

The European Commission's
**INTELLIGENT CITIES
CHALLENGE**

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Algeciras : Intelligent City Transformation Overview

ICC Final Deliverable



Executive summary

Algeciras is a port city in the south of Spain and is the largest city on the Bay of Gibraltar (in Spanish, the Bahía de Algeciras). The Port of Algeciras is one of the largest ports in Europe and the world in three categories: container, cargo and transshipment. It is situated 20 km north-east of Tarifa on the Río de la Miel, which is the southernmost river of the Iberian peninsula and continental Europe. In 2020, it had a population of 123.078.

The Economy of Algeciras depends mainly on its port, the main one in Spain and one of the most important in the Mediterranean and the industry located in the Bay of Algeciras. Within the municipality of Algeciras the implementation of industries is high relative to the rest of the region while the tourism sector does not represent large investments unlike the neighboring towns of the Costa del Sol.

Algeciras is located in a privileged geographical enclave, being a gateway between two continents and facing the bay to which it gives its name. The town is one of the few in Spain that shares its municipality with two natural parks: Los Alcornocales, the largest European reserve of this species, and El Estrecho, declared by the Unesco Transcontinental Biosphere Reserve of the Mediterranean.

This unprecedented natural richness is complemented by the two main beaches of the city, the urban one of El Rinconcillo, traditional and close to the different population centers of the northern sector, and Getares, which each year receives the Blue Flag of the Clean Seas of Europe in attention to the quality of the services and services it gathers.

Executive summary

The challenges

One of the main priorities of Algeciras is to promote the development of port activity, the main economic engine of the city, as well as the industrial fabric associated with port activity.

The main challenge for Algeciras is to promote sustainable development that ensures the development of the economy associated with port activity, while preserving and guaranteeing the sustainability of its rich natural environment, including two natural parks.

Vision, ambitions and solutions proposed

Algeciras vision is *“to become a reference on sustainability, being recognized for the responsible and efficient management of our resources, and for the respect and care of our environment”*.

To develop this vision, different lines of action are proposed in the three most urgent areas of environmental sustainability in the city:

- Water management: ensure the efficient use of water by renewing the infrastructure of the supply network, and reducing the environmental impact by improving the management of the sanitation network and its discharges to the port.
- Waste management: promote the responsible use of resources and waste management, evolving towards more developed models that allow maximizing reuse and recycling, and the optimized treatment of waste.
- Zero emissions: development of municipal policies aimed at reducing emissions while developing awareness campaigns and citizen involvement to guarantee the transformation towards an emission-free city.

Mayor Foreword

Algeciras is being a pioneer in this field promoting a comprehensive city project that allows us to take a step forward in quality of life of citizens, in urban environment and sustainable development of the economy. By the end of 2020 Algeciras City Council Algeciras was appointed as a pilot project by Minister of mobility and Urban Agenda. This Agenda included digitalisation not as a specific chapter but addressing the five urban dimension of the strategic plan.

Recently, in June 2022, Algeciras has been selected as City of Sciences and Innovation for three years within Network Innpulso, promoted by the Minister of Science and innovation. This award was facilitated, among other components, because of the transfer of knowledge acquired in networks as DCC in last years, or ICC during 2018-2020.

This experience has been very grateful within an environment of “global pandemic”, which realised the importance of digitalisation process in public services and local administration.

The city of Algeciras pursued an EU-supported transformation over four main stages, and this document details that journey by these sections

Overview to the city's journey and structure of this document



1 Preparation & assessment

5 months:
September 2020 – January 2021



2 Ambition & roadmap

3 months:
February 2021 – April 2021



3 Implementation

15 months
May 2021 – July 2022



4 Review & way forward

2 months
August 2022 – September 2022

*Reported as
one section*

Summary

Find out **where a city is, where it should go** and who in the ecosystem is going to **mobilise make things happen**

Develop a **concrete plan** to achieve **measured improvements**, collaborating with the community; push action with immediate benefits

Get “big moves” **done** and **see results**; take **action in partnership** with others

Measure success, and commit to **keep connections and improvements going**

Section

1

Algeciras: Preparation and assessment

ICC transformation

September 2020 to January
2021

Introduction

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City needs: State of the city overview

Significance of insight to what we want to do on the ICC

 Of critical importance to ICC journey and we should be working to change

 Of importance to ICC journey, and we should act to change this along the journey as opportunity presents

 Contextually relevant, but not major point of attention in ICC and unlikely to be impacted on the journey

The state of Algeciras today

-  Green Economy is a priority for Algeciras. The city has been working for years to tackle the main environmental problems: air quality, reduce the carbon footprint and foster the usage of green energy sources, improve the water management (both in supply and sanitization) and waste management.
-  The city has reached relevant advances especially in improving air quality and reducing the carbon footprint during the last years. Nevertheless, water and waste management remain relevant environmental issues that the city must address as soon as possible.
-  The city has mobilized the local ecosystem to improve the quality of the water delivered through the “Lago Marítimo” project that includes interventions in different drainage routes and that will help to mitigate the problem of water discharges, but solve the water management problem will require relevant investment in a deteriorated infrastructure
-  Waste management is another of the city's challenges. It will be necessary to work both on public awareness and with neighboring municipalities to find solutions that minimize the impact of waste on the environment.
-  The OPE (Operación Paso del Estrecho) is a unique event in the city, mobilizing more than three million vehicles during two summer months, generating a very significant environmental impact, and which has conditioned the configuration of the city

Key insights from city performance analysis

Higher performance observed

- 1** The city has experience mobilizing the local ecosystem to develop relevant projects for the city (ex. Project “Lago Marítimo” with the collaboration of the city council, University, Junta de Andalucía, Port Authority, municipal water Company, etc.)
- 2** The city has experience conducting projects supported by EU or regional governments
- 3** Natural environment: natural parks of “El Estrecho” and “los Alcornocales”, beaches of “el Rinconcillo” and “Getares”
- 4** The port is the main economic driver of the city
- 5** The city and its citizens are aware of the main environmental problems that affect Algeciras and agree that solving them is a priority for the city

Lower performance observed

- 1** Initiatives with the highest impact on the environment require relevant investments in infrastructure improvement
- 2** Some environmental projects (ex. waste management) could require a better coordination with municipalities of “Campo de Gibraltar” or “Bahía de Algeciras”
- 3** The city needs to increase its maturity on the usage of technologies (sensors, IoT, AI, etc.) to improve the diagnosis and management of their resources
The lack of data is a relevant limitation to develop smart solution for the city
- 4** The water sanitization network, the uncontrolled water discharges, the waste management and the high atmospheric pollution are the main environmental problems currently in Algeciras
- 5** Other relevant problems in the city are the high level of unemployment and lack of training in some sectors of the population, such as young people, and a local business that is not very adapted to the new realities and needs.

City Ecosystem



Port Authority of the Bay of Algeciras: public body dependent on the Ministry of Transport, Mobility and Urban Agenda, responsible for managing the ports of Bahía de Algeciras and Tarifa



Company responsible for the municipal water service, which manages the complete life cycle of water at the municipal level



Foundation that provides training, research, development and innovation services as well as the coordination of joint actions with different public and private entities in its environment.



Algeciras City Council



Public company responsible for providing cleaning, maintenance and waste management services at the municipal level



Chamber of commerce of Campo de Gibraltar that integrates the municipalities of Algeciras, La Línea, Los Barrios, San Roque and Tarifa.



Bahía de Algeciras Campus, belonging to the University of Cadiz

City Ecosystem

Insights from the 1:1 interviews:

- There is a consensus on identifying sustainability and improvement of the environment as the main priority of the city
- There is a good predisposition to collaborate in achieving the objectives set by the city in the field of sustainability and improvement of the environment

Insights from the local enablers analysis:

- The city council usually participates as coordinator of the different local stakeholders
- There are relevant local capabilities and expertise (University, Circularity Economy Lab in Campus Tecnológico de Algeciras, local services providers, etc.) to reach the city's ambitions

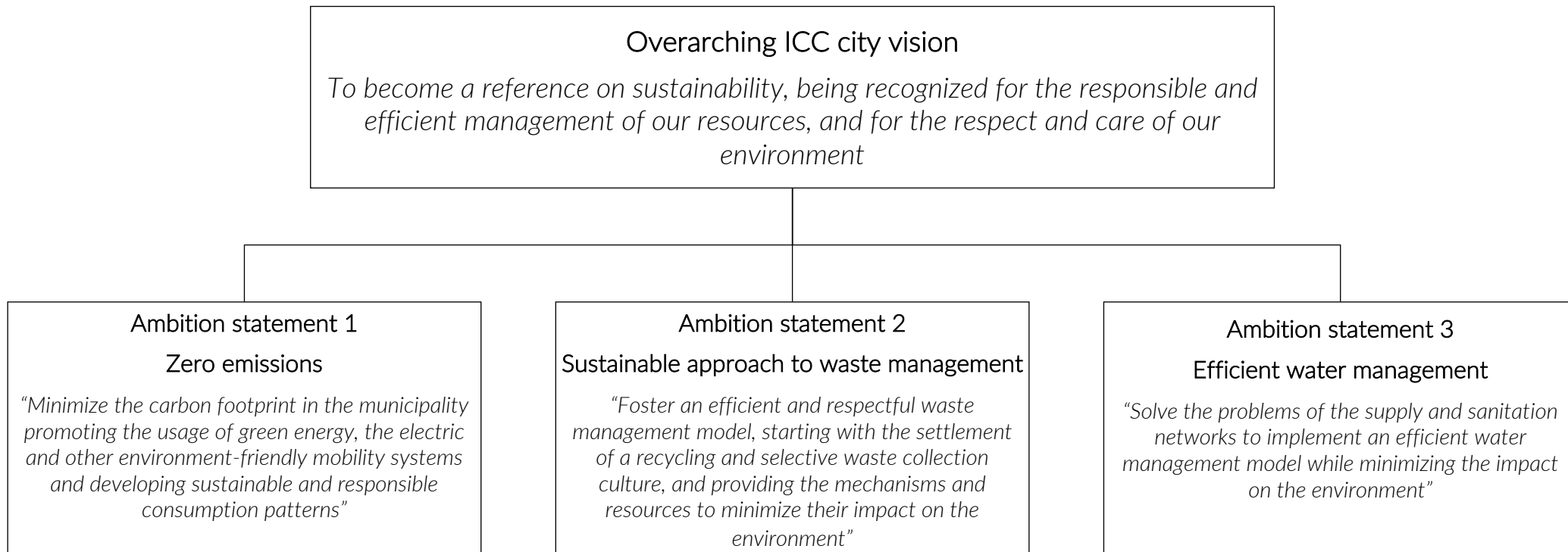
Reflections from the stakeholders in the workshop:

- There is a critical dependence on funding to develop projects to improve the urban infrastructure
- There are previous successful experiences of collaboration between the main stakeholders of the city

Reflections on working norms with the ecosystem:

- Some stakeholders (ex. University) require a budget to participate on the development of solutions proposed within the ICC program
- The City Council role is critical to ensure the coordination and mobilization of the local ecosystem

ICC strategy: Vision and ambition statements



Achieving environmental sustainability is a critical challenge and at the same time an opportunity for the city of Algeciras. The city's ambition is to transform a problem into an opportunity to achieve environmental balance, where smart metering and the development of analytical solutions based on data are key elements for the development of solutions on the three main fronts of the city in the environmental field: reduction of the carbon footprint, efficient waste management and optimization of water management.

