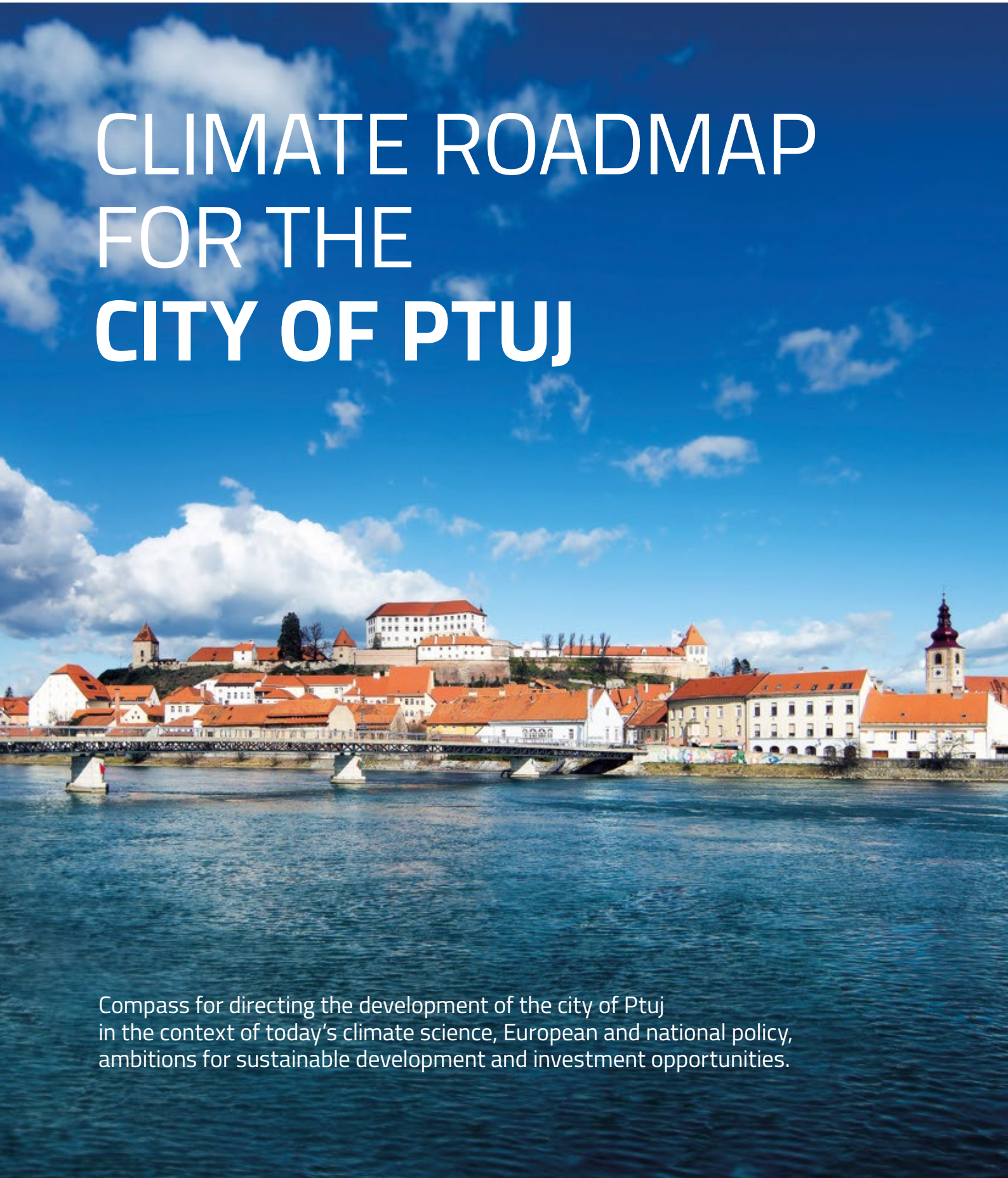
eit Climate-KIC

CLIMATE ROADMAP FOR THE **CITY OF PTUJ**



Compass for directing the development of the city of Ptuj
in the context of today's climate science, European and national policy,
ambitions for sustainable development and investment opportunities.

CITY OF PTUJ

Climate-KIC

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Compass for directing the development of the city of Ptuj in the context of today's climate science, European and national policy, ambitions for sustainable development and investment opportunities.

MESTNA OBČINA PTUJ

institute

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Introduction

1. Introduction

With its inhabitants, natural resources, culture and heritage as well as its economic and social organisations, the City Municipality of Ptuj (hereinafter referred to as the Municipality of Ptuj) holds the potential to enable the transition to a sustainable, low-carbon, healthy and connected society through smart, inclusive and future-oriented governance.

The path to such a development is not easy given the current situation, nor is it clearly defined.

With the help of the Climate Roadmap and the active involvement of residents, local organisations and companies, the Municipality of Ptuj will strive to find a development model that will guide the municipality and lead it towards the set development ambitions.

The Climate Roadmap for the city of Ptuj (herein the Climate Roadmap) builds on the vision of sustainable development, which enables the inhabitants to live a good life, maintain a quality environment and reduce greenhouse gas emissions. Of key importance for the introduction of the changes necessary for the transition to such development is engaged strategic management that strives for the given goals and implements them together with the population and the administrative and business community.

The Climate Roadmap describes the initial conditions and challenges, sets ambitious goals, and formulates strategies for achieving these goals.

The Climate Roadmap indicates the necessary direction of development of the city of Ptuj in the context of today's climate science and in accordance with the target policies of the EU and Slovenia in the period after 2020, which are crucial for attracting investments and drawing European development funds. The document builds on the content of the Sustainable Urban Strategy of the Municipality of Ptuj 2015-2025 (SUS), new European political and investment priorities, best practice examples of global, national, and local strategies for sustainable development and the cooperation of the local community.

trategic basis for directing the development of the city of Ptuj

Context

2. Context

In preparation of development guidelines, the Municipality of Ptuj draws from international development models such as the United Nations Agenda 2030[1], the European Green Deal and EU development strategies such as "A Clean Planet for All" and "EU 2030 Climate and Energy Framework", sustainable development strategies, low-emission mobility, climate change adaptation and the EU strategy for the Energy Union. National guidelines included in development documents are taken into account, such as the Slovenian Development Strategy 2030[2], the National Energy and Climate Plan, the Operational Programme for the Implementation of EU Cohesion Policy, the long-term strategy for promoting energy renovation of buildings, the Energy Efficiency Action Plan (EE AP) and Renewable Energy Sources Action Plan (RES AP), the Operational Programme of Measures to Reduce Greenhouse Gas Emissions (OP GHG) and the forthcoming National Energy and Climate Plan.

By signing the Paris Agreement, Slovenia has committed itself to limit the rise in global temperature to below 2°C and manage the consequences of climate change. Reducing greenhouse gas (GHG) emissions requires increased energy efficiency, the transition to renewables, new business models, the development of innovative solutions in technologies, services and products and lifestyle changes. These development processes form the basis for a more competitive economy and new jobs.

At the global as well as European level, there is a realisation that the Paris Agreement and the Universal Sustainable Development Goals (UN) cannot be achieved without activating and connecting cities. The global dialogue under the Paris Agreement encourages cities to increase their ambitions for climate strategies and action plans, thus seizing the opportunities offered by the new, breakthrough development model.

The Municipality of Ptuj is aware that it plays an active part in this global dialogue and that its decisions can have a significant impact on climate change, quality of life and the environment as well as on new economic opportunities offered by upcoming systemic changes (energy, construction, mobility, ICT, agriculture, etc.).

1 Agenda 2030 is a global plan for achieving global sustainable development. It sets out the sustainable development goals adopted by 193 countries, including Slovenia (2015). The 2030 Agenda comprises 17 interrelated ambitions and 169 specific goals that address today's global challenges, such as poverty, inequality, climate change, environmental change, peace and justice.

2 In 2017, the Government of Slovenia adopted the Slovenian Development Strategy 2030, the headline development framework of the country, which puts quality of life for all at the forefront. With five strategic orientations and twelve interconnected development goals, it lays new long-term development foundations

2.1 EU INSTRUMENTS

In line with the carbon neutral, more balanced and sustainable development trends, the European Commission has developed the "European Green Deal"[3], a strategy that sets out an ambitious package of measures on climate change, environmental protection, the sustainable economy, and social equality. This will be followed in 2020 by a new European Climate Act, which will include the goal of climate neutrality by 2050 in European legislation as a legal formal requirement and no longer just as an ambition. The future multiannual financial framework of regional and cohesion policy (for the period 2021-2027) is also in line with the EU Green Deal, where the focus of regional development investments will be on priorities for a "smarter" and "green, carbon-free Europe" (amounting to 65-85% of European Regional Development Fund (ERDF) funds).[4] Specifically for Slovenia, this share should be 75% of the ERDF.[5]

The topics of the Climate Roadmap are directly related to European policies and investment guidelines in the framework of cohesion policy in the period 2021-2027 and future periods[6]. The Climate Roadmap is a supporting strategic document that comprehensively addresses priority areas and development opportunities related to limiting and at the same time adapting to climate change. The document supports and extends the Sustainable Urban Strategy of the Municipality of Ptuj (SUS) in certain topics, with the aim of strengthening the strategic orientations, programmes, and operations of the municipality in the direction of sustainable development, achieving carbon neutrality and improving access to investment funds.

It is becoming increasingly clear that climate and green policies will play a key role in channelling EU investment in the coming period. This is indicated by the European Green Deal, the new cohesion policy, and the investment priorities of the regional development programme.

The key priorities of European regional development and their connection with the topics of the Climate Roadmap are summarised below.

Priority: A smarter Europe - Innovative and smart industrial transformation is summarised in the Climate Roadmap mainly in the chapters "Sustainable economy" and "Sustainable mobility". The "Sustainable Economy" section contains goals and priorities that are directly related to smart specialisation and S4 priorities[7] and thus to a specific EU goal: Development of skills for smart specialisation, industrial transition, and entrepreneurship.

Priority: Low carbon and greener Europe - A clean and fair energy transition, green and smart investments, a circular economy, climate change adaptation and risk prevention are covered in the Roadmap in three headline areas. The first section ("Carbon Neutral City") covers measures

3 https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

4 https://ec.europa.eu/regional_policy/en/2021_2027/

5 ZMOS information

6 https://www.eu-skladi.si/sl/dokumenti/po-2020/2019_porocilo-o-drzavi-2019.pdf

7 Smart cities and communities, smart buildings, networks for the transition to a circular economy, sustainable food production, factories of the future, mobility

to promote: energy efficiency, especially in residential buildings, energy-poor households, the service sector, and industry; the use of energy from renewable sources, in particular for heating and cooling; the second section ("Sustainable City") covers measures to increase biodiversity, improve green infrastructure in the urban environment and improve access to it; pollution reduction and sustainable water management. The topics of adaptation to climate change, risk prevention and strengthening resilience in the event of natural disasters are covered in the third content section of the Roadmap ("Smart City").

Objectives of the Connected Europe priority are summarised in the Roadmap mainly in the chapter on sustainable mobility, with an emphasis on measures and investment needs that support the development of sustainable, intelligent, and intermodal mobility.

Investment support for sustainable initiatives will also be available under the InvestEU programme, which combines 13 European financial instruments and is the successor to the Investment Plan for Europe, known as the Juncker Plan. InvestEU supports four different sectoral areas, including project financing in the fields of sustainable energy, digital connectivity, transport, the circular economy, water, waste, and other environmental infrastructure.[8]

A smarter Europe

Low carbon
and greener Europe

8 https://ec.europa.eu/commission/priorities/jobs-growth-and-investment/investment-plan-europe-juncker-plan/whats-next-investeu-programme-2021-2027_en

Purpose and Structure of the Roadmap

3. Purpose and Structure of the Roadmap

The purpose of the Climate Roadmap is to provide a strategic basis for directing the development of the city of Ptuj, which is, together with the municipality, run by numerous organisations and civil society. It is therefore a development document that indicates the necessary direction of development in the context of today's climate science, European and national policy, global ambitions for sustainable development and investment opportunities.

The process of preparing the Roadmap is based on an expert understanding of climate issues and European policies; understanding the current context of development in the municipality and recognising its potential; on co-creation of content priorities with the local community as part of thematic workshops (Ptuj Vision 2048, City for Nature); existing European and national development guidelines and in accordance with scientific findings and guidelines.

An important feature of the Roadmap is that it opens space for debate, especially in the direction of upgrading objectives and more precisely defining priority areas and goals. The Roadmap represents a comprehensive set of topics, for which detailed action plans will be needed that will implement the indicated measures and guide the further development of the city. The Roadmap is meant as a living document that needs to be updated according to local needs, the development of technologies, knowledge and policies.

The commitment to the goals of sustainable, climate-friendly development indicated in the Climate Roadmap is reinforced in the Municipality of Ptuj with other existing strategies and programmes of the Municipality: Sustainable Urban Strategy 2015-2025 (SUS), Local Energy Concept (LEC), Municipal Environmental Protection Programme (MEPP), Integrated Transport Strategy (ITS), Walkability Strategy for the City of Ptuj.

Table 1: Related existing strategies and programmes of the Municipality of Ptuj

CLIMATE ROADMAP	**Sustainable Urban Strategy 2015-2025 (TUS)**
	Local Energy Concept (LEK)
	Municipal Programme for Environment Protection
	Comprehensive Mobility Strategy (CPS)
	Walkability Strategy for the City of Ptuj

The Climate Roadmap highlights strategic orientations, goals, priority measures and indicators that will be of key importance in promoting climate-neutral, sustainable development. In this way, the Climate Roadmap serves as a framework for the preparation of detailed action, project and investment plans.

The Climate Roadmap comprises 3 headline strategic directions that lead to the goal of making Ptuj:

- A carbon neutral city
- A sustainable city
- A smart city

Each strategic direction is divided into several target areas defined by at least one goal. One or more progress indicators are set for each goal. They are quantitative and semi-qualitative (process) in nature.[9]

Each target area is described on the basis of baseline conditions, local and global challenges and potential solutions.

The table below shows the basic framework of the Climate Roadmap. An extended framework, including objectives and indicators, is provided in Annex 1.

