awareness raising campaign addressed to citizens and companies).
- One-week EV experiment with main members of Regional Government.
- Involvement of EV trade stakeholders.
- Dissemination of e-mobility among tourism stakeholders, companies and citizens.
- Participation in TV shows, news and newspapers.

A2 Inter-relationship with other measures

This measure had a tight relationship with the following measures:

- **MAD 2.1** - Sustainable Regional Mobility Plan (SRMP) - The strategic objectives of the SRMP are promote transport solutions that promote the competitiveness of the region, to promote low-carbon transport solutions through the use of more efficient technologies (EV) and implement solutions that offer economically and environmentally sustainable transport options to tourists.
SRMP includes measures to improve energy efficiency in the transport sector, namely renewal of the TP fleet with more efficient technologies, expansion of e-charging stations, renewal of public and private administration vehicle fleets and creation of reserved parking for EV.
- **MAD 5.1** - Urban Freight Solutions, with regard to promoting more efficient fleets in logistics plans, which include the use of EV in logistics operators' fleets, contributing to the reduction of polluting emissions and noise in urban centres, improving the quality of life of citizens and tourists.
- **MAD 7.1** - Electrical vehicles and clean fuels for public transport in urban and interurban fleets. The promotion of electric solutions was addressed in this measure to drive, in public transport operators, the transition from diesel engines to electric solutions.

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

The target groups that will be mostly affected by the measure are the private companies' fleets, public organization fleets, citizens and EV trade market stakeholders.

A4 Stakeholders: CIVITAS project partners and other important actors

Stakeholder name	Activities description
DRETT (Economy and Land Transportation Authority)	Regional authority and partner. Provide Information and awareness raising. Provide support in the acquisition of light EV through a national Fund.
Municipalities	Local authority and partner. Provide Information and awareness raising
Regional Electricity Company (EEM)	Electricity producer. Provide Information and awareness raising
Mobi-E	National e-charging network manager. Information and dissemination purposes. Responsible for the platforms dedicated to electric mobility
Charging point operators (ZEEV; Factor Energia; EMACOM)	Energy operator. Collaboration in the awareness raising. Provide information about the electric recharging spots
Rent-a-cars companies	Transport operator. Information and collaboration in the awareness raising
Taxi operators	Transport operator. Provide Information
ACIF (Chamber of commerce)	Commerce representative. Provide Information and dissemination
AITRAM (Taxi association)	Transport operator. Provide Information gathering and dissemination
Local traders (hotels, parking)	Involvement in e-charging points installation. Participate in the installation of e-charging stations for EV.
Private companies with fleets	Transport operator. Provide Information
Public companies with fleets	Transport operator. Provide Information

Table 1: Stakeholders involved and roles

B Measure implementation

B1 Situation before CIVITAS

In the Autonomous Region of Madeira, the transport sector is responsible for more than 50% of the final energy demand. The intensive use of private transport solutions, relying mainly on more polluting technologies, caused high level of pollutant emissions and noise during peak hours in urban centres. This situation leads to high fossil fuel dependency of the transport sector.

For those who wanted to buy an EV, they had to deal with a reduced e-charging network, composed by only 11 public e-charging points, in 5 locations. In addition, the e-charging points in residential and private service buildings were non-existent, garages in buildings were not equipped with e-charging points. Before DESTINATIONS, the electric option had little credibility by users, existing only around 100 EV in the region, the investment required with EV compared to conventional was very high and by then, the EV had limited battery life.

In addition to such hurdles, Madeira as outermost island, faces problems in the energy management of the electricity grid, with an unbalanced charge diagram of electricity production.

B2 Innovative aspects

The introduction of EV in transport sector contributed to ecotourism image in Madeira destination through the following innovative aspects:

- **Targeting specific user groups** – awareness raising actions targeted the rent-a-car, taxi services, private and public fleets to the benefits of the use of EV in daily services.
- **New economic instrument** - introduction of incentive schemes to EV acquisition in public and private fleets and citizens.
- **New policy instrument** – through the promotion of municipal regulation for electrical charging points in new buildings in the municipalities.
- **New physical infrastructure solution** – promotion of introduction of e-charging stations in Madeira Island, including in tourism sector (accommodation, restaurants, shopping centres and airport).

B3 Technology development

This measure carried out study of the impact of EV in energy consumption, energy mix (fuels and renewables), CO₂ emissions and impact in Madeira Island e-charging network and electricity load diagram. Despite not being a technological tool, this study is an important contribution to Regional Electricity Company (EEM) to prepare and adapt the electrical network to address the effect of the increasing number of running EV in Madeira Island.

B4 Actual implementation of the measure

The implementation of the measure started with assessment works to identify the starting point, including problems and needs for the expansion of the EV e-charging network and the preparation of municipal regulation for electrical charging points in new buildings. It was defined the technical specifications for the fast e-chargers and dissemination among stakeholders.

Strategy for the Promotion of Electric Mobility in Autonomous Region of Madeira

AREAM provided support to the development of the Strategy for Electric Mobility promotion in Madeira (Resolução do Concelho de Governo no 180/2017, de 28 de março 2017), which includes the action plan for 2020, such as, the acquisition of EV for public fleets and installation of the 6 new public fast e-charging stations and the study of its location. In May 2020, three new public fast e-charging were already installed.



Figure 2: Photo of the public event

Expanding e-charging network

AREAM provided technical support to DRETT (Economy and Land Transportation Authority) and CMF (Municipality of Funchal), as well as other stakeholders in order to expand the charging network in Madeira and Porto Santo Islands.

It was provided technical support to the Regional Government that installed 6 e-charging stations in Madeira Island public grid (5 public fast e-charging stations: Funchal, Ribeira Brava, Câmara de Lobos, São Vicente, Machico and 1 normal e-charging station: Estreito de Câmara de Lobos). To promote electric mobility in the Madeira Region, the use of public fast e-charging stations was free until 2020 with the support of the regional budget.



Figure 3: Photo of Machico fast e-charging

DRETT made contacts with stakeholders from accommodation, restaurants, airport and shopping centres to promote the installation of charging stations in tourism sector. CMF implemented a green tariff to outdoor parking slots, which allowed a free charge for EV and a 50% discount for hybrid vehicles. In addition, CMF proceeded with the installation of 11 normal e-charging stations throughout the municipality, near sought areas by residents and tourists, using additional budget (FEDER – Operational Programme M14-20), between 2019 and 2020, with the CMF assuming the costs of charging operating tax, EV users only pay the electricity consumed.

AREAM released normative information about the procedures to be adopted by the municipalities in the scope of the licensing of new constructions, the installation of charging stations in new households and service buildings. It was also installed 11 normal e-charging stations by private companies for clients use in shopping centres, restaurants, hotels and the airport and 6 e-charging with municipal budget in public domain. In total, 34 e-charging public stations were installed in Madeira with the support of DESTINATIONS. Additionally, in the scope of the environmental national fund (Fundo Ambiental) 18 normal e-charging stations were installed by public organizations in owns buildings and facilities, for private use of electric vehicles available under the national fund.

