

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

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City of Velika Gorica: Intelligent City Transformation Overview

ICC Final Deliverable



Executive summary

Velika Gorica is the largest city in Zagreb County, covering 329 square kilometres and consisting of 58 settlements. With 63.000 citizens, it is the 6th largest city in Croatia. The main airport of the Republic of Croatia is located in its territory. The area of Velika Gorica is rich in forest, gravel and groundwater.

The majority of the population is middle-aged and older, of medium technological literacy, with smaller settlements slowly dying out as the younger population goes to cities, leaving mostly older people who are technologically illiterate and who neither like change nor are interested in it. The whole area of the City, including all the surrounding settlements have the same problem. Poor quality of life, which is strongly influenced by poor air quality, which is especially evident in the winter months, when walking around the city in the evening becomes difficult. The elderly population, especially those in the surrounding settlements, resist the need for change, as most people live in their old family houses, with a small pension, in such conditions that they are likely to belong to vulnerable groups at risk of energy poverty. They heat mostly on wood, since they probably own a forest, but their pension is too small to even think about changing energy sources.

Before the ICC, the city had a basic webGIS system in which it collects data needed to implement new projects aimed at addressing both energy issues and to ultimately improving air quality. It needed to develop of further data digitization as the City has. On the other hand, there is no single system in which all existing projects could be monitored, ie future projects for which data in the webGIS system are required.

Executive summary

Before the ICC, the city had a basic webGIS system in which it collects data needed to implement new projects aimed at addressing both energy issues and to ultimately improving air quality. It needed to develop of further data digitization as the City has, on the other hand, there is no single system in which all existing projects could be monitored, ie future projects for which data in the webGIS system are required.

The vision of the city is to create a nurturing environment for green businesses, optimize the digitalization process and to deal with pollution in the air, land and water. These objectives helped shape the strategy and we will continue working on that in the next three years and beyond.

The city of Velika Gorica has many good projects to help achieve the decarbonization and digitalization agenda. However, financial constraints and unavailability of workforce slows the process.

Mayor Foreword





Modern times require cities to meet the diverse demands of modern society. In the modern world, the needs of our citizens are implemented through various measures using modern technologies for their implementation. Thus, one of the main goals of the new city administration, elected in the second year of the City of Velika Gorica's participation in the ICC, is the modernization of the city administration and its business processes.

The stated goal is compatible with the goals implemented through the ICC, which leads to the ultimate goal of providing citizens with access to data through a unique platform that has proven to be one of the features of smart cities in the modern world, and which crystallized during our participation in the ICC. Thus, Velika Gorica, through the Open data portal, will provide citizens with access to the data it has in two ways, as raw data and as processed data through various graphs, in order to enable them to access information as easily as possible.



The city of Velika Gorica 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

					<i>Reported as one section</i>
	1 Preparation & assessment	2 Ambition & roadmap	3 Implementation	4 Review & way forward	
	5 months: September 2020 – January 2021	3 months: February 2021 – April 2021	15 months May 2021 – July 2022	2 months August 2022 – September 2022	
Summary	The city urgently needs to solve the problem of air pollution and incorporate data to better prepare for and recover from natural disasters.	Expand the GIS database, create an open data portal and implement a program to deploy glean energy to all building categories.	Despite the Covid-19 challenges, the city was able to enter into new agreements with the heating company and other key stakeholders. Funding was also secured to deploy some key projects.	Maintain open communication with the national government, agencies and other key stakeholders. Will keep the open communication with citizens.	

Section

1

September 2020 to January
2021

City of Velika Gorica: Preparation and assessment

ICC transformation



Introduction



Velika Gorica

Location & history

Velika Gorica is located south of Zagreb, the capital city of the Republic of Croatia. In the 20th century, it belonged to the wider community of Zagreb County and was briefly part of the city of Zagreb. It gained the status of a city in 1995.

Size

Velika Gorica is the largest city in Zagreb County, covering 329 square kilometres and consisting of 58 settlements. With its 63.000 citizens it is the 6th largest city in Croatia. The main airport of the Republic of Croatia is located in its territory.