Table 2: Content framework of the Climate Roadmap

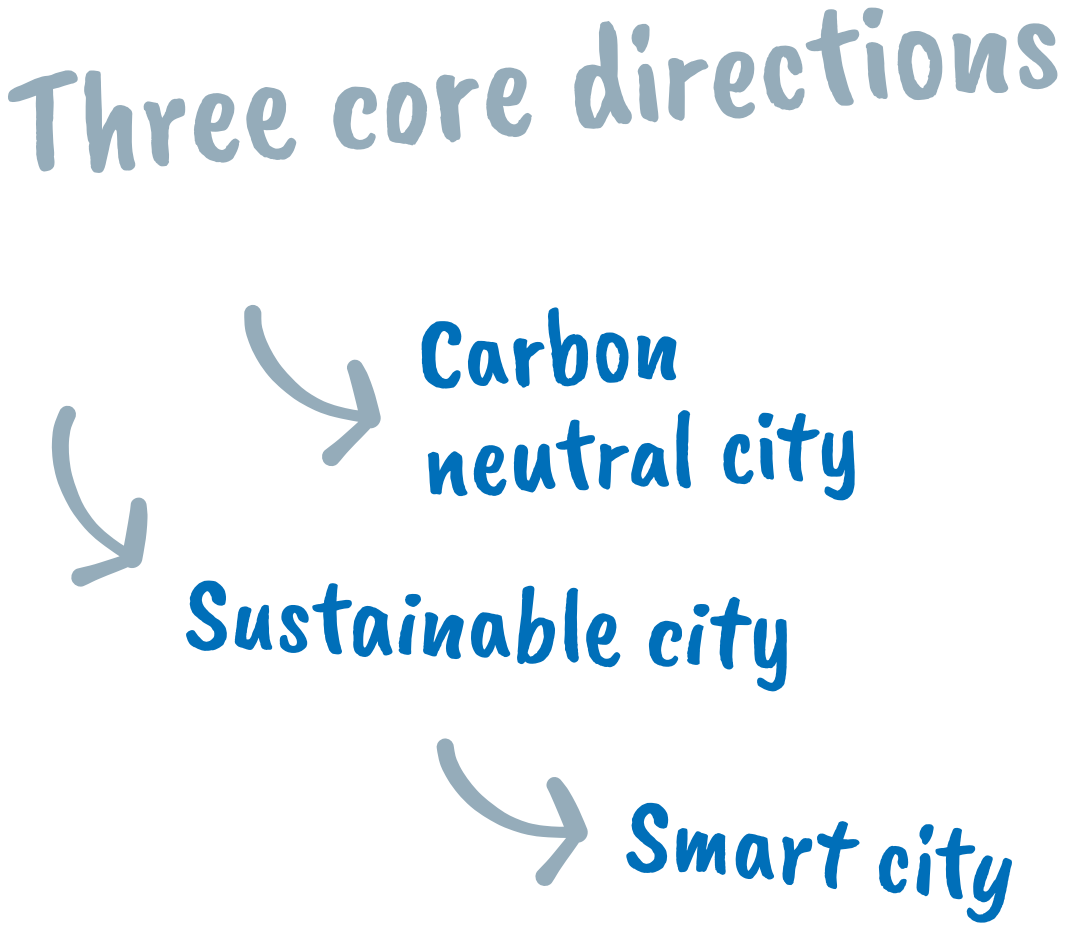
AMBITIONS	
CARBON NEUTRAL CITY	Sustainable Energy
	Green Buildings and Infrastructure
	Sustainable Mobility
SUSTAINABLE CITY	Health and Well-being of the Citizens
	Functionality of Ecosystems and Biodiversity
	Sustainable Economy
SMART CITY	Adapting to Climate Change
	Connectedness and Collaboration

9 The use of indicators to measure progress has the following role:
- to support informed decision-making at strategic and project level,
- to promote the successful implementation of city-funded activities,
- to support city-funded activities, and
- transparency of projects and operations carried out with public funds.

The Climate Roadmap represents the basis for drawing EU and state funds in the new financial perspective, as it covers the topics to which a larger share of EU investment funds will be directed. With its content, it represents support in strategic planning and management, a basis for the promotion of cross-sectoral cooperation and support for the development of capacities that will guide and enable climate-friendly development.

The Municipality of Ptuj will be able to implement the development goals of the Climate Roadmap within the framework of integrated territorial investment programmes; other thematically and strategically related development programmes and projects at the European, national and local level; private investment; and through the structuring of group investment projects to be covered by the private, charitable and crowdfunding sectors.

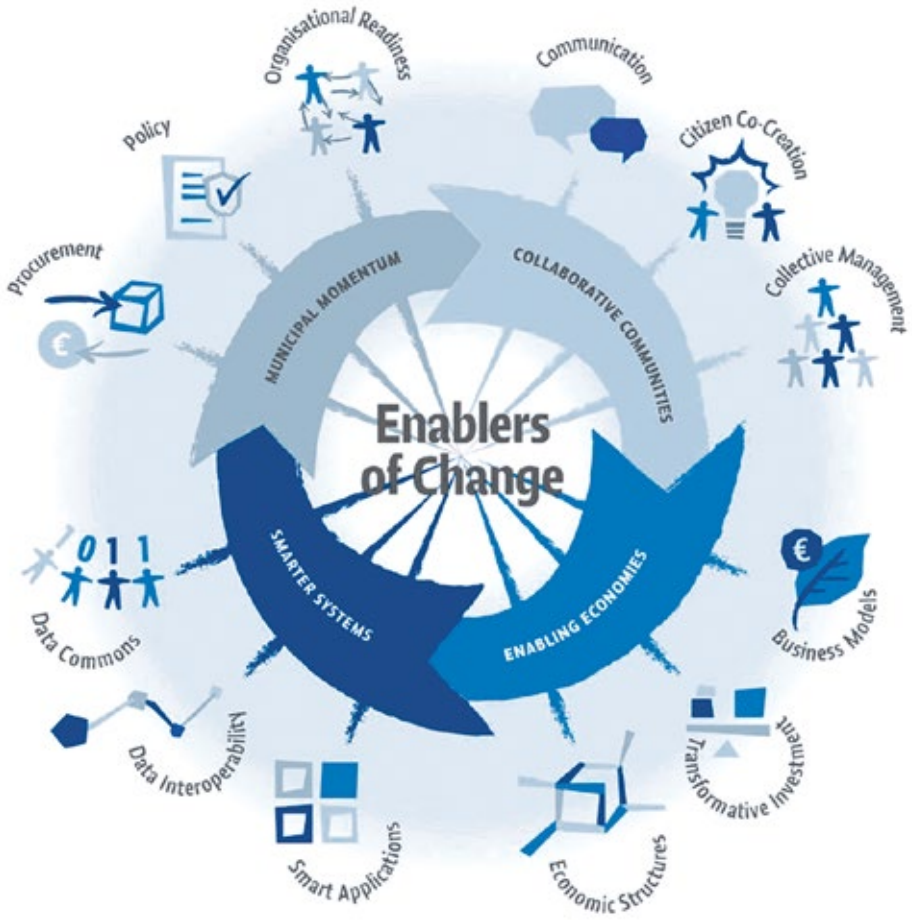
The Municipality of Ptuj is aware that an integrated development breakthrough can only happen if all actors (municipality, residents, companies, and other organisations) are involved and participate in the process. The Municipality of Ptuj will play a key role in establishing this cooperation and in initiating changes.



Enablers of Change

4. Enablers of Change

Cities will successfully develop into sustainable, low-carbon, sustainable, inclusive and healthy if they manage to create good conditions and processes for the necessary changes. The reference framework to encourage thinking about this is the diagram below.



Source: Thriving Communities (https://cutt.ly/ljaEked)

In this Thriving Communities framework 12 basic conditions for the introduction of major but necessary social changes are presented. These conditions are divided into four key areas and are explained in more detail below.

4.1 Collaborative Communities

Collaboration across communities must be the foundation for agreeing on shared goals and implementing the most effective ways of achieving them.

Communication is the foundation of collaboration. We have more communication than ever, and yet communities are increasingly struggling to communicate effectively between citizens, social groups, organisations, businesses and governments. Better communication with each other is essential for other forms of collaboration to develop.

Citizen co-creation is essential for the process of designing strategies, change processes, actions, management models and indicators for evaluating progress. This needs to go far beyond typical consultation and engagement, into processes that are fully inclusive and that really share ownership of plans and outcomes long-term.

Collective management structures are essential for the long-term collaborative ownership of community assets. Most communities already have some mix of local government, agencies, public utilities, NGOs and co-operatives. These need to be built on with models that prioritise equity and inclusiveness - redistributing power and value as needed.

4.2 Enabling Economies

Too often the economy is still talked about like it is the ends in itself, rather than a means to help us collaborate, prosper and live well. Many aspects of the economy as it is today are proving barriers to progress rather than enablers. While cities certainly need to find ways to harness the power of financial capital at a new speed, scale, and purpose; we believe three key economic areas need focused work in support of transformational change.

Using **Business Models** that are designed to enable successful project delivery, maximise the benefits to the community and drive equity and prosperity long-term. Where current models are not doing this, they need to be challenged, redesigned, or replaced. These link closely to collective management models.

Transformative Investment: Aligning needs for investment through modelling of the overarching investment case for transformational action; aggregating local assets with both project capital needs and operating resource needs; then matching this demand to supply through local financial mechanisms that bring together investment from a blend of public, private and community capital investment partners. This creates strategic investment in what is really needed for transformation - with the efficiencies of standardisation, scale, and a systemic long-term view.

Economic Structures in our communities need to be reshaped so that the local economic context better enables scaling of transformational change activities over time. In many cases the benefits of change, and thus potential revenues, would not accrue to those actors in the community who would bear the most costs in today's economy. This undermines opportunities for both capital alignment and viable business models. Innovations in the structural economic context might include shifting taxes from 'goods' to 'bads', shifting subsidies from 'bads' to 'goods', a universal basic income, local banking and/or local currencies.

4.3 Smarter Systems

'Smart' is also often used today with the sense that it is an end rather than means - with many cities especially striving to be 'Smart Cities'. But generally, the value from 'smarter' data and associated digital technology systems comes from them helping us to do something more effectively. They enable improvements in the community systems from which citizens finally derive real value. As such we see smarter systems as an enabler area.

Data Commons should be the key principle of local data governance. This requires a citizen-centric ownership and management approach to ensure that the systems making data available for broader communal use safeguard privacy protection and equitable value distribution. This builds the trust needed for useful data sharing.

Interoperability standards for data systems ensure efficient sharing and use of data across the community. This maximises opportunities for 'smart application' innovation and thus value-creation.

Smart Applications use available data to help us to optimise strategies, actions, information sharing, real-time guidance, and operations management. This adds value for both decision makers and citizens in their daily lives and planning for the future.

4.4 Municipal Momentum

Completing the enablers circle, we come to the area of local government, governance and municipalities. Local government can, and must, play a critical role in enabling change. Municipalities may also play a leading role in anchoring the change process, or not - as generally they are not set up to do so, but that is a discussion for another day. As a key enabler, municipalities can drive:

Procurement strategies and processes that accelerate investment in transformation and use public buying power to nurture innovation, alignment and as a seed for the scale of investment needed.

Policy interventions such as strategic and spatial planning and local regulations, which accelerate innovative actions, enable new business models, reduce risk for capital partners, ensure transparency and influence necessary behaviour changes.

Organisational Readiness. Most municipalities today are not set up to nimbly drive transformative action in their community. Municipalities need to reprioritise and reorganise their human resources to play the strongest role they can, while supporting wider cross-community organising and management models that build more Collaborative Communities.

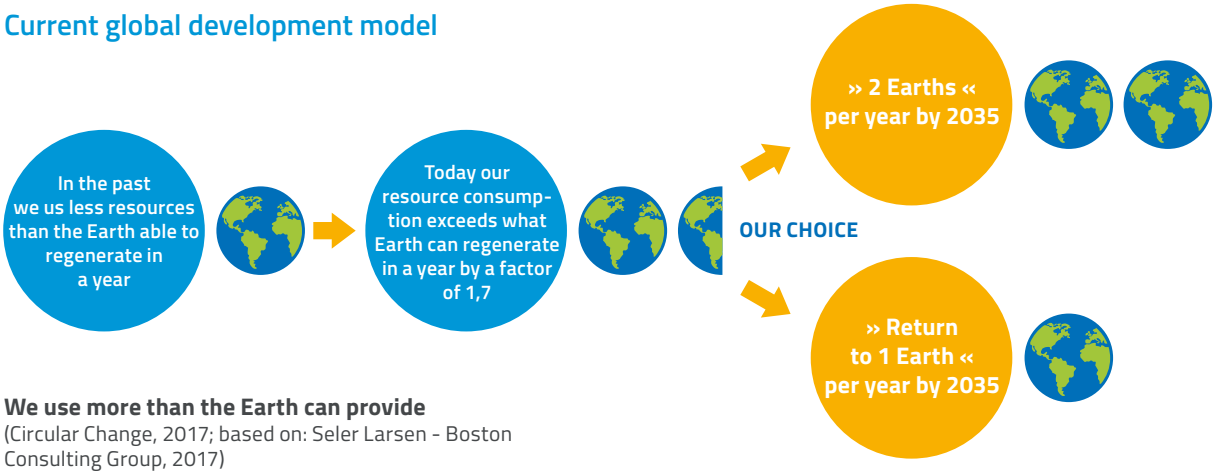
Climate Change and Sustainable Development

5. Climate Change and Sustainable Development

The Municipality of Ptuj, like all other cities and regions, is involved in global events and pressures that are manifested at the global and local level.

The socio-economic model of development we are currently pursuing is unsustainable, as evidenced by exceeded planetary boundaries and the fact that we are currently consuming more resources than the Earth can provide.[10]

Current global development model



We use more than the Earth can provide
(Circular Change, 2017; based on: Seler Larsen - Boston Consulting Group, 2017)

The consequence of the current model of development is the destabilisation of biochemical and biophysical systems that regulate the metabolism and regeneration of matter and ecosystems on this planet. Alarming areas are biodiversity loss; increasing intake of nitrogen and phosphorus in the form of fertilisers (into the biosphere and oceans); climate change; and change of land use.