Promotion of e-mobility

In October 2017, it was organized an electric vehicle test drive for members of the Regional Government. The Regional government had the opportunity to experiment 5 EV in daily service trips for one week. After the demonstration, followed an energy performance evaluation, assessing also economic and environmental impacts of the electric mobility experience. It was estimated an energy saving of 983 kWh (78%), a reduction in carbon dioxide emissions of 213 kg (63%) and a €90 reduction in energy costs (72%), compared to the combustion vehicles. The demonstration also included the development of a survey, addressed to drivers, to evaluate the satisfaction with the use of EV. In general, there was a positive opinion about the use of EV despite the initial negative impression.



Figure 4: Brochure to promote electric mobility

In order to promote electric mobility in Madeira, several promotional activities took place. In September 2017, AREAM and DRETT launched two brochures addressed to about 137.500 households and private companies. Such brochures intended to promote EV among residential sector and companies, and to promote e-charging stations in tourism sector (accommodation, restaurants, shopping centres and airport).

DRETT developed and launched the MADEIRA MOVE campaign in all municipalities of the region in 2017. This activity included events promoting the use of the EV, more sustainable modes, and road safety, dedicated to the entire population with games targeted to children audience.

Complementarily, AREAM developed an online guidebook for Electric Mobility in Madeira launched in September 2020, under the campaign for the acquisition of EV for citizens and companies. The guidebook included information about electric mobility solutions, incentives for the electric mobility, charging stations in Madeira and Porto Santo, charging stations installation in households and electric mobility legislation, among other related issues.

Concerning the acquisition of EV in public fleets, AREAM supported three public organizations with a technical and economic feasibility study to assess the impact of the acquisition of EV. The idea was to support decision making during the renewal fleet circumstance. Besides all the information provided, relevant barriers remain to take the final purchase decision, namely the limited confidence on the technology and batteries, together with the higher investment price compared to fossil fuel solutions.

AREAM and DRETT participated in several initiatives on media to promote electromobility solutions.

Incentive schemes for electric vehicles acquisition

In order to promote the incentive scheme for EV acquisition in the public sector, AREAM analysed fleets used by three Regional Government entities, with the objective of assessing the possibility of introducing EV with a tailor-made fleet renewal process. Beside the objective of Regional Government to introduce 30% of EV in its fleet, it was identified, from stakeholders' side, some doubts and resistance regarding the use of EV, in what concerns the reliability of the technology and the higher investment needed. AREAM disseminated, among the regional

public services and public companies, the open call “1st and 2nd Phase of the Program of Support to Electric Mobility of the Public Administration”, financed by the national fund (Fundo Ambiental). The Programme finances up to 100% of the monthly renting/leasing cost of up to three vehicles per regional entity over a period of 48 months.

In July and December 2019, AREAM disseminated, among the 11 municipalities of Madeira, the open call "3rd Phase of the Program of Support to Electric Mobility of the Public Administration", financed by the national fund (Fundo Ambiental). The Programme financed up to 50% of the monthly renting/leasing cost of up to two vehicles per municipality over a period of 48 months.

In this scope the Program Supports Electric Mobility of the Public Administration, namely 5 entities were awarded the financing for 23 EV for four years. HF was one of the awarded entities, with three EV and charging stations.

PRIME-RAM incentive scheme

An incentive scheme addressed to Porto Santo Island, was created by Regional Government, to fund the acquisition of EV targeted to citizens and companies. To implement this objective, an Ordinance No. 434/2019 of 7 August was published, this framework regulates the incentive for Electric Mobility on Porto Santo Island, called “PRIME-RAM”. This initiative is aligned with the Sustainable Urban Mobility Action Plan of ARM and the “Porto Santo Sustentável - Smart Fossil Free Island” Project, with a budget of 400 thousand euros foreseen in the Region’s Budget for 2019 in which they were co-financed by Regional Government budget 41 light EV.

An incentive scheme addressed to Madeira Island, was created by Regional Government, to fund the acquisition of EV by citizens and companies. To implement this objective, Ordinance No. 110/2020 of 1 April was published, it regulates the incentive campaign for Electric Mobility on Madeira Region, called “PRIME-RAM” with a budget of 1 million euros foreseen in the Region’s Budget for 2020. Between April and December, 221 EV (139 in private and 82 in companies), 6 electric bikes and 22 electric bicycles were co-financed in € 999.200 by the Regional Government budget.

Campaign for acquisition of EV in private fleet

In September 2020, AREAM launched a Campaign for the acquisition of EV in private fleets and citizens in Madeira. This campaign disseminated information about electric mobility, environmental and economic benefits, and offered cheaper prices for EV acquisition. The campaign was planned to start in April 2020, but due to COVID 19 it was rescheduled for later on.

For the campaign, it was necessary to prepare the campaign regulation and the contract to be signed between the EV traders and AREAM. Meetings were held with local EV traders, presenting the objectives of the action, and inviting brands to submit special price proposals for the campaign. The six most important EV traders joined and offered special prices for 42 models of plug-in hybrid and 100% EV. An online platform (<http://ve.aream.pt>) was developed to support the campaign and promote sustainable electric mobility. During this campaign, beside the discounts in vehicles, beneficiaries could also benefit from the grant created by the Government



Figure 5: Photos of the campaign

to support the acquisition of EV by citizens and companies, PRIME-RAM.

During the campaign period, three talks were held on Facebook and YouTube, under three themes: “advent ages and myths of EV and plug-in hybrids”, “batteries and charging stations” and “the future of electric mobility”.

As part of the campaign and addressing a lack of preparation by the regional civil protection to intervene in road accidents involving EV, a training addressed to firefighters was held to explain the procedures during road accidents involving EV. The training was given by the National Firefighters’ School. 24 trainees were benefited, total of 16h of training.

AREAM’s campaign exceeded expectations regarding the participation of traders and the number of models of plug-in hybrid and 100% EV. Concerning vehicles sales, the outcomes were lower than expected, justified by the context of crisis and uncertainty caused by the pandemic. The campaign allowed to reach a wider audience through social media and the media, raising awareness and informing the population about advantages of joining electric mobility.

The registration number on the campaign website was 359, 278 private and 81 companies, with the intention of purchasing electric and hybrid vehicles and to know more about the available models in trade. This led to 478 contacts from dealers and 53 test drives. These figures reveal a relevant interest of consumers and companies in the electric mobility matter. Until November 2020, 13 EV were purchased generating about 409.000€ of revenue for traders.

During the month of the EV campaign, through of the several dissemination activities developed on social media and google the ads were displayed 376.977 times, resulted in 21.332 interactions, 18.009 clicks and 124 shares. The campaign website had about 7.606 visitors, of which 7.274 new visitors, with an average duration of 3,14 minutes per visit. The electric mobility webpage, which included the online guidebook for electric mobility in Madeira, had 1182 visitors.

Electric mobility information platform

A planned output of this measure was the creation of a platform regarding the location of available e-charging points to support users of EV. However, since the conception of the project, several dedicated platforms became available (Rede MOBI.E; Electromaps, PlugShare, Chargemap, GreenRace), and there was no need to create a new platform.