City strategy: justification

How do the solutions interact? Do some have positive synergies that reinforce the success of one another? Or are there conflicting interactions that need to be managed carefully?

- The three solutions are related because they each one impact on an environmental dimension: carbon footprint, water and waste.
- There is no conflict between them because each one works on a different dimension of sustainability.
- However, there is synergies between them because the three solutions contribute to improving the environment and the sustainable development of the city. Although individual goals can be set for each, the three solutions contribute to the common overall goal.

City strategy: justification

If you could boil down your strategy to three thoughts that have best guided you on your way, what would they be? These ways of thinking will be helpful when things get tough in implementation

- Improving the city's living conditions
- Ensuring a sustainable future for the city
- To make sustainability a dynamizer of the city by promoting trade, increasing the attractiveness of the city, generating employment through the boost of circular economy models, and for citizens to feel part of these achievements by being part of the solution

City strategy: justification

What are the key factors that define success across all of your solutions? These could not be solution related, e.g., managing political cycles

- Ensuring the citizens engagement
- Sharing the achievements with the citizens making them feel proud as key contributors to achievements
- Look for mechanisms to reinforce commitment and maintain the enthusiasm of citizens for contributing to achieve the objectives set
- Find the necessary financing to achieve the objectives set

Section

2

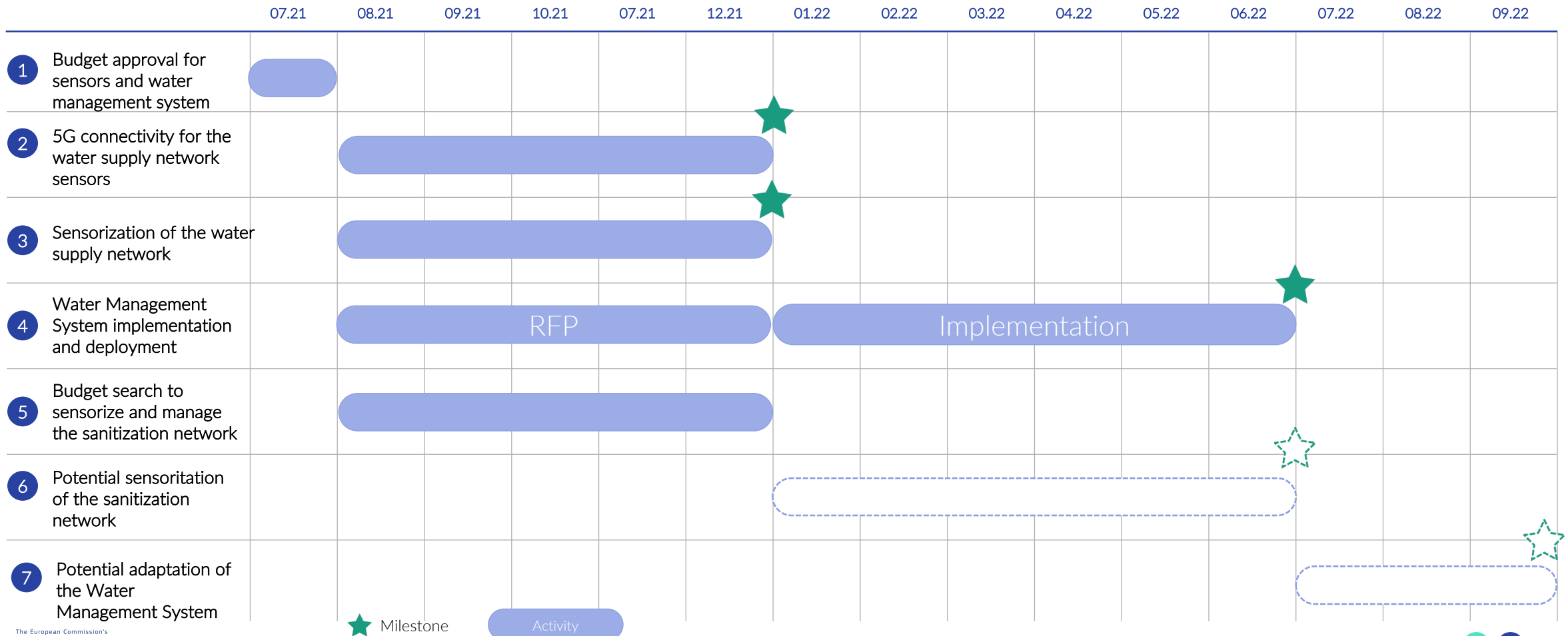
Algeciras: Ambition and roadmap

ICC Transformation

February 2021 to May 2021

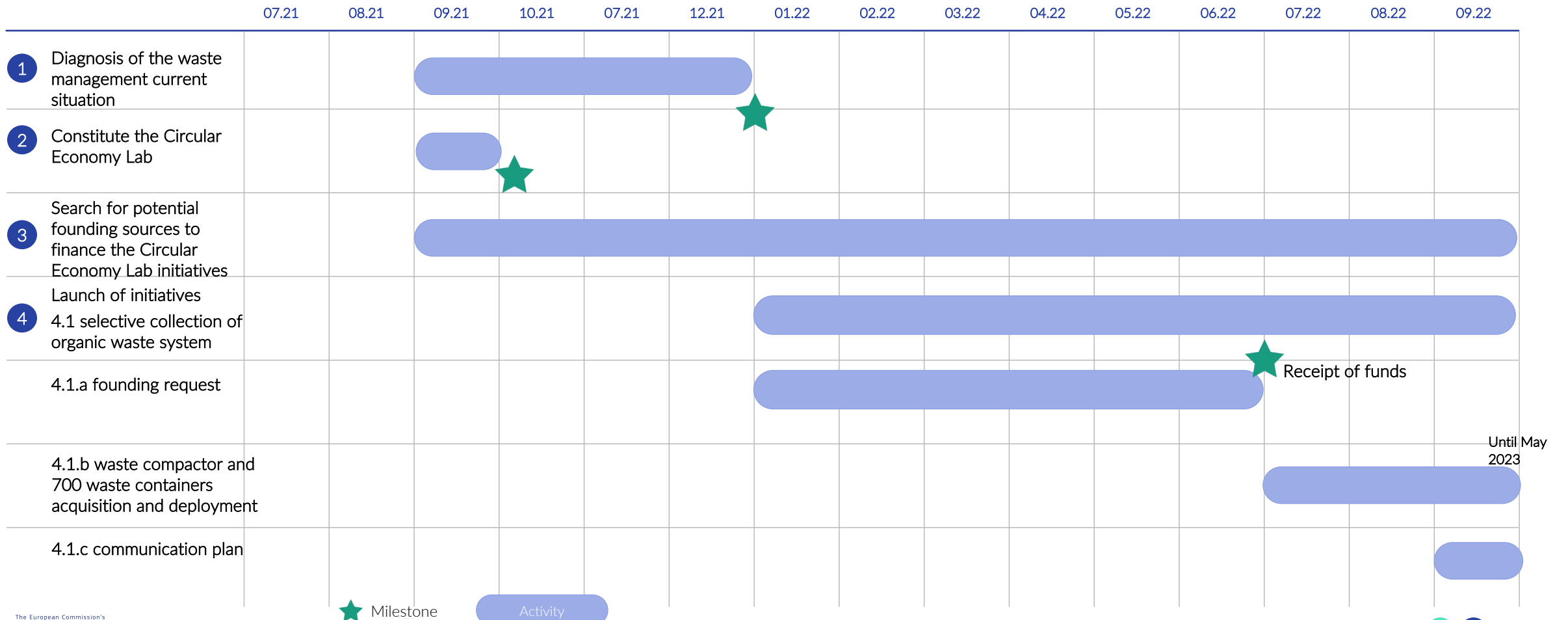
High level implementation roadmap for solution 1: Water Management

High level implementation roadmap for solution



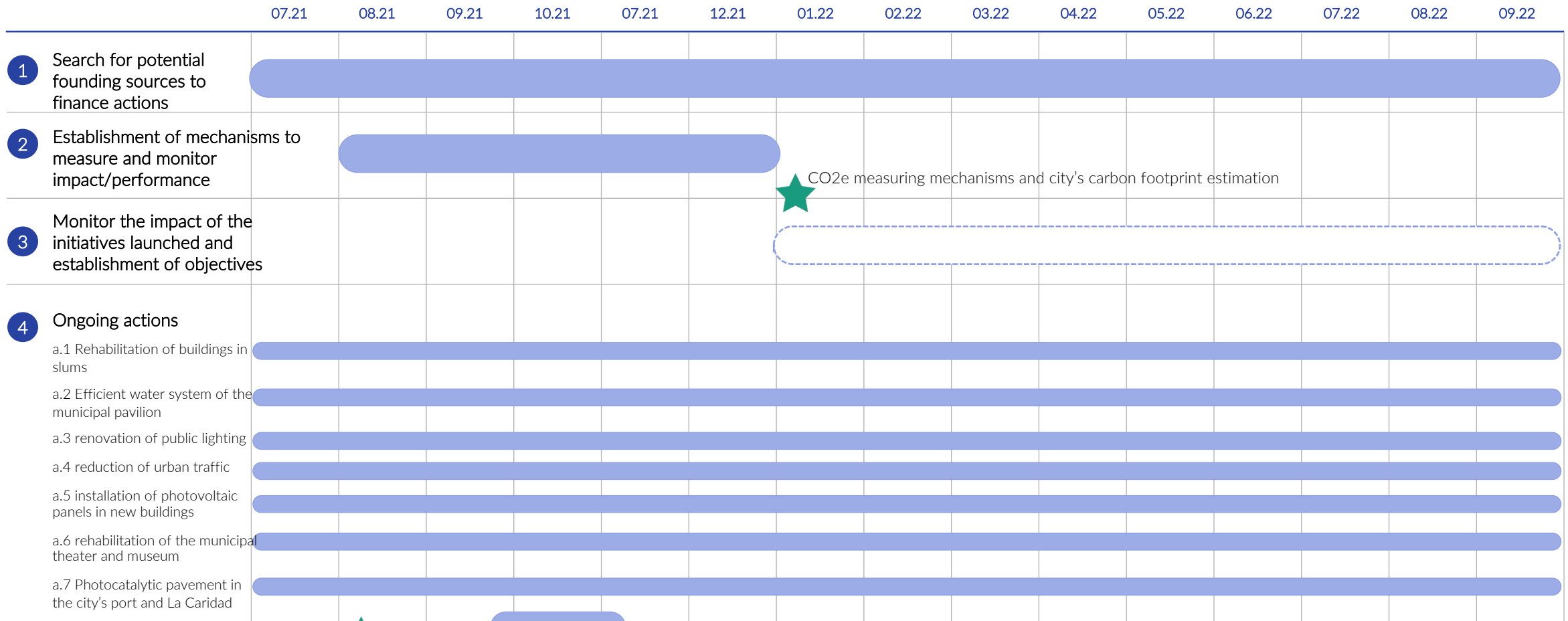
High level implementation roadmap for solution 1: Waste Management

High level implementation roadmap for solution



High level implementation roadmap for solution 3: Zero Emissions

High level implementation roadmap for solution



★ Milestone

Activity

Rationale to road map

In accordance with the vision defined for the city of Algeciras within the ICC program “*To become a reference on sustainability, being recognized for the responsible and efficient management of our resources, and for the respect and care of our environment*”, three ambition statements were defined: *Zero emissions, Sustainable approach to waste management and Efficient water management*












Three different solutions were defined to tackle each ambition statement:

- **Solution 1. Water management:** Water distribution and sanitization networks monitoring and advanced management system
- **Solution 2. Waste Management:** Foster an efficient and respectful waste management model
- **Solution 3. Zero Emissions:** Smart solutions to minimize carbon footprint












Although the three solutions contribute to improving the sustainability and development of the circular economy in the city, each of them is developed in an independent area of competence.

