

Integrated and Replicable Solutions for Co-Creation in Sustainable Cities

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Santa Cruz de Tenerife replication plan

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Executive Summary

The here-below deliverable, Santa Cruz de Tenerife Replication Plan, represents the initial smart city plan of the city. It defines the foundations for project development and implementation regarding every single one of the selected measures based on the integrated solutions demonstrated by the LHC, in IRIS EIP-SCC project. These measures have been carefully chosen, framed in the five IRIS transitional tracks, according to a three steps participation process; vision of the city, needs and challenges and outline. These cocreation events were enriched by different target groups; citizens, professionals, companies' representatives and public workers respectively. These groups gathered among 30 and 40 people in each session. Furthermore, several prior online actions also took place as preparation for these meetings.

The main purpose of the document is to present in a structured way the set of actions to be deployed across the city during the coming years regarding the smart city plan of the municipality with the following subsequent objectives; carbon footprint reduction according to SCT's SECAP, improving mobility issues of the city as the main citizenship's concern, creating conditions for new business models and boost employment based on innovative public services and infrastructures, refining the innovation culture of the municipality and increasing citizens' participation in the local public policies. SCT RP has been leaded by a multidisciplinary team comprised by public workers of SCT municipality and the professional team of Sustainable Building Cluster.

In order to reach a better understanding of this document it is important to know several remarkable points. Firstly, since there are still two more execution years on IRIS project, this document will keep evolving absorbing the teachings gathered from LHCs demonstration actions as well as from crossed experiences in the other FCs. However, the current level of readiness of this project is quite high and some measures are already set into motion. Secondly, some measures are imbricated between them having different working lines. In particular, citizens' engagement measures, ISs 5.1, 5.3 & 5.4, develop the social edge of IS 1.1, IS 2.3 & 4.2, and IS 4.1 respectively. Thirdly, some initiatives are simpler actions in terms of complexity such as IS 1.1 (installing 14 RES to create positive energy public schools), and others are more complex activities comprising several measures which combined create an integrated solution to tackle a harder local issue, such as for instance IS 3.2 (personal mobility strategy). However, all defined measures are planned to solve important needs or challenges of the city and are key to conform a complete replication plan for the municipality. Fourthly, in spite of that the replication plan should be located on a very specific district of the city, SCT municipality has decided that its RP is executed on a wider approach for a better social distribution of the benefits of these investments. This is the reason that there are some measures scattered across the municipality. On the contrary, most of the measures are concentrated in the sea border axis of the city. Finally, some measures are described with higher level of details and other with a minor degree of definition, this is due to the fact that there are cases in which a technical project is already developed and others do not count on it yet. This is the reason that budget may slightly differ with reality in the future.

This document is mainly design for city managers and public workers with the purpose of helping them to accomplish their specific sectorial goals under a common framework and within a structured and interlinked vision; benefiting from synergies and increasing efficiency during the execution as well as



extending the impact. It will also serve as methodology support, as the principal compass for the implementation process and as a reference for assessing the results thanks to the defined KPIs. In another hand, this RP will help local ecosystem companies to comprehend the roadmap of the city and contribute to the goals either participant during procurements or aligning their strategic positioning and investments with the city ones. Finally, this document will also aid for public communication in order to let citizenship know with transparency what are the city plans regarding smart city and sustainability public investments. Nonetheless, a more general public oriented document will be developed from this one with this specific purpose, in Spanish.

	Integrated Solutions Summarize							
IS	Name of the IS	Short description	Budget (€)	Funding				
IS 1.1	PV schools	14 public schools with 207,74 kWp PV capacity	383.647,71	Demanded ERDF				
IS 1.2	NZCB Social Housing	Two NZEB social building retrofitting (57 +21 dwellings)	400.000,00	Funded				
IS 2.1	Smart Gerencia- Tome Cano.	155 kWp PV, 10 kW wind power, 14 EV charging points, BEMS	321.239,25	Not funded yet				
IS 2.3	2 nd Life Batteries.	196 kWh 2nd life batteries integrated in Smart Gerencia	20.000,00	Own sources				
	RES-EV	28 EV charging point in buildings with RES support	1.143.017,80	Funded				
IS 3.1	E-Bus	4 Pluggable e-buses with a 100 kWp PV support	1.930.000,00	Funded				
	Sustainable Street	302 kW PV, 18 kW wind power, 12 EV charging points.	1.596.807,16	Funded				
IS 3.2	Personal Mobility Strategy	Car mitigation zones, 2 alternative parking, 7 school paths, pedestrianization of C/ La Rosa, Linking city nodes	3.559.669,00	Partially funded				
IS 4.1	City Monitoring System.	City Innovation Plaform integrating IRIS KPI monitoring system and the Environmental monitoring system.	1.346.923,50	Funded				
IS 4.2	CIM	Small section of the city modelled with sensor integration	165.000,00	Not funded yet				
IS 4.3	Smart EV Charging	Webplattform and communication devices integrating all municipal EV charging points	100.000,00	Not funded yet				
IS 5.1	Public campaign	Activities for citizen engagment within	32.000,00	Not funded vet				
	Energy Virtual	the schools realm Virtual reality spot for public and	12,000,00	Not fue de duit				
15 5.3	Reality/BIM	management use	12.000,00	Not funded yet				
IS 5.4	Public awareness campaign Air Quality	Citizen engagment comunication system for an effective implement car restrictions measures	25.000,00	Not funded yet				

The estimated budget of SCT Replication Plan is 11.029.304,42 €. This budget is distributed as follows:



TOTAL	11.629.304,42
Table 1 IS Summarize	

SCT has the human resources dedicated to the present RP organized by departments with the leadership of the City Mayor Office. Public Services Department, will serve as coordinator of the RP. ICT Department will be in charge of integrated solutions 4.x and will coordinate the digital integration of all the RP. Citizen Security and Mobility Department will lead ISs 3.x in coordination with Environment Department and Infrastructure Department. Citizen Engagement Department will lead ISs 5.x. with the assistance of Education Area. In additions, other public related institutions such Gerencia de Urbanismo or Viviendas Municipales will participate in IS 3.2 and 1.2 respectively. On the other hand, Cluster Construcción Sostenible as direct partner of IRIS project will also participate accordingly with legal regulations in the RP execution, and will promote the participation of the local ecosystem companies.

Regarding the timeline, the current RP ranges from the beginning of 2020 with some project execution definitions, such as Sustainable Street and E-Bus projects (IS 3.1); until 2026 with the last 2^{nd} hand batteries installation in the Gerencia de Urbanismo building (ISs 3.1 & 3.2). In between there are the core actions concentrated within 2022 and 2024.

This replication plan will be assessed during its executions thanks to the IS 4.1 (CIP). The main impact will be a substantial CO_2 emissions reduction, the start of a new mobility paradigm and strong advancements of the innovation culture and citizens' engagement values. From the learnings of the RP implementation a future Smart City Plan will be designed and deployed across the whole city. The purpose is to apply for H2030 funds as Smart City European leader once the current RP is successfully executed.

To finalize, on one hand, the expected impact of the Deliverable 8.8 is to share SCT approach to replication in its city with the rest of FC besides of helping to demonstrate to LCH that the chosen ISs are viable and scalable in other territories. And on the other hand, this document is nurtured by most of the WPs of IRIS work plan, in particular it is remarkable the impact received from the demonstration actions described on WP 5.x, 6.x and 7.x. In addition the WP 4 is crucial for CIP of the city and it is expected a stronger impact of the WP3 will occur in coming reviews of this RP.



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List of Abbreviations and Acronyms

Abbreviation	Definition
AR/VR	Augmented Reality/Virtual Reality
BIM	Building Information Modelling
CIP	City Innovation Platform
CCS	Cluster Construcción Sostenible
EIP-SCC	The European Innovation Partnership on Smart Cities and Communities
EU	European Union
EV	Electrical Vehicles
FC	Follower City
IDAE	Institute for Diversification and Energy Saving.
IS	Integrated Solution
KPI	Key Performance Indicator
LHC	Lighthouse city/ies
NZCB	Near Zero Carbon Buildings
RES	Renewable Energy Sources
GRDP	General Register of Data Protection
RP	Replication Plan
SDG	Sustainable Development Goals
SCC	Smart Cities and Communities.
SCT	Santa Cruz de Tenerife
SECAP	Sustainable Energy and Climate Action Plan
TT#	Transitional Track
UPR	Ultra-Peripheral Region
vRES	Variable Renewable Energy Sources
WP	Work Package



1. Introduction.

Deliverable 8.8, Santa Cruz de Tenerife Replication Plan, pursues to describe the framework and all the details of the planned actions to be executed in order to turn the city into a smart and sustainable city. This document belongs to the Work Package 8, placed on task 8.5. This deliverable is fed by Lighthouses demonstration activities located on WP 5, 6 and 7.

1.1. Scope, objectives and expected impact.

The objective of this Deliverable is to provide a detailed overview of the replication activities of Santa Cruz de Tenerife municipality in the IRIS project, in line with the integrated solutions developed and exposed by the Lighthouse cities of Utrecht, Nice and Gothenburg.

The city of SCT has defined its vision, challenges and needs which will be addressed in this innovative and collaborative framework; and it has design a set of actions to tackle, regarding low carbon buildings, smart buildings, a more efficient mobility with less impact on pollution, the improvement of the innovation culture of the administration, its citizenship and its local enterprise ecosystem, as well as to root a stronger citizen engagement culture.

This deliverable is devised for the following audiences:

- Public representatives and public workers of Santa Cruz de Tenerife municipality.
- Stakeholders of Santa Cruz de Tenerife ecosystem as it should provide a detailed overview of the goals and replication actions to be implemented by the municipality and each partner.
- Other public representatives and public workers from other municipalities in the region and nationwide.
- Project partners in the other lighthouse and follower cities.
- Broader public which is interested in the details of the replication plan of the city.

1.2. Contributions of partners.

This document has been leaded by the municipality of Santa Cruz de Tenerife and was received the continuous and valuable support in its development by the partner 34 Cluster Construcción Sostenible.

Furthermore, numerous organizations from the local ecosystem have participated during the definition of this replication plan as well as a selected group of citizens in the different participatory process.



1.3. Relation to other activities.



Figure 1. Relation D8.8. with other activities

The WP8, presents several interdependencies with several other WPs, in particular it is through Deliverables 8.1 and 8.3 to define Deliverable 8.8.

Interdependencies:

WP1 develops seven deliverables. D1.1 helps to select KPI for D.8.8. Deliverables from D1.2 to D1.7 orientate with basic working lines for replication use about the demonstration activities of the five TT#.

WP2 helps to gain further information for replication activities of SCT, thanks to cooperation with other lighthouse projects (D.2.1), in particular about KPIs (D.2.3), and it might be of help at a later stage of the project regarding ICT interoperability (D.2.2)

WP3 business models deliverables (from D.3.1 to D.3.9) a truly relevant for replication plan in SCT, since all replication actions should be financially sustainable based on bankable business models.

WP4 represents the foundations for pre-defining the SCT CIP as well as support its development. SCT CIP, will let citizens and third-party developers to access, visualize and use the data stored and organized in order to be informed as well as create new business models and companies to boost the local economy based on data.



WP5, WP6 & WP7. D8.8. is mainly fed by the contributions made during the implementation of the Integrated Solutions of each LHC (WP5, WP6 and WP7). The associated deliverables creates the conditions for SCT to study the feasibility of each selected Integrated Solution for replication in the city.

WP9. The monitoring and evaluation of the SCT replication plan together with the selection of effective KPIs will let the city know the impact of the integrated solutions and correct possible deviations.

1.4. Structure of the deliverable.

In order to present the integrated solutions chosen for replication in SCT this document has de following structure;

Chapter one contains objectives, contribution of partners and relation to other activities within IRIS project.

Chapter two covers the methodology employed for defining the present replication plan.

Chapter three presents city needs, challenges and prioritization.

Chapters from 4 till 8 describe the selected integrated solutions of each TT#. These chapters present for each integrated solutions the following main steps; brief summarize of the TT#, the mapping of stakeholders expected to be involved in replication activities, identifying knowledge gaps, capacity building and knowledge transfer related in each TT#, and the detailed description of every integrated solution.

Chapter nine presents the summarize of the use cases and measures of SCT

Chapter 10 presents the interdependencies amongst other WPS and tasks.

Chapter 11 and 12 content final conclusions and references of this deliverable.



2. Methodology.

2.1. Introduction.

This chapter presents the methodology adopted in the framework regarding Task 8.5 SCT Follower City replication activities. This work involves arranging coordination structures and procedures that will let an adequate replication of the designated integrated solutions. In order to achieve these goals, the main actions embarked on are the following:

- Creating *ad hoc* SCT coordination structures.
- Identifying actors in SCT municipality and CCS to assign roles and responsibilities in the coordination and strategic areas aligned with TT#.
- Identifying SCT ecosystem and communication at SCT ecosystem.

• Internal and external dialogue to further study of integrated solutions and to launching the selection process of SCT integrated solutions.

• Aligning project planning and investments with activities and investments which were already planned in the city.

• Identification of local risks and mitigation measures. Adaption to COVID crisis.

2.2. Replication methodology.

The general replication methodology followed for the present replication plan is based on Deliverable 8.1 A Roadmap for replication of activities, Deliverable 8.3 Replication tool box and Deliverable 8.2 A mentoring roadmap.



D8.1 A	Roadmap for replication of ac	tivities	
Provides the process	D8.3 Replication tool box		
description of the replication steps needed for successfull	Provides the tools available	D8.2 A mentoring roadmap	
replication, with focus on creation of replication ecosystem and analysis of demonstrated integrated solutions	for the replication activities needed for the replication process.	Provides actions for knowledge exchange and capacity building.	

Figure 2. General replication methodology

In particular, regarding the diagnosis of the city there have been carried out several steps.

Firstly, a profound local diagnosis was achieved following the Sustainable Development Goals methodology in order to reveal what is the Santa Cruz de Tenerife situation regarding these worldwide recognized goals. This has helped to find out specific topics which are correlated to IRIS main goals. Considering these common aspects, the second diagnosis work was attained.

CLIMATE CHANGE					
SDG 7. Affordable and clean energy					
SDG 13. Climate Action					
ENVIRONMENT					
SDG 6. Clean water and sanitation					
SDG 12. Responsible consumption and production					
SDG 14. Life below water					
SDG 15. Life on land					
SOCIAL					
SDG 1. No Poverty					
SDG 3. Good health and well-being					
SDG 4. Quality education					
SDG 5. Gender equality					
SDG 17. Partnership for the goals					
ECONOMY					
SDG 2. Zero hunger					
SDG 8. Decent work and economic growth					
SDG 9. Industry, innovation and infrastructure					



SDG 10. Reduced inequalities	
CULTURE	
SDG 11. Sustainable Cities and Communities	
SDG 16. Peace, Justice and strong Institutions	
Table 2 Areas and ODS general diagnosis	

Green = good situation of the indicator

Yellow = regular situation of the indicator.

Orange = large margin of improvement.

In order to narrow more precisely the interlinked indicators among IRIS goals and specific indicators of the Sustainable Development Goal (SDG), it has been selected a number of 26 out of 50 and grouped in their general areas in Annex I.

Secondly, several public participation on on-line consultation and workshops (see Annex III for the most significant results) were accomplished in order to incorporate the public opinion as well as the local ecosystem contributions in the diagnosis level and the creation process of the replication plan.

2.3. Creation process for replication plan.

The creation of the replication plan was based on a double approach. Firstly, an outside view in order to discover other cities' experiences and gain inspiration as well as increase motivation. And secondly, an inside view with the purpose of revealing city needs and select challenges to be tackled.

The first approach began in accordance to WP2 with a review of other SCC Lighthouses projects using their website as main source. Additionally, several e-mails were sent to request further information with very poor success. Finally, a workshop organized by INEA in Brussels on 26th of January in 2018, where numerous representatives from all SCC Lighthouses projects attended, helped to gain a deeper understanding of many initiatives in execution across Europe.

The inner approach had the following structure. Firstly, the creation of the working team with the public employees of the municipality and the personnel of the local partner, CCS. Secondly, finding the representatives of the organizations of the local ecosystem. Thirdly, developing a participatory process with the local ecosystem and public workers in order to define city needs, challenges, barriers and opportunities.

During the first 24 months of the IRIS project, there have been celebrated two workshops in order to help to define a trustful diagnosis of the municipality as well as shed some light on IRIS vision.

The first workshop, held on the 23rd of November 2018, was conducted as the first testbed of the document; "Smart Cities Guidance Package for Integrated Planning and Management", leaded by Judith Borsboom-van Beurden and Simona Costa. A total of 43 professionals, from enterprises of the local ecosystem as well as public employees from the municipality, participated during this workshop, ranging all areas related to the five Transitional Tracks of IRIS approach. The workshop let participants reflect and debate among cross-sectorial professionals, and in spite of the difficulties to go further along the long



methodology and the lack of time, a common final conclusion was reached. Mobility was the main concern of the participants. More details about this workshop on Annex II.



Figure 3. Cross-sectorial workshop

The second workshop, 19th of June 2019, was conducted by Cluster Construcción Sostenible and the participation of Santa Cruz municipality, with the main goal of helping in defining the Replication Plan of the municipality. In order to attain this target, two objectives were pursued. The first one, identifying three main challenges for every Transitional Track and secondly, sketch the roadmap for these challenges.

Nonetheless, before the workshop it was developed a basic diagnosis for each Transitional Track made in two steps: by technician of CCS based on know-how, support documents and public employees' interviews; later on, this basic diagnosis was improved by the local ecosystem participants by filling online a Google formulary with the basic diagnosis contents.

During the workshop, thematic tables were created counting on 30 professionals from the local ecosystem, associations and public workers from the municipality. 5 thematic working tables comprised by four till nine persons debated in order to attain consensus among them with the SWOT analysis presented (the one obtained during the online phase), the three main goals for the thematic area / Transitional Track and the roadmap of actions to achieve these three goals. See results of the workshop on Annex III.



Figure 4 Challenges & Roadmap Workshop

A third set of workshops took place in December 2019 as part of the review of the strategic plan of SCT city. This process had a wider approach focused on updating the current strategic plan and, indirectly, validate or not the results of the specific IRIS participation process. This set of workshop were structured in three sessions, where a representative chosen group of 40 citizens out of 150 previous participants,



comprising different ages, genders, ethnics groups, districts or sectors...), the mail goal was to set the main vision for the SCT city. First, there is an ecological sustainability, by means of attaining a zero ecological footprint of the city and its re-naturalization of the city. And second, focusing on people, by empowering them and taking more care to people.

These results of the strategic vision for SCT have been positively aligned with IRIS previous workshops, since the following replication solutions fit in this vision.



Figure 5 Strategic vision for SCT Workshop

2.4. Solutions chosen for replication.

Santa Cruz de Tenerife, as every other city, has its own particularities but the one related to climate, is by far, the most significant one which makes the difference compared to the LC's initiatives. For instance, there is not final interest on any heating initiative. In order to merge local reality with replication solutions, in some cases a few measures from the replication actions have been selected and study for further accomplishment. In other cases, there are more direct correlation among LC replication actions.

Furthermore, the replication solutions are not meant to be executed in a very specific part of the city as a compact demonstrator, but on the contrary, on a more or less scattered set of demonstrative experiences to penetrate into the city on different spaces and levels. Nonetheless, the project is expected to encourage the city transformation.

The following tables are the integrated solutions (highlighted in green) of LHC, which are related with the selected measures for SCT. This shows the first inspiration step for SCT to define its replication actions accordingly with the previous participatory process.

IS 1.1. Positive Energy	TT# 1		
Lighthouse City	Deliverable	Description	Specific measure
Utrecht	5.3	Smart renewables and closed- loop energy positive districts	District wide PV NZEB refurbishment
Nice	6.3	Smart renewables and near zero energy district	building scale: PV and a battery storage system
Gothenburg	7.3	Flexible electricity grid networks	Viva positive energy sub-district



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Santa Cruz de Tenerife	8.8	Replication actions of Santa Cruz de Tenerife	Solar PV Schools Social Dwelling Retrofitting in La Alegría and San Andrés neighbours Smart Public buildings "La Gerencia-Tome Cano"

Table 3. Solutions for replication IS 1.1

IS 1.2. Ne	TT# 1		
Lighthouse City Deliverable		Description	Specific measure
Utrecht	5.3	Smart renewables and closed- loop energy positive districts	NZEB refurbishment
Nice	6.3	Smart renewables and near zero energy district	Collective self-consumption at building scale: PV and a battery storage system
Gothenburg	7.3	Flexible electricity grid networks	Viva positive energy sub- district
Santa Cruz de Tenerife	8.8	Replication actions of Santa Cruz de Tenerife	Social Dwelling Retrofitting in La Alegría and San Andrés neighbors

Table 4. Solutions for replication IS 1.2

IS-2.1: Flexible electricity grid networks			TT# 2
Lighthouse City	Deliverable	Description	Specific measure
Utrecht	5.3	N/D	N/D
Nice	6.3	Utilizing 2nd life batteries for smart large-scale storage schemes	To be defined a demonstrator
Gothenburg	7.3	Smart renewables and near zero energy district	Viva Measure 200 kWh electricity storage in 2nd life batteries powered by 140 kW PV.
Santa Cruz de Tenerife	8.8	Replication actions of Santa Cruz de Tenerife	Smart Public buildings "La Gerencia-Tome Cano"

Table 5. Solutions for replication IS 2.1



IS 2.3 Utilizing 2 nd lif	e batteries fo	r smart large scale storage	
schemes.			TT# 2
Lighthouse City	Deliverable	Description	Specific measure
Utrecht	5.3	N/D	N/D
Nice	6.3	Utilizing 2nd life batteries for smart large-scale storage schemes	To be defined a demonstrator
Gothenburg	7.3	Smart renewables and near zero energy district	Viva Measure 200 kWh electricity storage in 2nd life batteries powered by 140 kW PV.
Santa Cruz de Tenerife	8.8	Replication actions of Santa Cruz de Tenerife	"Smart La Gerencia"

Table 6. Solutions for replication IS 2.3

IS 3.1. Smart Solar V2G EVs charging.			TT# 3
Lighthouse City	Deliverable	Description	Specific measure
Utrecht	5.5	Smart e-Mobility Sector	V2G e-cars V2G e- buses
Nice	6.5	Activities on NCA	Smart charging infrastructure
Gothenburg	7.5	Activities on Smart e- mobility	Viva Measure 200 kWh electricity storage in 2nd life batteries powered by 140 kW PV.
Santa Cruz de Tenerife	8.8	Replication actions of Santa Cruz de Tenerife	Sustainable Street Santa Cruz EV Charging System TITSA E-Bus

Table 7Solutions for replication IS 3.1



IS 3.2. Innovative Mobility Services for the Citizens			ТТ# 3
Lighthouse City	Deliverable	Description	Specific measure
Utrecht	5.5	Activities on Smart e- mobility	Car sharing suspended
Nice	6.3	Activities on Smart e- mobility	Car sharing suspended
Gothenburg	7.3	Activities on Smart e- mobility	Brf Viva
Santa Cruz de Tenerife	8.8	Replication actions of Santa Cruz de Tenerife	Personal Mobility Strategy (substituting Car sharing initiative due to COVID19)

Table 8. Solutions for replication IS 3.3

IS 4.1. Urban Monitoring		TT# 4	
Lighthouse City	Deliverable	Description	Specific measure
Utrecht	5.6	Activities on City Innovation Platform and information services	Smart Street Lighting with multi- sensoring
Nice	6.6	Activities on City Innovation Platform and information services	Sensors data collection in air quality
Gothenburg	7.6	Activities on City Innovation Platform and information services	-
Santa Cruz de Tenerife	8.8	Replication actions of Santa Cruz de Tenerife	Sensors data collection in air quality

Table 9. Solutions for replication IS 4.1



IS-4.2: City Management and Planning			TT# 4
Lighthouse City	Deliverable	Description	Specific measure
Utrecht	5.6	Activities on City Innovation Platform and information services	Monitoring E-Mobility with LoRa network
Nice	6.6	Activities on City Innovation Platform and information services	Data control and monitoring for Smart e-mobility
Gothenburg	7.6	Activities on City Innovation Platform and information services	City Information Model Pilot
Santa Cruz de Tenerife	8.8	Replication actions of Santa Cruz de Tenerife	CIM pilot

Table 10. Solutions for replication IS 4.2

IS 4.3. Innovative Mobility Services for the Citizens		TT# 4	
Lighthouse City	Deliverable	Description	Specific measure
Utrecht	5.6	Activities on City Innovation Platform and information services	Monitoring E-Mobility with LoRa network
Nice	6.6	Activities on City Innovation Platform and information services	Data control and monitoring for Smart e-mobility
Gothenburg	7.6	Activities on City Innovation Platform and information services	-
Santa Cruz de Tenerife	8.8	Replication actions of Santa Cruz de Tenerife	EV Charging Control System

Table 11. Solution for replication IS 4.3



IS-5.1: Changing everyday energy use			TT# 5
Lighthouse City	Deliverable	Description	Specific measure
		Activities on Citizen	Community building by change agents identification tool
otrecht	5.7	feedback	Campaign District School Involvement: involvement of young people in district schools
Nice	6.7	Activities on Citizen Engagement and motivating feedback	Citizens individual engagement - IOT invoices
	1	1	
Gothenburg	7.7	Activities on Citizen Engagement and motivating feedback	PET: Personal Energy Threshold application
		-	
Santa Cruz de Tenerife	8.8	Replication actions of Santa Cruz de Tenerife	IRIS Monitoring Platform: Environmental Information

Table 12. Solution for replication IS 5.1

IS-5.3: Living labs			TT# 5
Lighthouse City Utrecht	Deliverable	Description Activities on Citizen Engagement and motivating	Specific measure Co-creation activities in Local
Nice	6.7	feedback Activities on Citizen Engagement and motivating feedback	-
Gothenburg	7.7	Activities on Citizen Engagement and motivating feedback	Residential digital assistance citizen engagement activities VR BIM: the Building Information Modeling platform based on 3D
			Virtual Reality environment
Santa Cruz de Tenerife	8.8	Replication actions of Santa Cruz de Tenerife	VR BIM: the Building Information Modeling platform based on 3D Virtual Reality environment

Table 13. Solution for replication IS 5.3



IS-5.4: Behaviour changing information			TT# 5
Lighthouse City	Deliverable	Description	Specific measure
Utrecht	5.7	Activities on Citizen Engagement and motivating feedback	VR New Home and District Experience
Nice	6.7	Activities on Citizen Engagement and motivating feedback	Urban Environmental Monitoring project
Gothenburg	7.7	Activities on Citizen Engagement and motivating feedback	Personal Threshold Application
Santa Cruz de Tenerife	8.8	Replication actions of Santa Cruz de Tenerife	Public awareness campaign Energy – School & Collège; Youth & Family

Table 14. Solution for replication IS 5.4



3. City needs, challenges and prioritization.

3.1. City context and relevant action plans.

SCT municipality has a population of 209.194 inhabitants, being located in the North-East of Tenerife Island, in the Atlantic Ocean close to Occidental Sahara (Africa). SCT has a strong bond with San Cristóbal de La Laguna city with whom form the largest urban area of the Canary Islands. It is regional capital (shared with Las Palmas de G.C.) of the Canary autonomous community. This community has a geographical strategic situation since it is the main hub communication among Europe, Africa and South America. In particular SCT has a harbor where goods and more than 500 cruises arrive every year.