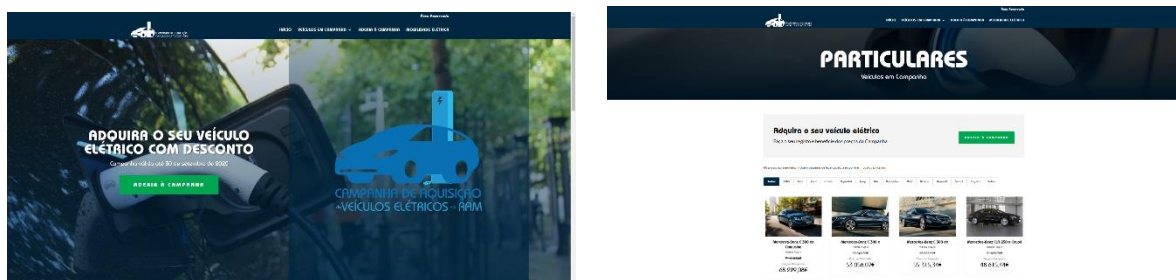


Figure 6: Electric mobility information platform

With these platforms, the user may find the e-charging points, specifications, availability and can simulate a trip plan, to each model of EV, from origin to destination. Related with Rede MOBI.E, that is the national standard for electric mobility charging network, AREAM collaborated with operators to raise awareness to the importance to connect to MOBI.E. AREAM collaborated with the Regional Government (DRETT) to create the legal framework offering one

year of free energy supply for private operators, with the condition to connect MOBI.E network, however it was not possible to establish this incentive.

Considering the actual needs to promote sustainable electric mobility, AREAM created an electric mobility information platform for the EV campaign launched in September 2020, to promote the purchase of EV by citizens and companies, with specific area for promotion of electric mobility, which also includes links that redirected the user to the main e-charging information platforms (<https://ve.aream.pt/>). An specific area to promotion of electric mobility was also included in the AREAM's website (<https://aream.pt/mobilidade-eletrica/>)

Study of electric transport impact on electricity production and use of renewable energy

AREAM developed a study of the impact of EV in energy consumption, energy mix (fuels and renewables), CO₂ emissions and impact in Madeira Island e-charging network and electricity load diagram. The study was concluded in June 2020 and it allows the Regional Electricity Company (EEM) to prepare and adapt the electrical network for the future changes due to the increase of number of EV that it predicted in circulation, making it possible to analyse the investment in new production systems of RES.

C Impact evaluation

C1 Evaluation approach

Expected impacts and indicators

Impact category	Impact indicator	Unit of measure
556 new light EV/ 3 EV in HF		
Transport	1- Number of EV	n ^o
Environment	2- CO emissions avoided by EV	kg/year
Environment	3- NOx emissions avoided by EV	Kg/year
Environment	4- PM emissions avoided by EV	Kg/year
Environment	5- CO2 emissions avoided by EV	t/year
Energy	6- Energy consumption avoided by EV	MWh
Energy	7- Renewable energy in the mix of electrical production	MWh; %
Economy	8- Investment costs	Eur
Economy	9- EV avoided operating costs	Eur
Society	10-Beneficiary organizations and citizens	n ^o

Table 2: Expected impact and indicators

Method of measurement

Impact indicator	Method*	Frequency			Target Group	Domain (demonstration area or city)
		Baseline	During	After		
1 - Number of EV	DC	M12	M16/M28/M40	M52	EV users	Madeira
2 - CO emissions avoided by EV	E	M19	M16/M28/M40	M52	EV users	Madeira
3 - NOx emissions avoided by EV	E	M19	M16/M28/M40	M52	EV users	Madeira
4 - PM emissions avoided by EV	E	M19	M16/M28/M40	M52	EV users	Madeira
5 - CO2 emissions avoided by EV	E	M19	M16/M28/M40	M52	EV users	Madeira
6 - Energy consumption avoided by EV	S; E	M19	M16/M28/M40	M52	EV users	Madeira
7 - Renewable energy in the mix of electrical production	E	M19	M16/M28/M40	M52	EV users	Madeira
8 - Investment costs	E; DC	No	M16/M28/M40	M52	EV users, trade	Madeira
9 - EV avoided operating costs	E	M19	M16/M28/M40	M52	EV users	Madeira
10 - Beneficiary organizations and citizens	DC	No	M16/M28/M40	M52	EV users	Madeira

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

Table 3: Method of measurement

Detailed description of the indicator methodologies:

- **1 - Number of EV in Madeira** – This indicator evaluates the number of light EV in circulation on the islands of Madeira and Porto Santo. The information was requested to the concessionaires who commercialize EV in Madeira between 2012 and 2020.
- **2 - CO emissions avoided by EV** - Calculation models adopted by the EC (Copert) for combustions vehicles and EMEP/EEA air pollutant emission inventory for EV, were used to estimate avoided emissions. In the reference year, avoided emissions were estimated, considering that the EV existent in 2016 replaced the equivalent number of fossil fuel vehicles. For 2017, 2018, 2019 and 2020 calculation methodology was the same.
- **3 - NOx emissions avoided by EV**- Estimation of avoided emissions using calculation models adopted by the EC (Copert) for combustions vehicles and EMEP/EEA air pollutant emission inventory for EV. In the reference year, avoided emissions were estimated, considering that EV existent in 2016 replaced the equivalent number of fossil fuel vehicles. For 2017, 2018, 2019 and 2020 calculation methodology were the same.
- **4 - PM emissions avoided by EV**- Estimation of avoided emissions using calculation models adopted by the EC (Copert) for combustions vehicles and EMEP/EEA air pollutant emission inventory for EV. In the reference year, avoided emissions were estimate,

considering that EV existent in 2016 replaced the equivalent number of fossil fuel vehicles. For 2017, 2018, 2019 and 2020 calculation methodology were the same.

- **5 - CO2 emissions avoided by EV-** Estimation of avoided emissions using IPCC CO₂ emission factor of diesel and petrol for conventional vehicles, and EMEP/EEA air pollutant emission inventory for EV. In the reference year, avoided emissions were estimated, considering that EV existent in 2016 replaced the equivalent number of fossil fuel vehicles. For 2017, 2018, 2019 and 2020 calculation methodology were the same.
- **6 - Energy consumption avoided by EV-** The annual energy consumption avoided by the EV was estimated through improving the energy efficiency of EV compared with fossil fuel vehicles. For the baseline it was calculated the energy consumption of 100 EV and 100 vehicles with fossil fuels (60% diesel and 40% petrol), being the difference, the consumption avoided by the EV.

For the estimate of energy consumption, data was obtained from the EV users survey, in which it was possible to obtain the average consumption of EV (13.3kWh / 100km) and average annual kilometres (13.373 km), and for combustion vehicles it was used kilometres similar of EV and an average consumption obtained through Copert (Euro 3 light vehicles, 9.6 l / 100km in petrol vehicles and 6.55/100km in diesel vehicles). For 2017, 2018, 2019 and 2020, the calculation methodology was the same.

