

STRATEGY FOR THE TRANSITION TO CIRCULAR ECONOMY IN THE MUNICIPALITY OF MARIBOR

Prepared by: **Wcycle Institute Maribor**

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Interreg 
Alpine Space
GREENCYCLE
Področje Regionalni razvoj, infrastruktura



MESTNA OBČINA
MARIBOR





Mayor`s address

In recent years, the **Municipality of Maribor (MOM)** has proven that a municipality, which is burdened by difficult economic conditions and various other social challenges, can successfully direct its development path into a brighter future. Since 2014 MOM has been planning an integrated urban system that would include integrated management of all the resources generated in the region based on a circular economy policy, efficient and sustainable use of energy and water, and the use of recovered waste as a new source. At the same time, the system would also include the fundamental principles of a cooperative economy with the involvement of civil society, which is pursued by both the European Commission and the United Nations, and the development of mobility. With numerous interactions with the representatives of the people of MOM, experts, government, companies and representatives of the EU, MOM has formed its own innovative umbrella project for the transition of the City of Maribor into a circular economy - the Wcycle project.

MOM is currently the only municipality in Slovenia that redirects its activities, the operation of its companies and inhabitants into the model of circular management. This does not only include the concept of a circular economy in the field of municipal waste, but also the implementation of the concept in construction and industry, energy, water management, land use and mobility in the city. At the same time, MOM continues to implement the network of cooperative economy by promoting collaboration with NGOs, younger population, the elderly and minorities. These activities point to an extremely innovative approach of the city to policy-making, which creates synergistic effects for all groups of the population, the environment and the economy.

In April 2017, in order to implement the Wcycle project in Maribor, five companies, owned or partly owned by the MOM, founded the Wcycle Institute Maribor (IWM). IWM is the umbrella organization, responsible for the implementation of projects derived from founding enterprises, townspeople themselves or private entities. The presentation of the Wcycle Maribor project was carried out within the framework of the European Week of Cities and Regions in October 2016 in Brussels with the support of the former European Commissioner dr. Janez Potočnik and presented to the residents of Maribor in November 2016. The concept was then unanimously endorsed by the City Council of MOM, which in March 2017 blessed the further development and establishment of the IWM.

Already in the first year of operation, the IWM successfully implemented the concept of circular economy in the MOM, whereby it is rapidly gaining national and international recognition. The Wcycle project received the first Future of Cities Award in 2017, and MOM, in cooperation with IWM as part of Urban Innovative Actions, acquired the Urban Soil 4 Food project, which will bring not only the European Union's 3 million Euros, but also a number of positive effects for residents. In 2017 and 2018, IWM also participated as a partner in the preparation of the Roadmap towards the circular economy in Slovenia, which was presented to the public in May 2018. So, if Maribor connects itself with others, Maribor can, wants and is able to.

Dr. Andrej Fištravec
Mayor

Summary of the Strategy for the transition to circular economy in Municipality of Maribor

”Only close cooperation between public companies, citizens, industry and local self-government can lead to a successful interconnected system that optimizes resources and results - economic, environmental and social.”

The basic idea of the Strategy for the transition of the City of Maribor to the circular economy (Strategy) as well as the Wcycle project is its own innovative model as a system for managing all the resources available in the Municipality of Maribor and the wider urban area.

The model is based on the operation of enterprises that are predominantly publicly owned, which already provide public services for residents, and thus are the city's bottlenecks that until now have not functioned as a connecting link, which is a fundamental principle in the transition from linear to circular economy. Only close cooperation between public companies, citizens, industry and local self-government can lead to a successful interconnected system that optimizes resources and results - economic, environmental and social. This is a long-term project that provides development-oriented efficient management of resource flows in local and regional environments.

The purpose of the Strategy and Wcycle project discussed is cross-sectoral cooperation in handling, processing, re-use and development of resources, which deals with the circular economy in Maribor in seven selected sectors (i.e pillars or circles). The positive consequences of these practices are the emergence of new business opportunities for the MOM, the people and the economy, the creation of high-quality, predominantly green jobs, new added value and a new economic boost. In order to meet the general goal of the Strategy, radically new ways of thinking are needed. This approach is truly innovative from all aspects of implementation - technological, organizational, social, cultural and behavioral innovation with a systematic, eco-innovative ap-

proach. The idea is based on the concept that companies in the city, with the aim of creating a regenerative urban environment and providing quality services for their citizens, share information and work together to achieve the highest possible rate of reuse of waste, excess heat and wastewater as new sources, while respecting the quality of land use, the development of sustainable urban mobility and a cooperative economy.