SCT has more than 4.000 sun radiation hours per year, what is the most sun exposed zone in the European Community (together with other UPR). This fact represents a clear asset regarding the compromise of the city with the Covenant of Mayors, in 2015. In 2015 SCT had achieved a 15.42% CO₂ reduction from 290.236 CO_2 ones till 245.524 CO_2 tones, via public buildings lighting improvement, efficient traffic lights, improvements in the efficient water distribution and the new efficient leasing of the municipal vehicles fleet. 2020 reduction is expected to reach, at least, 20%.

The main plans to reduce carbon footprint of the city are three. Firstly, the EDUSI "Anaga en el Corazón" where 17.6 million of euros will finance a set of actions to reduce CO_2 emissions. Secondly, the new urban waste management contract for 168.8 million of euros with the goal to increase recycling process and CO_2 reduction via a more efficient vehicles fleet. Thirdly, the new mobility plan which will pursue the CO_2 mitigation regarding private mobility. Furthermore, the current IRIS project and its replication actions are a new step forward to this goal.

There are other remarkable assets of SCT city which are important such as Anaga UNESCO Biosphere Reserve with its natural biodiversity, landscape and associated culture. The Carnival world widely recognized international festivity. Furthermore, there is an advantageous economical and tax regime which is truly attractive for international investments.

3.2. Challenges and needs analysis.

Accordingly SCT vision workshops, the Sustainable Development Goals Diagnosis and the specific IRIS participatory process; there are clear challenges and needs to be tackled.

In order to attain the vision of an ecologically sustainably city, it is foremost indispensable to improve the air quality, increase the supply of desalinized water, expand the green areas of the city, augment the kilometer zero food production and advance in the water sewage treatment among the most important challenges; all achieved with almost zero carbon footprint source of energy.



- Regarding air quality, traffic of fossil fuel based vehicles are the main cause of contamination apart from other impacts on people's quality of life such as ab/use of the urban space and physical dangers. New mobility solutions must be developed to solve this priority need such as redesigning logistics, urban planning, better and multimodal public transport.
- Considering that water is very scarce vital good in Tenerife and due to the fact that the main supply comes from the subsoil from the extinguishing so-called fossil waters; SCT has an important activity in water desalinization. However, this is a very intensive energy process (expensive and CO₂ emitter). Optimizing these technologies and compensating carbon footprint with RES is as important as increasing the production of water volume.
- Expanding the green areas of the city is an international trend as a way of increase the quality of life of citizens of the cities, apart from its consistent positive ecological impacts. The most promising challenge on this issue will be the recovery of the refinery soils for the city, which might take place in the coming years.
- Concerning the kilometer zero food production SCT faces a mayor challenge since it would be against the rural abandoning global trend. Nonetheless, SCT still has important and fertile lands for this purpose.
- Due to historical reasons, in all Canary Islands, water sewage has suffered a minor investment compared to population's growth, hence there is an important lack of modernizing and enlarging water sewage treatment and reutilization system. These infrastructures are also energy consuming, thus associated RES must be integrate in the already budgeted public investments (300 million of euros of all Tenerife Island).

On the other hand, in order to conquer the vision of aiming on people, is primary essential empowering them and taking more care to people.

- Empowering people requires that citizenship reaches as high rate of employment as possible. A better education and training is also necessary to increase capacitation and job opportunities, in particular the knowledge of foreign languages is an asset in a touristic city.
- Empowering people involves a strong culture and principles of participation and engagement. More positive participation experiences are need to motivate population and a more robust participation structures and processes need to be put into motion.
- Empowering people comprises creating the right open data connectivity to boost opportunities to new business models for citizens/entrepreneurs.

Taking more care to people is a truly necessary vision due to aging population and social inequalities. Attaining a high standard on taking care of citizens might attract more people looking forward SCT quality of life and the caring services of the city. Creating a more accessible city, with better public services, with good professionals on 3rd age assistance with a strong volunteering culture in the general population will help to improve SCT profile in caring for people.



4. Transition track #1: Smart renewables and closed-loop energy positive districts.

4.1. TT#1 Replication in a nutshell.

In general, the replication actions regarding smart renewable and closed-loop energy positive districts, in Santa Cruz de Tenerife, pursues to create the foundations of a new city strategy regarding carbon footprint balance of the public administration, as well as to stablish a positive experience which might be of reference for the future social dwelling retrofitting ambitions and work methodology.

The LH demonstration project regarding TT#1 are the following;

Utrecht :

12 apartment buildings of social housing corporation Bo-Ex (644 apartments in total). The adopted solutions ranged from district-scale integrated PV-system, RES and LT district heating, energy savings towards NZEB, installation of innovative HEMS (feedback on energy related parameters), to smart hybrid heat pump.

Nice:

Collective self-consumption at building scale (commercial and residential) in Nice Méridia on two positive energy new buildings (PALAZZO MERIDIA and IMREDD buildings). A smart control system to be implemented and tested in Les Moulins on two degraded high-rise buildings (132 apartments) enabling to adjust the heat supply to the individual demand in each apartment. A Local Energy Management Dashboard (urban scale) to be implemented and tested in Grand Arénas on a waste heat recovery system.

Gothenburg:

A positive energy sub-district (6 buildings, 132 apartments) with trading PV energy surplus with another 55 buildings. HSB Living Lab will demonstrate will test solar cells on renovation process to be able to compare and evaluate from a technical and economic point of view.

4.2. Selection process.

Considering that SCT does not have heating requirements in building due to its mild climate, all demonstration actions related to heating have been discharged. However, despite the large differences between climate and economic parameters among Utrecht and Nice compared to SCT, building retrofitting experience in social housing were selected with these two cities, since SCT has a long tradition working in this field and there is great capacity to learn from it. Furthermore, SCT still have a large amount of social housing buildings to be retrofitted.



4.3. Mapping of stakeholders.

The most relevant stakeholders which should be involved in the replication process of this integrated solution are the following accordingly with the type of project. Regarding the social-housing retrofitting, the stakeholders are:

- SCT municipality
- Gerencia de Urbanismo (a public entity responsible for city planning of the city)
- Communities of neighbors from the affected buildings in Barrio de la Alegría and San Andrés.
- Private companies related to different fields:
 - Architect Study (up the procurement process)
 - Construction company
 - PV and monitoring providers

Regarding the Public School PV installation, the stakeholders are:

- SCT municipality
- Education Department of the Canary Island Government.
- Private companies related to different fields:
- PV and monitoring providers

4.4. Identified knowledge gaps.

As mentioned before, SCT has a long record of social-housing retrofitting counting on the building and retrofitting local ecosystem, which represents an important weight on local economy. In addition, Canary Island has an important renewable energy companies with long experience in the region as well as in third countries. Therefore, the know-how on this TT1# is fairly large for the goal of this initiatives.

On the contrary, despite the ITC local companies it seems that it could represent a gap the needed experience on developing Local Energy Management Dashboard to manage complex energy system at the communitarian building. This identified knowledge gap is covered through the knowledge exchange activities among the IRIS partners.

4.5. Capacity building and knowledge transfer.

In order to define the current replication plan SCT has made use of the knowledge transfer served by IRIS partners. Workshop, webinars as well as peer-to-peer meetings have provided important information to improve this document solving issues and questions regarding positive energy building and social-housing retrofitting, nonetheless deliverables 5.1, 6.1 and 7.1 have been the reference document of SCT RP working team.



4.6. IS-1.1: Positive Energy Buildings. PV Schools.

4.6.1. Baseline

Santa Cruz de Tenerife currently has 12.5 kWp of PV capacity working on 2 different buildings (Casa Forestal and Policía Local 3 de Mayo). Furthermore there are 7 other building with 91 kWp PV installation pending on energy distribution company authorization to be launched.

- Measure #2: PV Schools
- → TT#1 –IS-5.4: Behavior changing information

4.6.2. Ambitions:

The ambitions for PV Schools initiative is to balance the carbon footprint of 13 public schools of the municipality. Furthermore, there is an additional social benefit by using the new regulation which allows to partially compensate the energy cost of nearby families with social needs. A fine approach of the impact might show 397,06 kWp total solar energy production.



Figure 6. CEIP Tomé Cano. Urban School



Figure 7. CEIP El Tablero. Rural School



4.6.3. Planning of replication activities

A feasibility studio has been accomplished, as well as the preparation of a grant proposal ($386.000 \in 85\%$ of ERDF funds). SCT will lead this project accordingly with the funding pace. It is expected to be finished at the end of 2022. Once tenants had returned to their homes.

4.6.4. Organization of work

Since it is a public initiative for public buildings, the municipality of Santa Cruz leaded by Public Services department will be the coordinator of the action. CCS will support SCT on decision process. The project partners will be subcontracted in order to deliver the needed services such as technical definition of the project, material supply, software monitoring system, and installer.

Public Services SCT municipality	Coordinator. Javier Ignacio Fdez. Rguez.
Educational Department	Antonio Jiménez Gutiérrez de Tena
Private company 1/2/3	Suppliers (up the procurement process)
Private company 4/5/6	Maintenance service

4.6.5. Data collection and management

All PV energy production data as well as energy consumption data, either kWh in different periods or energy costs, will be monitored in order to provide raw data for benefit/cost analysis. Data shall be disaggregated to the school level as well as under an aggregate approach for a general view. This is information should be integrated into the IRIS Monitoring System.

4.6.6. Barriers and drivers

- Political barrier.
 - Other political interest regarding the budget limitation.
 - There is a fragmented political power in the municipality leading to several changes of leadership. This might affect to different initiatives.
- Economical barrier.
 - Despite the positive cost/benefit balance, the initial investment is high.
- Sociological driver.
 - It is expected to happen a positive reaction from educative community due to its positive impact on environment as well as an educational resource.
- Technological driver.
 - PV is a very mature technology with a very competitive cost.
 - Legal / Regulatory framework driver.
 - Currently there is a very favorable regulatory framework.
- Environmental driver.
 - $\circ~$ A significant reduction of the carbon footprint of these public buildings.


4.6.7. Specifications

The optimal system defined on the feasibility study stablish a PV capacity of 207,74 (kWp), with a 35% self-consumption and a 38.86% of the renewable energy self-produced, a 290 Tm CO₂ saving every year, an initial investment of 383.647,71 \in , with a year saving of 37.416,81 \in , with a 11.79 payback.



Figure 8. Location of the 34 public schools

4.6.8. Citizen engagement

There are three levels for citizen engagement. Firstly, IRIS monitoring system where general public can access to the data. Secondly, the educative community will count on these resources in order to use it for educative purpose. And thirdly, the families with economical needs will receive a direct economic impact which is expected to be turn into a more engaged community regarding PV and climate change. This procedure is carried out in accordance with the national regulation. In this case municipal Social Services will designate selected homes located under a 500 meters buffer zone from each PV installation, and will inform to the energy distributor that they will be the beneficiaries of the PV energy surplus. Hence, this measure is located in the second step of the citizen engagement ladder "Story telling".

4.6.9. Business model

The business model is based on the recovery of the public investment in a short-term basis, for an initial financing of 383.647,71 euros. The goal is to start from an 8.52 years payback approach to a more reduced time considering public funding (85%) attaining 1.27 years payback; to re-invest the benefit in more public PV installation, to create a virtuous circle of fossil-fuel continuous independency and a constant reduction of the municipality energy bill.



4.6.10. Governance

The energy production monitoring system will let to manage the different installations in order to know if production is under normal working conditions or if it is required any specific action (cleaning due to "calima", re-boot inverters or guarantee claim among others).

4.6.11. Impact assessment

IRIS monitoring system will let analyze the success of PV Schools at first level, such as CO_2 reduction, and cost reduction.

КРІ	Parameter(s)	Definition	Baseline	Target
1. CO2 reduction	Ton of CO ₂	Number of CO ₂ kilograms reduced compared before RES.	The building without RES installed	119 ton CO ₂ reduction / year
2. CO2 reduction cost efficiency	CO ₂ Ton/Euros	CO2 emissions per ton for purchased electricity.	The building without RES installed	30%

Table 15. IS 1.1 KPIs

4.6.12. Implementation plan

The implementation plan of PV Solar Schools is being already launched with the Initiation and planning phases totally completed.

Execution phase will begin once the funding are conceded by IDAE. In order to launch this stage of this measure, firstly the procurement process needs to be started. This is the most crucial step since it requires long period in the internal procedure. It is divided into two steps; Technical design and Works Direction procurement and Material and Installation Supply procurement.

The most relevant issue during implementation is to comply with the time schedule since the funding to be received is strict on these terms. This is the reason that the first stage of procurement will be launch in February 2021 in spite of not being totally sure of receiving the public funding.



4.6.13.	WBS - W	lork Breakde	own Structure	& Gantt chart
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35 PV Schools												
1 Initiation	2 Planning	3 Execution	4 Closeout									
1.1. Feasibility study	2.1. Plan Schedule	3.1 Manage communication and city engagement	4.1 Impact assessment									
1.2 Fieldwork,			4.2 Integration with SCT									
dimension and	2.2. Plan Resource	3.2. Manage procurement	Smart City Monitoring									
budgeting			System									
1.3 Proposal												
preparation and	2.3. Plan Budget	3.3. Manage changes										
funding												
	2.4. Plan Pick management	3.4 PV and monitoring system										
	2.4. FIAIT NISK IIIdildgelilelit	set up										



Figure 9. Gantt IS 1.1 Positive Energy Buildings

4.6.14. Financing schemes and opportunities

The Ministry of Industry by means of the IDAE organization, is coordinating ERDF which are still calling for proposals up to the end of 2020 regarding renewable energy. The co-financing for Canary Islands regions is 85% (this means 15% of municipal contribution; so far 57.547,15 euros. CCS will work on the proposal as a specific contribution to SCT replication plan.



4.7. IS-1.2: Near zero energy retrofit district. Social dwelling.

4.7.1. Baseline

Santa Cruz de Tenerife currently provide 57 and 21 social dwellings respectively families, in the neighborhoods of La Alegría and San Andrés. The average age of the buildings is twenty years and both are legal property of the municipality. There is a regular maintenance as well as retrofitting actions based on regional, national and local funds besides of dwellers expenses. Local climate makes bioclimatism as advantage to attain comfortable and energy low demanding buildings. On the contrary, most of the calculations regarding the return of investments shall be revised accordingly with the previous sentence.



Figure 10. Social dwelling in San Andrés neighbourhood



Figure 11. Social dwelling in La Alegría neighbourhood

4.7.2. Ambitions

The present replication action serves to develop the first social dwelling retrofitting experience in SCT; combining bioclimatic criteria with renewable energies and monitoring. In addition, a strong cost-benefit study shall be developed for a better understanding of these type of initiatives in order to be replicated



along the coming retrofitting funding periods. The final goal is to imbricate the social dwelling retrofitting policy with the learnings of this project.

4.7.3. Planning of replication activities

The public procurement was launched in September 2020, thus before June 2021 the architecture and engineering design of the near zero carbon retrofitting solutions will be finished. With this document, new procurement process regarding the retrofitting itself will launch. Therefore, it is expected to start the works at the beginning of 2022. Participatory process regarding energy APP use will arrive once the buildings are ready to live in.

4.7.4. Organization of work

The municipality of Santa Cruz develops its social dwelling policy through the public entity "Gerencia de Urbanismo". In addition to this, Infrastructure Service Department of SCT is managing the received EDUSI funds (ERDF) for low carbon retrofitting measures. This team will cooperate to implement the administrative, technical and social elements of this pilot project. Project suppliers will be subcontracted in order to deliver the needed services such as project definition, construction, material supply, software monitoring system, and installers.

Public Service SCT municipality:	Project Coordinator Javier Ignacio Fdez. Rguez.						
	Project developer. Pedro González						
Municipal Housing	Juan Ramón Beltrán. Manager.						
Communities of neighbors	From both buildings (La Alegría & San Andrés neighbourhoods)						
Private company 1	Architect Study (up the procurement process)						
Private company 2	Construction company						
Private company 3	PV and monitoring providers						

4.7.5. Data collection and management

All PV energy production data as well as energy consumption data of the building and in each dwelling, either kWh in different periods or energy costs, will be monitored in order to provide raw data for benefit/cost analysis. Data shall be disaggregated to the school level as well as under an aggregate approach for a general view. This information should be integrated into the IRIS Monitoring System.



4.7.6. Barriers and drivers

- Political
 - There is a fragmented political power in the municipality leading to several changes of leadership. This might affect to different initiatives.
- Economical.
 - There is a current assigned fund (EDUSI).
 - Without specific extra funding technologies are difficult to implement in social dwelling retrofitting measures.
 - Success on the results of the cost/benefit study might create a new mindset on this field.
- Sociological:
 - The complexity of the process itself considering that it will affect 78 families.
- Technological:
 - \circ $\,$ Technologies to be used are matured and local architecture is strong in the region.
- Legal / Regulatory framework.
 - It will be necessary to receive the formal acceptances for monitoring energy consumption. It is likely that the study will have to use a % of the total data available.
 - There are some constrains about gathering the electricity invoices in order study current energy consumption.
- Environmental.
 - $\circ~$ The location is closed to Biosphere Reserve but it is not legally affected, furthermore it will improve the footprint of the buildings.

4.7.7. Specifications

The main goal is transforming the current "normal" two dwelling buildings into a near zero carbon footprint buildings. It is opened to the private designer (to be contracted) provider the design and the solutions to be implemented. Nonetheless, local knowhow state of the art regarding low consumption energy buildings shows that, shading, façade and roof isolation, solar production (hot water and PV) are the most effective measures in the local climate. Communication system for monitoring shall be implemented using standard and open solutions.

4.7.8. Citizen engagement

Residents will be able to see the total energy balance of their building in their resident app, as well as being able to monitor the use of water and electricity of their own household. Residents will have access to the PV production's real time monitoring system in order to let them learn and use PV energy as prosumers instead of consumers. Hence, this measure is located in the third step of the citizen engagement ladder "Co-creation for adoption of existing touchpoint".



4.7.9. Business model

The cost-benefit analysis will show the expected payback of the investments. In this sense it is expected that matured and already demonstrated solutions such as PV system will provide an estimated investment return from four to six years. On the contrary, more heavy measures such façade isolation impact might be difficult to measure and the return might take long term approach. Nonetheless, considering that comfort and quality of life besides CO₂ mitigation, are intangibles but with a very encouraging results on well-being of the dwellers and positive impact of CO₂ reduction.

Furthermore, this pilot project will let to know what type of measures are reasonable to implement in future in local social dwelling retrofitting, with clear reduced payback on one side; and on the other hand, it will give light, accordingly with this experiences, to figure out creative solutions for less affordable measures.

In case there is not enough budget to accomplish this project, there is an alternative plan in order to facilitate to reduce the carbon footprint of the buildings by means of renewable energies implementation. In order to do this, a feasible approach would be financing the needed investment by the municipality of SCT and the payback would be recovered by means of the energy bill savings of the tenants.

4.7.10. Governance

During the project execution it is crucial a fluent communication among Viviendas municipales and the neighbors' buildings. Despite that both buildings are municipal property, this communication is essential for the tenant's acceptance and well performance of the public investments.

4.7.11. Assessment

КРІ	Parameter(s)	Definition	Baseline	Target
1. Degree of energetic self- supply by RES	CO ₂ Tm/Euros	Ratio of locally produced energy used from RES and the energy consumption.	N/A	30%
2. CO ₂ emission reduction	Kg of CO ₂	Number of CO ₂ kilograms reduced compared before RES.	The building without RES installed	647,2 ton CO ₂ reduction / year

The main impact pursued with this project is to reduce CO₂ emissions.

Table 16. IS 1.2 KPIs

The KPI selected to measure the impact is $kWh/m^2/year$, in this extent the minimum goal for this project pursued is to attain 0-15 $kWh/m^2/year$ of primary net energy. In particular, and accordingly with current regulation, the conventional energy use might reach 50-65 $kWh/m^2/year$ but it must be compensated by production 50 $kWh/m^2/year$ with renewable energies *in situ*.



4.7.12. Implementation plan

This measure has been started with the procurement process of the architectural and RES technical execution projects. Planning has been partially established waiting for the execution projects details. The key factor is the communication with the tenants in order to avoid last minute problems, and furthermore, create a positive attitude towards the initiative remarking the benefits and setting solutions before the arise of possible inconveniences. For instance, the time to comply during execution phase is crucial to avoid these types of problems with tenants. Hence, specific procurement clauses should be included to cope with this risk. Monitoring would need to summarize data in order to comply with RGPD.

4./.13. WBS - WORK Breakdown Structure & Gantt cna	4.7.13.
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Social Dwelling										
1 Initiation	2 Planning	3 Execution	4 Closeout							
1.1 Architectural retrofitting measures	2.1. Plan Schedule	3.1 Manage communication and city engagement	4.1 Impact assessment							
1.2 RES selection and integration	2.2. Plan Resource	3.2 Manage procurement	4.2 Integration with SCT Smart City Monitoring System							
1.3 Project definition	2.3. Plan Budget	3.3 Retrofitting works								
	2.4. Plan Risk management	3.4 Monitoring system set up								
5.1 Coordination	5.1 Coordination									
5.2 Monitoring										
WP 5: Coordination and r	monitoring									



		2020							2021 2022											2023								MILESTONE	E WD									
Work Packages and task description																	MC	DNT	HS																	&	LEADER	PARTNER
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WP 1: Design project																																					SCT	Contractor 1
T1.1 Architectural retrofitting measures																																						
T1.2 RES selection and integration		\square																																				
T1.3 Project definition																																				D1		
WP 2: Execution Planning																																					Gerencia Urbanismo	sct
T2.1 Plan Schedule																																						
T2.2 Plan Resource	Π	Т																													Τ	Γ						
T2.3 Plan Budget																																						
T2.4 Plan Risk management																																						
WP 3: Execution																																					Gerencia Urbanismo	Contractor 2
T3.1 Manage communication and city engagement																																						
T3.2 Manage procurement																																				M1 & M	2	
T3.3 Retrofitting works		\square																																		D2		
T3.4 Monitoring system set up																																				D3		
PT 4: Closeout																																					SCT	Gerencia Urbanismo
T4.1 Impact assessment																																						
T4.2 Integration with SCT Smart City Monitoring System																																						
WP 5: Coordination and monitoring																																					SCT	Gerencia Urbanismo
T5.1 Coordination																																						
T5.2 Monitoring		┙																																				
D1. Project desing																																						
D2. Retrofitting finalization																																						
D3. RES integration																																						
M1. End of degining project procurement process																							_															
M2. Launch of the retrofintting contract																																						

Figure 12. Gantt IS 1.2. NXEB

4.7.14. Financing schemes and opportunities

Santa Cruz de Tenerife has been granted funding from the European Regional Development Fund by 400.000 €. The project execution will define the final cost of the actions. In case of extra funding is needed, it will be covered by municipal funds, apart from the already allocated 15% municipal co-financing.

Additionally, there is funding possibility using the PREE program from the National Government (13 million of euros for Canary Islands region until 2021).

4.8 Conclusions on ambitions and planning of activities for TT#1 Smart renewables and closed-loop energy positive districts.

Accordingly with the compromise of SCT municipality with the Covenant of Mayors, carbon footprint reduction in the city is a prior objective. In this regard, and considering the impact of buildings on the behavior of this indicator, SCT municipality addresses two pilot replication actions to create direct impact on its sphere of impact; local public buildings and social dwellings. In the first realm, this replication project will gather demonstrative experience to extend the PV installations on every other local public building across the municipality. On the other jurisdiction, it will help to establish a more carbon awareness policy in the future retrofitting and construction of public dwellings.



5. Transition track **#2:** Smart energy management and storage for grid flexibility.

5.1. TT#2 Replication in a nutshell.

In general, the replication actions regarding smart energy management and storage for grid flexibility, in Santa Cruz de Tenerife, pursues the integration of local vRES, decentralized battery storage and public/private EV charging infrastructure under a common Local Energy Management System. The main objective is study various operation strategies of such connected assets, towards to find the optimization of energy use and cost, making the best of the grid flexibility.