For the 3 EV introduced in the HF service fleet, the avoided energy consumption was calculated taking into account the real annual average consumption of the EV (18,61 kWh), with real annual average service (2018 (July-December): 5.673 km / vehicle, 2019 (January-December): 12.668 km / vehicle and 2020 (January-December): 9.740 km / vehicle) compared with the three fossil fuel vehicles that were shot down from the fleet. The data from the EV and fossil fuel vehicles were provided by HF.

- **7 – Renewable energy in the mix of electrical production-** The estimate of annual RES (Renewable Energy Source) consumed by EV was based in electricity mix production (source: Regional Electricity Company) and through surveys of EV users, which was possible to identify the time that users of companies and citizens prefer to carry out EV charging.

Based on the annual energy consumption of EV, it was estimated the amount of energy consumed that was from renewable sources (MWh) and the average percentage of renewable energy of the electricity consumed (%).

	Mix of RES 2016- Madeira	Mix of RES 2017- Madeira	Mix of RES 2018- Madeira	Mix of RES 2019- Madeira	Mix of RES 2020- Madeira
Day time	30,40%	29,60%	31,40%	24,70%	27,00%
Night time	80%	80%	80%	80%	80%

Table 4: Mix RES between 2016 and 2020 in Madeira

Source: Regional Electricity Company of ARM

For the 3 EV introduced in the HF service fleet, the estimate of annual RES (Renewable Energy Source) consumed by EV was based in electricity mix production the avoided energy consumption and through data from HF in which it was reported that EV preferentially load during the day. Based on the annual energy consumption of EV, it was estimated the amount of energy consumed that was from renewable sources (MWh) and the average percentage of renewable energy of the electricity consumed (%).

- **8 - Investment costs** – This indicator estimated the investment costs in new EV in Madeira. For the indicator it was considered the average cost of 23.200€ per new EV in circulation, considering also the incentives for companies and citizens. For the comparison with EV, the acquisition of new fossil fuel vehicles was estimated to be 30% cheaper on average.
- **9 - EV avoided operating costs** – This indicator estimated the avoided operating costs taking into account the annual energy and maintenance costs for EV compared to the costs of the equivalent number of fossil fuel vehicles.

Energy costs			Annual maintenance costs per vehicle			Other costs	
Petrol vehicle (Eur/litre)	Diesel vehicle (Eur/litre)	EV (Eur/kWh)	Petrol vehicle	Diesel vehicle	EV	Circulation tax (petrol and diesel vehicles)	Insurance
1,48	1,24	~0,2 (peak hours, ~0,2 (off peak hours)	150 €	200 €	50€	140 €	200 €

Table 5: EV avoided operating costs

For the 3 EV introduced in the HF service fleet, the estimate of avoided operating costs was estimated through data from HF.

- **10 - Beneficiary organizations and citizens** - The indicator evaluates the number of beneficiary organizations and citizens of the campaigns developed under this measure, namely results of the four incentive schemes and national funds.

The Business-as-Usual scenario

Without DESTINATIONS project a BAU scenario would be a less effective increase of the EV fleet in the ARM. DESTINATIONS project had an important role in the credibility of EV technology and its dissemination among stakeholders and citizens.

For the indicator 1 - Number of EV in Madeira it was projected a BAU, considering data about the quantity of EV sold between 2011 and 2016 (before DESTINATIONS). The data was collected directly with the Renault and Nissan vendors. For the BAU projection it was considered data between 2011 and 2016, using a tendency linear line for the following years.

Regarding the indicators 2, 3 and 4 (CO, NOX and PM emissions avoided), without DESTINATIONS, an increase of the emissions avoided would be noticed, but not as significant as with the support of DESTINATIONS.

For the indicator 5 - Emissions of CO₂ avoided by EV and 6 - Energy consumption avoided by EV it was considered the data of annual energy consumption avoided by the EV sold between 2011 and 2016 being estimated through improving the energy efficiency and CO₂ emissions of EV compared with fossil fuel vehicles. For the BAU projection it was considered data between 2011 and 2016, using a tendency linear line for the following years.

As for the investment costs (indicator 8), a BAU scenario would be the continue of limited investment instruments regarding electric mobility.

On the other hand, the operating costs avoided by the EV (indicator 9) would not exist without DESTINATIONS. Citizens would continue to have higher costs with their diesel vehicles. In addition, organizations and citizens would have not benefited from the initiatives.

C2 Measure result

Impact category	Impact indicator	Unit of measure	Baseline	Ex-Ante	Ex-Post
556 new light EV					
Transport	1-Number of EV	n°	100	200	656
Environment	2-CO emissions avoided by EV	kg/year	682	1.364	4.475
Environment	3-NOx emissions avoided by EV	Kg/year	651	1.302	4.256
Environment	4-PM emissions avoided by EV	Kg/year	51	102	329
Environment	5-CO ₂ emissions avoided by EV	t/year	201	402	1.276
Energy	6-Energy consumption avoided by EV	MWh	878	1.756	5.563
Energy	7-Renewable energy in the mix of electrical production	MWh; %	117 66% RES	175 80% RES	754 65% RES
Economy	8-Investment costs	€	2.320.00 0	4.640.00 0	15.385. 724
Economy	9-EV avoided operating costs	€	142.986	285.972	937.39 6
Society	10-Beneficiary organizations and citizens	n°	0	60	266
3 EV in HF					
Transport	1-Number of EV	number	0	3	3
Environment	2-CO emissions avoided by EV	Kg/year	-	5	5
Environment	3-NOx emissions avoided by EV	Kg/year	-	38	38
Environment	4-PM emissions avoided by EV	Kg/year	-	2,3	2,3
Environment	5-CO ₂ emissions avoided by EV	t/year	-	5,9	5,9
Energy	6-Energy consumption avoided by EV	MWh;	-	27	27
Energy	7-Renewable energy in the mix of electrical production	MWh; %	-	1,75 24,7% RES	1,75 24,7% RES
Economy	8-Investment costs	€	-	-	-
Economy	9-EV avoided operating costs	€	-	10.645€	10.645 €
Society	10-Beneficiary organizations and citizens	n°	0	1	1

Table 6: Impact indicator measure results

C 2.1 Transport

1-Number of EV

Between 2016 and 2020, it was verified an increase of 556% of EV. It is estimated that the entry into service of these EV have replaced 556 fossil fuel vehicles, a technology that consumes about 5 times more energy to cover the same service.

Number of light EV	Unit of measure	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
EV (including EV HF)	Nº	2	15	16	2	28	37	87	93	142	234
Variation	%	-	650%	7%	-88%	1.300%	32%	135%	7%	53%	65%
Cumulative EV	Nº	2	17	33	35	63	100	187	280	422	656
Variation	%	-	750%	94%	6%	80%	59%	87%	50%	51%	55%
EV HF	Nº	-	-	-	-	-	-	0	3	3	3

Table 7: Number of EV since 2011 until 2020

As shown in Figure 7, in a BAU scenario, the number of EV would be fairly low compared to the actual achieved values.