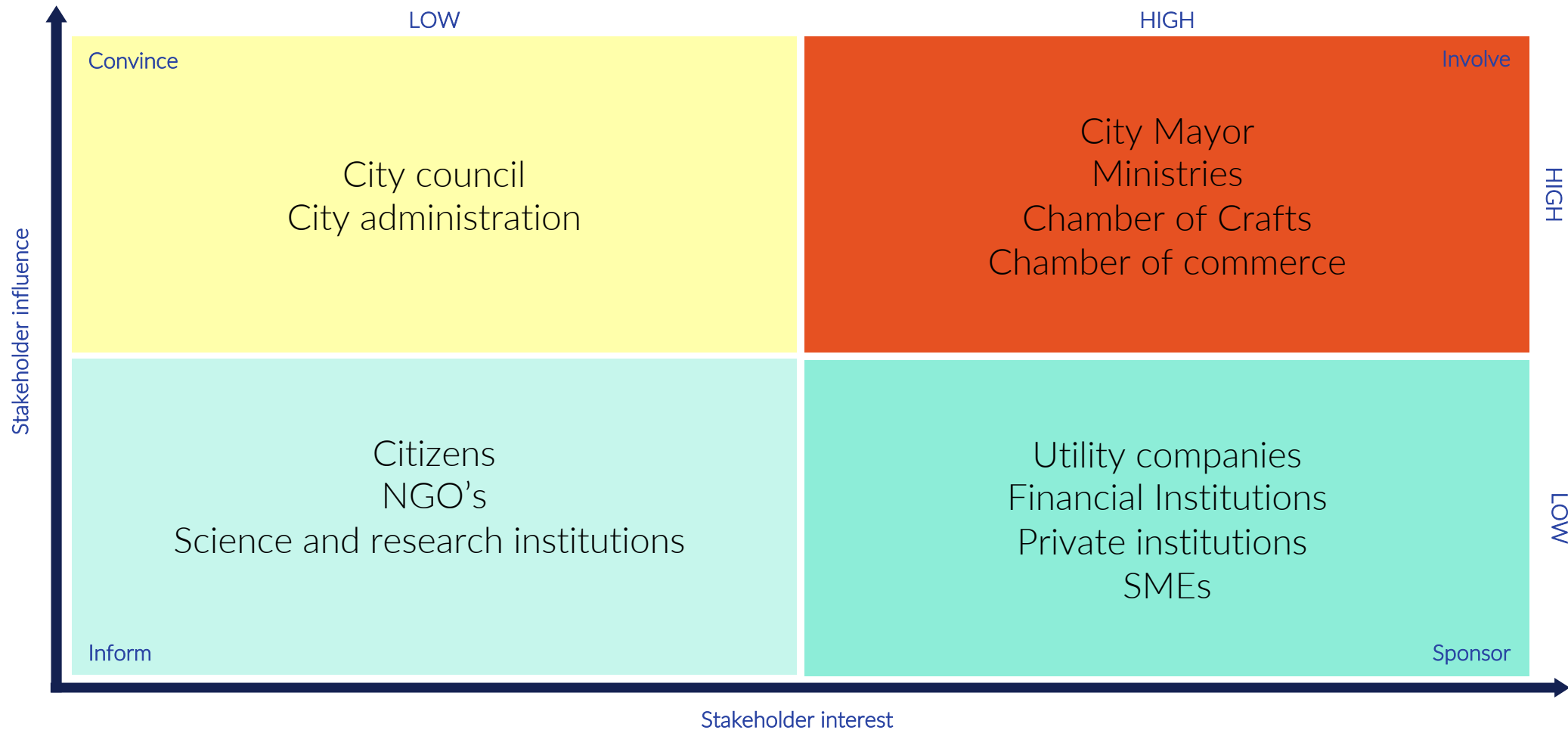
Natural conditions

The area of Velika Gorica is rich in forest, gravel and groundwater. The excavation of gravel created 4 artificial lakes that are unregulated. The true condition of the lakes and any impact on groundwater is currently unknown.

- All strategic documents of the city are aligned with national and EU objectives of green and digital transition. We are focusing on disaster risk management, energy efficiency and reducing pollution particularly in the air. With these actions, we would be preserving the environment for future generations.



Stakeholder map



City Ecosystem

We are proud of the good cooperation with various external stakeholders from institutions, ministries to private companies. Thus, we have concluded various agreements with the Croatian heating utility company, then with Croatian International Airport, and with the Croatian Post.

We have already started projects with some of them, such as the Croatian heating utility company, with which we agreed that two primary schools will switch to the Central Heating System instead of gas as the current energy source. At the same time, they will cover one parking lot with solar collectors. On the other hand, the Croatian International Airport joined the project of planting urban forests, as one of the measures to reduce groundwater ozone levels in the area of Velika Gorica and they donated plants and trees for planting at 3 locations of primary schools. We hope that we will continue to do the same with other stakeholders, whether public or private.

In order to educate children from an early age, we've installed e-panels in the renovated primary school buildings that are connected to the ISGE (an online application for monitoring and analysing energy and water consumption in public sector buildings) so it shows a comparison of consumption before and after the renovation.

In cooperation with the Faculty of Civil Engineering and representatives of the co-owners, through the CONGREGATE project, sensors were installed to monitor energy consumption in multi-apartment buildings in Velika Gorica, and through the project, the thermal comfort and air quality of one apartment will be monitored. In Velika Gorica, the project is implemented in 7 multi-apartment buildings, both energy-renovated and those that have not yet undergone energy renovation.

There are many good projects implemented with various stakeholders.

City ecosystem insights

- ❑ Stakeholders are interested in the development of projects in the city and are open to collaborating with the city
- ❑ Financing options are limited and cause delays in implementation of ideas.
- ❑ Resistance of local communities to change is another major issue. However, it is being mitigated by involving citizens in decision-making processes. This involvement reduces mistrust of local government, which leads to a better acceptance of new projects.
- ❑ The biggest roadblock in project implementation is the very complicated relationships in asset ownership, such as land, buildings, etc. Through discussions and awareness raising campaigns, in addition to an open data portal to increase transparency, we are hoping to tackle the challenge effectively.
- ❑ Finally, the most important fact is that there is a desire for positive change across all levels in the city. Our goal is to present the citizens with opportunities available to them and support the improvements necessary for a better quality of life in the city.

City ecosystem: insights from stakeholders

Stakeholders are used to working together. They are willing to contribute and expect someone to be the champion and organiser of initiatives.