The LH demonstration projects regarding TT#2 which are better aligned with SCT goals are the demonstration made by Utrecht and Nice; in addition it is also of interest the Brf Viva demonstration case with the integration and evaluation of a 200kWh energy storage.

Utrecht:

The municipality of Utrecht shows an important set of measures which will help SCT to attain its goals regarding TT#2. In particular, the measures regarding the 14 V2G e-cars, the 2 V2G e-vans, together with the Solar V2G charging points for e-cars are an important references. However, stationary storage in apartment buildings and the smart energy management system are complementary experiences with real added value for the SCT RP.

Nice:

The demonstration is organised among different service layers, starting from the management of single assets towards the district scale and further, achieve the interfacing with energy service markets via aggregation.

The demonstration activity in Nice pays special attention to the management of self-consumption endeavours via the combination of different energy conversion and storage assets (including electric vehicles (EV) and stationary batteries energy storage systems (BESS) and the valorisation of flexibilities under different operation strategies for relevant flexibility services for the electricity grid. In the case of SCT there will not be focalization in its integration in the existing energy markets. This demonstration will close with the assessment of the feasibility and bankability of a local energy management system (LEMS).

Goteborg:

The new housing cooperative, Viva, with a total of 132 apartments, are deployed de related demonstrators. The pilot demonstration, DC, battery and PV will be evaluated in Akademiska Hus's innovation group: "350 V DC building micro-grid utilizing 140 kW rooftop PV installations and 200 kWh battery storage".



5.2. Selection process.

SCT municipality does not have central city heating infrastructures due to its privileged climate avoids this need. Hence demonstration action related to heating on TT#2 has been cleared. However, despite the large differences between climate and economic parameters among Nice and Goteborg compared to SCT, smart energy management and flexible grid are common areas of interest. SCT has interest in adapting these experiences into local reality, in particular in the public buildings. In order to optimize PV energy and reduce costs, it is considered that several public buildings could be benefited from these two approaches moreover considering the current legal national framework.

5.3. Mapping of stakeholders.

The main stakeholders which might be involved in the replication process of this integrated solution are:

- Municipality of Santa Cruz de Tenerife.
- Consortium of Fire of Tenerife.
- Engineering company.
- VRES Company.
- TITSA Bus Company.
- Electrical supplier and installation.
- Local Energy Management System Provider Company.

5.4. Identified knowledge gaps.

SCT municipality has some experience in PV installation, even larger experience in EV charging systems but any experience in battery storage and very little with the integration of these assess into a Building Energy Management System. Therefore, the knowledge transference will be very useful to define efficiently the goals and eventually attain the right results

5.5. Capacity building and knowledge transfer.

The above identified knowledge gap for this transition track refers to integration of 2nd life batteries and its integration into an efficient Building Energy Management System. These gaps can be tackled through peer to peer meetings, due to Covid 19 virtual site visits of similar solution developed and implemented in Lighthouse or/and Follower cities. The capacity building on this issue can also be done through distributing different technical materials solving particular issues posed by SCT to IRIS partners.



5.6. IS-2.1: Smart Public Building. Smart Gerencia-Tome Cano.

5.6.1. Baseline

"La Gerencia de Urbanismo" building is a large administrative building with 300 workers; and a remarkable energy consumption, which is 380,28 kWh.m²/year, an in total 4.255,76 MWh/year). Comparatively the roof surface is proportionally reduced (440 m²) for PV production. There are two public buildings adjacent to La Gerencia de Urbanismo; the public school "CEIP Tome Cano" (480 m²) y "Santa Cruz Fire Station" (380 m²) with available roof space for RES. In total there is a rough approach 80 kW. The municipality has 3 electrical motorbikes and it is being renew the leasing vehicles fleet and there will be 12 EV charging stations in this building. The integration of 2nd life battery storage as an asset of a complex building energy management system is an innovative contribution. The objective is to establish a feasible usage of 2nd life batteries in a pilot project in order to create the framework for other public buildings across the city.



Figure 13 Gerencia de Urbanismo building from South, Avda. 3 de Mayo.

5.6.2. Ambitions

The main ambition is an effective and feasible economic implementation of the integration of three local vRES (PV and Wind power), decentralized 2nd life battery storage and public/private EV charging infrastructure under a common Local Energy Management System. Once the knowledge transference from LHC is done, there will be done the testing the various operation strategies of such connected assets, towards the delivery of flexibility services to the electric grid. The demonstration is organized from the management of this pilot demonstrator towards its replication on different similar public buildings hubs



across the city, and furthermore to bring it to the district scale by combing public and private actors in future.

5.6.3. Planning of replication activities

This integrated solution is planned to be launched from end 2021 with the procurement process for charging points and the first phase PV installation. The second phase, at the end of 2022, will continue the expansion of the renewable energy by installing more PV panels and wind power capacity; as well as the electrical interconnection between La Gerencia building and the public school "Tomé Cano". In 2022 the BEMS will be deployed accordingly with the previous monitoring system. Eventually, the 2nd life batteries backup system will be installed (either once e-buses batteries available, either price of batteries are more competitive), around end of 2023.

5.6.4. Organization of work

The owner of the building "Gerencia de Urbanismo" is the public body "Viviendas Municipales" which belongs to the municipality of Santa Cruz de Tenerife. The manager of the public building "CEIP Tome Cano" is Public Services Department, from SCT municipality. And the building "Fire Station" belongs to the Fire Consortium (SCT municipality is part of its Standard Committee).

In order to coordinate this project it is essential to develop two minimum viable projects accordingly with the property of the building (Municipality of SCT and Fire Consortium). This team will cooperate to implement the administrative, technical and inter-departmental aspects of this replication action, but if any barrier arises in one of the building the other could continue its progression.

Hence, the investment will be accomplished by two separated public organisms and there should be independent implementation phases:

- Phase A: EV-charging points for E-vehicles (three buildings)
- Phase B: PV and wind power installation for self-consumption (three buildings) interconnection of the buildings.
- Phase C: BEMS for assets integration
- Phase D: 2nd life batteries installation (Gerencia de Urbanismo building)

Project suppliers will be subcontracted in order to deliver the needed services such as project definition, installation of RES, 2nd life batteries supply and the Local Energy Management System.

Public Services Department.	Project Coordinator Javier Ignacio Fdez. Rguez.					
	Project developer. Juan Cano.					
Consorcio de Bomberos de Tenerife	Evelyn del Carmen Alonso Hernández.					
Municipal housing	Juan Ramón Beltrán. Manager.					



Gerencia de Urbanismo

Private company 1

Private company 2

Private company 3

Private company 4

Marta de Olano La Roche. Head Director

Asención Bacallado. Head Director

Project technical definition (up the procurement process)

VRES, buildings interconnection (up the procurement process)

VRES, 2nd life batteries, buildings interconnection (up the procurement process)

Local Energy Management System development/supply.



Figure 14. Aerial view of potential building to be interconnected

5.6.5. Data collection and management

RES production will be monitored in real time as well as the energy consumption in the three buildings with special attention to the different electric lines (EVs, climate, and others) from the La Gerencia de Urbanismo building.

The Building Energy Management System will collect and analyze the energy balance of the system to maximize the use of renewable energies considering the two buildings, considering batteries and the EV-charging point's performances. In another extent, general information regarding energy savings, CO₂ emissions mitigation, rate of solar energy used, among others; it will be shown in IRIS monitoring web site



5.6.6. Barriers and drivers

- Political:
 - There is a fragmented political power in the municipality leading to several changes of leadership. This might affect to different initiatives.
 - $\circ~$ This RA will let SCT innovate and attain more impact on its goals with the Covenant of Mayors.
 - \circ $\;$ There is need of a collaboration agreement among Consortium of Fire and SCT municipality.
- Economical:
 - $\circ~$ The investment of this system will be higher that other more traditional RES initiatives. Therefore, there is uncertainty regarding the return period of the investments.
 - 2nd Life Stationary Battery storage can be more expensive compared to 1st life battery storage systems due to the extra safety measures required
 - \circ ~ Necessary funding with no clear source detected yet.
- Sociological:
 - Citizens might not easily understand this project. Hereafter extra communication effort must be done. If so, citizenship will likely be interested in these solutions since it more circularity.
- Technological:
 - This project represents is more complex initiative in the administrative as well as the technical level.
- Legal / Regulatory framework.
 - $\circ~$ New regulation allows direct interconnection among buildings in 500 meters reach.
 - How could be solved the integration of combined RES production, from different public administration, to balance cost and energy use?
- Environmental
 - \circ A better compliance of the CO₂ reduction goals.

5.6.7. Specifications

Building	Gerencia de Urbanismo	CEIP Tome Cano	Fire Station	Total
PV power capacity	70 kW	35,20 kW	70 kW	150 – 230 kW
Wind power capacity^	10 kW	0	0	10 kW
EV-charging points	12 (1 fast charging + 11 slow charging)	1	1	14
2nd Life Battery Storage	150 kWh	0	0	196 kWh
BEMS	1		1	

Table 17. Specifications of IS 2.1

D 8.8



*Considering the possibility of using the shading structure in East side of the building.

^ This capacity will have to be technically assessed.

5.6.8. Citizen engagement

Regarding the describe measure, there are three levels for city engagement. Firstly the IRIS monitoring system where general public can access to the data. Secondly, the EV APP where citizens will be able to use the EV charging point with renewable energy. And thirdly, as explained in previous citizen engagement section, the families with economical needs will receive a direct economic impact when the storage capacity is fulfill and there is energy surplus into the general net. Hence, this measure is located in the second step of the citizen engagement ladder "Storytelling".

5.6.9. Business model

There are two important elements for the business model of this replication action. Firstly, the already asset represented by the lower energy production cost of PV compared to fuel-oil system. Hence, the investment of PV will be worth it by itself with a fast return period of the investments. And secondly, it is the batteries situation, which is explained in chapter 5.7. IS-2.3.

Technology	Building	Power capacity (kW)	Opertation cost (€/year)	Payback (years)	
	Tomé Cano	35,02	46.839,25	437	9
PV	Gerencia de Urbanismo	70	93.625,00	750	8
	Fire station	70	93.625,00	750	8
Wind power	Gerencia de Urbanismo	10	21.950,00	800	12
	Tomé Cano	1	2250	70	*
EV-charging points	Gerencia de Urbanismo	12	42750	1070	*
	Fire station	1	2250	70	*
Electrical interconnection	All buildings	-	3000	50	?
BEMS			14.950		
TOTAL			321.239,25		

Table 18 Smart Gerencia elements

5.6.10. Governance

The key issue during the Governance of this integrated action is the complexity of actors regarding the ownership of the buildings and the organizations managing. Hence there two main actions to improve the governance.



In first place, the project must be split into two separated but complementary projects. There is the Gerencia and Public School Tomé Cano investments on one hand; and on the other, the Fire Station investments. By doing so, it will be possible to attain the goals despite one administration (Fire Consortium) could eventually step out of the project.

In second place, a strong communication protocols must be sent into motion during the planning phase and continue during the execution phase, among the actors (Viviendas municipales, Gerencia de Urbanismo, Public Services from the municipality and Fire Consortium). Roles, duties and benefits to be gained are going to be key in order to keep motivation and interest until the end of the project execution and along the coming years of operations.

5.6.11. Impact assessment.

The impact assessment is based on the energy self-consumption indicator of the designated buildings. Furthermore, the continuity success indicator will be to increase the scope of this project by adding another public building (CAE Rumeu Health Center, from Regional Government), additionally other projects in different parts of the city also might be replicated accordingly with their own features.

КРІ	Parameter(s)	Definition	Baseline	Target
CO ₂ reduction	CO ₂ tonnes per year	CO ₂ Tonnes saved per year. It includes energy saved accordingly with the emission factor in Canary Island, and the energy released to the grid if so.	N/A	254,83 CO ₂ tonnes
RES self supply ration	%	Amount of renewable energy (kWh) used in the set of interconnected buildings in relation with the total energy used in the set of interconnected buildings	N/A	30%
Energy cost reduction	%	Percentage of cost reduction in energy; amount of euros paid of unit of energy used before and after the investment. It has to include the RES amortization cost for a 8 years period.	0.14 €/kWh	0.09 €/kWh

Table 19. IS2.1 KPIs

5.6.12. Implementation plan

The implementation of this measure requires a detailed assessment of the RES capacities of the building regarding sun and wind, and accomplish inquires to determine the needs and technical requirements regarding EV charging points. Once these initial actions are solved a precise technical project will be developed. Execution planning will be settled accordingly with it. The truncal works will begin execution of the three technical measures; PV & Wind installation, BEMS and battery storage (from IS2.3). But managing communication is prior as well as the procurement process which will be core in terms of time



and importance to comply with legal regulations. Eventually the impact assessment must be achieved by consulting the effectiveness of the integration of this set of technologies with the City Monitoring System.

5.6.13. WBS - Work Breakdown Structure & Gantt chart

Smart Gerencia									
1 Initiation	2 Planning	3 Execution	4 Closeout						
1.1 PV capacity and needs definition	2.1. Plan Schedule	3.1 Manage communication and city engagement	4.1 Impact assessment						
1.2 Wind power assessment and potential capacity	2.2. Plan Resource	3.2 Manage procurement	4.2 Integration with SCT Smart City Monitoring System						
1.3 E-charging points needs and requirement	2.3. Plan Budget								
		3.4 Building Energy Management System							
1.4 Technical project definition	2.4. Plan Risk management	3.5 Battery storage integration							
5.1 Coordination									
5.2 Monitoring									
WP 5: Coordination and m	onitoring								

	2021			2022								2023								2024									20	026												
Work Packages and task description		MONTHS											MILESTONE & DELIVERABLE	WP LEADER	PARTNER																											
		n m	4	10 O	7	8 6	10	11	13	15	16	17	19	21	2	24	8 8	27	33	30	30	33	5 8	37	38	8	41	8	44	18	8	61 62	63	2 8	8 5	5 8	8					
WP 1: Procurement process of project definition and Design project																																							SCT	Contractor 1		
T1.1 PV capacity and needs definition																																										
T1.2 Wind power assessment and potential capacity																																										
T1.3 E-charging points needs and requirement																																										
T1.4 Technical project definition																																						D1				
WP 2: Execution Planning																																							1	SCT		
T2.1 Plan Schedule																																										
T2.2 Plan Resource																																										
T2.3 Plan Budget																																										
T2.4 Plan Risk management																																										
WP 3: Execution																																							SCT	Contractors		
T3.1 Manage communication and city engagement																																										
T3.2 Manage procurement																																						M1,M2,M3&M4				
T3.3 PV and Wind installation																																						D2 & D3		Contractors 2&3		
T3.4 Building Energy Management System																																						M5		Contractor 4		
T3.5 Battery storage integration																																						D4		Contractor 5		
PT 4: Closeout																																							SCT	Contractor 1		
T4.1 Impact assessment																																										
T4.2 Integration with SCT Smart City Monitoring System																																										
WP 5: Coordination and monitoring			ΙT		ΙT		П		IT		IΤ			П		IT		IT		IT		ΙT			IT	Г	ΙT			IT			IΤ		IΤ	IT			SCT	Contractor 1		
T1.2 Coordination											IT					IT						IT																				
T1.3 Monitoring																																										

Figure 15. Gantt IS 2.1 Smart Public Building



5.6.14. Financing schemes and opportunities

Santa Cruz de Tenerife will work on a co-funding proposal focused on European Regional Development Fund period 2021-2027, regarding one of the five main goals; a Greener, carbon free Europe, implementing the Paris Agreement and investing in energy transition, renewables and the fight against climate changeⁱ.

Technology	Building	Funding source	Organization in charge of funding
	Tomé Cano		Municipality of Santa
PV	Gerencia de Urbanismo	PEDER-POPE IDAE.	Cruz
	Fire station	FEDER - Canary Island Government	Fire Consortium
Wind power	Gerencia de Urbanismo	FEDER - Canary Island Government	
	Tomé Cano	FEDER - Canary Island Government	Cruz
EV-charging points	Gerencia de Urbanismo	MOVES2	
	Fire station	FEDER - Canary Island Government	Fire Consortium
Electrical interconnection	All buildings	FEDER-POPE IDAE.	Municipality of Santa
BEMS	All buildings	FEDER - Canary Island Government	Cruz

Table 20 Funding scheme for Smart Gerencia



5.7. IS-2.3: Utilizing 2nd life batteries for smart large-scale storage schemes

5.7.1. Baseline

"La Gerencia de Urbanismo" building, already described on chapter 5.6.1 requires basically from a batteries support in order to attain the goals of the previous measure (5.6. IS 2.1- Smart public building). Considering the specificities regarding using 2nd life batteries here it is explained how this measure should be developed.

5.7.2. Ambitions

Bearing in mind that electric mobility will be wide spread across the world, and the limitations of the batteries for mobility requirements, and considering the needs of reducing the carbon footprint of the buildings; there is a large opportunity to still make good use of them for improving the energy balance of public buildings as testbed for its future extensive use.

5.7.3. Planning of replication activities

TITSA Bus Company has just begun operations with two hybrid bus during second semester of 2020. The lifespan of the exiting batteries is expected to be 6 or 7 years at least. Hence, this measure is likely to be launched during the 2025. Nonetheless, I first test bed with new batteries will be carried out in order to test the BEMS in its full capacity and begin reducing CO_2 emissions in an early stage.

5.7.4. Organization of work

The "Gerencia de Urbanismo" public organization will lead this measure in coordination with Public Services of the SCT municipality. TITSA Bus Company will collaborate within the project as batteries supplier.

"Gerencia de Urbanismo"	Marta de Olano La Roche. Head Director
	Asención Bacallado. Head Director
Public Services Department.	Project Coordinator Javier Ignacio Fdez. Rguez.
	Project developer. Juan Cano.
Private company 1	Project technical definition (up the procurement process)
Private company 2	Installation of 2 nd life batteries, (up the procurement process)



5.7.5. Data collection and management

Data collection will be integrated in the BEMS and its information will also be inserted in the City Monitoring System.

5.7.6. Barriers and drivers

- Political:
 - Positive approach by doing Circular Economy in the local context.
- Economical:
 - 2nd life batteries should be free of charge but it could be difficult to obtain them accordingly with the e-bus contract.
 - 2nd Life Stationary Battery storage can be more expensive compared to 1st life battery storage systems due to the extra safety measures required, hence a feasibility study must be done in order to decide if this measure is executed as planned or turned into first life battery system.
- Sociological:
 - Public interest in good management of public resources (from buses to buildings).
- Technological:
 - \circ $\;$ Storage solutions are increasing in the market.
 - \circ $\;$ New solutions may arise providing other storage system technology.
- Legal / Regulatory framework.
 - No regulatory constrains
 - It is still to be defined if the contract from SCT, TITSA Bus Company and Vectia Bus suppliers allows the battery property by SCT or it needs further negotiation.
- Environmental
 - $\circ~$ A better waste management with increasing circular use of products such as batteries.

5.7.7. Specifications

Building	Gerencia de Urbanismo	CEIP Tome Cano	Fire Station	Total
2nd Life Battery Storage	196* kWh	0	0	196* kWh
New Batteries storage	20 kWh			20 kWh

Table 21. 2nd life batteries specifications

*This is a nominal capacity, but the real capacity will be less since it will be 2nd hand batteries.

The storage capacity with 2nd life batteries is expected to reach the 196 kWh, considering that each bus has a 44 kWh batteries capacity and that there will be 4 operative buses along 2021. This capacity will be installed in several phases, accordingly with the generation of these 2nd life batteries coming from TITSA e-buses, once they lifespan is finished on the buses.



5.7.8. Citizen engagement

This measure will be publicly communicated by IRIS monitoring system where general public can access to the data. A press released will be done when beginning operations. Hence, this measure is located in the first step of the citizen engagement ladder "Awareness".

5.7.9. Business model

Nowadays, new batteries are still too expensive to see a clear economic viability. However the breaking point for economic viability is expected to be before 2023. Hence, the first testbed for new batteries would be from this moment. However the main benefit will come when installing 2nd life batteries from public electric buses.

Technology	Building	Power capacity (kW)	Cost (€)	Opertation cost (€/year)	Payback (years)
2nd Life Battery Storage	Gerencia de Urbanismo	196 kWh	20.000*	200	?
New Batteries Storage	Gerencia de Urbanismo	20 kWh	4.000	200	8

Table 22. Costs of 2nd life batteries

*This amount regards the project definition and the installation considering the connection, racks and safety measures.

Regarding the second life batteries, there is an important element for the business model of this replication action, it is the fact that batteries are still too expensive to see a clear economic viability. On the other hand, batteries from E-buses are going to become a waste problem if a solution is not found. In this regard, using them in buildings for energy storage after their life on EVs is an optimal solution to try to enlarge the loop before its recycling. In the local context, there is an opportunity to reuse e-buses batteries as well as other EVs from the public corporation. Using 2nd life batteries with low investment cost will let use the energy from vRES when not directly used. This project pursues to validate that this is also a feasible economic solution to be replicated in other public buildings.

Nonetheless, accordingly with Gothenburg demonstration experience, cost could rise in a not viable scale. So SCT replication plan will need to be review when new info is released by this LHC.

5.7.10. Governance

The main governance issue is to define the transition of the batteries from the bus use considering TITSA Bus Company needs and SCT will to keep exploiting the batteries.



5.7.11. Impact assessment

КРІ	Parameter(s)	Definition	Baseline	Target
1. CO2 reduction	Tonnes of CO ₂	Number of CO ₂ kilograms reduced compared before RES.	The building without RES installed	120 CO ₂ tonnes reduction / year
2. Degree of energetic self- supply by RES	%	Ratio of locally produced energy used from RES with batteries and the energy consumption.	The building without RES installed	60%
3. Increase the building interconnected	Number	Number of new building interconnected with the system.	2	1 in two years

Table 23. IS 2.3 KPIs

5.7.12. Implementation plan

This measure, as part of IS 2.1 on chapter 5.6 Smart Gerencia, depends on the batteries availability. Since 2^{nd} life batteries will be available from 2026, this horizon is too far to complete the measure Smart Gerencia. Therefore, a set of new batteries with medium storage capacity will be deployed in the system in order to let fully run the BEMS.

5.7.13. WBS – Work Breakdown Structure & Gantt chart

2nd life batteries storage system											
1 Initiation	2 Planning	3 Execution	4 Closeout								
1.1 Storage system design (new and 2nd life)	2.1. Plan Schedule	3.1 Manage communication and city engagement	4.1 Impact assessment								
1.2 Integration with RES	2.2. Plan Resource	3.2 Manage procurement	4.2 Integration with SCT Smart City Monitoring System								
1.3 Technical project definition	2.3. Plan Budget	3.3 Installation of storage system									
	2.4. Plan Risk management	3.4 Monitoring system set up									
5.1 Coordination											
5.2 Monitoring	5.2 Monitoring										
WP 5: Coordination and m	WP 5: Coordination and monitoring										



			2022 20			023					2024						2026								MILESTOP	E um																	
Work Packages and task description																				MOI	NTH	s																			&	LEADER	PARTNER
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WP 1: Procurement process of project definition and Design																																											Contractor
project																																										SCT	1
T1.1 Storage system design (new and 2nd life)																																											
T1.2 Integration with RES																																											
T1.3 Technical project definition																																									D1		
WP 2: Execution Planning																																										Contracto 1	r SCT
T2.1 Plan Schedule																																											
T2.2 Plan Resource																																											
T2.3 Plan Budget																																											
T2.4 Plan Risk management																																											
WP 3: Execution																																										SCT	Contractor 2
T3.1 Manage communication and city engagement																																								Т			
T3.2 Manage procurement																																									M1 & M	2	
T3.3 Installation of storage system																																									D2		
T3.4 Monitoring system set up																																											
PT 4: Closeout																																										SCT	Contractor 2
T4.1 Impact assessment																																											
T4.2 Integration with SCT Smart City Monitoring System																																											
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T1.2 Coordination																																											
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D1. Project desing			T		T					T																				T	T						T						
D2. Installation of storage system finalization																																											
M1. End of degining project procurement process																																											
M2. Launch of the storage system contract																																											

Figure 16. . Gantt IS 2.3 2nd life batteries

5.7.14. Financing schemes and opportunities

Technology	Building	Funding source	Organization in charge of funding
2nd Life Battery Storage	Gerencia de Urbanismo	2nd life batteries are already of its property (using on e- buses) Own sources will be used for new batteries	Municipality of Santa Cruz

Table 24 Funding of 2nd life batteries

Furthermore, ERDF will be search on the national scale, if available, in order to support and or enlarge the capacity of the new batteries. As well as incorporate them to other public buildings with RES.

5.8. Conclusions on ambitions and planning of activities for TT#2 Smart Energy Management and Storage for Energy Grid Flexibility.

Considering that there is no need of central heating due to local weather conditions, there is not many possibilities to work with the LHCs demonstration projects in this regard, excepting the second life batteries approach. In spite of high share of renewables in energy mix normally will require more storage solutions (which will be tackled either with 2nd life batteries approach if cost are worthwhile or with 1st life batteries tactic) other alternatives are present to SCT situation. Considering first, that RES production will be directly consumed by the simultaneous buildings consumption and production (synchronicity); and secondly, thanks to national regulations, all RES energy surplus could help to compensate other buildings electrical invoices, either from the municipality or by the designated families, storage solutions are not a compulsory investment to take advantage of the RES investments.



The activities for Transition Track #2 in Santa Cruz de Tenerife pursues increasing energy network flexibility among different public buildings, this will help to optimize the renewable energy utilization and reduce the buildings carbon footprint. Adoption of renewable energy sources, energy storage capacity solutions for electricity use and its interconnection with the electrical mobility assets represent the means to accomplish this goal.