The constraints we face as a society and the growing pressures on natural resources and systems make it clear that we need radical change.

The University of Leeds research project "A Good Life for all Within Planetary Boundaries" confirms the thesis that currently, no country in the world meets both ecological and social criteria that would satisfy the ambition of a good life within ecological boundaries.[11]

According to the indicators of this framework, Slovenia achieves quite positive social results, while according to environmental indicators, it is at the very top in terms of unwanted surpluses, similar to other European countries. According to the collected data, Slovenia exceeds the viable thresholds

10 http://www.vlada.si/fileadmin/dokumenti/si/projekti/2016/zeleno/Kazipot_prehoda_v_krozno_gospodarstvo.pdf

11 https://goodlife.leeds.ac.uk/; https://www.kateraworth.com/2018/12/01/doing-the-doughnut-at-the-g20/

of all environmental indicators, except for indicators related to the quality and quantity of water resources. At the level of social indicators, Slovenia achieves positive conditions in 9 out of 11 categories.

To address global challenges such as climate change, migration pressures, biodiversity loss, reduced ecosystem functionality and social inequality, communities need new ways of managing, connecting, and living that our planet and society can sustain in the long run. Our generations face the challenge of drastically reducing greenhouse gas emissions over the next 20 to 30 years. Achieving this goal will require radical changes in many areas, happening simultaneously and faster than ever before.[12]

City administrations have a key role to play in determining critical priority measures and enabling stakeholder participation to prepare incentives and investments and build infrastructure that will ensure a systemic breakthrough into a new development model.

12 Transformation, in time, EIT Climate-KIC strategy 2019-2022

Climate Roadmap

6. Climate Roadmap

6.1 A CARBON NEUTRAL CITY

The Carbon Neutral City chapter contains three target areas: sustainable energy, green buildings and infrastructure and sustainable mobility and the related objectives summarised in the spreadsheet below.

OBJECTIVES	
CARBON NEUTRAL CITY	SUSTAINABLE ENERGY
	Elimination of fossil fuels in the local district heating energy system until 2050
	Extension of district heating, especially to areas where the use of fossil fuels prevails
	Monitoring and reducing final energy consumption in accordance with national and EU objectives
	Monitoring and reducing co2 per person emissions in accordance with national and EU objectives
	Establishment of local power energy systems for electricity production (public sector)
	Reduction of energy poverty in the municipality
	GREEN BUILDINGS and INFRASTRUCTURE
	Reduce greenhouse gas emissions in buildings by 70 percent by 2030
	Achieving the carbon neutrality of public buildings by 2050
	Active management of public real estate
	Renovation and use of an existing building fund
	SUSTAINABLE MOBILITY
	Active mobility and "green" mobile services (public transport, climate friendly vehicles) become priority mobility options
	60% of journeys are made by public transport, on foot, by bicycle or by group transport
	Emission-free public fleets by 2030
	15% increase in frequency/density of public transport
	Optimisation of city logistics for companies and residents of the old city centre

The dependence of energy, processing and transport systems on fossil fuels poses an increasing range of risks.

The extraction and combustion of fossil fuels contribute to increasing greenhouse gas emissions and, consequently, accelerate climate change. The latter is reflected in increased weather and natural disasters, increased infrastructure damage, destabilization of the economy, disruption of food and other goods production, water scarcity, negative impact on human beings, increasing pests, destruction of ecosystems, etc.

Fossil fuel extraction is concentrated in certain often "crisis" areas, which for many "importing" countries poses a risk related to the dependence on the supply of these resources.

Emissions of fossil fuels (gases and particulate matter) cause air pollution and thus harm human health. New research shows that air pollution, as a result of fossil fuel combustion, causes about 9[13] million premature deaths a year and thus represents one of the key health problems of this century.

The Paris Agreement (2015) on climate change has reached a global consensus and agreement to limit global warming to "below" 2°C. The Agreement includes an action plan covering the period from 2020 onwards.

The latest report by the IPCC (Intergovernmental Panel on Climate Change) suggests that achieving the goal of limiting climate change to below 2°C requires urgent and radical social change that the panel believes is achievable and feasible.

There are many technologies on the market today that offer alternatives to fossil fuels. In many cases, they are also more economically justified than the continued use of fossil fuels. The biggest problem in terms of a breakthrough to a carbon-neutral society arises in the systemic bottleneck where outdated technologies and related infrastructure need to be replaced with new ones, which of course requires large financial investments and adjustments of energy and other systems for successful energy distribution and use at the European, national and local levels. This process requires political motivation and perseverance, strengthening cooperation between sectors and stakeholders and actively rejecting conflicting interests.

To achieve the status of a carbon neutral city, the Municipality of Ptuj has set three headline ambitions, which include the field of energy, buildings and mobility.

13 Lelieveld J. et al. Cardiovascular disease burden from ambient air pollution in Europe reassessed using novel hazard ratio functions

6.1.1 Sustainable Energy

OBJECTIVES:

ELIMINATION OF FOSSIL FUELS IN THE URBAN ENERGY DISTRICT HEATING SYSTEM UNTIL 2050

EXTENSION OF DISTRICT HEATING, ESPECIALLY TO AREAS WHERE THE USE OF FOSSIL FUELS PREVAILS

MONITORING AND REDUCING FINAL ENERGY CONSUMPTION IN ACCORDANCE WITH NATIONAL AND EU OBJECTIVES

MONITORING AND REDUCING CO2 PER PERSON EMISSIONS IN ACCORDANCE WITH NATIONAL AND EU OBJECTIVES

ESTABLISHMENT OF LOCAL POWER ENERGY SYSTEMS FOR ELECTRICITY PRODUCTION (PUBLIC SECTOR)

REDUCTION OF ENERGY POVERTY IN THE MUNICIPALITY

Indicators:

SUSTAINABLE ENERGY	UNIT
Share of RES in the local district heating system	%
Proportion of heating covered by local district heating	%
Final energy consumption per capita	MWh/capita/year
CO_2 emissions per capita	tCO_2/capita/year
Share of final energy consumption in the local public sector covered by own energy production from RES	%
Municipal investments in the field of sustainable energy (renovation of buildings, public transport, public energy systems - heating, electricity)	EUR/year
Proportion of households that cannot afford adequately heated housing	% of households

Challenge:

For cities to achieve the ambitious goals set in global treaties, such as the United Nations Agenda 2030 (SDG), the Paris Climate Agreement and the European Green Deal, they will need to accelerate change in a number of areas. For some time now, one of the key areas of transformation has been the energy sector, where massive expansion of production from renewable energy sources (RES) or decarbonisation of the energy network is needed, as well as the related technological transition on the one hand and improving energy efficiency and reducing energy consumption on the other.

The European Union is committed to developing a sustainable, competitive, secure, and decarbonised energy system by 2050. Under the European Energy Directives and the EU 2030 Climate and Energy Framework, Member States will need to strive for a cost-effective balance between decarbonisation of energy supply and reduction of final energy consumption. Members will need to identify the expected results of their long-term energy strategies and monitor developments by setting progress indicators according to national circumstances and developments. Cities, as centres of activity and living, will play a key role in this.[14]

Studies of modelling the energy transition to 100% renewables confirm that a systemic energy transition to renewables in Europe is not only possible in the long run but achievable by 2050. Existing potentials for renewable energy and technology, including energy storage, can ensure a sufficient and secure energy supply in all sectors. Studies find that a sustainable energy system would be more cost-effective than the existing system based primarily on fuel fossils and nuclear energy. The energy transition is no longer as much a matter of technical or investment feasibility but a matter of political commitment and will. [15] [16] [17]

Although cities or municipalities are not necessarily the owners or managers of energy systems, they have an influence over them.

For example, if a city decides to use energy based on RES for its own activities, it can indirectly have a positive impact on the transformation of the local energy system. The role of cities in this case is: to set clear goals regarding local energy policy, to properly direct public procurement, to promote the aggregation of local demand for RES and to promote energy efficiency and the transition to RES through various mechanisms (decision making, integration, awareness, financing, etc.).[18]

The following graphs show energy consumption in the Municipality of Ptuj by consumers:

14 Directive (EU) 2018/844 of the European Parliament and of the Council

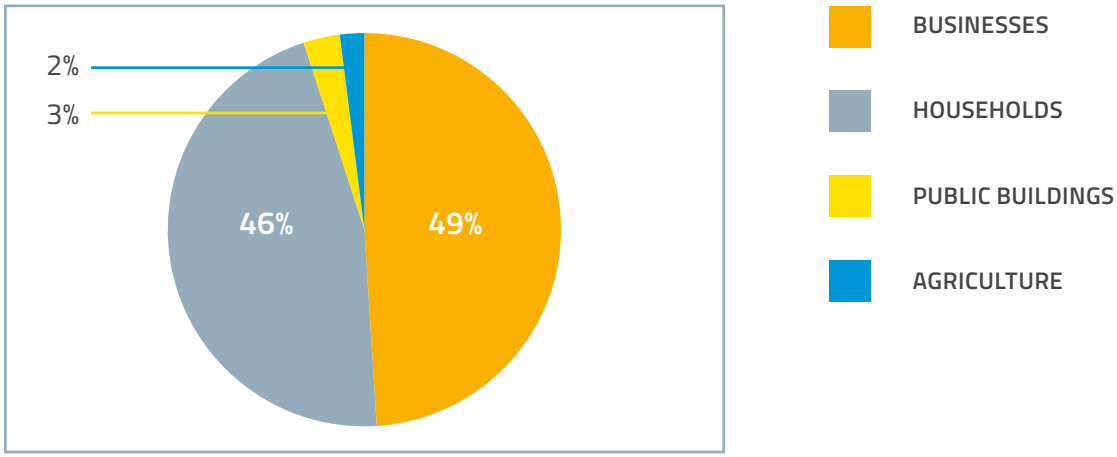
15 global energy system based on 100% renewable energy power, heat, transport and desalination sectors

16 https://www.sciencedirect.com/science/article/abs/pii/s1364032118307913

17 https://physicsworld.com/a/a-global-100-renewable-energy-system/S

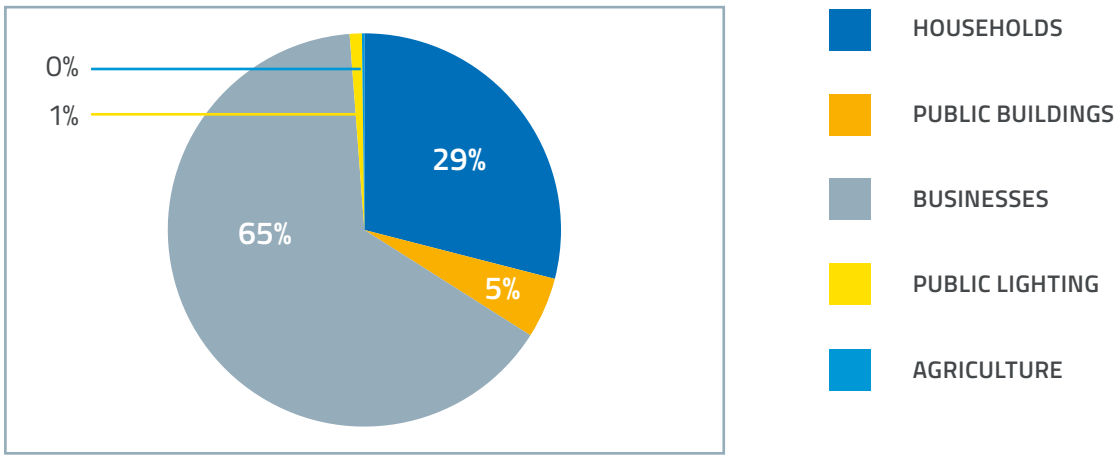
18 Mckinsey center for business and environment: focused acceleration, 2017

Thermal energy consumption in the Municipality of Ptuj



Graph 1: Thermal energy consumption in the Municipality of Ptuj by sector; LEK MO Ptuj*

Electricity consumption in the Municipality of Ptuj

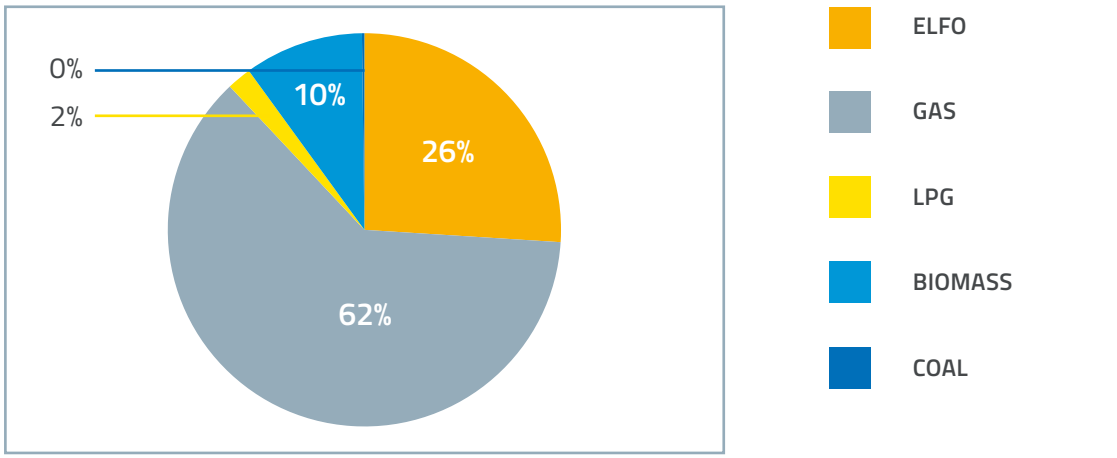


Graph 2: Electricity consumption in the Municipality of Ptuj by sector; LEK MO Ptuj*

*Data are based on LEK (2010). The situation has not changed significantly in the intervening period. (LEA Spodnje Podravje)

When using energy for heating, the structure of energy products is shown in Graph 3.

Heating energy products in the Municipality of Ptuj



Graph 3: Heating energy products in the Municipality of Ptuj by share; LEK MO Ptuj**

**Data are for all consumers

District heating covers 21% of household consumption, and a similar amount of energy is delivered to other consumers (8,400 MWh/year).

