D6.2: Bold City Vision 2050 for each FC

(BCVs for Alba Iulia, Smolyan, Võru, Písek, and Sestao)

+CityxChange | Work Package 6, Task 6.2
Final delivery date: 09-03-2023

Deliverable version	v.04
Dissemination level	Public
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This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 824260.

Document Information

Project Acronym	+CityxChange
Project Title	Positive City ExChange
Project Coordinator	Annemie Wyckmans, Norwegian University of Science and Technology
Project Duration	1 November 2018 - 31 October 2023
Deliverable Number	D6.2: Bold City Vision 2050 for each FC
Dissemination Level	PU-Public
License	CC-BY4.0 Creative Commons Attribution, except where otherwise noted. https://creativecommons.org/licenses/by/4.0/
Status	Completed
Due Date	31-04-2022
Work Package	WP6 – +Followers
Lead Beneficiary	ISOCARP
Contributing Beneficiaries	MAI, MP, SB, SMO, VÕRU

Revision History

Date	Version	Author	Substantive changes made
07-02-2022	v.01	Johnathan Subendran (ISOCARP); Gisela Garrido Veron (ISOCARP)	FIrst draft of the deliverable
10-01-2023	v.02	Taliah Dommerholt (ISOCARP); Alexandru Muresan (MAI); Tudor Drambarean (MAI); Miloš Prokýšek (MP); Siim Meeliste (VÕRU); Borislava Spasova (SMO); Andy Bäcker (SB); Samir Amin (ISOCARP)	Contributions of the processes and implementation by all cities, added detail, summaries and conclusions
21-02-2023	v.03	Taliah Dommerholt (ISOCARP)	Integration of QA comments
09-03-2023	v.04	Taliah Dommerholt (ISOCARP); Samir Amin (ISOCARP)	Final Edits

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List of Acronyms

ANERGO	Alba Energy Observatory
BCV	Bold City Vision
eMaaS	e-Mobility as a Service
ESCO	Energy Service Company
ESIF	European structural and investment funds
ETS	EU Emissions Trading System
EUCF	European City Facility
EV	Electric Vehicle
FC	Follower City
GIS	Geographic Information System
ICT	Information and Communication Technologies
IoT	Internet of Things
LHC	Lighthouse City
nZEB	Nearly zero-emission building
PEC	Positive Energy City
PED	Positive Energy District
PEB	Positive Energy Block
PV	Photovoltaics
RES	Renewable Energy Sources
SDGs	Sustainable Development Goals
SEAP	Sustainable Energy Action Plan
SECAP	Sustainable Energy and Climate Action Plan
SMEs	Small Medium Enterprises
SUMP	Sustainable Urban Mobility Plan
U4SSC	United for Sustainable Cities

Executive Summary

In working towards climate neutrality, urban decision-makers and planners must contend with a number of available aims, strategies and technologies. With many ideas of how to address issues of energy generation and consumption, such considerations have entered a space of political absorption and practical roll-out. Still, the alignment of developments and long-term climate neutrality visions is a challenge for policy makers and practitioners. To address such challenges, a process of goal setting and planning is proposed, through the development of Bold City Visions (BCVs). BCVs enable policy makers and practitioners to feasibly consider how to reach climate neutrality, through common energy efforts and the establishment of Positive Energy Districts (PEDs). The process considers the long-term roll out of solutions, over various generations and scales, with reflection on how to do so and the development of roadmaps to inform future planning and execution.

This deliverable demonstrates how the +CityxChange Cities of Alba Iulia, Smolyan, Võru, Písek, and Sestao have utilised the BCV Framework to create visions for their cities. It serves as a collection of visions across these cities, and a reflection on the processes and value of utilising the BCV Framework. The BCV Framework was employed in the +CityxChange project to help Lighthouse Cities and Follower Cities in their design and construction of energy neutrality visions. This report outlines the process by which each city developed their BCVs, understanding the key stages and methods of enactment that led to their development. Each BCV for the five Follower Cities, constructed by municipal representatives in each city, is presented, outlining planning processes, implementation roadmaps, guidelines for deployment and monitoring of process. A reflection is then made on the process and outcomes of building BCVs in this project.

The value of the Bold City Vision process is highlighted at multiple points throughout the report, in its ability to make tangible that which is often abstract and seemingly unattainable. It connects localised strategies and activities to emergent ideas and technologies in pursuit of climate neutrality. It also allows for governors to merge national and international goals and targets with local policy-making. The BCV process is one that draws in many various actors and shares the responsibility of information sourcing and encourages co-creation and co-development of solutions at a city level. The BCV also aids in the consideration of scale, political will and temporal changes in the creation of realistic and attainable visions for climate neutrality, through common energy solutions.

In the deployment and replication of the BCV process, the value of careful consideration of purpose and design are crucial to producing usable outputs. A diversity of actors should be drawn into the BCV process, including politicians, law-makers and citizens, and co-creation should be encouraged to produce mutually beneficial results. The BCV process is inherently a malleable and adaptable one, able to fit multiple contexts and political landscapes. This, however, does imply that replicating BCV construction should consider consistency and how BCVs may feed into one another, especially under broader national and international planning banners.

1 Introduction

This deliverable is a compilation of five individual reports, one from each Follower City (FC) (Alba Iulia, Romania; Písek, Czech Republic; Võru, Estonia; Smolyan, Bulgaria; and Sestao, Spain), detailing the development and implementation of the FC's Bold City Vision (BCV). The purpose of a BCV is to set goals for achieving climate neutrality, enabling a common energy market and establishing Positive Energy Districts (PED) that can then be replicated for large-scale impact. For each FC, the BCV 2050 includes an integrated planning process, implementation roadmap, and guidelines for deployment, monitoring and continuous improvement of the process. The BCVs are embedded in the unique policy context for each city, as well as other ongoing strategic transitions.

In this document, FCs present their BCVs, including well-integrated innovative strategies based on the specific urban, technical, financial, and social aspects relevant to each city. Using the Lighthouse Cities (LHCs) and their BCVs as examples, the Follower Cities (FCs) document what they as urban authorities need to do in order to enable the creation of a Positive Energy City by 2050, and how they can develop lasting infrastructure, together with local stakeholders. The Visions are aligned within a digital roadmap that identifies the targets and milestones for co-creating and implementing the BCV, including the necessary investments for achieving such a vision. The visions and roadmaps reinforce each other by using open innovation and helping to avoid duplication within municipal bodies, thus limiting costs and effort of implementation. This task demonstrates how the FCs, together with a range of local stakeholders, can co-create a vision for the future and employ a range of resourcing and funding mechanisms for the implementation, replication, and scaling up of solutions to social, economic, physical, and environmental issues. This is guided by the overarching goals and ethical standards set in the Sustainable Development Goals (SDGs) 2030[1].

The report builds on *D3.1: Framework for Bold City Vision, Guidelines, and Incentive Schemes*[2], with influence from *D5.7 +Trondheim 2050 Bold City Vision and Guidelines* and *D4.7: Limerick 2050 Vision*[3], *Integrated Action Plan and Digital Guide*[4]. D3.1 is the starting point for the methodology, and this deliverable represents the continuation of D3.1 in practice. In D3.1, the BCV framework is presented as a tool that helps cities identify and address key opportunities and actions on their way towards becoming smarter and more sustainable. D3.1 further elaborates upon guidelines for the BCV development, serving as a catalyst and trigger for the FCs. The transferral value, adaptability and level of scaleup of each city's BCV depends on their entrance point and ability to utilise the available information in their local context. The level of overlap with member states and their local conditions varies, so it is

[1] Sustainable Development Goals https://sdgs.un.org/goals
[2] D3.1 Framework for Bold City Vision, Guidelines, and Incentive Schemes (SDG City Transition Framework) https://cityxchange.eu/knowledge-base/framework-for-bold-city-vision-guidelines-and-incentive-schemes/
[3] D5.7 +Trondheim 2050 Bold City Vision and Guidelines (Vision for Sustainable Urban Transition) https://cityxchange.eu/knowledge-base/d5-7-trondheim-2050-bold-city-vision-and-guidelines-vision-for-sustainable-urban-transition/
[4] D4.7: Limerick 2050 Vision, Integrated Action Plan and Digital Guide https://cityxchange.eu/knowledge-base/d4-7-limerick-2050-vision-integrated-action-plan-and-digital-guide/

important to emphasise that the BCV is not a rigid concept with predefined steps and protocols, but it is flexible and open to possibilities to explore, regardless of the entry point. This adds value and experience, and ensures that if needed, the path can be redefined.

As outlined in D7.1: Approach and Methodology for Monitoring and Evaluation[5], the project KPI for Bold City Visions is that all seven cities will have their Bold City Vision, including guidelines, roadmaps and action plans, politically approved in their city. This is identified as KPI 6 for +CityxChange.

Throughout this report, including the attached BCVs in the annex below, some background information is repeated from the aforementioned reports, including D3.1, D5.7, D4.7, and D7.1.

1.1 Structure of this document

Following the introduction, this deliverable begins with an overview of the Bold City Vision Process (Chapter 2), including the framework and guidelines, methodology, and the role of co-creation and co-learning. To provide a succinct overview of the main progress and outcomes of each FC in implementing their BCVs, Chapter 3 briefly summarises each city's BCV and outlines current outcomes, future aims and processes of political approval. Chapter 4 discusses the outcomes of the BCV process, challenges and limitations, lessons learned, and replication and scalability. Each subsequent annex contains the detailed BCV of each Follower City: Alba Iulia (Annex A), Písek (Annex B) Võru (Annex C), Smolyan (Annex D), and Sestao (Annex E).

[5] D7.1 Approach and Methodology for Monitoring and Evaluation https://cityxchange.eu/knowledge-base/approach-and-methodology-for-monitoring-and-evaluation/

2 The Bold City Vision Processes

2.1 BCV Overview

The role of the Bold City Vision (BCV) is to set goals for city transformations, including PEDs in each city, with the potential for large-scale replication. This contributes to the creation of a Positive Energy City (PEC) by 2050 and is a means to co-create the future with citizens and stakeholders[6]. The BCV outlines plans to design, implement, replicate, and scale up PEDs, requiring FCs evaluate their own unique capacities and obstacles. Given the particularities of each FC, a combination of individual and collective exchanges were facilitated. Individual exchanges between cities and +CxC partners were to support the advancement of the visions for 2050, address context-specific challenges within their cities, and brainstorm ambitions that align with the development of PEDs, and eventually PECs. The development of the BCVs is completed with support of project partners but must ultimately be approved and adopted by local city councils. Collective exchanges between FCs have also occurred, to share knowledge, experiences, and support networks. Furthermore, a guideline was developed to assist the FCs in structuring the various components of the BCV into a logical narrative and attractive document for external approval (D5.7). As a result, the key aspects of the BCVs follow a general structure, as described below.

Each BCV includes a fully integrated planning process, realistic implementation roadmaps, and guidelines for deployment, monitoring, and continuous improvement of the process. The city must be constantly adapting to changing local, national, and global circumstances with input from citizens, community groups, local leaders, and industry partners. As such, the Bold City Vision uses evidence-based data and insights to make informed decisions on urban, technical, financial, and social aspects of future development pathways, guided by the overarching goals and ethical standards as set in the SDGs.

The development process of the BCVs is dependent on citizen engagement, co-creation, and citizen-driven open innovations, as well as engagement and cooperation with relevant stakeholders and partners. The BCVs begin with a city overview, providing a profile of defining characteristics, values, priorities, and capabilities. This includes a summary of the main trends and challenges experienced by each city, such as population change and climate stressors. To ensure that the Bold City Vision serves as a foundation and reference for future city plans and strategies, the work in +CityxChange is integrated into each city's municipal planning strategy, and further contextualised in European and global standards and objectives. A successful PED relies on innovative partnerships between stakeholders and employs a variety of tools and strategies, such as digital communication platforms and Citizen Observatories (T6.3) that facilitate co-creation processes. It also requires a solid

[6] D3.1 Framework for Bold City Vision, Guidelines, and Incentive Schemes (SDG City Transition Framework) https://cityxchange.eu/knowledge-base/framework-for-bold-city-vision-guidelines-and-incentive-schemes/

investment and resourcing plan, and an assessment of the necessary organisational/structural development that needs to occur within the municipality (T6.11).

2.2 Bold City Vision Framework and Guidelines

D3.1 introduces the BCV Framework as a matrix (Figure 1) to elaborate a city-specific roadmap for the energy transition and is the starting point for the work methodology. This deliverable represents a continuation of D3.1 in practice.

The framework sets out six main interlinked processes, each highlighting important considerations and opportunities for cities as well as for city partners, current and future. For each BCV, it is critical to begin with a policy review and revision, to ensure that policy objectives are in line with city evaluations. The framework includes six main interlinked processes: 1) standardisation, 2) policy development, 3) innovation partnerships, 4) organisational development, 5) citizen engagement, and 6) project development. These processes form six horizontal levels of governance that intersect with five vertical actions that serve as general steps to enable change: 1) engage, 2) design, 3) activate, 4) accelerate, and 5) support. As a matrix, this results in 30 sub-processes that highlight important considerations and opportunities for cities, enabling them to anticipate the multidimensional and complex transactions involved in change management. They are to be used at different organisational levels as guidance and to ensure the necessary elements are in place to carry out efficient processes, inform decision making and achieve the desired impact.

	Engage	Design	Activate	Accelerate	Support
Standardisation	Evaluation	Visualisation	Simulation	Funding	Sharing
Policy development	Review	Revision	Planning	Budgeting	Analysis
Innovation partnerships	Appointment	Linking	Collaborating	Prioritising	Portfolio management
Organisational development	Idenification	Leadership	Intrapreneurship	Self organisation	Twinning
Citizen engagement	Acknowledgement	Deliberation	Localisation	Connection	Amplification
Project development	Pitching	Prototyping	Delivering	Capitalising	Storytelling

Fig. 1.: The Bold City Vision Framework (source: D3.1[7])

[7] D3.1 Framework for Bold City Vision, Guidelines, and Incentive Schemes (SDG City Transition Framework)

Although each BCV is different, they include more or less the following information:

Table 1. BCV structure.

Section	Description
City overview	• General profile with defining characteristics, values, priorities, capabilities etc. • Context of the BCV (local, national, international) • Municipal overview and outline of the city's defining characteristics (e.g. population, location, heritage, economic activity, etc) • Main issues, challenges, threats. (e.g. population growth/shrink, climate change stressors - heat, flooding, etc.) • The city's assets and trends regarding climate neutrality

Vision & ambition for climate neutrality by 2050	• Related to global/european standards and city-specific policy frameworks (e.g. smart city policies/objectives)
	• What is the vision and ambition for 2050 of the city, and how will it be achieved? (including vision for climate neutrality)
	• How are the ambitions tackling local challenges and global agendas?
	• Alignment with EU policies and goals.
	  ○ Link to local environmental, social, economic and political challenges/trends of the city (relating to +CityxChange themes)
	  ○ Link to Sustainable Development Goals, New Green Deal and possibly other new initiatives like New European Bauhaus

Development process of BCV	• The process of shaping the BCV and how it grew from idea/proposal into possible strategic action • How has BCV been developed from a content perspective?, ie analysing challenges, public consultation, strategic visioning workshops • Role of citizen engagement, co-creation, and citizen driven open innovation/business development • Specific tools/methods used for citizen engagement and collaboration, ie crowd source data, workshops, events • Innovative partnerships (cross-sector collaboration with academia, businesses, NGOs) • The role of +CityxChange and the BCV in the context of the municipality ○ Relevance and influence +CxC has on the strategic visioning of the city

https://cityxchange.eu/knowledge-base/framework-for-bold-city-vision-guidelines-and-incentive-schemes/

Implementation	• How has the BCV been embedded in policy & city/european/global targets and within the city's overarching planning & management processes?
	  ○ Describing the process of strategic alignment of BCV with future urban development and existing planning frameworks/policy
	• Roadmap to 2050, specific actions taken along a timeline
	• Overview of:
	  ○ The means of gaining political approval
	  ○ Use of specific urban processes and tools
	  ■ Use of digital platforms
	  ■ Innovation Zones/Playgrounds/Citizen Observatories
	  ○ Role of citizen engagement & various democratic processes
	• How can you build a strong civil society platform and form public-private partnerships?
	• Investment & resourcing plan

Impact, Outcomes and Results	• Project development: tangible results, such as new technical infrastructure or changes to the built environment • Guidelines for deployment, monitoring, and continuous improvement of the process • How will results be embedded in social/cultural contexts? • What kind or organisational/structural development needs to occur? (creation of a core team, education of human resources, reshifting of internal priorities) • Communication strategies - what efforts will be made to communicate results?

Learnings, limitations, and next steps	• Potential for replication throughout the city/country
	  ○ How to share high potential solutions for large scale impact?
	• Potential hurdles and methods to overcome them
	  ○ Are there foreseeable compromises that will be made? How to avoid scaling down ambitions?
	• What needs to be done to enable success?
	• Lessons learned with regard to initial participation/citizen engagement, technology/innovative solutions, organisational development, financing, etc.
	  ○ How to connect to financial, social, and human capital needed for socio-technical interventions?

2.3 Methodology

To have a clearer picture of the steps to be followed in order to successfully prepare the Bold City Vision 2050 for each FC, the process was divided into 3 main stages: 1) Preparation: ideation & initiation 2) Evaluation & analysis, and 3) Visions & ambitions: BCV formulation & implementation of roadmaps. These stages served as rough guidelines–each city also had the autonomy to determine how best to conduct its methods throughout the process of BCV development. Qualitative methods were used to support the development of the BCVs throughout each of the stages. In addition to the scoping and on-the-ground research that occurred in each city, cities were able to use insights gained from storytelling and peer-to-peer learning sessions. Further information and methods were learned during Climathons and citizen engagement events, to understand key stakeholder populations and their desires and demands.

2.3.1 Preparation: Ideation & initiation

For each city, the initiation process of the BCV required detailed brainstorming sessions and workshops in which cities identified urban challenges and their potential solutions. This was based on an overview of the city, including its defining characteristics, values, priorities and capabilities. In this stage, it is critical to align project ideas on Positive Energy Districts and cities with sustainable development goals in such a way as to structure each city's trajectory and ambitions. It is useful in this stage to provide references to other strategic city documents, to help inspire the FCs in developing their own BCVs. This stage also required an analysis of main issues, challenges and threats; common examples include population growth/shrink and climate change stressors, such as rising temperatures and flooding.

This stage began with the formation of the working group. Together with each municipality a working group consisting of municipal staff and consultant expertise from ISOCARP was established. This phase was divided into several main steps:

- *Appoint BCV coordinator for each FC.* The strategy coordinator within each FC has a central role throughout the process. They lead the process within the municipality, coordinate work and activities of working groups, and are the main points of contact with ISOCARP.
- *Set up the operational structure*. The operational structure was formed by ISOCARP and the partnership team within the FCs. Each municipality partnership team should have: 1 project coordinator, municipality staff, relevant stakeholders and, if necessary, external experts within its administrative territory. Due to the complexity of compiling a city vision, the municipality staff and the stakeholders ideally came from different sectors (e.g. infrastructure, environmental, social issues, etc.).
- *Roles and responsibilities.* Each FC municipality is responsible for the following activities: data collection; organisation and facilitation of field work; data retrieval to AutoCAD/Geographic Information System (GIS) or other formats; active participation on the visioning process; presentation of BCV2050 components in front of the public as defined at each stage; facilitating communication with other public

institutions, businesses, citizens and stakeholders; publication of necessary documents; ensuring that the BCV is aligned with other municipality plans; and sending BCV2050 to the approval stages and ensuring its legitimacy. ISOCARP is responsible for: participating in fieldwork and gathering information whenever possible and necessary; building the database and populating it with data; drafting the proposal for the BCV2050; preparing presentations for public & municipal consultations; reviewing documents/maps according to comments from the quality assurance team; communications between parties.

- *Consider engaging external experts from each municipality.* External experts can provide experience and expertise that is lacking in the municipality and help build capacity. External experts have mainly complementary roles.
- *Ensure political commitment.* This is necessary to ensure the legitimation of the BCV. The greater the consensus between political parties and stakeholders, the more successful the strategy is likely to be. Briefing the Mayor and the Municipal assembly and ensuring their participation in the process is a task undertaken by the BCV coordinator for each FC.
- *Stakeholder analysis.* In order to set-up an appropriate operational structure for the BCV, a stakeholder analysis is necessary. Relevant stakeholders should be regularly consulted during the BCV process.
- *Publicity campaign.* Citizen participation is an important element throughout the process of the BCV. To ensure that the process is as transparent as possible, it is necessary to use a variety of communication channels and tools. This enables knowledge dissemination and gives citizens the opportunity to participate.

2.3.2 Evaluation & analysis

The preparatory phase was followed by the evaluation and analysis stage, which aimed to build an understanding and contextualization for the project. This stage defined the basis for the continuity of work in drafting the BCV. The vision, strategic objectives, and all other proposals are formulated on the basis of a thorough analysis of the territory and its components.

For this phase, FCs conducted literature reviews of main planning and environmental strategies and policies (national, regional, local), in order to have a clear understanding of the overarching context. This is important in order for the BCV to be in compliance with already produced visions and plans for the city, to develop a common understanding of the amount and quality of information that is available, and to agree on the activity plans and responsibilities of each party. Cities were also encouraged to list potential institutions and partnerships. Also in this second stage, cities conducted an analysis to assess the external environment which influences the municipality, looking at political, economic, socio-cultural, technological, and legal factors.

For each FC, it is important to analyse the institutional context in the local and national political environment, in order to understand the motives behind planning actions and best assess how to incorporate positive energy designs into existing urban development plans.

The aim is to understand and analyse key challenges and opportunities, and then synergise these findings into a detailed plan.

2.3.3 Vision & ambition: BCV formulation & roadmap implementation

The third stage involves developing the municipal vision, including its objectives and priorities. This is informed by trends and estimates gained from the initial analyses and stakeholder engagements. In this stage it is also important to develop indicators to measure performance, using KPIs that make sense in a global context and can link the BCV to the SDGs. This is followed by Bold City Vision implementation roadmaps, which includes an implementation agenda outlining the main steps needed to realise the vision.

To formulate the BCV, it is important to understand how each FC can develop a trajectory based on the evidence gathered from explorations into local challenges and environments. With an understanding of the projected future, as well as the desired future, it is possible to combine the vision for the city with the goals of +CxC, especially related to Positive Energy Districts and cities. From this, the vision statements can serve as a way to guide urban development and innovation in each FC. The BCVs should be supported by ambitions that can help to manifest and materialise the vision into concrete actions that are capable of addressing local challenges. Ambitions should also be accompanied by measurable indicators that help the FCs to monitor progress.

2.4 Co-Creation and Mutual Learning

Co-creation is vital for the success of the BCVs for each FC. There are many ways to involve stakeholders in their respective cities and enable different groups and individuals to help inform the decision-making process. As discussed in the methodology, each city carried out their own stakeholder engagement activities that were either directly related to the BCVs or related to other +CxC activities, such as the Climathons to help gather insights and formulate ideas. It was critical for each city to understand the attitudes of certain stakeholder groups and their perspectives on the future of their city, and such information was then used to frame the vision. In co-creation with the citizens, the BCV process tested how to enhance current practices to reach and engage citizens of all ages, communities, stakeholders, industry partners, and local leaders.

BCVs for each FC also relied on collaboration with +CxC project partners, and coordination of events such as storytelling events and learning sessions, both intra-project and within their city networks. Lighthouse Cities have played key roles in leading the way for BCV creation and contributing to its continued development, so that the BCV process is continuous and evolving.

3 BCV Implementation per Follower City

To provide a succinct overview of the main progress and outcomes of each FC in implementing their BCVs, this section briefly summarises each city's BCV and outlines current outcomes, future outcomes and processes of political approval. The following subsections are divided per each FC.

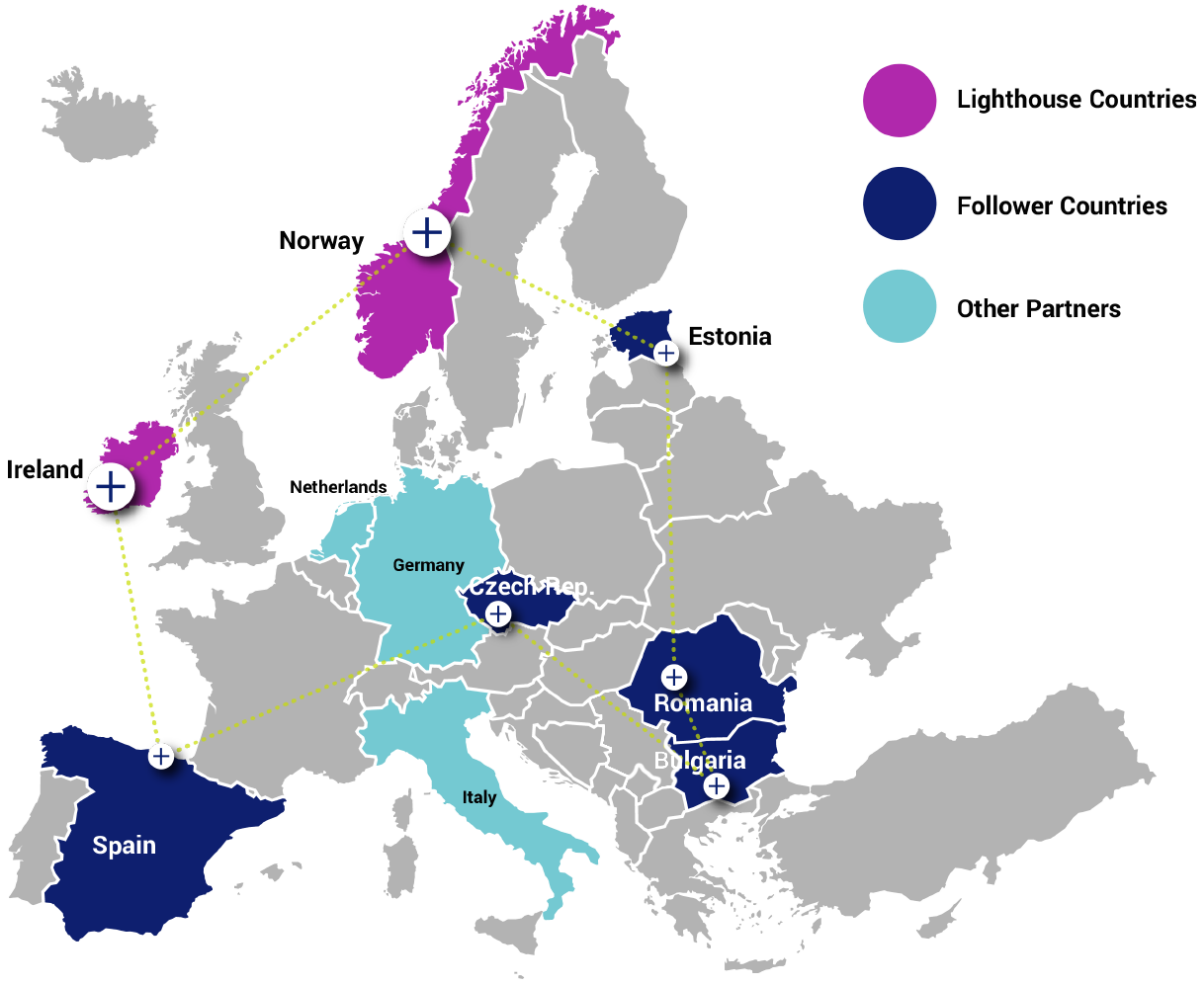

Fig. 2: +CxC map, highlighting the follower cities in dark blue.

3.1 Alba Lulia

The city of Alba Iulia aims to be a healthy and sustainable city by 2050, striving to become Romania's first Positive Energy City. Through the Bold City Vision strategy, the city of Alba Iulia aligns with the recommendations proposed by the United Nations via the Sustainable Development Goals (SDGs). The ambitions and objectives assumed within Alba Iulia's BCV plan are also strongly correlated with EU energy policies regarding energy efficiency, usage of renewable energy sources, energy poverty eradication, connectivity, sustainable communities and circular economies. Therefore, the strategy can be considered by the

local administration as a guide for actions and policies in the field of energy, backed by EU recommendations, that will eventually lead to the carbon neutrality of the city.

From a holistic perspective, the development vision for Alba Iulia outlines an inclusive, open, and Smart city, truly prepared for achieving carbon neutrality by 2050 . Alba Iulia aims to become a territory where strategic urban management facilitates growth, and improves living standards and competitiveness. The city also aims to become an area where urban quality, with its various facets, attracts and maintains local and foreign businesses, as well as a talented workforce, a place where jobs are created and promoted through different forms of sustainability, coherent and resilient development, in accordance with the European Union's territorial and urban policies. Of course, all areas mentioned above and not only are and will be part of the energy transition ecosystem.

The strategic objectives contributing to the achievement of Alba Iulia's vision are:

- Alba Iulia – A SMART, accessible, and coherent city; - Smart City Strategy City of Alba Iulia 2021-2030[8]
- Alba Iulia – A GREEN city with efficient public services; - Action Plan for Sustainable Energy - Alba Iulia[9]
- Alba Iulia – A COMPETITIVE and CREATIVE city; - Integrated Urban Development Strategy 2021-2030[10]
- Alba Iulia – A European CULTURAL and TOURISTIC OBJECTIVE.

The Municipality of Alba Iulia has made a strong political commitment to the energy transition, with a view to supporting the European society's coordinated response against the effects of climate change. To this end, the Municipality joined the "Covenant of Mayors" in 2010, a program promoted by the European Commission to help cities reduce their carbon footprint. The main document underlying the Covenant of Mayors is the Sustainable Energy and Climate Action Plan (SECAP), which was drawn up by Alba Iulia City Hall in collaboration with the Alba Local Energy Agency (ALEA). The SECAP provides the basis for the Municipality's energy policies for the next 10 years, with the reference year for emissions (GHG) set at 2008 values. In 2016, new Energy and Climate targets were agreed upon, which led to the extension of the Covenant of Mayors' framework for sustainable energy planning to 2030, with a goal of reducing CO2 emissions by 40% by 2030. Alba Iulia's perspectives, as outlined in the "Integrated Urban Development Strategy of Alba Iulia Municipality 2014 - 2023," are reflected in the energy component of the Integrated Urban Development Strategy 2021-2030, as well as the Action Plan for Sustainable Energy 2030 and the Bold City Vision Plan 2050. The latter was developed with the full support of local authorities and is strongly aligned with the sustainability strategies being implemented by the Municipality.

[8] https://www.apulum.ro/images/uploads/fisiere/Strategia_Smart_City_a_Municipiului_Alba_Iulia_2021-2030.pdf
[9] https://www.apulum.ro/images/uploads/fisiere/PAEDC_Alba_Iulia_FINAL.pdf
[10] https://www.apulum.ro/index.php/primaria/detail/comunicat-privind-strategia-integrata-de-dezvoltare-urban-sidu

The main processes and stages of Alba Iulia's Bold City Plan emerged over a period of 2 years as the result of consultations with local political leaders, key stakeholders and the local community involved in city planning and development. The key to the BCV plan is to work with the collective intelligence of many stakeholders and for those organisations to recognize that their future prosperity cannot be secured merely through what happens within their boundaries. The city context in which they operate is the key for achieving the proper synergy.

The AIM's Bold City Vision Plan was built from a solid data set that at the time defined the current situation of the municipality in relation to the energy transition process. Meanwhile, the markets, the policy context as well as the energy security principles at the European and national levels were subjected to a 180 degrees turnout which affects the ability of local authorities to develop and implement clean energy initiatives. Nevertheless, history has taught us that one of man's most special skills is his and her adaptability to various environments and living conditions therefore several solutions have been identified. The five components of Alba Iulia's BCV can be seen in Figure 3 below.

Fig. 3: Bold City Vision Plan Ambitions

Keeping in mind the worldwide context and present economic volatility, the BCV Plan is designed based on a modular approach that will be periodically adapted to the current needs of the city and its citizens. It integrates processes linked to accounting for and including city officials, citizens, business partners, and other stakeholders as part of an integrated set of guidelines for managing a societal transition towards smarter and more sustainable cities.

The Alba Iulia City Hall is currently in the process of ratifying the Bold City Vision Plan 2050. This involves seeking approval from both the National and European Funding Department before presenting the plan to the Mayor for final sign-off and approval. Once the plan has been fully ratified, it will serve as a blueprint for achieving the city's goal of becoming carbon net zero by 2050.

Overall, Alba Iulia takes a holistic approach to the formation and implementation of the Bold City Vision. The complexity of the city's Bold City Vision Plan requires the involvement

of the local and regional administrative and executive apparatus. Starting from the Mayor's office, which is responsible for coordinating and providing the final review of the document, the BCV is the result of cooperation between all the experts working within Alba Iulia's administrative and executive departments. Stakeholder engagement is also key to the city's BCV. The stakeholder engagement plan is a main component of Alba Iulia's Bold City Vision plan, identifying the strategies and actions required to promote active involvement of stakeholders in decision-making, execution and monitoring processes.

3.2 Písek

Písek's BCV presents an extensive and detailed vision focusing on environmental effects in the city. The vision for Písek takes a focus on community involvement in sustainability developments and orients itself around solutions for climate mitigation and adaptation, that provide benefits for residents. The main targets for 2050 are related to reducing energy consumption, ensuring the use of renewable energy, increasing urban greenery, and climate change mitigation. The driving force behind Písek's is the interconnection of Sustainable Development Goals (SDGs) and climate change mitigation and adaptation. Preparing to cope with the consequences of climate change and reducing greenhouse gas emissions are at the forefront of the city's BCV.

The main thematic areas of focus contained in Písek's BCV are:

1. Efficient energy management and creation of Positive Energy Blocks / districts
2. Citizen Engagement
3. Sustainable transport and mobility
4. Písek, city for business
5. Climate resilience of the city and environmental education

The BCV of Písek outlines a detailed and specific series of implementations that work towards the overall goals of the city. Through a combination of parallel interventions, the city hopes to reach its goals for a Bold Písek. The strategies presented in Písek's BCV range across a variety of scales and thematic areas, and represent a modular design of the vision, with multiple smaller actions forming the bulk of movement towards end goals. At the current stage of development, energy management has been upscaled within the city administration, with specific plans created for the renovation of municipally owned buildings. The creation of Positive Energy Blocks is slightly stunted by legal obstacles, however the plan outlines how such obstacles are being managed. Citizen engagement activities are well underway and several information campaigns and workshops have been completed successfully. Many plans have been outlined for sustainability transport and mobility, such as the introduction of electric vehicle fleets, modification of public transport systems and promotion of bicycling. Such plans are currently under development and yet to be physically introduced. Actions towards climate resilience focus on broader connection with EU and UN programs bringing new ideas to the city. A strong focus here is placed on bringing citizens (specifically younger people) into conversations regarding climate resilience, with a number of outreach activities performed or planned.

The creation of the BCV in the city of Písek has inspired other side-projects that address partial problems that we identified in the preparation of the BCV and feasibility studies. The first is the SECAP (Sustainable Energy and Climate Action Plan), which is now the main and only document setting climate targets. Its sub-sections are also included in the BCV. The second major project is the introduction of energy management, which has systematised the monitoring and development of energy-related measures on the assets of the city and its constituent organisations. In the transport sector, a complete emission-free public transport and a bike sharing system were introduced as part of a Sustainable Mobility Plan. Partial energy measures will start to be implemented this year (PV development). Energy-relevant buildings have been included in evidence-based programs in the past and are being systematically renovated to achieve higher energy savings. The Blue-Green Infrastructure Policy was also adopted last year as part of a Sustainable Greenery Plan.

From an energy perspective, the deployment of energy management software and ISO 50001 certification occurred in 2022. A side effect was the training of relevant staff, thereby raising awareness of energy issues at all levels of the city and its organisations. The implementation documentation for the installation of a PV plant at the J.K.Tyl Primary School was also completed. For the next four years, EUR 100,000 is earmarked in the city budget each year for other renewable energy projects. In the next 3 years, the replacement of lighting in all primary schools will be completed. Smart metering equipment has been purchased and will be gradually deployed on the city's buildings and operations with an expected completion by 2025. The gradual change in legislation will allow for more development of community and municipal energy.

In the area of citizen engagement, the concept of Citizen Engagement Week has been developed and already been done twice. A group on community energy has been created and we regularly communicate with it on the possibilities of implementing measures in this area. Some parts of the BCV have been reflected in sub-strategic documents such as the Sustainable Mobility Plan and the Sustainable Green Space Plan. A concept for a city-established organisation for renewable energy development and energy management has been prepared.

The BCV, as part of the project primarily led by the Smart Písek organisational unit, falls under the responsibility of the First Deputy Mayor. The First Deputy Mayor is also responsible for the energy sector. From the perspective of climate issues, the Environment Department, which has been involved in the preparation of the BCV, is also an important partner in the project. The BCV itself has not yet been politically adopted and is scheduled for adoption in April 2023. The adoption of the BCV at the political level has been delayed by changes in the city's leadership following the October 2022 elections.

3.3 Võru

In the governance structure of Võru the BCV sits at the very top of strategic planning as an overarching long-term vision for achieving carbon neutrality. The pace of change not only in the energy sector, but in society in general has been fast and the BCV is seen as an important tool to help avoid blindspots in strategic planning. The pace of creating and

approving the Võru BCV was quick due to political commitment: the decision to deliver a proposal to the local council (legislative branch) was taken by the municipal government (executive branch) and included a delivery date. This ensured that the document was delivered and approved on time.

The BCV for Võru is formulated around the premise of growing existing and attracting new businesses and number of active residents via addressing issues of environmental threat, healthy living spaces and technological development. The vision clearly outlines the need for cooperative efforts to tackle the consequences of climate change and reduce greenhouse gas emissions. At the same time, the vision highlights the importance of community protection and integrated ideas of resilience both relating to social strength and adaptation to changing climate effects. The vision focuses on three areas: viable business, sustainable and living environment, and community services and smart governance (Figure 4).