Therefore, and although some activity may be common to the three solutions (for example, search for funding sources), their roadmaps have been defined independently.












Initiative charter – Solution 1 Water Management

Strategy	Stakeholders involved	Inputs, outputs, outcomes and impacts
<p>Description</p>  <p>Improves the management of the water supply and sanitation network through sensorization and adoption of a centralized management system and actions that allow improving the conditions of the network infrastructure</p>	<p>Solution lead: Municipality of Algeciras</p>  <hr/> <p>Solution working team: Municipality of Algeciras / Municipal Water Company</p>  <hr/> <p>Contributors: Municipality of Algeciras / Municipal Water Company / Algeciras Port Authority</p>  <hr/> <p>Risks and mitigation</p>  <p>That the main opportunities for improvement are associated with improvements in the network infrastructure, which will require a relevant investment and the search for sources of financing to undertake said improvements.</p> <p>The city council is carrying out an intensive search (at local, national and European level) for aid to obtain funds that will allow it to finance costly projects to improve sanitation and water supply networks.</p>	<p>Source of funding and estimated cost</p>  <p>592k € to complete the sensorization of the supply network and to adopt a centralized management system (pending approval)</p> <p>Other potential sources of funding will be necessary to complete the sensorization of the sanitation network and to undertake activities to improve the network infrastructure. (Under assessment)</p> <p>Initiative budget: 592k € (all budget secured)</p>
<p>Link to vision</p>  <p>To become a reference on sustainability</p>		<p>Solution maturity outputs</p>  <ul style="list-style-type: none"> - Sensors installed (supply network) - Water Management System deployed and operative - Sensors installed (sanitization network)
<p>Link to ambition statement</p>  <p>Ambition statement 3. Efficient water management: Solve the problems of the supply and sanitation networks to implement an efficient water management model while minimizing the impact on the environment</p>		<p>City performance outcomes and impacts</p>  <ul style="list-style-type: none"> - Water leak improvement (% of total water consumed) - % improvement in operative expenses in water network (maintenance, repairs, etc.) - % water consumption reduction by citizen - % water consumption reduction by industries & businesses vs activity (GDP) - Minimization of uncontrolled discharges (once measured)
<p>Expected impact and timing</p>  <p>The main impacts will begin to materialize once the water management system is deployed (mid-2022), which will make it possible to identify the main opportunities for improvement in the supply network, which will minimize water losses (currently 25%).</p>		

Initiative charter – Solution 2 Waste Management

Strategy	Stakeholders involved	Inputs, outputs, outcomes and impacts
<p>Description</p>  <p>Reduce the waste generated, improve the selective collection of waste and promote its recovery</p>	<p>Solution lead: Municipality of Algeciras</p> 	<p>Source of funding and estimated cost</p>  <p>Beyond the budget required to carry out the diagnosis study, the development of the initiative will depend on the funds obtained to finance these activities.</p> <p>Current actions and allocated budget: implementation of a selective collection system for organic waste (1,98 million €; Next Generation EU funds).</p> <p>Initiative budget: 1,98 mill € (pending of Next Generation UE funds allocation)</p>
<p>Link to vision</p>  <p>To become a reference on sustainability</p>	<p>Solution working team:</p>  <p>Municipality of Algeciras / ALGESA (Municipal street cleaning and urban waste collection company) / FCTA: Fundación Campus Tecnológico de Algeciras, promoted by the regional authority (Junta de Andalucía), Cadiz University, Algeciras City Council and the commonwealth of municipalities of Campo de Gibraltar)</p>	<p>Solution maturity outputs</p>  <ul style="list-style-type: none"> - Actions launched - Communication campaigns launched - Citizens engaged (in any program)
<p>Link to ambition statement</p>  <p>Ambition statement 2. Sustainable approach to waste management: Foster an efficient and respectful waste management model, starting with the settlement of a recycling and selective waste collection culture, and providing the mechanisms and resources to minimize their impact on the environment</p>	<p>Contributors:</p>  <p>Municipality of Algeciras / ALGSA / Fundación Campus Tecnológico de Algeciras (Junta de Andalucía, Universidad de Cadiz and Mancomunidad de Municipios del Campo de Gibraltar)</p>	<p>City performance outcomes and impacts</p>  <ul style="list-style-type: none"> - Waste generated by citizen (t) and by the city (t) - Recycled and reused waste (t and %) - Waste to landfill (t and %) - Incinerated waste (t and %) - Waste-to-energy (t, %, and total recovered energy from waste-to-energy (MWh))
<p>Expected impact and timing</p>  <p>The main impacts will begin to materialize once the diagnosis finished, and the initiatives launched (as of Mid 2022) but the results will probably not start to be representative until EOY 2022 or 2023.</p>	<p>Risks and mitigation</p>  <p>Beyond the budgetary aspects, obtaining the collaboration of the municipalities of Mancomunidad de Municipios del Campo de Gibraltar will be a key aspect to ensure the success of the initiative.</p> <p>In order to achieve this objective, there will be close collaboration with these municipalities, seeking objectives that benefit all the municipalities involved.</p>	

Initiative charter – Solution 3 Zero Emissions

Strategy	Stakeholders involved	Inputs, outputs, outcomes and impacts
<p>Description</p>  <p>Set of actions in different areas aimed at reducing the city's carbon footprint</p>	<p>Solution lead: Municipality of Algeciras</p> 	<p>Source of funding and estimated cost</p>  <p>Current actions and allocated budget: rehabilitation of buildings in slums (4,1 million €); efficient heated water system of the municipal pavilion (376k €; FEDER funds); renovation of public lighting (3,656 mill €; FEDER funds); reduction of urban traffic (4,6 mill €; IDAE); installation of photovoltaic panels in new buildings (TBC); rehabilitation of the municipal theater and museum for efficient energy consumption (TBC); photocatalytic pavement in the city's port and La Caridad neighborhood (TBC)</p> <p>Initiative budget: 23,6 mill € (12,7 mill € currently secured)</p>
<p>Link to vision</p>  <p>To become a reference on sustainability</p>	<p>Solution working team:</p>  <p>Municipality of Algeciras / Autoridad Portuaria de Algeciras (Port Authority), with the collaboration of the future Circular Economy Lab (whose constitution is considered in Initiative 2)</p>	
<p>Link to ambition statement</p>  <p>Ambition statement 1. Zero Emissions: Minimize the carbon footprint in the municipality promoting the usage of green energy, the electric and other environment-friendly mobility systems and developing sustainable and responsible consumption patterns</p>	<p>Contributors:</p>  <p>Municipality of Algeciras / Autoridad Portuaria de Algeciras (Port Authority) / Circular Economy Lab</p>	<p>Solution maturity outputs</p>  <ul style="list-style-type: none"> - Total city's carbon footprint - Total energy/CO2e consumed by citizen - Total energy/CO2e consumed by industries/businesses
<p>Expected impact and timing</p>  <p>Although the most ambitious objectives will be achieved in the long term, there are many initiatives (some promoted by the European authorities, such as strategies and directives for the implementation of low-emission zones, etc.) whose implementation is immediate and will speed up the improvement of emission rates.</p> <p>The main objective of this initiative is to have an accurate measurement of the city's emissions and launch different actions that allows to reduce the city's carbon footprint.</p>	<p>Risks and mitigation</p>  <p>Beyond the accessible budget to launch new initiatives, the main challenge of the city council is to promote the correct sustainable policies that allow maximizing the environmental impact and achieve the involvement and complicity of citizens. To this end, the Circular Economy Lab will promote actions to develop a sustainable culture among its citizens and seek their involvement in achieving the zero emission goals.</p>	<p>City performance outcomes and impacts</p>  <ul style="list-style-type: none"> - Number of communities rehabilitated - Reduction of urban traffic - Photovoltaic panels installed in new buildings - % of the work executed of different actions: <ul style="list-style-type: none"> • Renovation of public lighting • Municipal pavilion water heating system • Rehabilitation of the municipal theater • Rehabilitation of the municipal museum • Photocatalytic soils in the city's Port • Photocatalytic soils in La Catalina neighbor

Key Performance indicators – overview

Solution	Activities – Inputs and actions	Solution Maturity - outputs	City performance – outcomes and impacts
1. Water management	Water leaks	Water leak improvement (% of total water consumed)	The objective is to minimize the water leaks, that currently represents 25% of water delivered
1. Water management	Operative expenses in water network (maintenance, repairs, etc.)	Improvement on operative expenses (%)	The objective is to minimize the water management operative expenses through infrastructure improvements
1. Water management	Water consumption by citizen	Water consumption reduction by citizen(%)	The objective is to minimize the water consumed by citizen
1. Water management	Water consumption by industries & businesses vs industries & businesses activity (GDP)	Water consumption reduction by industries & businesses (%)	The objective is to minimize the water consumed, and increase the recycled water, by the industry and businesses
2. Waste Management	Waste generated by citizen (t) Total waste generated by the city (t)	Reduction of waste generated by citizen (%) Reduction of waste generated by the city (%)	The objective is to minimize the waste generated by citizens and the city
2. Waste Management	Recycled waste (t)	Recycled waste/total waste (%)	The objective is to maximize the waste recycled by citizens

Key Performance indicators – overview

Solution	Activities – Inputs and actions	Solution Maturity - outputs	City performance – outcomes and impacts
2. Waste Management	Total incinerated waste (t)	Incinerated waste (%)	The objective is to maximize the incineration (non-organic) of non-recyclable waste
2. Waste Management	Total recovered energy from waste-to-energy (MWh)	Total energy recovered from incinerated waste (MWh/t)	Maximize the energy recovered from waste incineration (implementation of waste-to-energy)
2. Waste Management	Waste to landfill (t)	Waste to landfill / total waste (%)	Minimization of waste to landfill
3. Zero emissions	Total energy (and CO2e) consumed by citizen	CO2e by citizen	Minimization of carbon footprint by citizen
3. Zero emissions	Total energy (and CO2e) consume by the industries/businesses	CO2e (t) generated by the industries/business vs GDP	Minimization of the carbon footprint generated by businesses and industries

Key Performance indicators - Cross cutting indicators

Cross cutting indicators

Number of new relationships with new stakeholders.