Extra light heating oil (ELHO) (34.9%), wood and wood residues (21.7%), district heating (21%) and natural gas (NG) are most often used for household heating and domestic hot water heating (20.3%). Companies and local industry use the most natural gas for heating at 79%, 19% ELHO and 2% are other energy sources.[19]

Natural gas and heating oil are currently the dominant energy sources for heating.

The share of the final use of electricity produced from RES in Slovenia is 21.5%. According to official data, the total power of installations for the production of electricity from RES in the support scheme in the Municipality of Ptuj is 0.29 kW per capita, and the production of electricity is around 308 kWh per capita[20].

The transition to a carbon neutral energy system will require addressing the public, economic and household sectors. Changes are needed in both heat and electricity production.

The assessment of local energy sources shows good potential for the use of solar energy, biomass, biogas and geothermal energy.[21]

The aggregate potential is especially emphasised in district heating, which in the Municipality of Ptuj covers approximately 20,000 MWh per year or 10% of the total use of thermal energy. District heating systems can be highly energy efficient and have a high potential for the transition to renewable energy sources. The district heating system in the Municipality of Ptuj is in need of technological renovation due to the dilapidation of the technology and in order to achieve the current state regulations, which will most likely be tightened in the future. The transition of the system to RES (wood biomass) is under consideration. Due to the compact settlement and the concentration of industrial activities in Ptuj, the district heating system has a significant potential for expansion. At the same time, the Ptuj district heating system has a high potential for a comprehensive transition to RES by 2050 (minimum 50% of RES according to the current regulations from 2020 onwards). Public services in Ptuj estimate that with appropriate support and investments, the local district heating system could transition to 75% RES in the short term.

Given the high energy consumption of some companies, it would make sense for companies with higher energy consumption to carry out appropriate energy audits and become aware of appropriate carbon neutral energy options. The largest energy consumers in the Municipality of Ptuj are activities related to food production and the production of heat and electricity.[22]

The potential for the transition to carbon neutral energy is also represented by the use of excess energy generated in various production and conversion processes and the use of energy from waste. There are many examples around the world of using excess energy from energy-intensive industrial

19 Data were collected in 2010, but according to LEA Ptuj, despite potential minor deviations, they are still current.

20 data based on the support scheme - Borzen

21 LEC of the Municipality of Ptuj, 2012

22 LEC of the Municipality of Ptuj, 2012

production. The model of using heat, biogas and sludge from municipal wastewater treatment plants for either district heating and/or electricity generation, which can be used, for example, to operate urban service systems (treatment plant, water supply), is also gaining ground. The relevance of further feasibility and investment studies was also confirmed by a study carried out by Bistra Ptuj Scientific Research Centre (ZRS Bistra Ptuj) as part of the "Research and Development of Sludge Management of the Ptuj Treatment Plant Programme". Other locally available alternative fuels that could be used in such an energy system (lower quality biomass, river alluvium, biological waste) must also be taken into account.

To increase the use of electricity from RES, some cities also decide to aggregate the demand for electricity produced from RES by taking on the role of energy supplier and connector of interested stakeholders (clients), and in some cases also the energy producer. For successful climate and energy development, it will therefore be necessary to define the role of the municipality as a potential producer and supplier of energy and a link between stakeholders.

In order to achieve a reduction in energy consumption as well as increase energy efficiency and the transition to RES, the Municipality of Ptuj will strive for the following priority measures as part of accelerating the transition to a carbon-free society:

PRIORITIES:

1. COOPERATION WITH STAKEHOLDERS FOR THE SUCCESSFUL TRANSITION OF THE DISTRICT HEATING SYSTEM TO RENEWABLE ENERGY SOURCES

2. PROMOTION OF FEASIBILITY STUDIES FOR EXPLOITING THE ENERGY POTENTIAL OF WASTE RESOURCES (EXCESS HEAT, TREATMENT PLANT, WASTE)

3. CONSIDERATION OF OPTIONS AND THE ROLE OF THE MUNICIPALITY AS A POTENTIAL PRODUCER OR SUPPLIER OF ENERGY (E.G. OFFER OF A RES ENERGY PACKAGE FOR LOCAL CONSUMERS)

4. AWARENESS OF CHANGING HABITS TO REDUCE ENERGY USE

5. REDUCTION OF ENERGY USE BY MODERNISATION OF EXISTING SYSTEMS (ENERGY RENOVATION OF BUILDINGS, PUBLIC LIGHTING, PUBLIC TRANSPORT ETC.)

6. CONSTRUCTION OF INFRASTRUCTURE FOR RENEWABLE ENERGY SOURCES UTILISATION (RES SYSTEMS ON PUBLIC BUILDINGS)

7. REVISION AND IMPLEMENTATION OF LEK AND OPVO MEASURES

Co-benefits:

Economy

The transition to renewable energy and increasing energy efficiency brings new investment and economic opportunities and new jobs (technology, products, installation, construction, project management, products management and maintenance). Renewable energy is already more economical in most cases today (excluding fossil energy subsidies) and at the same time, it is the only sensible energy investment in the long run, both from a social and environmental point of view. At the local level, the mobilisation of renewable energy transition projects and the improvement of energy efficiency can contribute to reducing energy costs, developing new business sectors and their complementary services and thus to an overall increase in economic development and social well-being.

Health

The transition from fossil fuels to renewable energy sources reduces air, water and environmental pollution and has a direct impact on the consequent improvement in the quality of life and health of the population.

More and more experts are increasingly drawing attention to the problem and the direct impact of polluted air on the deterioration of human health, especially in connection with pulmonary and cardiovascular diseases. This impact is also evident in the financial balance of health services, where the costs of treating diseases related to environmental pollution are rising sharply (or are becoming increasingly apparent).

Society

By enabling affordable purchase of energy from RES (e.g. district heating + aggregate electricity package), residents are enabled to actively participate in reducing the negative impact on the environment and consequently society.

Raising the awareness of the population enables the reduction of energy use and the transition of households to sustainable energy sources.

6.1.2 Green Buildings and Infrastructure

OBJECTIVES:

REDUCE GREENHOUSE GAS EMISSIONS IN BUILDINGS BY 70 PERCENT BY 2030

ACHIEVING THE CARBON NEUTRALITY OF PUBLIC BUILDINGS BY 2050

ACTIVE MANAGEMENT OF PUBLIC REAL ESTATE

RENOVATION AND USE OF AN EXISTING BUILDING FUND

Indicators:

GREEN BUILDINGS AND INFRASTRUCTURE	UNIT
Share of CO2 emissions reductions in households and in business sector	% per year
Share of all renovated public buildings owned by the municipality	%
Long-term management plan for publicly owned real estate	Developed Yes/No
Share of unused dwellings / business premises	%
Proportion of dwellings / business premises in poor condition (major renovations required)	%
Ratio of urban renovations to new constructions	Ratio
Financing and co-financing of building renovation projects and related infrastructure by the municipality	EUR/year

Challenge:

Buildings and related infrastructure represent the most material-intensive sector. We use as much as 40.6 Gt of materials per year for the construction and maintenance of buildings, or 44% of the total annual consumption of materials consumed by mankind.[23]

In the EU, buildings are responsible for around 40% of energy consumption and 36% of CO2 emissions. About 75% of the buildings in Europe are energy inefficient. European cities face the urgent need to renovate the building stock to a more sustainable and energy-efficient one. According to some estimates, in 2050 the European building stock will make up 75% of the buildings that already exist today, which means that the existing building stock has the greatest potential for achieving energy savings.[24]

In recent years, the Municipality of Ptuj has carried out energy renovation of 26% of public buildings owned by the Municipality of Ptuj, including kindergartens and schools. Further energy renovation projects are currently being prepared (Mladika Primary School, Ptuj School Centre, Ptuj Gymnasium, Ptuj Boarding House). However, there is still a large number of public buildings for which the renovation within LEK MO Ptuj[25] is planned but has not yet begun.

23 Circularity Gap report 2019, Circle Economy

24 https://ec.europa.eu/energy/en/topics/energy-efficiency/energy-performance-of-buildings

25 Ljudevit Pivko Primary School, Stara steklarska, the building of the former Ptuj conglomerate, Narcisa Kindergarten, workshops next to the Narcisa Kindergarten, City Hall and National Hall and Health Centre, People's University, Prešernova 29 Business building

Renovations of buildings increase the quality of the living environment, reduce energy costs, reduce GHG emissions, solve the problem of energy poverty and at the same time strengthen the construction sector, support local small and medium-sized enterprises (SMEs) and create new jobs.

The European Directive addressing the energy performance of EPBD buildings (2018/844/EU)[26] aims to decarbonise the entire European Building Stock by 2050.[27] Under this Directive and the Renovation Wave strategy, Europe will also further strengthen the financial framework of the European Structural and Investment Funds (ESIF), which will improve the conditions for investing in energy efficiency in the building market. The Directive promotes access to finance, including for the segments of the national building stock with the lowest energy efficiency, for consumers affected by energy poverty and for social housing and households. This measure will be important especially for the renovation of residential buildings in the centre of Ptuj, where most municipal-owned housing is intended for socially vulnerable groups, which means solving the problem of energy poverty.

In the new EU perspective, the renovations of buildings will, in addition to other financial mechanisms, also be financed under the InvestEU scheme.[28]

The centre of Ptuj is characterised by cultural heritage buildings that are subject to special regimes of protection that impact the process of renovation, including energy renovation. Energy renovation of historic buildings is a challenge, as the integrity of the historic core and the characteristic character of the building must be preserved, which makes it often impossible to apply the full range of standard energy measures. Also, the renovation of such buildings is usually more demanding, which is also reflected in the cost. In renovation and rehabilitation, an approach is encouraged in which all parts of buildings and elements that do not have heritage features are restored with technological solutions with a high level of energy efficiency, while for building parts or elements with heritage value, it is permissible to improve energy efficiency only to the point when the heritage features of the building are not compromised.[29]

Heritage conservation and energy efficiency are not necessarily mutually exclusive goals. Many energy efficiency measures even support heritage conservation measures. By improving thermal comfort, reducing adverse health effects and significantly reducing energy consumption, these measures make a positive contribution to increasing the usability of buildings and thus ensuring long-term maintenance and preservation.[30]

Tenders for energy renovation of public sector buildings take into account specific assessment criteria for cultural heritage buildings, and the calculation may also take into account the savings of those measures that cannot be fully or partially implemented due to cultural heritage protection. In 2016, the Ministry of Infrastructure issued guidelines for the energy renovation of cultural heritage buildings as part of the "Renovation of cultural heritage buildings and other special groups of

26 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L0844&from=EN

27 In Slovenia, the Rules on efficient energy use (PURES) from 2010 are currently in force, which will have to be supplemented with new rules by 2020 in accordance with Directive 2018/844/ EU.

28 https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf

29 https://www.gov.si/assets/ministrstva/MK/DEDISCINA/NEPREMICNA/smernice_kd-final.pdf

30 https://www.gov.si/assets/ministrstva/MK/DEDISCINA/NEPREMICNA/smernice_kd-final.pdf

buildings" measure. Until now, in the Municipality of Ptuj, the guidelines for the energy renovation of cultural heritage buildings have been taken into account only in the renovation of the Olga Meglič Primary School[31].

The Amendment to the Long-Term Strategy for Encouraging Energy Renovation of Buildings (DSEPS)[32] also provides for the adjustment of the amount of allocated funds for cultural heritage buildings according to the complexity and scope of interventions, which has not yet been established. This measure will be of exceptional importance for the Municipality of Ptuj due to the large share of public buildings that are fully or partially under monumental protection and require energy renovation and rehabilitation.

The situation of the housing stock in the Municipality of Ptuj is as follows: in 2018, a total of 9866 apartments were registered. Of these, about 65% were built before 1980 (and more than 80% before 1990). As many as 16% of apartments are vacant, which represents about 100,000 m2 of unused living space.

The Municipality of Ptuj strives to increase the use, rehabilitation and energy renovation of buildings, with an emphasis on the problem of dilapidated and degraded part of the building stock in the old city centre, which, among other things, limits the development and activation of the city centre.

The building stock of the inner city comprises 416 buildings and is multi functional in terms of size, structure and purpose. A large part, over 20%, of the building stock in the centre is uninhabited or unused. The Municipality of Ptuj is a major owner of the building stock (11% - 100% ownership; 20% partial ownership) in the city centre, which enables the city to prepare direct measures for the use and renovation of its own buildings. In addition the Municipality of Ptuj, directs the spatial policy of the local area and thus regulates the spatial development of the city.[33]

In the field of building renovation, the Municipality of Ptuj faces many challenges related to the unbalanced social structure, the limited investment potential of the population and the municipality, regulations and restrictions on renovation related to the protection of cultural heritage and the high costs of rehabilitation and renovation of historic buildings.

The city strives to find a sustainable model of rehabilitation and renovation of historic buildings of the central city and thus enable the re-use of urban space, reactivation of the city centre with the aim to provide a quality, sustainable living and working environment in the city. Due to the large investment, the city will have to focus in the first phase on the development of appropriate business and investment models that will enable reconstruction. An important role will also be played by more active management of the public real estate, which primarily requires a clearly defined management and development strategy, including review of the current situation, assessment of property value, ownership consolidation plan, social housing decentralisation plan, a plan for the

31 LEA Ptuj

32 https://www.energetika-portal.si/fileadmin/dokumenti/publikacije/dseps/dopolnitev_dseps_feb_2018.pdf

33 AD HOC study

renovation and adaptation of apartments for the needs of various socio-demographic groups, a plan for the renovation and adaptation of business premises for modern economic needs, a long-term plan for quality real estate management.

To ensure comprehensive progress, it will also be necessary for the city authorities to work closely with building owners, both residential and commercial, with real estate investors and with building occupants.

Sustainable building measures are particularly important because of their long-term impact. In principle, the building stock is reversed only every 30 to 50 years. Improperly pledged investments carry long-term risks and consequences associated with higher costs and emissions. In contrast, comprehensive and sustainable infrastructure investments in the long run reduce the operating costs of buildings and provide better, more comfortable living and working spaces.