Fig. 4: Vision of the sustainable city of Võru in 2050 areas

Viable business refers to a promotion of local enterprise, particularly focused on the improvement of life quality, public space, modern business infrastructure, public services and leisure opportunities. A sustainable and living environment refers to infrastructural sufficiency in providing quality living, transportand and healthy spaces for residents. Simultaneously, this refers to the protection of the environment and promotion of climate friendly infrastructures. Community services and smart governance refers to the

interactions of leaders with residents, in understanding and delivering high-quality public services based on the needs of the residents.

In its current stage, the city of Võru is implementing the BCV on two levels: on one hand it is considered as a vision document when short-term action plans (what is going to be done) and fiscal strategy (how the actions are financed) are compiled, and on the other hand it provides a basis and inspiration for specific action in various fields that the city operates in. The deployment and adoption of the BCV is secured through "hands-on" testing and approval by municipal representatives, leading to its incorporation into strategic planning processes as a visionary document.

Regarding specific action, Võru handed out for the first time a sustainable business award and is working towards the above outlined vision alongside local businesses on a case-by-case basis: for example assisting with budgeting various energy production options on site and developing a new industrial area in collaboration with the district heating company. On general planning of urban space the BCV is bringing in focus mobility and access topics and is a driver for co-design in these fields.

With regards to community services, a number of public amenities exist in Võru for residents for the whole human life cycle: education, extracurricular activities for the youth and seniors, and primary and secondary healthcare facilities, for example. The BCV of Võru outlines the main areas that need attention and outlines high-level actions on how to maintain and improve the number and quality of these services. The city, for example, is increasing the number of digitally accessible services, seeks to collaborate with the private sector in bringing higher education in IT to the city and is building out a public co-creation space to induce entrepreneurship, especially in youth..

3.4 Smolyan

BCV Smolyan 2050 contributes to the Municipality's long term policy efforts to achieve climate neutrality and sustainability. The successful implementation of the BCV will change the look of the city itself, renovating both private and public buildings, improving the urban environment, infrastructure, and the communication links within the region, and creating a hospitable and attractive environment for citizens, businesses and tourism. This is achieved while preserving the natural and cultural-historical value of the region. It will also help facilitate a change in how the Municipality engages with its citizens, building stronger connections and working together for the prosperity of the city.

Within the Bold City Vision 2050 strategy, the city of Smolyan aims to create a greener, cleaner, and more sustainable city through the use of smart positive energy solutions and digital services to improve the quality of life for and together with its citizens. Through the Bold City Vision Plan, the city of Smolyan aligns with the recommendations proposed by the

United Nation Sustainable Development Goals (SDGs) and the goals set in the European Green Deal[11].

Building on the BCV framework, Smolyan aims to develop long-term ambitions to achieve a more sustainable and green future for the city. The BCV outlines 5 main goals for the city, as seen below in Figure 5 (for further elaboration, refer to Annex D).

Fig. 5: Bold City Vision Smolyan 2050 main goals.

The 5 goals set in the BCV Smolyan 2050 are aligned with the National plan for recovery and resilience, National development program 2030, National strategy for sustainable tourism development, SECAP Smolyan 2030, and the Plan for integrated development of the Municipality 2021 – 2027. They reflect both the local challenges and needs, as well as the national roadmap.

The Bold City Vision Smolyan 2050 is created following national short-term and long-term strategies, local sustainable development plans, developed in accordance with the European net-zero emissions goals set in the European Green Deal and the SDGs. For the city of Smolyan, the BCV will serve as a guideline for future policies and strategic documents for the urban development of the municipality that extend beyond the year 2030.

BCV Smolyan 2050 is on its way to being ratified by the Municipal Council. Following the completion of the BCV report, it will be open for public discussion circa February 2023. After the internal process is completed, the Municipality will hold a public hearing to discuss the developed strategies and goals with the citizens and adjust them to incorporate the

[11] European Green Deal https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

public concerns. Once the BCV passes both processes it will be presented in front of the Municipal council which holds the authority to ratify it.

The BCV's main goal is to serve as a guideline towards a greener, more innovative and more future-proof Smolyan. It aims to provide an outline of the city's roadmap toward carbon neutrality in several key sectors, while the concrete implementation goals and priorities will be set in short-term programs and strategies, starting with the "Plan for integrated development of the Municipality 2021 - 2027", ratified by the Municipal Council in October 2022.

The process of developing the BCV included not only policymakers from the Municipality but also citizens of different ages, who were engaged through surveys and focus group meetings. This helped to identify broader topics of interest for the community and brought citizens' concerns and visions to the table. Two of the main goals in the BCV, Citizen Engagement and Developing sustainable urban environment are a direct result of these interactions. The process of the BCV has shown the importance of listening to local communities and proved that involving them more in policy development is beneficial for the successful implementation of the goals set by the municipality.

At the time of this report, Smolyan has designated three demonstration areas within the city suitable to become a PEB, but within the timeframe of the project only one PEB is likely to be achieved. The DPEB, currently in development in Smolyan, is located in DA1, the Old City Centre, and currently consists of three buildings: The Sports Hall "Velichko Cholakov", the City Swimming Pool, and the Training Stadium with Service building. There is also the potential to expand the project to include two more locations: Secondary School "Sv. Sv. Kiril and Metodi" and Public Kindergarten "Buratino". The procedure for the procurement of photovoltaics (PV) for the Sports Hall and the Municipal Swimming Pool has started and we are currently preparing the technical project and hope to complete the installation within this year.

The Municipality of Smolyan has participated in several national, bilateral trans-border and European projects regarding carbon neutrality, sustainability and adaptation to climate change. At the present time, the Municipality is also preparing for the new national programs related to implementation of energy efficiency measures in multi-family homes; administrative, cultural and sports buildings; buildings for educational services and care facilities as well as programs for the installation of RES for self-consumption. So far, it has successfully implemented EE measures in 40 multi-family buildings, all local kindergartens and the majority of schools within the city, including replacing the heating systems. The city has also installed four Electric Vehicle (EV) charging stations in the territory of the municipality and are in the process of switching to more energy efficient street lighting.

The municipality has undertaken a full review of all public buildings on its territory that need retrofitting and energy efficiency measures, and will shortlist the necessary interventions and then to continue on the road of developing more DPEBs within the city, expanding to include private residences and business. Recently, the Municipality of Smolyan was selected as one of the recipients of the European City Facility (EUCF) grant. The application was

inspired by the BCV and the concept of PEB, introduced through the +CxC project. Their ambition is to create a PED encompassing the administrative centre of the city, the Cultural Complex and the surrounding residential area, part of DA2. The measures include introducing EE measures and RES for the energy needs in a large number of public and residential buildings on the territory of the city, feasibility study on the possible development of smart grid and transition towards green public transportation. The grant will allow the city to create a detailed investment concept and to identify financing options for the project.

Regarding the city mobility, the municipality is currently in the process of developing its Sustainable Urban Mobility Plan which will provide the backbone for the transition towards green transport.

3.5 Sestao

The BCV framework, as part of the +CxC project, has acted as a catalyst for action in the city of Sestao, providing the structure and resources to come together and develop ambitions for the future.

The Sestao BCV was created in conjunction with *Agenda Urbana*[12], the local urban agenda, in order to reduce redundancy within the political process and increase the chance of getting official approval for the proposed measures. The development of the two documents was opened for citizen participation, resulting in an Action Plan that was unanimously approved across all political parties in the city council's plenary session at the end of July 2022. Together, the plan includes 24 projects aimed at making the municipality more sustainable. These are grouped together under ten Strategic Objectives:

1. Improve land management, including conservation and protection
2. Avoid urban sprawl and revitalise the existing city
3. Prevent and reduce the impacts of climate change and enhance resilience
4. Sustainable resource management and promotion of the circular economy
5. Promote proximity and sustainable mobility
6. Promote social cohesion and seek equity
7. Promote and favour the urban economy
8. Ensure access to housing
9. Lead and promote digital innovation
10. Improve intervention instruments and governance

Regarding physical implementation, a public tender is scheduled to be published in April of 2023 that will ask for bids (under an Energy Service Company (ESCO) model) for installing 8 energy communities, renovating Sestao´s exterior public lighting, installing electrical charging stations, incorporating e-vehicles into the municipal fleet, refurbishing public buildings to make them more energy efficient, and implementing a municipal energy monitoring digital platform. The public lighting will have a direct impact on the +CxC PEB areas. The energy communities will be less than a 1km away from the +CxC PEB areas and

[12] Agenda Urbana: https://www.sestao.eus/es-ES/agenda-urbana-sestao/Paginas/default.aspx

their produced electrical power will be consumed by the PEBs. The software platform will include the PEB areas. It is to be determined if one or more new charging stations will be connected to the PEB areas (at SB we already have one). The new municipal e-vehicles will circulate and conduct various activities inside the PEB areas.

Beyond the PEB areas, Sestao received a grant to launch a type of ´sustainable wikipedia´ for Sestao (to act as an initial pilot project and hopefully grow regionally and even internationally). This project is included in the BCV and is part of the Innovation Playground. The physical manifestation of this project is that, because of it, hopefully all types of retailers, SMEs, corporations, public entities, as well as citizens, within Sestao, will be implementing more sustainable solutions (including physical ones) in their professional, academic and lifestyle activities.

Sestao has been a Member of the Covenant of Mayors since December 2020. It created its first draft version of its carbon inventory (based on 2019 levels) and in October of 2022 it completed its SECAP (most likely aiming toward reducing its overall CO2 emissions at least 55% below 1990 levels by 2030 for the public sector).

4 Outcomes & Conclusions

Based on the BCV process a number of outcomes and conclusions can be drawn. This conclusion section reflects on the commonalities between Follower City BCVs, to outline the main results and findings of the process. Alongside the main outcomes, procedural challenges, lessons learned and considerations for replication and scaling are highlighted.

4.1 Outcomes of the Bold City Vision Process

The central outcome of the Bold City Vision process is that, as an activity, it enables feasible climate-neutrality strategies to be integrated into urban planning processes. The process of developing a Bold City Vision draws on various existing activities and engagements across a range of stakeholders and brings together heterogeneous elements into a realistic bigger picture. For many Follower Cities, the placement of the +CityxChange project and efforts to build PEBs and PEDs within broader urban strategies was reported to be helpful, in being able to envision practical outcomes and relate project activities to broader political processes. While aimed at climate action planning, the BCV framework can be employed as a tool to support the development of any strategy, as it takes an iterative 360 degree approach to strategy development that has both engagement at its heart, both internal (institutional) and external (public).

The Bold City Vision has also been reported to aid in the navigation of political processes, in the creation of long-term outlooks for energy neutrality. Due to the logical construction of BCVs and the substantiation of goals and actions, the process creates a compelling narrative for the integration of positive energy transformations into political decision-making. It enables political discourse relating to community driven energy generation and provides a structured format to engage a multitude of actors in the design of visions. This is especially important given the complexity of navigating processes of political approval. Embedding BCVs in local policy is critical to successful transitions.

The process of constructing Bold City Visions was also reported to help decision-makers consider scale in the design of visions and strategies. The timespan of proposed BCV formats prompted Follower Cities to consider broader (national and international) objectives relating to climate-neutrality. The BCVs are operationalised by aligning the implementation and roadmap schemes to existing planning and urban development frameworks both within the cities and in a larger EU context. In doing so, connection was made with targets that can sometimes appear disconnected from localised planning and intervention. The BCV process helped to actualise these broader objectives within a local context.

The Bold City Vision process also helped to lend material strategy to physical applications of the +CityxChange project. Uniform processes within the project were able to be adapted to the urban and societal conditions within Follower Cities. This helped many to better understand how +CityxChange activities may appear in their cities and enabled a process of understanding how long-term changes may be adjusted to the local context. The BCVs are

expected to have a lasting impact on local energy production and consumption. Ultimately, it aims to instigate paradigm shifts where decentralised, renewable energy systems adequately respond to energy demand.

4.2 Challenges and Limitations

While the benefits of the BCV process outlined previously are numerous, there are some limitations to the process that present challenges in pursuit of efficient and successful energy transitions. These largely come down to the changing of longstanding processes, both politically and within local communities, and the complexity of aligning BCVs with other strategic documents related to long-term urban development. While BCV development enhances practices of engaging in public consultations with a variety of stakeholders including citizens, communities, industry partners and local leaders, it can be challenging to determine appropriate use of language, means of communication, use of digital technologies, structure and process for developing ideas, and means of gaining approval from local decision-makers. Nevertheless, this process is vital in the development of effective plans for energy transitions. The complexity of consolidating the visions and ideas of different stakeholders into a consistent and impactful plan for urban development is in part a benefit in developing appropriate long-term plans.

The process of designing BCVs can help decision-makers to navigate political processes and engage with political figures to open discourse on energy transitions. When considering actual strategies within the BCV process, however, local law and regulations must be considered, especially with relevance to prosumer economies and retrofitting. In many cases, legal and regulatory obstacles come in the forms of steadfast rules that act in opposition to developing community-led energy generation. While the BCV process can allow for potential obstacles to be identified early, it is less adept at anticipating potential changes to processes that may arise from legal obstacles, and must therefore be open to adaptation and amendments. In this it is also important to consider the potentiality of political administration changes, in ensuring long-term energy transition goals are not interrupted.

As mentioned, a key group of stakeholders to navigate in the BCV process are local citizens. The complexity of BCV processes, in determining energy transition visions for cities, often means that it can be difficult to extensively involve citizens in every step of the process. The question that policymakers must grapple with is how can BCV processes and topics be better communicated, despite the complexity of the subject matter. Extensive citizen involvement in visionary activities can help to maintain civil support for enacted strategies and manage difficulties in political administrative changes. Citizens may also be able to direct innovative strategies in unforeseen ways, beyond the scope of decision-makers and governors. Increased citizen involvement in BCV processes aid in validity and reach.

A material challenge to BCV processes may emerge in the securing of adequate investment for planned activities. For many cities, budgeting of energy transition activities is a major challenge. While the BCV is rooted in designing logical strategies, it is often difficult to anticipate changes in the availability of funding. The feasibility of planned activities may then

be undercut by a lack of funding and insufficient preparation for such eventualities. A successful BCV needs to fully consider financing methods and potentials for collaborations with +CityxChange partners, internal and external stakeholders, to support activities throughout the visionary period.

The geopolitical context, including the current energy crisis, has created a multitude of challenges and problems throughout Europe and the world. This creates high levels of unpredictability across markets, meaning that many initial assumptions made during the BCV process were subject to change, leading to significant modifications in the final outcomes. A major challenge for the Follower Cities, therefore, was adapting their BCVs to accurately reflect changing conditions.

4.2.1 Covid-19 impact

Here a note is given to the fact that the Covid-19 Pandemic has had a significant impact on the preparation of plans and strategies for BCVs. The timelines of BCV processes were delayed, due to a variety of phenomena attributable to the Covid-19 pandemic. Impacts of staffing, urgent societal actions and reduced organisational capacity all contributed to delays in the process. Originally, there had been plans to organise workshops in each city to assist with BCV development, but unfortunately these were not able to be held in person. The impacts of the Covid-19 pandemic however, while disruptive, did enable the adoption of digital engagement tools that created new modes of organising work. In some areas, the continued use of such tools may aid in processes similar to that of constructing BCVs.

It should also be recognised that given current global occurrences, similar disruptions to BCV (and other energy transition) processes may well occur. This is potentially something to be acknowledged and planned for, to the best of one's ability.

4.3 Lessons Learned

4.3.1 Learning from Lighthouse Cities

The Follower Cities in the +CityxChange project build on the Bold City Visions of the two Lighthouse Cities, Trondheim Kommune in Norway and Limerick City and County Council in Ireland. Trondheim's primary goal is to create a city that is happy, healthy, and regenerative. For Limerick, the key goal is the growth of Limerick and the surrounding region to be a Tier 2 city in order to maximise the economic, social, cultural and environmental opportunities for the city. Both cities place citizens at the centre of their efforts, providing comprehensive guidelines and overviews of best practices and strategies for achieving the SDGs and becoming energy positive cities. A number of joint exchange and learning sessions took place between LHCs and FCs as part of WP9 (D5.9[13]). A key take away from these exchanges was that while local contexts can vary, similar structures must be in place to design a successful vision and associated guidelines.

[13] D5.9 Playbook of regulatory recommendations for enabling new energy systems https://cityxchange.eu/knowledge-base/d5-9-playbook-of-regulatory-recommendations-for-enabling-new-energy-systems/

The guidelines from the Trondheim BCV stress the need for evidence-based SDG policy, political commitment, SDG-budgeting, and multilateral partnerships as enabling factors for cities to become energy positive and achieve their sustainability goals (*see* D5.7: +Trondheim 2050 Bold City Vision and Guidelines (Vision for Sustainable Urban Transition) [14]). Furthermore, Trondheim has outlined the following recommendations and reflections:

- Start early with legislative/legal dispensations if needed, especially when dealing with technological interventions
- Work parallel with innovations and solutions; do not wait to develop and test interventions
- Recognise and harvest the value from solutions as they present themselves; these provide evidence and incentives to engage
- Review, evaluate, and target commitment and alignment to steering documents
- SDGs elevate the energy work; these are legally binding and enable work on energy specific solutions, so it is important to align with these
- Map stakeholders and partners for collaboration
- Seek knowledge and networks

In the Limerick process we learned that the process of policy development needs to be viewed as an innovative and iterative process that focuses on achieving and progressing agreed goals (*see* D4.7 Limerick 2050 Vision, Integrated Action Plan and Digital Guide[15]). The BCV framework provides a way to integrate actions across a number of processes that can connect policy formulation through development and into action. Because the BCV is constantly a work in progress, it can be adapted and co-created as the context evolves.

4.3.2 Learnings between Follower Cities

There are many important takeaways from the Bold City Vision process in the Follower Cities. BCVs are ambitious and comprehensive city visions that form the basis for transitioning to climate neutrality. Developing the Bold City Vision Plan was a complex task that required multi-creational processes, community engagement, and several design stages.

The first lesson learned throughout the BCV development process is that a continuous monitoring process is more important than the strategy itself. The monitoring process needs to be employed from the initial stages and must be kept active throughout the development of a strategy. This way, the accuracy of the used data will be maximised. The BCV must also be embedded into the larger political context, in order to better ensure its feasibility and relevance.

Another important lesson learned is that the inhabitants of the city must be at the heart of the development of such a strategy, in addition to other stakeholder groups such as key

[14] D5.7 +Trondheim 2050 Bold City Vision and Guidelines (Vision for Sustainable Urban Transition) https://cityxchange.eu/knowledge-base/d5-7-trondheim-2050-bold-city-vision-and-guidelines-vision-for-sustainable-urban-transition/

[15] D4.7 Limerick 2050 Vision, Integrated Action Plan and Digital Guide https://cityxchange.eu/knowledge-base/d4-7-limerick-2050-vision-integrated-action-plan-and-digital-guide/

industry actors and urban authorities. Consistent citizen engagement throughout the BCV is imperative to the development of a successful city. Since sustainability is linked to every aspect of society, efforts must be adequately integrated and respond to the needs and desires of those most impacted.

The BCV on its own is just a vision—to result in direct environmental and social benefits, the Vision and roadmap must be implemented. This requires strong leadership and access to resources, including comprehensive financing schemes. Community leaders are responsible for leading citizen and stakeholder engagement, enabling co-creation throughout the BCV process and in future iterations over time. In order to help this vision to become reality, the transformation process also needs to have the appropriate resources (human, technological and financial). This transformation is not a one-off process but rather a constant cycle of supply and demand of information that requires a macro "visionary" perspective that is also grounded and operational. It is important to include key stakeholders throughout the process and find creative ways to keep them engaged and invested.

A significant challenge for all cities in establishing their BCVs is that they must contend with local politics. While many municipalities have expressed interests in favour of the BCVs, getting official approval is an arduous and somewhat uncertain process that is dependent on the current state of government affairs, especially regarding elections. This can be quite a challenge, especially when aligning local decision-making processes with larger global goals and targets. It is therefore necessary to align the BCV with the larger political context and coordinate the vision with other strategic documents.

Finally, it has become evident throughout this process that flexibility and objective assessments are the key to success in such an unpredictable time. In order to ensure success, municipalities must diversify financial instruments and develop investment portfolios that can support urban development plans.

4.4 Replication and Scalability

Reflecting on the outcomes and learnings from the BCV process, in +CityxChange, a number of considerations emerge for the replication and scaling of activities. The strength of the BCV process is that its malleable nature means that cities can adapt and customise the content, to fit their specific context and political landscape. This helps to bridge the gap between international and national agendas and local policy making. The malleable nature of the BCV process, however, does create some complexities in its execution, largely in that aligning multiple BCVs can be difficult when they are structured so differently. This is especially important to consider in the scaling of BCV processes. If multiple cities were to produce BCVs and these were to be collected in alignment with national goals and agendas, being able to easily compare and combine visions would streamline such a process. There is a fine balance of maintaining a flexibility to BCV construction, and making outcomes uniform when useful to the context. This balance should be considered in replication, especially across multiple scales. The lasting message is that the design of BCV processes

should consider the end to which the visions are most useful, and the relative importance of malleability vs consistency.

From the experiences of the LHCs and FCs in creating their BCVs, a number of considerations also emerge, relevant to the replication of BCV processes for cities. These largely touch on the complexity of the process and organisation of contributors. In replication, it is advised that the BCV process be initiated as early as possible. This helps to ensure that the information expressed in BCVs is aligned with current visions for urban development. It also allows for consideration of stakeholder involvement in the process, to identify crucial information sources that could help in the construction of realistic and attainable BCVs, especially in navigating legal complexities. In the construction of BCVs, the format of outputs is also crucial to consider. Alongside understanding who should be involved, understanding for who this information is most useful is essential. Not only does it help information to be tailored to target areas, but it also opens deliberation on the format of outputs. The presentation of outputs should work towards the goals expressed within BCVs and as such, expressing information in transmedia formats could aid in the reception and understanding of contents.

For both LHCs and FCs, the action they will take following the closure of the +CityxChange project will at many points refer to the contents of the BCVs. Their production and alignment with political, legal and societal trends may prove crucial in the development of future plans for climate neutrality. The documents made and reflected on in this document serve to aid in the roll out of practical changes and the development of urban spaces that will work towards better cities and a better climate.

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Annexes

The annexes to this report contain the full Bold City Visions for each Follower City. This work was completed by members within each Follower City and is structured according to city-specific formats. Some re-ordering of information has been done for ease of reading.

Annex A: Alba Iulia - Bold City Vision 2050

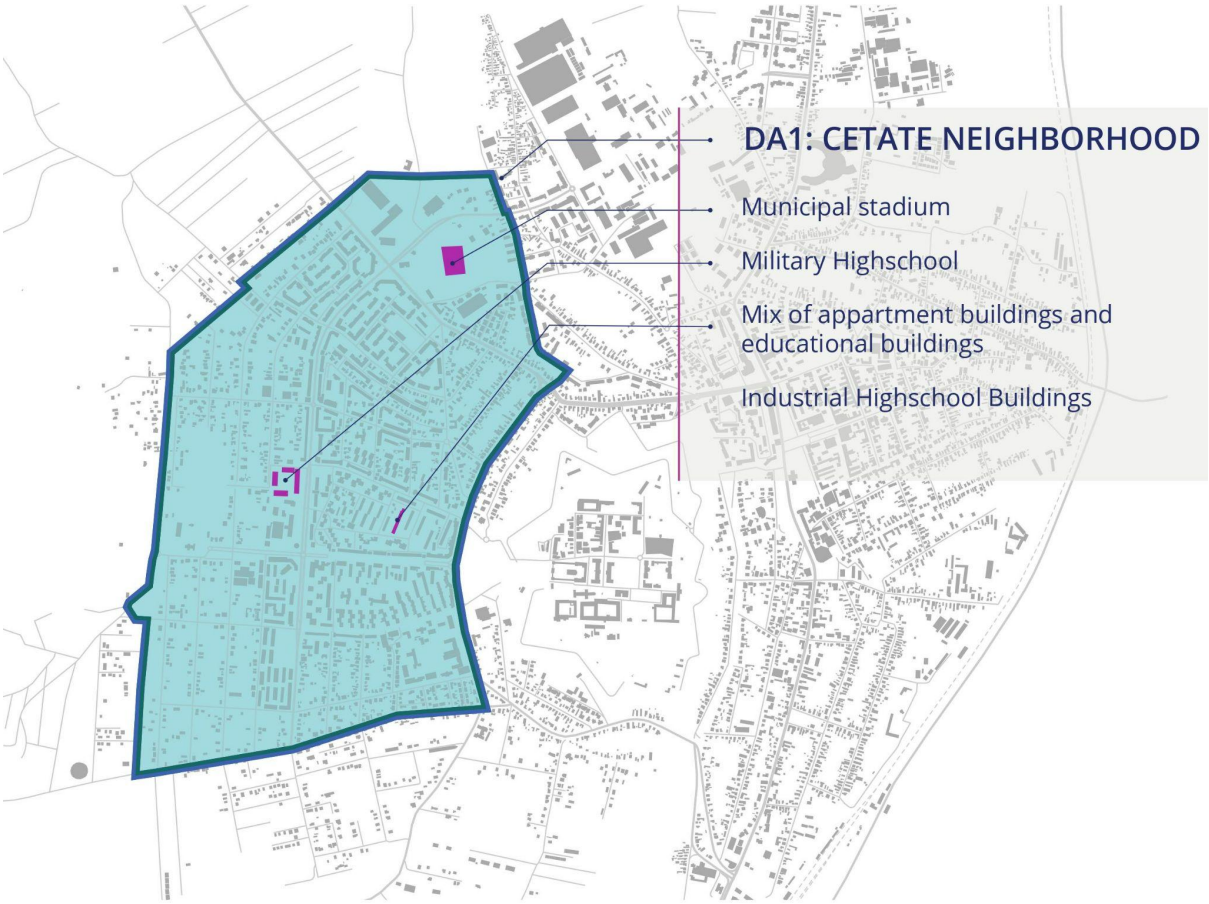

Fig. A.1: Map of planned +CityxChange interventions in Alba Iulia.

A.1 Summary

The EU aims to be climate-neutral by 2050, supporting an economy with net-zero greenhouse gas emissions. This objective is at the heart of the European Green Deal [1] and in line with the EU's commitment to global climate action under the Paris Agreement. EU energy policies and strategies are in the midst of realising visions for sustainable development and growth, such as Alba Iulia's Bold City Vision 2050.

With a population of almost 74,000 and an urban area of 104 square km, Alba Iulia has a population density of 713 habitants/km2. Alba Iulia is located by the Mureş River in the heart of Transylvania in central Romania. The vision of Alba Iulia is to "become a more attractive city to live, work, and invest in by 2050". 'Digital Alba Iulia' is part of this vision that links seamlessly to the +CityxChange project. Within the Bold City Vision plan, Alba Iulia's path is straightforward towards reaching carbon neutrality by 2050, in accordance with the European Laws.

Within the Bold City Vision strategy, the city of Alba Iulia will experiment with how to become a leading city integrating smart positive energy solutions. Through the use of digital services, the quality of life for and together with the citizens will be improved, more energy will be produced than consumed, and experiences with cities across Europe will be exchanged to facilitate faster learning together. Through the Bold City Vision strategy, the city of Alba Iulia aligns with the recommendations proposed by the United Nations via the Sustainable Development Goals (SDGs).

The BCV Plan integrates processes linked to accounting for and including city officials, citizens, business partners, and other stakeholders as part of an integrated set of guidelines for managing a societal transition towards smarter and more sustainable cities. The main processes and stages of Alba Iulia's Bold City Plan emerged over a period of 2 years as the result of consultations with leaders, key stakeholders and the local community involved in city planning and development. The key to the BCV plan is to work with the collective intelligence of many stakeholders and for those organisations to recognize that their future prosperity cannot be secured merely through what happens within their boundaries. The city context in which they operate is the key for achieving the proper synergy.

The current report is divided into 7 main sections. The Introduction describes the actual energy policy context at the European and National levels alongside the Bold City Vision's generic Framework. The first section is meant to assess the municipal capabilities from an internal and external point of view. The internal structure of the administrative apparatus is presented as well as the image of AIM through the eyes of their external partners. Moreover, a brief description of the stakeholders directly or indirectly involved in the BCV development is employed/provided. The vision and mission of the BCV2050 are explained and presented within Section 3.3. Keeping in mind the European policy context in terms of sustainability, the Bold City Vision action plan is presented taking into account 5 main directions: Energy, Connectivity, Circular Economy, Health and Wellbeing, Homes, and Community. The third section summarises the city's past developments in terms of sustainability and project motivations along with the specific challenges and barriers related to Alba Iulia's socio-economic development (SWOT Analysis). The fourth section (3.4) presents the main goals of the BCV plan associated with each action pillar. The implementation of the Bold City Vision plan approached from the perspectives of the five ambitions is presented in Section 3.5, also containing insights into future interventions and targets. Within Section 3.6 a generic strategy for citizen engagement is developed, taking into account several worldwide accepted techniques such as surveys and participatory budgeting[16]. The monitoring process is just as important as the plan itself, and thus the proposed data collection methodology contains qualitative and quantitative processes. Through Desk research, interviews and surveys, and workshops, the Municipality of Alba Iulia will closely monitor the implementation of the Bold City Vision plan over the years. Moreover, possible financing instruments are presented. Finally, based on the information and knowledge acquired during the development of the current report, several conclusions and lessons learned are stated (Section 3.7).

[16] https://bugetareparticipativa.apulum.ro/

A.2 Introduction & City Overview

A.2.1 Context and Municipality

With a population of almost 74,000 and an urban area of 104km2, Alba Iulia has a population density of 713 per km2. Alba Iulia is located by the Mureş River in the heart of Transylvania in central Romania. Cultural heritage and tourism are of significant importance for Alba Iulia. The historical centre is the core of the urban organisation. The Alba Carolina Citadel, the most representative Vauban Citadel in Romania, highlights the city of Alba Iulia. After a series of large renovation projects over the last decades of more than €70m, financed by EU funding (European structural and investment funds, ESIF) , the Municipality has enhanced the city's cultural heritage and provided the opportunity for both citizens and tourists to explore the area. Alba Iulia won the title of European Destination of Excellence in 2012 by the European Commission through the Ministry of Regional Development and Tourism. The most important city strategies are the 'Integrated Urban Development Plan 2009-2015' and 'Alba Iulia Project Prioritisation for 2014–2020'[17].

The vision of Alba Iulia is to "become a more attractive city to live, work, and invest in by 2050". 'Digital Alba Iulia' is part of this vision that links seamlessly to the +CityxChange project. In collaboration with the Ministry of Communications and Information Society, 'Alba Iulia Smart City 2018' has been established as a pilot project. Alba Iulia Municipality is managed by a dynamic administration with an open and welcoming approach to private investors. The Municipality and Orange Romania signed a protocol to establish close cooperation for urban IT infrastructure and other smart solutions. Alba Iulia is also included in Siemens' global research project 'Smart Cities Research'. In 2010, Alba Iulia Municipality became a member of the Covenant of Mayors in collaboration with the Alba Local Energy Agency. The main objective is to create an integrated coherent policy with respect to the sustainable development strategy, by reducing energy consumption by 24% up to 2020. The Sustainable Energy Action Plan (SEAP) was updated and approved by the Local Council in 2016. The city also has a Sustainable Urban Mobility Plan (SUMP) in accordance with the specific European legislation, national legislation and financing schemes. The SUMP was subjected to a process of public consultation where the citizens were invited to express their proposals and recommendations.

A.2.1.1 Key stakeholders

Figure A.2 illustrates Alba Iulia's stakeholders map. Across Alba Iulia city, there are several important stakeholders with various profiles. These stakeholders are all important to the creation and implementation of the BCV. They include:

- Academia (Colleges and Universities);
- Private Companies Associations;
- Energy Suppliers;

[17]'Alba Iulia Project Prioritisation for 2014–2020': https://documents.worldbank.org/en/publication/documents-reports/documentdetail/527401468190739988/alba-iulia-project-prioritization-for-2014-2020

- Transmission System Operators (TSO);
- Distribution Systems Operators;
- The regulatory bodies;
- The mediators (Mayor's office and the Municipality itself, which consists of 432 employees organised in 25 different departments).

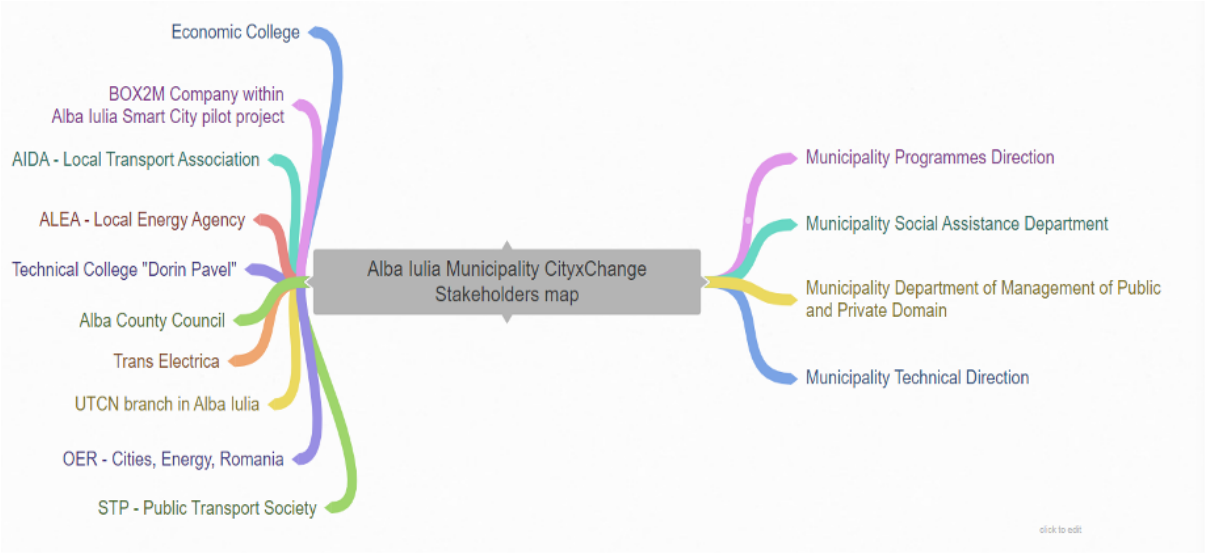

Fig. A.2: AIM's stakeholders map

A.2.2 +CityxChange and BCV: Climate neutrality at the international and EU level

The EU aims to be climate-neutral by 2050 – an economy with net-zero greenhouse gas emissions. This objective is at the heart of the European Green Deal and in line with the EU's commitment to global climate action under the Paris Agreement. The transition to a climate-neutral society is both an urgent challenge and an opportunity to build a better future for all. All parts of society and economic sectors will play a role – from the power sector to industry, mobility, buildings, agriculture and forestry. As part of the European Green Deal, the Commission proposed on 4 March 2020 the first European Climate Law to enshrine the 2050 climate-neutrality target into law. Moreover, the European Parliament endorsed the net-zero greenhouse gas emissions objective in its resolution on climate change in March 2019 and resolution on the European Green Deal in January 2020[18].

EU energy policies and strategies provide the context for realising visions for sustainable development and growth such as Bold City Vision 2050 within the Lighthouse and Follower Cities. Co-creation within a quadruple helix approach, as is a basis within the+CityxChange project, defines the scope and sets the agenda for working on a Bold City Vision and further on the realisation of the vision, and "bridging the gap" between international policies and the local level development and implementation work. In general, there is a significant lag between EU latest policies and their implementation by local administrations due to

[18] European Green Deal: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_ro

barriers specific to each country and region. These barriers are of an economic, social technological nature and must be overcome by the European cities, some in a shorter time frame, while others require long-term solutions and actions, to facilitate the practical implementation of EU recommendations thus proactively contributing to the holistic climate targets assumed by all member states. In this regard, the ambitions and objectives assumed within Alba Iulia's BCV plan are strongly correlated with the EU energy policies regarding energy efficiency, usage of renewable energy sources, energy poverty eradication, connectivity, sustainable communities and circular economies. Therefore, this strategy can be considered by the local administration as a guide for actions and policies in the field of energy, backed by EU recommendations, that will eventually lead to the carbon neutrality of the city.

The EU Common Energy Market (clean, secure and affordable energy for all Europeans) defines furthermore a baseline for what is needed to aim for in terms of energy in this context. The Energy Union Strategy (European Commission, 2015)[19] and it's 5 mutually reinforcing dimensions is at the core in this context:

- Security, solidarity, and trust (incl energy security)
- Fully integrated internal energy market
- Energy efficiency
- Climate action, decarbonizing the economy
- Research, innovation, and competitiveness

The Clean Energy for all Europeans package[20], released in 2019, based on Clean Energy 21 for all Europeans (European Commission, 2016) marks substantial steps towards the implementation of the Energy Union Strategy.