% of activities completed on time.

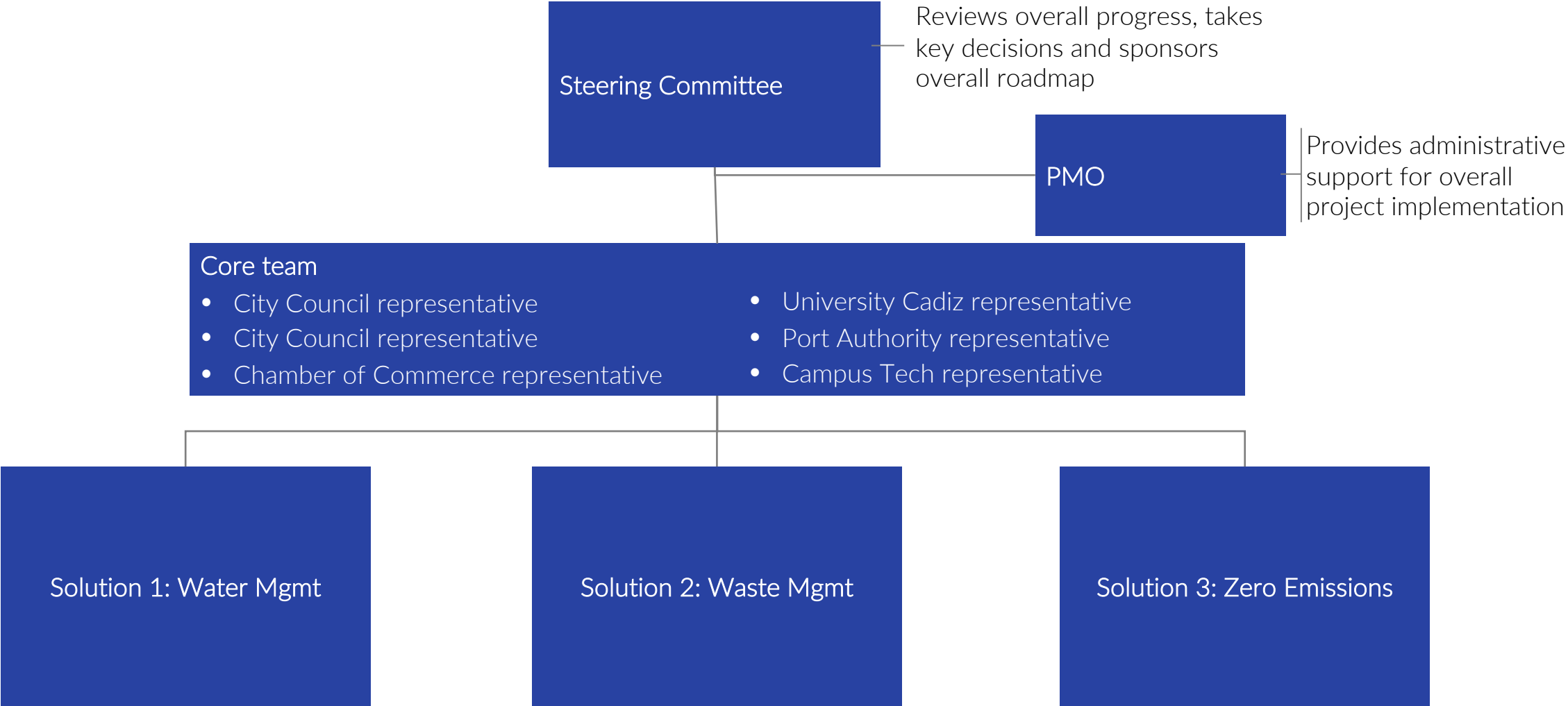
% of investment spent.

Number of new employees created.

% of citizens who have heard about the initiative.

% of citizens who are agree that the initiative has had a positive impact on the city.

Governance structure for roadmap implementation



Section

3+4

Algeciras: Impact

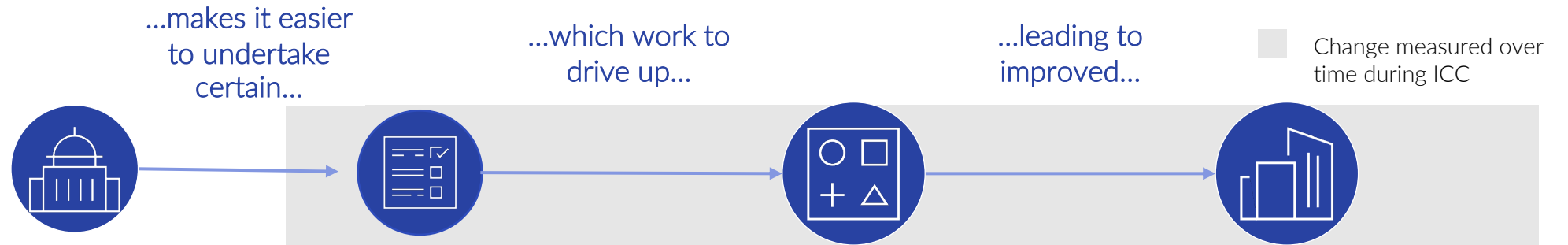
ICC Transformation

February 2021 to May 2021

Impact executive summary

- **What were the major successes during the ICC? What were the major obstacles?**
 - The greatest success of Algeciras during the ICC was to strengthen the ties of collaboration with the local ecosystem and mobilize all stakeholders to join forces to advance the common goal of ensuring the sustainable transformation of Algeciras
 - Another success has been reinforcing collaboration with neighbouring town councils to establish a comprehensive plan for waste management and conservation of the natural environment of Campo de Gibraltar
 - Obtaining feedback from more advanced cities in the green transition has been a relevant source of inspiration for designing the city's sustainable transition plan
- **How was your progress against the KPIs you initially set?**
 - The main advances have been achieved in the sensorization of the water supply network, the implementation of the water management system, and various interventions aimed at reducing emissions in public facilities (renovation of public lighting, reduction of urban traffic, installation of photovoltaic panels in new buildings, photocatalytic pavement, etc.)
- **What will you commit to over the next 3 years? How will you achieve these goals?**
 - Complete the sensorization of the network and extend the water management system to the sanitation network
 - Develop an advanced waste management model with neighbouring municipalities
 - Lead and raise awareness among the different stakeholders to advance in the decarbonization of the city, assuming specific objectives by the different parties involved
 - Open lines of collaboration with more advanced cities in the development of sustainable development models

There are four types of measurable concepts that come together to drive success in the ICC



Idea	Local enablers – city characteristics	Activities – actions and inputs	Technology maturity – outputs	City performance – outcomes and impacts
Description	<p>Each city has unique strengths and weaknesses that help action happen. These can be stakeholder networks, local capabilities, cultural factors or many more that drive success in ICC projects.</p>	<p>A cities main intervention on the ICC is to take actions. These can be direct (e.g., procuring technology), or indirect, (e.g., forming a working group on a topic). The right actions can lead to the right inputs going in to the ICC (e.g., funding, time)</p>	<p>Cities can drive technological solutions to try and improve city performance. How well these solutions are currently used can be described as their 'maturity', - considering whether they are available for stakeholder use, what stakeholders think of them, and so on</p>	<p>Success of an intelligent city is ultimately measured by its ability to address city needs. These can be considered an improved quality of citizen life and a better environment for stakeholders</p>
Example	<p>A history of strong collaboration between city and a local university...</p>	<p>...allows the creation of a new e-health pilot project using social housing in the city...</p>	<p>...leads to the launch a new tele-health solution utilising 4G data connections...</p>	<p>...resulting in pre-emptive diagnosis and lower wait times at medical facilities</p>

Assessment of city performance - discussion

Most of the initiatives launched during the ICC program will allow us to lay the foundations to improve our knowledge and understanding, measure impacts and design actions that allow us to reach the established objectives in the long term.

Except for some measures adopted to minimize the carbon footprint of the city (zero emissions initiative) for which the impact generated in terms of carbon footprint reduction could be estimated, the initiatives will generate long-term impacts, outside the time scope of the program ICC.

The main areas of impact expected by initiative are:

- **Solution 1. Water management:** minimize the water leaks (25% of water delivered system currently); minimize the water management operative expenses (thanks to the Water Management System); minimize the water consumed; increase the recycled water, by the industry and businesses.
- **Solution 2. Waste Management:** minimize the waste generated by citizens and the city; maximize the waste recycled by citizens; maximize the incineration (non-organic) of non-recyclable waste and the energy recovered from waste incineration (implementation of waste-to-energy); minimization of waste to landfill.
- **Solution 3. Zero Emissions:** Smart solutions to minimize carbon footprint generated by the city (citizens, businesses and industries)

Although the three solutions contribute to improving the sustainability and development of the circular economy in the city, each of them is developed in an independent area of competence, contributing independently to the sustainable development of the city and its environment.

Assessment of solution maturity - discussion

Regarding the level of maturity of the solution, the main advances are focused on the development of the technologies required to facilitate the sustainable transformation of the city, in addition to specific actions aimed at reducing the carbon footprint of the city and improving the management of the waste:

The main advances on the solution by initiative are:

- **Solution 1. Water management:** sensorization of the water supply network; 5G connectivity of water supply network sensors; implementation and deployment of the water management system.
- **Solution 2. Waste Management:** waste management analysis and diagnosis; constitution of the Circular Economy Lab; launch of initiatives (selective collection of organic waste system).
- **Solution 3. Zero Emissions:** establishment of mechanisms to measure and monitor impact/performance; actions to minimize the emissions:
 - Rehabilitation of buildings in slums
 - Efficient water system of the municipal pavilion
 - Renovation of public lighting
 - Reduction of urban traffic
 - Installation of photovoltaic panels in new buildings
 - Rehabilitation of the municipal theater and museum
 - Photocatalytic pavement in the city's port and La Caridad

Assessment of city ecosystem and activities - discussion

Regarding the assessment of our city ecosystem and the activities we designed and developed together we may highlight:

- **Local ecosystem identification, governance and mobilization.** Local ecosystem includes the following institutions/organizations: *Algeciras City Council; Port Authority of the Bay of Algeciras; Chamber of commerce of Campo de Gibraltar (that integrates the municipalities of Algeciras, La Línea, Los Barrios, San Roque and Tarifa); Fundación Campus Tecnológico de Algeciras (Foundation that provides training, research, development and innovation services); Algesa (Public company responsible for providing cleaning, maintenance and waste management services); Emalgesa (Company responsible for the municipal water service); Bahía de Algeciras Campus (Bahía de Algeciras Campus, belonging to the University of Cadiz)*
- **Collaboration with city's stakeholder to:**
 - Agree on city's needs and priorities regarding green economy
 - Solution identification and definition (including establishment of objectives and roadmap)
- **Constitution of the Circular Economy Lab** formed by the local ecosystem members cited above and citizens associations and representations.
- **Collaboration with Mancomunidad de Municipios del Campo de Gibraltar** (association of municipalities of Algeciras, Tarifa, Jimena de la Frontera, San Martín del Tesorillo, Castellar de la Frontera, San Roque, Los Barrios, La Línea de la Concepción) to define the **future model of waste management** for the mentioned municipalities.