6. Transition track #3: Smart emobility sector.

6.1. TT#3 Replication in a nutshell.

In regard with Smart e-mobility, SCT municipality as fellow city has learnt from Lighthouse cities and its other fellow cities in IRIS project through different means; such us the Deliverables 5.5, 6.5 & 7.5. Furthermore, site visits of demonstration actions as well as specific mobility webinar and peer to peer online meetings have been important to develop for SCT replication action plan in TT#3.

The lessons learnt from LH cities regarding their actions and the barriers to overcome have been a priceless information to let SCT municipality mobility department to selection and plan the implementation of the integrated solution. Using this information to solve local mobility issues has always been the main goal of this TT#3. In this regard, the coming review of the mobility plan of the city will be nourished by this TT#3 and the teachings adopted along the process.

6.2. Selection process.

According to the participatory process, mobility is the main issue of the municipality. In particular the intensive use of the private car either in the city center either the entrance in the city of private cars from the surrounding cities and villages. Furthermore, city center air and noise pollution is also a remarkable problem in the city.

In order to tackle these two main problems and considering the integrated solutions to be replicated in IRIS framework, it has been selected actions to reduce pollution and noise by electrical vehicles prioritization in the city (with complementary measures to reduce gas vehicles penetration in the city), as well including light e-vehicles for last-mille promotion in the city.

6.3. Mapping of stakeholders.

Considering the actors affected or the organizations or persons which might be interested by the integrated solutions regarding TT#3, as well as the actors with capacity to influence by any means in the project implementation; it has been selected as main stakeholders the following:

- Municipality of Santa Cruz de Tenerife
- TITSA Bus Company
- Metro Tram Company.
- Vectia Bus Company.
- Dobon's Technology S.L.
- Taxi Cooperative.



- IMCAN S.L.
- Citizens

6.4. Identified knowledge gaps.

SCT municipality together with TITSA and Metro Tram have a very extensive experience in mobility management. Furthermore, the local enterprise ecosystem presents large experience on RES and EV charging points. However, the complexity of revolving the mobility pattern from intensive gas private cars towards another more flexible and integrated generates great uncertainty. Therefore, despite the specific small technical knowledge gaps, which could be solved by knowledge transference with LH cities, the main gap is how to articulate measures to launch effectively and efficiently the change of paradigm in the municipality of SCT.

6.5. Capacity building and knowledge transfer.

The mentioned knowledge gap for this transition track regarding to specific small technical knowledge gaps such as integrating batteries to fluently serve bidirectional RES - EV-charging, are expected to be overcome through (virtual) site visits of similar solutions developed and implemented in Lighthouse or fellow cities. The capacity building might be achieved by peer to peer online meetings or exchanging *ad hoc* or broader technical materials.

6.6. IS-3.1: Smart Solar V2G EVs charging. Calle Sostenible, E-Bus, RES-EV charging points

6.6.1. Baseline

This Integrate Solution 3.1 is presented in this document structured in three sub-projects, since there are three different types of approaches, in SCT municipality, to attain the goals related. Firstly, it is the Sustainable Street project; secondly, the solar powered EV-charging points; and thirdly, the electrical buses. In specific cases, they are unified when common roots present, such as the barriers and drivers of impact assessment parts.

Santa Cruz de Tenerife municipality counts with twenty four electrical vehicles public charging points, these are scattered across the city. Twenty out of them are installed from public lighting, and four more are specific installations, from which two are pending of energy supply to be in service.

On the other hand, electrical buses are not a reality in the city yet. Nonetheless, accordingly with IRIS goals and current replication plan, and in line with mobility goals, electric pluggable bus have been recently procured to the city and public bus company. It is planned to install two electrical charging points (pantograph), one in the central station and the other one in San Andrés (end of the e-bus line).



Currently, there are 79 official cars in the municipality of Santa Cruz they are going to be substituted by a new leasing contract in which electrical mobility will be considered. In addition, there are and 4 electric motorbikes in the Police Department. Furthermore, the public cleaning and waste management company (Valoriza) has a 50% electrical vehicle fleet.

In particular the municipal vehicles fleet has 26 plug-in hybrid electric vehicles and 14 electric vehicles. These are provided by a private supplier as part of a leasing contract.

6.6.2. Ambitions

Accordingly with Santa Cruz de Tenerife's Mobility Plan the ambition of the city regarding mobility is reducing air pollution produced by vehicles. In order to do so, there are two main strategies, reducing the number of CO_2 emitters' vehicles entering the city and increasing the vehicles electrically motorized.

In order to attain this goal, several initiatives are being carried out to pedestrianize its city center. However, the rest of the city requires further measures. The incentive parking in the entrance of the city avoids car or reduced the amount of cars entering the city. However, considering that this parking space is becoming over-demanded there is an opportunity to let e-vehicles to park with preference and charge with O emissions in this parking zone.

Secondly, municipal employees will have electrical vehicles for their public services which will be also charged by RES (PV) installed on the roof of the buildings where the vehicles resides. The goal is to duplicate the number of e-vehicles in the next five years and making all municipal e-cars be charged by RES (100% minimum).

And finally, introducing e-buses in the public transport system is an opportunity to test this technology in a steep city like Santa Cruz as well as an opportunity to reduce city pollutions. The long-term vision is letting Santa Cruz become a very low pollution zone. Furthermore, another further goal is that the e-bus charging system is fed by an in-site photovoltaic plant production system. Charging E-Bus with PV requires and very large power capacity. Since the bus central station does not have enough available roof surface for the PV potential capacity for instantaneously charging the demand of the e-bus, it is planned to combine a more reduced PV system in order to generate enough energy along the day to balance the energy demanded by the e-bus along the usual operational day, with the main goal of compensate CO₂ emissions

6.6.3. Planning of replication activities

This Smart Solar V2G EVs charging initiative is, as shown before, comprised of three main projects. The first one, related to promoting e-cars and reducing cars entering into de city. This one is already defined in an execution project document, named "Sustainable Street" and is currently in the procurement process to define the company in charge of the execution. It is expected to be finished before the end 2022.



The second one, is a long term project. Since it pursues the installation of photovoltaic production system and the charging points in the garages of the public buildings, as well as the acquisition of more e-cars. Therefore, it is expected to be starting at the beginning of 2022 and to be finished 2025.

The third one, is already advanced with the finalization of the procurement process of the e-buses and the pantograph. The installation works are about to start and it is expected to be ready at the end of August 2021. On the contrary, the carbon footprint mitigation using RES will be deployed by end 2021 and 2022.

6.6.4. Organization of work

Project 1: Sustainable Street

The municipality of Santa Cruz develops the "Sustainable Street" project within the Infrastructure Department. Once this infrastructure is in service, the Public Service will continue in track its correct operation. But before this, project suppliers will be subcontracted in order to deliver the needed services such as project definition (already done), installation of RES, charging points, batteries supply and the monitoring system.

Infrastructure Service Department	Project Coordinator: Isabel Acosta Guerra.
Public Services Department.	Chief executive: Javier Ignacio Fdez. Rguez.
	Technical manager: Juan Cano.
Dobon's Tecnology	Project technical definition. Julián Monedero Andrés
Private company 2	PV panels, batteries, pergolas, mini-wind turbines (up the procurement process)
Private company 3	Civil works (up the procurement process).

Project 2: EV-PV charged

The municipality of Santa Cruz develops the "EV-PV charged" project within the Infrastructure Department. Once this infrastructure is in service, the Public Service will continue in track its correct operation. But before this, project suppliers will be subcontracted in order to deliver the needed services such as project definition, installation of PV systems, charging points and the monitoring system.

Infrastructure Service Department	Project Coordinator: Isabel Acosta Guerra.
Mobility Department.	Chief executive: Evelyn Alonso Hernández.
	Technical manager: Jaime Rodríguez Ceballos.
Private company 1	Project technical definition (up the procurement process).

GA #774199



Private company 2	PV panels, inverters, etc. of the RES (up the procurement process).		
Private company 3	Civil works (up the procurement process).		
Private company 4	E-cars (up the procurement process).		

Project 3: E-Bus-PV carbon balanced

The municipality of Santa Cruz develops the "E-Bus PV carbon balanced" project within the Infrastructure Department in collaboration with bus company TITSA. Once this infrastructure is in service, TITSA Company will continue in track its correct operation and will be responsible of its maintenance. But before this, project suppliers will be subcontracted in order to deliver the needed services such as project definition (already defined), installation of PV systems, charging points and the monitoring system.

TITSA	Project Coordinator: José Luis García Pérez.
	Operational manager: Pedro Gómez.
Infrastructure Service Department	Project manager: Isabel Acosta Guerra.
Public Services Department.	Chief executive: Javier Ignacio Fdez. Rguez.
	Technical manager: Juan Cano.
Private company 1	Project technical definition. E5 Technology
E-bus supplier	Vectia
Private company 2	PV pannels, inverters.
Private company 3	Civil works (up the procurement process).

6.6.5. Data collection and management

Project 1: Sustainable Street

The wind and PV inverters will be plugged in seven niches placed in the parking grown. In which there will be a three-phase net analyzer Circutor CVM-MINI, with RS485/Modbus communication to measure the energy generation. In addition to this, there will be another three-phase net analyzer Circutor CVM-MINI with same RS485/Modbus communication in order to measure global energy generation of all inverters. Furthermore a GSM modem will communicate to the web monitoring platform the gathered information.





Figure 17. Monitoring scheme

In order to complement the monitoring system there will also be set up the following equipment:

- Irradiance and temperature cell sensor (célula Si-RS485TC-2T-v-MB) with RS485/Modbus
- Anemometer Vwind-Si
- 7 converters Modbus/Zigbee iDigi XA-Z14-CS3PH-W + 12VDC/120-240VAC
- 1 Gateway iDigi X4K-Z1U-U8011-A1 Modbus/Zigbee GSM
- 1 License of the IRIS web monitoring platform (E5 Technology o similar).

Project 2: EV-PV charged

There are only two charging spots with consumption monitoring (Central Police Station and C/ Viera y Clavijo). Nonetheless, they are not fed by any RES.

The energy consumed by every EV charger will be measured by a single-phase net analyzer, a RS485/Modbus communication and the IRIS web monitoring platform, which will centralized all EV charging system. Regarding the EV charged by PV (only the ones with direct relation to buildings) will also need a gateway in which all energy production and consumption will be previously received in order to communicate with the IRIS web monitoring platform.

Project 3: E-Bus-PV carbon balanced

The pantograph will run with its internal communication system (Vericiti platform), proving info such as power or operational parameters from the bus. In parallel, PV installation will also use the internal communication system from the inverter. In order, to synchronize these two set of data, both communication systems will be redirected towards a Gateway connected with the central station Wi-Fi in order to send the production and consumption balance to the IRIS web monitoring platform.



6.6.6. Barriers and drivers

- Political
 - EV is a generally accepted technology in the whole politic spectrum.
 - There is a fragmented political power in the municipality leading to several changes of leadership. This might affect to different initiatives.
- Economical
 - PV energy costs are already lower that traditional energy costs.
 - There is already an ongoing funding for part of the project.
 - Battery costs and EV costs are still for too high for a model mobility change.
- Sociological
 - The current climate change social awareness will keep growing along the time, reaching a critical mass acceptance during projects execution.
 - COVID crisis has sensibly reduced region's rent, so Smart infrastructures' investments might be seen negatively if not well introduced to the citizenship.
- Technological
 - PV is a mature technology.
 - Batteries are still not mature enough to be widely used in public or private transportation in a step city like SCT.
- Legal / Regulatory framework
 - \circ $\;$ There is a clear legal framework for EV and PV systems.
 - \circ $\,$ Some incentives must be implemented for reaching a broader EV penetration in the municipality.
- Environmental
 - Pollution reduction in the city center.
 - \circ CO_2 reduction due to less traffic and less gas vehicles and more EV charged by solar energy.

6.6.7. Specifications

Project 1: Sustainable Street

PV: 302 kW. Deployed on 3 types of canopy modules.

- 13 modules of C12PD90 canopy with 90 solar panels (22.500 Wp, a=7,5 m., 12 parking places).
- 2 modules of C8PD canopy with 60 solar panels (15.000 Wp, a=5 m., 8 parking places).
- 2 modules of C4PD canopy with 30 solar panels (7.500 Wp, a=5 m., 4 parking places).
- Three phase inverters: 16 units of 20 kWn, 2 units of 15 kWn and 2 units of 6 kWn.
- 116 PV production optimizer in order to avoid shading production limitation.





Wind turbines power: 3 Windmills of 6 kWn producing a total 18 kWn ranged alingned South-East direction in a 65 meters total distance, initially oriented towards East with 12 meter height towers, plugged with three three-phase inverters.



Figure 19 Location and measures of windmills

Months Dor		Production en kWh/(kW)			Duaduation on LWh
Months	Days	PGR	Ep/day	Ep/month	Production en kwn
Jan	31	0,876	3,95	119,133	29.797,85
Feb	28	0,849	5,529	149,319	33.217,50
Mar	31	0,82	6,327	189868	45.103,44
Apr	30	0,808	6,319	183,508	43.590,45
May.	31	0,808	6,914	207,883	51.298,86
Jun.	30	0,773	6,028	177,241	49.949,55
Jul.	31	0,762	6,966	208,525	51.818,41
Aug	31	0,782	6,674	199,462	48.750,99
Sep	30	0,774	5,288	154,829	42.456,88
Oct	31	0.834	4,702	141,932	37.748,75
Nov	30	0,854	3905	113,639	28.458,92
Dec	31	0,869	3,673	110,465	26.984,49
Year	365	0,818	5,523	1955,804	489.176,07

Table 25. Energy production by both RES (PV and Windmills)



Project 2: EV-PV charged

The following table represents the state of the EV charging points in the city.

Location and status	Power, type of connection and type of electrical current
In service	
Palacio Municipal	22 kW Three-phase (Meckness) + 3,6 kW single-phase (Schuko)
Local Police Central Station	22 kW Three-phase (Meckness) + 3,6 kW single-phase (Schuko)
Service from public lighting (only during daylight)	7,2 kW Meckness + 3,6 kW Schuko (both single-phase)
C/ Dique San Andrés	7,2 kW Meckness + 3,6 kW Schuko (both single-phase)
C/ Elías Ramos González	7,2 kW Meckness + 3,6 kW Schuko (both single-phase)
C/ Chacerquén	7,2 kW Meckness + 3,6 kW Schuko (both single-phase)
C/ De la Rosa	7,2 kW Meckness + 3,6 kW Schuko (both single-phase)
C/ Dr. José Naveiras	7,2 kW Meckness + 3,6 kW Schuko (both single-phase)
Avda. Fco. La Roche	7,2 kW Meckness + 3,6 kW Schuko (both single-phase)
C/ Puerto Escondido	7,2 kW Meckness + 3,6 kW Schuko (both single-phase)
Avda. Veinticinco de Julio	7,2 kW Meckness + 3,6 kW Schuko (both single-phase)
C/ Ramón y Cajal	7,2 kW Meckness + 3,6 kW Schuko (both single-phase)
C/ José María de Villa	7,2 kW Meckness + 3,6 kW Schuko (both single-phase)
C/ Heliodoro Rguez. López	7,2 kW Meckness + 3,6 kW Schuko (both single-phase)
Avda. del Carmen	7,2 kW Meckness + 3,6 kW Schuko (both single-phase)
C/ Adán Martín Denis	7,2 kW Meckness + 3,6 kW Schuko (both single-phase)
Avda. Alcalde José Emiliano García Gómez	7,2 kW Meckness + 3,6 kW Schuko (both single-phase)
C/ Máximo Acea Perdomo	7,2 kW Meckness + 3,6 kW Schuko (both single-phase)
C/ Máximo Acea Perdomo	7,2 kW Meckness + 3,6 kW Schuko (both single-phase)
C/ Sargento Provisional	7,2 kW Meckness + 3,6 kW Schuko (both single-phase)
C/ Ipalán	7,2 kW Meckness + 3,6 kW Schuko (both single-phase)
Avda. Los Majuelos	7,2 kW Meckness + 3,6 kW Schuko (both single-phase)
Pendring from energy supply	
C/ La Marina	22 kW Three-phase (Meckness) + 3,6 kW single-phase (Schuko)
Roque Las Bodegas, Taganana	7,2 kW Meckness + 3,6 kW Schuko (both single-phase)

Table 26. Location and features of current charging points

It is planned to deploy 12 PV installation in the following public buildings detailed, ranging the five SCT districts. Furthermore, there will be installed in the same buildings 28 charging points; 8 fast and 20 slow charging speed with the following PV backup.

- Anaga
 - o San Andrés Office. PV 46,08 kWp
 - Las Mesas UNIPOL police station. PV 61,63 kWp
- Centro-Ifara
 - Nifu-Nifa building. PV 34,56 kWp



- City Hall. PV 69,12 kWp
- FIDES building. PV 23,04 kWp
- Casa Siliuto. PV 8,01 kWp
- Ofra-Costa Sur
 - o Ofra administrative building. PV 40,32 kWp
- Salud-La Salle
 - Old Market La Salud. PV 138,24 kWp
 - C/ Ganivet public building. PV 63,36 kWp
 - Vivero municipal. PV 57,6 kWp
- Suroeste:
 - C/ Avegato public building. PV 18,43 kWp









Figure 20. Charging devices (slow and fast speed)

Project 3: E-Bus-PV carbon balanced

4 Pluggable e-buses, with features:

- Two batteries (12V/225 Ah) HD type, VARTA. 44 kWh total capacity.
- One DC/DC converter, for two batteries (24V) with 5 kWh power.





Figure 21. Pluggable e-bus of SCT

PV system in the central station:

- Photovoltaic plant of 100 kWp
- There are two e-buses which in normal operational circumstances, they will need 8 charges per day in total.

6.6.8. Citizen engagement

Project 1: Sustainable Street

The EV users could park free of charge, with reserved spots and receive a 100% free emissions' battery charge for their e-car. Furthermore, gas cars users will see the benefits of having e-cars.

An informative panel will be displayed on site where citizens and tourists, who normally access to the Auditorium Adam Martín, to the Maritime Park or to de exhibitions ground, will see direct relation between mobility and renewable energies.

The IRIS platform will inform the citizens about the production and consumption made by different profile users (e-cars, public lighting...).

Hence, this measure is located in the first step of the citizen engagement ladder "Awareness".

Project 2: EV-PV charged

The EV users will enjoy free parking (in this case with limited time), with place priority and receive a 100% free emissions' battery charge for their e-car.

An informative panel will be displayed on each charging point, only those which are charged by RES, in order to show the features of this solar charging point. Furthermore, gas cars users will see the benefits of having e-cars.

IRIS web platform will public inform all energy produced and used by e-cars users on each charging spot and the attained CO_2 reduction.


In order to increase the quality of this measure regarding citizen engagement, co-creation process will be launched in order to define contents and designing of the public users informative panels for EV-charging points. Therefore, this measure is located in the third step of the citizen engagement ladder "Co-creation for adoption of existing touchpoint".

Project 3: E-Bus-PV carbon balanced

IRIS web platform will public inform all energy produced by the PV system and used by the e-buses and the attained CO_2 reduction.

Furthermore, a public informative panel with the solar generated energy and the e-bus charging consumption will be displayed in the bus central station.

Hence, this measure is located in the first step of the citizen engagement ladder "Awareness".

6.6.9. Business model

Project 1: Sustainable Street

The cost of this project is $1.566.039,72 \in$ and considering the energy produced (489.176,07 kWh); the average cost of energy ($0,11 \notin$ kWh) and the price of the energy for charging e-cars in market ($0,30 - 0,45 \notin$ kWh); a conservative approach would provide a very long Payback (15 years). Considering the battery charging service and the savings of the energy cost.

However considering the benefits for the city in terms of pollution reduction (379,60 Tm of CO_2 reduced, and 252.863,78 m³ of NOx, 184.575,71 m³ of SO₂ and 287 Kg of particles); and the benefit of environmental awareness as well as the advantages of introducing new technologies in regional market; makes more reasonable the investment.

Furthermore, considering that 85% of the cost of this investment will be co-financed by ERDF, the final PAYBACK for the municipality would be 2.34 years.

Project 2: EV-PV charged

During the first phase of this public service, there will be no charging for money. However, it is planned to create a pay-per-use system on 2022, in order to create and cash flow revenue to support maintenance and the installation of the new EV-PV systems.

Project 3: E-Bus-PV carbon balanced

This project has two sides regarding the business models. Firstly, it is the electric-pluggable bus, which has a cost of 420.000 euros. This is far more expensive than comparable fuel-oil bus. This additional cost is expected to be partially recovered during the whole operational life of the bus, by means of reduction of the gas consumption. This, as a pilot project, will serve as experience to be replicated in the municipality. Hence, if economic study shows practical economic feasibility more buses will be introduced in the lines with more potential (the ones less steep). In addition to this, it is remarkable the ERDF grant with 75% of cofounding for the investment of the bus and the pantograph.



And secondly, the associated PV production system. The estimated cost would be 135.000 euros for 100 kWp PV plant. Considering that the cost of the energy (see above) and the possibility of using it totally in the building for self-consumption, the Payback will be seven years. There are possible grants and tax exemptions which could be applied for in order to reduce this payback period.

6.6.10. Governance

Project 1: Sustainable Street

Santa Cruz municipality will lead this investment, its monitoring, control and maintenance. Some coordination with Cabildo Insular de Tenerife might be possible when complementary mobility measures arise in future.

Project 2: EV-PV charged

Santa Cruz municipality will lead this investment, its monitoring, control and maintenance of this investments.

Project 3: E-Bus-PV carbon balanced

Santa Cruz municipality will lead this electric-pluggable buses in coordination with TITSA Bus Company which will invest in the associated PV system. Meanwhile, its monitoring, control and maintenance will be reasonability of TITSA Bus Company.

6.6.11. Impact assessment

The IRIS web platform will monitor the parameters of the performance of these investments accordingly with the following KPIs:

КРІ	Parameter(s)	Definition	Baseline	Target
1. Performance of direct use of RES	kWh	Amount energy directly used by EV from RES	N/A	N/A* kWh
2. CO2 reduction in mobility via EV and RES	Tons of CO ₂	Tons of CO ₂ reduced thanks to RES charging EV (public, municipal fleet and bus fleet).	N/A	N/A* tons of CO ₂
3. Increase of e- Bus fleet	kWh battery capacity in the bus fleet of the city	Increase of electric o electric-pluggable bus penetration in the public transport system.	0	350 kWh in three years

Table 27. IS 3.1 KPIs

* N/A: to be defined in the execution project phase.



6.6.12. Implementation plan

The implementation plan of these three measures is different since they have different features and executions paces.

Sustainable Street measure already has a technical project defined and it is on procurement process. Hence, planning is by now ready and execution project is expected to be launched during the last semester of 2021. Accordingly with MOVES2 financing scheme this measure should be operative by the end of 2022.

RES-EV is a more long term measure since it is being developed from previous years with the initial installation of EV charging points, and it will be continued by installing more charging points with RES support in public buildings. This process will be continuing until attaining a balanced between EV penetration in the city and the service provided. It is expected to last until 2025 when the public and private charging network be robust enough.

The E-Bus measure is already in the first operational phase with two pluggable e-buses and the installation of a pantograph. Another two more similar buses are expected to be operative along 2021. Another pantograph should be installed but due the city planning constrains in the end of the 910 bus line, it will be delayed until they are solved. TITSA Bus Company possess the technical project of a 100 kWp PV installation, and installation works will begin once funds are available (COVID19 restrained 2021 budget).