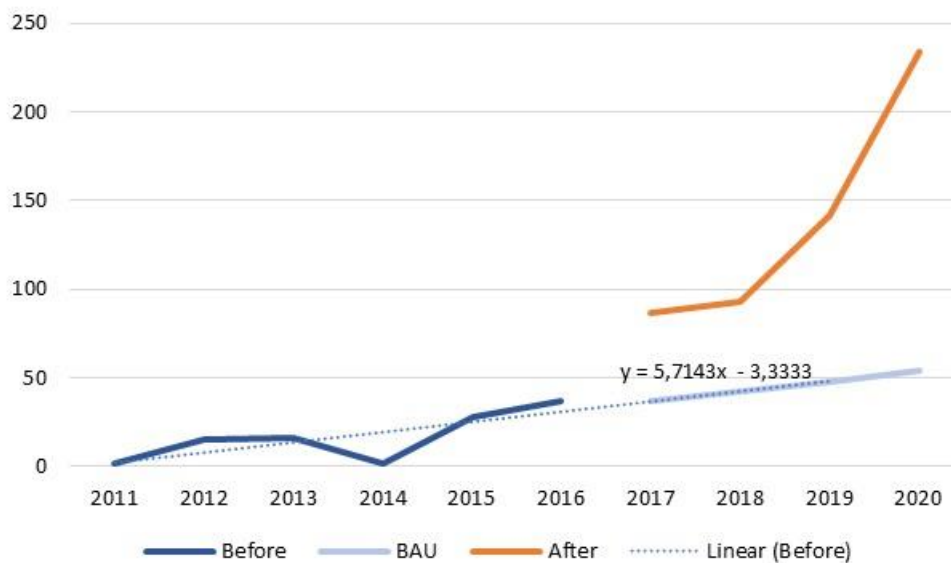


Figure 7: Annual number of EV in Madeira (Before, BAU and After)

C 2.2 Environment

2-CO emissions avoided by EV

The 556 new light EV avoided 3.383 kg of CO emissions in 2020, more 2.701 kg avoided emissions compared to the baseline. The EV compared with the 556 fossil fuel vehicles that were replaced emitted 98% less CO emissions in kilometers made in 2020.

The 3 new EV from HF, avoided 3,7 kg of CO emissions in 2020, 93% less compared with the 3 fossil fuel vehicles that were replaced in kilometers made in 2020.

	CO emissions	2016	2017	2018	2019	2020	Var. (2016 - 2020)
656 EV	Nº of vehicles	100	187	280	422	656	556 EV
	Fossil fuel vehicles	694 kg	1.301 kg	2.068 kg	3.053 kg	4.554 kg	3.860kg
	EV	12 kg	23 kg	33 kg	51 kg	79 kg	67 kg
	CO emissions avoided by EV	682 kg	1.278 kg	2.035 kg	3.002 kg	4.475 kg	3.793 kg
3 HF EV	Fossil fuel vehicles	-	-	2,3 kg	5,2 kg	4,0 kg	-
	EV HF	-	-	0,17 kg	0,37 kg	0,29 kg	-
	CO emissions avoided by EV	-	-	2,15 kg	4,79 kg	3,68 kg	-

Table 8: CO emissions avoided by the 556 new EV and the new 3 EV

3-NOx emissions avoided by EV

The 556 new light EV avoided an estimate of 3.606 kg of NOx emissions in 2020, compared to the baseline. The EV compared with the 556 fossil fuel vehicles that were replaced emitted 95% less NOx emissions in kilometers made in 2020.

The 3 new EV from HF, had a reduction of 29,7 kg in NOx emissions in 2020, 94% less compared with the 3 fossil fuel vehicles that were replaced in kilometers made in 2020.

	NOx emissions	2016	2017	2018	2019	2020	Var. (2016 - 2020)
656 EV	Nº of vehicles	100	187	280	422	656	556
	Fossil fuel vehicles	687 kg	1.282 kg	1.889 kg	2.846 kg	4.504 kg	3.817kg
	EV	36 kg	68 kg	101 kg	159 kg	248kg	212 kg
	NOx emissions avoided by EV	651 kg	1.214 kg	1.788 kg	2.687 kg	4.256 kg	3.605 kg
3 EV HF	HF fossil fuel vehicles	-	-	18,3 kg	40,9 kg	31,5 kg	-
	EV HF	-	-	1,02 kg	2,27 kg	1,75 kg	-
	NOx emissions avoided by EV	-	-	17,31 kg	38,7 kg	29,7 kg	-

Table 9: NOX emissions avoided by the 556 new EV and the new 3 EV

4-PM emissions avoided by EV

The 556 new light EV avoided an estimated of 329 kg (556%) of PM emissions in 2020 compared to the baseline. The EV compared with the 556 fossil fuel vehicles that were replaced emitted 95% less PM emissions in kilometers made in 2020.

The 3 new EV from HF, avoided an estimated of 1,8 kg of PM emissions in 2020, 87% less compared with the 3 fossil fuel vehicles that were replaced in kilometers made in 2020.

	PM emissions	2016	2017	2018	2019	2020	Var. (2016-2020)
656EV	Nº of vehicles	100	187	280	422	656	556
	Fossil fuel vehicles	53 kg	99 kg	139 kg	209 kg	346 kg	293 kg
	EV	2 kg	5kg	7 kg	11 kg	17 kg	15 kg
	PM emissions avoided by EV	51 kg	94 kg	132 kg	198 kg	329 kg	278kg
3 EV HF	HF fossil fuel vehicles	-	-	1,2 kg	2,7 kg	2,0 kg	-
	EV HF	-	-	0,15 kg	0,34 kg	0,26 kg	-
	PM emissions avoided by EV	-	-	1,04 kg	2,3 3kg	1,79 kg	-

Table 10: PM emissions avoided by the 556 new EV and the new 3 EV

5-CO2 emissions avoided by EV

The 556 new light EV avoided 958 t (556%) of CO₂ emissions in 2020 compared to the baseline. The EV compared with the 556 fossil fuel vehicles that were replaced emitted 73% less CO₂ emissions in kilometers made in 2020.

The 3 new EV from HF, avoided 4,5 t of CO₂ emissions in 2020, 66% less compared with the 3 fossil fuel vehicles that were replaced in kilometers made in 2020.

	CO ₂ emissions	2016	2017	2018	2019	2020	Var. (2016-2020)
656 EV	Nº of vehicles	100	187	280	422	656	556
	Fossil fuel vehicles	265 t	496 t	742 t	1.119 t	1.739 t	1.315 t
	EV	64 t	118 t	171 t	298 t	463 t	357 t
	CO ₂ emissions avoided by EV	201 t	378 t	571 t	821 t	1.276 t	1.075 t
3 EV HF	HF fossil fuel vehicles	-	-	4,0 t	9,0 t	6,9 t	-
	EV HF	-	-	1,4 t	3,1 t	2,4 t	-
	CO ₂ emissions avoided by EV	-	-	2,6 t	5,9 t	4,5 t	-

Table 11: CO₂ emissions avoided by the 556 new EV and the new 3 EV

A BAU scenario would be a slight continuous growth of avoided emissions, but not significant as achieved under DESTINATIONS.