The expectations of external private stakeholders from local government are high. Some of **the insights** expressed at the stakeholders' workshop include:

- ❑ Improving citizens' access to clean energy would directly enable air pollution reduction,
- ❑ Use of covered parking lots for solar energy production and solar farms on water wells would enable smart space management,
- ❑ Implementation of water metering applications with remote monitoring measurements,
- ❑ Access to information and access to real-time data would enable business decision making,
- ❑ Finally, the introduction of efficient combustion systems could be the start of energy development and strengthening the circular economy program

ICC vision for the city of Velika Gorica



City solutions and linkage with overall city strategy

How we are transforming our ambitions into actions

To be the city of clean air by drastically reducing air pollution and increasing share of renewables by at least 2% per year

GIS smart air quality infrastructure. We have implemented **smart monitoring systems** to inform decision making. City admin is systematically working on the implementation of environmental protection measures, directing citizens towards the use of renewable energy sources, while cooperating with stakeholders, such as utilities and associations, universities and private investors. But in order for projects to be implemented, it is necessary to have quality data.

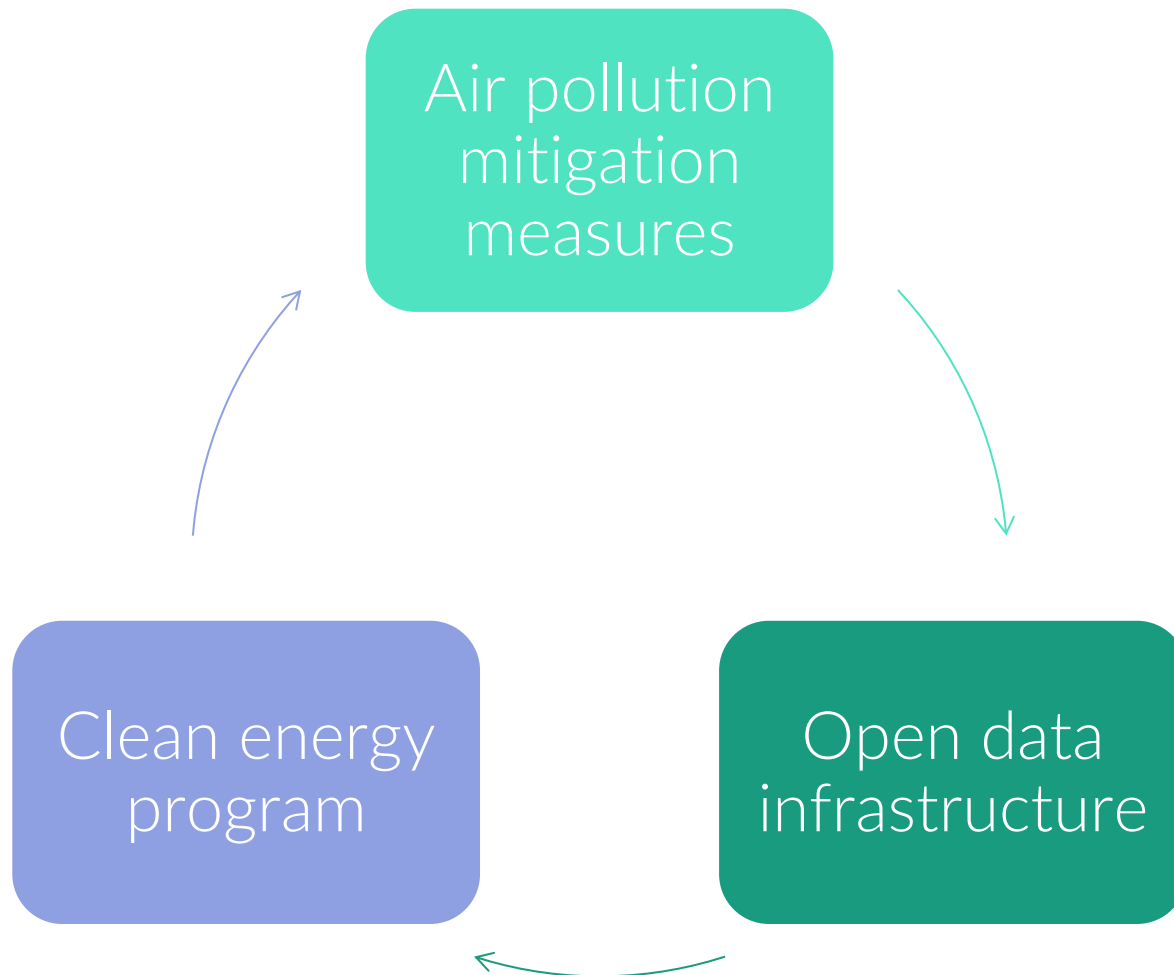
To have a decarbonized local economy by encouraging use of environment friendly technologies particularly in buildings

With the **Open Data infrastructure**, companies can access the relevant information needed to create new solutions. The initiative serves both Ambitions 1 and 2 with the primary objective of eliminating sources of air pollution. From the data entered into the GIS system on energy sources used by households, local stakeholders can determine which area has the greatest need for introduction of renewable energy sources to reduce air pollution in each place. The city co-finances the change of energy and inform citizens about co-financing calls from regional or national bodies.

Strengthen the resilience of the city by incorporating measures such as gathering essential data that aid prevention and fast recovery from natural disasters

Resource constraints prevented fast implementation of the third ambition. However, data is being collected and damaged buildings are being reconstructed for the purpose of enhancing resilience.

City solutions and initiatives are interconnected by design



Solution 1: Decarbonisation map using GIS infrastructure

The city's GIS system is already filled with a large amount of data, The main biggest polluters are home fireplaces and traffic, it is necessary first to list all households and the energy source they use for heating, and enter them into a single web GIS system.