	Sustainal	ole Street	
1 Procurement process of project definition and project design	2 Planning	3 Execution	4 Closeout
1.1 Public procurement for project design Sustainable Street supported. Direction of Works and Security and Health project.	2.1. Plan Schedule	3.1 Manage communication and city engagement	4.1 Impact assessment
1.2 Technical project definition	2.2. Plan Resource	3.2 Manage procurement	4.2 Integration with SCT Smart City Monitoring System
	2.3. Plan Budget	3.3 Installation of PV and canopy	
	2.4. Plan Risk management	3.4 Installation of Windmills	
		3.5 Monitoring system set up	
5.1 Coordination			
5.2 Monitoring			
WP 5: Coordination and	monitoring		

6.6.13. WBS - Work Breakdown Structure & Gantt chart





Work Packages and task description:						202	20											2021	L								·	2	022	2				MILESTON		
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T.1 Public procurement for project design Sustainable Street supported. Direction of Works and Security and Health project.																																				
T1.2 Technical project definition																																		D1		
WP 2: Execution Planning																																			Contrac tor 1	SCT
T2.1 Plan Schedule																																				
T2.2 Plan Resource																																				
T2.3 Plan Budget																																				
T2.4 Plan Risk management																																				
WP 3: 2nd phase of Pulic Procurement and Execution																																			SCT	Contractor 2
T3.1 Manage communication and city engagement																																				
T3.2 Manage procurement																																		M1		
T3.3 Installation of PV and canopy																																		M2		
T3.4 Installation of Windmills																																		M3		
T3.5 Monitoring system set up																																				
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T4.1 Impact assessment																																				
T4.2 Integration with SCT Smart City Monitoring System																																				
WP 5: Coordination and monitoring																																			SCT	Contractor 1
T1.2 Coordination																																				
T1.3 Monitoring																																				
D1. Project desing																																				
D2. Installation of storage system finalization																					Т															
M1. Selection of contractor/s																																				
M2. Launch of the PV and storage system																																				
M3. Launch of the Windmills																																				

Figure 22. Gantt IS 3.1 Smart Solar V2G EV

	RES-EV	/	
1 Procurement process of project definition and project design	2 Planning	3 Execution	4 Closeout
1.1 Public procurement for project design EV-PV supported. Direction of Works and Security and Health project.	2.1. Plan Schedule	3.1 Public procurement for Project Execution	4.1 Impact assessment
1.2 Selection of most valuable charging spots with RES	2.2. Plan Resource	3.2 Manage communication and city engagement	4.2 Integration with SCT Smart City Monitoring System
1.3 Measurement and feasibility study for supporting RES.	2.3. Plan Budget	3.3 Installation of Charging Spots	
	2.4. Plan Risk management	3.4 Installation of RES	
		3.5 Installation of storage system	
		3.6 Monitoring system set up	
5.1 Coordination			
5.2 Monitoring			
WP 5: Coordination and monitor	ing		



Work Packages and task description:	2022										2	023				_					202	24								20	25					MILESTONE &	WP	WP		
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T2.2 Plan Resource																																								
T2.3 Plan Budget				Π																																				
T2.4 Plan Risk management				\square																																				
WP 3: 2nd phase of Pulic Procurement and Execution																																							SCT	Contractor 2
T3.1 Public procurement for Project Execution																																								
T3.2 Manage communication and city engagement						Т			П			1	Т			Т										Т														
T3.3 Installation of Charging Spots				\Box																																				
T3.4 Installation of RES																																						M1 ,2 & 3		
T3.5 Installation of storage system																																								
T3.6 Monitoring system set up																																								
PT 4: Closeout																																							SCT	Contractor 2
T4.1 Impact assessment																																								
T4.2 Integration with SCT Smart City Monitoring System																																								
WP 5: Coordination and monitoring																																							SCT	Contractor 1
T1.2 Coordination																																								
T1.3 Monitoring				Π																																				
D1. Project desing																																								
D2.3 & 4. Installation of charging spots																																								
D3. Installation of support RES																																								
D3. Installation of storage system																																								

Figure 23 Gantt IS 3.1 RES-EV

	E-Bus		
1 Procurement process of project definition and project design	2 Planning	3 Execution	4 Closeout
1.1 Public procurement for project design E-pluggable Bus supported. Direction of Works and Security and Health project.	2.1. Plan Schedule	3.1 Manage communication and city engagement	4.1 Impact assessment
1.2 Technical project definition	2.2. Plan Resource	3.2 Manage procurement	4.2 Integration with SCT Smart City Monitoring System
1.3 PV support system	2.3. Plan Budget	3.3 Installation of PV and canopy	
	2.4. Plan Risk management	3.4 Installation of Windmills	
		3.5 Monitoring system set up	
5.1 Coordination			
5.2 Monitoring			
WP 5: Coordination and mo	nitoring		





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E-pluggable Bus	1	3	3	4	0 9	7	8	9	10	11	12	1	2	3	4	5	9	7	8	6		11	13	14	15	16	21	18	19	20	21	22	23	24	28	27	28	29	30	31	32	33	35		LEADER	1 ANTILL
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T.1 Public procurement for project design E-pluggable Bus supported. Direction of Works and Security and Health project.																																														
T1.2 Technical project definition																																												D1		
T1.3 PV support system						Τ																		Т																			Γ	D2	TITSA	CCS
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T2.4 Plan Risk management																					Т			Т		Т																				
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T3.1 Manage communication and city engagement																																														
T3.2 Manage procurement																																												M1		
T3.3 Installation of PV and canopy																																												M2		
T3.4 Installation of Windmills																																												M3		
T3.5 Monitoring system set up																																														
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T4.1 Impact assessment																																														
T4.2 Integration with SCT Smart City Monitoring System																																														
WP 5: Coordination and monitoring																																													SCT	Contractor 1
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D1. Project desing																																														
D2. Installation of storage system finalization																																														
M1. Selection of contractor/s																																														
M2. Launch of the PV and storage system																																														
M3. Launch of the Windmills																																														

Figure 24. Gantt IS 3.1 of E-pluggable bus

6.6.14. Financing plan

Project 1: Sustainable Street

Santa Cruz municipality has already a co-funding scheme approved, in particular the EDUSI program. The procurement process is ongoing. Total budget 1.596.807,16 €. (50% financed by MOVES2 program ERDF). The amount not co-funded will be provided by SCT own resources.

Project 2: EV-PV charged

Santa Cruz municipality has been developing its own EV charging network from its own public budget. The existing 50% co-funding by MOVES2 program (ERDF) establishes 189.000 € for 28 EV charging points On the other hand, the future EV charging infrastructures will still be funded by public budget on a regular basis of. Furthermore, the 12 PV installations are expected to cost 827.000 euros, with a cofounding from MOVES2 program of 25%. The amounts not co-funded will be provided by SCT own resources. Furthermore, the maintenance of the 40 electric/hybrid vehicles has a cost of 127.017,8 euros per year.

Project 3: E-Bus-PV carbon balanced

This measure has a total cost of 1.930.000 euros. It includes four hybrid buses and one pantograph $(250.000 \in)$. Santa Cruz municipality has already a co-funding scheme approved of ERDF, in particular the EDUSI program. There are two buses working in testing phase as the drivers are receiving the specific training. Regarding the PV system, TITSA Bus Company will invest on it considering that the payback time is affordable and the positive impact on its public image. Further grant will be studied to reduce the payback using the program PREE, ERDF, on 2021.



6.7. IS-3.2: Innovative Mobility Services for the Citizens. Personal Mobility Strategy.

6.7.1. Baseline

Santa Cruz de Tenerife municipality has an intensive private car use, either by its inhabitants either by visitors (for work and leisure). In peak hours 7:30 – 9:30 and 14:00-16:00 the vial congestion creates pollution and time consuming for working visitors. Furthermore, the public space used by parked cars reduces opportunities to create new opportunities for citizenships. In addition, due to the urban planning in an islandic environment, there are not large enough spaces to easily include new mobility infrastructures across the city such as bike-lanes. Finally, SCT is a very steep city that does not allow bike, skate use for individual transportation.

The only bike-lane of the city is in the east side of the city by the harbor and has a very intensive use for leisure and sports, however it does not match needs for letting a wide use for citizens and workers.

However, thanks to the electrical new mobility technologies the steepness of the city is no longer a limitation. Therefore, new opportunities arise for individual mobility and a reduction of the car penetration in the city.

6.7.2. Ambitions

The main goal of this project is to create the conditions to extend the safe and efficient personal mobility vehicles such as e-bikes, e-scooters, bicycles... To attain this goal it is compulsory to deploy a thick net of soft and hard infrastructures to let these types of vehicles ride safely and be accessible to all publics. On the contrary, a progressive reduction of car penetration must be attained to liberate space for this new mobility technology.

6.7.3. Planning of replication activities

In order to attain success the replication activities are set as following.

Phase 1. Car mitigation zone. This is a defined zone of the city where cars have limited access, such as only neighbours or goods transports whenever is possible, and other street will have Zone 20 Km/h limitation with personal vehicles priority. This measure will be accompanied by e-bike and e-scooter public renting system.

Phase 2. Alternative parking. There will be two new alternatives parking at the entrance of the city which allow to reduce car penetration in the city center.

Phase 3. School paths. Creation the secure and sustainable paths for students to go to their schools either on foot either by bike.

Phase 4. Pedestrianisation. De La Rosa Street will be closed for cars in order to boost commerce and tourism, as well as improving quality of life and mobility.



Phase 5. Linking city nodes. Gathering experience of School Paths measure, there will be done a similar initiative in order to link main city nodes, such as Bus Intercambiador, City Hall, Other administrative buildings, museums and commercial zones.

6.7.4. Organization of work

The municipality of Santa Cruz develops the "Personal Mobility Strategy" project with leadership of Mobility Department and the collaboration of the Infrastructure Department. Once this infrastructure is in service, the Public Service will continue in track its correct operation. But before this, project suppliers will be subcontracted in order to deliver the needed services such as project definition (already done), installation of RES, charging points, batteries supply and the monitoring system.

Mobility Department	Project Coordinator: Pedro González.
Infrastructure Service Department	Chief executive: Isabel Acosta Guerra.
Other services	
IMCAN	Technical assistance. Victor García Hernández
Private company 2, 3, 4, 5 & 6.	Project Design Definitions (one for each measures) (up the procurement process).
	PROYMA Consulting, S.L.P. Fernando Alsina.
Private company 7	Civil works and signaling for Car mitigation zone (up the procurement process).
Private company 8	Ecoblu Tenerife (e-bike renting) & E-Scooter sharing supplier (up the procurement process).
Private company 9 & 10	Civil works for alternatives parking (up the procurement process).
Private company 11	Civil works and signaling for School paths
Private company 12	Monitoring system for School paths
Private company 13	Civil works for pedestrianisation of C/ De La Rosa.

6.7.5. Data collection and management

The location of the infrastructure (lane, charging's parking and e-scooters) will be georeferenced based available using specific APP or/and website. Energy consumption of the e-bike and e-scooters sharing system will be monitored by using private service. Number of cars and parking time will be monitored on the alternative parking. All this data will be included in IRIS Monitoring System as a procurement conditions.



6.7.6. Barriers and drivers

- Political
 - o Drivers:
 - At medium-term this type of policy has good political revenues (votes).
 - o Barriers:
 - Reducing opportunities for cars presents a short-term price
- Economical
 - Drivers:
 - Local e-scooter producer with low prices
 - Boost of local commerce in C/ De La Rosa
 - Barriers:
 - Still a high price product (e-scooter)
- Sociological
 - o Drivers:
 - High acceptance once measures are already established
 - Barriers:
 - Risk perception of e-bike and e-scooters for not-young segment of population (above 50)
- Technological
 - o Drivers:
 - Batteries enough to tackle steep runs and larger time of use.
 - Barriers:
 - Still some time for new batteries generation to reach to market.
- Legal / Regulatory framework
 - Drivers:
 - Some soft measures to promote this mobility in some parts of the city, such as priority zones.
 - New special urban plan for El Toscal will allow all measures on this zone.
 - Barriers:
 - New traffic regulation at national scale which might require insurance and stronger regulation, (increase cost of use).
- Environmental
 - o Drivers:
 - Pollution reduction in the city center.
 - Barriers:
 - Accidents when bad use or regulation (e-scooters)

6.7.7. Specifications

<u>Car mitigation zone</u>. This measure will be deployed in phases approach. First stage will be developed by using the pedestrianisation of C/ De La Rosa and will link the Bus Intercambiador, by creating specific bike



lane and combing with Zone 20 Km/h the streets with space limitation. Following stages will be studied when assess the impact of this measure.



Figure 25. Initial Car mitigation zone

<u>Alternative parking</u>. There will be two new alternatives parking at the entrance of the city which allow to reduce car penetration in the city center. These parking are prefabs infrastructures based on galvanized steel, prestressed concrete founded on the ground. It a modular solutions with multiple floors with a quick installation.



Figure 26 Initial locations for alternative parking

A mobility support with e-bike or e-scooter renting system, bound to the linking city nodes measure, will be set up by promoting it via private companies' initiatives.

<u>School paths</u>. Creation the safe and sustainable net of paths for students to go to their schools either on foot either by bike. There will be a preferential walking and biking paths of getting around used by families. There will be a specific signage either for students or for vehicles, and an APP will be available, as well, with detailed information about the schools paths in the municipality (duration, GPS maps, safes public spots...) Traffic restriction will be implemented on potentially danger spots, as well as protection fences o bike lanes whenever possible and recommended.. It will be deployed in one school path of every each of the five districts.

<u>Pedestrianisation</u>. There will not be any parking spots for traditional vehicles in De La Rosa Street and the speed limit will be reduced to 20 Km/h helping the bike cohabitation; in order to boost commerce and tourism, as well as improving quality of life and mobility.



Linking city nodes. Due to difficulties regarding space use for personal vehicles on an own lane, the most feasible alternative is creating Zones 20 Km/h with bike/e-scooter priority along selected streets, with specific signage on ground and vertical signals. Cameras and speed radar for controlling drivers behaviour will be set in critical spots such as crossings.

6.7.8. Citizen engagement

Car mitigation zone

The main beneficiaries of these measures are the citizens. However, car drivers might see this as a negative policy. On the contrary, there is a part of the citizenship which demands more space for people to use the public space at the expense of cars, either on foot or using personal mobility solutions, or outdoor terraces and bar services (COVID measures). Therefore, in order to increase public involvement of this new mobility approach it is necessary to deploy a public communication campaign in order to keep drivers informed about new rules and its benefits. This campaign will be co-created with drivers and students from different levels. Hence, it is placed in the four step of the citizen engagement ladder; "Co-creation for adoption new service".

Alternative parking

Considering the mobility problem of SCT municipality, the limited available lot in the city periphery and the social inertia for private vehicles; there is not much alternative to deal with city engagement. However, meanwhile certain city access limitations are put into play, an APP for using these alternative parking areas with benefits when combining with public transport will be available. Hence, it is located in the first step of the citizen engagement ladder; "Storytelling".

School paths:

Police, AMPA, families and students will co-create this measure, defining the school paths in accordance with the mobility technicians. On the purpose to boost its use, a promotion campaign among schools will be carried out. And in order to improve its functionality surveys and assessment meeting will be part of the citizen engagement. Therefore, it is placed in the four step of the citizen engagement ladder; "Co-creation for adoption new service".

Pedestrianisation

C/ De La Rosa pedestrianisation executive project is based on the need of providing an answer to El Toscal neighbors and local retailers' historical demand. Based on basic project, all parties involved (neighbors, retailers, municipal workers and other related companies such as clusters) are currently being asked about their view. Then, it is positioned in the four step of the citizen engagement ladder; "Co-creation for adoption new service".

Linking city nodes

Considering that this type of measures are going to produce a negative perception regarding cars drivers due to the lowered speed limits, it is important to count on SCT citizens in order define the most suitable streets to create this city slow-speed network to make possible the co-habitation with other users such



as bikes and e-scooters users. This is another step for a change of culture in mobility for citizenship.In addition to the physical infrastructures on the streets there is a logistics investment to be done, primarily by private companies which might offer e-bike (Ecoblu Tenerife) or e-scooter renting service.In order to boost the usage of this new safe streets to link city nodes, the municipality of SCT will rent e-scooter for their employees' mobility in labor hours. Then, it is positioned in the four step of the citizen engagement ladder; "Co-creation for adoption new service".

6.7.9. Business model

There is not business model in these measures since it will be a public service to help to change the mobility pattern in the city.

However, the alternative parking will need to be maintained by managed by the incomes provided by users. The price will be fixed accordingly with a cost-benefit study once they are fully operational and its value proposition is demonstrated.

Accordingly to previous experiences, pedestrianisation of C/ De La Rosa will create a remarkable increase of the local commerce.

E-bike Ecoblue company launched its operation after summer 2020, and their business model already validated in other cities is still to be shown as profitable in the city of SCT. Therefore it will be the same for the e-scooter renting service. It is expected that the mobility measures exposed here will help to boost this business models.

6.7.10. Governance

The key issue during the Governance of this integrated action is the complexity of measures regarding the expected and needed synergies among them.

Firstly, the project must run all operations fluently and efficiently in order to put into motion the restrictions of the gas private vehicles. In case, alternative measures are not working well, wrong public acceptance might occur. Therefore, a gradually implementation should be carried in both sense; new alternative measures and the restrictive ones, both put into motion finding the right balance. Because I late introduction of the restrictive measure could led to a poorly used of the alternative systems. Furthermore, an effective citizen engagement will help to attain success.

6.7.11. Impact assessment

The impact assessment of these personal mobility strategic measures will be measured by the following indicators.



КРІ	Parameter(s)	Definition	Baseline	Target
1. Impact of the dissuasive parking	%	Number of cars parked in the dissuasive parking places in relation with total capacity	N/A	85%
2. Air quality	Green days	Number of days with environmental indicator below threshold values, except during Calima episodes	N/A	95%
3. Scholar paths usage	Children-users / scholar day	Number of children-users using effectively this path from home to school every day	0	100 after first year
4. Use of e- scooter renting	Number of trips Km. made	Number of trips per month made using the e-scooters and number of kilometres made every month.	0	1200 trips/month 1000 km./month

Table 28 IS 3.2 KPIs

6.7.12. Implementation plan

These initiative has 4 main measures and they will be implemented in parallel with its own calendar, in spite of their bounds and the need of each other for a total success. However, for the benefit of a fine implementation they will be treated separately in terms of its implementations.

6.7.13. WBS – Work Breakdown Structure & Gantt chart

Personal Mobility Strategy			
1 : Procurement process of project definition and project design	2 Planning	3 Execution	4 Closeout
1.1.a. Public procurement for project design. Cars mitigation zone. Direction of Works and Security and Health project.	2.1. Plai Schedule	3.1 Manage communication and city engagement	4.1 Impact assessment
1.1.A. Technical project definition: Cars mitigation zone	2.2. Plan Resource	3.2 Manage procurement (A,B,C & D)	4.2 Integration with SCT Smart City Monitoring System
1.2.a. Public procurement for project design. Alternative parking. Direction of Works and Security and Health project.	2.3. Plan Budget	3.3 Implementation of Cars mitigation zone	



1.2.B. Technical project definition: Alternative parking	2.4. Plan Risk management	3.4 Implementation of Alternative parking	
1.3.a. Public procurement for project design. Pedestrianisation Phase I. School paths. Direction of Works and Security and Health project.		3.5 Implementation of Pedestrianisation Phase I. School paths	
1.3.C. Technical project definition: Pedestrianisation Phase I. School paths.		3.6 Implementation of Pedestrianisation Phase II. El Toscal C/ La Rosa	
1.4.a. Public procurement for project design. Pedestrianisation Phase II. El Toscal, C/ La Rosa. Direction of Works and Security and Health project.			
1.4.D. Technical project definition: Pedestrianisation Phase II. El Toscal, C/ La Rosa			
5.1 Coordination			
5.2 Monitoring			
WP 5: Coordination and monitoring			



Work Packages and task			20	21								20	22											2023	3							
description:		1	1	1	1	1	1	1					_							_										MILESTONE	WP	WP
Personal Mobility Strategy	2	60	σ	ę	÷	5	5	7	5	16	17	18	19	8	21	8	8	24	8	8	27	8	8	8	3	8	8	8	18	& DELIVERABLE	LEADER	PARTNER
WP 1: Procurement process of project																														DELIVENOUL		
definition and project design																															SCT	Contractors
T1.1.a. Public procurement for project design.																																
Cars mitigation zone. Direction of Works and																																
Security and Health project.																																
T1.1.A. Technical project definition Cars																																
mitigation zone																														D1		Contractor 1
T1.2.a. Public procurement for project design.																																
Alternative parking. Direction of Works and																																
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T1.2.B. Technical project definition Alternative																														62		
parking												_	-	_		_				-					_			_		UZ		Contractor 2
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Pedestrianisation Phase I. School paths.																																
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T 1.4 a. Public procurement for project design																									-					05		conductor 5
Pedestrippication Phase II El Tossal C/La Bosa																																
Direction of Works and Security and Health																																
project																																
T1.4.D. Technical project definition													_							_												
Pedestrianisation Phase II. El Toscal. C/ La Rosa																														D4		Contractor 4
WD 2. Fuentier Diseries																															Contractor	
WP 2: Execution Planning																															5	SCT
T2.1 Plan Schedule																																
T2.2 Plan Resource																																
T2.3 Plan Budget																																
T2.4 Plan Risk management																																
WP 3: 2nd phase of Pulic Procurement and																																
Execution																															SCT	Contractors
T3.1 Manage communication and city																																
engagement																	_											_			SCT	
T3.2 Manage procurement (A,B,C & D)																															SCT	
T3.3 Implementation of Cars mitigation zone																														M1		Contractor 6
T3.4 Implementation of Alternative parking																														M2		Contractor 7
T3.5 Implementation of Pedestrianisation Phase																																
I. School paths																														M3		Contractor 8
T3.6 Implementation of Pedestrianisation Phase																																
II. El Toscal C/ La Rosa																				_										M4		Contractor 9
PT 4: Closeout																															SCT	Contractor 10
T4.1 Impact assessment																																
T4.2 Integration with SCT Smart City Monitoring																																
WP 5: Coordination and monitoring																															SCT	Contractor 5
T1.2 Coordination																																
T1.3 Monitoring																																
D1. Project desing A.																																
D2. Project desing B.																																
D3 Project desing C																																
D4. Project desing C.																																
M1 Project desing D.																																
Mit. Project implementation A.																																
N2. Project Implementation B.																																
M3.Project implementation C.																																
M4. Project implementation D.																																

Figure 27. Gantt IS 3.2 Innovative Mobility Services

6.7.14. Financing schemes and opportunities

Title of the action	Description	Cost €	50% Co- financed National Funds (MOVES2) €	Own funds €	Financer	
	Signals	5.200			SCT	
Cars mitigation zone	Grown painting	6.800	9.290	9.290	municipality	
	Speed humps	6.580			municipality	
Alternative parking	Dissuasive parking near Hospital	1.000.000	1.000.000	1.000.000	SCT municipality	

D 8.8



	Dissuasive parking north of the city entrance	1.000.000			
School paths	Safe routes to schools	565.000	282.500	282.500	SCT municipality
Pedestrianisation	C/ De La Rosa	5.000.000	4.250.000 (DUSI)	750.000	SCT municipality
Linking city nodes infrastructures	Phase 1: El Toscal – Intercambiador	100.000	50.000	50.000	
E-bike Ecoblue	E-bike renting	N/D	N/D	N/D	Ecoblue
E constant chaning sustains	Hubs and route definition	25.000	0	25.000	SCT municipality
E-scooter sharing system	Sharing system	50.000	0	50.000	Private contractor
Municipal E-scooter mobility	SCT own e-scooter fleet	12.000	0	12.000	SCT municipality
Total		3.559.669	1.731.535	1.828.135	

Table 29. Funding scheme for Personal Mobility Strategy

MOVES2 financing is already conceded, DUSI financing with 85% will be demanded in the next national call.

6.8. Conclusions on ambitions and planning of activities for TT #3 Smart e-Mobility Sector

SCT municipality is determined to reduce carbon footprint regarding mobility in the city. Considering the city needs and capacities, the three smart e-mobility axis defined in the present replication plan are considered as the most effective and plausible replication projects to help achieving this carbon reduction objective.

In general, two replication projects will increase electrified mobility in the city, either in the public and the private transport, demonstrating integrated smart mobility solutions are affordable, technically valid and operatively advantageous. Its demonstrative impact will let the rest of the city stakeholders to reflect and react in favor of smart e-mobility solutions helping the acceleration of their market uptake and the transition to a more urban sustainability.

In particular, SCT smart mobility replication plan requires applying car mitigation actions in order to augment personal mobility vehicles in combination with other intermodal solutions as well as safe walking. This pursues to progressively extract cars from the city to make it more attractive to people and less to cars opening great spaces of new urban possibilities.



7. Transition track #4: City innovation platform

7.1. TT#4 Replication in a nutshell

The City Innovation Platform transitional track pursues to set an environmental and traffic monitoring system to increase municipal reaction capacity as well as increase citizen's awareness. Furthermore, it is crucial that the municipality launch operations regarding CIM to enter to a new management scale of the city, raising improve operational and innovation capacities, hence a pilot CIM block scale project will be accomplished. And finally, due to the investments in EV mobility solutions and RES, and in order to improve the efficiency of this investments; it is important that all these infrastructures are interconnected to a central control system for a further public use.

7.2. Selection process

Considering all demonstration measures among all LH cities IS measures the following have been the most interested and related to solving prior issues for SCT.

Regarding IS 4.1. it has been selected to be replicated Nize demonstration measure Sensors data collection in air quality with subtle adaption changes. Concerning IS 4.2., it has been selected Nize CIM experience with IMREED related measure. And with regards on IS 4.3, it has been selected a fusion of Utrecht Monitoring E-Mobility with LoRa network with Nize Smart Charging measure.

7.3. Mapping of stakeholders

Considering the actors affected or the organizations or people which might be interested by the integrated solutions regarding TT#4, as well as the actors with capacity to influence by any means in the project implementation; it has been selected as main stakeholders the following:

- Municipality of Santa Cruz de Tenerife.
- University of La Laguna.
- Fiware Canary Islands HUB.
- Sustainable Building Cluster
- Cluster Insignia Empresarial.
- Endesa Company.
- Telefónica Company.
- Integra Canarias S.L.
- Wara Consultoría y Desarrollo S.L.
- Citizens



7.4. Identified knowledge gaps

There is still a large gap regarding Fiware knowhow in the municipality as well as in the local ecosystem. Despite the recent creation of Fiware Canary Islands HUB, it this technological mindset still represents too many uncertainties for a short term commitment.

7.5. Capacity building and knowledge transfer

It is expected that next two years, SCT municipal public ICT workers gain confidence in Fiware approach and launch a CIP to integrate it in the municipal management strategy. In order to do so, peer to peer meetings, virtual visits and specific training should be carried out with the support of TT#4 leaders from all LH and fellow cities.

7.6. IS-4.1: Services for Urban Monitoring. Smart City Monitoring System.

7.6.1. Baseline

IRIS replication plan is going to produce an important amount of data regarding its all monitoring susceptible measures (13). This information needs to be gathered, organized and displayed on a web interface. Hence, The Smart City Monitoring System will assemble SCT IRIS measures for its public communication as well as for municipal city management.

In particular, pollution due the traffic is an issue for the city. SCT has a high rate of vehicles per inhabitant (0.78), in addition the average age of the vehicles is 11 years old. To SCT arrive during bankable days 130.000 vehicles a day. Considering a proportion of 68-32 (gas/diesel) the yearly CO_2 emissions are 1.617 Tm, 0.73 Tm of NO_x y 3.65 Tm of CO only for the entry of the cars in the city.

In order to cope with this reality, apart from the measures explain in TT#3 chapter, environmental monitoring control system must be implemented to be at the disposition to develop mitigation actions when needed.