This package dubbed "Winter Package" of energy legislation[21] will provide the framework for energy policy in the European Union for many years to come. It contains proposals for a whole range of energy-related issues, including energy markets, energy infrastructure, renewable energy, climate policy and energy demand. The Regulation is built on the essential premise that Member States must create plans that are (a) integrated across these five areas, (b) individually and collectively comply with the Union's goals for efficiency, renewables, and carbon reduction, and (c) satisfy additional goals, including energy security and cooperation, transparency, regional coordination, and energy innovation and economic competitiveness[22]. Under the Regulation, Member State energy and climate plans will be reviewed by the Commission, which may, in various ways, request or (perhaps) require Member States to take actions to ensure compliance with Europe's top-level energy goals. Article 3 of the Governance Regulation sets out the required contents of national 10-year climate and energy plans, beginning in 2019, which must include: a description of national targets for each of the five dimensions of the Energy Union ; a description of policies and

[19] Energy Union Strategy: https://www.europarl.europa.eu/RegData/etudes/BRIE/2015/551310/EPRS_BRI(2015)551310_EN.pdf
[20] Clean energy for all Europeans package: https://energy.ec.europa.eu/topics/energy-strategy/clean-energy-all-europeans-package_en
[21] Winter Package (2017): https://fsr.eui.eu/wp-content/uploads/The-EU-Winter-Package.pdf
[22] Rosenow & Bayer (2017): https://doi.org/10.1016/j.enpol.2017.04.014

measures to achieve the targets; and the Member State's "methodologies and policy measures for achieving the energy savings requirement in accordance with" Article 7 and Annex IV of the Energy Efficiency Directive (EED) (European Parliament, 2012) as well as the "long-term strategy for the renovation of the national stock of residential and commercial buildings (both public and private)" in accordance with the Energy Performance in Buildings Directive (EPBD), considering also the latest amendments[23]. The Governance Regulation recognizes the crucial role that energy efficiency must play in meeting the Union's 2030 and 2050 climate and energy goals and sets out a planning process that would chart a path to meeting energy efficiency goals in each Member State. However, the regulation reveals a striking gap between assessment and enforcement. It does not chart governance rules that would cause Member States, utilities, and system operators to invest in efficiency, where it is less expensive or more valuable than supply-side options; nor does it contain specific enforcement tools to pay for and deliver energy savings if Member State efficiency programs were to underperform. Since a failure to deliver cost-effective energy savings will make every other element of the Energy Union more expensive and harder to reach, the enforcement gap for efficiency is a serious problem that requires considerable attention as the Winter Package proceeds through the adoption process. When it comes to the means of ensuring that the Union's efficiency goals will be met, either in individual Member States, or collectively across the Union, still the governance structure remains indefinite and possibly compromised. Even though the new governance mechanisms are proposed by the European Commission in the "Winter Package", there is little or no reference to what currently passes for governance effectiveness. Therefore, there is a need for identifying the preconditions for an efficient governance, through a systematic and thorough analysis of evidence-based planning and decision-making processes in the European sustainable/positive energy projects. Even though the Winter Package will provide an important part of the framework for energy policy in the EU, there are other crucial policies, directives, strategies, and plans such as "The Recovery and Resilience Plan"[24], REPowerEU[25], and the European Climate Law[26] which include several policy dimensions as the strengthening of the emissions reduction targets for each Member State, the EU Emissions Trading System (ETS)[27], and many more. These fast-forward actions set the agenda for energy, governance concerning energy and stretching towards a sustainable energy future. These are also important when defining guidelines and incentive schemes for Bold City

[23] DIRECTIVE 2010/31/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 May 2010 on the energy performance of buildings: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:153:0013:0035:EN:PDF

[24] https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en

[25] REPowerEU: https://ec.europa.eu/commission/presscorner/detail/en/ip_22_3131

[26] Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law'): https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021R1119

[27] EU Emissions Trading System: https://ec.europa.eu/clima/eu-action/eu-emissions-trading-system-eu-ets_ro

Vision in the +CityxChange context: Policy Framework for climate and energy 2020-2030[28], Energy Roadmap 2050[29]. On the Promotion of the Use of Energy from Renewable Sources (European Parliament, 2018), the Third Energy Package, and the 22 more of an enabler through the SET Plan.

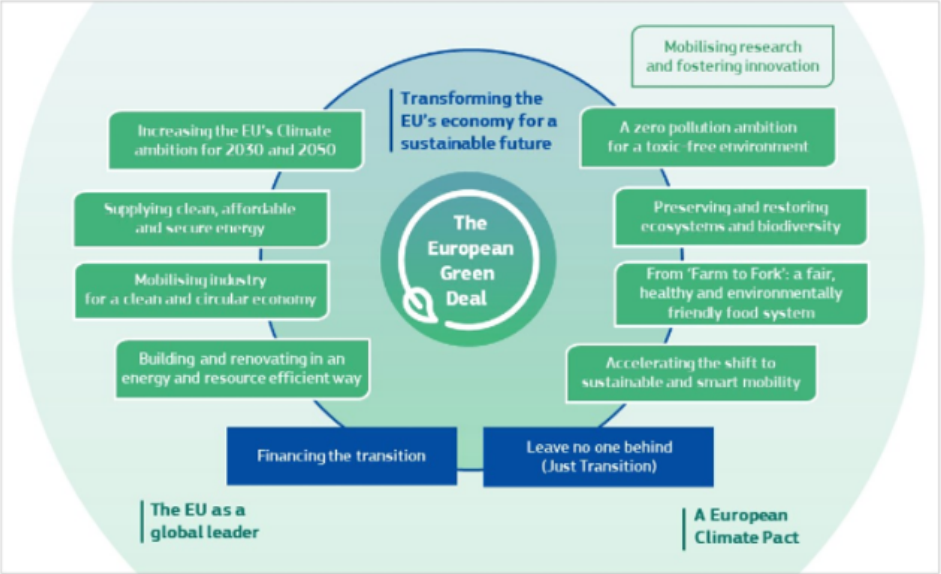

Fig. A.3: European Green Deal[30]

In addition, The European Green Deal resets the Commission's commitment to tackling climate and environmental-related challenges that is this generation's defining task. The European Green Deal is a response to the challenges associated with climate change. It is a new growth strategy that aims to transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use. It also aims to protect, conserve and enhance the EU's natural capital, and protect the health and well-being of citizens from environment-related risks and impacts. At the same time, this transition must be just and inclusive. It must put people first, and pay attention to the regions, industries and workers who will face the greatest challenges. Since it will bring substantial change, active public participation and confidence in the transition is paramount if policies are to work and be accepted.

Alba Iulia's Bold City Vision 2050 is built on evidence-based data and insights to create a sustainable Positive Energy City, guided by the overarching goals and ethical standards of the UN Sustainable Development Goals 2030. The 2030 Agenda for Sustainable

[28] COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Stepping up Europe's 2030 climate ambition Investing in a climate-neutral future for the benefit of our people: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0562

[29] COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Energy Roadmap 2050: https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A52011DC0885

[30] A European Green Deal
Striving to be the first climate-neutral continent:
https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

Development, adopted by all United Nations Member States in 2015[31], provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership. They recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests. The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity. The 17 SDGs were developed in an integrated manner in such a way that they recognize that action in one area will affect outcomes in others, and that development must balance social, economic and environmental sustainability.

For this to happen the proposed KPIs and methods meant to measure impact need to work both on a local and a global level. The current BCV plan is linked to the Sustainable Development Goals through the use of the KPIs that also makes sense in a global context. The KPIs developed and managed by UNECE and ITU under the United for Smart and Sustainable Cities (U4SSC 2017)[32] umbrellas are fast emerging as the most important global standard for measuring and monitoring smart sustainable cities. Based on data collected, Alba Iulia city needs an evaluation report and scorecards, such as the one presented in the figure below, see Figure A.4.

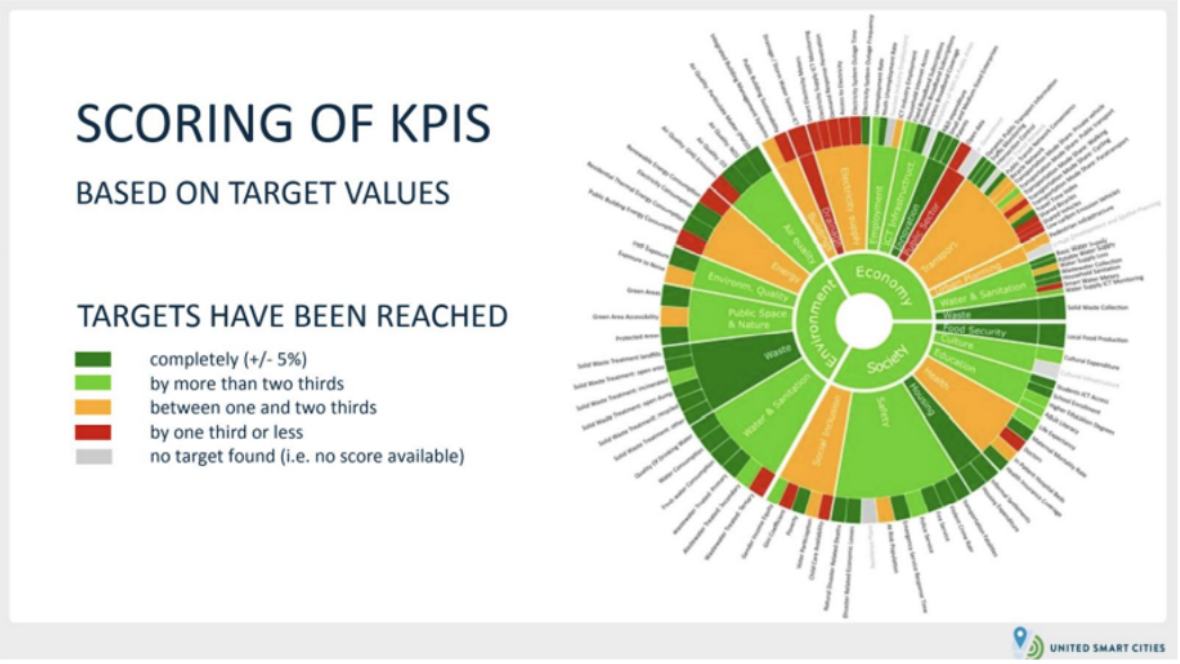

Fig. A.4: Scorecard of U4SSC KPIs (source: U4SSC)

[31] Transforming our World: The 2030 Agenda for Sustainable Development: https://www.unfpa.org/resources/transforming-our-world-2030-agenda-sustainable-development
[32] United for Smart and Sustainable Cities (U4SSC 2017) https://www.itu.int/en/ITU-T/ssc/united/Documents/U4SSC%20Publications/KPIs-for-SSC-concept-note-General-June2020.pdf

A.2.3 +CityxChange (the role and overall impact on municipality)

The +CityxChange vision is to enable the co-creation of the future we want to live in. This includes the development of a framework and supporting tools to enable a common energy market supported by a connected community. This leads to recommendations for new policy intervention, market (de)regulation and business models that deliver positive energy communities integrating e-Mobility as a Service (eMaaS). +CityxChange develops feasible and realistic demonstration projects in climate-friendly and sustainable urban environments. The demonstration projects are developed in the Lighthouse Cities (Limerick, Rep. of Ireland and Trondheim, Norway) and will be replicated in five Follower Cities (Alba Iulia, Romania; Sestao, Spain; Pisek, Czech Republic; Smolyan, Bulgaria and Voru, Estonia).

Demonstrations to be carried out in the Lighthouse and Follower Cities will fall into 3 categories:

- enabling a common energy market;
- creating connected communities;
- recommendations for new policy interventions, market regulations and business models.

These demonstration projects will showcase how digital technologies can be exploited to improve the quality of life, make cities more climate-friendly and productive, and facilitate business development. In addition, during the project lifetime the demonstration projects will be used to validate and improve the model using an iterative approach. The model will then be exploited to develop a framework for how these demonstrations can be scaled up and replicated across a district, a city and the wider European region. The success of the demonstration projects will then be monitored and evaluated, and the results will be used to refine these processes and technologies so that they can be replicated in the Following Cities and beyond.

A.2.4 Bold City Vision (the role for municipality)

The overall goal for the +CityxChange project is to design and demonstrate Positive Energy Blocks (PEBs) within the timeframe of the project, i.e., between November 2019 and October 2023. A PEB comprises several connected buildings that have an average yearly positive energy balance between them. This definition excludes embodied emissions, but allows for focus on the infrastructure and systems between buildings as part of the built environment, and ways to implement and incorporate them within existing cities. In order to move beyond a limited demonstration and create a more significant impact, the solutions developed need to scale from the block level to the city level, and beyond. In other words, the +CityxChange project needs also to anticipate what happens after 2024, when the first Positive Energy Blocks will have been delivered, and account for conditions and dimensions that may be addressed both post and pre-2024, up to 2050, as part of the European Energy Transition. Co-creational process on scaling-up from PEBs to Positive Energy Districts, and finally to Positive Energy Cities (PECs) by 2050 consists of 3 main steps: Design and prototyping, Enabling, and Accelerating. Based on literature and experiences

from our city, these 3 main steps were then during the work in Task 3.1 detailed into 5 steps – or subprocesses – that are necessary to scale from PEBs to PECs: Engage - Design -Activate - Accelerate - Support).

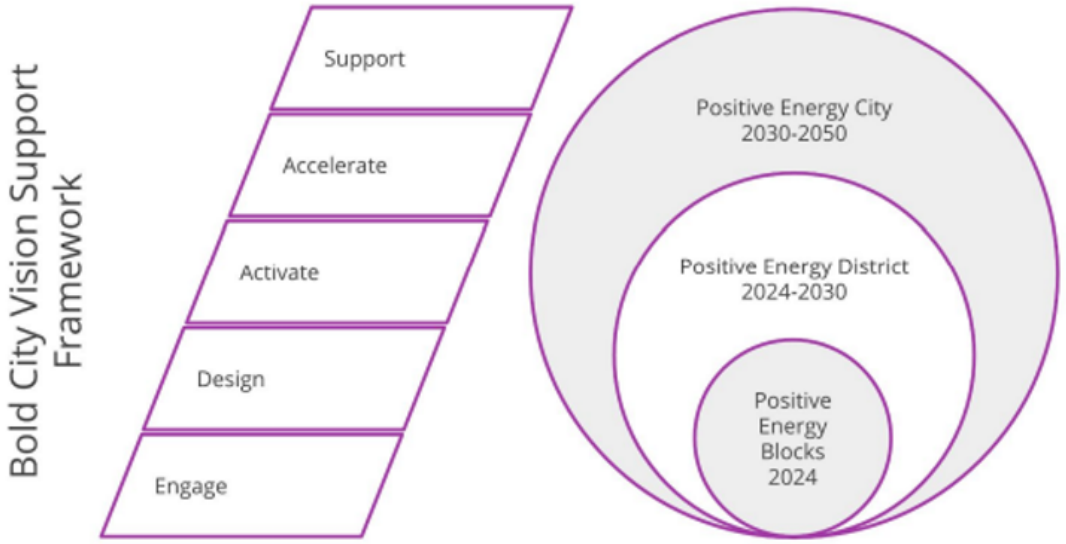

Fig. A.5: The +CityxChange 5 subprocesses for the BCV Framework to facilitate and drive scaling of PEBs to PEDs and PECs.

A.3 Vision and Ambition for 2050 (BCV)

A.3.1 Mission & goals to address key challenges

The Bold City Vision Framework connects the global goals of the SDG's to local policy development with a strong emphasis on citizen engagement and citizen driven open innovation and business development. The SDGs provide the basis for developing the framework. The goal for Alba Iulia 2050: In 2050, Alba Iulia is a healthy and sustainable city. A city of hope and aspiration, where everyone can share in its success. A second objective is for Alba Iulia to be Romania's first Positive Energy City and provide better services and quality of life for all stakeholders of the city. The Bold City Vision Plan mission follows the directions and targets assumed in 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs), thus integrating the following components:

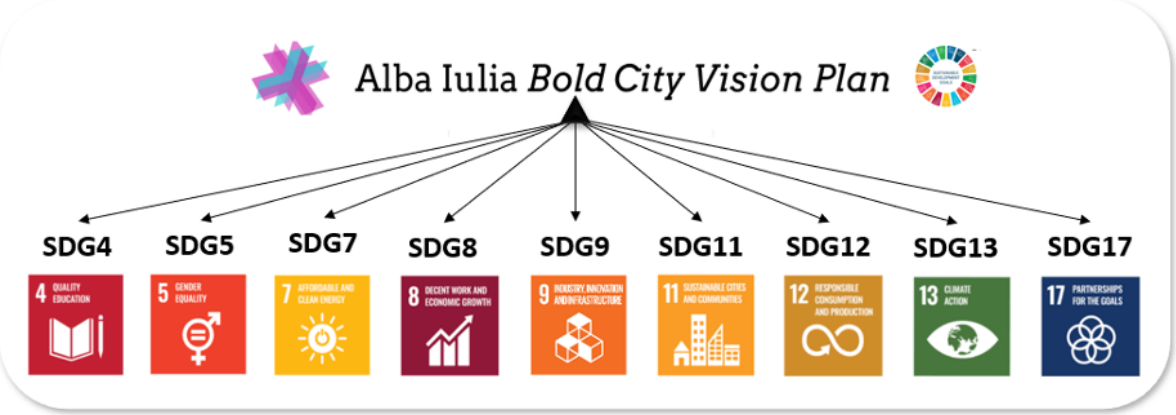

Fig. A.6: SDG Goals embedded in Alba Iulia's BCV Plan

Throughout the implementation process of the measures and actions proposed within the BCV plan, people of all genders will have equal rights, responsibilities and opportunities; thus, men and women will benefit to an equal extent from quality education for professional and personal growth, further encouraging the formation of a sustainable behaviour of today and tomorrow's society (SDG4, SDG5). Partnerships and collaborations are encouraged during the BCV's implementation, and Alba Iulia Municipality will act as a technical, economical and social "bridge" between different stakeholders, ensuring that local efforts are focused in the proper direction, namely decarbonization of the city by 2050 (SDG17). From a technical perspective, first and foremost, in order to achieve such an ambitious target, the Municipality is aware that a well-established energy system, considering the entire energy cycle from generation to final consumption, supports the transformation and transition for all sectors from medical sector and education to agriculture, infrastructure, communications and high-technology (SDG7). In addition, one of the most important components of the BCV plan is to eradicate the energy poverty across the city, thus generating a positive impact on all assumed goals within the Bold City Vision plan (SDG7). Of course, all activities and investment initiatives in the field of energy and sustainability will be carried out under the climate protection "umbrella" (SDG13).

A.3.2 Vision: Sketch for the desired future

A vision does not imagine that every organisation and individual will contribute to every outcome, rather it makes collaboration easier and helps to highlight where collaboration is possible. While public sector bodies often have a geographic focus that makes it essential to work together, the same is not always true of individuals or private enterprises. The network of opportunities created by a vision can leverage more political power, more financial clout, and more skills than any sector could in isolation. The goal for Alba Iulia 2050: In 2050, Alba Iulia is a healthy, and sustainable city. A city of hope and aspiration, where everyone can share in its success". A second goal for Alba Iulia is to be Romania's first Positive Energy City and provide better services and quality of life for all stakeholders of the city. This will be achieved through the creation of an Innovation Ecosystem for Urban Commons/Civic Tech/Civic Participatory Design and co-creation of processes and services related to shared public spaces and services. This cooperative living model will enable a greater understanding of how shared resources (energy, environmental, social, and

economic) are used and where they are conserved. It will allow new working models to be easily proposed, developed, trialled, tested, and revised to suit. Digital platforms and tools, linked to active design and co-creation processes, will provide the openness and transparency required to incorporate feedback loops. These will be accessible to the maximum number of participants in order to efficiently generate knowledge regarding optimal ways of living and hence guide actions to manage change in the natural and built environments through bottom-up actions supported by top-down structures. Further to this, a joint City and University/Academic Institutions led approach of a Lab model of partnership with local government and industry, centred around local communities, and involving communities of interest will be adopted. This will lead to a digitally literate city/Living Labs approach. Finally, a distributed, open government approach will be enabled by city design processes and e-government to build the structure for the self-organisation of citizens and for an adaptive form of government to emerge in the city and its surrounding region.

Fig. A.7: Bold City Vision Plan Ambitions

The "Connectivity" component can be divided in two major directions, urban mobility and ICT infrastructure across the city which also includes the level of digitisation of services of public interest, e.g. how the community has access to information of public interest such as pollution, electric vehicles charging stations availability or energy consumptions across the city. The current transport system is based on the use of private vehicles. Transport is inefficient and relies on fossil fuels, which contribute greatly to environmental pollution. Commercial (logistical) transport is also served by cars using fossil fuels. The use of sustainable alternative modes of mobility (walking, cycling) and the infrastructure for these modes is still low. In this regard, based on the "rule by example" expression, the Municipality will considerably increase the number of charging stations across the city encouraging the citizens to use electric vehicles for personal purposes. Moreover, the local administration is planning to launch an initiative to develop a smart platform for management of charging station availability at local level. The platform will be accessible by users of electric vehicles and will provide information on the availability of charging stations in the municipality, the type of energy each station is powered by, and the emission equivalent of CO2 for a full charge. It will also have capabilities to guide car drivers to the charging unit of choice.

In order to successfully implement the Bold City Vision Plan, several major action directions need to be established. Figure A.7 illustrates the AIM's vision regarding how carbon neutrality can be achieved. Through interventions in the fields of Connectivity, Economy, Environment, Health and Wellbeing, Homes and Communities, and Learning Skills the objectives assumed for the next 20 years will be successfully achieved. The Municipality of Alba Iulia (AIM) is aware that any strategy's nucleus must be the citizens of Alba Iulia. Whether the citizens of Alba Iulia connect in person or in virtual spaces, and whether they connect in their local communities or their global communities, the city infrastructure helps bring them together. We believe that connectivity is synonymous with productivity and the city of Alba Iulia aims to be the regional centre for productivity. Within the BCV plan the barriers and obstacles affecting people to connect are addressed through interventions and specific actions such as participatory budgeting programs, public workshops, Internet of Things (IoT) public platforms, and encouraging energy communities to be created.

Strategic planning provides the incubators and foundations for sustainable businesses to develop across the Alba Iulia city. It is also important to provide secure, rewarding work and a fair wage for all ages and all abilities. Innovation thrives where the conditions are right. The public sector and the private sector are equally supported through interventions at the economic level, to keep abreast of the new and novel ways of working. Where the action is needed, the BCV plan delivers. The confluence of wide-ranging further environmental initiatives and ambitious targets have been established within the carbon neutrality strategy. The trajectory of Alba Iulia's enviable environmental credentials is managed through continually measuring and planning and consulting through the BCV plan At the end of 2050, its citizens will thrive in a city that supports their physical health and mental health equally. The challenge towards achieving carbon neutrality by the 2050s will be overcome by strong partnerships between the stakeholders and Alba Iulia's citizens.

A future sustainable smart city ensures a state-of-the-art medical infrastructure and accessibility to its citizens. Within the BCV plan, the approach to housing in Alba Iulia has been influenced by the ambition to be an inclusive, supportive, healthy city. Residential housing has an important proportion from the energy consumption at the local level and the BCV plan proposed actions and encourages and supports every new building to have the Nearly zero-emission building (nZEB) status by 2050. By 2050 everyone will be able to access fuel, insulation, and heating to ensure nobody suffers from a cold home. The measures and actions embedded within BCV Plan represents an integrated response of the AIM to the needs of the local community in the energy transition process.

A.4 Challenges and Opportunities (BCV)

A.4.1 Overview

The City of Alba Iulia is among the leading cities in Romania in attracting non-reimbursable funds dedicated to investments and actions in the field of sustainable energy. Whenever we are talking about investments with a direct impact in reducing CO2 emissions, e.g. in infrastructure such as public lighting systems, high-efficiency buildings, renewables, thermic

systems or electric vehicles for public transport, or in educational campaigns (with a more difficult to quantify impact in terms of emission reductions) the local administration is strongly motivated to use state-of-the-art technologies to improve the quality of life across the city while achieving the climate targets stated by the EU.

Alba Iulia Municipality initiated, elaborated and submitted several major projects under the ERDF - Regional Operational Program with a total worth of over 50 million Euros. The projects are aimed at transforming the mobility at the level of the municipality from a car-oriented network of roads towards a sustainable transport-oriented network of roads based on dedicated lanes for buses, dedicated bike and pedestrian lanes, bike-sharing system with 8 stations spread all over the city, installing a total of 9 charging stations for electric cars etc.

Regarding the public lighting system, AIM has submitted several projects consisting of non-reimbursable funds for the retrofitting of the public lighting system (over 4000 new bulbs - LED technology, sensors and smart solutions) by implementing new infrastructure where it is needed. These projects aim to reduce pollution and to make public lighting in Alba Iulia a more efficient solution regarding consumption and CO2 reduction. The projects envisage the modernising of the lighting system in almost all parts of the city. Moreover, Alba Iulia also introduced smart lighting on various streets throughout the city, thanks to the partnership with 3 companies: Schreder, Philips and Orange. Over 218 smart lighting bulbs have been installed so far.

In addition, the local administration strives continuously to support the sustainable development of the city by encouraging the R&D sector by engaging in an international consortium which includes major world-renowned actors in the field. In this regard, at the level of 2020, together with the international partners the municipality won three HORIZON2020 projects, as follows:

- THERMOS - Thermal Energy Resource Modelling & Optimisation System - funded by the European Union under the European HORIZON 2020 Programme, Sustainable and Efficient Energy component. Overall objective: the THERMOS (Thermal Energy Resource Modelling & Optimisation System) project aims to provide the methods, data and tools necessary to enable public authorities and other stakeholders to undertake effective thermal energy system planning much faster and cheaper than they can do today.
- PlastiCircle - Improvement of the plastic packaging waste chain from a circular economy approach, HORIZON 2020 Programme.
- UlaaDS - „Urban Logistics as an on Demand Service", HORIZON 2020 Programme.

The outcomes of the aforementioned projects and initiatives are strongly correlated with the ambitions and objectives proposed within the BCV plan, and hence a natural continuity is emphasised. In terms of sustainability, through other projects and initiatives that have generated added value at the municipal level, among the outcomes to be mentioned are:

- Free WIFI in public transport but also in many parts of the city (especially in the central part - the Vauban Fortress)

- Mobile app e-Alba Iulia available for both Android and IOS users with over 600 beacons spread throughout the city: users will be informed of various issues from touristic hotspots to public relevant news
- Seniors benefit of free public transportation throughout the city
- 22 electric charging stations for electric cars will be installed all over the city through an EU funded project: 4 fast charging, 13 slow charging, 5 normal charging stations.
- 18 bike-sharing stations with publicly accessible bikes will be installed at city level through an EU funded project. Around 10 bikes per bike station will be accessible.
- An e-bike rental facility is already installed in Alba Iulia Citadel.
- Over 400 beacons were installed all over the city through an EU funded project, functioning through a mobile app (e-Alba Iulia: for IOS and Android devices). The beacons are used to communicate with the citizens and tourists (about historic-touristic landmarks) and to announce different events that are happening in the city. The beacons are using Bluetooth technology and marketing proximity solutions to send push notifications to users' smartphones.

A.4.2 Socio-Economic, Environmental, and Technological Challenges

A.4.2.1 Market barriers

Over the years, AIM strengthened its cooperation with the private sector building a trustful public-private partnership. Nevertheless, it is important to mention that Romania has an emergent economy characterised by instability and immature economic behaviour which in turn induces additional risks and barriers when one intends to implement an investment, of any kind. It is common practice for Romanian companies to deliver low-qualitative products for profit maximisation. However, this market barrier can be easily overcome by a complete and comprehensive tendering process which will filter the low-cost products by imposing high quality standards.

A.4.2.2 Ownership barriers

The main barriers in the area are related to the ownership and administration of the buildings which belong not only to the municipality but also to the County Council and other organisations/institutions. There is still a legislative drawback in the process of providing energy from a building to another belonging to other types of public institutions or organisations (public or private).

A.4.2.3 Business Reluctance between certain local actors

Another barrier that has to be mentioned is the reluctance of different stakeholders for collaborative projects. The AIM acts as a mediator for different actors involved in Alba Iulia's path towards achieving the carbon neutrality status. Obviously, there are only advantages, especially for the citizens of Alba Iulia, if the city will become more sustainable and greener.

A.4.2.4 Legislative barriers

Another barrier that has to be mentioned is the reluctance of different stakeholders for collaborative projects. The AIM acts as a mediator for different actors involved in Alba Iulia's

path towards achieving the carbon neutrality status. Obviously, there are only advantages, especially for the citizens of Alba Iulia, if the city will become more sustainable and greener.

A.4.2.5 Demographic barriers

Chronic lack of the strength of specialised renovation labour buildings, installation of sources installation, etc.

A.4.3 SWOT Analysis

Looking ahead to the next few years at both national and local level, a number of challenges that central and local governments will have to manage in the coming years in the context of the energy transition through which carbon neutrality will be achieved.

Table: A.1 SWOT Analysis for Alba Iulia.

Strengths	Weaknesses
Strong administrative capacity with proven skills in accessing non-reimbursable funding and other types of grants grant funding; Alba Iulia is the city with the highest absorption of European and other non-reimbursable funds per capita in Romania; + Long experience in energy management, energy efficiency and use of local renewable sources; Clearly defined objectives and pipeline of priority projects defined and in preparation for accessing non-reimbursable funding and other types of grants grant funding; + Efficient public transport + City of AIM is a new touristic destination at national/international level + Municipality seen as one of the most dynamic at national level	○ Internal resources focused on the implementation of the proposed projects, with a high degree of occupation; ○ Public building stock in high need of renovation; ○ Built stock of residential buildings - individual and collective housing - with high renovation needs. ○ Relatively low budget for investments at municipality level ○ young people usually flee to other cities to study and settle there; ○ Relatively low number of investors; ○ National authorities lacks the institutional capacity to deal with the funding programs without creating bureaucratic barriers and resource waste
Opportunities	Threats

• Multiple non-reimbursable funding programmes and calls in the field of sustainable energy that can be accessed (ROP, PODD, 10d, 10c, Norwegian grants, Swiss grants, AFM, PNRR, etc.); • European and national policies that support and even require decarbonisation; • Local companies ready to offer energy efficiency and renewable solutions; • Involving the citizens in budgetary participation process; • Building Smart City strategy and further developing the Smart City profile; • Greener public transport; • Becoming a hotspot in Romanian/EU tourism • Becoming a business hub for innovative tech • Increases visibility thanks to innovative digital tools	• Fluctuating national legislative framework with low predictability; • Allocations of national government funds set on non-competitive criteria; • Chronic shortage of skilled labour in building renovations, installation of renewable energy sources, etc. • Leadership change in the future • National policies challenging urban development • Lower taxes collection than foreseen • Emigration to larger cities or another countries • Lack of investments/investors

A.5 Development Process of BCV (Road Map)

The energy transition is a crucial enabler of sustainable development and climate resilience. Forward-looking actions will create new jobs, stimulate growth and harvest social and health benefits[33]. The introduction of clean energy solutions can bring vital services such as improved healthcare, better education and affordable broadband, creating new jobs, livelihoods and sustainable economic value to reduce poverty.

[33] https://www.un.org/sites/un2.un.org/files/2021-twg_2-062321.pdf

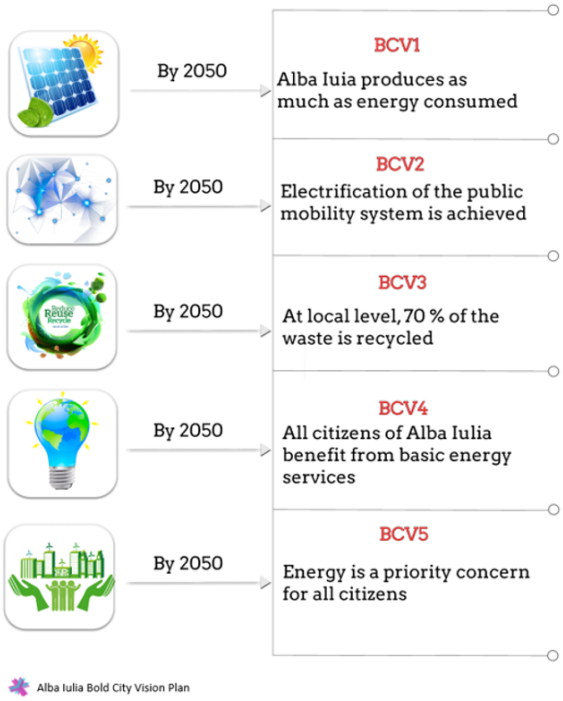

Fig. A.8: Alba Iulia's BCV Plan goals

Energy

Why?

Because ensures the maintenance and development of civilized life, in comfort and safety for the inhabitants of the local community while at the same time the pollution generated by the energy sources themselves leads to increased pollution with a direct impact on the population health.

Connectivity

Why?

Green mobility aims to reduce both air and noise pollution from transport, and to address climate change in the transport sector. In a well-connected society the information will flow among a multitude of communication channels towards the citizens who will have all the tools to make smart decisions

Circular Economy

Why?

Moving towards a more circular economy will deliver benefits at local level such as reducing pressure on the environment, improving the security of the supply of raw materials, increasing competitiveness, stimulating innovation, boosting economic growth (an additional 0.5% of gross domestic product) alongside creating jobs.

Health and well-being

Why?

Energy poverty can have major impacts on health, well-being, social inclusion, and quality of life. By eradicating energy poverty, the municipality will improve the quality of life of its citizens and create a fairer and more inclusive society.

Home and Communities

Why?

To ensure a just transition, the Municipality must support the local communities to adapt to a green economy through social protection and new skills. Support energy communities will empower people at the heart of the energy system. It brings them together to take democratic climate

Fig. A.9: Alba Iulia's BCV Plan goals, elaborated.

A.6 Implementation Plan/Strategy

A.6.1 Roadmap for 2050

The starting point for elaborating a city specific roadmap should be the existing body of policy objectives as well as an evaluation of the cities' current performance using available local, national and international standards (KPIs) for localising and assessing how smart and sustainable the cities currently are. This first steps towards creating the roadmap (6 sub processes collectively referred to as "Engage") also involve steps to assess popular opinion, needs, and aspirations of the citizens and the relevant actors, as well as initial steps to set up activities to build an overview of available knowledge and existing solutions both within and beyond the city organisation. The overall roadmap can be structured around the Policy Innovation Process, see Figure A.10.

The AIM will implement a continuous monitoring and evaluation process meant to bring updates correlating with the latest European and national policies in the field of sustainability. Given the volatility of the worldwide geopolitical and economic context, the objectives and strategies of today may become ineffective or unenforceable in a relatively short period of time therefore the roadmap must be constantly evaluated and adapted according to the rate of change of the parameters considered as working hypotheses.

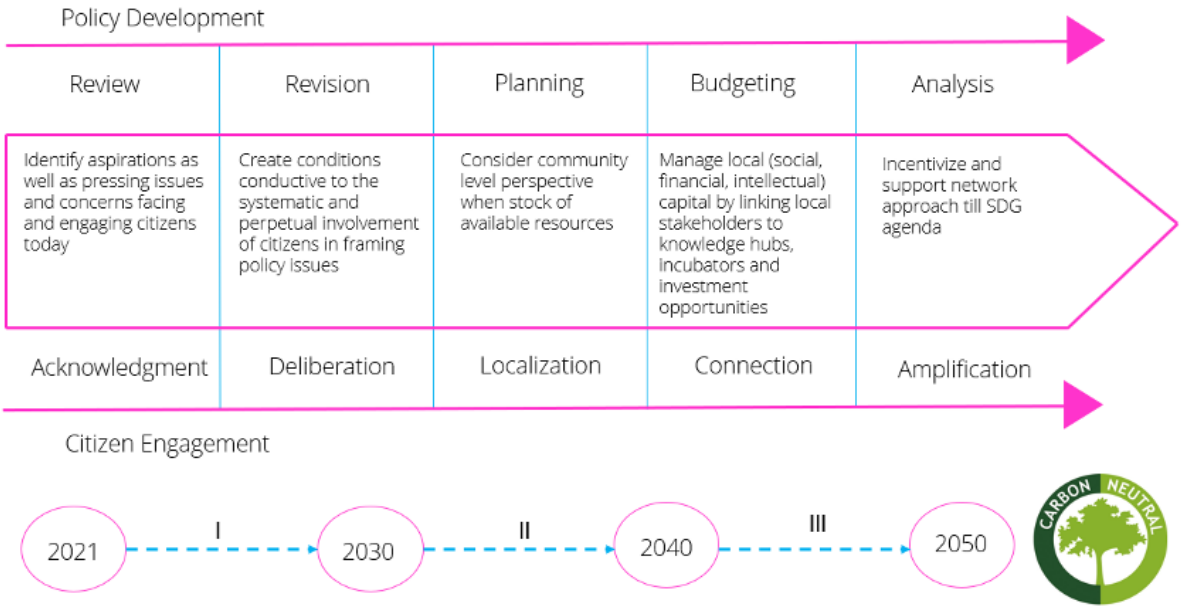

Fig A.10: Alba Iulia's Bold City Vision Plan generic roadmap

In this regard, the municipality aims to continuously monitor the implementation of the Bold City Vision by adopting modifications where and when appropriate. Alba Iulia municipality reiterates that at the centre of this process are its citizens therefore empowering the people in all implementation and monitoring stages is a priority.

A.6.2 Action Plan

For a coordinated response with European society against climate change and the consequences that it already generates, the Municipality of Alba Iulia has already taken important steps toward achieving carbon neutrality by 2050, thus entering the activation stage from an administrative perspective. In this regard, AIM has joined the "Convention Covenant of Mayors" promoted by the European Commission in 2010. Through this commitment, the aim by 2020 was to achieve a 24% reduction in CO2 emissions. The key document underpinning the Covenant of Mayors on Energy and Climate is the Sustainable Energy and Climate Action Plan (SEECP). Having signed up to the new Energy and Climate targets in 2016, the new form of the Covenant of Mayors has extended the framework for sustainable energy planning to 2030, with the provision that by 2030 to have a 40% reduction in CO2 emissions. The ECDAP was drafted by the City Municipality of Alba Iulia together with the Alba Local Energy Agency - ALEA and is the basis for the energy policies of the public administration for the next 10 years with the reference year of emissions (GHG) set values for 2008. Whereas the perspectives established in the "Integrated Urban Development Strategy of Alba Iulia 2014 - 2023" are perpetuated in the energy component of the SIDU 2021-2030, the "Development Strategy of Alba County, 2014-2020", and the "Development Plan of the Region Centre 2014-2020" this is integrated together with the Action Plan for Sustainable Energy 2030 of the Municipality of Alba in the Energy Master Plan of Alba County, carried out in 2011, as well as in the Energy Strategy of Alba County.

The municipality was also a Lead partner in different projects financed at the national level while being part as project partner in different transnational projects, being familiar in working with other cities such as Oslo, Berlin, Paris, London, Liverpool, Genova, Murcia, Barcelona, Stockholm, Copenhagen, Utrecht, Zaragoza, Brussels, Ghent, Wien, Warsaw, Krakow etc, and being familiar in working within most European funding programs: URBACT, Interreg Europe, Horizon 2020, Europe for Citizens, Intelligent Energy Europe, Erasmus Plus, COSME, etc

In addition, underpinning the development, implementation, monitoring and evaluation of BCV Plan was based on a system of information and communication system managed by the Municipality team, which has respected the European and national principles applied in the development of regions and were involved formal and informal consultations/discussions, the launch of a barometer with questions on energy, the built environment, the environment and the importance of climate change. and an online webinar with public access, involving citizens from the local community, representatives of competent authorities, local public authorities, civil society organisations, economic and social partners, taking into account including the promotion of equality and non-discrimination.