5 key lessons

Lesson	Reflections
1	<ul style="list-style-type: none">▪ Achieving the proposed objectives in terms of sustainability will require the engagement of the different stakeholders: citizens, businesses, industry, local institutions and organizations, educational entities, and Regional, National and European Public Administration,
2	<ul style="list-style-type: none">▪ The role of the city council in raising awareness, promoting and developing the sustainable culture of the city will be critical
3	<ul style="list-style-type: none">▪ The role of the city council will also be fundamental in the coordination, government and promotion of the local ecosystem.
4	<ul style="list-style-type: none">▪ The sustainability objectives of the city of Algeciras go beyond the municipal level and will require the involvement of neighboring municipalities
5	<ul style="list-style-type: none">▪ Some far-reaching initiatives imply significant investments, fundamentally in terms of infrastructure, which will require external financing in order to be developed. The role of the city council will be to ensure accessibility to the funds allocated for sustainable development at the local, national or European level.

Reflections on city collaborations

- The initiatives launched in Algeciras within the ICC program were focused on solving the particular and most urgent needs of the city of Algeciras (solving the structural problems of the water supply and sanitation networks, etc.) so the collaboration with other cities given the difficulty in finding examples that have worked on such particular needs.
- However, many of the initiatives and actions to be launched in the coming years will be focused on more generic aspects and shared with any city that is addressing the challenge of transforming the city towards models of sustainable development. The design of such initiatives should be based on the experience of more advanced cities in the implementation of sustainable development models (eg advanced waste management models: waste to energy,) for which that expert advice will be needed to identify the necessary technologies, estimate the economic effort associated with the project, as well as identify critical aspects of success for the implementation of said projects and achieve the objectives set. For this reason, Algeciras' collaboration with cities that are more advanced in sustainable transformation will be critical in future phases of the city's green transformation program.

Commitments

Commitments to on-going resources

Reserve municipal budget items to continue promoting the sustainable transition of the city

Seek sources of external financing (European funds, aid from local, regional and national administrations) to finance structural transformation projects

Seek financial support and collaboration from local business and industry to promote sustainable transformation projects

Commitments to on-going collaboration

Strengthen collaboration with the neighboring municipalities to advance on a sustainable model of the area

Get the support and commitment of citizens, companies and local industry

Establish collaboration agreements with more advanced cities in the adoption of successful models of sustainable development

Establish agreements with cities facing similar challenges to join forces in the search for global solutions to sustainability challenges for the cities

Commitments to on-going KPIs

Improve water quality and management:

- Reduction of supply network leaks
- Improving water treatment in the sanitation network
- Eliminate polluting discharges to the Bay of Algeciras

Establish a roadmap to achieve the goal of zero emissions

Improve waste management:

- Maximizing waste recycling and reuse
- Energy recovery of waste
- Collection and selective treatment

3 Year plan - ambitions

Building on the ICC, what would the city aim to achieve in 3 years time?

1. Facilitate the transition of the city towards models of sustainable development.
2. Act on three fundamental axes in the sustainable transition of the city: water management, waste management and reduction of carbon footprint.
3. Make the city council the catalyst for the sustainable development of Algeciras through the integration of the city's stakeholders, disseminating sustainable culture and promoting initiatives aimed at favoring the sustainable transformation of Algeciras.

What steps will you take over the next 3 years to achieve these goals?

1. Complete the technological transformation that allows establishing the bases for efficient management of the city's critical resources (water, energy) while minimizing its environmental impact (waste management, carbon footprint reduction)
2. Seek financing for relevant infrastructure transformation projects with a high impact on sustainability (water supply and sanitation network, dev. of low-emission zones, etc.)
3. Promote the activity of the Circular Economy Lab as a catalyst for sustainable initiatives.

Appendix

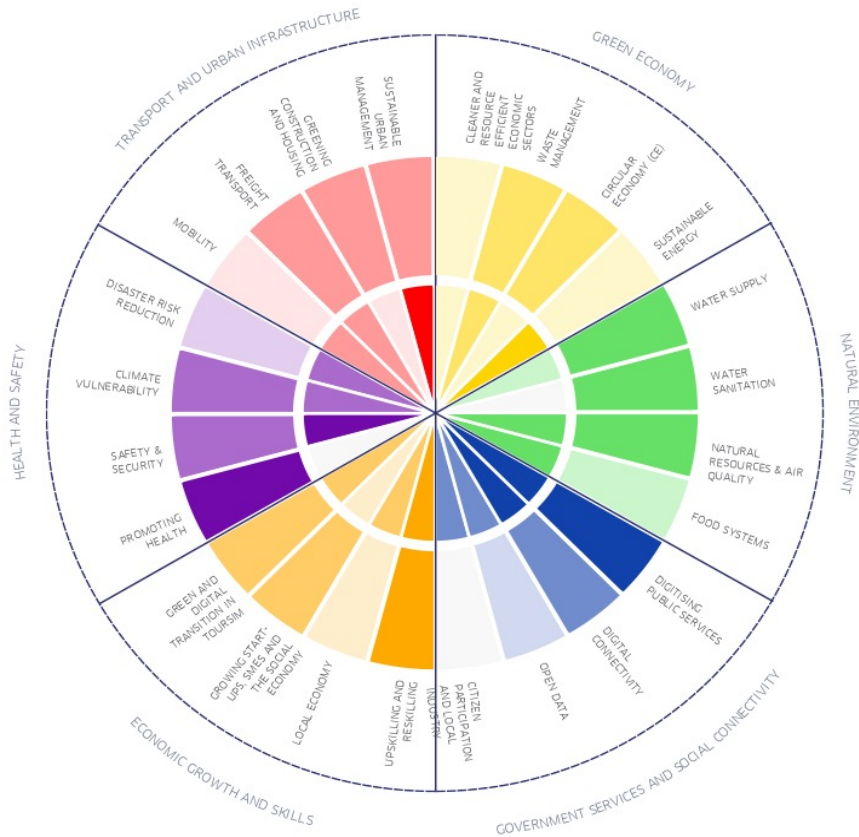
Algeciras: Additional information

ICC Transformation

February 2021 to May 2021

City Needs: State of the city overview

Assessment of the city's maturity level and thematic track selection




City performance by thematic track - Algeciras

Green Economy	31%	← Chosen topic
Natural Environment	36%	
Transport and Urban Infrastructure	44%	
Economic Growth and Skills	50%	
Health and Safety	50%	
Government Services and Social Connectivity	64%	

City Needs: State of the city overview

Preliminary identification of Algeciras' green economy needs

	Diagnosis	Actions	Key challenges
 <p>Air pollution</p>	<ul style="list-style-type: none"> Improving air quality since 2014 	<ul style="list-style-type: none"> Air quality improvement plan since 2014 	<ul style="list-style-type: none"> Continue to reduce emissions from road traffic and industrial emission
 <p>Greenhouse gas emissions</p>	<ul style="list-style-type: none"> Emissions inventory implementation -10% from 2013 to 2016 	<ul style="list-style-type: none"> Mayors' Pact: -20% Emissions: Energy Efficiency and Clean Energy Climate city network: target 0 emissions 	<ul style="list-style-type: none"> Improved footprint calculation (studies and data collection by emissions-generating sectors and activities) to improve decision-making
 <p>Water management</p>	<ul style="list-style-type: none"> High consumption: 167 liters/hab. per day Leaks: +25% 	<ul style="list-style-type: none"> Telemetry: leak detection system Water treatment plant (EDAR) with capacity for 212k inhabitants 	<ul style="list-style-type: none"> Introduce intelligent leak control and tracking system Reduce water consumption/inhabitant
 <p>Waste management</p>	<ul style="list-style-type: none"> Selective PPV collection 50%? Bio-waste selective collection: 40%? 	<ul style="list-style-type: none"> Municipal ordinances Selective collection points Environmental Complex Transfer plant 	<ul style="list-style-type: none"> Selective collection of organic waste and 40% composting Modernize and improve the waste collection and storage system, vehicles, containers, etc.

City Needs: State of the city – detailed analysis

higher performance areas

Key insight

Data points

Interpretation

So what?

1

Initiatives with the highest impact on the environment require relevant investments in infrastructure improvement

Relevant investments are required in infrastructure to improve resource management and minimize environmental impacts: water supply, collection and treatment network, adaptation of public buildings, etc.

The actions with the greatest impact require structural changes in the city's infrastructure. These projects require significant financial contributions

Access to external funding sources will be key to developing high impact projects linked to the transformation of urban infrastructure.

2

Some environmental projects (ex. waste management) could require a better coordination with municipalities of "Campo de Gibraltar"

Some services such as waste management is coordinated by the Commonwealth of "Campo de Gibraltar", which is made up of several municipalities.

Waste management transcends the municipal scope as it is managed by all the "Mancomunidad del Campo de Gibraltar"

Developing solutions in the field of waste management will require the participation and agreement of the municipalities that make up the commonwealth of Campo de Gibraltar.

3

Algeciras has a valuable natural environment

Outstanding natural environments of Algeciras: Natural Parks of "El Estrecho" and "los Alcornocales", beaches of "el Rinconcillo" and "Getares"

Having such a privileged natural environment highlights the importance of preserving the natural environment of Algeciras

The proposed solutions must ensure the preservation of the privileged natural environment of Algeciras

City Needs: State of the city – detailed analysis

lower performance areas

Key insight

Data points

Interpretation

So what?

1

The city has experience mobilizing the local ecosystem to develop relevant projects for the city

Ex.: Project “Lago Marítimo” with the collaboration of the city council, University, Junta de Andalucía, Port Authority, municipal water Company, etc.

The main challenges of the city in developing local green deals will require the contribution of the main representatives of the local ecosystem.

The previous experience of collaboration between the main members of the local ecosystem reinforces the idea of building solutions relying on all of them to maximize the chances of success.