The same should be done in relation to water protection, given due to recent earthquakes it collapsed a small part of the lake shore, but as the area of the city is rich in groundwater, it is important to determine the depth of the lake and the slopes on the shores. By obtaining and entering this data into the GIS system, among others, citizens could see where it is safest to use the lake.

Solution 2: Open data infrastructure for the city of Velika Gorica. The Open Data portal will display all necessary information, which will directly affect the quality of life.

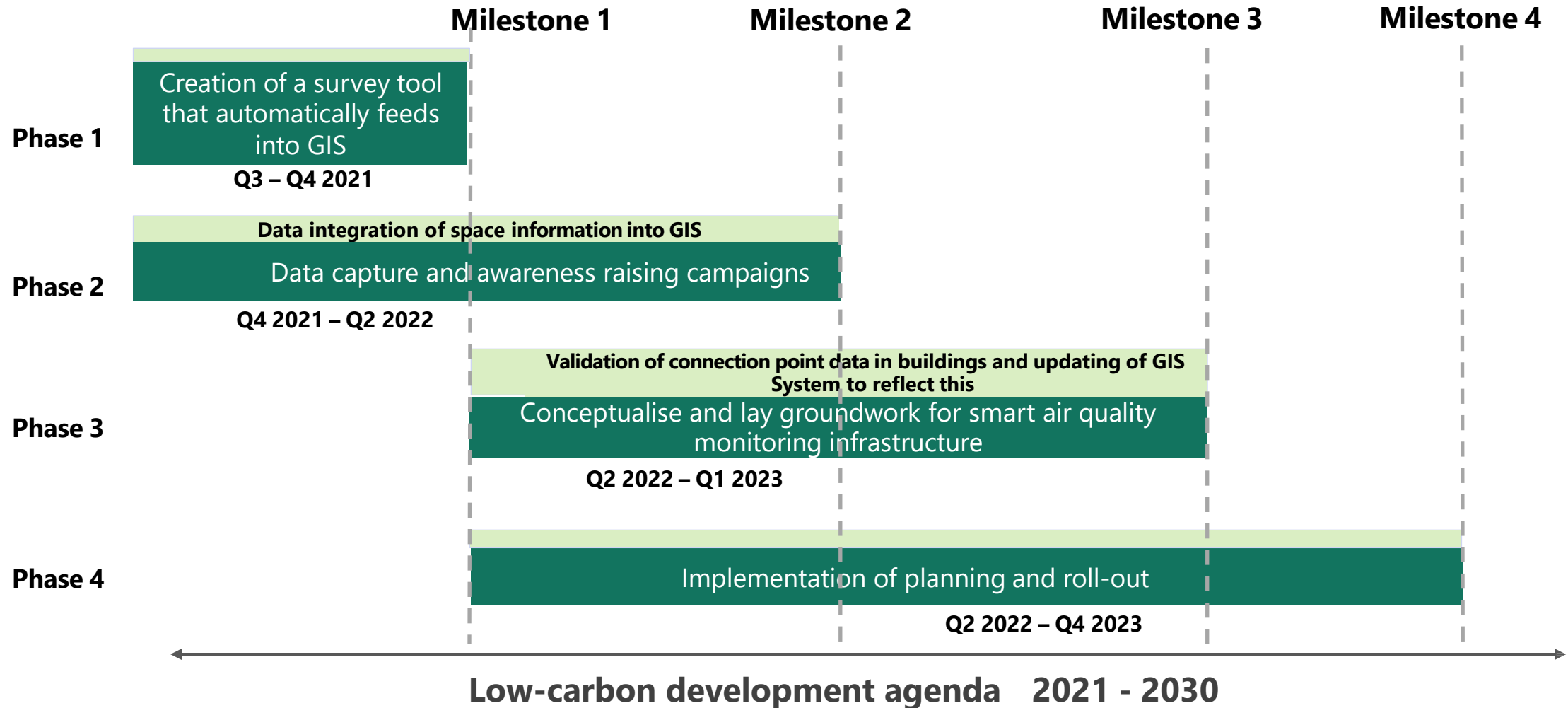
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City of Velika Gorica: Ambition and roadmap