In particular, IS-4.1 has links with all ISs but more specifically with the following three ISs:

• Measure #1 : City Information Modelling

→ TT#4 –IS-4.2 Service for City Management

• Measure #1 : Smart EV Charging Control System

TT#4 -IS-4.3 Service for Mobility

• Measure #1 : Public awareness campaign Air Quality



→ TT#5 –IS-5.4: Behavior changing information

In near future, public lighting infrastructure will support the sensing network of the city.

7.6.2. Ambitions

The main ambition of this action create a public information system where all IRIS related measures data is available. Furthermore, in order to avoid environmental critical situations due to traffic conditions, as well as to have real data in order to develop larger traffic restrictions measures, there will be a special effort in managing and offering this information.

7.6.3. Planning of replication activities

This measure, Smart City Monitoring System will be launched at the beginning of 2022 with the data analysis and communication protocols in order to define the technological requirements needed to gather this set of wide profile of actions.

The environmental analysis monitoring system is expected to be launched at the mid of 2021 with the public procurement. Then, the analysis phase will keep on during 6 months, and the civil works after this analysis stage. The installation and setting of the equipment (cameras, sensors) and its integration with software will lead to the operations stage at the end of 2022, in accordance with the Monitoring Matrix.

7.6.4. Organization of work

The municipality of Santa Cruz develops the "Smart City Monitoring System" project within the ITC Department with the support of the Infrastructure Department. Once this infrastructure is in service, the Public Service will continue in track its correct operation. But before this, project suppliers will be subcontracted in order to deliver the needed services such as project definition (already done), installation of RES, charging points, batteries supply and the monitoring system.

ICT Department	Manuel Pérez Coca. Head Director						
	Laureano Díaz.						
Infrastructure Service Department	Project Coordinator: Pedro González.						
Public Services	Javier Rodríguez Fernández. Head Director						
Private company 1	Sensors, hardware and software supplier						
Private company 2	Installation, set up and maintenance service provider						
Private companies n	All companies related with data collection						



7.6.5. Data collection and management

In order to locate all information generated by IRIS measures in a single access point, the system must be able to replicate measured values in a centralized repository. This will be done via an API, which must be fed by all communication and data management system from every IRIS measure. All documentation shall be provided to consume the EndPoints from the centralized service.

This control and monitoring system will be in cloud software, based on a standardized communication protocols and using secure intercommunication systems such as optic fiber when possible and Internet secured protocols when not possible. The specific technology will be decided by the company suppliers fulfilling the operational requirements. All IRIS measures must include:

- Scalable, to let new parameters be part of the monitoring system.
- Secure, to avoid low and mid-level hacking.
- Real time, to provide information as real time as the various monitoring devices could deliver.
- Open-source, to avoid proprietary solutions which might limit further developments.
- Robust, to guarantee the normal functioning of the system.
- Attractive in design and intuitive to use, in order be catchy for citizens.
- Data controlled, to be able to select what data is available to consult or download either for all publics, either only for researchers or just for city managers.

7.6.6. Barriers and drivers

- Political
 - Leadership.
 - Initial public resistance to traffic control measures.
- Economical
 - Economic burden for investments.
 - Potential grants to solve it.
- Sociological
 - $\circ \quad \text{Change of behavior} \quad$
 - o Improvement of citizens health
- Technological
 - o Communication protocols incompatibility.
 - Interoperation difficulties.
- Legal / Regulatory framework
 - \circ Data protection regulation.
- Environmental
 - Reduction of carbon footprint
 - o Public environmental information availability



7.6.7. Specifications

This system must be developed accordingly with all communication actions of the selected 12 measures of this Replication Plan. This represents a remarkable technological challenge, however an expected strategy to tackle this complexity will be to establish a set of communications protocols to ease its integration.

In particular, regarding the example of the environmental traffic monitoring, the main specification of the system is defined on the following elements:

- Variable Messages Panels.
 - 6 units (see image below for location). With TCP/IP communication protocol for environmental information visualization, alternative routes, traffic incidences, or traffic restriction.
- Environmental sensors.
 - $_{\odot}$ 12 outdoor CO₂, CO, NOx/NO units (2 on each indicated point, see below) with Modbus TCP/IP.
- Artificial vision cameras.
 - 12 IP high resolution cameras with integrated connection with data base to characterize vehicles, counting vehicles, and detect traffic anomalies.
- Wiring.
 - \circ ~ Optic fiber connection between all elements and the control center.
- Communication hardware.
 - 32 entries recorders, PC, screens, converters, etc.
 - Environmental impact and restriction management software
 - Integration of elements and manage them.



Figure 28. Location of control system



7.6.8. Citizen engagement

Based on all IRIS KPIs as well as regarding traffic monitoring system with the specific information panels with real data displayed (accidents, traffic jams, traffic restrictions) citizens will suffer less road risks. Furthermore, providing environmental information will arise social awareness about the mobility behaviors and might led to a more sustainable pattern. All information from this system will also be in the IRIS monitoring website. Thus, it is situated in the second step of the citizen engagement ladder; "Storytelling".

7.6.9. Business model

For this initiative, the target user is the municipality for urban planning. No business model is associated.

7.6.10. Governance

This project will be leaded by Infrastructure Department during the procurement and implementation process.

Thereafter ICT Department will be responsible for control and maintenance of the total system with the support of the external service suppliers.

The Security and Traffic Department will be the manager of the tools of the system as another tool of at their availability.

Citizens will be part during the co-design of the pedagogic content.

7.6.11. Impact assessment

This measure will enable to take advantage of collecting data in order to generate citizens' engagement. On the one hand benefits are expected for the air quality evaluation.

КРІ	Parameter(s)	Definition	Baseline	Target
1. Monitoring system's efficiency	Operative days	Number of days of fluent information functioning	N/A	365
2. Open data- based solutions	Number of open data impacts	Number of business initiatives, research uses or APP base on available open data	N/A	10 after first year
3. Integration percentage	Degree of measures integrated in IRIS Monitoring System	Number of measures integrated in IRIS Monitoring System with respect of the total proposed in this RP	0	100%



4. Car reduction	Number of cars reduced	Number of cars reduced when indicator inform about red days (pollution)	130.000 vehicles a day	100.000 vehicles a day
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Table 30. IS 4.1 KPIs

7.6.12. Implementation plan

The implementation of this measure Smart City Monitoring System will be with a long term perspective launching operations from the beginning of this RP. Is necessary to do it as soon as possible because it will determine the opportunities of the rest of measures integration success.

In particular, the environmental traffic monitoring control system will be implemented in the short term (see specific Gantt below) and will be developed using the operational requirements referred on 6.6.5.Data collection and management. This will set the foundations for further coming extensions to create the final SCT Smart City Monitoring System.

7.6.13. WBS - Work Breakdown Structure & Gantt chart

Environmental and traffic monitoring								
1 Procurement process of project definition and Design project	2 Execution Planning	3 Social campaigns	4 ICT Integration	5 Closeout				
1.1 Public procurement for citizen engagement campaign	2.1. Plan Schedule	3.1 Traffic and environment information campaign	4.1 Impact assessment	5.1 Impact assessment				
1.2 Public procurement for citizen ICT Integration	2.2. Plan Resource							
	2.3. Plan Budget							
	2.4. Plan Risk management							
6. Coordination and monitoring								
6.1 Coordination								
6.2 Monitoring								



	-			-					_				-					_				-					-				202	-				1		
Work Packages and task description:	2022						-					023				_				20	024								202	5					WD	1470		
Environmental and 8 Traffic Manitaring	H	-	<u> </u>	-	-		-	1 1	-	-	1 1	-	-	1		-	-	<u> </u>	-	1 1	-	—	1 1	-	-	<u> </u>	-	1		-	<u> </u>	<u> </u>	<u> </u>	<u> </u>	-	DELIVERABLE	LEADER	PARTNER
Environmental and & frame wonitoring	5 1	£ 5	8 5	18	6	20	52 23	23	24	26	2.7	28	8 8	31	32	33	38	36	37	38	40	4 64	43	44	46	47	49	50	19	23 E	54	8 8	57	89	60			
WP 1: Procurement process of project definition and Design project																																					SCT	Contractors
T.1.1 Public procurement for citizen engagement campaign																																						
T.1.2 Public procurement for citizen ICT Integration																																				D1		Contractor 1
WP 2: Execution Planning																																					Contractor 5	SCT
T2.1 Plan Schedule																																						
T2.2 Plan Resource																																						
T2.3 Plan Budget																																						
T2.4 Plan Risk management																																						
WP 3: Social campaigns								11																				11									SCT	Contractor2
T3.1 Traffic and environment information campaign																																						
WP 4: ICT Integration																																					SCT	Contractor2
T4.1 Integration with Smart City Monitoring System								П																												D2		
WP 5: Closeout																																						
T5.1 Impact assessment																																						
WP 6: Coordination and monitoring																																						
T6.1 Coordination				T																																		
T6.2 Monitoring																																						
D1. Project desing				Г									Г													1 T												
D2. Monitoring integration																																						

Figure 29. Gantt IS 4.1 CIP: Environmental and traffic monitoring

Smart City Monitoring System							
1 Procurement process of project definition and Design project	2 Execution Planning	3 Social campaigns	4 Closeout				
1.1 Public procurement for citizen engagement campaign	2.1. Plan Schedule	3.1 Positive Energy Buildings_ PV Schools	4.1 Impact assessment				
1.2 Public procurement for citizen ICT Integration	2.2. Plan Resource	3.2 NZCB Social Housing					
	2.3. Plan Budget	3.3 Smart Gerencia (including 2nd life batteries measure)					
	2.4. Plan Risk management	3.4 Sustainable Street					
		3.5 E-Bus					
		3.6 RES-EV charging points					
		3.7 Alternative parking					
		3.8 Schools paths					
		3.9 Environmental Traffic Monitoring					
		3.10 City information modelling					
		3.11 Smart EV Charging Control System					
		3.12 VR BIM					
		3.13 Public awareness campaign Air Quality					
5. Coordination and mo	onitoring						
5.1 Coordination							
5.2 Monitoring							





Figure 30. Gantt IS 4.1. CIP: Smart City Monitoring System

7.6.14. Financing plan

This project will have a total budget of 150.000 euros for software development and integration activities. However it is important to highlight that every measure will have its own communication budget. In this regard, the environmental-traffic control system is already granted with a national fund with co-funding percentage of 50%, with the total funding of 1.196.923,50 €. The other 50% will be provided by own local private resources.

7.7. IS-4.2: Services for City Management and Planning. CIM

7.7.1. Baseline

The City of Santa Cruz de Tenerife has worked on an open data strategy since 2018. It is one of the most advanced municipality in Spain regarding transparency. In the improving process, SCT is expecting the introduction in its internal city management tools the BIM applied to the city in the large scale. In order to do it, a pilot project will be developed as the starting point to be spread across the city in the near future. Base on the modelling, all possible data will be in the open data platform of SCT.

GA #774199





Figure 31. Pilot urban block for CIM

In particular, IS-4.2 has links with the following ISs.

• Measure #1 : Smart Gerencia

→TT#2 – IS2.1 Smart Public Building

• Measure #1 : Smart City Monitoring System: Environmental and traffic monitoring

→TT#4 – IS4.1. Service for Urban Monitoring

• Measure #1 : VR-BIM

→TT#5 - IS-5.3: Living labs

7.7.2. Ambitions

SCT ambition is to integrate buildings, infrastructure and urban planning data to create the City Innovation Model (CIM) of the city, in a pilot project to gain experience for a future expansion to the whole city. CIM will be a platform for greatly enhancing the efficiency of city management and planning, both saving money and reducing the environmental impact.

7.7.3. Planning of replication activities

The planning of the City Information Model consists, on one hand the procurement phases (service contract and CIM integration software), and in the other hand the technical development, in particular the model creation and its integration with the software to include monitoring data. The works will be launched in late 2022 and will develop activities until 2024.



7.7.4. Organization of work

The municipality of Santa Cruz will work the "CIM" pilot project within the ICT department. Once this infrastructure is in service, the Gerencia de Urbanismo entity will lead the other technical side of the project. In order to achieve the right development of the project, technology suppliers and training suppliers as well as architecture and infrastructure providers will have to be subcontracted in order to deliver the needed services.

ICT Department	Project Coordinator: Manuel Pérez Coca.						
	Laureano Díaz.						
Gerencia de Urbanismo	Asención Bacallado. Head Director						
Cluster Construcción Sostenible	Consultancy company						
Private company 1	Software supplier						
Private company 2	Training provider						
Private company 3 and 4	Architecture and infrastructure model developers.						

7.7.5. Data collection and management

The data available in the CIM will be the one source urban monitoring system, in particular in the control spot of Avenue 3 de Mayo:

- Air quality observation data: CO2, CO, NOx
- Traffic restriction in the surrounding streets.

Furthermore, it will be display the energy performance of the building Smart Gerencia:

- Energy consumption.
- PV production.
- Wind production (if installed).
- Energy transferred from/to EV charging stations in the building Smart Gerencia.
- Energy storage in batteries.

The CIM demonstrator will allow to visualize a number of geo-referenced equipment in the selected spaces, which are the building of Gerencia de Urbanismo, CEIP Tomé Cano and, eventually, Fire Station.

- Solar panels.
- Wind mills.
- Lithium-ion battery (2nd life).
- Electric vehicle charging stations (Smart Gerencia).
- The main energetic counter of the building (Smart Gerencia).



7.7.6. Barriers and drivers

- Economical
 - The costs of creating this information models are high.
 - The potential benefits of having the information model are likely to be worth it of the cost.
- Sociological
 - It is a very visual way of showing public information to citizens, hence high acceptance is expected.
- Technological
 - Challenges to be solve in including data from various sources in real time into the in cloud model.
- Environmental
 - Energy optimization and energy consumption awareness.

7.7.7. Specifications

On one hand, concerning the environmental and energy data the system is comprised by same specifications related in IS 4.1 and IS 2.3. On the other hand, regarding CIM model itself will have to be developed considering the following specifications:

- Points cloud data from 3D Laser scanner complemented by drones, digital cameras and study visits.
- EdgeWise software to integrate the points cloud of the elements into a BIM model.
- IFC models of the buildings with all equipment.
- Developing APP of the SCT Smart City Monitoring System to show the elements of the city information model with real time sensing data.

In particular the elements to be included in the model are:

- La Gerencia de Urbanismo Building.
- CEIP Tomé Cano.
- Section of Avda. 3 de Mayo until the roundabout.
- Section of Tomé Cano Street.
- Section of the Avda. Del Carmen.
- Section Juan Sebastián Elcano Street.

7.7.8. Citizen engagement

The target users of the CIM initiative are:

- Users of the building (Gerencia de Urbanismo, Viviendas municipals, Servicios Públicos, Medio Ambiente and Infrastructures)
- Private companies (Maintainer of the building at the building scale)
- Public entity (Universities)



- Citizens (visitors, private transport users, pedestrians)

From the observation of the environmental sensors into the surrounding area, citizens could decide to change habits of doing physical activity in the area. From the observation of the traffic restriction information citizens could change their way of entry or exit the city accordingly. From the observation of the Smart Gerencia energy system, citizens could learn about this topic and even take action in their homes. This particular information, regarding The Gerencia de Urbanismo building, will be included in IS 5.2 Living Labs with the use of Virtual Reality using the BIM model and data. Thus, it is situated in the third step of the citizen engagement ladder; "Co-creation for adoption of existing touchpoint".

7.7.9. Business model

For this initiative, the target user is the municipality for urban planning. No business model is associated.

7.7.10. Governance

Municipality of SCT will operate accordingly with ITC Department, which will create the connectivity among data system to make flow of the environment sensors, solar panels, 2nd life batteries, EV charging stations and energy counter of the building with the CIM. Hence SCT municipality is responsible to provide data from the environmental sensors to the CIP.

La Gerencia de Urbanismo is the public organization in charge of the main test building, therefore they will be in charge of the well-functioning of all system installed in their facility as well as to provide an effective data transmission. Regarding the data transmission and maintenance of the rest of the elements is responsibility of the Security traffic Department.

7.7.1. Impact assessment

The expected impact depends of the public and users satisfaction assessment surveys, which will be carried out after 6 months launch operations.

КРІ	Parameter(s)	Definition	Baseline	Target
1. Users of CIM	Number of access	Number of access to the web CIM platform	N/A	2.500 a year
2. Satisfaction Survey	Average score	Average score of the use of CIM among target users	30 surveys minimum	4 on the scale of 1- 5 (Likert Scale)

Table 31 IS 4.2 KPIs



7.7.2. Implementation plan

The implementation plan of this measure pursues the effective implementation of the prototype of SCT City Information Modelling. This will be a medium term process since it will depend on other measures (see 6.7.1) and also because it requires to mature innovation culture of SCT city. Here it is described the basic implementation, however if further inner capacities are developed or stronger ambitions are supported by the right budget, during the implementation phase the scope of this measure might be enlarged embracing more area of the city.

7.7.3. WBS - Work Breakdown Structure & Gantt chart

CIM								
1 Initiation	2 Planning	3 Execution	4 Closeout					
1.1. Feasibility study	2.1. Plan Schedule	3.1 Points clouds gathering	4.1 Impact assessment					
1.2 Fieldwork, dimension and budgeting	2.2. Plan Resource	3.2. Modelling creation						
1.3 Proposal preparation and funding	2.3. Plan Budget	3.3 Integration with SCT Smart City Monitoring System						
	2.4. Plan Risk management							



Figure 32. Gantt IS 4.2 Service for City Management. CIM.



7.7.4. Financing schemes and opportunities

Considering the inexistence of public grants for developing projects with BIM technology, and the fact that other element of this project is financed by other initiatives related to IS 4.1 and IS 3.2; the activities related to points clouds, modelling itself the elements of the system as well as the integration of the models in the SCT Smart City Monitoring System will be financed by own municipal resources. With an initially estimated budget of 165.000 euros in total.

7.8. IS-4.3: Services for Mobility Smart. EV Charging Control System

7.8.1. Baseline

IT 4.3 in SCT is related to the TT#3 demonstration activity which is focusing on building a centralized system operating EV charging stations all across the city and coupling with the RES supported EV charging stations, aiming at implementing a "Smart Charging" management and testing various related use cases for the EV municipal fleet (RES supported).

Regarding RES supported EV charging stations, Smart Charging requires to access real time and historical data of various profiles to dynamically control and monitor both EV and RES aiming at a better forecasting of the energy usage and an optimal charging plan of EVs based on RES (PV).

On the other hand, concerning the public EV charging stations, there will be implemented ground parking sensor, equipped with triple detection technology (magnetic, ultrasound and infrared detection), in order to provide accurate and real time information about the occupancy of the availability of EV charging stations for citizens, as well as the right time for users to unplug and free the parking place for next users.

Furthermore, this measure will be integrated into City Monitoring System.

In particular, IS-4.3 has links with the following IS.

• Measure #1 : Sustainable street, E-Bus, RES-EV charging points

→ TT#3- IS-3.1: Smart Solar V2G EVs

• Measure #1 : Smart City Monitoring System

→ TT43- IS-4.1: Services for Urban Monitoring

7.8.2. Ambitions

The main ambition of this measure is to have a centralized software-tool for managing the EV-charging stations in the city, where all operations and maintenance activities might be coordinated. Monitoring energy consumption, time and frequency of use is very useful data for improving this public service. In



addition, optimizing the energy use when charging rom the municipal fleet is an asset to reduce the internal operative costs. Furthermore, providing a public service to inform about the availability and the end time of usage of the EV charging station will help to optimize the efficiency of this public resource.

7.8.3. Planning of replication activities

This project is planned to be launched in parallel with the Sustainable street measure, with the RES-EV charging points in public buildings, and if technically possible, with the e-bus charging system with TITSA bus company. The prior works must be accomplished in order to update the database of other supported by RES installations in public buildings. Furthermore, in order to include the current EV charging points in the future centralized system, communication devices will be deployed. Then, inasmuch as the RES-EV are installed they must be connected with the control software. This is a long-term action since it is expected to last as long as new RES-EV are developed in the city.

7.8.4. Organization of work

The municipality of Santa Cruz develops the "Smart Charging" project within the Infrastructure Department. Once this infrastructure is in service, the Public Service will continue in track its correct operation. But before this, project suppliers will be subcontracted in order to deliver the needed services such as project definition (already done), installation of RES, charging points, batteries supply and the monitoring system.

Infrastructure Service Department	Project Coordinator: Isabel Acosta Guerra.
Public Services Department.	Chief executive: Javier Ignacio Fdez. Rguez.
	Technical manager: Juan Cano.
Dobon's Tecnology	Project technical definition. Julián Monedero Andrés
TITSA bus Company	José Luis García Pérez. Infrastructures Chief Executive
Private company 2	Communication devices and software development and integration.

7.8.5. Data collection and management

This parking sensor will be installed in all public EV charging stations across the city (24 in present time), but all new stations will also need to have it and to be included in the centralized system, which should be integrated with IRIS monitoring system.

Wireless communication solutions should be implemented to interconnect EV-charging stations with the central control unit.



7.8.6. Barriers and drivers

- Political
 - EV solutions are well perceived and it is in all parties agendas.
- Economical
 - The payback is not guarantee, hence maintenance is not assured but the current system.
- Sociological
 - Adequate used of this infrastructure must be improved by citizen's information campaign.
- Technological

- Sensing technology is already RTL 7 (mature).
- Legal / Regulatory framework
 - \circ $\,$ There is a lack of regulation for private investors and municipality provide this promotion service.
- Environmental
 - \circ Wireless communication system might consume more than desired energy.
 - Other solutions should be studied.

7.8.7. Specifications

LoRaWAN in-ground parking sensor is equipped with triple detection technology - magnetic, ultrasound and infrared detection – in order to increase the accuracy. The sensor is equipped with a replaceable battery (note, other suppliers require replacing the entire sensor including electronics). Speed of detection: The sensor performs measurements with a frequency of every 0,5 seconds. The parking sensor therefore detects a quick vehicle rotation, namely a car leaving (car1) and another car (car2) entering the parking spot within 5 seconds.¹

7.8.8. Citizen engagement

The public layer of the IRIS monitoring system will be at the disposition of the citizens to let checking of the operating of this project. What is more important, there is the public service related to the availability a time of charging use of public EV users. Consequently, it is situated in the first step of the citizen engagement ladder; "Awareness".

7.8.9. Business model

This is a public service provided by the municipality.



There is card provided by the municipality in order to use the charging system. This is the first step for a future pay as a service business model. It is expected to remain a free of charge service until the EV are more abundant in the city.

7.8.10. Governance

This project will be leaded by Infrastructure Department during the procurement and implementation process.

Thereafter ICT Department will be responsible for control and maintenance of the total system with the support of the external service suppliers.

The Public Service Department will be the manager of the tools of the system as another tool of at their availability.

7.8.11. Impact assessment

The impact assessment of services for mobility replication action will be based on the following indicators.

КРІ	Parameter(s)	Definition	Baseline	Target
1. Energy efficiency provided by vehicles	kWh	Positive balance of energy contribution made to the energy balance in the building with associated RES	N/A	10%
2. Charging hours of EV charging stations	Number of hours	Number of hours of usage of the public EV charging stations.	N/A	<i>To define</i> hours
3. City pollution reduction base of EV.	%	Average city pollution reduction based on increase of EV vehicles use.	See indicator performance after first year of measurements a compared with EV census.	10% after three years.

Table 32 IS 4.3 KPIs

7.8.12. Implementation plan

This measure, as referred in the baseline (6.8.1), will be implemented accordingly with the investment of the new EV-RES supported charging points. However, it will eventually include previous EV-RES-not-supported charging points. This service will have to be inserted in the Smart City Monitoring System, for public information. Further capabilities will be only at the management disposition.



7.8.13. WBS - Work Breakdown Structure & Gantt chart

Smart Charging						
1 Initiation	2 Planning	3 Execution	4 Closeout			
1.1. Public procurement for project design. Direction of Works and Security and Health project.	2.1. Plan Schedule	3.1 Manage communication and city engagement	4.1 Impact assessment			
1.2. Technical project definition Cars mitigation zone	2.2. Plan Resource	3.2. Manage procurement				
	2.3. Plan Budget	3.3 Implementation of sensing and communication system				
	2.4. Plan Risk management	4.4. Integration with IRIS Smart City Monitoring System				



Figure 33. Gantt IS 4.3 Smart Charging Control System

7.8.14. Financing schemes and opportunities

There is not open funding schemes for the measures not already included in previous IS. Therefore, it is expected, for those not already allocated funding will be financed by SCT own funding. However new funding opportunities will be studied for next call MOVES3 in April 2021. 100.000 euros.

7.9. Conclusions on ambitions and planning of activities for TT #4 City Innovation Platform (CIP)

SCT municipality's ambition is to upgrade the information and communication technologies in the city management, with the final goal of developing a complete City Innovation Platform. However, in order to attain this mayor objective, minor but crucial integrated replication actions will be deployed to gain



experience and solve more immediate needs, such as become a greener and more sustainable city, increase and improve city information capturing for an advance city management as well as for creation of a more green economy.

In particular, the determination for TT#4 is to reduce pollution through monitoring and communication; boost the open data potential via BIM; and to optimize the municipal EV smart charging system. The implementation of this integrated replication projects will assistance in the digital transformation of the city.


8. Transition track #5: Citizen engagement

8.1. TT#5 Replication in a nutshell

Santa Cruz de Tenerife municipality is working on increasing the citizen engagement in their government process by means of different strategies and scales of participation. On one hand, it is important that citizens' opinions are taken into consideration to understand their views about the municipality development or problems. On another hand, these views or opinions should have a real impact on the local reality; this is the reason that there is a growing part of the local budget decided by citizen's participation.