A.6.2.1 Energy

Currently energy in all its forms of production, transport, distribution, and use at Alba Iulia ensures the maintenance and development of civil life, in comfort and safety for the inhabitants of the local community, while at the same time generating a direct impact on the population's health. Once the problem is identified, solutions must be developed and implemented. The Municipality of Alba Iulia, through the local public authority, together with the other (de) centralised public institutions, as well as through the involvement of the local

community, the private sector, and the local business environment, will aim to make a significant contribution to ensuring security and continuity in supply, with reduced impact on the environment and human health. It is important to emphasise that all other local strategies, measures, and solutions limit impact as long as we are not able to ensure our primary energy consumption from renewable energy sources. It is inefficient to massively invest only in infrastructure such as charging stations or public lighting, while leaving aside the issue of the energy mix feeding these infrastructures. The CO2 emissions equivalent of a full charging station load depends to a large extent on the energy mix at that time of the day. The Municipality must emphasise that in order to support the energy transition and finally achieve carbon neutrality by 2050, the new infrastructure must be fed with energy produced by clean sources (solar, biomass, wind). Now, although controlling the energy mix flowing through local networks seems to be an impossible task for the municipality, there are several action pillars that will be approached during the implementation of the Bold City Vision plan. The general objective of the "Energy" component of Alba Iulia's BCV plan is strongly related to energy efficiency improvements in the local heritage of buildings and implementation of local renewable energy sources both being supported by attracting investments, in particular non-reimbursable investments from external and government funds. More specifically, the following initiatives will be prioritised:

- Introduction of components associated with renewable energy sources and intelligent control equipment in extensive renovation projects of public and private buildings. By 2030 all new buildings will have to partially secure their energy consumption from their own sources. By 2050, 30% of the local usable roof surfaces will have photovoltaic panels installed on it. These objectives will be achieved through local policy regulations gradually adopted by the municipality.
- Implementation and operation of energy storage facilities connected in parallel to production capacities across the city. Encourage the development of energy storage capacities in the economic and residential environment. By 2050 all new building projects will have to contain, in addition to renewable energy sources, electricity storage capacities.

A.6.2.2 Connectivity

The "Connectivity" component can be divided in two major directions, urban mobility and ICT infrastructure across the city which also emphasise how the community has access to information of public interest such as pollution levels, electric vehicles charging stations availability or energy consumption across the city.

Urban green infrastructure is becoming an increasingly important concept for sustainable urban planning. In planning research, the concept of green infrastructure has gained a lot of attention in the last decade, especially in the context of sustainable urban development. The municipality of Alba Iulia sees great potential for high-quality urban green infrastructure within the city to deal with a variety of current and future challenges that city regions have to cope with in regard to climate adaptation and urban quality of life, and to build healthy neighbourhoods From a mobility perspective, the AIM aims to outline ways in which the city is transformed and evolves to serve the citizens with services of mobility, traffic, and parking at the highest level, comfortable and clean, based on the most advanced technologies and principles in the field by 2050. In such a context, vehicles in the municipal fleet will be adapted to support new sustainable mobility standards that can reduce congestion and CO2 emissions, especially within the urban outline. Projects linked

to energy efficiency and renewables will contribute to the development of intelligent traffic management systems and "mobility as a service" solutions through projects already initiated, but also by attracting new funds for future investments. A key objective of this area is to develop an energy infrastructure that enables two-way electricity exchange between electric vehicles and the National Electricity Network. The main goal of the BCV "Connectivity" component is that by 2050 all urban mobility will be based on electric vehicles, with the possibility of bidirectional energy transfer. Such a major transition will be possible with the full support and commitment of Alba Iulia's municipality from a financial, policy, and administrative perspective.

Regarding the ICT infrastructure, the municipality will consider measures and initiate projects to ensure that digital technologies such as artificial intelligence, blockchain applications, 5G, cloud and computing, and the Internet of Things (IoT) can accelerate and maximise the impact of policies to address changes regarding climate change and environmental protection at the local level. The development of a municipality-wide IoT platform can bring both benefits in terms of efficiency of electricity consumption through monitoring of street lighting, public lighting stations, public transport stations, mass information across the city, as well as a security component that can be interoperable with the sensors and cameras required for the technical operation of this technical assembly. Basically, by 2050 one living in Alba Iulia should be able to remotely access all information and services provided by the local administration.

A.6.2.3 Circular Economy

Global consumption of materials such as biomass, fossil fuels, metals and minerals are expected to double in the next forty years[34], and annual waste production will increase by 70% by 2050[35]. Extending the circular economy to the main economic actors will make a decisive contribution to achieving Alba Iulia's neutrality by 2050 and to decoupling economic growth from resource use, while ensuring the city long-term competitiveness and that nobody is left behind[36].

To achieve this ambitious goal, the municipality will accelerate the transition to a regenerative growth model that gives back to the planet more than it takes from it, progressing towards a context where it keeps its resource consumption within limits and therefore reduces its footprint and doubles its circular material use rate over the next decade. From a holistic perspective, the transition towards a circular economy will be achieved by developing the ideal policy context for the development and implementation of innovative technological solutions for the transition pathways while promoting the most viable programmes in the field across the city. Therefore, by 2050 Alba Iulia will be transformed into a regenerative circular city. As part of this initiative and, where appropriate, through legislative proposals, the municipality will consider establishing principles and other appropriate ways to address the following issues:

[34] OCDE (2018), „Global Material Resources Outlook to 2060".
[35] World Bank (2018), „What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050"
[36] https://eur-lex.europa.eu/resource.html?uri=cellar:9903b325-6388-11ea-b73501aa75ed71a1.0017.02/DOC_1&format=PDF

- Creating the legal framework for increasing the recycled content of products, while ensuring performance and safety. In addition, the municipality will support the development of a suitable recycling environment, an initiative which already has begun.
- Mobilising the potential of digitization of product information, including solutions such as passports, labels and digital watermarks.

In the roadmap towards the city's neutrality the transition to the circular economy will be systemic, deep and transformative. For a successful process this will require the alignment and cooperation of all stakeholders at all levels. Hence the municipality invites all local actors from the private and public sectors to actively contribute and support the city's green transformation.

A.6.2.4 Health and well-being

The health and well-being within a city is also dependent to a large extent on the capacity of public authorities to ensure access to secure, sustainable and affordable energy for all its citizens. In the context of the 2030 framework of the Covenant of Mayors in Europe, which Alba Iulia joined in 2010, in addition to actions to mitigate climate change and adapt to its inevitable effects, signatories commit to drastically reducing fuel poverty across the continent. In practice, this means that vulnerable citizens across the city either do not have access to energy services and/or the use of these energy services undermines their access to other basic services. Energy poverty can have major impacts on health, well-being, social inclusion, and quality of life. The priorities of the local administration are to fully eradicate fuel poverty across the city by 2050, taking measures to combat challenges such as inadequate levels of essential energy services including lighting, heating/cooling, appliance use, transport, and many others. Energy poverty will therefore be taken into account in many policy areas - including social, economic, and, of course, climate and environmental fields. As a first natural stage of this process, the local administration has begun the elaboration of a database mapping the vulnerable consumers across the city. By eradicating energy poverty, the municipality will improve the quality of life of its citizens and create a fairer and more inclusive society.

A.6.2.5 Homes and communities

Increasing local community awareness of the consequences of climate change and excessive pollution will improve the citizen's energy culture, which in turn will stimulate active community involvement in the city pathway towards climate neutrality by 2050. The educational component is the foundation and basis for a sustainable society. An educated community will be able to adapt its behavioural patterns to the problems of current issues, which finally leads to a resilient society. The Municipality of Alba Iulia is aware that the energy transition undertaken by the local administration must be carried out in accordance with the real needs of the local community, however, at the same time, citizens must be aware that we are in a crucial moment and must act accordingly. This level of awareness can only be achieved through education and proper energy culture levels within the local community. One of the expected results of increasing energy literacy of local communities is the establishment of energy communities and micro-communities that will eventually lead to the formation of Positive Energy Blocks followed by Positive Energy Districts. In line

with the Social Development Goals (SDG), this strategy must facilitate action from an energy perspective and give citizens a central role [11]. Given that global challenges must be addressed through local action, the transition toward energy decentralisation through Local Energy Communities (LEC) is one of the municipality's priorities in the years to come. Positive Energy Districts and Neighbourhoods will be an integral part of comprehensive approaches toward sustainable local urbanisation including technology, spatial, regulatory, financial, legal, social, and economic perspectives. They will imply the interaction and integration between all kinds of buildings, users, and the regional energy, mobility, and ICT systems. In this regard, by 2050, several Positive Energy Districts with annual net-zero energy import and net-zero CO_2 emissions will be integrated into the local and regional energy system.

A.6.2.6 Conclusion

Table A.2: Proposed targets and actions within BCV Plan

Energy
·By 2030 all new buildings will have to partially secure their energy consumption from their own sources
By 2050 30% or more of the local usable roof surfaces will have photovoltaic panels installed on it By 2050 all new building projects will have to contain, in addition to renewable energy sources, electricity storage capacities
Connectivity
By 2050 all urban mobility will be based on electric vehicles By 2050 one leaving in Alba Iulia should be able to access remotely all information and services provided by the local administration
Circular Economy
Elaboration of the legal framework for increasing the recycled content of products, while ensuring performance and safety Mobilising the potential of digitization of product information, including solutions such as passports, labels and digital watermarks
Health and Wellbeing
· Fully eradicate fuel poverty across the city by 2050
Homes and Communities
Stimulate active community involvement in the city pathway towards climate neutrality By 2050, several Positive Energy Districts with annual net-zero energy import and net-zero CO_2 emissions will be integrated into the local and regional energy system

A.6.3 Citizen & Stakeholder Engagement

Once the city has clarified its current policy objectives, these can be compared to the results from the city evaluation (using local, national and international KPIs), and later to the feedback generated through an open and inclusive process with relevant stakeholders. The materialisation of Alba Iulia's BCV plan is strongly linked to its usage by interrelated stakeholders and community representatives as a navigation tool in the context of the energy transition. The local actors must operate based on an integrated approach in order to maximise the positive outcomes of their actions. The BCV must integrate processes linked to accounting for and including city officials, citizens, business partners and other stakeholders as part of an integrated set of guidelines for managing a societal transition towards smarter and more sustainable cities.

The stakeholder engagement plan is a main component of Alba Iulia's Bold City Vision plan that identifies the strategies and actions required to promote active involvement of stakeholders in decision making, execution and monitoring processes. The strategy is both formal and informal and highly detailed or broadly framed, based on the needs of the plan and the expectations of stakeholders. The first step in every stakeholder engagement plan is to list and classify the relevant actors based on the nature of their commercial/industrial/residential profile. However, it's important to be thorough because it's easy to underestimate the ability of a minor stakeholder to impede the plan when the message is not being communicated with adequate clarity. Moreover, many stakeholders will be involved in only a certain phase of the BCV plan, and therefore the invested resources by each particular stakeholder need to be carefully planned in order to fulfil their specific contribution within the BCV without overwhelming them.

There are five proposed steps within Alba Iulia's BCV plan to engage the stakeholders in in a joint, integrated action, resulting in the complete decarbonization of the municipality:

A. **Classify Stakeholders:** As an initial step in stakeholder analysis, classifying the stakeholders into defined groups can assist in the next, more detailed steps.
B. **Develop Power/Interest Grid:** This is the primary stakeholder analysis tool. It contains the power of the stakeholder on the y-axis, which is the ability of the stakeholder to stop and/or change the project, and the interest level of the stakeholder on the x-axis, which is the amount of overlap the stakeholder's interests have with the BCV plan. This defines the stakeholder's "stake".
C. **Define Power:** Although the stakeholder's location on the chart is important, a verbal analysis of the power of the stakeholder is imperative to get a sense of how much influence the stakeholder has. For example, a government regulatory agency usually has extremely high power to influence the plan objectives– they can withhold their approval for different legal frameworks. The success of the plan execution is heavily dependent on keeping them informed on an ongoing basis.
D. **Define Interest:** Once again, the location of the stakeholder on the chart is expanded and analysed to determine what their interest within the BCV plan really is. The stakeholder's business interests are analysed and prioritised. Their needs

and wants must be described to a point where the stakeholder is well understood by the BCV plan management team.

E. **Develop the Stakeholder Engagement Approach:** The stakeholder communication needs are itemised based on the power and influence analysis. Once the interest and needs of each actor involved in the BCV plan are identified a different approach will be employed for each stakeholder category. For example, based on the identified barriers during the +CityxChange project, legal framework recommendations will be proposed at the local and national levels targeting the policymakers. Taking into account that the Bold City Vision plan is a projection of SDG and European Green Deal strategies at the local level, a proper legal framework needs to be done in order to achieve carbon neutrality through sustainable means. Regarding academia, colleges, and mostly the local Universities, a research-friendly environment will be created in which the outcomes of the research projects will have the opportunity to be quantified in real-life challenges. In general, the research results provided by Academia tends to be dominated by theoretical aspects rather than applicability in real-life fields. In this regard, within the BCV plan facilitates the cohesion between local industry and academia from a research perspective. The research institutions must maintain an open, transparent, and regular dialogue with representative industry associations. Extensive and early engagement from all stakeholders is key for achieving an agreement on the final form of Bold City Vision Plan and therefore ensuring its implementation.

The process of engaging citizens critically involves the monitoring of local conditions and aspirations, as well as an emphatic acknowledgement and celebration of local initiatives likely to add to the growing portfolio of people, passion and action driving the SDG Agenda. Some forms of engagement will be more conducive to long term success and knowing what behaviours to amplify will make public resources go a lot further. Based on previous acquired experience, The Municipality of Alba Iulia traditionally tends to be more geared towards democratic innovations as ways to legitimise top-down change, and make sure the change process is inclusive.

Smart citizens are at the heart of the smarter city process. Improving citizens' quality of life, offering quality jobs, creating a more equal and inclusive society, all while becoming more sustainable, will be at the core of smarter cities. Citizens have an important role to play in developing and implementing smart city strategies and solutions. A successful smart city will reach out to, empower and engage with its citizens to capitalise on their potential as co-creators of urban solutions [12]. We are aware that lack of proper engagement can result in delayed or cancelled measures due to not having the community's support and acceptance. Meaningful local engagement will always result in a better sense of community ownership, understanding and awareness of how their community could become a Positive Energy Block and lead the transformation towards Positive Energy Districts and Cities.

Currently the council has an online mapping tool for citizens to report, view, or discuss local problems (graffiti, broken paving slabs, or street lighting). Alba Iulia Municipality is planning to develop an online participatory budgeting platform through an EU project starting at the end of 2019. There is a Local Community Barometer (Alba Iulia Smart City, 2019) at a testing

46 phase, being developed by the Municipality in partnership with the local university, for diagnosing the community support for the planned development projects. Citizens will be able to participate using this tool to give their opinion regarding different issues at the local level, no participation data is available yet.

A.6.4 +CityxChange Partner collaboration during and after the project

A.6.4.1 Moving forward

When planning such complex strategies as Alba Iulia's Bold City Vision Plan 2050 the risk management assessment needs to be considered from the beginning. The applicability over 20 years as well as the challenging number of targeted actors within the proposed plan involve a large number of dependent and independent variables which may be taken into account during the development stages. However, the risk management plan needs to be updated at each implementation stage due to several factors, as:

- Voting cycles -> For 20 years, there will be 4 electoral cycles in the city of Alba Iulia therefore most probably a transition of the personnel will happen within the Municipality administrative apparatus;
- National Political Context;
- European Political Context.

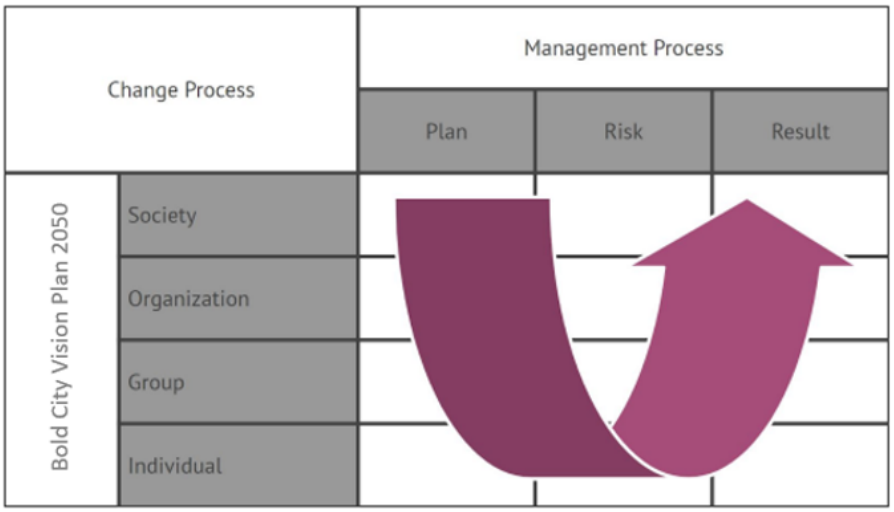

Fig. A.11: Risk Management Approach

The current management risk strategy is inspired by the work of Otto Scharmer (2009)[37] on system theory and system innovation. It is assumed that societal change is a process of becoming a community where individual, group and organisational actions are mutually constituted across time and space. The Scharmer's system innovation process is mapped on to a generic version of the cities' own enterprise management processes, recognizing that all cities have a more or less routinised way of dealing with planning, risk management and performance management. The main purpose of the risk assessment procedure is to understand what functions and practices were prevalent at the intersection between these processes, as illustrated in Figure 9.

[37] Scharmer, C.. (2018). The Essentials of Theory U: Core Principles and Applications.

When structuring the Bold City Vision Plan 2050, and in order to handle the inherent complexity of transitioning entire societies in a smarter and more sustainable direction (transition process), the proposed risk management procedure has been optimised to deal with the following questions:

- How can the Municipality of Alba Iulia maximise their ability to identify and share local high potential solutions in order to meet their agreed goals? The Municipality is aware that investing in large numbers of research and pilot initiatives may lack both the ambition and the conditions conducive to large-scale impact.
- How can the Municipality identify and connect the financial, social and human capital needed to realise large scale socio-technical interventions, as those proposed in the current plan? There is a risk that ambitions are scaled down to fit local constraints instead of creating opportunities to mobilise the resources needed to truly scale the solutions to match the SDG-related challenges facing the city.
- How can the Municipality of Alba Iulia best manage the complexity, and thus the opportunities, involved in SDG-planning and action? A fragmented approach could undermine both local impact and the potential for large scale innovation, productive partnerships, and investments.

Besides the risks and barriers associated with community empowering, implementation and monitoring processes in the context of the energy transition in the local context, the Municipality is aware and also connected to the worldwide political and economical climate. An economic rebound after the COVID-19 pandemic has triggered price spikes for multiple commodities. In addition, the conflict in Ukraine has led to even further increasing energy prices and security-of-supply concerns. However, the transition to a lower-carbon energy system continues and even accelerates, and the coming decades will likely see a rapidly-changing energy landscape. In this regard, The Bold City Vision plan integrates a modular implementation structure always ready for updates and even changes of direction where necessary.

A.6.4.2 Financial Instruments

Among financial instruments on which the interventions and proposed actions relies on are:

A. National Recovery Resilience and Plan

As part of a wide-ranging response, the aim of the Recovery and Resilience Facility is to mitigate the economic and social impact of the coronavirus pandemic and make European economies and societies more sustainable, resilient and better prepared for the challenges and opportunities of the green and digital transitions.

B. Sustainable Development Operational Program – SDOP

The SDOP strategy is in line with the European Union's objective of conserving, protecting and improving the quality of the environment. At the same time, the SDOP is based on objectives aimed at ensuring social, economic, and territorial cohesion by supporting a low-greenhouse gas economy and by ensuring the efficient use of natural resources. The SDOP aims to maximise the added value of the financial support allocated to Romania from the European budget by financing the national and local development needs and proposed strategies.

C. Regional Operational Program– ROP

The strategic vision regarding the development needs that the ROP must meet is based on the analysis of the economic and social situation of the Romanian regions (in the National Strategy for Regional Development), which led to the identification of the main problems related with the following topics:

- Innovation and research;
- Digital agenda;
- Support for small and medium enterprises (SMEs);
- Low carbon economy

D. Horizon Europe

Horizon Europe is the EU's key funding programme for research and innovation with a budget of €95.5 billion. The programme facilitates collaboration and strengthens the impact of research and innovation in developing, supporting and implementing EU policies while tackling global challenges. It supports creating and better dispersal of excellent knowledge and technologies. It creates jobs, fully engages the EU's talent pool, boosts economic growth, promotes industrial competitiveness and optimises investment impact within a strengthened European Research Area. Legal entities from the EU and associated countries can participate.

A.7 Approach, Methodology & Methods Used

The transformation of our city into a sustainable habitat is a challenging and visionary undertaking because of the manifold fields of action such as energy infrastructure, mobility, and much more. These interrelated complex systems on different scales with many stakeholders involved are sometimes hard to grasp and even harder to manage; the transformation is a very demanding task. The approach of Alba Iulia's BCV methodology is based on the recognition of the fact that it has become increasingly important to consider longer-term possibilities to help anticipate the unexpected whilst trying to achieve ambitious goals in a complex and demanding environment. The overarching question was how a group can coordinate a common effort in a complex endeavour never seen before. Our answer is to create a shared future vision of what exactly a group wants to achieve in the long-term future, and that is represented by the Bold City Vision Plan 2050. To create a shared and effective Bold City Vision implementation process, the methodology has been developed in such a way that community and stakeholders' participation is firmly at the centre stage of attention. The project's proposal stated clearly that the BCV 2050 process needed to be a co-creation process between, industry, innovative SMEs, entrepreneurs, and citizens, tailored for each ambition stated and described within this document.

A.7.1 Overview of process

A.7.1.1 Data Collection methods

Different forms of engagement such as interviews, learning sessions, informal discussion sessions and similar workshops can be used as a source of data and information. Data is generated at different stages during the implementation of various project interventions. The generated data is initially captured and stored by partners involved in the implementation and management of the interventions, after which relevant data points are processed (where necessary) and shared to the appropriate data repository. The BCV data

collection strategy will focus on gathering information regarding: Distributed Positive Energy Block (DPEB), Community Grid, eMobility as a Service (eMaaS), storage solutions, Energy Trading and Flexibility Markets; regulatory and legal aspects; socio-economic and gender perspectives; and spatial and urban planning to support roll-out of Positive Energy Blocks, districts and finally the entire Alba Iulia city.

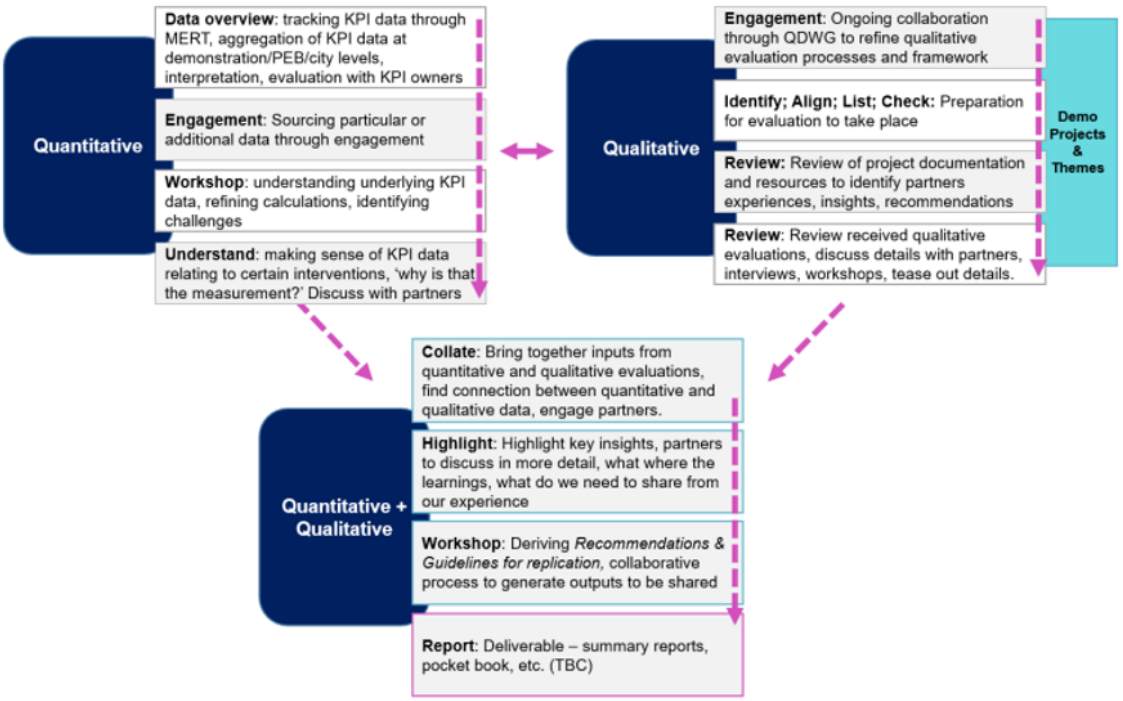

Fig. A.12: BCV's Data Collection Strategy

The evaluation of activities and interventions implemented through the 2050 Bold City Vision Plan will be done through a combination of quantitative and qualitative measures to ensure that impacts and results are assessed throughout the project lifetime, see Figure A.12.

A.7.1.2 Quantitative data

Within the Alba Iulia's 2050 Bold City Vision Plan the quantitative data collection strategy is developed in accordance with the "Collection Methodology for Key Performance Indicators for Smart Sustainable Cities" developed by United for Sustainable Cities (U4SSC) initiative[38]. These indicators have been developed to provide cities with a consistent and standardised method to collect data and measure performance and progress to:

- achieving the Sustainable Development Goals (SDGs);
- becoming a smarter city; and
- becoming a more sustainable city.

[38] Collection Methodology for Key Performance Indicators for Smart Sustainable Cities: https://unece.org/DAM/hlm/documents/Publications/U4SSC-CollectionMethodologyforKPIfoSSC-2017.pdf

The indicators will enable cities to measure their progress over time, compare their performance to other cities and through analysis and sharing allow for the dissemination of best practices and set standards for progress in meeting the Sustainable Development Goals (SDGs) at the city level. Within the considered dimension, there are sub dimensions that focus on more specific areas of performance and progress. An example is the ICT Infrastructure sub-dimension which provides a more in-depth view of how ICTs are deployed and used within a city (BCV Connectivity component). This collection methodology for the Key Performance Indicators for Smart Sustainable Cities provides cities with a methodology on how to collect data or information from key performance indicators (KPIs) for smart sustainable cities (SSC). Further, this strategy is the theoretical basis of the Quantitative Data Collection within the 2050 Bold City Vision Plan.

The quantitative side of the evaluation process will consider KPI data and other quantitative data as outcome of BCV plan, which will be reviewed and analysed to highlight trends or specific relevant data points to consider in the overall evaluation. KPI data is captured, aggregated and tracked through different tools, while ongoing engagement with partners will identify other quantitative data points to take into consideration.

A.7.1.3 Qualitative data

The qualitative side of the evaluation process will consider all the engagement with BCV's partners and stakeholders regarding the evaluation of the proposed objectives during the plan lifetime, interventions, and insights into quantitative data. This includes the evaluation of activities/interventions induced by the BCV (through feedback forms, interviews, informal discussions, group workshops) and the review of relevant projects

The development of the qualitative evaluation process is underpinned by four main pillars - Who, What, When, and How. Key elements defining each pillar are mentioned within the four columns. The description within the pillars (columns) provide an overview of some important aspects to consider in the evaluation process. All aspects are considered equally important and are not ranked or prioritised in any way. Key questions in defining the pillars could be summarised as follows:

- Who - Who is involved in the evaluation process?
- What - What information needs to be considered? Where does the information come from, and how is it managed?
- When - When does evaluation need to take place?
- How - How is the evaluation done? How is the evaluation reported?

The main themes used in the evaluation process include the following:

- Theme 1: DPEBs;
- Theme 2: Community Grids;
- Theme 3: eMobility as a Service (eMaaS);
- Theme 4: Storage solutions;
- Theme 5: Energy Trading and Flexibility Markets;
- Theme 6: Regulatory and legal aspects;

- Theme 7: Socio-economic and gender perspectives;
- Theme 8: Spatial and Urban Planning to support roll-out of PEBs, districts and cities;
- Theme 9: ICT architecture, ecosystem, and data integration recommendations on digitization and big data, ICT use, data management, security and protection.

A.7.1.4 Desk research

The Desk research during BCV's development and operability is basically involved in collecting data from existing resources hence it is often considered a low-cost technique as compared to field research, as the main cost is involved in executive's time, telephone charges and directories.
There are basically two types of desk research techniques proposed within BCV's plan:

A. Internal Desk Research (by the AIMitself)
Much Information could be generated internally within the organisation as a course of the normal process. The main advantage here in performing internal desk research is that it involves internal and existing organisational resources to organise the collected data in such a way that it is not only efficient but also usable. The BCV's progress and status at the level of AIMwill be continuously monitored.

Important steps have already been taken by the AIMtowards carbon neutrality. The city of Alba Iulia signed in January 2015 a collaboration agreement with the first energy observer based in Alba Iulia, within the Alba Local Energy Agency - ALEA – supporter of integrating energy efficiency measures and promoting the use of renewable energy sources at local and regional level since 2008. The municipality of Alba Iulia has access through the services provided by ANERGO to the database of own energy consumption (municipal buildings) as well as an image consumption in the tertiary buildings sector, the residential sector, public utilities, the fleet municipal, and other energy indicators revealed in the process of analysis of energy consumption in the aforementioned sectors. The database provided to the City Hall of Alba Iulia by the energy observatory provides the energy data needed to compile the necessary consumption and CO2 emissions inventories for the Covenant of Mayors. Energy data required for monitoring reports completed every 4 years by the City Hall of Alba Iulia for the Convention of Mayors are also provided by Alba Energy Observatory (ANERGO) and the municipality, benefiting in this way and support on the harmonised development of SEAP and SUMP databases. The Energy Observatory collects data from both local authorities and data providers. So far, no individual energy consumption data are collected in the residential and industrial sector.

The energy agreements with which agreements have been signed, the most important of which are:
- Electricity suppliers;
- Natural gas suppliers;
- Providers of public transport services.

- ANERGO processes the primary energy data, and following their processing and their adaptation to a common format, used for all localities in Alba County and in the development region "Centre", elaborates energy data compatible with:
- Inventories of energy consumption and associated CO2 emissions for the Covenant of Mayors;
- Inventories of energy consumption for Efficiency Improvement Programs;
- Energy for localities with a population of more than 5000 inhabitants;
- Energy efficiency strategies at local, county and regional level;
- other plans for sustainable energy development and the use of renewable energy sources.

Through Desk Research data collection techniques, the available information is used as a baseline from the Bold City Vision plan. Moreover, the already created database will be developed using artificial intelligence and machine learning algorithms in order to be able to effectively manage important collected big data. During the implementation of the 2050 BCV plan, several development stages need to be achieved in accordance with the technological level of the local and national energy infrastructure ensuring a well-defined interoperability with smart tools: demand and response, smart metering infrastructures, Renewable Distributed Sources etc.

B. External Desk Research

External Desk Research involves research done outside the organisational boundaries of the Municipality however collecting relevant information. These possible outside resources are described below:

- Online Desk Research
- Government published data: The applicability of BCV plan is directly dependent by the national current legal frameworks. The updates of international and national laws will be carefully monitored during the implementation of the BCV plan.
- Continuous assessment of involved actors desk research: One of the best and most prominent ways of extracting information for research is directly communicating with existing partners, networking. Valuable information is acquired from the professional and social associations and groups regarding the barriers they are facing in the process of energy transition. The feedback and information provided by the partners is the most accurate and useful data which can be used most effectively in the further process of BCV updates.

A.7.1.5 Interviews & surveys

One of the most valuable data collection technique is based on interviews and surveys which addressed to:

- BCV plan directly involved actors: stakeholders, public institutions, academia, citizens associations.

- BCV plan indirectly involves actors and target groups: actors whose economic, social and professional life will be affected by the implementation of the plan (citizens and stakeholders).

The purpose of design and development of a survey-based questionnaire and interviews is to collect qualitative information regarding partners' experience with plan interventions.

A.7.1.6 Workshops

Workshops will be used as a mechanism by BCV's implementation team to carry out evaluations of interventions, but also to validate and elaborate on feedback following the evaluation of interventions. Several aspects will be considered in the process of workshops organising, as:

- Delivering feedback on or shortly after events or activities take place;
- Sharing of 'event calendars' to inform the necessary people in advance of the activity;
- Setting up a structure for recurring evaluation of activities / interventions that take place throughout the course of the project;
- After action reports (based on planned interventions);
- Focus group exchange workshops (interviews);
- Making use of the template to guide interaction and gathering of information during engagement and project activities.

Moreover several co-design workshops will be employed during the implementation of BCV plan. The co-design workshops are meant to be public participatory events where people can work together through challenges, discuss issues, find consensus and create ideas and concepts which in turn will positively impact their own lifestyle and health.Citizens and end-users need to be actively involved in the design, development, implementation and, in updating the BCV strategy. This process follows a demand-driven approach encouraging participation and motivation, which also ensures that the final measures will be successfully implemented. The main objectives of the co-design workshops are:

Objectives
• Inform and activate end-users and citizens. • Receive feedback from end-users and citizens. • Incorporate end-users and citizens early in the development of briefs, action plans and proposals. • Co-create solutions together with end-users and citizens

Fig. A.13: General proposed objectives within BCV plan induced workshops

A.7.1.7 Citizen engagement – Storytelling events etc.

In the energy worldwide context, the municipality conducted a study in order to identify the challenges faced by the citizens (seen as energy consumers in the study) from a financial and life quality perspective. Within the elaboration of the BCV plan, it was considered both the direct and indirect interactions between energy and citizens. First of all, the common citizens are directly affected by energy-related costs due to the fact that this implies a relevant proportion of their income and in general, this gets their full attention. Based on the previous statement, obviously, the issues related to the energy mix flowing throughout their homes and their carbon footprint are topics of secondary importance, although the pollution consequences could generate health issues and other consequences that are already felt. One of the main ambitions of Alba Iulia's BCV plan is to increase the energy culture within the local society, specifically the level of awareness regarding the necessity of taking immediate actions for combating climate change and building a sustainable lifestyle for generations to come. Below, the outcomes of the study, which serve as the BCV plan foundation are presented and discussed. The study was performed using a survey method adopting the structured interview technique.

A.7.2 Survey results

Before planning and implementing any measures and actions in the Bold City Vision plan context, the Municipality of Alba Iulia conducted an energy consumption-related questionnaire in order to assess the interaction of the local community with energy consumption and associated public services. Community involvement at the local level in combating climate change means reducing energy consumption and increasing efficient use of earth's resources (renewable energy sources and circular economy). This must begin on the one hand with the needs of the Alba Iulia citizens but on the other hand, they need to understand the current context and get actively involved in this process. Therefore, the BCV plan emerged as a reaction of the municipality to the society's challenges. All five components of the plan have been designed to support citizens and create a sustainable and clean local environment. The aim of the questionnaire-based research was to find out all the details and possible dissatisfactions of consumers regarding energy consumption and its factors.

The first conclusion of the study is that more than 90% of the respondents to the survey see global warming as a threat to the planet, and therefore to their lives and the lives of future generations, see Figure A.14. Therefore, it can be concluded that the citizens of Alba Iulia are aware of the climate change and pollution harmful consequences however very few of them have actively participated (individually or collectively) in mitigating these consequences so far. Moreover, if relations between neighbours are assessed from collective action in dealing with energy efficiency, most people do not collaborate very often with each other (energy loneliness).

Based on the presented results a first local need is identified namely the need to create energy collectives at the local level through which the Municipality together with other relevant actors in the field can disseminate information materials and campaigns, advice,

and recommendations on possible energy efficiency measures and/or information on non-reimbursable financing programs in the field of energy (see the implementation components).

Although in general, the air quality in Alba Iulia was within the limits the public opinion regarding this topic is slightly different, more than 70% percent of the survey respondents believe that the city is polluted, see Figure A.15. Through informational and educational campaigns the municipality will endeavour to ensure that all citizens of the city are aware of the sources of information on pollution levels in the city.

Regarding the public lighting system and the accessibility of public transport, the majority of the respondents are disappointed with the current situation. In accordance with the responses associated with Figure A.16, when the citizens were asked to choose a level of approval for the affirmation "The way I use energy sources at home has an impact on the environment " 89% agreed that their energy consumption contributes to the environmental pollution, see Figure A.17.