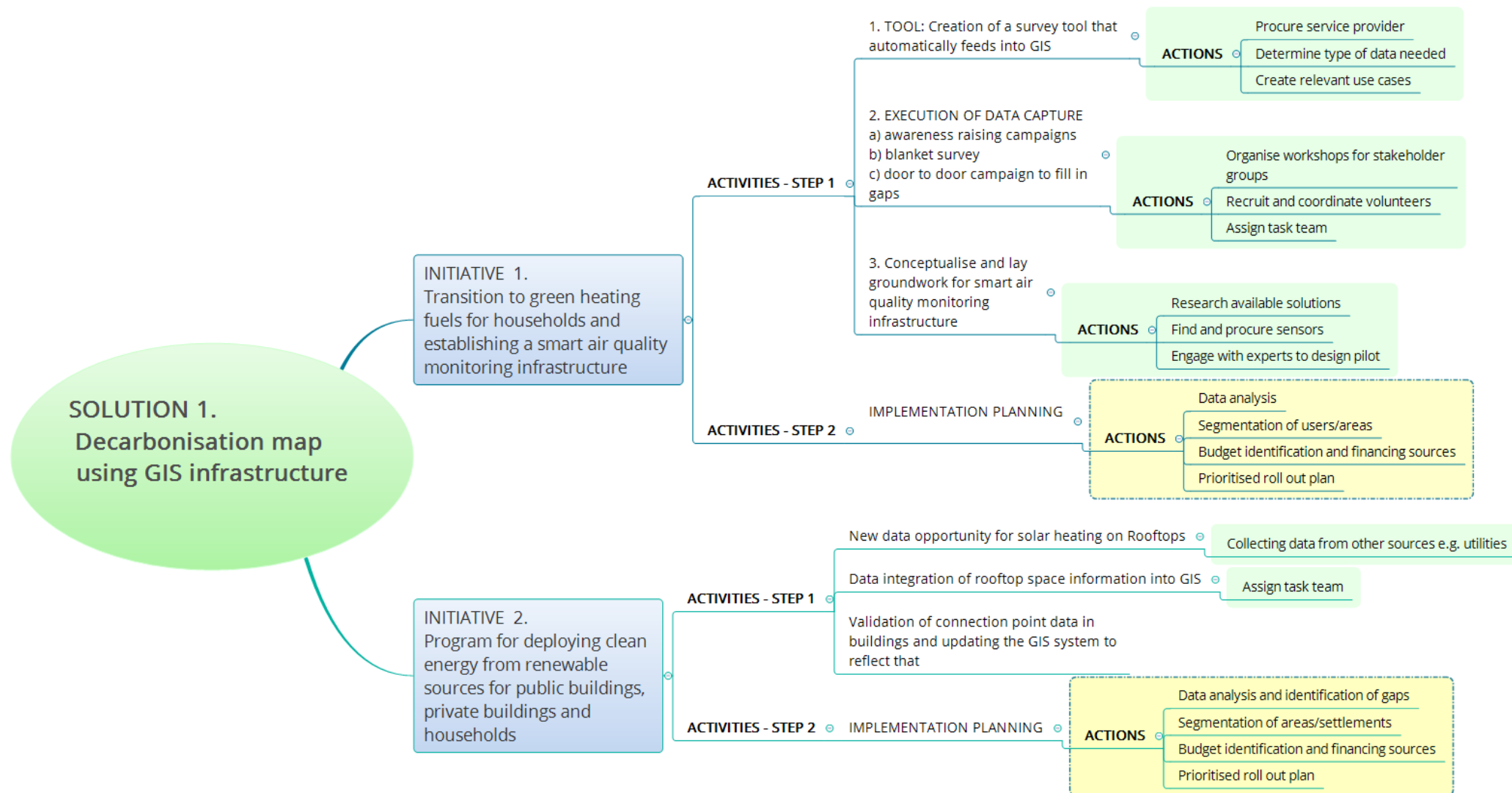
ICC Transformation

February 2021 to May 2021

High level implementation roadmap for solution 1. Decarbonisation map using GIS infrastructure



1 Solution 1 – Decarbonisation map using GIS infrastructure



Rationale to road map

The low-carbon development agenda formed the basis of the roadmap for this solution and its initiatives

The roadmap was designed with the national and city strategies in mind. It also took available human and financial resources into account. It was necessary to collect data on major air pollutants, in order to assess how much effort would be needed to improve the overall air quality in the City area. This was done by creating a survey tool that automatically feeds into GIS, awareness raising and door to door campaign.

Covid-19 restrictions and resource limitations meant that task of engaging with experts for pilots were impossible to carry out. Some equipment procurement had to be postponed.



1

Initiative charter

Solution 1 - Decarbonisation map using GIS infrastructure

Strategy

Description



Transition to green heating fuels for households, establishing a smart air quality monitoring infrastructure and deploying clean energy from renewable sources for public buildings, private buildings and households.

Main purpose is to collect data on major air pollutants, in order to assess how much effort is needed to improve the overall air quality in the City area. Creation of a survey tool that automatically feeds into GIS, awareness raising and door to door campaign.

Link to vision



Having a clear insight into the number of households that contribute to the poor air quality by improving the quality and quantity of relevant data.

Link to ambition statement



Using digital services and gathering data to enable decision making that improves health and quality of life.

Expected impact and timing



We got the funding for new modules in the GIS infrastructure from the Fund and it is in the implementation phase. And we got the funding for one station for measuring air quality in one of the rural settlements, and we got in touch with one institution to measure air quality in 3 primary schools and one kindergarten.

Stakeholders involved

Solution lead:



City departments for urbanism and environmental protection

Solution working team:



Employees of city departments for EU funds and departments for urbanism and environmental protection and VEGORA (Local development agency)

Contributors:



The Faculty of Mechanical Engineering and Naval Architecture, NGO's, Utility for urban housing of the city of Velika Gorica

Risks and mitigation



Key risks is the lack of citizen engagement. It will all depend whether they will be interested in getting involved, which will be the biggest challenge. Also it is a big challenge to gather data during pandemic caused by COVID-19 virus.

Since it is problematic due to the pandemic crisis to collect data from citizens live, currently everything is done online.

Inputs, outputs, outcomes and impacts

Source of funding and estimated cost



Support is needed from the Fund for Environmental Protection and Energy Efficiency and from the competent ministry.

Solution maturity outputs














The city is interested in increasing broadband connectivity and is awaiting public calls.

City performance outcomes and impacts



The city has adopted documents in the field of air protection and energy and is implementing measures based on these plans that have a direct impact on increasing the quality of life of citizens.