2

The city has experience conducting projects supported by EU or regional governments

The City Council has participated in many projects and programs promoted and/or supported by government entities: European Commission (ex.: DDC), Junta de Andalucía and National Administration

The experience in collaborations with public entities reflects the commitment and proactivity of the city in promoting local initiatives supported by public administrations

The city's experience in managing projects with the public administration is a positive factor that favors the achievement of the objectives set within the program

3

The city needs to increase its maturity on the usage of technologies (sensors, IoT, AI, etc.) to improve the diagnosis and management of their resources

The lack of data is a relevant limitation to develop smart solution for the city

Neither the water supply and collection network, nor many energy supply or waste collection points have smart readers that allow advanced management of the city's resources

Having smart meters is critical to be able to implement smart solutions, supported by data analytics and artificial intelligence algorithms that allow better diagnosis and resource management

The incorporation of smart meters is a critical starting point in the development of smart solutions for city resource management

City Needs: bottom-up perspectives: stakeholder views

How do the observations in the top-down perspective **translate to specific pain points or benefits for stakeholders?**

- Environmental problems are the main challenge for the city and this is how it is perceived by all stakeholders.

How do their **behaviours influenced** by the state of the city today?

- The absence of solutions and tangible advances associated with the main environmental challenges of the city has made citizens lower their arms in some aspects (selective garbage collection, etc.) and have neglected the development of responsible and sustainable habits

Are certain stakeholders are **more or less impacted?**

- All the stakeholders (local commerce, businesses, citizens, etc.) are impacted to a greater or lesser extent by the environmental problems.

What do we think the **stakeholders care most about?** What is lower down their agenda?

- All stakeholders seem interested in improving the environment, although the lack of incentives and resources slows the development of many possible initiatives. The development of an action with impact could produce a catalytic effect in the development of solutions and adoption of sustainable habits.

Do they all speak to a common underlying problem? Is the city's performance actually better or worse in certain areas when you actually consider the stakeholders in your specific city, their values, cultures and behaviours?

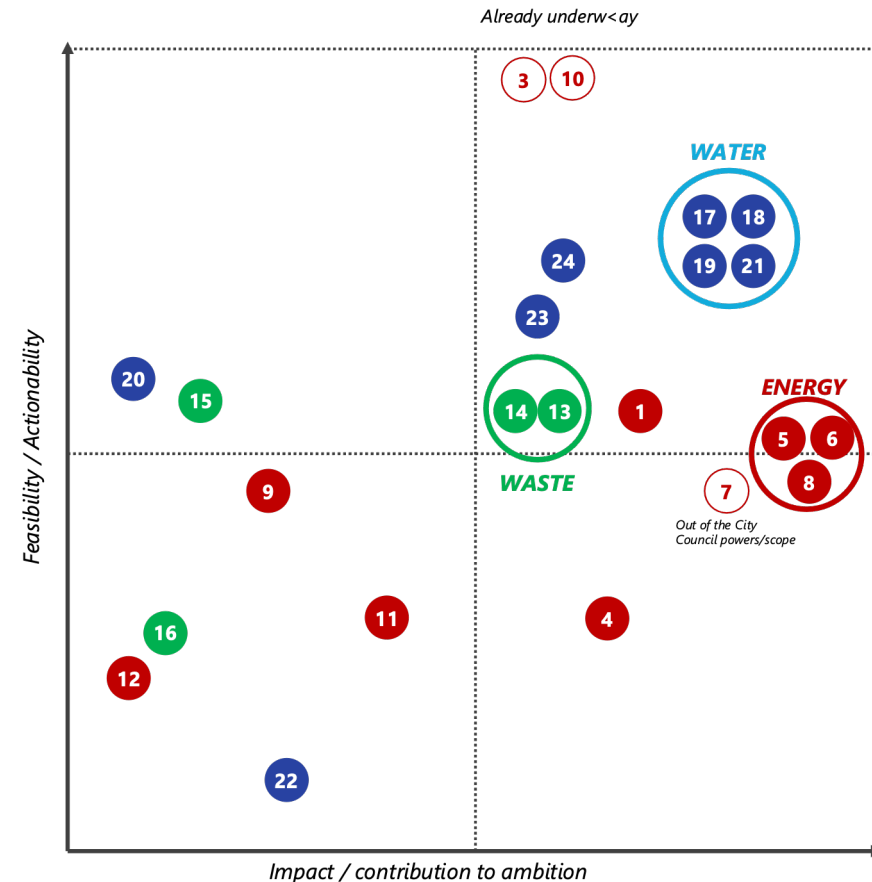
- The stakeholders agree on the identification of the main challenges and on the need of coordinated actions and the required sum of efforts of the different stakeholders to reach the objectives defined in the vision.

Solution: Review of the solution maturity assessment

Potential solutions:

1. Pedestrianisation
2. Green energy sourcing
3. Smart lighting
4. DER & EVs for public transportation and city fleets
5. DER (Distributed Energy Resources)
6. Deep renovation of public buildings
7. Energy efficiency in residential buildings
8. Energy Efficiency Guaranteed saving contracts / Performance contracting
9. Solar thermal heating
10. Air pollutants detector
11. Foster public EV charging infrastructure
12. Biomass boiler replacement
13. Circular economy Lab
14. Gamification of recycling
15. Needs-based collection
16. Smart garbage bins
17. Smart water system (AMI + analytics)
18. Central Event Management
19. Smart leak detection
20. Water quality monitoring
21. Smart home meters with adaptative tariffs
22. Three pipes circular sewer system
23. Flood defences
24. Sewer monitoring systems

Solution prioritization matrix



Solution strategy.

Solution #1 Water monitoring and advanced management system

What does the solution set out to solve?

The **water leaks**, **sanitization network** and **uncontrolled water discharges** are amongst the main environmental problems currently in Algeciras.

The city has mobilized the local ecosystem to improve the quality of the water delivered through the “Lago Marítimo” project that includes interventions in different drainage routes and that will help to mitigate the problem of water discharges, but solve the water management problem will require relevant investment in a deteriorated infrastructure.

The solution proposed consist in **deploying metering equipment** in the network and connecting it to a **central management system**. This investment must be part of a **Water Infrastructure Master Plan** that also addresses the investment required to revamp the network, sourcing and treatment assets.

Solution strategy.

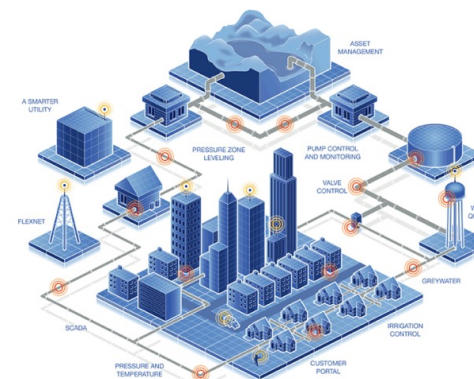
Solution #1 Water monitoring and advanced management system

What are the main features of the solution?

The main features of the solution consist in deploying **metering equipment** in the network and connecting it to a **central management system**.

The centralized data allows on one side the water **consumption invoicing** to citizens and companies based on their real consumption and on the other hand to have a **capillary view of the water system**, allowing faster **maintenance, leak and fraud detection**.

Smart water systems combines smart water meters, advanced sensors, software analytics and services that enables to go beyond smart metering and **maximize the return on investment** through **leak identification**, improved cost **reductions in maintenance**, asset utilization, risk mitigation, **revenue capture** or **customer service**.



Solution strategy.

Solution #1 Water monitoring and advanced management system

Why is *this* the right solution for the city?

- Water consumption digitalization is **key for the city's sustainability and smart strategies**.
- This sort of solution raises the opportunity to offer many dependent solutions along the road, such as:
 - Leverage on data to launch **focused campaigns and incentives to save domestic water usage** (incl. Gardens and Swimming Pools)
 - Prevent **disasters launching real-time alerts** based on insight on leaks, bursts, network breaches and other network inefficiencies
 - Design **adaptative tariffs to end-users** (homes and companies) through app-based digital meters that give individuals and businesses timely insight into their own water use, raising awareness, locating inefficiencies and decreasing unnecessary demand
- This sort of solution highly fit to the local enablers of Algeciras and is fully supported by the incumbent stakeholders.

Solution strategy.

Solution #1 Water monitoring and advanced management system

What is the business model?

Investments in water network will help to increase the revenues **reducing leaks** (represents 25% of water delivered), **adjusting tariffs** to usage and incorporating a rental fee for the meter, and **reducing asset management operative expenses** (maintenance, repairs, etc.)

Solution strategy.

Solution #1 Water monitoring and advanced management system

Key partners



Who are our key partners?
Which key resources are we acquiring from partners?
Which key activities do partners perform?

- Municipalities
- Water supplier companies (Algeciras and Mancomunidad)
- Technology providers
- Consulting Firms and Systems integrators

Key activities



What key activities does our solution require to have impact?
How does the solution keep running behind the scenes?

- Baseline review, systems, processes, operate model and performance metrics in relation to network and workforce activities;
- Developed a target state operational design blueprint; level 0 – 3 process definitions, systems and architecture roadmap, governance framework for decision making & intervention management
- Design a 3 phased approach to develop, test and validate business value – P.ofValue, Pilot and Rollout
- Create a business case for full implementation and an implementation roadmap

Value propositions



What value do we deliver to users?
What value proposition to we deliver to partners?
How does the wider city benefit?

- For the municipality:
- Measurement of water inflow and outflow in order to detect **leaks**, discharges and fraud
 - Availability of real time information for **decision making**
 - Possibility to meter (set prices) other domains (such as waste) based on **citizens personalized water consumption**
 - Better water management for **environmental purposes**
 - Reduction in the **energy associated to water**
 - Information about number of visitors and **tourists based on water consumption**, combined with other factors
- For the citizens and companies:
- Offering personalized information on **water management** such as consumption for saving purposes, through web pages or apps
 - Remote control for **leakages** in second residences or during holiday seasons
 - Offering of control services on presence/well-being oriented to elderly citizens living on their own

Customer relationships



What type of relationship does each of our users expect us to establish and maintain with them?

- Awareness campaigns
- Digital relationship
- Showcase benefits

Channels



How do we reach different users involved in the solution?

- Change management through the usual channels of Water providers: Call Center, email, post in invoice, etc. for information and notifications
- Once in place: Online portal or Mobile App for regular water consumption management

User segments



Who are the different groups who could benefit from the solution?

What differentiates them?
Do they all get the same benefit? Do they all cost the same to serve?

- Public buildings
- Port Authority
- Citizens (B2C)
- Companies (B2B)

Cost structure



What are the most important costs?
Which key activities are most expensive?

- Project design and management assistance
- Technological investment for the implementation of remote water metering such as the related information systems required
- Repair and renewal of water meters
- Inspections required in order to detect anomalous cases in metering
- Maintenance costs

Revenue streams



Who is willing to pay for this benefit?
Who should pay?
Who can pay?

- Water payment from citizens, companies and public entities
- Rental fees for metering equipment
- Reduced OPEX compared to manual metering
- Reduced OPEX and CAPEX allocated to asset management (maintenance, repairs, etc.)
- Quick wins to deliver financial and operational gains through process analysis & changes to existing systems

Solution strategy.

Solution #1 Water monitoring and advanced management system

What are the main blockers and risk and how will the be overcome?