PRIORITIES:

1. INVENTORY OF THE BUILDING STOCK AND DEVELOPMENT OF A LONG TERM PUBLIC REAL ESTATE STRATEGY

2. DEVELOPMENT OF A PROGRAMME FOR RENOVATIONS AND ENERGY REHABILITATION OF CULTURAL HERITAGE BUILDINGS

3. FORMATION OF STRATEGIC PARTNERSHIPS AND ACTION PLAN FOR THE AGGREGATE RENOVATION OF THE BUILDING STOCK IN THE MUNICIPALITY OF PTUJ

4. DEVELOPMENT OF INVESTMENT MODELS FOR THE COMPREHENSIVE RENOVATION OF THE OLD CITY CENTRE

5. ESTABLISHMENT OF A QUALITY SYSTEM FOR THE MAINTENANCE OF PUBLIC HOUSING AND BUILDINGS THAT PURSUES CLIMATE GOALS

6. INCENTIVES FOR THE REHABILITATION OF PRIVATE HOUSING AND BUSINESS PREMISES - OFFERING A "PACKAGE" FOR PRIVATE INDIVIDUALS

7. REVISION AND IMPLEMENTATION OF LEK AND OPVO MEASURES

8. PROMOTING INNOVATION IN THE FIELD OF COMPREHENSIVE RENOVATION OF HISTORIC BUILDINGS THAT TAKE INTO ACCOUNT CLIMATE GOALS

Co-benefits:

Health

With the rehabilitation and energy renovation of buildings, the city creates conditions for healthy and quality living and working environment. The World Health Organization guidelines state that more energy-efficient buildings provide residents with higher levels of comfort and well-being and improve their health.

Society

Renovation of buildings enables increased use and activation of previously abandoned urban space, which is reflected as a positive effect in strengthening and developing social and economic activities and consequently as a positive effect on the labour market.

Renovations enable an increase in the quality of the building stock, which consequently also improves the preservation of cultural heritage at a quality and socially functional level.

Economy

Intensive modernisation of historic city districts, directly and indirectly, creates jobs in construction, craft activities and in sales and service activities.[34]

Given its strategic cultural building stock and the tradition of building crafts, the Municipality of Ptuj has the potential to become an important centre of excellence for the comprehensive, sustainable rehabilitation of Central European historic buildings.

The quality, accessibility and usability of historic city districts are not only associated with comfortable living in appropriately modernised residential buildings but also with the appropriate infrastructure and public areas. They must become part of the comprehensive renovation of buildings and living spaces in the historic centre and beyond.

6.1.3 Sustainable Mobility

OBJECTIVES:

ACTIVE MOBILITY AND "GREEN" MOBILE SERVICES (PUBLIC TRANSPORT, CLIMATE FRIENDLY VEHICLES) **BECOME PRIORITY MOBILITY OPTIONS**

60% OF JOURNEYS ARE MADE BY PUBLIC TRANSPORT, ON FOOT, BY BICYCLE OR BY GROUP TRANSPORT

EMISSION-FREE PUBLIC FLEETS BY 2030

15% INCREASE IN FREQUENCY/DENSITY OF PUBLIC TRANSPORT

OPTIMISATION OF CITY LOGISTICS FOR COMPANIES AND RESIDENTS OF THE OLD CITY CENTRE

34 AD HOC study

Indicators:

SUSTAINABLE MOBILITY	UNIT
Proportion of separate cycle / footpaths in relation to the entire road network; length of bicycle / footpaths per capita	%; m/capita
Proportion of journeys within the city made by public transport, on foot or by bicycle	%
Proportion of the population using shared vehicles (bicycle, car, scooter, etc.)	%
Motorization rate	#vehicles per capita/ household
Proportion of the population with access to public transport or micro mobile stations, within a radius of 300m	%
Proportion of low-carbon public mobility fleet	%
Number of modality stations per km2	%
Strategy for green city logistics	Adopted Yes/No
Investments made in the field of sustainable mobility	EUR/year

Challenge:

Urban areas face numerous challenges related to establishing a transport system that is sustainable, competitive, socially inclusive and accessible. The choice of the form of travel or the type of mobility has a significant impact on the quality of the environment and consequently on our health and well-being. This choice has a direct impact on air quality, noise levels, land use, travel costs and climate change.

As early as 2009, the European Commission adopted an Action Plan on Urban Mobility, which contains 20 measures to promote and assist local, regional, and national authorities in establishing a comprehensive approach to urban mobility. In 2013, the Urban Mobility Package was adopted and in 2016 the "Strategy for Low-Emission Mobility", which provides clear guidelines to Members regarding increasing the efficiency of transport systems, developing low-emission energy infrastructure, and switching to zero-emission vehicles. Cities and local communities are crucial in implementing this strategy. The European Green Deal indicates that urban traffic will have to cause less pollution in the future and at the same time predicts further tightening of emission standards for vehicles.

In Slovenia, the mobility sector is by far the largest source of GHG emissions (over 50%), most of it from road transport. It is also the only sector in Slovenia in which GHG emissions increased (in the period 2005-2017).[35]

Key problems related also to achieving the goals within the GHG Operational Programme (GHG OP) are regarding the number of passenger kilometres in public transport (especially the decline in passenger traffic by trains), increasing the share of RES fuels for vehicle propulsion and CO2 emissions of passenger cars.[36]

Increasing active mobility, improving public transport services and use and vehicle sharing are key to the transition to sustainable mobility.

The Municipality of Ptuj is increasingly focusing on sustainable and comprehensive planning of mobility systems, which is also confirmed by the adoption of the "Integrated Transport Strategy"[37] in 2017 and the development of the "Walkability Strategy for the City of Ptuj" (ZRS Bistra Ptuj). The municipality is carrying out activities in promoting active mobility and the use of public transport by providing free urban public transport; establishing a bicycle rental scheme (Pecikl), which it intends to upgrade with e-bicycles in the future; partial introduction of last-mile electric transport in the city centre in the summer months (Zapeljivec); volunteer on-call public transportation; traffic restriction policy; and the promotion of active and e-mobility as part of awareness-raising events (EU Mobility Week, events as part of relevant EU projects).

Despite the positive changes, the conventional method of mobility or overcoming distances with a fossil fuel car is still prevalent in Ptuj. According to statistical data, every second inhabitant of the municipality owns a car in Ptuj, and it is on average 10 years old.[38]

There are some personal electric vehicles in the city, but the share of these is still very small (1.11%, 2018)[39], which is in balance with the general situation in Slovenia, where sales of e-vehicles are currently very low (approximately 1% of annual sales in 2018).[40] The mobility sector is thus still responsible for a significant part of GHG emissions, air pollution and, consequently, lower quality of life and health of the population.

Improving the share of pedestrian and cyclist infrastructure and its hubs is crucial in increasing the share of active mobility in the city.

35 https://www.podnebnapot2050.si/wp-content/uploads/2019/09/Podnebno_Ogledalo_2019_Zvezek2_Promet_KONCNO-2.pdf

36 https://www.podnebnapot2050.si/wp-content/uploads/2019/09/Podnebno_Ogledalo_2019_Zvezek2_Promet_ KONCNO-2.pdf

37 http://sptm.si/wp-content/uploads/2019/04/Ptuj-CPS-2017.pdf

38 https://www.stat.si/obcine/sl/2016/Municip/Index/130

39 https://semafor.podnebnapot2050.si/

40 https://www.amzs.si/motorevija/v-zarometu/trg/2019-01-30-slovenski-avtomobilski-trg-v-letu-2018-72-835-prodanih-avtomobilov

By 2022, Ptuj intends to construct approximately 54 km[41] of regional cycling connections. The current state of cycling areas does not represent a positive basis for promoting cycling. Public cycle paths currently represent only 0.2% of the total road infrastructure in the municipality. In 2018, the length of cycle paths per capita was 0.02 m, which is negligible considering the entire road infrastructure. In the coming years, the municipality will construct about 3.5 km of cycling (and pedestrian) areas, which will raise the share of cycling areas to about 2% or 172 m per capita. The potential for improving infrastructure and enabling an increase in cycling and walking is therefore enormous and needs to be exploited further in order to increase the active mobility of the population.

Public passenger transport plays an important role in reducing distances travelled by car. A free city bus is currently available in Ptuj, which expanded its reach in the summer of 2019 and increased the frequency of journeys. It is necessary to upgrade urban connections between different points of interest (accommodation, services, recreation, tourism) and improve transport infrastructure (stations, low-carbon fleet, enabling multi-modal mobility).

In many European and also in some Slovenian cities, models of vehicle sharing and mobility as a service are already well-established, which, apart from bicycle rental in the city centre, cannot be detected in Ptuj yet. Given the density of settlement and the definition of residential areas, it would make sense to evaluate and test such approaches in a local context.

Well-organised city logistics are also crucial for the successful operation and attractiveness of the city centre. It covers many economic areas as well as other participants in the public space. In Europe, more and more cities are opting to limit the access of motorised traffic in parts of the city, especially in the centres, to increase the quality of life and limit pollution. Clearly designed logistics options that meet the needs of space users are important for the successful integration of the new system. Ptuj has been searching for suitable solutions for logistics in the city centre for some time now, which, in addition to service activities, also includes the access of residents to their homes. Activities for finding suitable solutions need to be further supported and focused on the creation of a new comprehensive transport system for the city centre.

Increasing the share of active mobility in overcoming shorter distances, increasing travel efficiency and decarbonising transport vehicles play a key role in improving air quality, population health, living comfort and reducing GHG emissions and the negative effects of climate change.

To achieve the goal of green mobility, the Municipality of Ptuj will need to ensure that active mobility is safe, convenient and pleasant, that public transport is fast, frequent, reliable, accessible and comfortable, that city logistics are sustainable, that "green mobility" services are available to residents, such as an e-car-share scheme, and that effective mobility options will be available between key transit stations.

41 MEPP

PRIORITIES:

1. IMPROVING INFRASTRUCTURE AND CONNECTIVITY FOR PEDESTRIANS AND CYCLISTS - ACTION PLAN; PROJECT INVESTMENTS[42]

2. IMPROVING PUBLIC TRANSPORT
(E-FLEETS; INCREASING FREQUENCY, RANGE AND NUMBER OF STATIONS)

3. INCREASING THE OFFER OF MICRO-MOBILITY (BICYCLE, SCOOTER, ELECTRIC MOPEDS, ELECTRIC SKATEBOARDS, ETC.)

4. EXPANSION OF THE BICYCLE RENTAL SYSTEM, INCREASE IN THE NUMBER OF BICYCLES, E-BIKES AND STATIONS

5. IMPROVING URBAN LOGISTICS FOR RESIDENTS AND BUSINESSES
(DEVELOPMENT OF URBAN LOGISTICS MANAGEMENT STRATEGY AND IMPLEMENTATION OF PROPOSED MEASURES)

6. SUPPORTING VEHICLE SHARING SERVICES (E.G. RAISING AWARENESS BASED ON GOOD PRACTICES AND SUPPORTING DEVELOPMENT IN THE TEST PHASE)

7. SMART MOBILITY SUPPORT SYSTEMS
(IT PLATFORMS FOR VARIOUS URBAN MOBILITY OPTIONS)

8. RAISING AWARENESS, PROMOTION AND INCENTIVES FOR SUSTAINABLE MOBILITY

9. REVISION AND IMPLEMENTATION OF CPS AND OPVO MEASURES

Co-benefits:

The Municipality of Ptuj will focus its measures on the implementation of the mentioned sustainable mobility systems, which will contribute to the improvement of: the quality of living and the attractiveness of the city, the health of the population, air quality and the reduction of negative impacts on the environment and climate.

Health

Reducing fossil fuel-based motorised road transport means, thereby reducing air and environmental pollution (particulate matter (PM), nitrogen dioxide (NO2), etc.), especially in cities where continuously elevated concentrations harm human health and the environment. An additional health problem associated with traffic is noise pollution. Road transport is the most widespread source of noise, with harmful noise levels affecting millions of people in the EU. Air and rail transport are also extensive

42 Development of an action/project plan for a green mobile system that connects residential areas, green areas, city centre, archaeological park, tourist destinations (spa, lake, Drava), recreational routes within the city and access to recreational routes outside the city and crafts/industrial zones.

sources of noise. In addition, transport infrastructure has a major impact on the landscape, as it fragments natural areas, with serious consequences for the conservation of animal and plant habitats and the preservation of their migration routes.

Active mobility promotes physical activity and thus contributes to better well-being and physical fitness. Numerous studies show that lack of physical activity has a negative impact on human health and, consequently, on the higher costs of necessary medical care.[43]

Environment

Active and carbon neutral mobility contributes to reducing noise and reducing air, water and environmental pollution.

Reducing transport-related infrastructure interventions helps maintain the integrity of natural areas, existing habitats and ecosystems.

Economy

The transition to new forms of mobility is linked to the development of new infrastructure and support services that bring new employment and business opportunities.

New research also shows that actively mobile people (cycling and walking) are more likely to purchase local products/crops than people who use other forms of mobility.

Society

Cities that design streets for people and not for vehicles provide better social cohesion and a better-quality living environment.

6.2 A Sustainable City

The city of Ptuj is aware of the impact that the living environment has on the health, well-being and productivity of the city's inhabitants. Preserving a quality environment, natural resources, ecosystems and biodiversity is therefore a key priority.

The "Sustainable City" headline area includes three target areas: health and well-being of the population, the functionality of ecosystems and biodiversity and sustainable economy. These are indicated in the table below and described in more detail in the following sections.