Initiative 1 – Transition to green heating fuels for households and establishing a smart air quality monitoring infrastructure

Initiative name:  Transition to green heating fuels for households and establishing a smart air quality monitoring infrastructure	Ultimate goal and scope of this initiative  The main purpose of the initiative is to collect data on major air pollutants, in order to assess how much effort is needed to improve the overall air quality in the City area. And with the installation of air quality sensors, it will lead to a better management/monitoring of air quality.	Impact and timing  Initiative will create impact immediately, because some activities have already started.
Initiative lead:  Gordana Mikulcic Krnjaja	In order to obtain the best possible data, it is necessary to involve citizens and other contributors.	Risks  Key risks is the lack of citizen engagement. It will all depend whether they will be interested in getting involved, which will be the biggest challenge.
Initiative working team:  Employees of city departments for EU funds and departments for urbanism and environmental protection	Major milestones  <ul style="list-style-type: none"> - 90% inputs from citizens in targeted settlements - Baseline data for air quality monitoring over a period - Number of households switched to the new energy system - Feasibility study done in 1 year in targeted settlement 	
Contributors:  <ul style="list-style-type: none"> • NGOs • VEGORA (Local development agency) • HEP Toplinarstvo (heating utility) • HEP d.d. (main power utility) • The Faculty of Mechanical Engineering and Naval Architecture • REGA (Regional energy agency for Northwest Croatia) 	Dependencies  <ul style="list-style-type: none"> - Locations where the sensors will be placed All initiatives are connected. For example, the data collected in the GIS system will be displayed on the Open data portal. Data collected from air quality sensors can be displayed in the same way.	Support needed  Funding will certainly be needed to introduce new modules in the GIS infrastructure, while significant resources will be needed for smart air quality monitoring infrastructure. Support is needed from the Fund for Environmental Protection and Energy Efficiency and from the competent ministry.
	Key stakeholders  Communication is frequent with all participants, with some once a week, either related to ongoing projects or future projects, as each contributor has some influence on decision-making.	

Initiative 2 – Program for deploying clean energy from renewable sources for public buildings, private buildings and households

Initiative name:



Program for deploying clean energy from renewable sources for public buildings, private buildings and households

Initiative lead:



Gordana Mikulcic Krnjaja

Initiative working team:



Employees of city departments for eu funds and departments for urbanism and environmental protection

Contributors:



- CITIZENS
- VEGORA (Local development agency)
- HEP Toplinarstvo (heating utility)
- HEP d.d. (main power utility)
- The Faculty of Mechanical Engineering and Naval Architecture
- REGA (Regional energy agency for Northwest Croatia)

Ultimate goal and scope of this initiative



The main goal is to increase the share of the use of renewable energy sources, either in the production of electricity from PVs, reheating of water from solar collectors, replacement of inefficient combustion plants, and all this regardless of who owns the facility. And which all leads to a better quality of life for citizens, with the possibility of using smart technologies.

Major milestones



- the amount of kWh of installed power of photovoltaic power plants on the roofs of public buildings, i.e. the number of covered roofs of public buildings with PVs
- number of installed solar PVs on private houses
- entered module with roofs of buildings in the GIS system
- number of replaced inefficient home fireplaces

Dependencies



All initiatives are connected. For example, the data collected in the GIS system will be displayed on the Open data portal. Data collected from air quality sensors can be displayed in the same way.

Key stakeholders



Utility companies

Impact and timing



Initiative will create impact immediately, because some activities have already started.

Risks



Key risks is the lack of citizen engagement. It will all depend on whether they will be interested in getting involved, which will be the biggest challenge.

Support needed



Funding will certainly be needed for all activities. Support is needed from the Fund for Environmental Protection and Energy Efficiency, from the competent ministry, and from utility companies.

Key Performance indicators – Activities (inputs and actions)

Solution	Initiative	Activities – Inputs and actions
Decarbonisation map using GIS infrastructure	Transition to green heating fuels for households and establishing a smart air quality monitoring infrastructure	a) Number of households that replaced inefficient heating fuels b) Baseline data for air quality monitoring over a period
	Program for deploying clean energy from renewable sources for public buildings, private buildings and households	a) Number of workshops held b) Total kWh of newly installed PVs on public and private buildings c) Number of buildings that switched to a new energy system

Key Performance indicators – solution maturity (outputs)

Solution	Initiative	Solution Maturity - outputs	Targets
Decarbonisation map using GIS infrastructure	Transition to green heating fuels for households and establishing a smart air quality monitoring infrastructure	1) Adoption rate of new heating fuels that reduce pollution 2) Create sensor network for air pollution monitoring	a) 90% inputs from citizens in targeted settlements b) Two years completion timeframe for households in targeted settlements c) Improve decision-making and analysis using sensor data
	Program for deploying clean energy from renewable sources for public buildings, private buildings and households	a) Amount of kWh of installed power of photovoltaic power plants on the roofs of public buildings b) Number of installed solar panels on private households	Increase the share of renewables by 2% per year

Key Performance indicators

Solution	Initiative	City performance – outcomes and impacts	Targets	Link to SDGs (optional)
Decarbonisation map using GIS infrastructure	Transition to green heating fuels for households and establishing a smart air quality monitoring infrastructure	a) Analysis of survey data b) Grassroots outreach to rural and energy poor communities c) City ranking on air pollution index	1 year study of the transition of a selected settlement	SDG 3, 7, 10, 11 & 13
	Program for deploying clean energy from renewable sources for public buildings, private buildings and households	More engaged stakeholders, particularly citizens	1 workshop per month with a cross section of ecosystem actors	