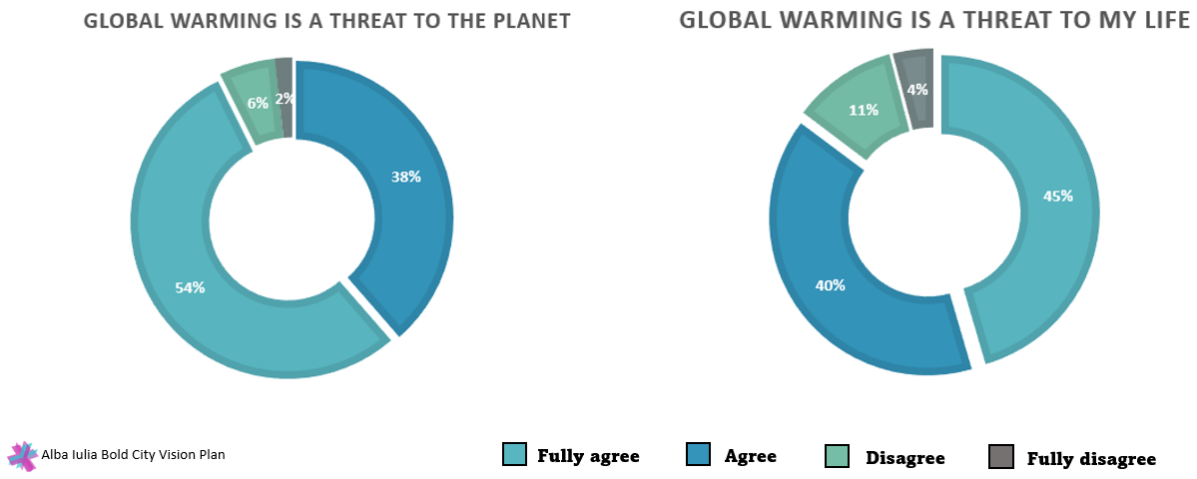

Fig. A.14: Public opinion regarding global warming

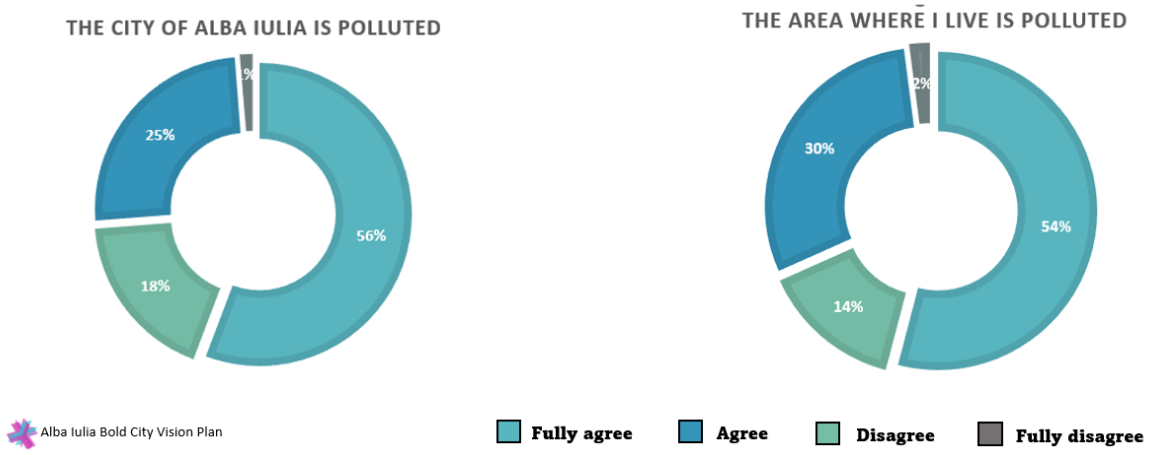

Fig. A.15: Public opinion regarding the Alba Iulia level of pollution

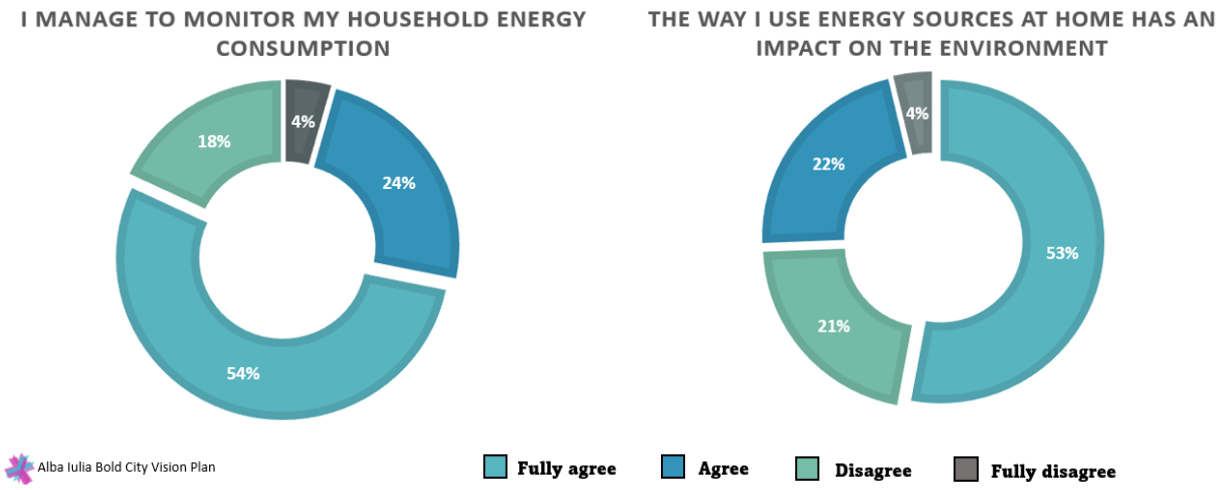

Fig. A.16: Public opinion regarding home energy use

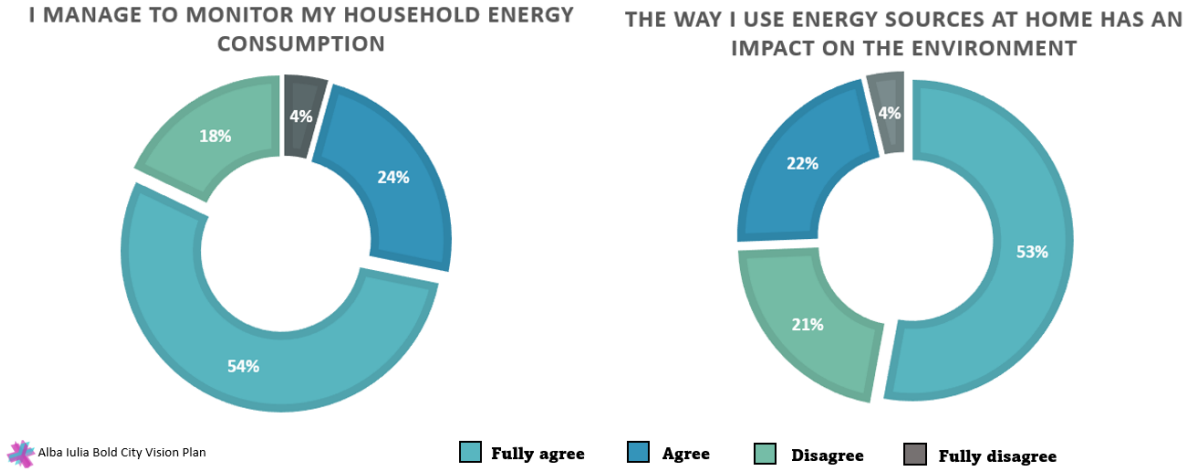

Fig. A.17: Public opinion regarding public services

A.7.3 A holistic strategy toward a sustainable energy transition

During the BCV plan implementation and monitoring process, community engagement will be a priority for the Alba Iulia municipality. The AIM will engage its community to understand the experience, needs, priorities, and more. Common outreach channels will include website updates, email campaigns, fliers, etc. Outreach doesn't ask for community members to respond, but rather listen.

The complexity of the AIM'sBold City Vision Plan requires the involvement of the local and regional administrative and executive apparatus. Starting from the Mayor's office, which will coordinate and provide the final review of the document, the BCV is the result of the cooperation of all the experts working within Alba Iulia's administrative and executive departments.

During the elaboration of the Bold City Vision plan, several partnerships have been employed/developed by the City Hall of Alba Iulia with international institutions, experts from abroad in different fields, private companies of national and European size, and global and the local and national Universities. Valuable reports and conclusions emerged from

these partnerships as well as experiences accumulated and the products realised within transnational projects with financing non-reimbursable in which the City Hall of Alba Iulia was or is a partner, etc.

Thus, one of the elements that inspired the development vision is a previous partnership for technical assistance concluded between the City Hall of Alba Iulia and the World Bank in 2015. Within the partnership, a methodology for prioritising projects was developed for long-term development, and prioritisation resulted in a long list. The report, which contains the methodology and lists of projects, also provides benchmarks for analysing a city's needs in three ways fundamental:

- the needs of citizens;
- the needs of tourists;
- the needs of companies, which constitute business environment;
- The needs of academia.

The Bold City Vision plan is meant to fulfil the needs of the city, identified with the support of external partners, in a sustainable manner, following the UN SDG recommendations and the European Green Deal policies.

Regarding the political commitment, The Municipality of Alba Iulia has already committed to the global (SDG's) and European ambitions regarding the reduction of CO2 emissions, making important steps towards reaching the milestones imposed by the aforementioned policies.

According to its current strategies, the city of Alba Iulia focused on 3 main directions of development:

A. **Improving the quality of life and creating a sustainable environment across the city;**
    a. Transport and mobility;
    b. Environment;
    c. Energetic sustainability;
    d. Urban regeneration and improvement of the quality of public services
B. **Increasing the attractiveness of Alba Iulia as a tourist destination**
    Tourism is a key sector from an economic perspective for Alba Iulia, therefore. In this regard, considerable efforts have been made to develop the necessary framework and tools to maximise the potential of local heritage and history.
C. **Supporting local entrepreneurship and business development across the region.**
    Under the third pillar of development strategy, the AIMhave initiated a process to create the appropriate environment for local business owners through: converting old industrial sites into state-of-the-art business friendly environments; creating financial incentives and policies to support entrepreneurs; development of incubators and business programs to create new jobs.

The information obtained from the evaluation of city strategies in the field of energy and carbon neutrality represents an important and valuable component of Alba Iulia's 2050

Bold City Vision Plan. The hard work employed by the Municipality over the years, for initiating the city's roadmap towards carbon neutrality, represents the BCV theoretical and practical foundation. The political commitment in creating a sustainable and clean environment for its citizens has been proven over the years therefore the BCV plan will be treated accordingly.

A.8 Impact, Outcomes and Results

By working together with the local community and experts, the Municipality of Alba Iulia has developed a strong vision for the city, creating a complex and clear picture of the main progress and development pillars for the years to come. The Municipality has built preliminary timelines of ideas, proposals, and schemes that underpin the roadmap towards achieving carbon neutrality by 2050 while eradicating energy poverty and creating a sustainable and healthy lifestyle for Alba Iulia's citizens. It is important to mention that the BCV Plan was developed in close connection with other city strategies in the field of energy and sustainability, all with the aim of mitigating pollution and climate change's harmful consequences. The Municipality is aware that at the centre of Alba Iulia's development and progress must be the community and therefore empowering the citizens is the main priority for the BCV implementation team. Within the BCV Plan development stages, it was established that in the next 30 years the city's ambition is to stay ahead in technology and innovation.

The Municipality of Alba Iulia is committed to achieving a sustainable development dividing the efforts in five directions – Energy, Connectivity, Circular Economy, Health and Well-Being, and Homes and Communities.

The Municipality of Alba Iulia, through the local public authority, alongside with other (de) centralised public institutions, as well as through the involvement of the local community and the private sector will aim to make a significant contribution to ensure security and continuity in energy supply, with reduced impact on the environment (renewables), pollution and human health.

The connectivity component is treated considering two different perspectives, mobility and ICT infrastructure (spreading Internet of Things concept and technologies across the city).
From a mobility perspective, the AIMaims to outline ways in which the city is transformed and evolves to serve the citizens with services of green mobility, traffic, and parking at the highest level, comfortable and clean, based on the most advanced technologies and principles in the field. Regarding the ICT infrastructure, the Municipality will consider measures and initiate projects to ensure that digital technologies such as artificial intelligence, blockchain applications, 5G, cloud and computing, and the Internet of Things can accelerate and maximise the impact of policies to address changes regarding climate change and environmental protection at the local level.

Extending the circular economy to the main economic actors will make a decisive contribution to achieving Alba Iulia's neutrality by 2050 and to decouple economic growth from resource use, while ensuring the city's long-term competitiveness and that nobody is

left behind. In terms of the fourth component, the priorities of the local administration are to fully eradicate fuel poverty across the city by 2050 taking measures to combat challenges such as inadequate levels of essential energy services such as lighting, heating/cooling, appliance use, transport, and many others.

The main purpose of the BCV fifth component is to raise awareness within the local community regarding climate change and excessive pollution consequences improving the citizen's energy culture which in turn will actively stimulate the community involvement in the city pathway towards climate neutrality by 2050.

During the BCV implementation, the Municipality commits to work tirelessly in order to fulfil the assumed targets and KPIs thus transforming the city into a sustainable and equitable living environment for everyone. Keeping in mind the worldwide context and the economic volatility of the moment, the BCV Plan is designed based on a modular approach that will be periodically adapted to the current needs of the city and its citizens. In this regard, a regular series of interconnected meetings will take place across the city to encourage information, thinking, and ideas to flow all materialised in BCV's Plan efficient monitoring processes and upgrades.

A.8.1 Lessons Learned

Developing the Bold City Vision Plan was a difficult task that implied multi-creational processes, community engagement, and several designing stages all providing valuable experience and important lessons learned.

In terms of energy consumption and generation having the greatest impact on the local carbon footprint, the Municipality learned that major challenges are the reduction of energy use in the existing built-up environment and releasing energy for other purposes. Based on several studies conducted at the local national and local levels it can be stated that it is important to reuse the existing infrastructure while upgrading and supplementing according to life-cycle analysis. Developing green infrastructure will mitigate climate effects, and building resilience through ecosystems will benefit public health.

Regarding mobility, the local administration learned that private cars are not compatible with building sustainable urban environments. The disproportionately large space that private cars claim in relation to other means of traffic makes it socially unsustainable. By transferring traffic routes from Alba Iulia, large land areas can be liberated for other use such as housing and public space, improving the provision of services and public transport, cycling, and walking.

There is an urgent need to promote the circular economy in urban development thus supporting the residents in the shift towards a low-carbon footprint lifestyle. This implies facilitating citizens' smarter consumption, recycling, shared economy, and pushing for a more climate-friendly behaviour which could also lead to a higher quality of life.

In terms of governance, the Municipality learned that one efficient methodology serving as a grounding start for the local goals and targets in terms of sustainability is to use global frameworks and international experiences. In addition, the Municipality must provide improved risk assessment and policy implication studies before introducing new policies at the local level. Policy measures might be positive in many ways but can have a negative impact on segregation, integration, and social sustainability.

Annex B. Pisek - Bold City Vision 2050

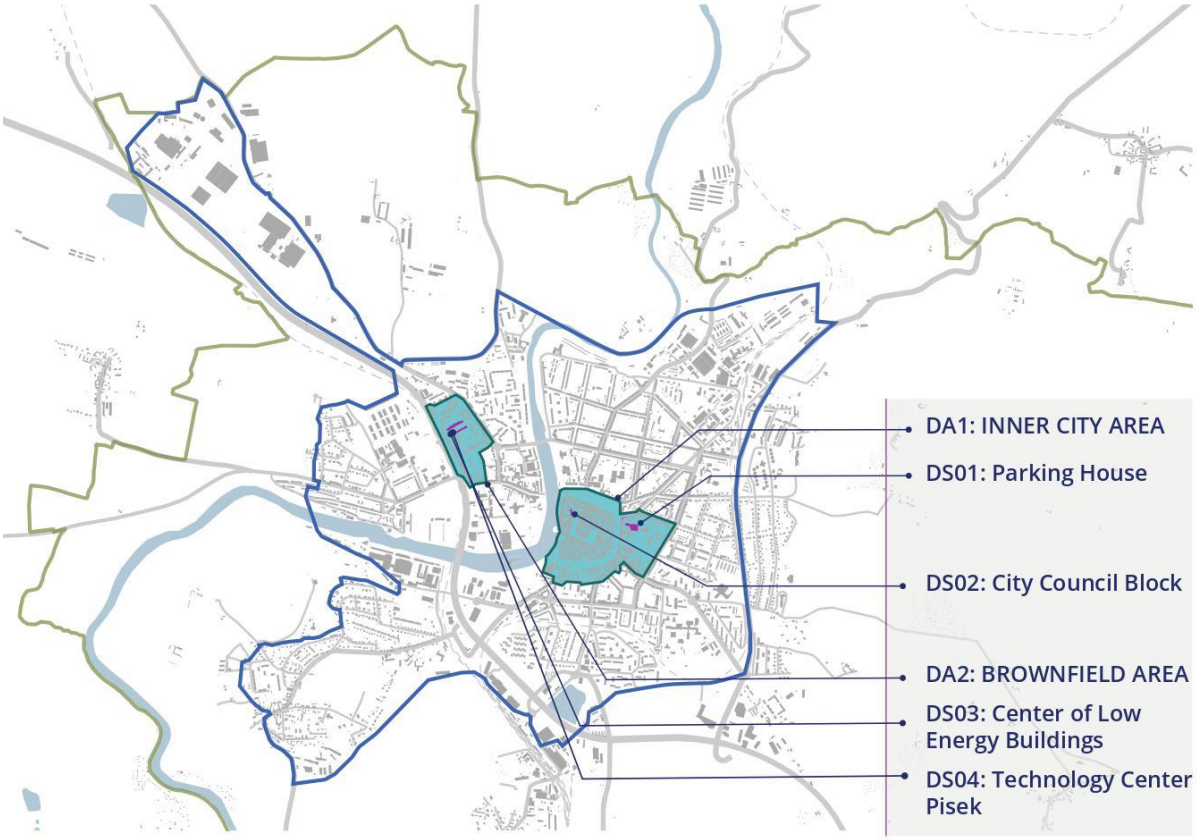

Fig. B.1: Aerial Map of Písek

B.1 Introduction & City Overview

Fig. B.2: Photograph of Pisek Centre

B.1.1 Characteristics of Písek

Písek (Czech pronunciation: [ˈpiːsɛk]).
The royal town of Písek is a medium-sized town with approximately 30,000 inhabitants, located in the South Bohemian Region, south of the capital city of Prague. Písek was founded in 1243 and is the third largest city in the South Bohemian region. The historic core of Písek is considered a city monument zone. In terms of innovation and the overall economic situation in the city, there has been a significant impact of foreign direct investment in the industrial zone located in the north of the city. The automotive industry and electrical engineering have the strongest influence. These are most often manufacturing companies such as Schneider Electric, Faurecia Automotive, AISIN Europe Manufacturing, or S.n.o.p cz.

Písek, as a former district town, is now a municipality with extended powers after the abolition of district offices in 2003. As of 31 December 2020, the city had a population of 30,379, of which 14,595 were men (48%) and 15,784 women (52%). With its population, Písek is the 37th largest city in the Czech Republic.

In 2020, the City of Písek generated total revenues of CZK 887,225,149 and total expenditures of CZK 802,781,931, thus reaching a budget surplus of CZK 84,443,218 as of December 31, 2020. Budget revenues decreased by CZK 41 million year-on-year. This decrease was realistically caused by a decrease in capital income, i.e. income from the sale of real estate, and further by a decrease in subsidy income. Tax revenues, which were expected to fall sharply due to the pandemic, decreased by almost CZK 26 million compared to 2019, but including the received compensation bonus of CZK 38 million, they increased by 2.2% year-on-year. Compared to 2019, budget expenditures decreased by CZK 61 million. This year-on-year decline, despite an increase of more than 40 million in non-capital expenditures, was caused by a 42% drop in capital expenditures.

Major innovations are taking place in the area of the old barracks, where two innovation centres have been built in recent years as a brownfield investment (total investment approx. EUR 40 million). In the last few years, private business has flourished in Písek, mainly in the fields of information and communication technologies and software development. At present, the town of Písek is one of the most visited and architecturally beautiful towns in South Bohemia due to its location in the wooded landscape and its atmosphere.

B.1.2 Písek's Smart City Journey

Písek is a pioneer in the field of "Smart Cities" in the Czech Republic and is perceived as the most successful Czech city in this regard. In 2015, it was the first municipality in the country to adopt a comprehensive Smart City strategy, the so-called "Blue-Yellow Book" (named after the city's official colours)[39]. This document analyses the current situation, defines the basic pillars and presents the stakeholders who will be involved in the development.It

[39] https://www.mesto-pisek.cz/assets/File.ashx?id_org=12075&id_dokumenty=5399

specifically defines individual activities in relation to the specified areas, as well as financial resources that can be used in the implementation of projects. The basic pillars it defines are: 1) Intelligent Mobility, 2) Intelligent Energy and Services, 3) Integrated Infrastructures and ICT. The Blue-Yellow Book strategy is in line with the "Smart Cities and Communities" activities.

Table B.1: Pillars of Smart City Pisek

Pillars of Smart City Písek and opportunities for development

	Opportunities for Development
Smart Mobility	Traffic management and regulation - traffic telematics
	User-friendly public transport
	Sustainable logistics and urban services
	Tourism using emission-free transport (rentals, bike-sharing, development of cycle paths)
Smart energy and services	Energy management, energy saving solutions
	Promotion of renewable energy and combined heat and power
	Use of modern technologies to minimise environmental damage
	Smart management of urban services - efficient waste management, public lighting and water management
Integrated infrastructure and ICT	Intelligent management and networks for internal and public use, city administration and communication with citizens
	Monitoring, diagnostic and security systems (fault detection, asset protection, environmental monitoring, fire alarm)
	Intelligent payment systems (public transport, parking, "Písek card")
	Information systems (data collection, storage, processing, Open Data, etc.)

Smart Písek was created as an organisation designed to fulfil this strategic document and began its activities on 1 January 2017. The city of Písek cooperates with various partners in the development of Smart City, whether they are public institutions (ministries, universities) or private entities. Písek established official cooperation with the national government by signing a memorandum with the Ministry of the Environment, and a similar memorandum with the Ministry of Territorial Development is being prepared. Thanks to this, Písek is an ideal follower of the "smart city" for testing innovative solutions. Písek is the seat of the

"Czech Smart City Cluster", an association of private and public sector entities that actively participate in promoting the "Smart Cities approach", including Atos, eON, Schneider Electric, Česká Spořitelna, CTU. This association strongly supports the activities of the smart city in Písek and its members were among those who stood at the birth of the "Smart Písek Concept". Písek primarily focuses on areas that need to be changed, either because of cost savings in the future or to increase the quality of life of current and future generations. The main vision is to establish sustainable development in the areas of water management, environmental hygiene, technical and transport infrastructure, and socio-demographic and economic conditions.

Smart Písek is given very high national attention in the Czech media and the city is regularly visited by representatives of other Czech cities. Together with experts in ICT, energy and mobility, Písek has set up a "smart city coordinator", a professional coordination unit that works on the further development of the smart city and ensures the necessary cross-sectoral cooperation. This unit is directly subordinate to the city council and will be accompanied by a "Smart Písek Committee" with representatives of academia, ministries and non-governmental organisations (e.g. the Czech Smart City Cluster), which will involve important stakeholders.

Písek has excellent opportunities in providing access to Czech and European structural and investment funds through adopted comprehensive strategies and signed memoranda. The newly created "Smart City Coordinator" is the result of the "Development of Smart City Písek" funded by the European Structural and Investment Funds (ESIF) from 2017-2018. Across the Czech Republic, over 24 billion euros are earmarked for sustainable development and growth for the period 2014-2020, and specifically for Písek, these funds will go to the specialised implementation of "smart" technologies, cloud technologies, data management and open data, within the Integrated Regional Operational Program (IROP). Under the Operational Program Enterprise and Innovation for Competitiveness (OPPIK, priority 3) in conjunction with the national budget program EFEKT, funds are set aside for testing "smart grid" solutions based on the use of interconnections with smart street lamps and the introduction of electric cars, e-buses and development of real-time passenger data.

B.1.3 Energy status and environment

The Sustainable Energy and Climate Action Plan (SECAP) has compiled an input energy and emission inventory (BEI) for 2015. The balance of final energy consumption includes energy consumption in buildings, facilities, equipment and industry (belonging to the sectors owned by the city, tertiary sector, residential buildings and public lighting), subsequently includes the influence of road transport - passenger road transport, public transport and vehicles owned by the city, ie company vehicles, waste collection vehicles, city police, etc.

The building sector has a decisive influence on the city's energy balance. Energy consumption in this sector in 2015 was calculated at 195 GWh (76% of the city's total consumption). Municipal buildings, the housing stock and the tertiary sector are the most significant contributors to consumption.

From the point of view of energy carriers, the supply of heat / cold contributes the most to energy consumption, namely 157.5 GWh, i.e. 80%. The heat supply is provided by the company Teplárna Písek, a. S. With the help of the Smrkovice heating plant and the Samota heating plant. The distribution network consists of 26 km of pipelines and more than 240 heat exchanger stations. Another dominant energy carrier is el. energy with 12.4 GWh (7%) and natural gas with 7.2 GWh (3%). The share of energy from renewable sources was set at 4.6%. The operation of all 4,395 light points in Písek is provided by the municipal services of Písek s.r.o., which are the owners of public lighting. The condition of all the lights is no longer satisfactory and the sector is very expensive. There is an effort to unify the types of luminaires and replace the existing lighting with modern luminaires using LED technology. Current electricity consumption energy is around 2.06 GWh / year, which is about 8% of the total. The share of RES in the supply of electricity energy is 10.5%.

The biogas plant has been in full operation since January 2013. The electric power of the station is 1189 kW, the thermal power is 1177 kW, which is provided to the industrial park. The station is equipped with two prismatic fermenters, which can be operated on a non-binding basis.

Teplárna Písek a. S. Is 75% owned by the city. The heating plant consists of the Smrkovice heating plant and the Samota heating plant. Smrkovice is located south of Písek and its distribution network supplies approximately 60% of the housing stock in the city (together with the Samoty heating plant). [i] The total heat production of the heating plant is approximately 480 TJ, of which 337 TJ belong to the Smrkovice heating plant. The total output of the Smrkovice heating plant is 48 MWt + 7.8 MWel. Another important source is the Samoty heating plant / boiler room with a total output of 38 MWt. The heating plant has gradually restored its economy. The Samoty boiler house originally had three fuel oil boilers, which had already been dismantled and replaced by a gas boiler (18.35 MW). The spruce heating plant replaced the coal-fired boiler with a biomass boiler (10 MW) and supplemented the gas boiler (4.75 MW). At the same time, the pipelines from the steam pipeline to the hot water pipeline are being renovated.

There are a total of three hydroelectric power plants in Písek. The most famous power plant is the Pod Skalou hydroelectric power plant with an output of 74 kW. The power plant is located in the building of the former Podskalský mill by the weir on the right bank of the Otava in the very centre of the town of Písek. It supplies a total of 0.367 GWh of energy to the network annually. Electricity production here started in 1888, now it also serves as a technical museum (private property). Other hydroelectric power plants in the cadastral area of Písek are MVE Písek and MVE Václavský jez. MVE Písek is located on the embankment. May 1 at the department store and has an output of 320 kW, annually produces 1,362 GWh of electricity. Energy, in operation since 1951 (owned by E.ON). The Václavský weir power plant is located in the water treatment plant on the right bank of the Otava. The power plant has an output of 250 kW and produces 0.598 GWh of electricity. Energy (1993 - co-owned town of Písek)

In Písek there are several dozen owners of solar power plants, which are mostly located on the roofs of houses. The median number of PV panels per owner is 20 - out of a total of 72

owners. The total peak power of the power plants was calculated at 1,725 MWp. This output corresponds approximately to the production of 1,250 MWh of electricity.
In 2021, the Písek energy centre was put into operation - a dried sludge and biomass incinerator, which will process 3,900 tons of sludge per year. The city is implementing an energy management system, resp. Implements ISO 50 001.

B.1.4 Building stock

The city owns at least 106 heated buildings, which the municipality owns 100%. There are other buildings in the city in which the city has a partial stake, as it owns one or more units. The buildings owned by the city are managed by various bodies and organisations: Department of Education and Culture, Housing and Housing Administration, Lesy města Písku s.r.o., Teplárna Písek, a.s. and Čevak Písek, a.s.

In Písek, several kindergartens and primary schools have been revitalised using the EPC method (providing energy services with a guaranteed result) and thanks to the availability of some data, efforts to open city data and financial resources from savings, the "Energy Portal" of the city of Písek is implemented, including 6 public buildings, 19 kindergartens and primary schools.

Of the total number of 4,271 buildings in the city, more than 80% (3,464) were designated for housing in 2011. The total housing stock in 2011 consisted of 12,481 permanently occupied dwellings, of which 2,905 were family houses and 909 apartment buildings. More than 80% of flats at that time used central heating, with the average construction date of the housing stock being 1961 and only the housing stock already insulated.
The contributory organisation House and Housing Administration of the City of Písek was established for the purpose of managing residential property and non-residential premises owned by the City of Písek and for the performance of heat management in the city of Písek. As at 31 December 2018, the Housing and Housing Administration managed a total of 316 houses with 1,336 city flats and 3,201 privately owned flats.
Of the total number of 4,271 buildings in the city, less than 20% (808) in 2011 had a purpose other than housing. This list includes, for example, 71 industrial buildings, warehousing and energy production; 277 multi-purpose buildings (combining e.g. commercial, administrative and residential functions); 123 recreational facilities; 307 public administration buildings, school, cultural, sports, medical and social, trade and more.

B.2 Vision and Ambition for 2050: Bold Písek

The vision and ambition for Písek's BCV are outlined through the projects and activities listed in the section that follows. The list below outlines the main thematic areas within Písek's BCV. These are an integral part of fulfilling the concept of a bold vision for 2050. Písek strives step by step to fulfil this bold vision in the main directions that it has set.

A. Efficient energy management and creation of Positive Energy Blocks / districts

The European Union is working to expand alternative energy sources and reduce greenhouse gas emissions. One of these activities is also the Energy Plus Neighbourhood and Neighbourhood Program for Sustainable Development. At present, the city creates concepts and studies that relate to this issue, and above all seeks to implement energy management.

B. Citizen Engagement

Civic engagement is an integral part of every municipality and the city of Písek actively supports it with its activities:

- Workshops
- Open days
- Public hearings

All these activities aim to involve citizens in the events, to actively participate and co-create the future of our city.

C. Sustainable transport and mobility

Fast, green public transport is an integral part of any well-functioning city. Since 2021, the city has introduced a new concept of urban public transport that should be faster, more efficient and, above all, more environmentally friendly.

D. Písek, city for business

Cities and municipalities often have facilities that they do not use, and at the same time they have to finance their maintenance, but in the long run it is not advantageous to get rid of them (schools, kindergartens, sometimes non-operating cultural houses or cinemas). The city's goal for the future is to make efficient use of these vacant spaces and offer them to start-up entrepreneurs. Another goal is to open a business mini incubator that will support entrepreneurship in the city.

E. Climate resilience of the city and environmental education

The city sees education in the public field, and especially the young generation, as one of the most important activities. Environmental education is becoming a global priority to prevent environmental damage or combat climate change. The trend of environmental education is growing and individual countries are trying to link and unify strategies.

B.2.1 Climate Mitigation and Adaptation

The main targets for 2050 are related to reducing energy consumption, ensuring the use of renewable energy, increasing urban greenery, and climate change mitigation. Reducing energy consumption can be achieved by reducing energy intensity - through construction measures, technical systems, modifications to the operation of equipment or the introduction of a sophisticated system of measurement and regulation. Reducing final energy consumption is an important element in reducing CO2 emissions by 41%. Ensuring reliable, long-term sustainable and efficient energy supply and management, will be based primarily on the use of renewable resources. The aim is to increase the share of local RES production from the current 5% to 22.5%, which also corresponds to the national value for achieving the European target by 2030.

In addition to attractive public spaces, which are enlivened by properly designed and maintained greenery, it is desirable to increase the share of greenery in the areas built up

by buildings. Greenery is a key element in increasing ecological stability, as it supports higher resistance to extreme climate change, such as retaining rainwater, improving air quality and cooling spaces. To improve the city's resilience to climate change (e.g. heat waves and torrential rains), it is necessary to increase the share of greenery within the city, and thus implement in the city buildings or support the private implementation of at least 5 pilot green roof projects on existing and new buildings.

As part of mitigation, efforts are made to reduce and prevent the generation of greenhouse gases, both directly and indirectly. At the national level, the potential for reducing greenhouse gases is in the order of several million tonnes. This potential comes from industry, energy, final energy consumption, transport, waste, agriculture and forestry. In industry, the potential for reducing greenhouse gases lies in energy management and the reduction of emissions from production. The production, transmission and distribution of heat and electricity are the largest producer of greenhouse gases in the Czech Republic and therefore have the greatest potential at the national level. Final energy consumption in buildings generally represents the potential for reducing energy intensity through renovations and construction as well as their use.

The share of transport in total CO2 emissions is increasing, but increasing the share of alternative propulsion in road transport and shifting freight transport offers great potential for reducing greenhouse gases. Rising emissions from landfill waste offer the potential for further waste recovery and recovery. Local priorities for obtaining sufficient greenhouse gas reductions can be derived from these national areas.

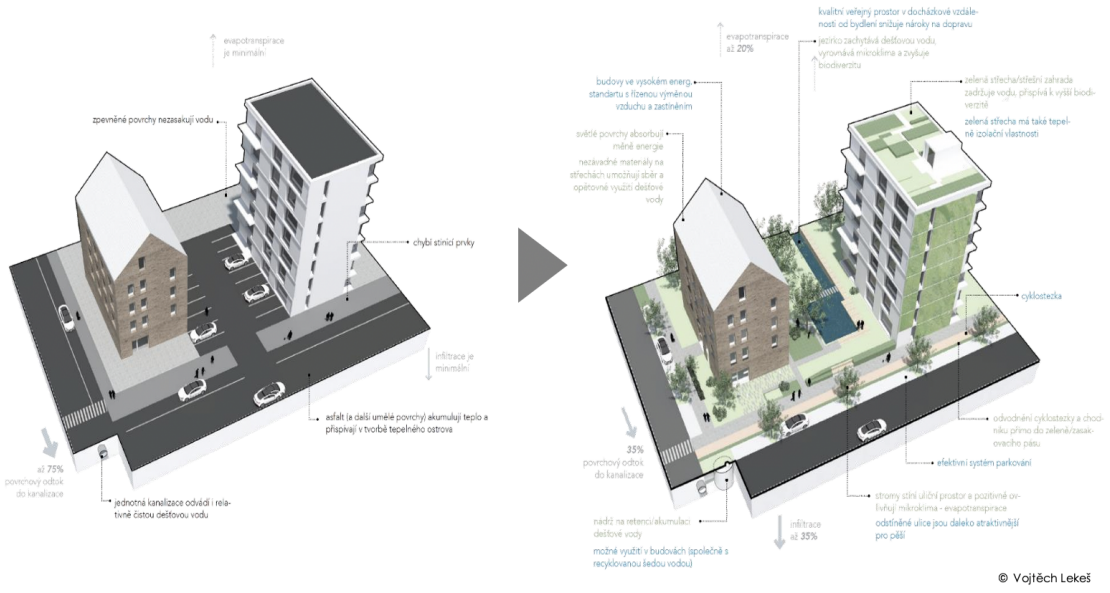

Fig. B.3: Example implementations of mitigation and adaptation measures

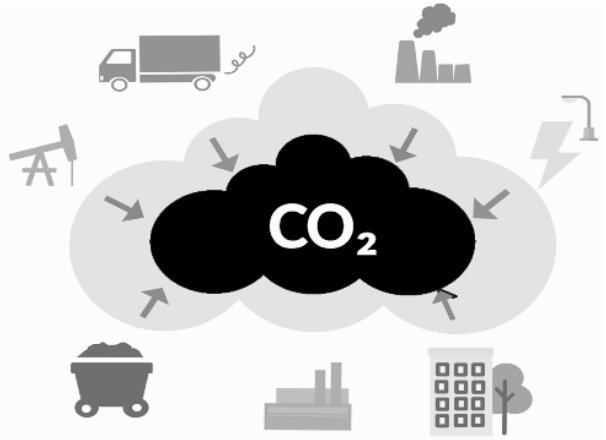

Fig. B.4: Potential CO2 reduction in a number of sectors

B.3 Development and Implementation of the BCV in Písek

This sub-section outlines the specific activities that are necessary to fulfil a bold vision in our city. These are specific steps the City is taking in this area. The following subsections are structured by the thematic areas outlined in the previous section.

B.3.1 Efficient Energy Management

The aim of the city is to introduce an energy management system at the level of the municipal authority and managed organisations. This is achieved primarily by creating a dedicated position of energy manager, formalisation and implementation of energy management processes, deepening and automation of energy data collection and their subsequent analysis.

The city of Písek manages more than 200 buildings, and has no centralised tool to deal with their management costs. There is therefore a significantly higher overhead than necessary. By creating a dedicated position for energy management and an assistant, in addition to the formalisation and introduction of energy management processes, deepening and automation of energy data collection and their subsequent analysis, will lead to significant savings.

B.3.1.1 Community Energy

Following on from previous projects, the town of Písek is actively trying to support the idea of community energy. In a situation where the climate crisis is resonating throughout the European Union, the replacement of fossil fuels with renewable ones is accelerating, and individual states are committed to achieving a significant reduction in greenhouse gas emissions by 2030 and carbon neutrality by 2050, the Czech state's efforts are weak.

Although the issue of community energy is one of the priorities of the European Union, the Czech government practically ignores these opportunities or reacts very slowly and the

state has not yet created a legislative environment for the emergence of energy communities, even if required by European directives.

The city of Písek, which is currently developing the Smart Písek initiative, does not want to be left behind. The aim of the project is, among other things, to reduce the energy consumption of public buildings by using smart technologies and installing photovoltaic power plants on rooftops. At present, a group of interested citizens has formed to deal with this issue, inform and educate other inhabitants of the city and are preparing for the time when it will be possible to implement the concept of community energy in practice.

Fig. B.5: Energetický šampión - díl 1.

B.3.1.2 Renovation of Municipally Owned Spaces

A central action to address efficient energy management is the renovation of municipally owned spaces as outlined below.

Place type	Residential buildings Commercial buildings Civic amenities

Target	Reducing the energy intensity of buildings Reduction of direct and indirect greenhouse gas emissions Reduction of water consumption

Measures	Construction measures ► Reduction of energy losses by improving the parameters of the building envelope ► By installing shading devices, eg external blinds Technical measures ► Replacing a local heat / cold source with highly energy-efficient or low-emission sources ► Utilisation of the energy potential of the environment - heat pumps, free cooling, photovoltaics, heat recovery ► Introduction of measurement and regulation + adjustment of building operation ► Use of grey water for flushing, rainwater collection, replacement of tap batteries with lever taps, introduction of multi-stage flushing and anhydrous urinals Soft measures ► Awareness programs that support user behaviour leading to energy and water savings ► Modification of the external environment to improve conditions around buildings, eg planting trees, shading, increasing the number of green areas, increasing air flow, eg by removing barriers

Indicator	Energy performance certificate of the building (consumption and emissions) Energy consumption Water consumption

Parties concerned	The town of Písek Contributory and other organisations related to the city of Písek

Funding	IROP - subsidy title for energy savings in apartment buildings NZÚ - a new green savings OPE - operational program of the environment OPPIK - operational program of business and innovation for competitiveness EFFECT - state program to support energy savings

B.3.2 Citizen Engagement

A number of activities have been developed to address citizen engagement as part of the BCV. The following paragraphs outline each of these and describe their implementation.