Reluctancy to **digitize the system as the main priority** may seem to **revamp the network itself**, since it's is old and needs constant maintenance to keep operating. Thus, this opposition may not be accurate as the deployment of Advanced Metering System (AMS) should be seen as an **optimizer of maintenance and revamping costs**, since it will allow a better allocation of funds based on real data.

There may be some reluctancy to changing and funding the new remote metering system because of the project management, technological components and maintenance **project costs** to be undertaken and other related aspects such as the **modification in water pricings** or the search for subsidies.

The fact is that finding a **new way to redistribute costs and regulate water billing is not straightforward** and requires a long process affected by legal and technical reports and validations (even though it is already in place in some other Spanish regions).

Solution strategy.

Solution #1 Water monitoring and advanced management system

What, at the highest level, are the main stages from today to getting this solution at full impact?

- The first stage is to raise a political awareness and gain alignment on this solution as fully necessary due to the benefits provided to the citizens, companies and the public service providers themselves.
- The second stage is to carry out the required technical and economical studies supporting the associated business case, economical sustainability and technical feasibility.
- The third stage is to launch a project with the following estimated building blocks:
 - Review of the current situation (baseline review, systems, processes, operate model and performance metrics) in relation to network and workforce activities
 - Developed a target state operational design blueprint; level 0 – 3 process definitions, systems and architecture roadmap, governance framework for decision making & intervention management
 - Design a 3 phased approach to develop, test and validate business value – P.ofValue, Pilot and Rollout
 - Create a business case for full implementation and an implementation roadmap
 - Progressively implement the remote metering systems.
- The fourth stage is to launch awareness campaign and related services based on data, and further inform and train both the citizens and public staff on how to properly and successfully manage the information collected.

Solution strategy.

Solution #1 Water monitoring and advanced management system

Who is making it happen?

- One party involved are the public entities managing the water supply in Algeciras and Campo de Gibraltar (under both a political and technical perspective)
- Another party may be the consulting firm and system integrator supporting project execution and acquiring the technological solution to be implemented.
- Another party involved may be the installation and maintenance companies, subcontractors of the utility companies and being either meter providers or any other company capable of providing such a service.
- Last but not least, the end-users that need to be engaged and mobilized to fully achieve the objectives in terms of changing water usage behaviors

What major uncertainties still need to be investigated?

- Prove technical and economical sustainability and functionality
- Funds and technical resources to launch the project

Solution strategy.

Solution #2 Foster an efficient and respectful waste management model

What does the solution set out to solve?

- Currently, the **excess generation of garbage** in Algeciras is a big issue. Resources for waste collection are saturated and it is difficult to establish orderly and efficient waste management models.
- In order to tackle this issue, it will be necessary to propose solutions that help to:
 - **Reduce waste generation:** the first step should be aimed at reducing the amount of waste generated by the city (citizens, industry, trade, village activity, etc.)
 - **Efficient waste management:** on the other hand, search for efficient waste management solutions will be also critical to minimize the impact of waste generated by the city on the environment

Solution strategy.

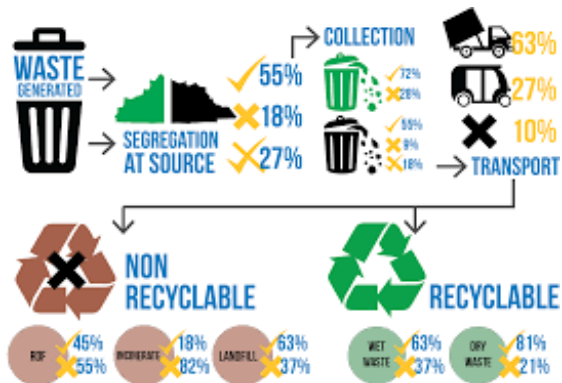
Solution #2 Foster an efficient and respectful waste management model

What are the main features of the solution?

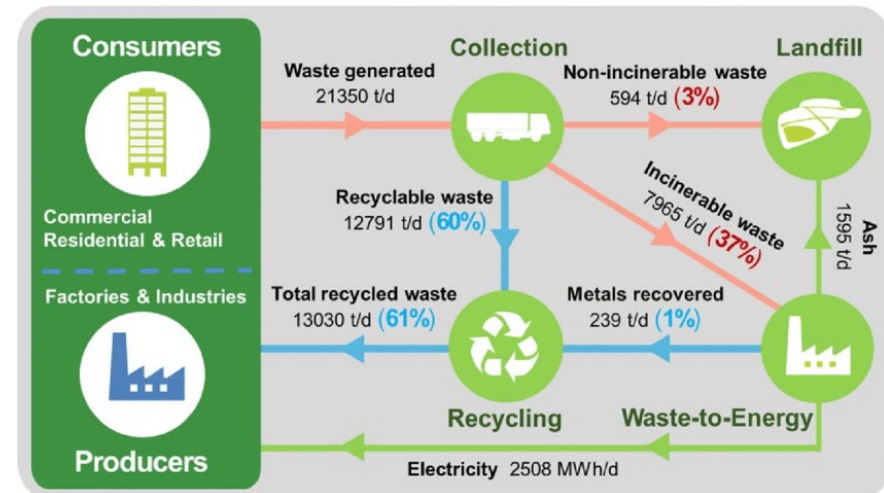
- Different solutions can be provided to both reduce waste generation and improve the waste management:

Reduce waste generation / improve the selective waste collection: educating the population in the adoption of sustainable habits (selective garbage collection, recycling, etc.) is a fundamental step to be able to evolve towards more efficient and environmentally friendly waste management models. Technologies can help bring about that change:

- Training, education, gamification, etc.
- Measurement, monitoring, reporting, Open data



- **Efficient waste management:** The city is also considering the possibility of establishing a Circular Economy Lab with the aim of seeking solutions that respond to the city's environmental challenges:
 - Circular Economy Lab



Solution strategy.

Solution #2 Foster an efficient and respectful waste management model

Why is *this* the right solution for the city?

Waste management initiatives will contribute to solve one of the main environmental issues in the city providing relevant benefits for the city:

- Positive impact on the quality of life, health and comfort of the citizens
- Reduces the risk of water and soil contamination due to the leaks of toxic leachate.
- Conservation of the environment and improvement of the aesthetic and attractiveness of the city.
- Reduces the negative financial impact on the cleaning services of the city and on the local budget due to the increasing fees the municipality must pay for the waste treatment.
- Additional benefits related with the adoption of some potential solution to improve the waste management: ex. reduction of city's carbon footprint thanks to waste-to-energy solutions

Solution strategy.

Solution #2 Foster an efficient and respectful waste management model

What is the business model?

The cost of technology platforms to spread a more sustainable culture can be offset by the benefits of adopting a more efficient waste management model

Waste to energy solutions is other potential source of revenues to compensate the cost required to develop the technological platform and resources required to improve the waste management model

Solution strategy.

Solution #2 Foster an efficient and respectful waste management model

Key partners



Who are our key partners?
Which key resources are we acquiring from partners?
Which key activities do partners perform?

- City Council of Algeciras
- Citizens, merchant associations / Chamber of Commerce, local industry
- Waste collection and treatment service provider
- Port Authority of Algeciras
- University
- Municipalities belonging to the Mancomunidad del Campo de Gibraltar
- Energy companies and other potential service/solution providers

Key activities



What key activities does our solution require to have impact?
How does the solution keep running behind the scenes?

- Diagnosis of the current situation of waste generation and management in the city
- Constitute the Circular Economy Lab
- Search for potential founding sources
- Feasibility study of potential initiatives and establishment of global objectives and communication
- Establishment of mechanisms to measure and monitor performance
- Launch and monitor initiatives

Value propositions



What value do we deliver to users?
What value proposition to we deliver to partners?
How does the wider city benefit?

- Positive impact on the quality of life, health and comfort of the citizens
- Conservation of the environment and improvement of the aesthetic and attractiveness of the city.
- Reduces the risk related with increasing fees the municipality could pay for the waste treatment.
- Reduction of city's carbon footprint thanks to waste-to-energy solutions, biogas generation, etc.

Customer relationships



What type of relationship does each of our users expect us to establish and maintain with them?

- Keep them informed (general information, training, performance, agreements, achievements, etc).
- Easy access and continue and updated feedback

Channels



How do we reach different users involved in the solution?

- Current council's own channels: local information office, online channels (web, e-mail, app, SSNN, ...)
- ... and potential new channels: ex. waste management gamification app, Open Data Platform, etc.

User segments



Who are the different groups who could benefit from the solution?

What differentiates them?

Do they all get the same benefit? Do they all cost the same to serve?

- Citizens
- Local commerce and businesses
- Industry

Cost structure



What are the most important costs?
Which key activities are most expensive?

- Adapt/transform the waste collection and treatment process/plants to enable efficient and sustainable waste management (waste-to-energy, biogas generation, recycling, etc.)
- Technological solutions to improve waste management (smart bins, apps, smart metering, data management, AI, management platform, Open Data platform, etc.)
- Resources required to management, control and monitor of the project

Revenue streams



Who is willing to pay for this benefit?

Who should pay?

Who can pay?

- European, national and regional funding
- Municipality
- Citizens, local commerce, businesses and industry: local tax
- Potential returns from waste-to-energy, biogas/methane generation from organic waste, etc.

Solution strategy.

Solution #2 Foster an efficient and respectful waste management model

What are the main blockers and risk and how will the be overcome?

- Risk 1: **The need to coordinate with neighbor municipalities** to agree on adopt more advanced waste management model (waste treatment platform shared by the municipalities of “Bahía de Algeciras”)
- Potential solution: to keep neighbor municipalities and/or the Mancomunidad de la Bahía de Algeciras involved in some initiatives that could require their support / contribution / agreement
- Risk 2: **Involving waste management company and or other potential solution providers** (energy companies able to provide waste-to-energy services)
- Potential solution: to stablish contact and involve waste treatment plant provider and other potential waste management solution providers (ej. waste-to-energy plants operators)
- Risk 3: **To engage the citizens to adopt sustainable habits:** waste classification, recycling, etc.
- Potential solution: Communication, education/training, monitorization, sanctions/rewards, gamification, etc.
- Risk 4: Advanced solutions (ex. energy recovery from waste, etc.) could require relevant **investment**
- Potential Solution: search for potential founding sources (Next Generation, National/Regional Government, etc.)

Solution strategy.

Solution #2 Foster an efficient and respectful waste management model

What, at the highest level, are the main stages from today to getting this solution at full impact?

- Preliminary diagnosis of waste generation and management in Algeciras and environmental impact:
 - key figures: volume and typology of waste generated by inhabitant/economic activity and evolution, % recycling/reutilization/selective collection, resources and budget available, waste management (landfill, incineration, composting, energy valorization, etc, etc.
 - Main challenges
 - Budget and resources available
- Definition and constitution of the Circular Economy Lab: objectives, members, government model, resources and funding needs
- Search for potential founding sources to finance projects promoted by the Lab
- Feasibility study of potential initiatives and establishment of global objectives
- Establishment of mechanisms to measure and monitor performance (level of achievement / impact generated)
- Communication and community engagement
- For each particular initiative/solution, detailed analysis of resources/needs (partners, technology, resources, budget) and potential benefits (economic and/or environmental)
- Development, launch and monitor of solutions based on the budget and resources available

Solution strategy.