43 http://www.scoop.co.nz/stories/GE1610/S00137/the-real-cost-of-physical-inactivity.htm

OBJECTIVES	
A SUSTAINABLE CITY	HEALTH AND WELL-BEING OF THE CITIZENS
	Improving urban green infrastructure (parks, urban forests, river and stream embankments, lakes)
	Improved access to nature and recreational/park areas for pedestrians and cyclists
	Improved access to supply of local healthy food
	Improving and maintaining the quality of water resources
	Improving and maintaining air quality
	FUNCTIONALITY OF ECOSYSTEMS AND BIODIVERSITY
	Establishing a "green network" of habitats in the city of Ptuj and the Lower Podravje region
	Revitalisation of urban, suburban and other important habitats and creating new habitats in the urban environment
	Sustainable management of agricultural land
	SUSTAINABLE ECONOMY
	Supporting economic activities offering sustainable services and products
	Increasing the number of employees in the green industry and the circular economy
	Reducing the amount of waste
	Active use of the European platform for the promotion of the circular economy
	Supporting the companies that are actively changing their operations to more sustainable ones (resource use, social responsibility)

6.2.1 Health and Well-Being of the Population

OBJECTIVES:

IMPROVING URBAN GREEN INFRASTRUCTURE (PARKS, URBAN FORESTS, RIVER AND STREAM EMBANKMENTS, LAKES)

IMPROVED ACCESS TO NATURE AND RECREATIONAL/PARK AREAS FOR PEDESTRIANS AND CYCLISTS

IMPROVED ACCESS TO SUPPLY OF LOCAL HEALTHY FOOD

IMPROVING AND MAINTAINING THE QUALITY OF WATER RESOURCES

IMPROVING AND MAINTAINING AIR QUALITY

Indicators:

HEALTH AND WELL-BEING OF THE CITIZENS	UNIT
Number of greening projects; improved / additionally acquired green areas	number; added m^2/year
Proportion of green areas to which there is a connected and separate cycling / walking access from the urban center	%
Proportion of the population living within a radius of 400 m from green areas that allow recreation	%
Number of initiatives aimed at increasing the supply and sales of local food	number
Proportion of households with own garden	%
Regular monitoring of pollutants and pressures affecting water, air, soil quality	Yes/No
Active implementation of OPVO measures	Yes/No

Challenge:

The Municipality of Ptuj is aware that by improving the quality and access to green areas, it helps build a more connected community and improves the health of the population.

The Municipality of Ptuj has considerable potential for a quality living environment. The surroundings of the urban area enable contact with nature, which is accessible to all residents. With the existing natural resources and urban green infrastructure, the possibilities for their improvement and expansion are enormous.

Particularly in the old city centre, solutions are needed to green the area and thus address the problems associated with climate change and the city's heat island, which include a lack of permeable surfaces, lack of shade, higher temperatures and lower air quality. Improvements to green areas and related infrastructure of stream and lake embankments are needed. Some natural areas are currently in a rather poor condition. Improvements are also needed in other degraded and polluted urban areas (e.g. abandoned industrial areas, abandoned yards, gardens, etc.).

One of the key priorities is also to improve the accessibility of green areas for the population by improving or constructing separate bicycle and footpaths.

Given the agricultural hinterland that surrounds the city and area of the Municipality of Ptuj, local food self-sufficiency is low. The current globally intertwined food system is based on mass industrial

production, processing and distribution of food. During its journey from the "field to the table", it consumes a huge amount of material resources and travels great distances. With direct and indirect emissions, this food system is one of the largest sources of greenhouse gas emissions globally (it ranks second, just behind the building sector). In an effort to increase food security through the stable production of safe, high-quality and affordable local food, the transition to sustainable farming is particularly important in reducing the climate impact of farming.

In the Municipality of Ptuj, 41% of agricultural land is in use, of which only 1.5% of the land is cultivated according to the principles of organic agriculture. To address this issue, the Municipality of Ptuj strives to promote the transition to sustainable farming and improve the supply of locally grown, healthy food through a series of measures (awareness, support for local initiatives, networking), including the renovation of the city market.

Due to the poor condition of groundwater, the quality of water resources in the Municipality of Ptuj is also an increasingly pressing issue. The Drava basin is known in Slovenia as the most problematic water body in terms of nitrate content. Analyses of nitrate in the groundwater of the Drava plain have shown that in recent years about 40% of measuring points have been detected to exceed the nitrate content. Among the worst is the water at the Skorba pumping station, which supplies almost 74,000 people in the Municipality of Ptuj and its surroundings. It is overloaded with nitrates as well as atrazine as a result of intensive use of fertilizers and pesticides in agriculture.[44] In 2018, more than 6% of water samples from the Skorba pumping station were microbiologically non-compliant, and 0.33% were unhealthy.[45] Inadequate groundwater quality requires priority treatment and solutions to the problem.

Air quality affects the health and well-being of all residents. In Slovenia, the biggest problem of air pollution is PM10 particles, which are mostly the result of traffic and the use of fossil fuels for heating. The World Health Organization (WHO) recommendation for an annual average of PM10 is 20µg/m3. In 2017, this was exceeded at almost all measuring points in Slovenia, including Ptuj, where the annual number of allowed days with increased pollution was also exceeded (ARSO, 2017).

According to WHO, air pollution poses the greatest environmental risk to human health in the European Union. Particulate matter (PM), nitrogen dioxide and ground-level ozone are the air pollutants with the greatest impact on health. Through its impact on the life expectancy of the population, increased health care costs and reduced work efficiency, air pollution also has a significant economic impact. At the same time, polluted air damages ecosystems, buildings and other infrastructure.[46]

44 https://www.arso.gov.si/vode/podzemne%20vode/publikacije%20in%20poro%c4%8dila/Porocilo_odzemne_2018_splet.pdf

45 http://www.komunala-ptuj.si/vodooskrba/letna-porocila-o-pitni-vodi/; poročilo 2018

46 https://www.arso.gov.si/zrak/kakovost%20zraka/poro%c4%8dila%20in%20publikacije/Letno_porocilo_2017_kakovost_zraka_fin.pdf

PRIORITIES:

1. DEVELOPING A PLAN TO IMPROVE AND INCREASE THE AREA OF GREEN URBAN INFRASTRUCTURE

2. CONSTRUCTING BICYCLE CONNECTIONS AND FOOTPATHS BETWEEN AND TO GREEN AREAS

3. REMEDIATION OF DEGRADED AND CONTAMINATED SURFACES

4. PROMOTING LOCAL PRODUCTION OF HEALTHY/ORGANIC FOOD AND LOCAL MARKETING

5. REVISION AND IMPLEMENTATION OF OPVO, CPS AND LEK MEASURES

Co-benefits:

Improving the well-being of the population, as a result of a better quality of life, brings many additional benefits in various areas.[47]

Health

According to research, people's well-being has a significant impact on their health, in terms of disease prevention, faster recovery, longer life expectancy and increased physical activity, which enables better well-being.

Society:

People's well-being has a positive effect on social activation, more time spent in society, more active participation in socially useful activities such as volunteering, blood donations, voluntary contributions, etc. The positive impact is also expressed through better educational results.[48]

Economy:

Well-being has a direct impact on better productivity and performance at work and a lower level of absence from work.

Environment:

Research shows that well-being also influences the environmentally-friendly behaviour of households, including donations to environmental charities.

47 https://link.springer.com/article/10.1007/s11205-017-1826-7

48 https://link.springer.com/article/10.1007/s11205-017-1826-7

6.2.2. Functionality of Ecosystems and Biodiversity

OBJECTIVES:

ESTABLISHING A "GREEN NETWORK" OF HABITATS IN THE CITY OF PTUJ AND THE LOWER PODRAVJE REGION

REVITALISATION OF URBAN, SUBURBAN AND OTHER IMPORTANT HABITATS AND CREATING NEW HABITATS IN THE URBAN ENVIRONMENT

SUSTAINABLE MANAGEMENT OF AGRICULTURAL LAND

Indicators:

FUNCTIONALITY OF ECOSYSTEMS AND BIODIVERSITY	UNIT
Conservation of key species	(+/-) change
Number of revitalized habitats	number
Proportion of agricultural land with organic food production or conversion to organic production	%
Gross nutrient balance on agricultural land (nitrogen, phosphorus)	kg/ha

Challenge:

The rapid decline of biodiversity in Europe and the world is one of the main environmental problems of our time. The extinction of insects, birds, aquatic life and other animal and plant species is the result of the reduction and impoverishment of habitats, which is decisively influenced by urbanisation, environmental degradation and modern agricultural practices. To reverse the trend, it will be necessary to change man's attitude towards nature, which means that nature will again have to become an integral part of space in cities and other urbanised areas. Therefore, it is necessary to raise awareness among people and city administrations to perceive green systems in cities as habitats and not just as park areas.

The city of Ptuj with its hinterland lies in an area of exceptional natural diversity, which is why several areas in its immediate vicinity are defined as Natura 2000. Of particular value are the aquatic and riparian habitats associated with the Drava River and dry grasslands and some landscape features. Most of the key habitats were created as a result of the work of human hands - mowing floodplain

forests, establishing hay orchards, grazing, etc. and are closely linked to the traditional way of cultivating the land, crafts, aquaculture and other activities.

Some natural heritage conservation projects are already being implemented in the region (Lake Ptuj - LIFE project, Šturmovci Landscape Park and Drava riverbed - project from the Agreement for the Development of Regions, Ormož Lagoon - LIFE project, etc.), which improve conditions for preserving key habitats and species and offer educational content, but they are not interconnected and are not tied with the urban centre of the region - Ptuj.

On the other hand, in the city of Ptuj itself and its immediate vicinity there are many green areas (Ljudski Vrt, Panorama, Ptuj Lake, Podvinci Pond, Park near Turnišče Castle, etc.), which enable residents to come into contact with nature but in their current state represent mostly parkland.

The challenge for the future of urban man's coexistence with nature is his greater awareness of the importance of nature for survival, bringing man closer to nature and training individuals and society to establish and maintain micro, small and large habitats - from balconies to yards, gardens, parks, forests and all the way to larger areas of nature. With a biodiversity programme, the city of Ptuj could establish a comprehensive connection between nearby habitats, urban habitats and the inhabitants of Ptuj and its surroundings and direct the local population to revive the primary link between man and nature in the urban environment in order to preserve the natural heritage of Ptuj and the wider region.

The share of agricultural land in use in the Municipality of Ptuj is 41%. This includes fields, gardens, meadows and pastures, orchards, vineyards, nurseries, vines and root-stock nurseries. Of the agricultural land used, only 1.5% is used for organic farming, which better supports biodiversity than conventional farming. The use of mineral nitrogen fertilisers is prohibited in organic farming. Farmers are therefore forced to take all measures to ensure more efficient nitrogen circulation. As a result, emissions of nitrous oxide, one of the greenhouse gases, are reduced and thus the impact of farming on the climate. At the same time, organic farming is less harmful to the environment and people, as the intake of pesticides and other life-threatening chemicals is quantitatively limited, which means producing better and healthier crops, maintaining healthy soil, preserving biodiversity and reducing environmental pollution (water, soil and air).

The increase in the share of organic farming in the Ptuj area is especially important due to the sensitivity of water reserves located below agricultural land, which are thus exposed to pollution.

PRIORITIES:

1. INCLUSION OF HABITAT TYPE MAPPING AS AN EXPERT BASIS IN THE PREPARATION OF MUNICIPAL SPATIAL PLANS

2. ESTABLISHING A COMPREHENSIVE GREEN HABITAT MANAGEMENT SYSTEM (ACTION PLAN)

3. ENABLING THE TRANSFORMATION OF GREEN URBAN AREAS (PARKS, YARDS, ETC.) **INTO FUNCTIONAL HABITATS**

4. RAISING AWARENESS OF RESIDENTS AND OTHER STAKEHOLDERS ABOUT HABITAT FUNCTIONS AND THEIR MAINTENANCE

5. PROMOTING ORGANIC AND DIVERSIFIED FARMING

6. REVISION AND IMPLEMENTATION OF OPVO MEASURES

Co-benefits:

Humans are largely dependent on natural systems, the functions they perform for us and the resources on which our survival rests. If we want to continue to draw on the abundance of these natural goods and services, the biodiversity it establishes must be preserved.

Economy

Biodiversity is crucial in our economic system. Our food system depends on it, not only in terms of food raw materials but also to enable the survival of species (resistance, reproduction). Conservation of biodiversity is essential for the removal of organic waste, soil formation, biological nitrogen fixation, crop genetics, biological pest control, plant pollination and the production of pharmaceuticals. Plants and microbes break down chemical pollutants and organic waste and allow nutrients to circulate in the ecosystem.

Green systems act as sinks and rainwater reservoirs, as microclimate regulators (mitigation of temperature extremes, humidity) and as air and water filters. These features have economic value, both for reducing the costs associated with disasters and energy use and for health costs associated with a polluted, poor-quality living environment.

There are different estimates of the value of ecosystem functions and biodiversity, and the key message is that the conservation and regeneration of ecosystems and biodiversity brings more value than their modification and technological solutions to related problems.

Greater biodiversity also creates many different jobs, from agriculture and pharmacy to parking wardens in natural landmarks.

Environment

With their functions of absorption, containment, filtration, detoxification, soil protection, temperature and climate regulation, ecosystems have a significant impact on climate change mitigation and reduction of negative impacts (floods, droughts, winds, pollution, erosion).

Society

Biodiversity is important for society and its well-being from an aesthetic point of view, from a relaxation point of view and from a health point of view in terms of a quality environment, as well as in terms of obtaining ingredients for the treatment of various diseases.

6.3.3 Sustainable Economy

OBJECTIVES:

SUPPORTING ECONOMIC ACTIVITIES OFFERING SUSTAINABLE SERVICES AND PRODUCTS

INCREASING THE NUMBER OF EMPLOYEES IN THE GREEN INDUSTRY AND THE CIRCULAR ECONOMY

REDUCING THE AMOUNT OF WASTE

ACTIVE USE OF THE EUROPEAN PLATFORM FOR THE PROMOTION OF THE CIRCULAR ECONOMY

SUPPORTING THE COMPANIES THAT ARE ACTIVELY CHANGING THEIR OPERATIONS TO MORE SUSTAINABLE ONES (RESOURCE USE, SOCIAL RESPONSIBILITY)

Indicators:

SUSTAINABLE ECONOMY	UNIT
Number of successful start-ups; successful crowd funding projects	number
Number of programmes that cultivate entrepreneurial innovation	number
Number of incubators, accelerators, co-working spaces	number
Proportion of mixed waste reduction compared to the previous year	%
Number of active sharing programmes (car-share, bike-share, library of things)	number
Proportion of "green" jobs including those related to local food	number
Value of green public contracts supporting local economy	EUR/year
Proportion of companies making their operations more sustainable	%

Challenge:

In addition to the energy transition, new economic models based on reduced and more efficient use of resources, the bioeconomy, green technologies and products and the exploitation of the potential for secondary use of materials will be crucial to achieving the Paris Agreement and the 2030 Agenda.