B.3.2.1 Hlava vPísku

One of the main tasks at the moment for the city is citizen engagement. To this end, the city organised the event called Hlava vPísku, which allowed people to visit places that are not typically open to the public. Citizens of the city could visit, for example, at a new water treatment plant, municipal heating plant, wastewater treatment plant, composting plant or waste sorting plant at a landfill. There was also the opportunity to go on a guided bus ride through the Písek mountains or a tour of the cinema building, which also serves as a shelter for homeless people. The discussion of the Czech climatologist Václav Cílek in the Municipal Library was also a great success.

Fig. B.6: Hlava v Písku 2021: city wastewater treatment plant tour

Fig. B.7: Hlava v Písku 2021: fire station tour

B.3.2.2 World cafe

This is a project to raise awareness of sustainability issues, especially among the younger generation. It includes a series of lectures at secondary schools in Písek, which aim to clarify this issue in the context of our city and at the same time obtain important information from the young generation, for example:

- their view of the city
- what the city is doing wrong and what is good,
- how to get involved
- what you like / dislike in the city.

This information is an important feedback for the city, on which it can continue to build and improve in relation to citizens of all ages.

B.3.2.3 Local days for the climate and energy of Písek

The town of Písek organises workshops for the public on current topics such as energy efficiency, the use of renewable energy sources and resistance to climate change.
In addition to outdoor events, panel discussions with high school students, screenings of energy and climate films and other related activities were provided.

Fig. B.8: Local days for the climate and energy of Písek

B.3.2.4 Competition “Indoor environment manager”

The competition implemented within the project "Comprehensive preparation and education in the field of reducing the carbon footprint and climate change" aimed to support the interest in energy management in buildings and achieve the effect of spreading the debate on energy efficiency outside the school environment. This sub-activity was implemented in two phases, namely pilot verification and full implementation.

Participants compete for the best school manager based on the quality of the indoor environment and the best proposal for measures to achieve energy savings. The purpose of the competition is to involve primary school pupils in the activities of the City of Písek in the field of improving the environment in the region. The intention is to follow up on school teaching in the cross-sectional topic of Environmental Education, especially the thematic

area Relation of Man to the Environment. The competition is focused on a specific topic, which is the control of the quality of the indoor environment in school buildings and the proposal of measures to achieve energy savings. The key indicator of the quality of the indoor environment is the concentration of CO2. Pupils measure the values of this gas in the school classroom during the competition. They then process their knowledge into proposals for optimising the classroom environment. All this with the support of organisational unit Smart Písek. The quality of the indoor environment in buildings is a current professional topic. The so-called quality managers of the indoor environment deal with its optimization.

B.3.3 Sustainable Transport and Mobility

In the first phase, the city decided to equip 19 selected public transport stops with information elements that will inform passengers about departures, possible delays and emergency situations. The City of Písek is cooperating with Busem on the equipment of these stops and public transport vehicles, so that it is possible to obtain current traffic data and, as a result, pass on current information to passengers.

Since the beginning of 2021, five ecological electric buses and two Compressed Natural Gas (CNG) buses have been running in the city. The new buses have been in full operation in Písek since 13 December 2021, when the new timetables were also applied. At the same time, a new bus line system will be launched, which will, for example, simplify timetables and reduce the number of lines from eleven to six. This will reduce CO2 emissions, which is one of the city's main goals.

Fig. B.9: Schema: city public transport

B.3.3.1 City Fleet Pisek

The city fleet includes vehicles operated by the city administration and city contributory organisations, there are a total of 19 cars and 1 fire truck, operated by the following organisations: Písek City Hall, Písek City Police, Volunteer Fire Department, Písek House and Housing Administration, City Social Services Center Sand. Of these 20 cars, 2 are electrically powered.

The strategic document MKSP (Blue Sand Yellow Book) responds to the city's vehicle fleet directly and indirectly through the pillars of 'Sustainable Urban Mobility' and' Intelligent Mobility. The area of the Intelligent Mobility pillar is the management and regulation of traffic in the city (including cycling and traffic at rest) through transport telematics, administrative measures and the planned development of urban transport infrastructure. It finds opportunities for development in the possibility of using passenger and commercial electric cars by the town of Písek and its organisations as users. Within this project, it is necessary to test the operation of vehicles, as well as the use and utilisation of vehicles. Another opportunity is identified in the form of intelligent information systems supporting

and optimising low-emission mobility in the city, which can, among other things, provide online information on the location and occupancy of charging stations for electric vehicles.

Place type	The whole city
Target	Reduction of emissions from city fleet cars and reduction of space requirements (transport at rest) and associated cost optimization.
Measures	Technical measures ► Replacement of vehicles with internal combustion engines with vehicles with alternative propulsion (see below) ► Purchase of e-bikes / electric scooters ► Reducing the space requirements of cars - transport at rest Soft measures ► Optimization of the number of vehicles together with the creation of a system for sharing vehicles and bicycles
Indicator	Percentage of low- / zero-emission vehicles Emissions produced
Parties concerned	The city of Písek The municipal organisations
Funding	Operational programme Transport

Fig. B.10: Electric charging station

According to general measures in the transport sector, it is recommended to increase the number of charging stations in the city from 4 to 50. This will make electromobility in the city more attractive and increase the number of electric cars. For vehicles that fall under the city's vehicle fleet, a partial replacement of existing means of transport for vehicles from renewable energy sources is proposed by 2030. The purchase of eight electric cars is being considered, ie. with the current two electric cars, alternative propulsion vehicles will already make up 50% of the city's vehicle fleet.

► 8 electric cars = 50% of city vehicles

► Costs 5.8 million CZK out of 30% (1.7 million) covered by subsidies

► Reduction of emissions by approximately 13 t CO2 (When driving 20,000 km / year per vehicle)

► Possible connection to public lighting infrastructure

B.3.3.2 Public Transport

At present, public transport is operated by ČSAD AUTOBUSY České Budějovice a.s. Písek has a total of 11 Písek public transport lines in operation and is served by five buses. Modern low-floor buses are in operation, the original CNG buses are used by the company outside the town of Písek. The annual raid is approximately 300 thousand. km within these five buses.

Although there is this bus network in the city, independent observations have found its low popularity and therefore its busy schedule. Public transport planning is complicated because the data is not collected by the city and there is no accurate idea of the load on the connections. As a result of the unconventional concept of public transport and the inflexible adaptation to the needs of potential users, urban bus transport is currently a non-competitive alternative to road transport.

Place type	Center of city Peripheral and rural parts of the city Industrial zones

Target	User-friendly emission-free public transport with an increased quality standard supporting a modern passenger information system.

Measures	Technical measures ► Emission-free public transport (see below) ► Construction of a fast charging station for daily operation Soft measures ► Increasing awareness of public transport and user comfort (eg Písek Card 2.0) leading to an increase in the number of passengers ► Streamlining public transport lines - Aggregation of data from the public transport operator, continuous evaluation and adjustment of lines (see below)

Indicator	Number of passengers / year Direct CO2 emissions

Parties concerned	The city of Písek ČSAD Autobusy České Budějovice, a.s.

Funding	Operational programme Transport

ČSAD, in cooperation with the city, will achieve the complete replacement of the existing buses with 5 electric buses with a total value of CZK 50 million, with 85% coverage of subsidies, ie CZK 42.5 million. The remaining amount for costs should come from the ČSAD budget. Buses could draw green electricity from the city's charging stations, which are part of the city's individual mobility measures.

Fig. B.11: Electric bus

Implementation of partial measures according to Smart Písek concepts to create a full-fledged form of transport used by residents, passers-by and tourists. Modification of public transport lines to create a more attractive functional line. Continuous collection of

vehicle occupancy data. Integration of the Písek card 2.0 for check-in with a contactless chip card within the integrated system in the city system.

B.3.3.3 Car and Freight Transport

The town of Písek is part of the crossroads of transit traffic between the towns of České Budějovice and Plzeň. These two regional cities are connected by first class roads I / 20. In the section between the towns of Písek and České Budějovice, this road is also used by vehicles heading for the alternative route from Prague to České Budějovice, and therefore the traffic intensity here reaches high values.
Another first class road is road I / 29, which intersects in Písek with road I / 20. It also serves Písek as a bypass (eastern part), unfortunately passing through a significantly built-up area. This road can be used for the directions of Tábor and Milevsko and further in the direction to the east of the Czech Republic. The town of Písek is significantly burdened by transit traffic, it is on one of the routes connecting the capital with České Budějovice. Traffic is significantly affected by the first class road I / 4, which brings traffic from the direction of Prague and Strakonice, connecting to the road I / 20 through the level crossing Nová Hospoda 7 km north of Písek.

B.3.3.4 Transport at rest

The city's long-term goal is to reduce the number of parking spaces in the center by a third. Therefore, the city created tariff parking zones: Tariff zone I - Velké náměstí, Alšovo náměstí, Jungmannova ul., Chelčického ul .; Tariff band II - Komenského street, Fügnerovo náměstí, Bakaláře, Gregorova ul.,
Píseckého ul .; Tariff zone III - In Karla Čapka Street (parking lot at the hospital), nábřeží 1. máje (parking lot at the House of Culture).

Place type	Local communication Parking
Target	Car-free city centre (connection to other forms of transport and transport in peace in other parts of the city) (see below) Smart parking system with connection to other modes of transport Increasing the share of emission-free drives in transport Speedup and simplify the passage for motorists for whom Písek is only a transit point and thus reduce locally produced emissions

Measures	Technical measures ► Revitalization of the historic centre reducing traffic at rest and construction of alternative parking (see below) ► Construction of a charging station for electric cars - connection to public lighting (see below) ► Technical and administrative support of commercial and community charging stations (VO) ► Smart Crossroads - Use traffic data to coordinate traffic flows and traffic planning Soft measures ► Development of a Sustainable Mobility Plan ► Monitoring and regular census of urban road traffic (beyond RSD) ► Promotional and information campaign for the use of public transport and bicycles ► Support for alternative drives in transport ► Support and efforts to accelerate the construction of important transport structures - the northern ring road, etc.

Indicator	Percentage of low- / zero-emission vehicles Emissions produced

Parties concerned	The city of Písek The city of Písek (City services Písek s.r.o.) ŘSD ČR E.ON a ČEZ Citizens

Funding	Operational Program Transport Financial instruments Alternative ways of financing

At present, there are two projects in the territorial management phase supporting traffic calming in the centre and addressing traffic at ease.
Revitalization of the historic centre of Písek
In addition to the new furniture and greenery, the project envisages a 33% reduction in parking spaces. As part of this measure, we recommend a significant increase in traffic reduction at rest in order to achieve the maximum positive effect (see Chapter 5.3 adaptation measures) and cooperation with the parking house.
► Traffic calming of the historic centre
► Significant reduction in the number of parking spaces
► Costs for the revitalization of the centre CZK 40-80 million
Parking House

Multi-storey building (and two multifunctional buildings) with min. The 250 parking spaces will serve as a central parking space for the historic centre and surrounding areas.
► 250 parking spaces, a sufficient number of spaces to cover reduced spaces in the centre for residents and short-term parking for the centre's services
► Costs +120 mil. CZK

B.3.3.5 Support for emission-free transport

Gradual installation and increase of 15 city-owned charging stations. According to the nationwide trend, it is considering increasing the total number of charging stations in the city to 50, while supporting the construction of other stations in the city by adapting VO distribution cables (see chapter VO). Of the 15 pieces mentioned, 2 charging stations are already in operation. For the new 13 stations, the purchase of 11 "classic" stations and 2 fast charging stations is being considered. The classic ones are suitable, for example, for department stores or parking centres with a charging time of 1.5 hours to achieve 80% of the car's battery capacity. Fast charging stations reach 80% capacity in just 30 minutes of charging. These stations are suitable for more frequented places, e.g. near major transport links. The investment price of 11 conventional stations is estimated at CZK 1 million, while the costs for the construction of two fast charging stations are estimated at CZK 1.3 million.

► Gradual installation of 13 charging stations
► The cost of the measure is approximately CZK 2.3 million
► Achieving a 3% share of electric car use in the city would reduce CO2 emissions from the individual transport sector by 624 tonnes.
► Another charging option is offered by the modification of VO poles (these public lighting)

The mentioned charging infrastructure is an essential supporting element and together with soft measures such as free parking, entry permits and reserved parking spaces (charging). These measures may not only concern electric cars, but also hydrogen-powered cars, and hybrids with emissions of up to 50 grams of CO2 per kilometre (types of cars that are likely to be exempt from road tax).

B.3.3.6 Bicycle Transport

Písek has a very good potential for the use of an alternative emission-free mode of transport - by bicycle - due to its size and the nature of the terrain. The majority of buildings and transport relations and connections usually take place on a plain or with a relatively slight elevation gain in the order of units of metres. The total length of the network of cycle routes is 55.6 km, but cycle paths are being built mainly in suburban areas. There is only one cycle path in the city centre, on the right bank of the Otava between Kamenný and Nový most (elsewhere, cycle paths do not fit in the street area). In the past, the so-called radial concept of their management was chosen for the construction of cycle routes, with one central point on the right bridgehead of the Stone Bridge, where all cycle routes from the surrounding area converge, so every cyclist should ideally arrive at this point and decide there. whether he will stop in the city or continue.

The negative phenomenon that affects cycling in the city is mainly the congestion of some key roads and stabilised historic street profiles with heavy car traffic in combination with motor vehicle parking. Adapted transport infrastructure exposes cyclists to a greater potential risk of collisions with cars. Between 2007 and 2018, there were about 90 cyclist accidents in the town of Písek and in its immediate vicinity.

However, the use of bicycles is increasing and the city, through strategic documents, aims to support tourism using emission-free transport through bicycle sharing and support for the development of cycle paths. Bikesharing has already proved its worth in Písek. The city has within its secondary goals of expanding electromobility in tourism, in which the city in 2018 supported the South Bohemian Region and donated four e-bikes to the public. In addition to these e-bikes supporting tourism, the operation of the Rekola service was launched in 2019, which involved sixty pink bicycles in the city for transport within the city. In just one month (July 2019), a distance of 2,330 kilometres was covered in Rekola, which is equivalent to saving 350 kg of CO2 compared to driving a car.

Place type	Center of city Peripheral and rural parts of the city
Target	Increasing the share of bicycle traffic in the city to 5% Increasing the attractiveness of cycling by reducing the number of accidents, increasing the safety of cycling and stored bicycles.
Measures	Technical measures ► Improving the permeability of the area through revitalization, interconnection and completion of key cycle routes ► Integration of bicycle transport on important streets ► Construction of storage rooms and stands - public space, bike & ride and civic amenities ► Improving the connection to public transport - connecting routes to stops (train and bus) with the possibility of storing bicycles Soft measures ► Support for bike sharing, so-called bikesharing - commercial and urban ► Update of the zoning plan, for greater consideration of pedestrian and bicycle traffic, protection of key links in the solution of existing and new developing areas
Indicator	The ratio of bicycle traffic to traffic in the city Number of km travelled on shared bikes Number of traffic accidents

Parties concerned	The city of Písek Shared services providers

B.3.4 City for Business

Every municipality strives to create a friendly environment for entrepreneurs. The town of Písek actively supports beginning entrepreneurs, through methods such as workshops. During the 5 meetings, participants will learn how to look for business ideas, safely test their potential and minimise risks with minimal risk and learn how to make the project financially sustainable.

Fig. B.12: Podnikni to! banner

B.3.5 Climate Resilience and Environmental Education

Several actions relating to climate resilience and environmental education are planned and taking place in Písek. These are listed below.

B.3.5.1 Climathon Písek

Climathon[40] is a worldwide event that takes place simultaneously in more than one hundred and fifty world capitals on November 13. It is a hackathon focused on climate change. This event will bring people together with the enthusiasm and ability to address the challenges facing cities. Climathon attracts innovators, entrepreneurs, students and professionals to propose new solutions to climate change issues for cities. Most cities in the world face these problems. Písek joined the event this year for participants defining the main competition area. The competition is aimed at improving the quality of the

[40] Refer to upcoming deliverable *D10.14: 9 Climathons* for further details about +CxC Climathons.

environment in Písek, specifically the use of water in the city, the drying up of cities and the loss of water in urban areas. The main goal is to raise awareness of ongoing climate change at the municipal level.

Fig. B.13: Climathon Poster

B.3.5.2 Covenant of Mayors and Sustainable Energy and Climate Action Plan

The City of Písek acceded to the Covenant of Mayors in 2017. The Covenant of Mayors for Climate and Energy is the world's largest climate and energy initiative for cities and municipalities, bringing together thousands of local and regional authorities.

The main target values that the city has set for 2030 are:

- Reduce CO2 emissions by at least 41% compared to 2015
- Increase the share of local production from RES from the current 5% to 22.5%
- Implementation of five pilot projects of green roofs on existing and new buildings

The goals set by the action plan, the analysis of the obtained data and their evaluation are currently underway. These feed into the development of the BCV and should be holistically addressed for a unified approach.

B.3.5.3 United for Smart Sustainable Cities (U4SSC)

A smart sustainable city is an innovative city that uses information and communication technologies (ICT) and other means to improve the quality of life, efficiency of urban operations, services, competitiveness and at the same time meet the needs of current and future generations on economic, social, environmental and cultural aspects.

The U4SSC is a UN initiative to achieve the goals of sustainable development and make cities and human settlements inclusive, secure, resilient and sustainable. U4SSC serves as a global platform for public policy enforcement and the use of ICT to facilitate the transition to smart sustainable cities.

The project aims to create a document that, according to established performance indicators (KPIs), evaluates how the city is performing in various areas (e.g. ICT

infrastructure, transport, employment, environmental quality, energy, culture, education, security). At present, Písek collects this data and creates the necessary documents that are necessary for the final evaluation of the entire project.

Fig. B.14: City Snapshot Gjøvik, Norway, October 2020

B.4 Impact, Outcomes & Results

During the +CityxChange project, the city of Písek has placed a considerable emphasis on the connection of its strategic plans and visions with European trends. Moreover, increased involvement of stakeholders, especially citizens, was found to be crucial. Although this area has been significantly strengthened, there is still room for improvement.

The key strategic documents are in particular the Sustainable Energy and Climate Action Plan, the Sustainable Mobility Plan, the Blue-Yellow book (Smart City concept) and the Blue-green infrastructure concept document. All these documents can be considered as next-generation strategic visions that partially or completely reflect the United Nations Sustainable Development Goals.

These documents serve as the foundation for the BCV of the City of Písek, which is the first connecting document that takes them into account. It is the isolation of the strategic documents and the isolation of the individual agendas that is the main obstacle to accelerating their implementation, or where opportunities are lost in the implementation of individual projects or measures. Furthermore, opportunities to fulfil many objectives or indicators at once are not adequately utilised by projects. Typical examples of this include street revitalisation, where green spaces or non-automobile transport are often neglected. Deficiencies in project alignment will be addressed in the upcoming years as part of the new municipal strategic plan (the current plan is valid until 2025).

The City of Písek has long been perceived as a progressive city in the Czech Republic with no significant economic, environmental, or transportation issues. This position allows Písek to focus primarily on improving the quality of life of its residents and promoting entrepreneurship. The city is moving towards climate neutrality in 2050 and, in the context of the events of recent years, towards strengthening the overall resilience of the city, in terms of mobility, climate, security, business and social aspects.

By adopting the BCV, the city commits to improve synchronisation between the different strategic documents and to implement the principles of the integral approach in the city's processes. Particularly, the multi-criteria evaluation of individual projects or activities and the early involvement of the stakeholders concerned, the use of innovative technical and non-technical solutions and the monitoring of the objectives achieved.

From the perspective of the City of Písek, the BCV is not a final and unchangeable document, but on the contrary a living document, whose content and wording must adapt to the present situation, and above all reflect the accomplished milestones and set new milestones on their basis.

B.4.1 Lessons learned

The creation of the BCV was a long-term process, the outcome of which in the form of this document cannot even come close to capturing the impact that this process had on the city of Písek. The main lesson learned is that the process is and must be gradual and based on mutual trust between all actors (officials, organisations, citizens, companies and many others)

The first key finding was the need to improve communication within the municipality. Only people who understand the strategic objectives of the municipality and their importance can identify with them and contribute effectively to their implementation. Equally, they then understand the needs of other actors and the reasons to support them.

Given the nature of the +CityxChange project, the need to work closely with the public, especially homeowners, was an entirely new experience. The project team had to assimilate a large number of new methods for promoting citizen-city communication and adapt many of them to the local conditions and mentality. In particular, the task of transforming feedback into actionable outputs initially appeared to be problematic. This problem was solved mainly by consistently localising general issues down to the level of the specific street.

From the perspective of the city management, a fundamental finding is the need to strengthen the principle of data-driven decision-making and the consistent implementation of set targets or indicators in strategic documents.

Annex C. Võru - Bold City Vision 2050

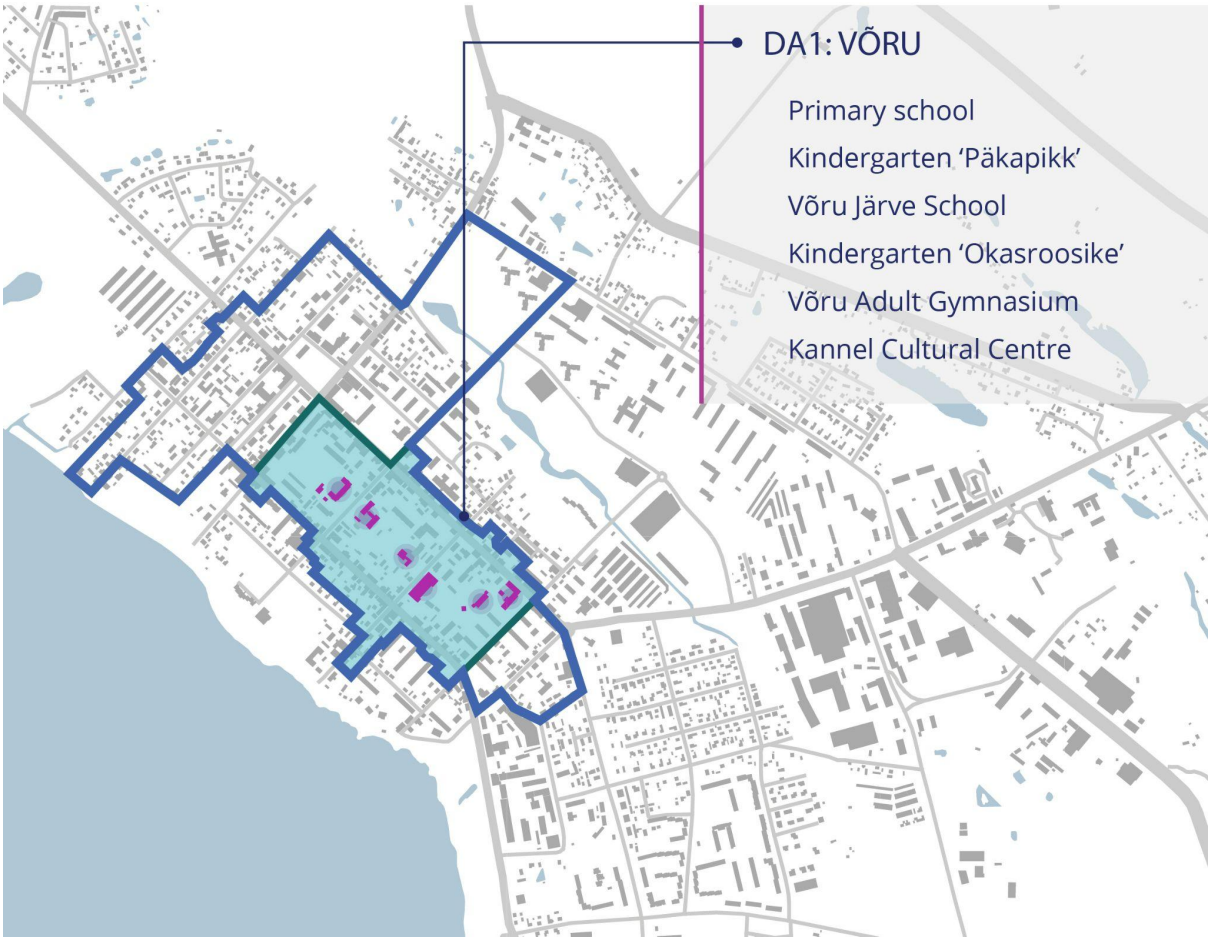

Fig. C.1: Map of planned +CityxChange interventions in Smolyan.

C.1 Summary

The vision is described through three areas: 1) viable business, 2) sustainable and living environment, 3) community services and smart governance. The main development opportunities and goals are formulated in these three areas. Vision 2050 puts human sustainability at the forefront in the context of limited natural resources, rapid technological development, the natural and economic environment and societal change. The city is the centre of attraction of the region, and therefore in shaping the vision it takes into account the whole region, including the movement of people, companies and services, and the natural environment that are located within it. Preparing to cope with the consequences of climate change and reducing greenhouse gas emissions are challenges that require fundamental societal change and action at all levels. The ideas that are reflected in the vision document are more likely to be realised if as many people as possible become acquainted with the vision, and therefore multiple perspectives are included in its design. Therefore including as many people as possible in the preparation phase of this document was of great priority. The message of the completed document needs to be spread on the

widest possible scale, for the positive impact it will have on humans, the environment, and the image of the city. The changes are rapid and have a significant impact on the living conditions of the public and the private sector, organisations and individuals, both financially and socially.

C.2 Introduction & City Overview

This document describes the vision of sustainable development of the city of Võru until 2050 (hereinafter BCV 2050). The city is a centre of attraction of the region, so in shaping the vision, it was designed for the entire region, including the movement of people, companies and services, and the natural environment, which does not respect the boundaries of administrative units. Preparing to cope with the effects of climate change and reducing greenhouse gas emissions are challenges that require fundamental societal change and action at all levels. The changes are rapid and have a significant impact on the livelihoods of the public and private sectors, organisations and individuals, both financially and socially.

The current development plan of the city of **Võru 2017-2035** formulates the vision of the city of Võru as follows:

Võru is an active city, where everyone has the opportunity to follow their heart and thus fulfil themselves. With its idyllic living environment, Võru is a great place to raise children. It is interesting for young people to live here. The community is frugal, the people are helpful and hospitable. We are proud of our own culture and homeland. As a strong centre of the region, Võru is a leader in providing jobs and services and initiating joint activities.

BCV 2050 puts human-centric solutions for sustainability at the forefront of efforts to limit natural resource dependence, rapidly increase technological development, and balance natural, economic and societal needs.The vision is described through three areas: viable entrepreneurship,sustainable and empowering living environment, and community services and smart governance. In these three areas, the main development opportunities and goals are formulated.

The ideas reflected in the vision document are more likely to be realised if as many people as possible are aware of the vision, which is why a great deal of attention has already been paid to inclusion in the document preparation phase. The message of the completed document needs to be disseminated as widely as possible, and it also contributes to the city's image.

BCV 2050 offers directions for action to provide city residents with high-quality public services in the conditions of a shrinking population, and at the same time taking into account the cultural expectations of the county residents for the city of Võru as the county's centre of attraction.

Fig. C.2: Vision of the sustainable city of Võru in 2050 areas

According to the population forecast of the Võru City Development Plan, the number of city residents will decrease from 12,367 in 2017 to 9,583 by 2049 according to the base scenario. In the case of the migration scenario, the number of urban residents may decrease to 8,056 by 2049. The vision also offers ways to stop the negative migration scenario and, if possible, turn it into growth.

The city of Võru, as a centre of attraction, can create an environment that is suitable for both existing and new companies, where residents have ample opportunities or work while maintaining family life, according to their abilities. This vision document is one step in developing increased community resources and benefits.

C.3 Vision and Ambition for 2050: Sustainable city of Võru

C.3.1 Viable business

Viable business is about enterprising people. The focus is on the development of quality living and public space, modern business infrastructure, public services and leisure opportunities.

The environment conducive to teleworking offers a highly qualified workforce the opportunity to work in Võru.

The city values innovative, efficient use of energy and resources, as well as environmentally friendly business based on the local valorisation of resources.

Business processes are energy and material efficient, and businesses that use the best available technology, have controlled environmental impacts and recycle materials are encouraged. Private companies are encouraged to participate in the Green Revolution and, where appropriate, to mobilise funding from various support measures. Support measures have been developed to encourage young people's entrepreneurship.

C.3.2 Sustainable and empowering living environment

A good level of housing stock, public space and transport connections create a healthy, time- saving and pleasant living environment. When planning on a community basis, important services are available within walking, cycling or reasonable public transport radius.

When constructing, planning and reconstructing new facilities, as many materials as possible are reused, the share of wood as a carbon-binding material is increased, wastage of drinking water is avoided, and energy consumption and waste generation are reduced.

Renovation of the housing stock will be promoted by motivating owners of private homes and apartment buildings to reconstruct buildings, creating visions of pleasant urban space (for example by contributing to the creation of recreation areas and playgrounds and green spaces) and highlighting good examples of redevelopment of existing infrastructure. Both public and private spaces have a **healthy indoor climate**, which is ensured by **energy-efficient** heating, cooling and ventilation solutions. The energy consumed is produced from **renewable energy sources** and **community-based energy production** is encouraged .

Intra-city **transport connections** (connections with the region and major Estonian cities) are based on the needs of the region's residents and companies. The city of Võru is the centre of attraction in the region in terms of living environment, jobs and services. The city and the surrounding residential areas are connected by light traffic routes, which promote diverse mobility (including all kinds of exercise activities) and reduce the pressure on the infrastructure and thus on the city budget.

The city values the **natural environment and biodiversity**. Hazards to groundwater are prevented and eliminated. The condition of open water bodies, including in particular Lake Tamula and the Korel stream, will be monitored and, if necessary, improved. The development of a comprehensive and coherent urban space will continue to strike a good balance between increasing biodiversity and maintaining human habitats.

Measures to help minimise the damage caused by increasing extreme weather events (e.g. heat and cold waves, torrential rains, etc.) will be analysed and implemented. The

population is aware of how to behave in various emergency situations in order to protect their health and protect them from damage to property.

C.3.3 Social services and smart governance

The city is governed wisely. The necessary reforms have been implemented, which take into account the expectations of both the residents and the residents of the county, in order to ensure high-quality public services based on the needs of the residents. The city has access to primary health services that are important for the whole region, a good level of general education, culture, and opportunities for sports and leisure.

Public services are accessible. This means that physical spaces and services - such as public buildings and parks - as well as intangible services - such as public authority websites, tourist information, and public transport timetables -are accessible and usable by as many people as possible .

The communication of the city government and its subdivisions with the residents, procedural procedures and internal processes are designed in a modern and clever way, taking advantage of the possibilities of digital solutions. The implementation of digital solutions means that they can be used by all citizens who may need them. Opportunities for the use of modern means of communication are guaranteed.

In order to strengthen communities, new opportunities for joint activities between the private and public sectors using the cultural heritage and resources of Võru County will be continued and sought. The cross-use of city-administered assets between city-administered institutions and the community will be encouraged and promoted so that public facilities can be used as much as possible.

C.3.4 The structure of the sustainable vision of the city of Võru in 2050

The vision of a sustainable city for 2050 or Vision 2050 has been compiled from the Horizon 2020 funded project +CityxChange. The vision is based on the broader goal of achieving climate neutrality by 2050, and to describe one possible long-term development scenario based on a reasonable balance between the natural environment and human activities, and the development of a cohesive community on that basis.

Similar to the development plan of the city of Võru 2017-2035 (hereinafter VAK2035) , the economic, social, cultural and natural environment have been taken into account in compiling this vision. In addition, the ways in which the Vision 2050 could contribute to the Global Sustainable Development Goals (SDGs) have been examined in the framework of the preparation of the Vision.

Local development is largely governed by four important interlinked documents: the general plan, development plan, budgetary strategy, and cross-cutting vision. The general plan and development plan describe and depict the development of the city and define the main goals to be achieved. The necessary activities and investments are also highlighted. The budgetary strategy defines the finances for the next five years in more detail and is set

out in detail in the annual budget. Thus, the development plan and the general plan are inherently more general and ambitious documents, which may contain more plans and wishes than the specific financial management instruments, the budget strategy and the budget. This cross-cutting vision describes the city's actions in the context of global sustainable development goals, highlighting key challenges and offering even longer-term goals in various areas to move towards a competitive urban environment with the least possible negative climate impact by 2050.

This document consists of two parts. The first part describes the vision of a sustainable city of Võru for 2050 in different areas:

- Viable business
- Sustainable and empowering living environment
- Social services and smart governance

The second part deals with the policies of the city of Võru in the context of global sustainable development goals. The development and action directions presented in the vision document are based on the strengths of the city and the region, as well as the most important challenges and opportunities of the coming decades. The key factor is seen as community delivery and the creation of preconditions for bringing talent home, which would be an additional force in creating a sustainable and environmentally friendly living environment.

C.3.5 Challenges of the city of Võru in the context of global SDGs

In compiling this plan, the activities and challenges of the city of Võru in meeting the global Sustainable Development Goals (hereinafter SDGs) were analysed and the connections between the SDGs and the development goals of the city of Võru were mapped.

VAK2035 points out the most important challenges for the period of preparation of the development plan. As the development plan is designed to address these challenges, the links between the LNGs and the challenges of the city of Võru are described, assuming that the activities of the development plan contribute more or less to addressing the challenges. The challenges have been formulated in 2017, and in several respects the situation has already improved significantly by 2021. On 25 September 2015, the UN Summit adopted the global Sustainable Development Goals (SDGs) and the 2030 Agenda. As a country, Estonia is pursuing global sustainable development goals for the long term.

The challenges facing the region were considered in the preparation of this vision paper. To this end, the challenges described in VAK2035 were analysed, and in the winter of 2021, sectoral workshops were held with Võru City Government officials to analyse long-term challenges in the context of LNG.

C.3.5.1 Indicators for the vision of a sustainable city

In addition to the analysis of global development goals, the indicators monitored to measure urban development (U4SCC indicators3) were also examined. The indicators were previously developed within the project framework with benchmarks. Baseline levels were

found during the analysis. In some cases, the target for 2050 has already been reached by 2020. The result of the analysis is shown in Table C.2.

Table. C.2: Analysis of U4SCC indicators

U4SCC indicator	Municipality score	Relevance
Household Internet Access	74,7% (2019)	Measured on county level
Fixed Broadband Subscriptions	82% (2019)	Fiber Optic cable connection available in majority of the City, measured on county level
Wireless Broadband Coverage	60,8% (2019)	Measured on county level
Public WIFI	Ca 20 sites mapped (Dec 2020, wifi.ee)	Relevance of public wifi access has decreased
Smart Water Meters	96%	Võru water utility information
Smart Electricity Meters	100%	Installation of remote reading obligatory for distribution grid
Electricity Supply ICT Monitoring	100%	Substation control, feeder control and end user load control (i.e. metering) connected to SCADA
Demand Response Penetration	0%	No know DR applications in Võru
Dynamic Public Transit Information	100%	Real-time information available for all bus lines
Traffic Monitoring	0%	No stationary monitoring of traffic installed in the city
Open data	787 available datasets	Measured nationally, https://opendata.riik.ee/en/
e-Government	100%	Local services also digitized
Public sector e-procurement	100%	All procurements digital
R&D Expenditure	No municipality level data	No local relevance
Patents	No municipality level data	No local relevance
Small and Medium-Sized Enterprises	Approx. 60-70 SMEs, 5-6% share of total	Data from business registry

C.4 Development Process of Võru's BCV for 2050

The elements that are part of the vision of a sustainable city of Võru for 2050 are described below in three different areas.

Fig. C.3: Overview of the vision of a sustainable city of Võru for 2050

C.4.1 Viable business

Viable entrepreneurship is about enterprising people. The focus is on the development of high-quality living and public space, modern business infrastructure, public and social services and leisure opportunities. The following statements specify the developed components that work towards the vision of viable business.

The city of Võru has a supportive living environment, which is the basis for maintaining existing jobs and creating new ones.

In order to reduce the effects of the shrinking income base and increase the number of inhabitants, it is possible to provide housing and employment for a highly qualified

workforce, and especially for those whose living and working arrangements allow them to move to Võru in the near future. A good example of the promotion of teleworking opportunities is the umbrella brand Kupland, which unites opportunity providers in South-Eastern Estonia. Meaningful communication and marketing activities, including the image of a child-friendly city, contribute to the promotion of the city of Võru as an attractive place to work and live. Meaningful land policy and optimal housing development further facilitate the relocation of Võru.

A high level of public and community services is key.

The key words are openness, involvement, cooperation and quick decision making. It is possible to do whatever one finds fulfilling for themselves in Võru - commuting, work-related and household activities take little time in Võru, which leaves people with more freedom to spend their time according to their wishes.

Entrepreneurship development is integrated into all levels of education. Entrepreneurship among young people, the working age population and the elderly (silver economy) is encouraged and recognized.

Innovative technology, efficient use of energy and resources, and environmentally friendly business based on the local valorisation of resources are valued

The innovativeness, environmental friendliness and resource efficiency of companies are valued by recognizing the environmental activities of companies and highlighting their activities as a positive example.

The city supports the development of innovative and environmentally friendly business through the planning and development of suitable and necessary public space for businesses. In addition to businesses, all relevant parties are involved in this process. Companies are viable and growth is supported through the planning and development of modern industrial and business areas. At the same time, a suitable environment is provided for companies at different stages of development. Diverse entrepreneurship creates preconditions for bringing different parts of the product value chain to the Võru region, which in turn increases the synergies between companies and helps companies to develop.

Business processes are energy and material efficient, and businesses with reduced environmental impact and material recycling are valued with the best available technology.