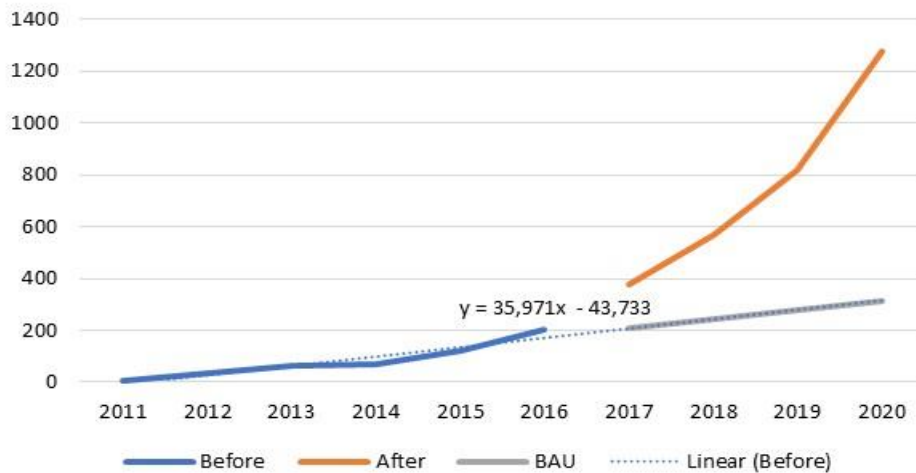


Figure 8: Before, BAU scenario and after DESTINATIONS of CO2 emissions avoided (t)

C 2.3 Energy

6-Energy consumption avoided by EV

The 556 new light EV avoided 4.715 MWh (556%) of energy consumption in 2020 compared to the baseline. The EV compared with the 556 fossil fuel vehicles that were replaced consume 83% less energy in kilometers made in 2020.

It is estimated that the 556 new light EV in 2020 compared to the baseline, allowed to reduce the consumption of fossil fuels by 577.343 liters (292.211 liters of diesel and 185.132 liters of gasoline) of fossil fuels.

With the 3 new light EV from HF, it was verified a reduction of 21 MWh in EV in 2020, 79% less energy compared with the 3 fossil fuel vehicles that were replaced in kilometers made in 2020. It is estimated that the 3 EV in HF allowed to reduce the consumption 2 528 liters of diesel of fossil fuels.

	Energy consumption	2016	2017	2018	2019	2020	Var. (2016 - 2020)
656 EV	Nº of vehicles	100	187	280	422	656	556
	Fossil fuel vehicles	1.026 MWh	1.918 MWh	2.873 MWh	4.329 MWh	6.730 MWh	5.704 MWh
	EV	178 MWh	333 MWh	498 MWh	751 MWh	1.167 MWh	989MWh
	Energy consumption avoided by EV	848 MWh	1.586 MWh	2.375MWh	3.579 MWh	5.563MWh	4.715 MWh
3 EV HF	HF fossil fuel vehicles	-	-	15 MWh	34MWh	26 MWh	-
	EV HF	-	-	3 MWh	7 MWh	5 MWh	-
	Energy consumption avoided by EV	-	-	12 MWh	27MWh	21 MWh	-

Table 12: Energy consumption avoided by the 556 new EV and the new 3 EV

Under a BAU scenario, despite an increase of the avoided energy consumption, it would not be as significant as with the support of DESTIATIONS project.

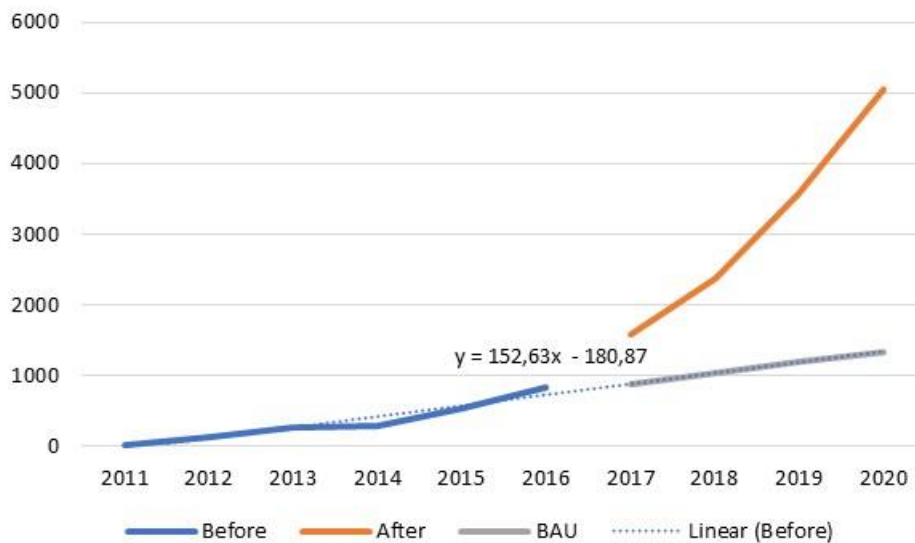


Figure 9: Before, BAU and After scenario for energy consumption avoided (MWh)

7-Renewable energy in the mix of electrical production

The new 556 light EV increased the consumption of 754 MWh (546%) of RES in EV compared to the EV of baseline. The percentage of RES in electricity consumption of the 556 EV decrease 1%, from 66% to 65% compared to the EV of baseline, mainly due to the year 2020 being a year with a lower mix of electricity production through RES (27,0%) compared to the baseline (30,4%), according to the data from EEM, as presented in Table 4.

In Madeira's electric grid, there is the potential to increase renewable energy penetration during off-peak and super off-peak hours (night), which allowed to reduce specific emissions in those periods, by using some of the wind energy that was rejected due to the grid's incapacity to integrate it (between 23:00h-7:00h) and EV in this period can consume electrical energy with a percentage of renewable of 80%, making it necessary to make EV users even more aware of the realization of EV charging during off-hours, taking advantage of a greater share of renewable energy and taking advantage of the lower energy cost in these periods.

	2016	2017	2018	2019	2020	Variation (2016-2020)
EV (including EV HF)	117 MWh	217 MWh	328 MWh	480 MWh	754 MWh	637 MWh
	66%	65%	66%	64%	65%	-1%
EV HF	-	-	0,99 MWh	1,75 MWh	1,47 MWh	-
	-	-	31,4%	24,7%	27,0%	-

Table 13: Renewable energy in the mix of electrical production

C 2.4 Economy

8-Investment costs

The new 556 light EV acquired reached the investment of 13.065.724 € made in 2017, 2018, 2019 and 2020 with all incentives from Regional Government and national fund, Fondo Ambiental, that benefited organizations and citizens.