Solution #2 Foster an efficient and respectful waste management model

Who is making it happen?

As has been mentioned before, in order for this action to be successful, it is necessary the involvement, not only of the City Council of Algeciras, but also another actors, as following:

- Citizens, merchant associations / Chamber of Commerce, local industry
- City Council of Algeciras
- Waste management service provider
- Port authority of Algeciras
- University
- Municipalities belonging to the Mancomunidad del Campo de Gibraltar
- Energy companies and other potential service/solution providers

Solution strategy.

Solution #2 Foster an efficient and respectful waste management model

What major uncertainties still need to be investigated?

The main uncertainties faced by this project coincide with the blockages and risks previously identified, and which in order of importance are:

- Getting funds
- Accomplish the involvement of the citizens and the energy services companies
- Need to coordinate with neighbor municipalities
- Involvement of potential solution providers

Solution strategy.

Solution #3 Smart solutions to minimize carbon footprint

What does the solution set out to solve?

Carbon footprint is also a **major environmental problem** in Algeciras.

The intense **port activity** is one of the main contributors of carbon emission. Other singular event, the OPE (Operación Paso del Estrecho), is also a relevant source of carbon emissions by concentrating a flow of more than three million vehicles in its transit between Europe and Africa.

Studies show that over 30% of the CO2 emissions at EU levels are related to buildings.

The city has conducted different initiatives to reduce the carbon footprint (efficient lighting, improved energy efficiency in public buildings, etc.) but new and smart initiatives will be required to move towards zero emission ambition, here we prioritize two:

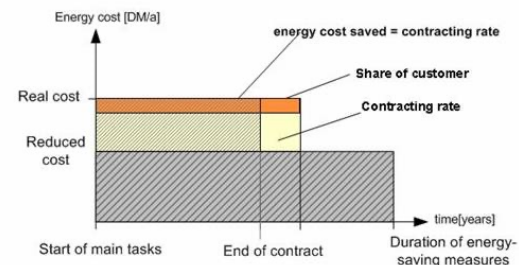
- Foster Distributed Energy Resources
- Deep renovation of public buildings, etc.)

Solution strategy.

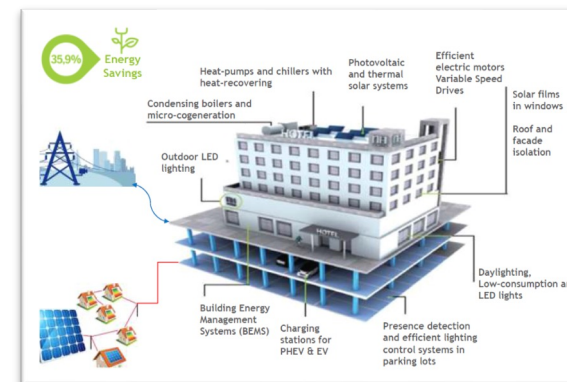
Solution #3 Smart solutions to minimize carbon footprint

What are the main features of the solution?

- Energy audits for all public buildings (managed or owned by the city council)
- Launch renovation campaigns to improve energy efficiency in big public buildings AND promote the same type of projects in local Commercial and Industrial players – and explore for Performance Contracting or Guaranteed Savings Contracts type for financing
- Create local “energy communities” that allow installing renewables in areas where it can be shared with buildings that cannot place PV solar installations.
- Design a system to provide ships moored in the harbor with Green Energy Sources (instead of burning fuel oil for their engines)



Types of “risk-free” projects in which the return on investment is subject to achieving the committed savings



Solution strategy.

Solution #3 Smart solutions to minimize carbon footprint

Why is *this* the right solution for the city?

These initiatives will be key to move towards **Algeciras' zero emission** ambition bringing many direct and indirect benefits for the city:

- **Lowers the pollution** levels of the city with positive effect on the air quality especially due to lowering the consumption of the fossil fuels
- **Improves the quality of life**, comfort and health of the citizens
- Reduces the negative financial impact on **public budget** allocated for utilities
- Contributes to a **smart and less polluted** city
- Creates an **ecosystem of local goods and services providers** that will boost employment related to **green economy**

Solution strategy.

Solution #3 Smart solutions to minimize carbon footprint

What is the business model?

These sort of investments can bring financial benefit from **reducing the energy consumption** at city level and for the public buildings, for community participants It can bring benefits for the ones who install the **PV panels (roofers)** and for the ones who consume the energy generated (**matchers**) as well as for the energy company acting as intermediary (i.e. Repsol Solmatch solution).

Public buildings are known to be very energy-inefficient making them unnecessarily significant **energy consumers** (with 3-4 times the consumption of residential buildings per square meter) and they have long utilization periods, thus making a strong economic case for energy efficiency modernization.

Solution strategy.

Solution #3 Smart solutions to minimize carbon footprint

Key partners



Who are our key partners?
Which key resources are we acquiring from partners?
Which key activities do partners perform?

- Local municipality and public buildings managers
- Port Authority
- Chambers of Commerce
- Local PV installators, energy efficiency companies, construction materials providers
- Financing Entities (Ex: Banks)
- Energy companies supporting solar communities (i.e. Repsol Solmatch)
- Regulatory entities that will help accelerate procedures

Key activities



What key activities does our solution require to have impact?
How does the solution keep running behind the scenes?

- Awareness of local councils / communities
- Bring different actors into contact
- Identify places to revamp / set-up facilities
- See feasibility of implementing additional innovative projects
- Evaluation of existing pilot projects and transfer success stories to other municipalities
- Launch public tenders / neighborhood communities (i.e. establish themselves as a cooperative, ...)

Value propositions



What value do we deliver to users?
What value proposition to we deliver to partners?
How does the wider city benefit?

- Reduction of energy bill
- Sustainable energy supply
- Valorization of energy surpluses and reduction of CO2
- Sustainable energy management: they can manage their own energy (higher degree of self-management)
- Consumer empowerment
- Local green jobs

Customer relationships



What type of relationship does each of our users expect us to establish and maintain with them?

- Energy platforms such as Solmatch

Channels



How do we reach different users involved in the solution?

- The local council's own channels: a local information office, an online channel (web, e-mail, app, WhatsApp group, ...)

User segments



Who are the different groups who could benefit from the solution?
What differentiates them?
Do they all get the same benefit? Do they all cost the same to serve?

- Neighborhood communities
- Energy cooperatives
- Shops / SMEs
- Shopping centres
- Educational centres
- Hospitals
- Public buildings...
- Port Authority

Cost structure



What are the most important costs?
Which key activities are most expensive?

- Project design and management assistance
- Investment in revamps, equipment, etc. (infrastructure, maintenance, repair works, updates, ...)
- Control and monitoring of the project

Revenue streams



Who is willing to pay for this benefit?
Who should pay?
Who can pay?

- Energy savings – maybe through Performance Contracting or Guaranteed Savings Contracts
- Green energy supply contracts for vessels in the Port
- European funding
- Creation of an energy Marketplace where each participant can sell surplus electricity
- Local Tax incentives or bonuses

Solution strategy.

Solution #3 Smart solutions to minimize carbon footprint

What are the main blockers and risk and how will they be overcome?

- Lack of motivation to mobilize and coordinate stakeholders.
- High cost of refurbishment / infrastructure and lack of economic Funds: lack of ability to obtain EU funds, or other subsidies or loans are needed and facilitate access to users.
- Legislation / Regulation: it should be aligned, put pressure on the state government; when it comes to legalizing new plants, the procedure should be more affordable, less bureaucratic. Facilitate the user work.
- Lack of expert resources in energy efficiency in the City Council.

Solution strategy.

Solution #3 Smart solutions to minimize carbon footprint

What, at the highest level, are the main stages from today to getting this solution at full impact?

- Bring together stakeholders
- Find interesting buildings to revamp, and potential areas to set up the Energy Community
- Drafting of the project to be carried out
- Find public or private funding
- Obtain regional and local authorization
- Project execution

Solution strategy.

Solution #3 Smart solutions to minimize carbon footprint

Who is making it happen?

- Algeciras city council
- Port Authority
- Other administrations managing large public buildings
- Energy companies (ENDESA as local DSO and other energy retailers promoting communities: SOM, Repsol Electricidad y Gas, Hola Luz, ...)
- Local SMEs in the energy efficiency and DER arena: renewables installers, energy efficiency advisors, revamping companies, etc.

Financing schemes can rely on promotional public money and future energy savings and involve ESCOs, banks, utilities, municipalities' tax schemes, subsidies and dedicated blended funds managed by specialists using thousands of accredited experts such as KfW's home efficiency program in Germany.

Local authorities can mobilize relevant neighborhoods, Industrial Players, etc. and create regulatory sandboxes to launch massive renovation calls for tenders to initiate neighborhood renovation programs (20,000 m² to 50,000 m² each). Regional project coordinators can be identified and empowered, including PPPs, to manage an ecosystem of suppliers, manufacturers, designers, architects, urban planners, BIM editors, engineers, public and finance bodies. Beyond economies of scale (through design, procurement, transport and logistics), neighborhood level interventions will enable local networks, grids, eco-conception and better urban planning. Energy savings are worth money and will facilitate investments.

Solution strategy.

Solution #3 Smart solutions to minimize carbon footprint

What major uncertainties still need to be investigated?

- Design a proper mechanism to foster public-private collaboration.
- Engage public and private buildings with high energy consumption or large roof tops near a high consumption area
- Involve energy companies, renewables installers, energy efficiency advisors, revamping companies, etc.

Solution strategy.

Overall strategy

How do the solutions interact? Do some have positive synergies that reinforce the success of one another? Or are there conflicting interactions that need to be managed carefully?

- The three solutions are related because they each one impact on an environmental dimension: carbon footprint, water and waste.
- There is no conflict between them because each one works on a different dimension of sustainability.
- However, there is synergies between them because the three solutions contribute to improving the environment and the sustainable development of the city. Although individual goals can be set for each, the three solutions contribute to the common overall goal.

Solution strategy.

Overall strategy

If you could boil down your strategy to three thoughts that have best guided you on your way, what would they be? These ways of thinking will be helpful when things get tough in implementation

- Improving the city's living conditions
- Ensuring a sustainable future for the city
- To make sustainability a dynamizer of the city by promoting trade, increasing the attractiveness of the city, generating employment through the boost of circular economy models, and for citizens to feel part of these achievements by being part of the solution

Solution strategy.

Overall strategy

What are the key factors that define success across all of your solutions? These could not be solution related, e.g., managing political cycles

- Ensuring the citizens engagement
- Sharing the achievements with the citizens making them feel proud as key contributors to achievements
- Look for mechanisms to reinforce commitment and maintain the enthusiasm of citizens for contributing to achieve the objectives set
- Find the necessary financing to achieve the objectives set