Key Performance indicators - Cross cutting indicators

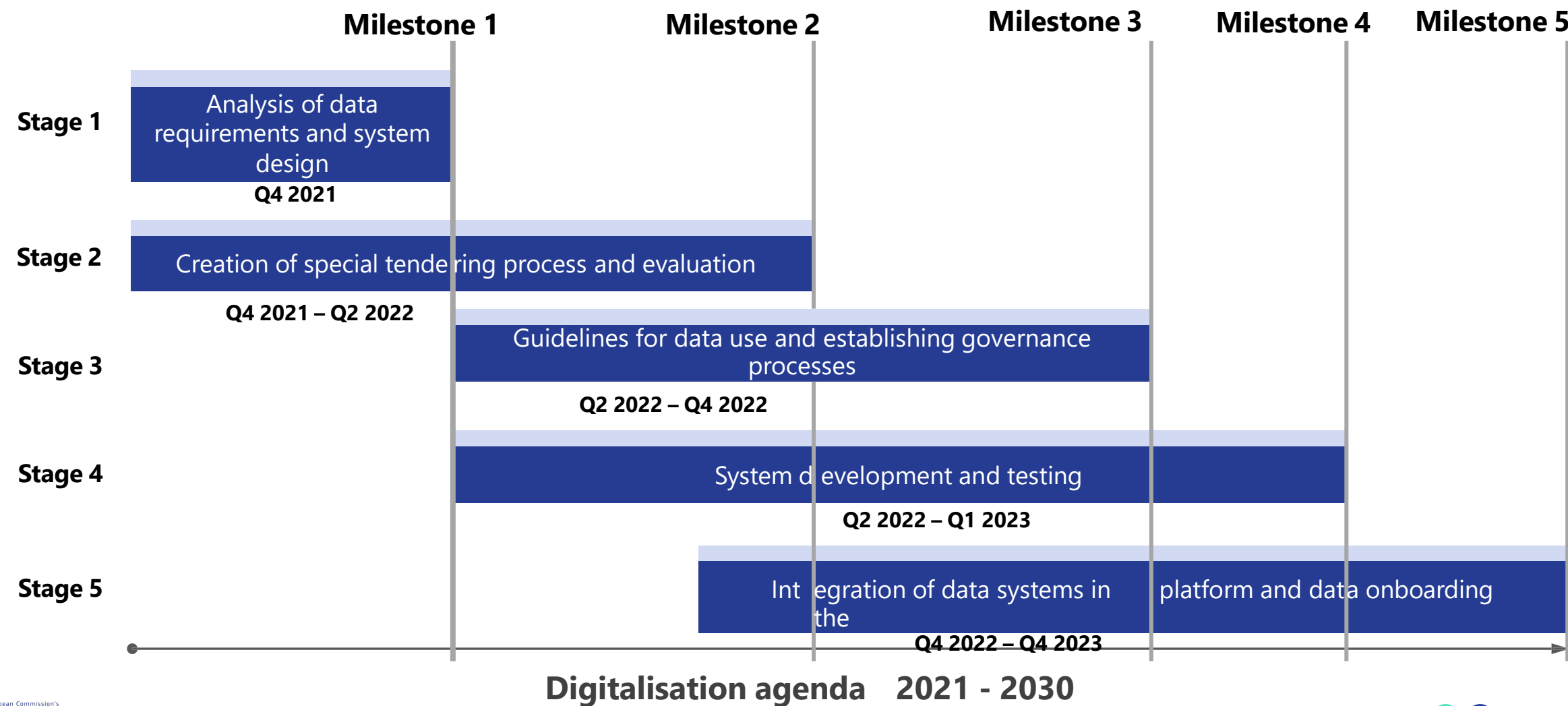
Cross cutting indicators

Number of new businesses accessing and using these services per year

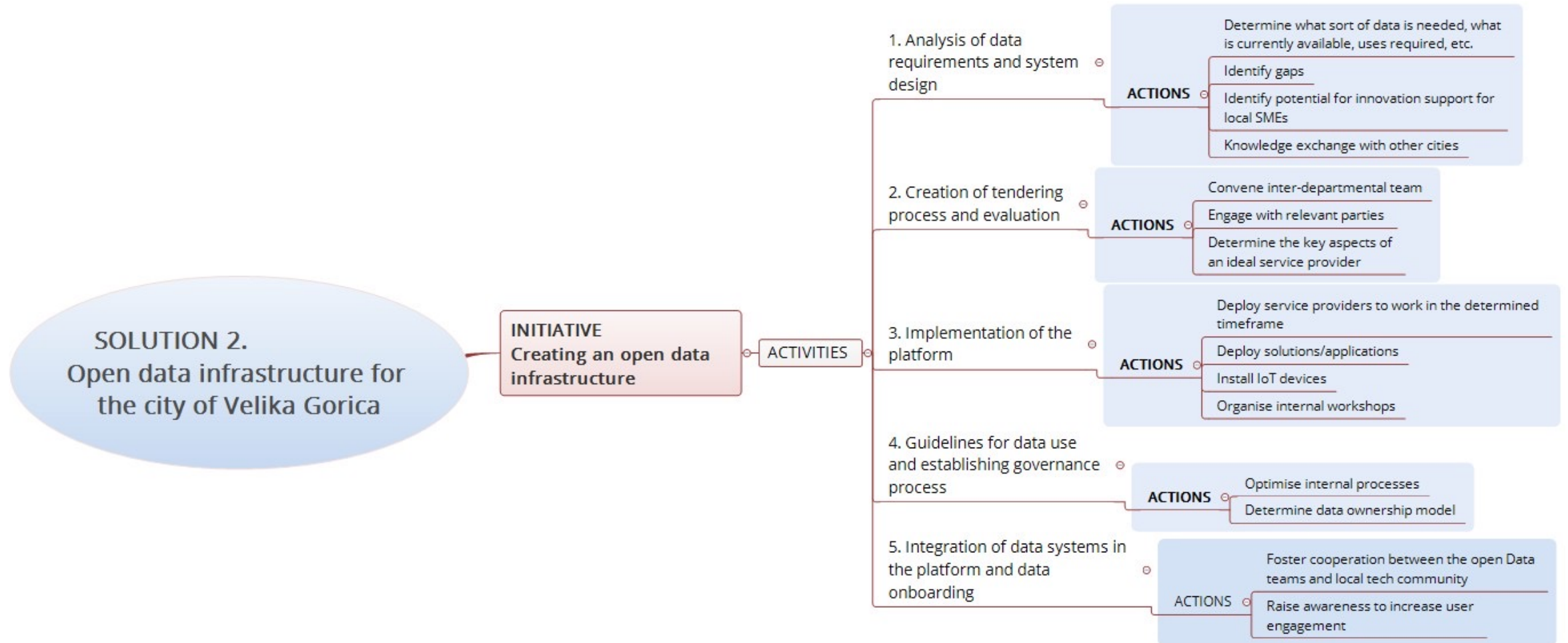
Level of citizens awareness of their role in green transition and pollution reduction