Investment costs		2016	2017	2018	2019	2020
EV	EV citizens and companies	2.320.000€ (100 EV)	2.018.400 € (new 87 EV)	1.948.800 € (new 84 EV)	2.969.600 € (new 128 EV)	5.428.800 € (new 234 EV)
	EV in Public entities (Nacional Fund)	-	-	100% financed by national funds (new 6 EV and e-charging stations) 195.846€	100% financed by national funds (new 14 EV and e-charging stations) 406.356€	-
EV HF	EV in Public entities (Nacional Fund)	-	-	100% financed by national funds (3 new EV and 3 e-charging stations) 97.922€	-	-
Total		2.320.000 €	13.065.724 €			

Table 14: Investment costs

9-EV avoided operating costs

The new 556 EV achieved a 708.672 € (556%) of avoided operating costs in 2020 compared to the baseline. The new EV compared with the fossil fuel vehicles reached 74% less annual operating costs in 2020. Between 2017 and 2020 the accumulated avoided operating cost by EV were 2.119.299 € compared with fossil fuel vehicles.

The 3 new HF EV avoided about 10.645€ of operating costs in 2019, 93% less compared with the fossil fuel vehicles.

	Operating costs	2016	2017	2018	2019	2020	Var. (2016 - 2020)	Accumulated operating cost (2017-2020)
New EV	Fossil fuel vehicles	193.276 €	361.425 €	541.172 €	815.623 €	1.267.877 €		3.169.373 €
	EV	50.290 €	96.912 €	141.064 €	212.603 €	330.492 €		831.361€
	EV avoided operating costs	142.986 €	264.513 €	400.108 €	603.020 €	937.396 €	794.409 €	2.348.023 €
New EV HF	HF Fossil fuel vehicles	-	-	5.123 €	11.441 €	8.797€		25.361 €

HF EV	-	-	357 €	797 €	613€		1.767 €
HF EV avoided operating costs	-	-	4.766 €	10.645 €	8.184€		23.594 €

Table 15: EV avoided operating costs

Based on the indicator 9- EV avoided operating costs in 2017, 2018, 2019 and 2020, users who opted for the purchase of the EV instead of fossil fuel vehicles, had an average payback period of 4 years, a period that fully recovers the highest EV investment with energy savings and maintenance, circulation tax and insurance costs.

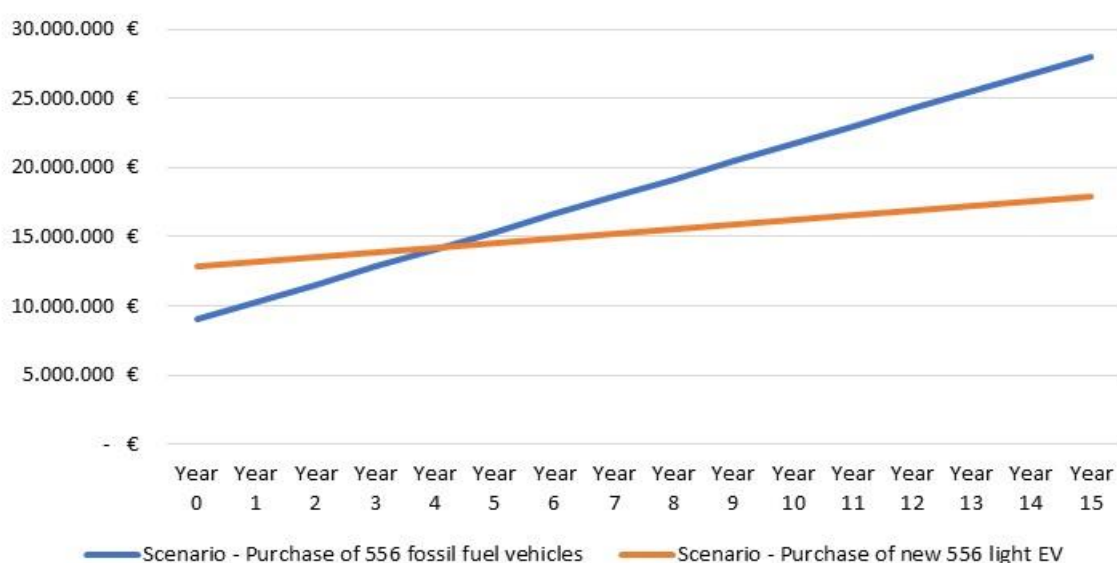


Figure 10: Accumulated costs with new EV and fossil fuel vehicles

C 2.5 Society

10-Beneficiary organizations and citizens

Beneficiary organizations and citizens from regional incentive schemes, national funds and Campaign for the acquisition of EV for citizens and private companies.

	Unit of measure	2016	2017	2018	2019	2020 (jan-oct)
New EV	Nº	-	-	2 (National Fund)	41 (regional government incentive for Porto Santo, citizens and private companies) 6 (National Fund)	221 (regional government incentive for RAM, citizens and private companies) Include 13 beneficiaries of Campaign for the acquisition of EV
New EV HF	Nº	-	-	1 (National Fund)	-	
Total					266	

Table 16: Number of beneficiary organizations

C3 Quantifiable targets

No	Target	Rating
1	Less emissions / increased air quality -197 t CO ₂ , 87%	**
2	Less fuel consumption - 653 MWh, 75%	***
3	Increased use of RES - 175 MWh, with 80% - renewable energy during night time	*
4	More attractive tourist destination	**
NA = Not Assessed O = Not Achieved * = Substantially achieved (at least 50%) – ** = Achieved in full *** = Exceeded		

Table 17: Assessment of quantifiable targets

Targets from 1 to 4 were planned in the grant agreement.

The target 1 was achieved in full. The reduction of CO₂ in 2020 (with 656 EV), was 1.276 t, more 1075 t than baseline, superior to the GA target which was 197 t, with an average reduction of 73% compared to the combustion vehicles that were replaced, less than predicted in GA 87%. This percentage is dependent on the mix of electricity and the habits of users through the time of day when they charge EV, in which opting for charging during off-hours (night) will allow a greater use of renewable electricity.

The target 2 was exceeded. The reduction of energy consumption in 2020 (with 656 EV), was 5.563 MWh, more 4.715 MWh than baseline, superior to the GA target which was 653 MWh, with an average reduction of 83% compared to the combustion vehicles that were replaced.

The target 3, was substantially achieved. The RES in 2020 (656 EV), increased 637 MWh, comparatively with the baseline situation (117 MWh). The average RES in 2020 was 65%. If all users charged during the night, it would be possible to maximize the positive impacts of electric mobility on the electricity grid, since energy during the night has more RES (about 80%).

Target 4 was achieved in full, through the contribution of the several Madeira DESTINATIONS measures. Each measure, under their scope and through the synergies resulted from the connection between them, contributed for a more attractive destination, providing attractive, more sustainable and efficient solutions for tourists.

C4 Up-scaling of results

In 2021 the Regional Government of Madeira plan to launch a new incentive, like the one launched in 2020, as a consequence of such decision the upscaling effect will be even greater.

In order to calculate the change in the indicators present above due to the expect increase of number of EV between January and December 2021, the results for the future impact predict new 250 EV, considering same annual kilometres and specific consumption per new EV of the previously calculated indicators, considering the replacement of fossil fuel vehicles.