The municipality has several structures to facilitate citizen's engagement. Firstly, there is a public register to create a control of all entities working accordingly with the Citizen Engagement Regulation. Furthermore, there are 3 operative local councils:

- Social Council. This is an advisory organism regarding socio-economics and urban development.
- Social Services Council. This is an advisory organism regarding the realm of the municipal social services.
- School Council. This is an advisory and participation organism regarding education in the municipality.

Apart from these ones, there are 5 District "Tagorores" which are most important participatory entities, which work at the district level (Anaga, Centro-Ifara, Salud-La Salle, Ofra-Costa Sur y Suroeste).

Communication Channels for citizen's engagement are various:

- On site: C/ Afilarmónica Nifú-Nifa, 32 1ª, 38003, Santa Cruz de Tenerife
- Telephone: +34 922606625
- APP Santa Cruz Mejora
- Using the Tagorores communications means.



Accordingly with D.5.7, within the IRIS project the Engagement Ladder is used as a reference tool to determine the *possibilities* for citizens to influence decisionmaking, articulating their needs, challenges and problems

NEW ACTIVE TOUCHPOINT	4->	NEW TOUCHPOINTS CITIZEN ENGAGEMENT THROUGH CO-CREATION	CONTRIBUTING CITIZENS
EXISTING ACTIVE TOUCHPOINT	3->	EXISTING TOUCHPOINTS CITIZEN ENGAGEMENT THROUGH CO-CREATION	CONTRIBUTING CITIZENS
TIVE POINT	2->	COMMUNICATION ACTIVITIES	INFORM CITIZENS through INVOLVED citizens
PASSIVE AC	1->	COMMUNICATION ACTIVITIES	INFORM CITIZENS

Table 33Engagement ladder structure

			SCT Integrated Solutions Mapping Exercise							
Citizeh Touchpoint/ Service Design co- creation				4	Co-creation of new service	School paths	Pedestrianisation	Linking city nodes		
Citizen Touchpoint Adoption			3	Co-creation for adoption of existing touchpoint	NZCB Social Housing	CIM	RES-EV	Public campaign Energy	Car mitigation zone	
Citizen Storytelling		2	Storytelling	PV schools	Smart Gerencia- Tome Cano.	E-Bus	Sustainable Street	City Monitoring System.	Virtual Reality/BIM	Public awareness campaign Air Quality
Citizen Awareness	1	Awareness	2nd Life Batteries.	Smart EV Charging	Alternative Parking					

* All cursive measures are part of the IS Personal Mobility Strategy, which has several measures with different level of citize engagement.

Table 34 SCT IS mapping

8.2. Selection process

Despite de participatory budget run every year, with the result of a set of wide range of initiatives (see Annex II City Engagement Initiatives Map); in order to select IRIS integrated solutions regarding citizen's engagement for replication, it has been of interest getting to know the IS5.x Demonstrators of the LHCs; either by the on site visits either by reading the associated deliverables. This TT#5 is also transversal because it is part of every single IS of the current Replication Plan.



In accordance with LHC integrated solutions and its specific measures, as well as with SCT development strategy, it has been selected the following IS and measures to be replicated in the municipality.

	IS-5.1: Chan everyday energy use	nging IRIS e Ener	Monitoring rgy Information	Platform: on	Environmenta	and		
TT#5 Citizen engagement and	IS-5.3: Living labs		VR BIM: the Building Information Modelling platform based on 3D Virtual Reality environment					
co-creation	IS-5.4: Behav changing informatio	viour Publ n & Fa	Public awareness campaign Energy – School; Youth & Family					

Table 35. Citizen engagement summarise

8.3. Mapping of stakeholders

Apart from the already mentioned Citizen Engagement operative councils, SCT municipality holds a various group of local stakeholder regarding participatory process.

- The municipal City Council.
- The citizenship of the municipality.
- The educative community.
- The sport clubs.
- The culture entities.
- The local enterprises ecosystem.

In particular, regarding the IS-5.1: Changing everyday energy use, it is important to remark the following stakeholders:

- Santa Cruz Sostenible Foundation.
- RACE motor club.
- Security and Traffic municipal Department.
- ICT municipal Department.
- ICT/Monitoring Companies.

Regarding, the IS-5.3: Living labs, it is necessary to mention the following stakeholders:

- The Architecture Professional Organization.
- The University of La Laguna, Graphic Expression Department.
- The Gerencia de Urbanism entity.
- BIM companies.

With regards with IS-5.4: Behaviour changing information, it is also significant to define additional local stakeholders.

- Environmental Education Companies.
- Parents Associations
- ICT/Monitoring Companies.



8.4. Identified knowledge gaps

The main knowledge gap in this TT#5 is the lesser experience in participatory process regarding the last steps of the citizen engagement ladder. That is why it has been very interesting the peer-to-peer meetings already celebrated with Utrecht partners and it will be welcome further meetings in this regards. Sharing experiences and validated citizen engagement methodologies is a strong approach for solving knowledge gaps and capacity building.

8.5. Capacity building and knowledge transfer

The IRIS designated municipal employees and CCS professional team have worked together to define the measures to be deployed. However, in order to improve the goals and increase success, the capacity to transfer knowledge assumed for this TT#5 and the selected IS 5.1, 5.3 and 5.4 is based on three levels. The first level is the thorough study of the related deliverables in order to find specific information as well as to raise new questions to be solve by e-mail or phone calls. The second level is the celebration of peer to peer online meetings (due COVID) with IRIS LCH partners where more detailed conversations take place. And the last one, is the virtual tours of the demonstrators in order to gain a better understanding without travelling and being in physical contact (due to COVID restrictions).

8.6. IS-5.1: Changing everyday energy use. Public awareness campaign Energy – School; Youth & Family

8.6.1. Baseline

In SCT municipality there are several possible means for citizens' dialogue. Exploring these options in engage at more levels and ways is the goal of this replication action. Considering that SCT has high potential for RES and current high social interest in renewable energies. It seems justified to develop participatory actions regarding the most relevant replication actions of the previous TT# regarding this important public interest. In particular, the Energy detective measure carried out by Utrecht LHC is an inspiration for the gamification measure in this IS for SCT.

In particular, IS-5.4 has links with the following IS.

- Measure #1: Public awareness campaign Energy School; Youth & Family
 - → TT#1 IS 1.1 Positive Energy Buildings; PV Schools

8.6.2. Ambitions

The main goal of this replication action is to increase the sustainably energy awareness of the educative community at different levels. Firstly, primary education students will be able to learn, accordingly to their ages, about renewable energies, energy saving, Climate Change thanks to RES on their schools' roofs and it is expected to integrate this resource into their educative curricula. Secondly, teachers will also be more



informed and aware about same previous concepts and could use these installations as a teaching resource. Thirdly, schools' Directors and other school employees will also become more energy use aware and will gain motivation to go further in their real of capacity concerning energy sustainability. Fourthly, parents will also benefit from this measure by means of receiving feedback from their children as well as from the campaign itself. Furthermore, social housing users close to the schools (less than 500 m.) will benefit from electrical invoices reduction hence they will also be part of this replication action. Finally, coming politicians will need to be proactive in this topic since this replication action will help to expand citizen engagement in more sustainable ways of energy production and use.

8.6.3. Planning of replication activities

A first step will be to identify motivated teachers in the selected schools to become changing agents. There is a need to identify a candidate list with suitable profiles as change agents by talking to schools' directors. This changing agent, also need to include AFA representatives (families' associations). Hence, three representatives from each school (Director, teacher and AFA representative) will be chosen and then trained to implement to citizen engagement activities e.g., promoting the curricula adaption in different subjects and levels, formulating the communication messages for families, developing activities such as gamification by motivating energy use improvement among schools, follow-up of progress on awareness goals. Local news agencies will be also included as partners in the effort to raise citizens' awareness.

8.6.4. Organization of work

The municipality of Santa Cruz will work the "Public awareness campaign Energy – School; Youth & Family" within the Participatory Office. Once this infrastructure is in service, accordingly with Public Service Department (IS-1.1) the Participatory Office will launch this citizen's engagement action. In order to achieve success, external assistance will be needed, in particular development specific contents for curricula adaption and

Participatory Office	Project Coordinator: Lucía Gutiérrez Armas
Public Services Department.	Chief executive: Javier Ignacio Fdez. Rguez.
Cluster Construcción Sostenible	Assistance company
Schools	Director of Schools
Private company.	Campaign support

8.6.5. Data collection and management

Technical data will be gathered and used accordingly with IS-1.1 description. However, impact and follow up assessment will be gathered by the Participatory Office and data will be included in the IRIS monitoring platform.



8.6.6. Barriers and drivers

- Political
 - Barriers: No political barriers were identified.
 - Drivers: There is an increasing need of citizens' engagement and participation in SCT.
- Economical
 - o Barriers: No economic barriers were identified.
 - Drivers: No economic drivers were identified.
- Sociological
 - Barriers:
 - Difficulties might arise when comparing schools' performance when gamification.
 - Attaining the real participation compromises from schools' Directors.
 - \circ $\;$ Drivers: Gamification might boost the participation and interest.
- Technological:
 - Barriers: Integration of content in the curricula in the middle of the academic year.
 - Drivers: No technological drivers were identified.
- Legal / Regulatory framework
 - Barriers: No legal/regulatory barriers were identified.
 - Drivers: No legal/regulatory drivers were identified.
- Environmental
 - Barriers: No environmental barriers were identified.
 - Drivers: No environmental drivers were identified.

8.6.7. Specifications

Regarding the planning it is important to count on the timing when the curricula should be modified. An ideal timing will be to make the first communication at the end the academic year 2022 (June), in order to coordinate the integration works for the first two weeks of September 2022. The work will start once the RES are installed and operative (gradually from September till December 2022). Teachers and Director will define the criteria for the curricula implementation contents.

The contents of the curricula adaption must be focused to primary level, but it will need to be structured to the six different courses (1st till 6th grades). Furthermore, there are at least two main subjects to receive specific contents; maths and natural science. In addition, it could be also worked into language or artistic subjects. Regarding duration, it will depend on the teacher's motivation, but the minimum content should provide contents for 5 hours per course and subject.

A leaflet will be designed in order to communicate the launching of the RES in the schools and measures to save energy at home as well as to promote the benefits and financing possibilities regarding RES at homes. Design will be done through a schools challenge. This will be sent via e-mail and social networks



to families. Another leaflet more orientated to savings and explaining the benefits in the electrical invoice will be delivered to the social housing families' beneficiaries of the RES at the schools.

The gamification actions (Energy Detective) will be defined in the campaign project, however it will be focused in attaining a better usage of the energy produced by their RES in order to improve the efficiency of the system becoming energy prosumers. No competition will be promoted but a comparison among initial situation and the improvement on learning using energy. Public recognition during European Weeks (2023 & 2024) of Energy will be done to schools accordingly with their achievements.

8.6.8. Citizen engagement

The target group is the following:

- 1 Director of schools
- 2 Teachers
- 3 Students
- 4 Families of the students
- 5 Other schools' employees
- 6 Proximity social housing users
- 7 Politicians.

Hence, this integrated solution is situated in the third step of the citizen engagement ladder; "Co-creation for adoption of existing touchpoint".

8.6.9. Business model

There is no business model in this IS, however the proper business model of the RES investment will be used for communication to citizens.

8.6.10. Governance

The key aspect during the Governance of this replication action is to keep the motivation and gain interest from most of the teachers in order to include this resource in their curricula and use it in the everyday work with students.

On the other hand, there is also an important need to keep a balance among all participating educative centres in order to progress together and be able to make pondered comparison.

8.6.11. Impact assessment

The impact Will be measured according to the following performance indicators in order to get a deeper understanding and knowledge on the perception of the selected citizens group (educative community and related) regarding this replication action.



КРІ	Parameter(s)	Definition	Baseline	Target
1. Integration of RES on curricula	Number of theoretical and practical exercises developed in class	Impact of the RES on the curricula and its use in everyday classes.	N/A	3 on the scale of 1- 5 (total number of subjects)
2. Local community involvement	Number of participants	The extent to which Educative community members have been involved in the participatory process	NA	100% of students 50% of parents

Table 36. IS 5.1 KPIs

8.6.12. Implementation plan

The implementation plan is shown in the following WBS and Gantt chart. In particular, it is remarkable the importance of developing a good integration of the RES in the educative curricula. In addition, the gamification actions to increase the participant interest are mostly the cornerstone of this measure's success.

8.6.13. WBS - Work Breakdown Structure & Gantt chart

Public awareness campaign Energy – School; Youth & Family							
1 Procurement process of the participation campaign	2 Participation campaign definition	3. Participation campaign execution	4: ICT Integration	5 Closeout			
1.1 Public procurement for participatory	2.1 Campaign planning	3.1 Integration and reinforcement of RES contents on curricula	4.1 Integration with SCT Smart City Monitoring System	5.1 Impact assessment			
campaign project definition and execution	2.2 Definition of RES contents for curricula	3.2 Families engagement					
		3.3 Gamification actions					
		3.4 Social housing communication actions					
6 Coordination and monitoring							
	6	.1 Coordinating					
	6	5.2 Monitoring					



Work Packages and task description:		2020					2023							2024													
Dublic surgestance services in Energy Cohool.																											
Youth & Family	4	ŝ	9	7		6	10	÷	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
WP 1: Procurement process of the participation campaign																											
T.1.1 Public procurement for participatory campaign project definition and execution																											
WP 2: Participation campaign definition																											
T2.1 Campaign planification																											
T2.2 Definition of RES contents for curricula																											
WP 3: Participation campaign execution																											
T4.1 Integration and reinforment of RES contents on curricula													D1														
T4.2 Families engagement																											
T4.3 Gamification actions																									D2		
T4.4 Social housing communication actions																											
WP 4: Closeout																											
T4.1 Impact assessment																											
WP 5: Coordination and monitoring																											
T5.1 Coordination																											
T5.2 Monitoring																											
D1. Effectiva RES integration in curricula																											
D2 Finalization of gamification actions																											

Figure 34. Gantt IS 5.1 Public awareness campaign Energy

8.6.14. Financing schemes and opportunities

The financing of this project will be entirely made by the municipality, about 32.000 euros, since it will only be expenses related to public communication and the citizen's validation of the technology, since the infrastructures' costs will is already assigned in IS 4.2.

8.7. IS-5.3: Living labs. VR BIM: the Building Information Modelling platform based on 3D Virtual Reality environment

8.7.1. Baseline

The Gerencia de Urbanismo building is going to be part a set of actions such as RES, EV charging, Building Energy Management System, and create a digital twit (BIM).

BIM data are becoming ubiquitous in new construction projects, but not in old ones. However its benefits could be used in existing building when virtual twin is created. Furthermore, BIM data is not too often easily available to the property owners or facility managers due to overly complex data management and visualization tools, instead requiring consultants and specialists as go-betweens to access information. The AR/VR BIM visualization tool developed in IRIS puts the information at the fingertips of the users in a simple and easily understood interface.

The virtual copy of the Gerencia de Urbanismo as "A Working Lab" has the potential of being a platform for all IoT products. Furthermore, it could also be a digital version of the building that sends notifications for property managers when, how and why to do different kind of services. When starting up a renovation



process/new research project the BIM model can be used to simulate different scenarios prior to decision making.

This replication action on The Gerencia de Urbanismo creates the opportunity to implement Virtual Reality and test its benefits in a building where different stakeholders could enjoy the results; building managers for management as well as users for energy use awareness, or professionals for technology development as test bed.

In particular, IS-5.3 has links with the following ISs.

• Measure #1 Smart Gerencia-Tome Cano

→TT#2– IS-2.3: Utilizing 2nd life batteries for smart large-scale storage schemes

- Measure #1 : VR-BIM
 - → TT#4 4.2. Service for City management and planning.

8.7.2. Ambitions

The demonstrator objective: This demonstration entails demonstration of a BIM (Building Information Modelling) based 3D Augmented Reality/Virtual Reality (AR/VR) Environment that will virtually immerse users into the inner workings and properties of a building, providing deeper understanding and involvement in the building's processes. This demonstrator is implemented in the AWL (A Working Lab) building, where the innovative environment and extensive sensor network will provide relevant inputs to the demonstrator.

8.7.3. Planning of replication activities

Accordingly with the launch of the operational phase of IS 4.2, this integrated solution 5.3 will be set off. A public presentation will be done via traditional media and social network. A participation list will be displayed in order to contain initial demand. Once this novelty effect is over, any user of the building will use the device when visiting the building if available.

8.7.4. Organization of work

The municipality of Santa Cruz develops the "VR BIM: the Building Information Modelling platform based on 3D Virtual Reality environment" project within the IT Department with collaboration of University of La Laguna and Sustainable Building Cluster. Once this infrastructure is in service, The Gerencia de Urbanismo local entity will continue in track its correct operation in collaboration with Citizen's engagement office. But before this, project suppliers will be subcontracted in order to deliver the needed services such final BIM model and VR system and sensors' integration in the BIM model.

ICT Department

Manuel Pérez Coca. Head Director





	Laureano Díaz.
Gerencia de Urbanismo	Marta de Olano La Roche. Head Director
	Asunción Bacallado. Head Director
University of La Laguna	BIM assessment
Sustainable Building Cluster	Project development assistance
Private company 1	BIM development
Private company 2	VR-Visualization of sensors parameters on the BIM model

8.7.5. Data collection and management

The solution will be implemented as a client-server solution consisting of a cloud server responsible for hosting and serving data, including both BIM and sensor data, and serving the data to both AR and VR clients. The cloud server communicates with the sensor network(s) of the building(s) and processes the sensor data for further streaming to the AR and VR clients.

The cloud server will be accessible via an online web-based user portal, which will allow users to access to the information and visualize it by using their own VR optics.

8.7.6. Barriers and drivers

- Political:
 - No political barriers were identified.
 - There is great emphasis on citizens' engagement by using attractive technologies.
- Economical:
 - No economic barriers nor drives were identified.
- Sociological
 - \circ $\;$ Gamification might boost the awareness on energy management.
- Technological
 - There is not an easy technological capacity to establish a feedback for later dialogue among public administration and citizens.
 - BIM data is becoming an increasing important aspect of planning, construction, operation and management of buildings.
- Legal / Regulatory framework
 - Handling personal data is always a key issue in creating new services and managing citizens' view.
 - $\circ~$ BIM data is often viewed as sensitive, it can be difficult to access or limited to open use.
- Environmental:
 - No environmental barriers nor drivers were identified.



8.7.7. Specifications

This demonstration, as a working lab, entails Demonstrate a BIM based on 3D Virtual Reality Environment that will virtually immerse users in the inner workings and properties of a building, providing deeper understanding and involvement in the building's processes.

Regarding hardware, it will require a cloud server responsible for hosting and serving data (BIM and sensor data) to both AR and VR clients. In addition, it will also need the visualisation hardware, such as headset for the VR visualisation. Furthermore, for the AR visualisation, smartphones running IOS or Android operating systems.

Sensors to be displayed on the model are set on IS 4.2. Service for City management and planning.

8.7.8. Citizen engagement

The target group is the following:

- 1 Property owners
- 2 Maintenance staff
- 3 Visitors to the building
- 4 Researchers

Hence, this integrated solution is situated in the second step of the citizen engagement ladder; "Storytelling".

8.7.9. Business model

There is no a clear business model foreseen for this integrate solution. However, there is a possible business cases to be considered:

1. The visualisation is provided to the building management organization as a service. The value proposition includes improved access to information, improved maintenance efficiency, etc. Therefore, a better management is expected.

8.7.10. Governance

The AR/VR BIM demonstrator will be governed by The Gerencia de Urbanismo, the management organization of the main building, since Santa Cruz municipality will be the owner of BIM data and sensor data. Data protection and integrity issues that may arise from monitoring of sensor data will be governed by the General Data Protection Regulation (GDPR), and if applicable, by Spanish legislation.

8.7.11. Impact assessment

The intuitive and simple user interface, a number of new stakeholders that have previously not been involved or asked will be able to engage themselves in the use of the building, public employees,



managers, maintenance service, and public visitor. All this, in turn, will enable a greater understanding of and a momentum towards how buildings should be designed and operated for increased sustainability, accessibility and comfort.

КРІ	Parameter(s)	Definition	Baseline	Target
1. Advantages for end-users	The extent to which the replication action offers clear advantages for end users	Level of advantages to end users compare with the no-use of the integrated solutions	Anticipated advantage before implementation of the measure	4 on the scale of 1- 5 (Likert Scale)
2. People reached	Gain insight in effect of effort to engage full extent of target group	Percentage of people in the target group that have been reached and/or are activated by the project	NA	70%

Table 37 IS 5.3 KPIs

8.7.12. Implementation plan

As it is shown the implementation phases in the coming chapter, the most crucial activities during implementation are the BIM development, on one hand. It is due to the fact that a quality model is required in order to make realistic and attractive to the general public. On the other hand, the technical implementation of the parameters on the BIM model in order to let users see them in the 3D model in a clear and nice-looking way, will also help to attain success.

8.7.13. WBS - Work Breakdown Structure & Gantt chart

VR BIM: the Building Information Modelling platform based on 3D Virtual Reality environment								
1 Procurement process of project definition and Design project	2 Execution Planning	3. BIM definition	4 ICT Integration	5 VR set up and public exposure	6 Closeout			
1.1 Public procurement for BIM development and project assistance	2.1. Plan Schedule	3.1 Points cloud registration	4.1 BIM model and sensor parameters integration	5.1 VR set up	6.1 Impact assessment			
1.2 Public procurement for VR- Visualization of sensors parameters on the BIM model	2.2. Plan Resource	3.2 BIM model design		5.1 Public demonstration for validation				
	2.3. Plan Budget							



	2.4. Plan Risk						
7. Coordination and monitoring							
7.1 Coordination							
7.2 Monitoring							



Figure 35. Gantt IS 5.3 VR BIM

8.7.14. Financing schemes and opportunities

The financing of this project will be entirely made by the municipality, since it is only considered the expenses related to public communication and the citizen's validation of the technology and the personnel costs. It is estimated to be about 12.000 euros. The rest of the costs are considered on the related measure IS 4.2.

8.8. IS-5.4: Behavior changing information. Public awareness campaign Air Quality

8.8.1. Baseline

Considering the high number of cars entering to SCT city during bank days (130.000) and the average age of them (11 years) the pollution generated by private car is truly remarkable, despite the natural dispersion conditions of the local environment. This situation normally become even worse when "calima"



conditions arrive, due to specific weather circumstances, which are getting more acute (duration and PMx concentration) due to Climate Change.

The measure related to IS 4.1 will establish the infrastructure for monitoring and accessing environmental data associate to car usage, this will help citizenship to became more responsible of their mobility decisions when pollution situations is required.

On another hand, SCT replication project is launching a set of actions which most of them are related to energy reduction and CO₂ mitigation. Therefore, providing all related information of all SCT IRIS initiatives to the general public, it is an excellent opportunity to increase citizen's engagement on energy issues.

In particular, IS-5.1 has links with the following IS.

→ TT#4 – 4.1 Service Urban Monitoring.

• Measure #1 : Environmental and Energy Information



Figure 36. Usual situation at 8:30 a.m.



Figure 37. Calima episode. World record 895 ppm. 02/2020

8.8.2. Ambitions

The energy associated to the car use is very notable among all islands energy sinks. Providing information about the environmental impact of the usual behavior of private cars users might help to change their decisions accordingly.

The first main ambition is to improve the air quality measurements in the municipality of Santa Cruz. This is expected to happen thanks to two big strategies. On one hand, a change of behavior of the private car users accordingly with their own environmental and energy awareness. In order to it, complementary mobility measures must be deployed, facilitating a progressive reduction of the private car. And on the other hand, traffic restriction measures put into motion when natural or anthropic conditions come across in the city.

The second main ambition is to help understand to the citizens what measures are taken across the municipality regarding energy reduction to fight against Climate Change. This will, eventually, increase environmental/energy awareness driving to a steadily reduction of the energy base of fossil fuels.



8.8.3. Planning of replication activities

The launch of this replication action will begin once the operative phase of IS 4.1 is enough developed. However the procurement process should be started before in order to match the timing of both IS. The participatory process based on campaign and public awareness are the key elements of this replication action. Nonetheless, it is an initial impulse in order to make the use of this tool 4.1 as usual as a possible to make a change of behavior accordingly with environmental information. Further campaign might need to be put into motion if necessary.

8.8.4. Organization of work

The municipality of Santa Cruz develops the "Urban Monitoring" project within the Infrastructure Department. Once this infrastructure is in service, the Public Service will continue in track its correct operation. But before this, project suppliers will be subcontracted in order to deliver the needed services such as project definition (already done), installation of RES, charging points, batteries supply and the monitoring system.

ICT Department	Project Coordinator: Manuel Pérez Coca, Head Director.
Citizen Engagement Department	Project assistance: Francisco P?.
Private company 1	Participatory process (through procurement).
Private company 2	ICT integration and compatibility Consultancy Company.

8.8.5. Data collection and management

All SCT integrated solutions proposed along the present replication plan have considered data collection and management. In some cases the related information is totally define, in others IS it is partially describe and in others IS there is only general approach waiting for the development of the solutions to be discovered.

In regards with the data integration, all measures from all integrated solutions must use standardized communication protocols with an open source data format, or at least compatible with the selected system. For this reason, ICT integration and compatibility Consultancy Company is important to be hired to assist on it.

8.8.6. Barriers and drivers

- Political
 - \circ $\;$ Traffic restrictions might have a negative impact on image.
 - Open information is well accepted.
- Economical
 - $\circ~$ A reduction of the pollution will increase the attractiveness for visitors and workers.