Energy and material-efficient companies are more competitive, and developing and meeting environmental targets creates opportunities for access to additional markets. Businesses are encouraged to take part in the green revolution and, where appropriate, are

helped to raise money for support measures aimed at improving energy and resource efficiency and the circular economy by working with sectoral support structures.

C.4.2 Sustainable and empowering living environment

The area of sustainable and empowering living environment focuses on spatial and environmental development, to the benefit of residents. As with the previous section, the specification of this area is divided by a number of statements that each contribute to the vision.

Renewal of housing fund

The renewal of the housing fund will be facilitated by highlighting exemplary examples and forming a vision for the development of different areas of the city. In cooperation with the state, a well-thought-out land policy and the development of an optimal housing stock have together provided the residents with adequate housing. In addition to improving the external boundaries and technical systems of buildings, opportunities are also highlighted to make the use of space in existing buildings more modern (e.g. by combining adjoining apartments). The city planning also takes into account the optimisation of the housing stock, as a result of which energy-intensive, depreciated buildings will be demolished and new dwellings meeting the standards will be built as needed.

With depreciated buildings (on the example of support for local government buildings), the aim is to find housing that meets at least the minimum standards for everyone who needs it. If necessary, information on existing and planned support measures will be provided to those who wish to optimise and modernise the housing stock. The housing stock and the public space are being developed in synergy. Special attention is paid to the reconstruction of the buildings in the Old Town of Võru. In addition to state subsidies (e.g. subsidies from KredEx and the National Heritage Board), the local government contributes to stimulating reconstruction through suitable financial and operational support from the local government. The multifunctional use of buildings in the city centre (incl. The old town) is encouraged. The protection of cultural and natural heritage is systematic and inclusive.

Electricity, heating and cooling are affordable and accessible to businesses and residents.

Environmentally friendly district heating will continue to be developed, environmentally friendly energy production will be provided on site (e.g. through solar panels) and energy security issues will also be addressed, especially in emergency situations caused by weather events. A conscious consumer can only consume electricity produced from renewable energy sources. Renewable energy communities are encouraged as an important activity to increase community awareness participation and consideration is being given to making the city's assets available to the community for this purpose.

Both private and public indoor spaces have a high-quality indoor climate that is energy-efficient and low-energy.

During construction and reconstruction, the best possible indoor climate and energy efficiency are ensured. A good indoor climate improves productivity and study, and reduces health risks due to high carbon dioxide content or other poor indoor climate.

In the construction and renovation of buildings and structures, long-term carbon sequestration materials are encouraged, and the reuse of materials is taken into account in the best possible way in the construction methods and operations.

The environmental impact of buildings and structures can be significantly reduced by reducing the need to use new materials and, for example, by using wood as a long-term carbon sink, not only in exterior finishing but also in construction.

The diverse natural environment increases the biodiversity of urban space and exists in harmony with human activity.

Multifunctional areas support settlement-based social relations. Planning and landscaping aimed at increasing biodiversity and diversity will continue in urban landscaping and urban space design. In order to increase biodiversity, general principles and practices have been developed, as well as recommendations for the private sector on how to protect habitats and create biodiversity in the city so that the urban environment does not disappear.

Convenient and environmentally friendly movement of people is made possible by a plan where the daily necessary services are within a 20-minute walk or cycling radius.

As the centre of attraction of the region, the city is well connected to the surrounding municipalities as well as to more distant but important places for the residents. Compact planning reduces time and fuel consumption for everyday operations. The main advantage of community-based solutions is the reduction of the physical distance between the consumer and the service provider and thus the reduction of the environmental impact and cost of consumption, including, for example:

- Reducing traffic by reducing distances by planning start-ups and destinations close to each other
- Reducing traffic through land use diversification (e.g. planning residential, shops and jobs in the same area)

Directions of movement where it is not practical to reduce physical distances will be used to facilitate the rapid passage of distances, such as:

- increasing the area covered by public transport and public transport solutions
- developing a network of light traffic roads both within the city and the nearest ones between settlements (20 minutes by bike, e.g. Meegomäe, Osula, etc.)

In order to facilitate the transport of goods, regular road connections in the direction of Tartu and Pärnu will be improved and the improvement of the possibilities of using the railway will be supported.

The movement of goods within the European Union and non-European countries is important both for the import of raw materials entering the region, for the export of finished products and for transit in support of regional development. The possibilities of using the railway can be improved in cooperation with the state and the railway operator, the role of the city is to be a constructive partner if necessary. Mobility has been approached systematically, i.e. it is possible to travel safely along the shortest possible route, in an environmentally friendly way and with the least possible time spent on transport. It is important to be able to use different public transport options to reach the destination or a major transport hub (e.g. by public transport to the bus station or Põlva railway station, by train or bus to Tartu or Tallinn airport or ports, in a suitable way to the international rail transport hub)

Waste from citizens and businesses is managed using the best available technology in a way that creates added value.

Priority will be given to reducing waste generation, improving the possibilities for separate collection of generated waste and seeking opportunities for material recovery or on-site treatment. Activities in the waste sector have a regional impact as the cost-effectiveness of treatment depends on the quantities handled.
Therefore, the support of the legislative framework to address the challenges in this area is also important.

The health of open waters and groundwater shall be monitored and improved, and appropriate risk reduction measures shall be taken.

New and historical threats to groundwater are being addressed. The health of open water bodies will be monitored and, if necessary, improved to enable Lake Tamula to be used both as a recreational area (e.g. the city's coastline as a bathing and recreational area) and as a Natura 2000 registered natural area. Measures have been taken to prevent the overgrowth of water bodies. In addition to lakes, attention is paid to the condition of watercourses passing through the city and the protection of groundwater. Residents are provided with clean and sufficient drinking water.

Innovative ways to drain rainwater are being sought and drinking water consumption is being reduced.

Efforts are being made to find smarter and cheaper ways to drain stormwater by constructing a separate-flow stormwater pipeline. If possible, the use of so-called grey water will be used to reduce the consumption of drinking water.

Environmental awareness is increased among the urban population.

In addition to program- and project-based events, educational institutions support learning about the natural environment and creating an emotional bond with the living environment. This has a very long-term impact and also improves the performance of all other planned activities.

C.4.3 Social services and smart governance

The area of social services and smart governance focuses on public services in pursuit of a healthy living environment. As with the previous sections, this section is divided by statements that make up the social services and smart governance vision.

Inclusion and transparent governance will be promoted.

Timely involvement of the population in decision-making processes and information on various development plans and societal changes affecting the living environment will help to make better decisions, create a sense of community and positive thinking, and increase a sense of security. In addition, the awareness of the population about the various factors of the living environment and the processes that shape the living environment is improving.

Physical facilities, premises and services are accessible and usable to ensure community cohesion.

The availability of public services will be increased to provide further amenities for residents. These services refer to, for example, public buildings, parks and intangible services, such as public authority websites, forms, tourist information, and public transport timetables. The principles of inclusive design are used in development projects.

The city is governed wisely.

All internal processes, agency services, and other services provided outside the organisation are digitised and updated. Information and services are available as quickly and resource-efficiently as possible.

Attention will be paid to citizen adaptation to digital services in connection with existing technological developments, as well as the digitization of public services.

The adaptation of citizens to technological developments will be assessed and, if necessary, actions will be taken to improve the situation. A safe, non-violent, inclusive and effective learning environment is ensured throughout the life cycle. A focus will be placed on tools that are suitable for residents of multiple ages.

Viable communities and public-private partnerships.

Opportunities have been created for joint activities between the private and public sectors and within the community, using the local cultural heritage and resources to Encourage and promote the cross-use of city-administered assets between city-administered institutions and the community. Cross-sectoral synergies have increased the number of organisations involved in hobbies and creative industries and the urban population that benefits from them. Access to services and safe, nutritious and adequate food is guaranteed. The co-operation provides the residents with needs-based social assistance and coping even in difficult times. Community activities and public-private partnerships are promoted regionally.

Lifecycle health services are available in the city. Võru, as an important centre of attraction in the region, offers high-quality primary health care services.

In addition, the South Estonian hospital is an important provider of health services and medical care for the entire region, with which it continues to cooperate as a constructive partner. Great emphasis is placed on the prevention of lifestyle-related illnesses and the improvement of mental health.

Codes of conduct have been developed and made available to public sector organisations, companies and residents to deal with crisis situations.

The continuity of essential services is guaranteed. The nature of what is considered an essential service may vary as crisis management and climate change adaptation are due to be considered in depth both locally and nationally.

The city promotes clean and local food.

Increasing the demand for local food promotes a healthy diet, contributes to the development of local businesses and reduces the environmental footprint of food production. The impact is regional, as food is mainly produced outside the city

C.5 Impact, Outcomes and Results

Developing the BCV started in August 2020 with the decision of the city government to produce a document and send it to the council for approval. In the preparation process most of the resources were spent on scoping and citizen/stakeholder engagement. A dedicated interview process was conducted with most of the city's largest employers to map where they saw themselves in the field of sustainable development and seek out where the city could assist them. Dedicated open and closed sessions with the youth, seniors and others were held until the end of 2021, including a Climathon in the beginning of 2021. The BCV was approved in the beginning of 2022.

The most important lesson from the process is that resources need to be dedicated to steer the process, and it's best driven by an explicit commitment from the city government, bound with a specific date when the document is due. The Innovation Playground concepts and ideas from partners assisted with 'slicing' the BCV creation in smaller bits and helped to engage both council and city government officials alike.

Annex D: Smolyan - Bold City Vision 2050

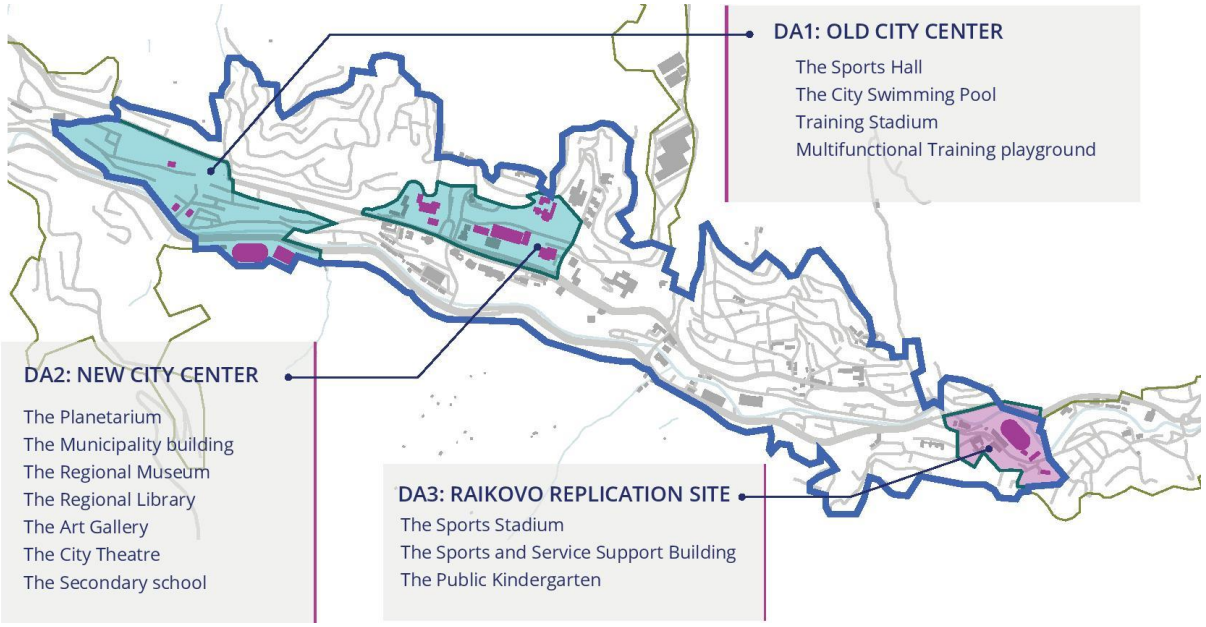

Fig. D.1: Map of planned +CityxChange interventions in Smolyan.

D.1 Introduction & City Overview

The Municipality of Smolyan is located in a mountainous region in South Bulgaria in the heart of the Rhodope Mountains, near the Greek-Bulgarian border. At 1000m above sea level, the area is 854km2. The population of the city of Smolyan is 28,416 and the larger municipality is 35,829 people, as of December 2020[41]. Smolyan is a regional centre and an important touristic and natural site. Smolyan is 250 km away from the capital Sofia and 100 km from the second largest city in the country, Plovdiv. The cross-border checkpoint with Greece (Zlatograd-Thermes) is situated only 55 km from Smolyan. The opening of another point in the near future – Elidge border checkpoint, only 30km away from Smolyan, will be the fastest connection to Xanthi and the Northern Aegean coast.

The municipality developed an SME-based economy, preserving its traditions, culture and natural resources, and building a vision for a modern regional centre that is attractive to both locals and investors. Major objectives for the municipality include achieving sustainable urban development, utilising local energy resources, supporting the local economy, promoting a thriving social community and welcoming business and social innovation. Within these, the municipality has identified 5 main priorities:

A. sustainable economic growth
B. improved infrastructure
C. effective cooperation & improved educational system
D. health and social services

[41] http://www.nsi.bg

E. increased employment rate and overcoming the migration of the young people from the area

In 2013 Smolyan became a signatory of the Covenant of Mayors; in 2014 at Mayors Adapt, it presented its action plan, with a reduction target of 20%. The city has participated in and continues to participate in numerous European projects, most recently, in 2018, in the URBACT network SmartImpact, where, together with Manchester, Dublin, Zagreb, Stockholm, Eindhoven, Porto and others, the partners are focusing on how to develop models of adapting administrative structures to smart development.

D.2 +CityxChange and Bold City Vision

In 2019, the Municipality of Smolyan joined the project +CityxChange, a smart city project that has been granted funding from the European Union's Horizon 2020 research and innovation program in the call for "Smart cities and communities". In the context of Smolyan, the project would aim to introduce people to what a sustainable city is and create a roadmap to achieving this, implement renewable energy sources, develop better use of urban spaces, and improve the quality of air, transport, services and life in general.

One of the main goals of the +CityxChange project is to design and implement Positive Energy Blocks (PEBs) in the Lighthouse cities within the project timeframe (i.e. between November 2019 and October 2023) These PEBs then serve as a model for the Follower Cities to replicate locally. In order to create a more significant impact, the solutions developed in the process need to be scaled up from block level to city level which requires a dedicated involvement beyond 2024 and the scope of the project.

Within the Bold City Vision 2050 strategy, the city of Smolyan aims to create a greener, cleaner and more sustainable city through the use of smart positive energy solutions and digital services to improve the quality of life for and together with its citizens. Through the Bold City Vision Plan, the city of Smolyan will align with the recommendations proposed by the United Nation Sustainable Development Goals (SDGs) and the goals set in the European Green Deal.

Fig. D.2: SDGs embedded in Bold City Vision Smolyan 2050

D.3 Vision and Ambition for 2050

Bold City Vision (BCV) framework connects the UN Sustainable Development Goals (SDGs), the UN United for Smart and Sustainable Cities Key Performance Indicators (KPIs), and other globally/nationally recognized standards for evaluating and monitoring sustainability or "smartness" to local policy development, with a strong emphasis on citizen engagement and citizen driven open innovation and business development.

Within the BCV framework, Smolyan aims to develop long-term ambitions to achieve a more sustainable and green future for the city. As described further below, the BCV outlines 5 main goals for the city of Smolyan:

1. Transition to low-carbon economy
2. Development of sustainable city mobility
3. Development of sustainable urban environment
4. Development of sustainable tourism
5. Citizen engagement

The 5 goals set in the BCV Smolyan 2050 are aligned with the National plan for recovery and resilience[42], National development program 2030[43], National strategy for sustainable tourism development[44], SECAP Smolyan 2030[45], and the Plan for integrated development of

[42] https://nextgeneration.bg/upload/67/BG+FinalRRP+2022-04-06-08-30+%28-TCA-%29.pdf

[43] https://www.mtc.government.bg/sites/default/files/nationaldevelopmentprogrammebulgaria2030-en.pdf

[44] https://www.tourism.government.bg/sites/tourism.government.bg/files/uploads/strategy-policy/strategy_2014-2030_13_05_2014-sled_ms_26_05_2014.pdf

[45] ОБЩИНА СМОЛЯН :: СТРАТЕГИЧЕСКИ ПРОГРАМИ :: ПДУЕ 2021-2030 :: План за действие за устойчиво развитие и адаптация към климатичните промени за периода 2021-2030 г. (smolyan.bg)

the Municipality 2021 - 2027[46]. They reflect both the local challenges and needs, as well as the national roadmap.

Fig. D.3: Bold City Vision Smolyan 2050 main goals

D.3.1 Transition to low-carbon economy

One of the main goals of the European Green deal is to reduce the carbon footprint and energy intensity of the economy, and to promote the green transition by taking measures to increase the energy efficiency of residential, public and commercial buildings, as well as by promoting the production of energy from renewable sources.

The Bulgarian economy is one of the most resource-intensive in the EU, lagging behind other Member States with regard to the application of the circular economy principle, and the implementation of eco-innovation activities. The energy intensity of Bulgarian industry remains highest in the EU, at almost three times higher than the EU average due to lack of significant changes in industrial structure, as well as a lack of significant improvement in terms of the technologies and production processes used. In addition, the household industry is characterised by high energy intensity, with 93% of the housing stock in the country not meeting the requirements for energy efficiency and 90% of the non-renovated buildings labelled with energy consumption classes E, F and G[47]. The city of Smolyan is no exception to these statistics, despite the significant efforts in recent years to increase the energy efficiency in the public and private multi-households buildings.

[46] ОБЩИНА СМОЛЯН :: СТРАТЕГИЧЕСКИ ПРОГРАМИ :: ПИРО 2021-2027 (smolyan.bg)
[47] ОБЩИНА СМОЛЯН :: СТРАТЕГИЧЕСКИ ПРОГРАМИ :: ПДУЕ 2021-2030 :: План за действие за устойчиво развитие и адаптация към климатичните промени за периода 2021-2030 г. (smolyan.bg)

Regarding the transition to widespread use of the renewable energy sources (RES), in the last twelve years there has been a significant increase in the share of energy from RES in gross final consumption of energy; in 2019, for example, the achieved share (21.6%) was more than twice the share in 2008 (10.3%)[48]. The ambitious goals set in the European Green Deal for gradual decarbonization, as reflected in national strategic documents, suggest additional efforts to further increase the use of RES before 2050.

The first main ambition of the BCV aims to facilitate the transition to a low-carbon economy and make Smolyan carbon-neutral by 2050. It incorporates several sub-goal, listed below:

A. Increasing the energy efficiency (EE) of existing public and private buildings and businesses in order to reduce energy consumption and CO2 emissions and to increase the comfort of living in both public and private buildings.
    a. Assisting businesses in implementing energy efficiency measures by conducting information campaigns on funding opportunities of similar projects.
    b. Introducing incentives to expand energy use by renewable sources and improve energy and resource efficiency.
B. Leading the transition to the widespread usage of RES and smart positive energy solutions and their popularisation and promotion on local level.
C. Studying the energy poverty of the population in the town of Smolyan and taking active steps to reduce it through administrative, financial and other measures.
D. Reducing the administrative burden in the design, connection and operation of RES by creating a single information point to the Municipality of Smolyan to support citizens and companies in this process.
E. Creating Energy Positive Communities within the city and moving towards Positive Energy City by 2050 with the goal to extend to include intermunicipal projects for the development of the entire region.
F. Increasing the capacity of local authorities in the field of energy efficiency.
G. Construction of energy efficient municipal systems for outdoor artificial lighting in the territory of the municipality.
H. Research and construction of geothermal energy sources in the region.

D.3.2 Development of sustainable city mobility

The way we live in populated areas affects the use of public spaces, the environment, human safety and health. Nowadays, the attractiveness of a city is largely determined by its developed transportation infrastructure, regardless of the ways we choose to use it. Despite the significant investment over the last decade to improve infrastructure nationwide and in the city, the degree of motorization is constantly growing. This leads to an increase in congestion, pollution, greenhouse gas emissions, noise and more public space occupied by cars. Expanding the capacity of the street network is not possible due to

[48] ОБЩИНА СМОЛЯН :: СТРАТЕГИЧЕСКИ ПРОГРАМИ :: ПДУЕ 2021-2030 :: План за действие за устойчиво развитие и адаптация към климатичните промени за периода 2021-2030 г. (smolyan.bg)

lack of space or not recommended because it further contributes to the negative impact on the environment and public spaces.

Sustainable urban mobility requires a change in thinking and urban planning, where the movement of personal cars gives way to the more active and mass modes of transport, such as walking, cycling, public transportation, and shared cars. Having a well-developed plan for sustainable urban mobility can help a city become more attractive and vital without limiting accessibility by offering integrated high quality and sustainable transport systems. Such a plan has to be created in accordance with the guidelines set by the European commission, contribute to the achievement of European climate and energy goals, and reflect the local needs and challenges.

Within the BCV, Smolyan sets the ambitious goal for transition to more sustainable city mobility by 2050, setting several priorities listed below:

A. Developing and implementing a Sustainable Urban Mobility Plan for the city of Smolyan.
B. Increasing the number of charging stations for electric cars within the city limits and in the municipality. Construction of charging stations using RES with the goal to have 30% share of renewable energy in the transport sector by 2050.
C. Assisting local public transport and taxi companies in the transition to green urban transport though educational, administrative, financial, and other means with the goal to achieve 100% green public transport by 2050.
D. Promoting electro mobility for private citizens and businesses in order to accelerate the transition to electric transport
E. Encouraging the use of micro-mobility devices by improving road safety and building bike lanes.
F. Designing of a system for shared mobility within the city and its surroundings
G. Improving the road infrastructure to reduce pollution and improve mobility.

D.3.3 Development of sustainable urban environment

Urban environmental sustainability encourages the revitalization of urban areas and cities and aims to improve livability, promote innovation and reduce environmental impacts while maximising economic and social co-benefits. A sustainable city means the increased use of eco-friendly practices, development and preservation of green spaces, and incorporating supporting technology into the urban environment to reduce air pollution and CO2 emissions, enhance air quality, and protect natural resources. These practices lead to a healthier environment for city residents and a lower carbon footprint for the city. Sustainable cities are becoming essential in the quest to reverse global climate change.

Developing a sustainable urban environment has an important place in the citizens' vision of Smolyan 2050. Within the BCV framework, Smolyan has set several sub-goals to improve the city spaces.

A. Improving air quality to achieve the requirements set by the European commission by improving the monitoring and regulation of pollution sources.
B. Providing a safe urban environment and full access to public buildings and space for people with disabilities by 2050.
C. Complete shift towards circular economy model and achieving zero waste by 2050.
D. Expanding the green and recreational places within the city and revitalising unused and neglected areas.
E. Implementing green architecture within the city to reduce resource use and lower greenhouse gas emissions.
F. Creating nature-based solutions for urban climate change adaptation and disaster risk reduction and developing and implementing action plans to provide support for the community to manage the impact of natural disasters.

D.3.4 Development of sustainable tourism

Tourism is a key sector of the Bulgarian economy which in 2016 made up 12.8% of the GDP of the country, providing a total of 362,900 jobs. The city of Smolyan, with its location in the heart of the Rhodope Mountains, is an important touristic centre in a region defined by unique natural resources, distinctive cultural, historical and ethnographic heritage, and religious diversity. It is an area that combines tradition and modern approaches, creativity and innovation. Mountain tourism offers an array of possibilities for tourists and a place away from the busy cities, to refresh, recharge and reconnect with nature.

The Municipality of Smolyan is situated in the central part of the Rhodope Mountains, characterised by stunning pine forests, high rounded ridges, deep steep and rocky valleys, complemented by a favourable climate. Distinguished by its extremely diverse natural resources, within the municipality there are different types of protected areas and numerous natural landmarks that make Smolyan a favourite place for recreation and tourism.

Working toward sustainable tourism can serve as a driving force for socio-economic development in mountain areas. Well managed, community-based tourism increases and diversifies household incomes, enhances job and livelihood opportunities, supports traditional systems, builds resilience and helps to conserve and promote natural and cultural heritage across landscapes.

COVID-19 pandemic brought inevitable changes in the global tourism industry and offered an opportunity to rethink how the sector works and how it benefits the mountains and their inhabitants. Tourists are increasingly looking at ways through which to reconnect – in a low-impact way – with nature, local traditions and cultures, and for experiences in open-air and less crowded destinations. This is particularly important in mountains, which are under pressure from the impacts of the climate crisis, natural disasters and biodiversity loss. In addition, at the United Nations Climate Change Conference (COP26) in Glasgow, the World Tourism Organization (UNWTO) and partners launched the Glasgow Declaration on Climate Action in Tourism, committing stakeholders to work towards net-zero by 2050.

As a city in a mountain region, heavily dependent on tourism throughout the year, especially in winter and summer months, Smolyan aims to make the tourism in the area more sustainable and eco-friendly in alignment with National strategy for sustainable tourism development[49] and the SDGs with the aim to achieve net-zero by 2050. Within the BCV framework, the city of Smolyan has set several sub-goals, listed below, to help make tourism in the region more sustainable.

A. Creating instruments to support green innovation in mountain tourism for faster energy efficiency transition in the accommodating sector and the increase of the usage of RES for heating and cooling.
B. Improving waste management in the tourism sector to increase sustainability and resource efficiency, enhance the attractiveness of the destinations, and to create more job opportunities with focus on sourcing sustainable supplies and recycling waste.
C. Preserving the natural resources and the cultural heritage of the region by developing local strategies and regulations.
D. Increasing the capacity of local authorities and improving the human resources in the sector.
E. Improving the accessibility of the destinations in the region.

D.3.5 Citizen engagement

Citizen engagement is a form of interaction between citizens and their governments. It can happen at any stage of the development or implementation of government policy and the delivery of public services, or be triggered by events in local areas. It can lead to a range of outcomes, including more effective services and more responsive and accountable states. Therefore citizen engagement is a key element in the EU Missions especially in the adaptation of climate change.

One of the biggest challenges facing the Municipality of Smolyan is finding new ways to engage at a more meaningful level with citizens and local stakeholders on "smart" development in order to design and implement innovative solutions tailored to the local context as well as to find the right partners to provide, install and maintain the necessary technological elements. Citizens have a central role in the development and implementation of BCV 2050 and the city of Smolyan aims to provide innovative solutions to improve communication with them.

A. Developing Easy-to-Use Platform for Innovation and Engagement providing a convenient way for the citizens to quickly retrieve data, submit forms, find necessary information and give feedback.
B. Increasing the range of influence and the number of Citizens laboratories in the city
C. Increasing the capacity of the local authorities for citizen engagement

[49] https://www.tourism.government.bg/sites/tourism.government.bg/files/uploads/strategy-policy/strategy_2014-2030_13_05_2014-sled_ms_26_05_2014.pdf

D.4 Development Process of BCV

Smolyan started developing the Bold City Vision 2050 together with its Plan for Integrated Development of the Municipality in 2020. From September 29th 2020 to October 23rd, 2020, the Municipality of Smolyan held City Engage Month as a direct form of communication with all stakeholders in all areas related to the local development. During the campaign, twelve focus groups were formed in order to cover different priorities of the municipality including infrastructure, environment, tourism, education, etc. Each group had its own agenda and subthemes to be covered. The aim was to outline the current state of each sector, to hear the problems and to discuss possible solutions. The main focus of the discussions was the future development of the city in a smart and sustainable way in accordance with the SDGs.

Tightening the Covid-19 measures prevented the Municipality of Smolyan from further engaging with the public in 2021 and slowed down the process of developing the BCV significantly. During 2021, we focused on analysing the local challenges, developing realistic goals for the future and aligning them with other strategic documents of the municipality, such as SECAP 2030.

The process of development of the BCV restarted in 2022 after pandemic measures were lifted. Since April 2022, there have been significant changes in the ambitions set by the city for 2050. This is partially due to the changes in the national policies regarding energy efficiency and RES, outlined in the new accepted National plan for recovery and resilience that has to be reflected in the local policies. In May 2022, the Municipality of Smolyan held Open Citizen Lab during an outside event with popular singers and influencers dedicated to the European Week of Youth. The event served as a form of a City Lab to give the young people of the city a voice in the process of forming local policies to build a better future for the younger generation and create the Bold City Vision 2050. Citizens were provided with a short questionnaire, consisting of three simple questions to help convey their vision of the future of Smolyan and which areas of the city development they see as a priority. The event garnered a lot of interest and produced compelling results which led the Municipality to expand the polling range to include the entire city and to extend the timeframe for the survey to gather more diverse results. Even though the survey is still ongoing, some of the priorities have already been included in the ambitions for 2050.

The Municipality of Smolyan is currently working to produce the BCV document in order to be presented for public discussion before submitting it to the Municipal council for approval.

D.5 Implementation

The Bold City Vision Smolyan 2050 is created following national short-term and long-term strategies, local sustainable development plans, developed in accordance with the European net-zero emissions goals set in the European Green Deal and the SDGs. For the

city of Smolyan, the BCV will serve as a guideline for future policies and strategic documents for the urban development of the municipality that extend beyond the year 2030.

After the completion of the BCV 2050, it will be coordinated with all relevant departments within the structure of the Municipality of Smolyan and any recommendations will be taken into consideration, discussed with the municipal leadership and included in the document if deemed necessary. After the internal process is completed, the Municipality will hold a public hearing to discuss the developed strategies and goals with the citizens and adjust them to incorporate the public concerns. After the BCV passes both processes it will be presented in front of the Municipal council which holds the authority to ratify it. The Municipality of Smolyan aims to finish the process by the end of February 2023.

While the BCV 2050 document outlines the city's roadmap toward carbon neutrality in several key sectors, the concrete implementation goals and priorities will be set in short-term programs and strategies, starting with the "Plan for integrated development of the Municipality 2021 - 2027", ratified by the Municipal Council in October 2022. The plan provides a detailed list of projects and programs to be implemented by the Municipality of Smolyan by 2027. The projects are grouped under three main Strategic goals and ten main priority sectors, identified during the City Engage Month in 2020. The table below provides an overview of the set priorities, more detailed information, including the detailed description of each project, estimated cost and financing mechanisms for their implementation in Annex 1 of the "Plan for integrated development of the Municipality 2021 - 2027"[50]. Future short-term plans, implemented by the Municipality, will provide a similar list of concrete projects and goals.

Strategic goal 1	**Economic development**
Priority 1	**Green economy and innovation**
Measure 1.1	Energy and resources efficiency of the enterprises: ● Implementing EE measures and RES in the local enterprises ● Investments in the use of alternative raw and recycled materials; ● Transition towards more sustainable and environmentally friendly business processes and practices
Measure 1.2.	Supporting entrepreneurship, science transfer and innovation: ● Development of Technology Park Smolyan ● Encouraging the development and implementation of innovative solution in the business and agriculture ● Providing support for start-ups
Measure 1.3.	Implementing strategies to provide environment for scientific research and innovation on the territory of a municipality Smolyan

[50] Приложение №1 - Програма за реализация на ПИРО Смолян.pdf (smolyan.bg)

Measure 1.4.	Career guidance and professional development
Priority 2	**Sustainable tourism**
Measure 2.1.	Preservation, restoration and popularisation of cultural and historical heritage
Measure 2.2.	Expansion of the tourist infrastructure and development of new touristic attractions
Measure 2.3.	Development of Strategy for Sustainable tourism
Strategic goal 2	**Environmental protection and integrated spatial development**
Priority 3	**Reducing the damage to the environment, caused by human activity and climate change**
Measure 3.1.	Waste management and implementation of circular economy
Measure 3.2.	Water and soil protection
Measure 3.3.	Implementation of energy efficiency measures in public buildings in the city of Smolyan
Measure 3.4.	Implementation of energy efficiency measures in public buildings in the settlements, part of the Municipality of Smolyan
Measure 3.5.	Implementation of energy efficiency measures in residential buildings
Measure 3.6.	Prevention and risk management of floods, forest fires and other natural disasters
Priority 4	**Development of sustainable urban and rural environment**
Measure 4.1.	Spatial planning ● Development of GIS system and Zoning Master Plan for the city of Smolyan and selected settlements in the municipality ● Development of Plan for sustainable city and regional mobility
Measure 4.2.	Sustainable urban mobility ● Renovation of the road infrastructure ● Transition towards green urban mobility ● Installation of charging stations on the territory of the municipality and incorporating RES in the public transport

Measure 4.3.	Improving the urban environment, city parks and green spaces
Measure 4.5.	Improving the environment in the settlements, part of the municipality
Measure 4.6.	Increasing the security in Smolyan and settlements
Priority 5	**Improving and expanding the connectivity in the municipality**
Measure 5.1.	Improving the transport infrastructure and connectivity in the Municipality of Smolyan by renovating old and creating new municipal roads
Measure 5.2.	Renovating national roads and expanding the interconnectivity in the region
Strategic goal 3	**Social and human capacity development**
Priority 6	**Increasing the scope and quality of the social and health services**
Measure 6.1.	Improving and modernising the social services in the municipality
Measure 6.2.	Improving the social services for disadvantaged or disabled group or families
Measure 6.3.	Implementing innovative solutions in health services
Priority 7	**Improving the educational level of the population and ensuring wider access to education**
Measure 7.1.	Modernising the educational processes ● Increasing the capacity of the educators ● Implementing innovative approaches to education ● Digitalization of the educational process
Measure 7.2.	Integration of disadvantaged or disabled groups in the educational process
Measure 7.3.	Expanding the opportunities for higher education in the municipality
Measure 7.4.	Developing a better relationship between schools and universities and the local business
Measure 7.5.	Improvement of the material and technical base in the educational institutions
Priority 8	**Sport infrastructure in the municipality and youth activities**

Measure 8.1.	Improving the sports infrastructure in the city of Smolyan
Measure 8.2.	Improving the sports infrastructure in the settlements, part of the Municipality of Smolyan
Measure 8.3.	Providing support for sport clubs and including disadvantaged or disabled groups in sport activities
Measure 8.4.	Developing activities and events for the youth population outside of the educational institution
Priority 9	**Cultural activities and the preservation of local traditions and customs**
Measure 9.1.	• Modernising of the regional library; • Showcasing local custom is interactive exhibitions • Organising modern and innovative cultural events
Priority 10	**Improving the digital connectivity, local governance inter-institutional cooperation and citizen engagement**
Measure 10.1.	Developing E-municipality, improving digitization and increasing the capacity of the local authorities
Measure 10.2.	Improving the cooperation between different local authorities and focusing on citizen involvement in the governing process

D.6 Impact, Outcomes and Results

Considering the goals set on a national level, we have made an estimate of the expected results for the first two ambitions. The numbers are based on the expected results for 2030, set in both the National Strategy for renewable energy and Smolyan's SECAP from which KPIs were extrapolated for every 10 years till 2050, with the aim to achieve a carbon-neutral city by 2050. Expected results can be seen in the picture below.

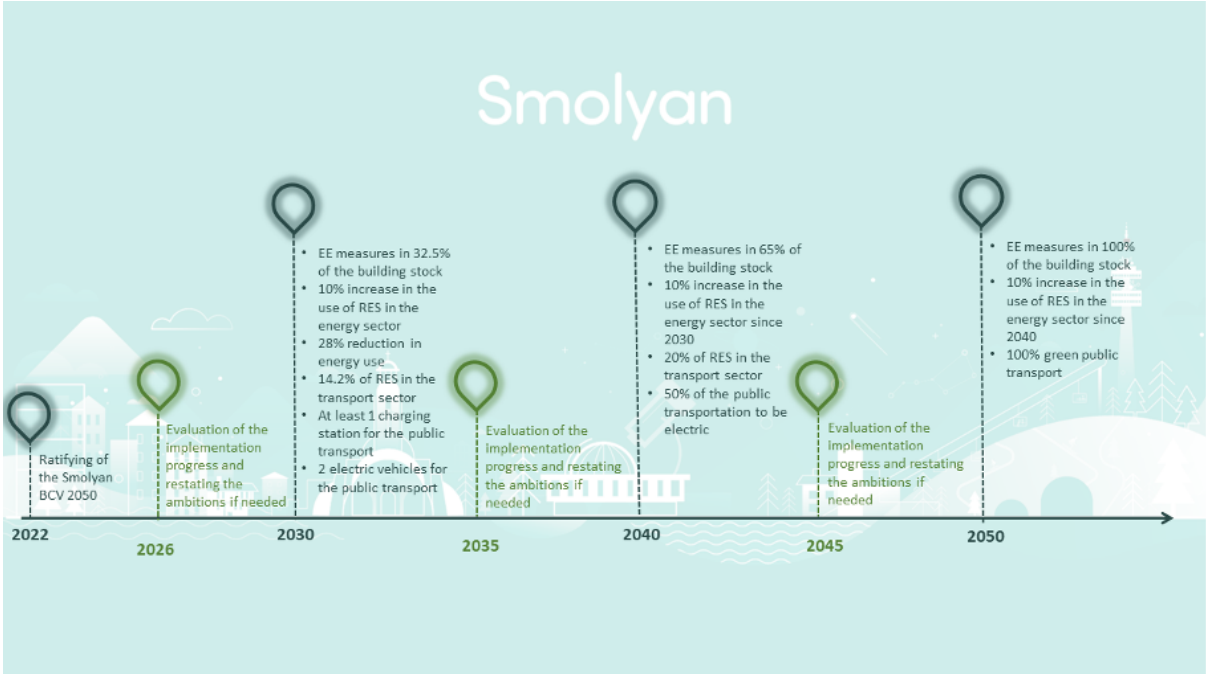

Fig. D.4: Expected outcomes

D.6.1 Progress update

At the time of this report, Smolyan has designated three demonstration areas within the city suitable to become a PEB, but within the timeframe of the project only one PEB is likely to be achieved. The DPEB, currently in development in Smolyan, is located in DA1, the Old City Centre, and currently consists of three buildings: The Sports Hall "*Velichko Cholakov*", the City Swimming Pool, and the Training Stadium with. Service building. There is also the potential to expand the project to include two more locations: Secondary School "*Sv. Sv. Kiril and Metodi*" and Public Kindergarten "*Buratino*".