At present, the global economy is still extractive and linear. The circular segment reaches only 9% of the economy. "The Circularity Gap 2019" report points out that the opportunity to transition to a circular and greener economy is necessary but also economical and feasible. The following will be key: a change in thinking and the perception that material flows of materials and energy should not be final (waste) but circular, aimed at optimal utilisation of substances, and the use of such resources that can be regenerated quickly enough, depending on the level of consumption.

Globally, most resources are used for housing and other physical infrastructure (40.6 Gt), followed by consumption of resources in the food chain (20.1 Gt), followed by consumption of resources in the mobility sector (products and fuel) (10.8 Gt) and for consumables (9.7 Gt).

In 2020, the European Commission will adopt an EU industrial strategy focusing on green and digital transformation. Together with the new European Circular Economy Action Plan, a policy framework

will be set for the modernisation of the EU economy and the accelerated development of a leading market in carbon neutral and circular products and services.[49]

The transition to a sustainable economy represents a huge entrepreneurial opportunity. Analyses of economic trends show that by 2030, over 70% of energy investments should be focused on clean and sustainable energy. In the Municipality of Ptuj, the energy obtained from renewable energy sources currently represents only 14% of final energy consumption.[50] There are still many opportunities for the expansion of RES, and this is also associated with additional jobs if local companies are selected to carry out investments. With the growth of the sector in the future, however, such companies will have a guaranteed market niche.

Sustainable materials and technologies are also increasingly used in construction, where the emphasis is also on reducing waste and maximising its secondary use. In the Municipality of Ptuj, energy renovations have so far been carried out on 29% of public buildings owned by the Municipality of Ptuj and 13% of all public buildings. Energy renovations of existing public (and private) buildings will remain a priority of the European Union in the coming perspective, which means an opportunity for local companies in the construction, consulting, technology and service sectors.

The category of sustainable economy includes, for example, industries such as: energy-efficient construction; sustainable building materials; renewable energy and related technologies, products and materials; circular economy: reuse of materials, recycling, design; local food; green infrastructure; products and technologies related to sustainable mobility, surface and water remediation; environmental consulting; digital optimisation of processes and systems; product and process design and planning; etc.

At the international, national, regional and city levels, it will be necessary to develop strategies that enable the transition to a sustainable economy. These strategies will be reciprocal in several areas and will require the involvement of stakeholders from different sectors and geographical areas.

With strategically oriented investment and support programmes and policies, the Municipality of Ptuj can increase the demand for local green services, technologies and products and enable greater recognition of local companies in the country and abroad. This will enable the accelerated development of the local sustainable economy.

One of the key measures in accelerating the economic transition will be more strategic public procurement with mandates that allow the selection of sustainable products and services to achieve climate, environmental, social and innovative goals. The basis for this is already provided by the revised rules in the framework of EU Directive 2014/24/EU on public procurement.

49 European Green Deal

50 LEA Spodnje Podravje, SUSHI project, Low carbon energy supply strategy of the old city centre of Ptuj, Ptuj, November 2019

PRIORITIES:

1. REVITALISATION AND EXPANSION OF THE START-UP PROGRAMME IN THE GREEN, DIGITAL AND CIRCULAR ECONOMIES

2. PROMOTION OF THE CITY AS A "BOUTIQUE" BUSINESS DESTINATION FOR SUSTAINABLE BUSINESS SECTORS AND ENTITIES

3. SUPPORTING/ENABLING A LOCAL CROWD-FUNDING SYSTEM

4. PROMOTION AND USE OF ONLINE PLATFORMS FOR THE PROMOTION OF THE CIRCULAR ECONOMY

5. INITIATION OF THE GREENEST NEIGHBOURHOOD IN THE COUNTRY PROGRAMME

6. SUPPORTING REUSE AND RECYCLING CENTRES

7. SUPPORTING CREATIVITY, INNOVATION AND ENTREPRENEURSHIP TOWARDS CLIMATE CHANGE PREVENTION AND ADAPTATION

Co-benefits:

Economy

Reducing the amount of waste saves costs associated with its processing and transportation. The reuse of resources enables significant savings in business and households, as a result of a reduction in the need for new materials/products.

Studies suggest that the circular economy will provide 10 times more employment opportunities than the current linear model of production and consumption.[51]

Clear political orientation towards a more sustainable, climate friendly economy, is providing leverage and decreasing risks for investments into industries providing related service and products.

Environment

Transition to renewables is decreasing climate related risks to environment. Technologies and services that enable improvements in energy and resource efficiency, climate mitigation and adaptation, sustainable framing and nature-based solution, are already bringing significant value to the economies around the world and are projected to grow significantly in the future.

The transition to a circular economy enables the optimization of resource use, transition to renewable resources and the preservation of the value of materials and substances through the circular life cycle, whereby the concept of waste is transformed into the concept of reuse and transformation innovation. Reducing waste makes it possible to reduce the consumption of resources that humanity

51 Cities 100 report, C40 and Nordic Sustainability, 2019 digital report, https://www.cities100report.com/

is currently consuming faster than they are able to regenerate. Waste reduction also means less pollution and greenhouse gas emissions (CO_2, CH_4) associated with the fermentation of waste materials in landfills and GHG emissions and air pollution in connection with the transport of waste to landfills. Compost systems reduce CO_2 emissions and generate nutrients/fertilisers to improve the soil and grow crops.

Society

Transition to renewables is enabling energy sovereignty of states and communities. Circular and sharing economy enables better collaboration within and between communities. It helps reduce redundancies in the system, helps minimise consumption and material ownership and helps reduce social inequalities.

The establishment of circular systems requires the participation of stakeholders from different sectors, who in the process of building a circular system also strengthen social capital.

6.2 A Smart City

The "Smart City" headline area includes two ambitions: adapting to climate change and connecting different sectors, actors and populations for better governance and development of the city.

SMART CITY	**ADAPTING TO CLIMATE CHANGE**
	Improving preparedness for climate change
	Preventing risks associated with climate change
	CONNECTEDNESS AND COOPERATION
	Introducing new ways of connecting, collaborating and managing city assets
	Replacing the sectoral approach to city management with a cross-sectoral one
	Establishment of a smart network of measuring points for monitoring the state of the environment (temperature, precipitation, air, water, soil, etc.)

6.2.1 A City Adapted to Climate Change

OBJECTIVES:

IMPROVING PREPAREDNESS FOR CLIMATE CHANGE

PREVENTING THE RISKS ASSOCIATED WITH CLIMATE CHANGE

Indicators:

ADAPTING TO CLIMATE CHANGE	UNIT
Number of events in the magnitude of 50-year floods	number
Ratio between permeable and impermeable surfaces in the city	ratio
Climate change risk assessment (analysis of risks related to climate change - floods, droughts, windstorms, landslides, sleet, etc.)	Yes/no
Proportion of buildings exploiting rainwater	%
Proportion of steep slopes defined as unbuildable	%
Area of revitalised degraded spaces	m^2/year
Proportion of urban public spaces shaded with tree canopies	%

Challenge:

In addition to preventing climate change, it is also important to successfully adapt to the increasingly significant pressures and already expressed consequences of climate change. Cities will need ambitious goals in this area to ensure the quality of living and the environment and to reduce related risks.

Understanding the climate in the future is important for adapting to climate change. Based on this understanding, it is necessary to develop proactive plans that will prepare the local community for the effects of the upcoming changes, while already taking advantage of opportunities to limit climate risks with appropriate solutions and to enable quality of life, within ecological boundaries.

The ARSO study on climate change in Slovenia by the end of the 21st century finds that the projected rise in temperatures will greatly increase the heat load in Slovenia. The number and duration of heatwaves will also increase. The surface layer of the soil will be heated more intensively, which will further potentiate the appearance of urban heat islands and cause changes in the phenological development of plants. The annual amount of precipitation and the intensity and frequency of exceptional precipitation are also expected to increase significantly. Due to increased evapotranspiration and precipitation, groundwater supply and the mean annual peak of river flows will increase.

To prevent the risks associated with these changes, it will be necessary to properly address the challenges of global warming, the ever more frequent weather events and the management of the increased amount of meteorological and aquifer waters. To a limited extent, these factors are already causing damage and disturbances in the functioning of the city of Ptuj and impacting the life of its inhabitants.

The Municipality of Ptuj is increasingly active in finding solutions to reduce climate risks to ensure the safety and well-being of the population. Minimising the impact of an urban heat island, for example, can be effectively addressed by adequately covering urban infrastructure with greenery that mitigates this effect. The shade and moisture brought to the city by the vegetation help to cool the air, lower the temperature and at the same time reduce air pollution. Placing porous lands, where trees are planted and urban gardens or green playgrounds are provided, enables the absorption of rainwater and thus helps to mitigate the flood risk of areas. The increase in precipitation can also be successfully solved by capturing and using rainwater.

To ensure a comprehensive and systematic approach to adaptation to climate change, the Municipality of Ptuj will first of all need to develop a plan that will include a risk assessment of various factors and identify a set of appropriate solutions (spatial planning, natural solutions, building blocks, awareness) for better preparedness for climate change and a programme framework for awareness-raising and cooperation with the population and relevant organisations.

PRIORITIES:

1.PREPARATION OF A MUNICIPAL OR INTER-MUNICIPAL PLAN FOR ADAPTATION TO CLIMATE CHANGE

2.UPGRADING THE SYSTEM OF MONITORING, ALERT SERVICE, PROTECTION AND EMERGENCY MEASURES ENFORCEMENT CONNECTED TO SEVERE WEATHER EVENTS

3.INTRODUCTION OF AN INNOVATIVE SURFACE AND METEORIC WATER MANAGEMENT MODEL THAT WILL MITIGATE THE CONSEQUENCES OF EMERGENCIES (STORMS, FLOODS) AND PROVIDE A WATER SOURCE DURING DROUGHTS (RESERVOIRS, WETLANDS, ETC.)

4.UPGRADING AND EXTENSION OF SUPPORT PROGRAMMES ALREADY IN PROGRESS (OPVO, LEK, CPS)

Co-benefits:

Health

Addressing climate risks will mitigate the negative effects of climate change (extreme heat, floods, deteriorating air quality, rising mould and bacteria, etc.) on society.

Many solutions that help reduce climate risks fall under "nature-based solutions". Among other things, they perform cooling and cleaning functions in cities, represent a natural sink or reservoir of meteoric water, mitigate the effects of extreme weather events, support biodiversity and thus enable a better quality of life, well-being, and, last but not least, health.

Environment

Implementing the plans together with stakeholders and the population will help to implement solutions and better prepare for change.

Economy

By creating favourable microclimatic conditions, nature-based solutions in the city make it possible to reduce cooling costs in the warmer months.

Nature-based solutions are financially attractive as they have lower maintenance costs, are less risky and are not subject to depreciation. Natural solutions perform ecosystem functions such as air purification, water retention and purification and temperature regulation, which are key to enabling a quality life. Due to their complexity, these functions are extremely difficult to market. Nevertheless, research experiments in this direction show that the cost of replacing natural systems with technological ones would be extremely high, in cases where this is at least partially feasible.

Society

A conscientious society, where the topic of climate change and related risks is exposed and discussed, is better prepared for the coming changes.

6.2.2 A Connectedness and Cooperation

OBJECTIVES:

INTRODUCING NEW WAYS OF CONNECTING, COLLABORATING AND MANAGING CITY ASSETS

REPLACING THE SECTORAL APPROACH TO CITY MANAGEMENT WITH A CROSS-SECTORAL ONE

ESTABLISHMENT OF A SMART NETWORK OF MEASURING POINTS FOR MONITORING THE STATE OF THE ENVIRONMENT

Indicators:

CONNECTEDNESS and COOPERATION	ENOTA
Value of community projects/investments	EUR/year
Proportion of population involved in community projects/consultations	%
Number of volunteer hours contributed by residents and local businesses for the public good	number
Number of cross-sectoral projects community projects	number
Number of measuring stations, number of monitored environmental parameters	number

Challenge:

Complex global problems (rising emissions, high levels of indebtedness, stagnant economy, need for large-scale infrastructure investments, growing interdependence) challenge our existing development models, practices, tools and institutions at all levels of governance while signalling the need for new scenarios and solutions.

Limiting climate change to below 2°C will require a fundamental transformation of our cities, in the light of urbanism, green systems, architecture, lifestyles, services and products and economic and social models. It will be necessary to decarbonise in all areas of urban life and thus adjustments will be necessary that will basically require increasing social and at the same time sectoral connection and cooperation.

Also important is to ensure that both the city and businesses, investors and residents can access data and develop instruments to integrate climate change into their risk management practices.

The key approaches to solving systemic problems will be based on building links and cooperation between different sectors and the population, which will enable the growth of social capital and joint investment in public goods (in a broader sense[52]). Increasingly important issues for cities are, for example, how to make joint decisions, how to invest in a new way of development, in common services and goods, and how to address the social risks and opportunities offered by the systemic transition, i.e. how to participate effectively as a community in an integrated development process (from vision to results).

For this, the way of organisation will be important to achieve a jointly defined vision and goals that the community collaboratively shapes through the process of participation. Participation or cooperation is a widely used term today, but it is difficult to implement it in practice. Today, there are more and more support tools and crowdsourcing platforms that enable new ways of collaborating and connecting crowds to address broader community challenges.

The Municipality of Ptuj can start the first steps towards new management models by preparing the basis and tools for the implementation of community projects, crowdsourcing and the implementation of a participatory budget. The Municipality of Ptuj can build on the good practices of other European cities that actively use various crowdsourcing tools for decision-making, investment (crowdfunding) and management of public goods to achieve their goals. For example, various London municipalities have supported more than a hundred public good projects worth over € 5 million since 2014, through their own Crowdfund London portal. These projects cover many social and environmental areas. Investments for projects come both from the citizens themselves (over 50%) and from municipal budgets (below 50%), and at the same time the obligations of managing these public goods are shared.

The goals of such processes are, among others, collective responsibility for the development and related issues (responsibility is not only in the hands of the municipality), greater activation of the

52 Public goods go beyond municipal resources alone (streets, sewers, water systems, etc.) and also include other urban infrastructure and natural resources (such as aquifers), data and social capital.

population and stakeholders and rebuilding trust between administrative institutions, citizens and other city stakeholders. All this is a driver of healthy sustainable development.