- Sociological
 - It is expected to be very difficult and slow to create a new mindset in local society regarding the private-car use.
- Technological
 - Difficulties in attaining total compatibility among all communication system and data formats and structures for all integrated solutions.
- Legal / Regulatory framework
 - Property data rights needs to be taken special care accordingly with regulation.
- Environmental
 - This is an opportunity to improve the air quality as well as to contribute to Climate Change mitigation.

8.8.7. Specifications

- Open source solution.
- Open data format and structure
- Standard communication protocols.
- Open to general public most of the information.
- Sensible or strategic data will be secured only accessible accordingly with clearance.

8.8.8. Citizen engagement

According to the Citizen Engagement Ladder this measure with reach the second level "Storytelling". At first, concise communication strategies, informing citizens on the impending changes in their environment are going to be provided. But secondly, with the involvement of citizens in actively contributing to the storytelling about the IRIS changes in their own neighborhood by taking actions own their own car use and energy consumption.

8.8.9. Business model

No business model developed since it is a municipal measure for public free service.

8.8.10. Governance

Municipality of Santa Cruz de Tenerife is the only Stakeholder of the measure, hence it will be leaded by the municipality itself. Nonetheless, accordingly with the initiative requirement there will be the need of the participation of external assistance either in information and participatory engagement, either in ICT support, which both will be subordinated to SCT leadership.

8.8.11. Impact assessment

The main impact will be the CO_2 , CO, NOx and particles reduction across the city. Furthermore, an energy reduction of the citizens may occur. Even so this impact could not be easily measure.



КРІ	Parameter(s)	Definition	Baseline	Target			
1. Pollution reduction	[CO2],[CO],[NOx], [PMx]	CO2, CO, NOx and particles reduction	Data measured after 1 year of measurements	30% reduction			

Table 38. IS 5.4 KPIs

8.8.12. Implementation plan

The implementation plan of this measure, graphically explained in 7.8.13, requires the adjustability to boost specific campaigns whenever the environmental conditions are negative; either due to *calima* either due to low wind regimen together high traffic circulation. Nonetheless, an initial campaign will be launched to explain the functioning of this service to citizens once the infrastructure is operational (see 7.6.1 Smart City Monitoring System, first measure: Air quality monitoring system).

8.8.13. WBS – Work Breakdown Structure & Gantt chart

Public awareness campaign Air Quality										
1 Procurement process of the participation campaign	2 Participation campaign definition	3. Participation campaign execution	3. Participation ampaign execution 4: ICT Integration							
1.1 Public procurement for participatory campaign project definition and execution	2.1 Campaign planning	3.1 Public communication actions (panels, media, website, social networks)	4.1 Integration with Smart City Monitoring System	5.1 Impact assessment						
6 Coordination and monitoring										
6.1 Coordinating										
6.2 Monitoring										



Work Packages and task description: Public awareness campaign Energy – School; Youth & Family					202	2									20	23					2024								
		5	9	7	8	6	10	11	12	13	14	15	16	17	18	19	20	21	8	ĸ	24	25	26	27	28	59	30		
WP 1: Procurement process of the participation campaign																													
T.1.1 Public procurement for participatory campaign project definition and execution																													
WP 2: Participation campaign definition																											1		
T2.1 Campaign planification																													
T2.2 Definition of RES contents for curricula																													
WP 3: Participation campaign execution																													
T4.1 Integration and reinforment of RES contents on curricula													D1																
T4.2 Families engagement																													
T4.3 Gamification actions																									D2				
T4.4 Social housing communication actions																													
WP 4: ICT Integration																													
T4.1 Integration with SCT Smart City Monitoring System																													
WP 5: Closeout																													
T5.1 Impact assessment																													
WP 6: Coordination and monitoring																													
T6.1 Coordination																													
T6.2 Monitoring																													
D1. Effectiva RES integration in curricula																													
D2 Finalization of gamification actions																													

Figure 38. Gantt IS 5.4 Public awareness campaign Air Quality

8.8.14. Financing schemes and opportunities

Regarding the hardware and software of the measure relate to environmental monitoring of this measure is already partially funded by National Funds in the program MOVES2, with a co-funding of 50%. On the other hand, the integration of all data into a general IRIS monitoring tool is still without external funding. ERDF are being expected to be obtained. Finally, the funding regarding the social campaign is going to be totally funded by SCT municipality, with 25.000 €.

8.9. Conclusions on ambitions and planning of activities for TT #5 Citizen Engagement and Co-creation

SCT municipality is compromised to increase citizen's engagement in its public policies. IRIS project is an excellent opportunity for this.

Considering the city needs and capacities, the three main specific replication actions are considered as the most effective and viable replication projects to help achieving this participatory goal with enough ambition but realizable.

In general these three replication actions will increase citizens' participation closing the gap between public initiatives and people. The first will help to engage local educative community with RES, the second, will help to get involved with new technologies and the importance of saving energy in the public infrastructure. And finally, with the last one, with air quality campaign it is expected to engage citizens with their own role in their own health's care by modifying their behavior accordingly with real time information. In brief, three different approaches for citizen's engagement to go further in this long road ahead for SCT.



9. Summary of Follower City use cases and measures

Accordingly with the participation process, SCT replication actions are focused to tackle the main challenges and needs of city, considering the city capacities in terms of experiences, culture and budget; regarding the IRIS framework and goals.

In brief, SCT challenges regarding IRIS project could be express as the following:

- Near zero carbon public buildings and social housing.
- Smart solutions for low carbon building and mobility.
- Smart mobility solutions to reduce pollution and increase quality of life.
- Enlarge the innovation culture of city, towards a C.I.P.
- Lift citizens' engagement culture.

In order to attain success considering these local objectives, along this document fourteen measures have been detailed for its implementation as replication actions in the city.

Due to the fact that the current replication plan is wide and ambitious, there is a preliminary three levels prioritization scheme of these measures. In the following list, green means first priority; blue represents a second level of prioritization and orange shows a minor priority level. Nonetheless all measures are expected to be addressed and completed during the established working timeline.

- 1. PV schools
- 2. NZCB Social Housing
- 3. Smart Gerencia-Tome Cano.
- 4. 2nd Life Batteries.
- 5. RES-EV
- 6. E-Bus
- 7. Sustainable Street
- 8. Personal Mobility Strategy
- 9. City Monitoring System.
- 10. CIM
- 11. Smart EV Charging
- 12. Public campaign Energy
- 13. Virtual Reality/BIM
- 14. Public awareness campaign Air Quality





Integrated Solutions Summarize (table 1 repeated)										
IS	Name of the IS	Short description	Budget (€)	Funding						
IS 1.1	PV schools	14 public schools with 207,74 kWp PV capacity	383.647,71	Demanded ERDF						
IS 1.2	NZCB Social Housing	Two NZEB social building retrofitting (57 +21 dwellings)	400.000,00	Funded						
IS 2.1	Smart Gerencia- Tome Cano.	155 kWp PV, 10 kW wind power, 14 EV charging points, BEMS	321.239,25	Not funded yet						
IS 2.3	2 nd Life Batteries.	196 kWh 2nd life batteries integrated in Smart Gerencia	20.000,00	Own sources						
	RES-EV	28 EV charging point in buildings with RES support	1.143.017,80	Funded						
IS 3.1	E-Bus	4 Pluggable e-buses with a 100 kWp PV support	1.930.000,00	Funded						
	Sustainable Street	302 kW PV, 18 kW wind power, 12 EV charging points.	1.596.807,16	Funded						
IS 3.2	Personal Mobility Strategy	Car mitigation zones, 2 alternative parking, 7 school paths, pedestrianization of C/ La Rosa, Linking city nodes	3.559.669,00	Partially funded						
IS 4.1	City Monitoring System.	City Innovation Plaform integrating IRIS KPI monitoring system and the Environmental monitoring system.	1.346.923,50	Funded						
IS 4.2	CIM	Small section of the city modelled with sensor integration	165.000,00	Not funded yet						
IS 4.3	Smart EV Charging	Webplattform and communication devices integrating all municipal EV charging points	100.000,00	Not funded yet						
IS 5.1	Public campaign Energy	Activities for citizen engagment within the schools realm	32.000,00	Not funded yet						
IS 5.3	Virtual Reality/BIM	Virtual reality spot for public and management use	12.000,00	Not funded yet						
IS 5.4	Public awareness campaign Air Quality	Citizen engagment comunication system for an effective implement car restrictions measures	25.000,00	Not funded yet						
TOTAL	-		11.629.304,42							

9.1. Integration of use cases and measures

The five IRIS TT#s implemented by IRIS LHCs as specific integrated solutions in their cities, are the source and inspiration for SCT Replication Plan. The explained measures for replication actions of SCT are also structured in these five TT#s.



The common denominator for all SCT measures is Citizens' Engagement, since it is a TT# by itself but also it is a necessary part of every measure in regards with the goal of empowering citizenship. In particular, PV Schools and NZCB Social Housing replication actions are the basis of the Public awareness campaign Energy – School; Youth & Family. Smart Gerencia and RES-EV replication actions are the source for Virtual Reality/BIM. Finally, Urban Monitoring and all mobility related replication actions are sustain for Public awareness campaign on Air Quality.

Furthermore, there are more interrelation among the different replication actions apart from the ones related to TT#5. Another backbone replication action is Smart Gerencia, which gathers multiple interconnections, learning from or providing inputs to these replication actions; PV Schools, NZCB Social Housing, 2nd life batteries storage system, RES-EV, CIM, Smart EV Charging, Personal Mobility Strategy and Virtual Reality-BIM.

Finally, considering the importance of mobility issues established during the participatory process, mobility related replication actions are specially linked, such as RES-EV, E-Bus, Sustainable Street, Personal Mobility Strategy, Smart Gerencia, Smart EV Charging, Urban Monitoring and Public awareness campaign on Air Quality.

Here it is a preliminary measures' representation map with these two figures. Notice that some specific actions are not represented since the scale of the map would be less convenient for the purpose of this map.



Figure 39. Replication Plan Main map

GA #774199





Figure 40. Replication Plan extension map



10. Output to other work packages

Output to Work Package 2

The replication plan of SCT could be relevant for WP2 "EU wide cooperation with ongoing projects, initiatives and communities", in particular to other fellow cities from other SCC funded projects o similar calls.

Output to Work Package 3

The replication plan of SCT could be relevant for WP3 "Development of bankable business models and exploitation activities". The replication activities of SCT may result in new business models which would be tested on the ground and serve as inspiration or data source to be adapted and replicated in other cities. Furthermore, the execution of this RP will let understand better the feasibility of intended goals in T3.3. "Business model advancement and Smart Cities Innovation Management". Further study and specific peer-2-peer meetings will be done in coming months to help increasing the benefits of WP3 on SCT RP.

Output to Work Package 4

The replication plan of SCT could be relevant for WP4 "offering an open, reusable and reliable platform for sharing data, speeding-up innovation, standardization and implementation of smart application." However, the main benefit would be showing the existing difficulties to replicated deep innovation changes (City Innovation Platform) in cities not ready for it in the short term, but on the contrary as a first step towards this goal in the medium term.

Output to Work Package 5, 6 &7

The replication plan of SCT could be of interest to WP5, 6 & 7 in terms of demonstrating the viable replication of their integrated solutions in different geographical and economic contexts. See tables from chapter 2.4. Solutions chosen for replication to find the specific bonds from this Deliverable.

Output to Work Package 8

This Replication Plan could serve as a mirror to look at for the rest of the fellow cities, as SCT could use their Replication Plan (D8.4, 8.5 & 8.6) the other way around. Cross learning is an important process in IRIS philosophy. Furthermore, this WP will serve as source for Deliverable 8.9.

Output to Work Package 9

The replication plan of SCT could feed WP9 "Monitoring and evaluation" by providing data to increase the information regarding Task 9.5 "Overall evaluation and impact analysis for impact enhancement".

Output to Work Package 10



The replication plan of SCT could provide input during the execution of IRIS project regarding impact on the indicators related to dissemination and communication efforts taking place within Work Package 10.



11.Conclusions

In brief, this replication plan of SCT is structured balancing the 5 IRIS TT# in order to take advantage of the most adoptable lessons for the city and with the main interest of solving the main challenges diagnosed by the participatory process, as well as the current municipality plans.

In accordance with the degree of importance for the city, there have been intense activity in funding search to sustain the priority measures. In this regard, among all fourteen measures, there are eight actions with high priority interest and more secured financing such as PV school, NZCB Social Housing, RES-EV charging points, E-Bus, Sustainable Street, City Monitoring System, Smart EV Charging and the Public campaign Energy. In addition, there are four other measures which are also important but with less urgency due to its complexity or uncertainty, with not totally secured financing yet, such as Smart Gerencia-Tome Cano, 2nd Life Batteries, Personal Mobility Strategy and Public awareness campaign Air Quality. Eventually, with a minor importance and not secure at all financing, CIM and Virtual Reality/BIM measures are to be done if the rest of the goals are succeeding.

The main implementation challenge is to pair the financing requirement timing with the internal procurement procedures pace. This is the reason some project execution definition are being procured event before of the financing in order to gain some time once financing is obtained.

Regarding current status, SCT RP has the following picture. Firstly, considering the already funded measures we see different degrees of implementation. It is currently implemented the E-bus project, only pending for the pantograph installation. With the project execution defined and already launched the procurement process for the civil works or technical supply, there are the following measures; NZCB Social Housing, Sustainable Street and Sustainable Street. Regarding the measures under the procurement process for the project definition, there are the following; PV school, RES-EV charging points and City Monitoring System. Smart EV Charging and Public campaign Energy are under study in order to be also in the procurement process phase. Personal Mobility Strategy is structured in a set of measures. In this regard, the pedestrianisation and the alternative parking are financed and in the participatory process for the project definition. The rest of the measures are still in the feasibility and alternative study phase. As well as it is the Gerencia-Tome Cano, 2nd Life Batteries, which will need to be obtained specific financing. Public campaign Energy and Public awareness campaign Air Quality are expected to be procured in the right time once the related measures (PV Schools, Smart Gerencia and City Monitoring System) are set into motion. CIM and Virtual Reality/BIM are to be better study and financing actions to become a reality.

To finalize it is important to mention that this RP is an alive document which shall be improved by the learnings and findings resulting from the LHC and other FC sharing via workshops and visits. Furthermore a specific topic might be included regarding water as an outside IRIS thematic to be included in this project since its vital and strategic importance for the municipality.



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Annex I

Sustainable Development Objectives SCT Indicators related to IRIS goals.

CLIMATE CHANGE	
7.1. Evistance of programs and initiatives of operate officiency use	
7.1. Existence of programs and initiatives for production and use of renormalia energy	
7.2. Existence of programs and initiatives for production and use of renewable energy	
7.3. Development of awareness campaigns, guides and training and information	
packages.	
13.1 Existence of programs and initiatives focused to reduce or compensate the	
carbon footprint.	
13.2. Sustainable mobility promotion, including public transport and alternative cero	
or low emission mobility systems.	
ENVIRONMENT	
6.2. Existence of programs and initiatives for efficient water use, assessing and	
reducing water footprint.	
6.3. Development of awareness campaigns, guides and training and information	
packages regarding water saving focused to general population.	
6.4. Existence of policies regarding eliminating pollution from water, as well as	
untreated and uncontrolled discharge of sewage	
14.1. Existence of criteria, rules and initiatives related to water mass quality control	
and instruments development to prevent pollution of water flows, wetlands, lakes,	
coastal waters, and seas.	
SOCIAL	
1.1. Collaboration among Public Administration and local entities in social campaigns	
and initiatives.	
1.2. Existence of measures to maximize economic benefits for the community and	
creation of stable bonds among local economy and economical activities of the	
setting.	
4.2. Existence of educative and dissemination activities regarding sustainable	
development.	
5.1 Generating plans, policies and awareness campaigns about gender equality	
fostered by public entities.	
17.1. Membership of networks, projects or global or regional alliances.	
17.2. Capacity of fostering and facilitating goods practices and sustainability know-	
how exchanges, either in the local territory either with external experiences, to	
inspire success cases replication.	
17.3. Existence of cooperation initiatives with academic or other entities, either public	
or private, to foster innovation in sustainable development.	
ECONOMY	
8.3. Existence of measures focused to qualified employment generation and to foster	
entrepreneurship.	
8.4. Fostering modernizations, diversification and technological innovation in order to	
increase productivity, mainly in highly labor activities.	_



9.1. Existence of initiatives, projects and directives orientated towards promotion and	
consolidation of sustainable infrastructures, including land and city planning.	
9.2. Existence of initiatives and projects capable to mobilize the use of ITC, smart and	•
sustainable management models in resource use.	
10.1. Development of social integration policies which pursues the elimination of	•
discriminatory elements and guaranties equality in opportunities for population,	
especially to the less favored population.	
10.3. Fostering the SMEs participation in the local development value chain, in order	
to diversify benefits distribution.	
CULTURE	
16.1. Boasting a governance system including all interested parties, especially at local	
level; fostering public-private partnership, with clearly defined responsibilities and	
roles, including the citizenship participation system.	
16.2. Make available an adequate indicator system to monitor and assess the	
continuous sustainable development.	
16.3. Offering updated, clear and truthful information about sustainable	
development indicators, in order to guarantee the transparency of public	
administration activities.	





Annex II



Figure 41. City Engagement Initiatives Map

Annex III

Results of participatory workshop





Objetivo del proyecto IRIS: establecer un plan de replicabilidad para la ciudad de Santa Cruz de Tenerife

Objetivos de los talleres:

- 1. Revisar, ampliar y confirmar el diagnóstico preestablecido online (DAFO=Debilidades, Amenazas, Fortalezas, Oportunidades) en cada uno de los temas;
- 2. Identificar los 3 principales retos en cada uno de los temas, a partir del diagnóstico y de los retos ya identificados online;
- 3. Redactar una hoja de ruta para cada uno de los 3 retos mayores.



5 temas IRIS:

- Energías renovables (EERR) y barrios de energía positiva (barrio con una producción de energía superior a su consumo)
- 2. Almacenamiento y redes flexibles de energía (que puedan soportar la introducción de EERR intermitentes)
- 3. Soluciones inteligentes de movilidad

4. Transformación digital y servicios

5. Participación ciudadana y co creación

Próximo año

Reemplazado por el tema de **agua**, crucial para S/C (y dependiente de la energía)



Participación





5 mesas de trabajo, de 4 a 9 personas

Expertos en cada ámbito con perfiles diferentes: entidades públicas, empresas privadas, asociaciones...



III.1. Energías renovables y distritos de energía positiva

III.1.a. DAFO

Dissemination Level: Public

Debilidades

- Barreras técnicas y jurídicas
- No está claro el modelo energético a seguir por parte de la administración ni implicación por parte de la ciudadanía
- Poco uso de energías renovables, lo que produce desconfianza en el usuario
- Barreras económicas (a pesar de su abaratamiento los últimos años)
- Red de distribución eléctrica limitada para una amplia introducción de EERR

Fortalezas

- Buena climatología
- Gran superficie de azoteas y tejados aprovechables
- Santa Cruz recibe certificado Huella de Carbono por reducir emisiones de CO2 (2018) + pacto de los alcaldes
- Ahorro energético y Telegestión --> nuevas tecnologías en eficiencia energética
- Múltiples edificios públicos

Amenazas Empresas tradicionales del sector

- Que se instalen renovables de impacto ambiental sin fomento primero del ahorro y el autoconsumo → dar prioridad a la generación distribuida
- Dependencia exterior del petróleo
- Impacto ambiental de las EERR
- Limitación de superficie en las cubierta + legislación "protección de la edificación como los bienes interés cultural"

Oportunidades

- Aprovechar de los objetivos nacionales y europeos para desarrollar las renovables
- EERR ahora más baratas que las energías fósiles
- Desarrollo de la tecnología fotovoltaica
- LowCarbon Plan
- El municipio lidere el desarrollo del autoconsumo en edificios públicos y al nivel ciudadano


III.1.b. Retos



Autoconsumo = el consumidor es también productor de energía, consume su propia producción. Colectivo = a la escala de un grupo de edificios, de un distrito o de un barrio.



III.1.c. Hojas de ruta

MESA DE TRABAJO: EDIFICIOS Y EERR EDIFICIOS Y EERR							
AyuntamientoEmpresasOrganizaciones socialesCabildoCuidadaníaOtrosGobierno de CanariasCuidadaníaOtros							
ACCIONES	ÁMBITO/ESCALA	TECNOLOGÍA	BARRERAS	€			
 Ventanilla unificada para el fomento de las EERR (técnica y administrativa) 	• Insular • Municipal	 Fotovoltaica Vehículos eléctricos Sistema de eficiencia 	 Financiación Políticos Burocráticos 	75 000 /año x 10 años			
 Establecer acuerdos con instaladores e 	Municipal	energética Ídem	 Competenciales Igualdad de oportunidades 	30 000			
ingenieros 3. Fomentar el vehículo eléctrico	InsularGobierno	 Vehículos eléctricos Cargadores de alta potencia Baterías de alto rendimiento 	 Capilaridad de la red Acuerdos comunidades de vecinos Lobby energías fósiles Costes de compra 	500 000 /año			



III.1.c. Hojas de ruta

MESA DE TRABAJO: RETOMUNICIPAL DE CONSENSO2 EDIFICIOS Y EERR MOVIIIdad eléctrica Ayuntamiento Empresas Organizaciones sociales Cabildo O Cuidadanía Otros							
ACCIONES Plan de	ÁMBITO/ESCALA	TECNOLOGÍA	BARRERAS	E			
 reordenación del tráfico para fomentar los dispositivos de movilidad personal 	Municipal	BicicletasPatinetes	UrbanísticasCulturales	300 000			
 Infraestructura de puntos de recarga pública 	Municipal	Puntos de recarga	 Financiación Políticas Urbanísticas 	1.5 M			
 Sustitución del parque móvil público por vehículos eléctricos 	Municipal	Vehículos eléctricos	Económicas	6М			



III.1.c. Hojas de ruta

MESA DE TRABAJO: RETOMUNICIPAL DE CONSENSO3 EDIFICIOS Y EERR Autoconsumo colectivo Ayuntamiento Empresas Organizaciones sociales Cabildo Cuidadanía Otros							
ACCIONES 1. Plan fomento autoconsumo colectivo: -identificación de superficies -Normativa/ordenanza municipa -propuesta de ahorro/inversión	ÁMBITO/ESCALA • Insular • Municipal	TECNOLOGÍA Fotovoltaica	BARRERAS Falta de ejemplos	€ 250.000			
2. Ventanilla única AD HOC	• Insular • Municipal	Fotovoltaica	Económicas	75.000 /año			
3. Acciones de fomento: -comunicación -participación -financiación	• Insular • Municipal	Fotovoltaica	Económicas	300.000 /año			







GA #774199

III.2. Almacenamiento de energía y redes flexibles

III.2.b. Retos





III.2.c. Hojas de ruta





III.2.c. Hojas de ruta





GA #774199



III.2.c. Hojas de ruta





III.3. Soluciones inteligentes de movilidad III.3.a. DAFO

Debilidades

Demasiado vehículo privado entrando en la ciudad

Necesidad de abordar las políticas de movilidad desde una perspectiva integral: políticas ambientales, urbanas y ordenación del territorio

Aparcamientos en el centro gratuitos

Poco uso de transporte sostenible

Pocos carriles bus/VAO

Fortalezas

Ciudad pequeña donde la gente podría ir a muchos sitios caminando (aparcamientos disuasorios en lugares estratégicos ayudarían) Hay apoyo del Cabildo en políticas a favor de

la movilidad sostenible

Ordenanza de tráfico para que en la zona "urbana" se de preferencia a la movilidad sostenible

Tranvía

•

• Red de guaguas amplia

Amenazas

- Mantenimiento de la cultura del vehículo privado
- Educación ciudadana en sostenibilidad
- No tener carriles o zonas específicas para dejar crecer los vehículos sostenibles
- Instalación de centros atractores de movilidad sin análisis de movilidad sostenible asociados
- Aumento de vehículos provenientes de otras poblaciones

Oportunidades

- Mejora en la gestión del tráfico una vez añadidos caminos peatonales y zonas específicas para la movilidad eléctrica ligera.
- · Movilidad eléctrica ligera
- Involucrar a centros públicos y privados atractores de movilidad
- Usar incentivos (bonos, descuentos, impuestos...)
- Mayor uso de buses eléctricos





III.3.b. Retos





III.3.c. Hojas de ruta





III.3.c. Hojas de ruta





III.3.c. Hojas de ruta





Debilidades

- Falta de estrategia centralizada
- Integrar la "Transformación Digital" en la Gestión de la ciudad
- Liderazgo político

Plan Estratégico de SC

El alto grado de penetración de

Colaboración con las empresas

Estrategia de Desarrollo Urbano

Sostenible Integrado (EDUSI)

electrónicos en móviles

- Falta de centros públicos de acceso a internet. Falta de apps municipales.
- Capacitación de la población/brecha digital

Fortalezas

tecnología en la ciudad / fibra óptica /

presencia de operadores tecnológicos

Administración electrónica, certificados

Amenazas

- Falta de visión global de "hacia dónde vamos" y estrategia al respecto, añadiéndole capacidad de rectificar según se evolucione
- Que otras ciudades vayan más rápido y perdamos competitividad
- Basar en precio la toma de decisiones
- Seguridad de los datos
- Aumento de la brecha digital

Oportunidades

- Aumento de eficiencia y reducción de la contaminación
- Mejora de la gestión de la ciudad
- Atractivo de las ciudades como emplazamiento de empresas tecnológicas
- Creación de nuevas empresas y/o nichos de mercado
- El Servicio de Innovación y Atención ciudadana trabaja para mejorar su eficiencia desde el punto de vista tecnológico





III.4.b. Retos





III.4.c. Hojas de ruta





III.4.c. Hojas de ruta



Dissemination Level: Public