Impact category	Impact indicator	Unit of measure	Assumptions	Likely results*
Transport	1-Number of EV	n°	Vehicles sold in incentives schemes	More 250 EV
Environment	2-CO emissions avoided by EV	kg/year	If more EV are sold more CO will be avoided	More 1.705 kg avoided
Environment	3-NOx emissions avoided by EV	Kg/year	If more EV are sold more NOx will be avoided	More 1.622 kg avoided
Environment	4-PM emissions avoided by EV	Kg/year	If more EV are sold more PM10 will be avoided	More 151 kg avoided
Environment	5-CO ₂ emissions avoided by EV	t/year	If more EV are sold more CO ₂ will be avoided	More 486 kg avoided
Energy	6-Energy consumption avoided by EV	MWh	If more EV are sold more energy (petrol and diesel) will be avoided	More 2.120 MWh avoided
Energy	7-Renewable energy in the mix of electrical production	MWh; %	If more EV are sold more renewable energy will be consumed, being able to integrate a greater amount of renewable electricity in the electricity grid	More 287 MWh of RES consumed
Economy	8-Investment costs	€	If more EV are sold more investment will be realized and more avoided operating costs	More of 5.800.000€ of investment
Economy	9-EV avoided operating costs	€	If more EV are sold more investment will be realized and more avoided operating costs	More 357.239€ avoided in operating costs
Society	10-Beneficiary organizations and citizens	number	One beneficiary per new EV sold	250 beneficiaries in PRIME-RAM (citizens and companies)

*(comparison with Ex-post) incentive schemes (January-December 2021)

Table 18: Estimated up-scaling of results

In this measure there is a strong possibility to up-scaling the results after the conclusion of DESTINATIONS project. Local partners can follow the methodology used in the EV promotion campaigns carried out by AREAM. The main objective is to better inform and provide incentives to companies and citizens to make more informed and attractive the purchase of EV.

D Process Evaluation Findings

D1 Drivers

As for **Positional** driver, the measure is already benefiting from integration of the Destinations work with local strategy to leverage EV and national programme which incentive the purchase of new EV.

At **political** level, the vision for more sustainable mobility solution for the coming years appears as part of the political agenda. In addition, the National legal framework can provide several financial benefits for citizens who intends to purchase EV. In parallel, the ongoing awareness campaigns to foster the use of bike and the introduction of bike sharing schemes, represents a driver to address the car dependence. In conclusion it's a fact that the increasing number of EV reflects that citizens and companies are gradually accepting electric mobility. Tourism experience could be the best occasion to test alternative transport solution such EV but actually the rental market showed to be not ready to address such touristic demand.

D2 Barriers

At a **cultural** level, social resistance had a significant impact. Changing habits among residents and tourist showed to be a difficult task to achieve. Despite the awareness-raising campaigns and the likelihood to change their transport habits, there is still strong resistance in acquiring/rent clean vehicles and adopting sustainable mobility habits. In addition, land barriers had to be well addressed with regards to the specific geography of the hilly Madeira. This condition can severely discourage the use of bicycles.

D3 Lessons Learned

The **variation** of oil prices, to the high EV costs and to a possible low interest of the beneficiaries represent a significant obstacle to the implementation. More incentive and awareness raising campaigns should be done to mitigate the issues.

Given that in the city of Funchal, there is still a considerable lack of knowledge and social resistance regarding sustainable mobility, it is important to put more efforts under this thematic. More specific information and engagement with residents and tourists. The political involvement is instrumental in promoting the events in this measure.

E Evaluation conclusions

Along the project the number of EV in the Madeira increased from 100, in 2016, to 656, in 2020. This increase led to a reduction of energy consumption (about 5,563 MWh) and of polluting emissions (about 1,276 tonnes of CO₂; 4,256 kg of NO_x; 329 kg of PM₁₀; 4,475 kg of CO). It also allowed the introduction of about 754 MWh of endogenous renewable energies through the electricity consumption which contributes to the decrease of energy dependence from abroad, as a result of the reduction in fossil fuel consumption and the high energy efficiency of electric vehicles.

Madeira EV charging network has undergone major improvements, from 5 charging stations, in 2016, to 34 stations, in 2020, including public stations and private stations with public use, with free charging in the launching period, which encouraged electric mobility for a while.

Besides free charging in public charging network some other incentive schemes for EV acquisition were applied along the project. An incentive scheme launched in 2019 by the Regional Government addressed to citizens and companies in Porto Santo Island (PRIME-RAM), with a budget of 400 thousand euros, through which 41 light EV were co-financed. In 2020, this incentive scheme expanded to whole Madeira Region, with 1 million Euro budget, through which 221 light EV (139 in private and 82 in companies), 6 electric bikes and 22 electric bicycles were co-financed.

Another incentive was promoted by AREAM, with the active involvement of EV traders in Madeira, throughout the Campaign for Acquisition of EV in Madeira (CAEVM), addressed to citizens and companies. In this campaign, launched in September of 2020, 13 EV were acquired by citizens and companies, generating about 409,000€ of revenue for traders, reasonable results considering the Covid-19 pandemic effects on the local economy for companies and citizens.

Together with the CAEVM, an information campaign about EV was also launched, to promote knowledge and capacity building among citizens and companies concerning electric mobility, which included online workshops and an information webpage. During the campaign the electric mobility webpage, which included an online guidebook for electric mobility in Madeira, had 1182 visitors. After the campaign, a specific area for electric mobility was included in the AREAM's official website (<https://aream.pt/mobilidade-eletrica/>).

All the awareness raising actions carried out along the project within this measure had important impacts on the awareness of citizens and companies about electric mobility option. This accumulated knowledge surely led to the acquisition of EV in a near future. Those indirect results of the project are difficult to evaluate accurately and are not included in the measure evaluation, however, they should be considered as a positive result of the project.

F Additional information

F1 Appraisal of evaluation approach

The evaluation methodology adopted showed to be much complex within this measure which included a variety of actions on the different scopes of electric mobility, from the EV charging network expansion, to stakeholders' support and raise awareness, authority's regulation and incentives for EV acquisition, which required a complex range of data collection and evaluation.

It is important to highlight that the evaluation should be a supporting tool for the implementation of the measure and not the opposite, which was the feeling at any point along the process.

F2 Future activities relating to the measure

As part of this measure, the electric mobility information webpage will continue to be available for dissemination and information after the completion of the Civitas Destinations project on AREAM's official website (<https://aream.pt/mobilidade-eletrica/>)

Regarding the incentive for the acquisition of electric vehicles, the Regional Government renovated, in 2021, the PRIME-RAM incentive with a budget of 1 million euros. Additionally, it was created an incentive to encourage the scrapping of vehicles over 10 years old, when purchasing a new EV, with an estimated budget of 500 thousand euros. Combining the two regional incentives, citizens are able to benefit up to € 7,500 in the purchase of a new EV. This shows the importance given by Madeira authorities on electric mobility as a more efficient and cleaner transport solution.

Also, as a result of the promotion of the electric vehicle, Madeira authorities, municipalities, hotels, shopping centres and other types of service buildings continued to invest in the integration of charging stations to meet customers' EV charging needs.