PRIORITIES:

1.ESTABLISHMENT OF A COMMUNITY INVESTMENT AND DECISION-MAKING PLATFORM FOR RESIDENTS

2.ESTABLISHMENT OF A PROGRAMME AND A SET OF TOOLS TO SUPPORT JOINT DECISION-MAKING, MANAGEMENT, INVESTMENT, AND MONITORING OF URBAN PROJECTS

3.IMPLEMENTATION OF MEASURING STATIONS FOR KEY ENVIRONMENTAL QUALITY PARAMETERS (TEMPERATURES, PRECIPITATION, AIR, WATER, SOIL POLLUTION, ETC.)

Co-benefits:

Environment

Greater social cohesion and trust enable better mutual understanding and improve the possibilities of active cooperation and solving environmental and other complex problems.

Economy

Connecting different actors and, above all, enabling unusual connections in the process of finding common solutions often lead to innovation and thus to increased economic activity, as it encourages thinking outside the traditional framework and predictability.

Society

The more connected the local community, the more collectively aware it is and the better prepared it is to work together for the public good and for the collective resolution of local problems/crisis. Connected local communities find it easier to define common problems and form solutions.

The more the local community is aware of and has the opportunity to use tools and approaches aimed at better networking, the better the skills of self-organisation and activation of this community are developed.

The End of the Roadmap and Start of the Journey

7. The End of the Roadmap and Start of the Journey

Ptuj in 2050. How do we imagine it? What kind of city do we want given the changes that are already happening and will happen? What opportunities await us in a carbon neutral future?

These were the leading questions in devising the Climate Roadmap for the City of Ptuj.

In the preparation of the Roadmap, we combined expert thematic knowledge, policy landscape insights and global good practices with local challenges. We explored available local data on the current situation in the municipality and gained knowledge about the local vision for development based on cooperation with residents, the municipality, experts, companies, and other co-creative stakeholders. All this is combined in the Climate Roadmap for the City of Ptuj, a "living" document that indicates the necessary direction of development in the context of global/local change, community needs, climate science, politics, and investment opportunities. With its wide but not exclusive range of development orientations, the Climate Roadmap opens space for debate in the direction of more precise definition of priorities and desired solutions that will guide the further development of the city.

The Climate Roadmap plays a role for all stakeholders, from residents, the business community, neighbourhoods and non-profits to public services and city administration. The efforts of all are the key to our common success in overcoming problems.

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Annex 1:
Development Framework of the Climate Roadmap for the City of Ptuj

SUMMARY OF PROGRESS TOWARDS OBJECTIVES

CARBON NEUTRAL CITY

OBJECTIVES	INDICATORS	UNIT	BASELINE	CHANGE (Year)	IMPROVEMENT (yes/no)	OBJECTIVE 2030	OBJECTIVE 2050	UNIT
SUSTAINABLE ENERGY								
Elimination of fossil fuels in the local district heating energy system until 2050	Share of RES in the local district heating system	%						
Extension of district heating, especially to areas where the use of fossil fuels prevails	Proportion of heating covered by local district heating	%						
Monitoring and reducing final energy consumption in accordance with national and EU objectives	Final energy consumption per capita	MWh/capita/year						
Monitoring and reducing co2 per person emissions in accordance with national and EU objectives	CO_2 emissions per capita	tCO_2/capita/year						
Establishment of local power energy systems for electricity production (public sector)	Share of final energy consumption in the local public sector covered by own energy production from RES	%						
Reduction of energy poverty in the municipality	Municipal investments in the field of sustainable energy (renovation of buildings, public transport, public energy systems - heating, electricity)	EUR/year						
	Proportion of households that cannot afford adequately heated housing	% of households						
GREEN BUILDINGS AND INFRASTRUCTURE								
Reduce greenhouse gas emissions in buildings by 70 percent by 2030	Share of CO_2 emissions reductions in households and in business sector	% per year (households; businesses)						
Achieving the carbon neutrality of public buildings by 2050	Share of all renovated public buildings owned by the municipality	%						
Active management of public real estate	Long-term management plan for publicly owned real estate	Developed Yes/No						
Renovation and use of an existing building fund	Share of unused dwellings / business premises	%						
	Proportion of dwellings / business premises in poor condition (major renovations required)	%						
	Ratio of urban renovations to new constructions	Ratio						
	Financing and co-financing of building renovation projects and related infrastructure by the municipality	EUR/leto						
SUSTAINABLE MOBILITY								
Active mobility and "green" mobile services (public transport, climate friendly vehicles) become priority mobility options	Proportion of separate cycle / footpaths in relation to the entire road network; length of bicycle / footpaths per capita	%; m/capita						
60% of journeys are made by public transport, on foot, by bicycle or by group transport	Proportion of journeys within the city made by public transport, on foot or by bicycle	%						
Emission-free public fleets by 2030	Proportion of the population using shared vehicles (bicycle, car, scooter, etc.)	%						
15% increase in frequency/density of public transport	Motorization rate	number of vehicles per capita/household						
Optimisation of city logistics for companies and residents of the old city centre	Proportion of the population with access to public transport or micro mobile stations, within a radius of 300m	%						
	Proportion of low-carbon public mobility fleet	%						
	Number of modality stations per km2	%						
	Strategy for green city logistics	Adopted Yes/No						
	Investments made in the field of sustainable mobility	EUR/year						

Annex 1:
Development Framework of the Climate Roadmap for the City of Ptuj

SUMMARY OF PROGRESS TOWARDS OBJECTIVES

A SUSTAINABLE CITY

OBJECTIVES	INDICATORS	UNIT	BASELINE	CHANGE (Year)	IMPROVEMENT (yes/no)	OBJECTIVE 2030	OBJECTIVE 2050	UNIT
HEALTH AND WELL-BEING OF THE CITIZENS								
Improving urban green infrastructure (parks, urban forests, river and stream embankments, lakes)	Number of greening projects; improved / additionally acquired green areas	number; added m^2/year						
Improved access to nature and recreational/park areas for pedestrians and cyclists	Proportion of green areas to which there is a connected and separate cycling / walking access from the urban center	%						
Improved access to supply of local healthy food	Proportion of the population living within a radius of 400 m from green areas that allow recreation	%						
Improving and maintaining the quality of water resources	Number of initiatives aimed at increasing the supply and sales of local food	number						
Improving and maintaining air quality	Proportion of households with own garden	%						
	Regular monitoring of pollutants and pressures affecting water, air, soil quality	Yes/No						
	Active implementation of OPVO measures	Yes/No						
FUNCTIONALITY OF ECOSYSTEMS AND BIODIVERSITY								
Establishing a "green network" of habitats in the city of Ptuj and the Lower Podravje region	Conservation of key species	(+/-) change						
Revitalisation of urban, suburban and other important habitats and creating new habitats in the urban environment	Number of revitalized habitats	number						
Sustainable management of agricultural land	Proportion of agricultural land with organic food production or conversion to organic production	%						
	Gross nutrient balance on agricultural land (nitrogen, phosphorus)	kg/ha						
SUSTAINABLE ECONOMY								
Supporting economic activities offering sustainable services and products	Number of successful start-ups; successful crowd funding projects	number						
Increasing the number of employees in the green industry and the circular economy	Number of programmes that cultivate entrepreneurial innovation	number						
Reducing the amount of waste	Number of incubators, accelerators, co-working spaces	number						
Active use of the European platform for the promotion of the circular economy	Proportion of mixed waste reduction compared to the previous year	%						
Supporting the companies that are actively changing their operations to more sustainable ones (resource use, social responsibility)	Number of active sharing programmes (car-share, bike-share, library of things)	number						
	Proportion of "green" jobs including those related to local food	number						
	Value of green public contracts supporting local economy	EUR/year						
	Proportion of companies making their operations more sustainable	%						

Annex 1:
Development Framework of the Climate Roadmap for the City of Ptuj

SUMMARY OF PROGRESS TOWARDS OBJECTIVES

SMART CITY

OBJECTIVES	INDICATORS	UNIT	BASELINE	CHANGE (Year)	IMPROVEMENT (yes/no)	OBJECTIVE 2030	OBJECTIVE 2050	UNIT
ADAPTING TO CLIMATE CHANGE								
Improving preparedness for climate change	Number of events in the magnitude of 50-year floods	number						
Preventing risks associated with climate change	Ratio between permeable and impermeable surfaces in the city	ratio						
	Climate change risk assessment (analysis of risks related to climate change - floods, droughts, windstorms, landslides, sleet, etc.)	Yes/no						
	Proportion of buildings exploiting rainwater	%						
	Proportion of steep slopes defined as unbuildable	%						
	Area of revitalised degraded spaces	m^2/year						
	Proportion of urban public spaces shaded with tree canopies	%						
CONNECTEDNESS AND COOPERATION								
Introducing new ways of connecting, collaborating and managing city assets	Value of community projects/investments	EUR/year						
Replacing the sectoral approach to city management with a cross-sectoral one	Proportion of population involved in community projects/consultations	%						
Establishment of a smart network of measuring points for monitoring the state of the environment (temperature, precipitation, air, water, soil, etc.)	Number of volunteer hours contributed by residents and local businesses for the public good	number						
	Number of cross-sectoral projects community projects	number						
	Number of measuring stations, number of monitored environmental parameters	number						

Annex 2: Priority Table

SUMMARY OF PRIORITIES

CARBON NEUTRAL CITY

	LEVEL OF PRIORITY	STATUS	RESPONSABILITY (DEPARTMENT)	SUPPORT
SUSTAINABLE ENERGY				
Cooperation with stakeholders for the successful transition of the district heating system to renewable energy sources				
Promotion of feasibility studies for exploiting the energy potential of waste resources (excess heat, treatment plant, waste)				
Consideration of options and the role of the municipality as a potential producer or supplier of energy (e.g. offer of a RES energy package for local consumers)				
Awareness of changing habits to reduce energy use				
Reduction of energy use by modernisation of existing systems (energy renovation of buildings, public lighting, public transport etc.)				
Construction of infrastructure for renewable energy sources utilisation (RES systems on public buildings)				
Revision and implementation of LEK and OPVO measures				
GREEN BUILDINGS and INFRASTRUCTURE				
Inventory of the building stock and development of a long term public real estate strategy				
Development of a programme for renovations and energy rehabilitation of cultural heritage buildings				
Formation of strategic partnerships and action plan for the aggregate renovation of the building stock in the Municipality of Ptuj				
Development of investment models for the comprehensive renovation of the old city centre				
Establishment of a quality system for the maintenance of public housing and buildings that pursues climate goals				
Incentives for the rehabilitation of private housing and business premises - offering a "package" for private individuals				
7Revision and implementation of LEK and OPVO measures				
Promoting innovation in the field of comprehensive renovation of historic buildings that take into account climate goals				
SUSTAINABLE MOBILITY				
Improving infrastructure and connectivity for pedestrians and cyclists - action plan; project investments[1]				
Improving public transport (e-fleets; increasing frequency, range and number of stations)				
Increasing the offer of micro-mobility (bicycle, scooter, electric mopeds, electric skateboards, etc.)				
Expansion of the bicycle rental system, increase in the number of bicycles, e-bikes and stations				
Improving urban logistics for residents and businesses (development of urban logistics management strategy and implementation of proposed measures)				
Supporting vehicle sharing services (e.g. raising awareness based on good practices and supporting development in the test phase)				
Smart mobility support systems (IT platforms for various urban mobility options)				
Raising awareness, promotion and incentives for sustainable mobility				
Revision and implementation of CPS and OPVO measures				

Annex 2: Priority Table

SUMMARY OF PRIORITIES					
		LEVEL OF PRIORITY	STATUS	RESPONSABILITY (DEPARTMENT)	SUPPORT
A SUSTAINABLE CITY	HEALTH AND WELL-BEING OF THE CITIZENS				
	Developing a plan to improve and increase the area of green urban infrastructure				
	Constructing bicycle connections and footpaths between and to green areas				
	Remediation of degraded and contaminated surfaces				
	Promoting local production of healthy/organic food and local marketing				
	Revision and implementation of OPVO, CPS and LEK measures				
	FUNCTIONALITY OF ECOSYSTEMS AND BIODIVERSITY				
	Inclusion of habitat type mapping as an expert basis in the preparation of municipal spatial plans				
	Establishing a comprehensive green habitat management system (action plan)				
	Enabling the transformation of green urban areas (parks, yards, etc.) into functional habitats				
	Raising awareness of residents and other stakeholders about habitat functions and their maintenance				
	Promoting organic and diversified farming				
	Revision and implementation of OPVO measures				
	SUSTAINABLE ECONOMY				
	Revitalisation and expansion of the start-up programme in the green, digital and circular economies				
	Promotion of the city as a "boutique" business destination for sustainable business sectors and entities				
	Supporting/Enabling a local crowd-funding system				
	Promotion and use of online platforms for the promotion of the circular economy				
	Initiation of the greenest neighbourhood in the country programme				
	Supporting reuse and recycling centres				
	Supporting creativity, innovation and entrepreneurship towards climate change prevention and adaptation				
A SMART CITY	ADAPTING TO CLIMATE CHANGE				
	Preparation of a municipal or inter-municipal plan for adaptation to climate change				
	Upgrading the system of monitoring, alert service, protection and emergency measures enforcement connected to severe weather events				
	Introduction of an innovative surface and meteoric water management model that will mitigate the consequences of emergencies (storms, floods) and provide a water source during droughts (reservoirs, wetlands, etc.)				
	Upgrading and extension of support programmes already in progress (OPVO, LEK, CPS)				
	CONNECTEDNESS AND COOPERATION				
	Establishment of a community investment and decision-making platform for residents				
	Establishment of a programme and a set of tools to support joint decision-making, management, investment and monitoring of urban projects.				
	Implementation of measuring stations for key environmental quality parameters (temperatures, precipitation, air, water, soil pollution, etc.)				

Authors:
mag. Nina Taylor,
Matjaž Gerl,
E-zavod - zavod za celovite razvojne rešitve

Collaboration:
Simona Kašman,
Martina Zamuda,
Elena Zupanc,
Mestna občina Ptuj

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