Number of new financing and collaborative models adopted

High level implementation roadmap for solution 2. Open data infrastucture for the City of Velika Gorica



Solution 2 – Open data infrastructure for the city of Velika Gorica



Rationale to road map

The digital development agenda formed the basis of the roadmap for this solution and its initiatives












The roadmap was designed with the national and city strategies in mind. It also took available human and financial resources into account. It was necessary to collect and manage quality data, as well as devise a means for data ownership. The intention is to enhance transparency and stimulate innovation.

Covid-19 restrictions and resource limitations meant that task of engaging with experts on defining key processes were difficult to carry out. Sites could not be visited and some equipment procurement had to be postponed.



1 Initiative charter

Solution 2 – Open data infrastructure for the city of Velika Gorica

Strategy		Stakeholders involved		Inputs, outputs, outcomes and impacts	
Description 	Creating an open data infrastructure <p>The main goal is to get an instrument that will be at the service of citizens with all the data available in real time, and which will also provide better visibility of existing data and projects of the city.</p> <p>Main activities: Analysis of data requirements and system design, creation of tendering process and evaluation, implementation</p>	Solution lead:  <p>City departments for urbanism and environmental protection</p>		Source of funding and estimated cost  <p>Support is needed from the Fund for Environmental Protection and Energy Efficiency and from the competent ministry.</p>	
	Link to vision  <p>Improving the service of the citizens by incorporating digital technology</p>	Solution working team:  <p>Employees of city departments for urbanism and environmental protection and Local development agency</p>		Solution maturity outputs  <p>City is interested in using new technological solutions such as open data platform but is waiting for public calls.</p>	
	Link to ambition statement  <p>Using digital services in gathering data and provide that data to citizens</p>	Contributors:  <p>- Regional - citizens</p>			
Expected impact and timing 	<p>After gathering data of Decarbonisation map using GIS infrastructure, an analysis of the required data will be made and after that, will need a system design.</p>	Risks and mitigation  <ul style="list-style-type: none"> • lack of knowledge • untimely entry of newer data • lack of co-financing possibilities • which data to enter in the Open data portal • what the portal will look like (user friendly) 		City performance outcomes and impacts  <p>The city has adopted documents in the field of air protection and energy and is implementing measures based on these plans that have a direct impact on increasing the quality of life of citizens.</p>	

Key Performance indicators – Activities (inputs and actions)

Solution	Initiative	Activities – Inputs and actions
Open data infrastructure for the city of Velika Gorica	Creating an open data infrastructure with e-services and quality data for citizens	<ul style="list-style-type: none">a) Establishing data Hub that would consolidate citizen and business data at City levelb) Design digital inclusion programc) Build local partnerships through monthly meetings with stakeholders

Key Performance indicators – solution maturity (outputs)

Solution	Initiative	Solution Maturity - outputs	Targets
Open data infrastructure for the city of Velika Gorica	Creating an open data infrastructure with e-services and quality data for citizens	<ul style="list-style-type: none">a) Data sharing agreement with external entitiesb) Citizen survey on ease of use of the platformc) Air quality sensor data collected and stored successfully	<ul style="list-style-type: none">a) First 1000 users acquired in the shortest possible timeb) Increased available data for quality decision-making

Key Performance indicators

Solution	Initiative	City performance – outcomes and impacts	Targets	Link to SDGs (optional)
Open data infrastructure for the city of Velika Gorica	Creating an open data infrastructure with e-services and quality data for citizens	<ul style="list-style-type: none">a) Number of citizens and businesses using the city services through the platformb) Number of sensors deployedc) Rate of compliance of stakeholders to provide data to the cityd) Increase in digital literacy	<ul style="list-style-type: none">a) Increased collaboration among stakeholder groupsb) Increased transparency and trust	SDG 5, 9, 10, 11 & 17

Key Performance indicators - Cross cutting indicators

Cross cutting indicators

Number of new businesses accessing and using the platform per year

Survey of citizens' acceptance and experience with the platform

Number of new financing and collaborative models adopted

Number of digital literacy programs organised for citizens and small businesses

● Governance structure of roadmap implementation for both solutions