So far the Sports Hall and the Swimming Pool have secured funding by Financial mechanisms of the European Economic Area, under Outcome 4 of the Programme "Environment Protection and Climate Change". The project installation for the production of electricity from renewable energy unit – PV, for the building of the Sports Hall in Smolyan and Combined installation for production of electricity and heat from renewable energy unit - PVt, for the building of the Swimming Pool, Smolyan. The installed power for each PV and PVt installation will be Pi = 30 kWp (t). A pilot intelligent energy monitoring system of energy consumption and production in buildings and monitoring of the potential of solar and wind energy will be also introduced. The project is underway but still in the beginning phase. By the end of 2023 we should have installed and put into exploitation the new RES measures of the two buildings as well as the energy monitoring system. The operation of the installed new capacities will be monitored and we should be able to model different scenarios for energy management of the buildings. With another project we will introduce energy efficiency measures in the external artificial lighting system in the city of Smolyan, including the supply and installation of new lighting sources, as well as the implementation of a new energy system.

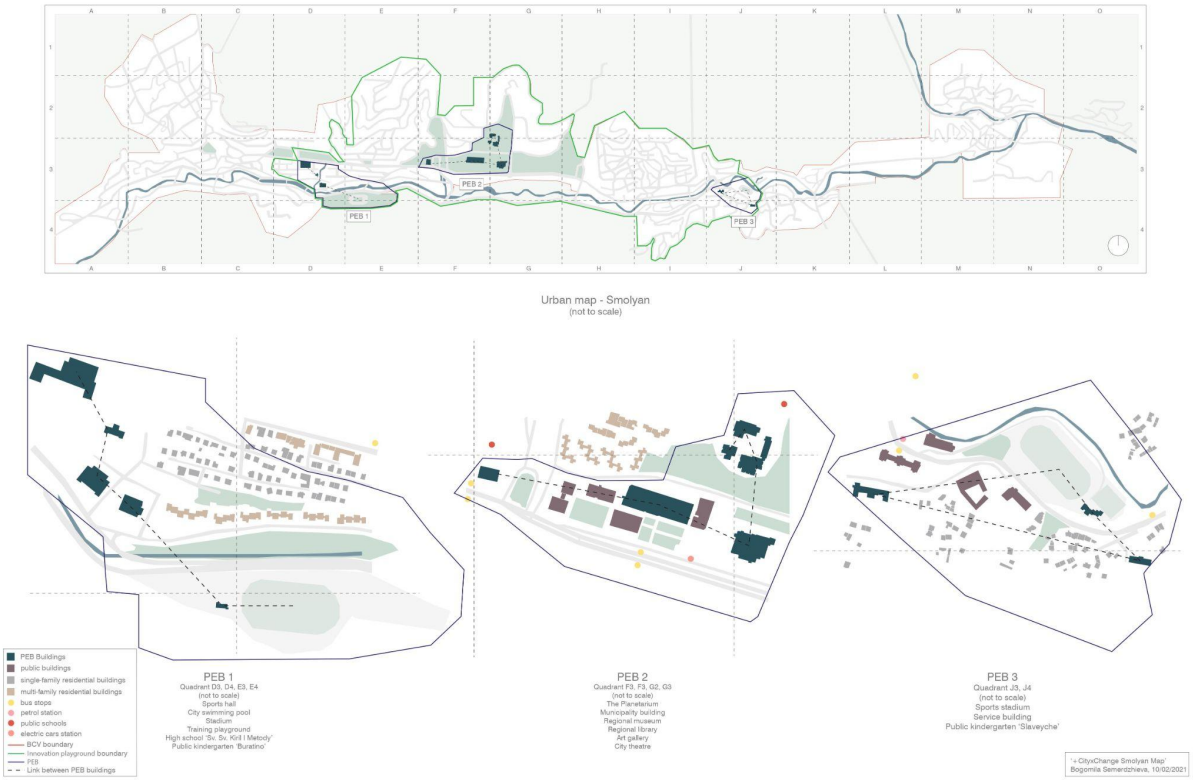

Fig. D.5: Map of Smolyan's DAs.

The Municipality is currently looking for possibilities for a complete retrofit of the Secondary School, including upgrading the heating system and installing RES, but with no success so far. The Public kindergarten, part of the PEB, was fully renovated in 2019 and is currently heated with a heating/cooling installation with thermal pumps (air-to-water). There is an installation of solar thermal collectors on the building (10 collectors, 2 m2 each) that are not quite well situated on the rooftop, so these need adjusting. Additional RES could be sought.

It is quite ambitious to have an operating PEB in Smolyan by 2023 and to establish a regulatory zone of the PEB buildings, and so far these are the steps we have managed to undertake.

The municipality has undertaken a full review of all public buildings on its territory that need retrofitting and energy efficiency measures, and will shortlist the necessary interventions and then to continue on the road of developing more DPEBs within the city, expanding to include private residences and business.

D.7 Learnings, Limitations and Next Steps

With the active development of its first DPEB, Smolyan aims to provide examples and share experience with other cities in the country to help facilitate a faster transition towards creating Positive Energy Cities. The Municipality of Smolyan will continue working to widen citizen engagement to foster better connection with citizens and garner their support to cocreate a more beautiful and sustainable city. Even though we have experienced some

recent successes in engaging with the citizens of Smolyan, especially with the city's youth, the municipality has a long way to go in that regard and this has proven to be one of the biggest challenges in front of us and requires persistent efforts to engage, in order to yield the best results.

At the present time, the Municipality of Smolyan relies heavily on national programs and European funding for the financing of the development plans. Within the scope of +CityxChange we are aiming to devise strategies to diversify the investment and funding opportunities with the goal to achieve net-zero emission by 2050.

Annex E: Sestao - Bold City Vision 2050

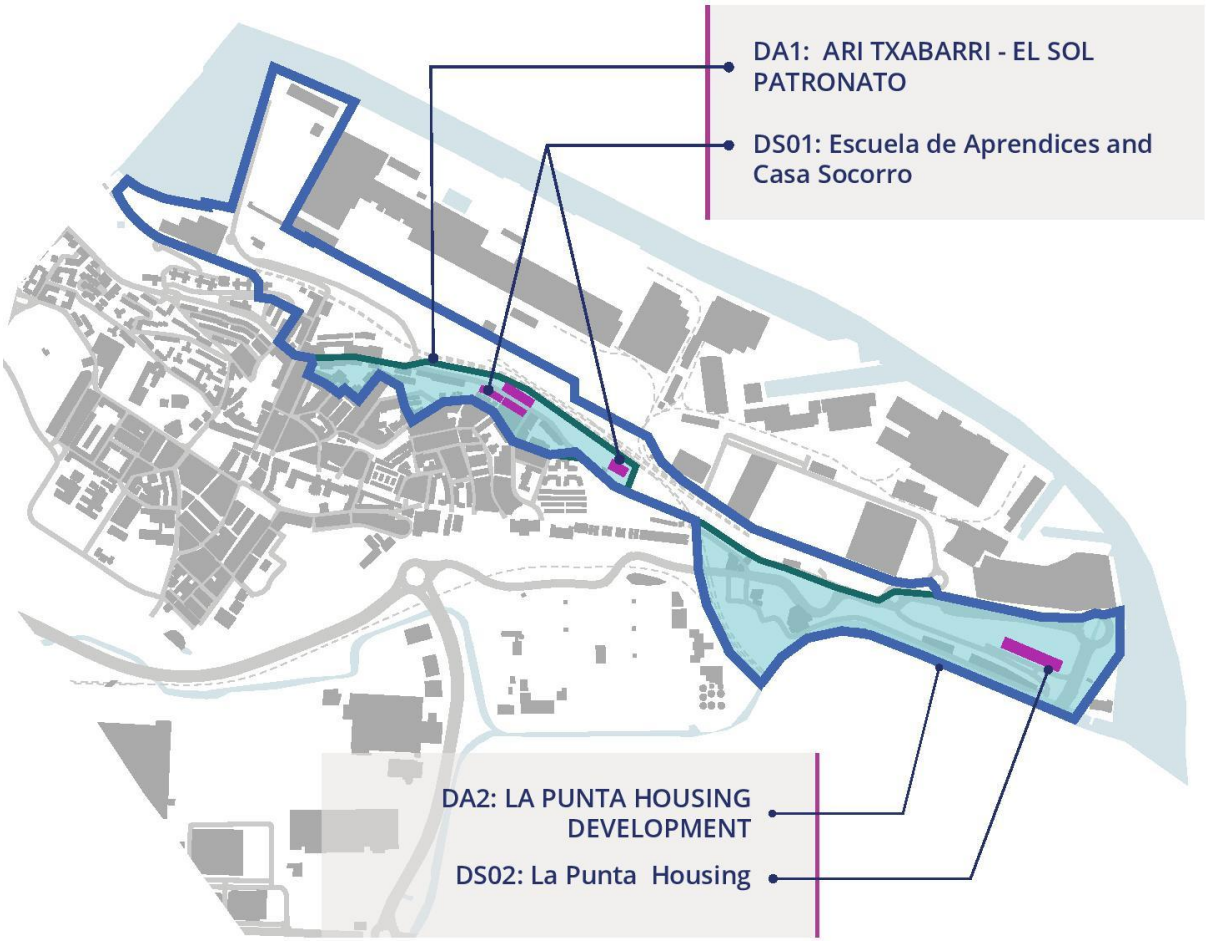

Fig E.1: Map of planned +CityxChange interventions in Sestao.

E.1 Introduction & City Overview

Sestao is a Basque municipality, located in the North of Spain. It is one of 26 municipalities that belongs to the Greater Bilbao Metropolitan Area, which accounts for a population of 871.497 citizens within an area of 372 km2 and represents Spain's highest population density in the North.

The municipality is located on the West bank of the estuary of the Nervión river, which leads to the Cantabric Sea, bordering with the municipalities of Barakaldo, Portugalete and Trapagaran. It occupies an area of ~3,5 square kilometres. It is characterised by its abrupt geography. The most favourable, flat, terrains are mostly of industrial use, while most residential and commercial buildings have been constructed densely on the hills.

Fig E.2: Satellite photo of Sestao and the Greater Bilbao Metropolitan Area (image source: Google Maps)

At the end of 2018, the registered inhabitants in the census of the city council were 27.445 citizens, providing a density of 7.926,86 hab./km^2.

Sestao is strategically well positioned, being located only 2km away from Bilbao, Biscay´s capital city, to which it is excellently connected through infrastructure such as roads, metro, train, and waterways (cycling lanes are currently being built).

The municipality has the water treatment plant of Galindo, which ranks among Spain´s 5 largest installations. It purifies 350.000 T/day of wastewater and serves approximately 1 million citizens.

In the past, Sestao was a heavy industry trend-setter and that legacy continues to live on today. As an example, it is home to the ArcelorMittal steel plant that aims to become, by 2025, the world´s 1st full-scale carbon-neutral steel plant in the world[51].

Sestao´s rich industrial past is increasingly attracting more industrial-centred tourism to the city.

51 https://corporate.arcelormittal.com/media/press-releases/arcelormittal-sestao-to-become-the-world-s-first-full-scale-zero-carbon-emissions-steel-plant

It is also one of the few cities in Spain to have a district heating system, which is operated with renewable energy (locally sourced biomass), providing heat to ~400 apartments.

Aside from the current +CityxChange project, it has also participated in 5 other EU projects (all linked, in some form or another, with energy efficiency), thus becoming a national innovator around sustainability and the transition towards a more circular and carbon-neutral economy. As such, municipal representatives can often be found presenting case studies in sustainable and smart cities related conferences and events.

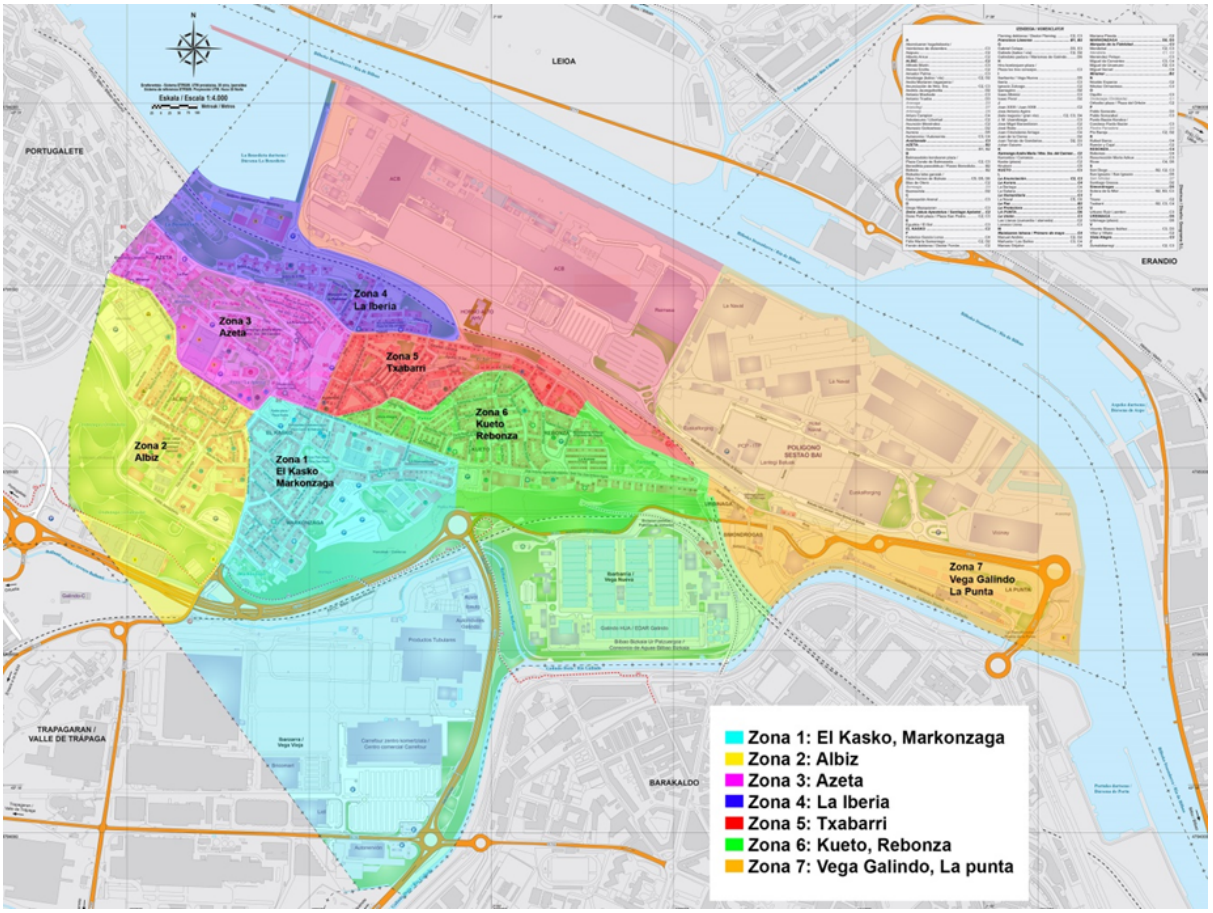

Fig. E.3: Neighbourhood zones in Sestao (image source: geo.euskadi.eus with edits by Sestao Berri)

During the ´80s, several large factories in Sestao started to shut down,leading to a significant rise in unemployment levels (historically, the company owners and white-collar workers tended to live in the more expensive districts across the estuary, while the actual factory workers lived in Sestao and some neighbouring municipalities). Sestao has had for many years the highest unemployment rate in the Basque Country. In addition, there has been a continuous decline in population. In the early ´80s, the population peaked at 40.000 citizens, and in 2021, the census was 27.342 citizens.

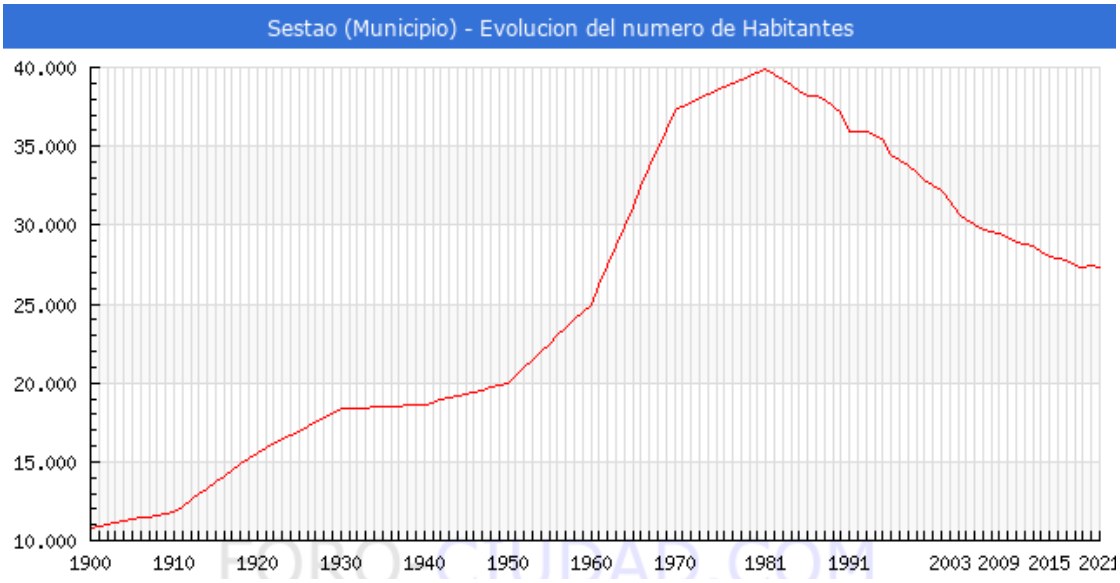

Fig. E.4: Population of Sestao over the years. (image source: foro-ciudad.com)

Recognizing these particular socioeconomic challenges, the Basque Government established in 2005 the creation of "Sestao Berri", a public entity that has, among its main tasks, the responsibility to help transform the municipality into a modern, healthy, and sustainable city.

The +CityxChange project offers a great number of benefits. However, if we distil the four that would be considered most important for the city, these are:

- **An enabler**: The mere fact of the project´s existence helps for various stakeholders to gather together, set specific goals, provide resources, etc.
- **How to create Positive Energy Blocks**. (This requires dismantling traditional barriers, working with new stakeholders, etc.).
- **Energy blocks act as a precedent for replication** within the city and eventually to other Basque and national municipalities.
- Creation of the **Bold City Vision** (in parallel with the Agenda Urbana), which, with its official approval, will help guide the direction to an ambitious and better future for Sestao and beyond.

E.2 Vision and Ambition for 2050

Sestao has numerous ambitions for becoming climate neutral. It has signed declarations and agreements, joined networks, and developed its urban agendas to achieve this by 2050.

Sestao has been a Member of the Covenant of Mayors since December 2020. It created its first draft version of its carbon inventory (based on 2019 levels) and in October of 2022 it completed its SECAP (most likely aiming toward reducing its overall CO2 emissions at least 55% below 1990 levels by 2030 for the public sector).

In 2019 Sestao signed an institutional declaration to become a carbon-neutral city by no later than 2050[52] (this was before the European Council endorsed in December 2019 the objective of making the EU climate-neutral by 2050, in line with the Paris Agreement).

In July 2022, Sestao got its Urban Agenda and initial version of its BCV approved, which includes twenty-four projects aimed at making the municipality more sustainable. Its Urban Agenda got selected by the Spanish Ministry of Transportation, Mobility, and Urban Agenda to take part in as a pilot along with other 122 Urban Agenda´s from other Spanish cities.

Sestao is part of the Udalsarea 2030 network, which is composed of Basque Municipalities committed towards sustainable development.

In March of 2022 the city signed a contract with the European Energy Efficiency Fund to receive technical assistance (at a cost of almost 200.000€ for the Fund) to study the economical, technical and legal viability, as well as create the corresponding public tender documents, for implementing energy efficiency projects initially estimated at a worth of 13,7 million €. These projects would be implemented under an ESCO model and would include energy communities (using PVs), energy efficient public lighting, energy efficiency improvements at municipal buildings, a digital platform for monitoring/citizen engagement and new e-mobility vehicles and infrastructure.

Sestao is in the process of creating other sustainability focused documents such as the Agenda 2030, its sustainable mobility plan, its sustainable landscaping plan, etc. The objective is to have multiple documents aimed at individual areas, such as education, mobility, construction, landscaping, etc. that jointly help to pursue the overall objective of making the municipality more sustainable and help the city reach, among others, its carbon reduction goals for 2030 and 2050.

E.3 Development Process of BCV

During the last years, several initiatives arose that were aimed at setting long-term ambitious sustainable frameworks for the City of Sestao by the years 2030 and 2050. The most important ones were considered to be +CityxChange's BCV, the Local Urban Agenda (UA) and the Sustainable Energy and Climate Action Plan (SECAP). Because of the similarities between the BCV and the UA, and the objective to get the city council´s various parties to officially approve all proposed measures and to minimise redundancy during the various required activities (involving the participation of municipal workers as well as citizens and other external partners), it was deemed of interest to merge the efforts and results of the BCV and the UA into a single process.

Sestao's start with the UA began at the February 2020 conference entitled "A new way of thinking about cities. The Urban Agenda", which brought together more than a hundred attendees to discuss the opportunities offered by the strategic framework of the UA at the

52 http://www.sestao.eus/es-ES/Noticias/Paginas/20190930_DeclaracionInstitucionalconsensuadaenJuntadePortavocesporlosGruposPoliticosdelAyuntamiento.aspx

local level. Throughout 2020, the diagnosis and Action Plan of the 2030 Agenda of the municipality were carried out, as well as participation in the development of the Ezkerraldea Regional Strategic Plan (Left Bank of the Greater Metropolitan Bilbao). The 2030 Agenda was approved at the end of 2020 together with the municipality joining the Covenant of Mayors. All the actions of the Agenda 2030 and the analysis of the emissions inventory to request admission to the Covenant of Mayors served as participatory actions prior to the start of the process of diagnosis/development of the Action Plan of the BCV and UA.

Sestao began the process of defining its BCV and UA at the beginning of 2021 as a strategic urban tool aimed at achieving the Sustainable Development Goals (SDGs) and aligning them with the strategic framework and methodological tools proposed by the Spanish Urban Agenda.

The BCV and the UA are, therefore, the result of a long commitment of the municipality to sustainable urban development. It represents a great opportunity to review and update the city's challenges and to configure an environmentally, socially, and economically sustainable urban development model that could ensure the well-being of people in a peaceful, supportive, inclusive, and cohesive society.

Sestao was carrying out this work when, at the end of 2021, the Ministry of Transport, Mobility and Urban Agenda published a financial aid program for UA pilot projects, endowed with 20 million euros, to help local and provincial administrations to promote their urban agendas; a call to which Sestao applied and was one of the 121 municipalities selected.

This helped develop the BCV and the UA, which was opened to the participation of citizens so that they could make their contributions and complement the work carried out internally by the City Council. This has resulted in a participative and consensual Action Plan that was unanimously approved across all political parties in the city council's plenary session at the end of July 2022.

The process of defining Sestao's BCV and UA was co-led by the Mayor's Office and Sestao Berri, through three internal working groups, in which technical and political staff participated, and had the external validation of the Advisory Council, key agents of the municipality, and representatives of all the political spectrum.

The working groups were made up of 40 participants as follows:

- Working Group 1: Territory, focused on the definition of the BCV and UA on strategic axes 1, 2, 3, 4, 5 and 8.
- Working Group 2: Citizenship, focused on strategic axes 6 and 7.
- Working Group 3: Innovation, Governance and Instrumentation, focused on the strategic axes 9 and 10.

Together, these groups defined the following 10 strategic objectives for Sestao (Table E.1)

Table E.1: 10 strategic objectives for Sestao

10 Strategic Objectives	STRATEGIC CHALLENGES
Objective 1: Land management and rational use, conservation and protection of land	To take advantage of the municipality's green spaces and their interconnection with each other, as well as the spaces linked to the riverbanks and the banks of the estuary.
Objective 2: To avoid urban sprawl and revitalise the existing city	Recover areas degraded by industrial activity and undertake a comprehensive rehabilitation of the residential park and the surroundings of the neighbourhoods.
Objective 3: Prevent and reduce the impacts of climate change and enhance resilience	Provide the municipality with adequate tools to mitigate GHG emissions and adapt to the impacts of climate change.
Objective 4: Sustainable resource management and promotion of the circular economy	Improve the energy efficiency of the municipal building stock and develop new ways of producing energy locally. Replicated across the city, the initial DPEB developed through +CxC.
Objective 5: Promote proximity and sustainable mobility	Take advantage of existing public transport connections in the municipality and prepare the city for the transition to a low-emission transport model.
Objective 6: Promote social cohesion and seek equity	Advancing towards equality of opportunity in all areas
Objective 7: Promote and favor the urban economy	Revitalise local commerce, provide citizens with new learning tools and explore the possibilities offered by industrial tourism.
Objective 8: Ensuring access to housing	Undertake a comprehensive rehabilitation of the housing stock and the neighbourhood environment and ensure access to housing for disadvantaged groups.

Objective 9: Lead and promote digital innovation	To advance in the modernization and digitalization of the local public administration.
Objective 10: Improve intervention instruments and governance	Provide the city council with new planning tools that favour the economic recovery of the municipality.

Due to the health restrictions resulting from the COVID-19 health crisis, the internal participative sessions had to be carried out telematically, which forced us to innovate and adapt to new ways of working and collaborating and allowed us to use innovative virtual tools that have facilitated the development of the meetings in a dynamic, agile and efficient way. As mentioned, citizen participation played a fundamental role in the BCV and UA, because it is not possible to draw up a city strategy without taking into account the opinion of citizens.

Fig. E.5: BCV / UA participatory engagement event with city officials. (Image source: Andy Bäcker)

Fig. E.6: BCV / UA citizen engagement event at a Sestao plaza. (Source of both images above: Luiskar Delgado)

Specifically, the following actions were carried out:

- **Virtual Surveys**: Citizens could access online surveys to express their challenges, needs, and opinions.
- **Forums**: During the month of June 2022, four forums were held in person with the following groups and specific themes: diversity and elderly (June 15th), the socio-economic fabric (June 16th), equality and community development (June 21st) and cultural and sports associations (June 22nd).
- **Suggestion box**: An online suggestion box was specifically set up so that citizens could submit suggestions.
- **Virtual forums**: A virtual forum was held (June 22nd) for those people who were unable to attend the face-to-face forums.

E.4 Implementation

The BCV and UA Action Plan were approved unanimously by all political parties in the municipality during a town hall plenary held in July of 2022.

The plan thus marks a roadmap to be followed for many years ahead and frees up resources to make the listed projects a reality. This translates, especially during the initial stages of the projects, towards being able to spend time and effort in trying to get financial resources (out of the Municipality´s yearly budgets, from the Basque Government, the Central Government, EU funds, partnerships between public/private sectors, etc.) so as to actually be able to materialise the various projects. Once the projects get the financial resources, depending on the project itself, time will be allocated to municipal workers, and potentially new workers will be hired for the specific project or tasks might get subcontracted, etc.

E.5 Impact, Outcomes and Results

The Action Plan and the list of Strategic Projects for the BCV and the Agenda Urbana are summarised below, describing the different objectives and associated lines of action.

Table E.2: A summary of the actions.

Objective 1: Land management and rational use of the land, its conservation and protection					
1.1. Manage the land in a way that is compatible with its territorial environment.					
Typology Line of Action	**Project/Action**	**Status**	**Typology**	**Timeframe**	**Main resp. entity**
Have a spatial planning strategy or plan that establishes the basis of the territorial model.	**Revision of the General Urban Development Plan**	Pending implementation	Planning	Medium	City Hall
Introduce measures to link land use planning with economic, cultural and natural resource planning.	**Urban development of Camino Txikito area**	Pending implementation	Normative	Medium	City Hall
	Urban development in the Mendieta area	Pending implementation	Normative	Medium	City Hall
To conserve and enhance the natural and cultural heritage and protect the landscape.					
Typology Line of Action	**Project/Action**	**Status**	**Typology**	**Timeframe**	**Main resp. entity**
Organise and design green and blue infrastructure networks taking into account ecological connectivity criteria and the geomorphological characteristics of the territory.	**Recovery of blue infrastructure**	Pending implementation	Intervention	Short	City Hall
	Interconnection of green spaces	Pending implementation	Intervention	Short	City Hall

Objective 2: To avoid urban sprawl and revitalise the existing city					
2.1. Define an urban model that promotes compactness, urban balance and the provision of basic services.					
Typology Line of Action	**Project/Action**	**Status**	**Typology**	**Timeframe**	**Main resp. entity**
Design an adequate and balanced system of local facilities and equipment, both quantitatively and qualitatively.	**Plan for the recovery of public spaces**	Pending implementation	Planning	Medium	Department of Works, Public Spaces, Services and the Environment
Improve the quality and universal accessibility of public spaces.					
Typology Line of Action	**Project/Action**	**Status**	**Typology**	**Timeframe**	**Main resp. entity**
Eliminate architectural barriers, pursuing greater autonomy for people with disabilities or reduced mobility, improving universal accessibility to	**Accessibility plan**	Pending implementation	Planning	Medium	City Hall

public spaces and facilities, housing and basic services.					

2.4. Improving the urban environment and reducing pollution

Typology Line of Action	Project/Action	Status	Typology	Timeframe	Main resp. entity
Decontaminate disused industrial land and proceed with its environmental recovery prior to its new use as urban land.	**Industrial land reclamation Arcelor Mittal**	Pending implementation	Intervention	Long	Department of Urban Planning, Housing and Industry
	Reclamation of industrial land La Naval	Pending implementation	Intervention	Long	
	Recovery of the La Benedicta dock	Pending implementation	Intervention	Long	

Objective 2: To avoid urban sprawl and revitalise the existing city

2.5. Promoting urban regeneration

Typology Line of Action	Project/Action	Status	Typology	Timeframe	Main resp. entity
Promote large-scale urban regeneration and renewal and link it to climate change mitigation tools and affordable and accessible housing stock through retrofitting.	**Local Strategy for Integrated Urban Regeneration**	Pending implementation	Intervention	Medium	Department of Works, Public Spaces, Services and the Environment

Objective 3: Prevent and reduce the impacts of climate change and enhance resilience

3.2. Reducing greenhouse gas emissions

Typology Line of Action	Project/Action	Status	Typology	Timeframe	Main resp. entity
Include new provisions in planning instruments, related to the adaptation and mitigation of the effects of climate change.	**Climate and Sustainable Energy Action Plan**	Pending implementation	Planning	Short	Department of Works, Public Spaces, Services and the Environment

Objective 4: Sustainable management of resources and promotion of the circular economy

4.1. Becoming more energy efficient and saving energy

Typology Line of Action	Project/Action	Status	Typology	Timeframe	Main resp. entity
Contain and even reduce energy expenditure, encourage energy savings and promote energy efficiency through plans, strategies or other measures.	**Integral Plan for the Rehabilitation of Public Buildings**	Pending implementation	Intervention	Medium	Department of Works, Public Spaces, Services and the Environment
	Energy rehabilitation of residential neighbourhoods	Pending implementation	Intervention	Short	

	Energy Infrastructure Plan (thermal, electrical, mobility)	Pending implementation	Planning	Medium	
	Street Lighting Improvement Plan	Pending implementation	Planning	Medium	
Distributed generation and self-consumption of energy in the urban environment	**Smart Energy Urban Communities**	Pending implementation	Intervention	Medium	

4.2. Optimising and reducing water consumption

Typology Line of Action	Project/Action	Status	Typology	Timeframe	Main resp. entity
Adopt measures to reduce water consumption, energy consumption and emissions associated with the distribution and treatment of this resource.	**Water Supply and Sanitation Improvement Plan for the Primary and Secondary Water Supply and Sewerage Network**	Pending implementation	Planning	Long	Department of Works, Public Spaces, Services and the Environment Bizkaia Water Consortium
To build water purification systems that are not aggressive with the environment. At the local level, apply treatments that avoid returning water to nature by polluting it or destroying biodiversity.	**Galindo WWTP Environmental Intervention Plan: treatment of faecal waste and water reclamation**	Implemented	Intervention	Short	

Objective 4: Sustainable management of resources and promotion of the circular economy

4.3. Promoting the materials cycle

Typology Line of Action	Project/Action	Status	Typology	Timeframe	Main resp. entity
Adopt measures to separate at source and manage construction waste and incorporate it in new construction or rehabilitation works, when technically, environmentally and legally possible, and promote the approval of plans for the reuse of construction waste.	**Circular Economy in the Construction Sector**	Pending implementation	Planning	Medium	Councillor for Citizen Safety, Civism, Mobility, Economic Development and Sports Behargintza Sestao Berri

4.4. Reducing waste and promoting waste recycling

Typology Line of Action	Project/Action	Status	Typology	Timeframe	Main resp. entity
Manage waste to reduce its impact, forcing waste treatment (hazardous and non-hazardous).	**Master Plan for the Pneumatic Collection of Urban Solid Waste**	Pending implementation	Intervention	Medium	Department of Urban Planning, Housing and Industry Department of Works, Public Spaces, Services and the Environment

Objective 5: Promote proximity and sustainable mobility

5.1 Promoting the city of proximity

Typology Line of Action	Project/Action	Status	Typology	Timeframe	Main resp. entity
Develop pedestrian and bicycle networks, including new urban developments, ensuring safe non-motorized travel in a friendly environment. Develop ordinances for the coexistence of cyclists and pedestrians.	**Bicycle and pedestrian path network**	Pending implementation	Intervention	Medium	Department of Urban Planning, Housing and Industry Department of Works, Public Spaces, Services and the Environment

5.2 Promoting sustainable modes of transport

Typology Line of Action	Project/Action	Status	Typology	Timeframe	Main resp. entity
Design transportation interchanges that act as transfer nodes between interurban and urban trips.	**Urbinaga Intermodal Transport Station**	Pending implementation	Intervention	Medium	Department of Urban Planning, Housing and Industry Department of Public Safety, Civism, Mobility, Economic Development and Sports Bizkaia Transport Consortium ADIF
Locate park-and-ride lots on the urban periphery, facilitating the transfer of the user from a private vehicle to public transport or carpooling.	**Parking Master Plan**	Pending implementation	Planning Intervention	Medium	Department of Finance, Assets and Car Parks
Integrate cycling with public transport and encourage bike-sharing initiatives.	**Electric Bicycle Rental Services**	Pending implementation	Planning Intervention	Medium	Department of Public Safety, Civism, Mobility, Economic Development and Sports Provincial Council of Bizkaia
Promote and encourage the use of alternative energy and hybrid vehicles.	**Renewal of the vehicle fleet**	Pending implementation	Acquisition	Short	

Objective 6: Promote social cohesion and seek equity

6.1 Reducing the risk of poverty and social exclusion in disadvantaged urban settings

Typology Line of Action	Project/Action	Status	Typology	Timeframe	Main resp. entity
Reduce levels of inequality, the risk of poverty and social exclusion through measures that act on levels of spatial and residential segregation and dissimilarity.	**Local Observatory of Coexistence-Conflict Resolution Team**	Pending implementation	Intervention Planning	Medium	Department of Social Action, Elderly People, Diversity and Health
Reinforce the sense of belonging to a place as a sign of identity and knowledge of the immediate environment.	**Register of associations and municipal premises**	Pending implementation	Registration	Short	Department of Culture, Citizen Participation, Youth, Historical Memory and Patrimonial Responsibility
	Cultural Reference Plan	Ongoing	Intervention	Short	
	Plan for the Expansion of Social	Pending implementation	Planning	Medium	

	and Cultural Infrastructures				
	Education, Youth and Culture Plan	Ongoing	Intervention	Short	
	Basque Language Plan	Ongoing	Intervention	Short	Department of Basque and Education
6.2 Seek equal opportunities from a gender, age and ability perspective.					
Typology Line of Action	**Project/Action**	**Status**	**Typology**	**Timeframe**	**Main resp. entity**
Adopt measures through plans or strategies to guarantee equal treatment and opportunities, equal access to the labour market and public life.	**III Equality Plan**	Ongoing	Intervention Planning	Short	Department of Social Action, Elderly People, Diversity and Health
	Friendliness and Active Aging Plan 2019-2022	Ongoing	Intervention Planning	Short	

E.6 Learnings, Limitations and Next Steps

The process of developing the BCV and Urban Agenda started in 2020. In 2021, specific projects started to be identified, which included suggested timeframes for their implementation. Now, nearing the end of 2022, we realise that several of these timeframes were overly ambitious. Among others, but especially, COVID and preparing a maelstrom of calls related to EU COVID Relief Funds were to a large degree responsible for delaying some of the originally planned timeframes. From now onwards, a greater safety margin will be incorporated in future timeframes to account for unpredicted delays.

The developed Action Plan is, and will remain, work in progress. New strategic projects will be added as they ensue.

As an example, BCV and UA strategic projects that are currently at an early development/ coordination stage (requiring future approval by the town hall plenary as to actually move forward) are:

- **Sustainable 'fiscalisation'**: Taxes that the municipality is responsible to collect, such as real estate taxes (Impuesto sobre Bienes Inmuebles, *IBI*), would be reduced by a predetermined percentage and timeframe in exchange for implementing sustainable actions such as installing PVs on one´s property.

- **Sustainable certification**: The already approved BCV and Agenda Urbana Action Plan includes the development of a Collaborative Tool For Identifying Sustainable Solutions (a type of ´sustainable wikipedia´ that allows professionals in all sorts of sectors that operate in Sestao to find products, practices, etc. that helps them to incorporate sustainability into their professional activity). A partner project of this initiative consists in the development of a voluntary, scalable, real-time sustainable certification program that provides a sustainability score for entities, citizens' lifestyles, products, neighbourhoods, etc. The resulting scores may potentially affect the sustainable fiscalisation mentioned above. The ambition of this project is for it to

scale up beyond the boundaries of Sestao, at an international level, and thus contribute towards achieving a significant positive net impact for the planet.

This particular project will require the participation of research centres, universities, businesses, etc. Positive discussions are already underway with multiple stakeholders (as an example, SGS and Bureau Veritas, both being the world's largest companies in the business of providing certifications) to collaborate on this project. The Department of Environment of the Basque Country has also expressed interest in this project and the possibility of scaling it up to all of the Basque country.