Because of events in the previous years, among project's starting points is also that the city does not have and does not want a landfill, nor does it want a waste incinerator, which the citizens of Maribor have repeatedly expressed publicly. Thus, waste generated by one sector must be used as a material or product in the operation of another sector. In addition to the mutually beneficial cooperation of public sector companies, the goal of companies is to process the generated waste or deliver it to other sectors, including excess heat and waste water. This will be interconnected with the development of an interactive information support tool.

The Wcycle Maribor project covers innovative urban circular economy system as a new business and economic model of the city in the field of efficient resource management, which has not existed anywhere yet and complements the principles of sustainable mobility and co-operative economy. The Strategy, as a basic document at local government level, makes it easier to implement the project and gives a clear signal that Maribor, as one of the first cities in the European Union, is also at the strategic level being completely directed into the circular economy.

The process of creating the Strategy for the transition to circular economy in the Municipality of Maribor

The creation of the Strategy is closely linked to the Interreg Alpine Space program and Greencycle project. MOM as a leading partner of the consortium of cities and organizations of the Alpine region, acquired the project for the duration from November 2016 to October 2019. Within the framework of the transnational program, MOM is working with ten partners from five EU Member States in order to achieve the goals of a low carbon society in the participating cities through the introduction of an integrated circular economy system for the management of urban areas. One of the main predicted results and positive effects of this project is the adoption of strategic documents by cities that are transitioning from linear to circular economy.

At the end of 2017, IWM started creating the Strategy with a broad inclusion approach, which enabled the co-creation of the content of the document to various stakeholders. In the working group that formulated the Strategy, experts from all the pillars of circular resource management in MOM took part. The draft strategic document was then presented at participatory local workshops, which were carried out at the beginning of 2018 for members of the municipal administration of the city, businessmen and the wider interested public. On the basis of the received responses and comments from the participants of the workshops, which were focused primarily on the need for more intense raising awareness and promotion of the circular economy in the local urban environment, the content of the Strategy was improved and expanded into several additional areas and contents.

Following the above-mentioned activities, the Strategy has been finished and will be submitted to the City Council of Maribor for approval in June 2018. This will add additional value to the strategic document, which will guide the operation of all stakeholders in the city not only during the Interreg Alpine Space Greencycle project, but also during the time after its official ending.

Content:

Mayor's address	2
Summary of the Strategy for the transition to circular economy in Municipality of Maribor	4
1. Starting points for the Strategy preparation	7
1.1. Analytical data about the City of Maribor	7
1.2. Starting documents for the Strategy preparation	7
1.3. The concept for circular and cooperative economy	9
1.4. The role of urban environment in the transition to circular economy	11
2. Strategy for the transition to circular economy in Municipality of Maribor	12
2.1. Basic concept of the model for the transition of Municipality of Maribor to circular economy	12
2.2. Horizontal organizational model of the project	14
2.3. Vertical organizational model of the project	15
2.4. Concept of process development	17
2.5. Strategic project areas	18
2.5.2. Use of processed soil and construction and demolition waste in urban building	20
2.5.3. Management of surplus heat and renewable energy	21
2.5.4. Sustainable mobility-Urban transport and joint service	23
2.5.5. Reuse of recycled water and alternative water resources	24
2.5.6. Sustainable land management and regeneration of degraded areas	26
2.5.7. Cooperative economy network	27
3. SWOT analysis	28
4. Conclusion	29

1. Starting points for the Strategy preparation

1.1. Analytical data about the City of Maribor

Area of MOM	147.466.576 m ²	Share of MOM area
Number of inhabitants	95.948	
Population density (inh. /km ²)	650,63	
Number of town districts and local communities	11+6	
Urban area (GURS)*	37.615.771 m ²	25,51 %
Urbano area (SURS)**	90.437.694 m ²	61,33 %
Building area	5.663.267 m ²	3,84 %
Usable area of buildings	7.723.130 m ²	5,24 %
Protected natural areas	13.459.114 m ²	9,13 %
Park areas	431.712 m ²	0,29 %
Green areas	11.688.769 m ²	7,93 %
Urban forests	53.317.522 m ²	36,16 %
Agricultural areas	55.020.629 m ²	37,31 %
Degraded areas	3.390.000 m ²	12,00 %

* The urban area of MOM or the core area is determined according to the methodology of the Surveying and Mapping Authority of the Republic of Slovenia

** The area of MOM for Integrated Territorial Investments is determined according to the methodology of the Statistical Office of the Republic of Slovenia

TABLE 1: ANALYTICAL INFORMATION ABOUT MARIBOR
SOURCE: SUSTAINABLE URBAN STRATEGY OF THE MUNICIPALITY OF MARIBOR

1.2. Starting documents for the Strategy preparation

The strategy is also being included in the wider regional and global development system of the circular economy, based on some binding national and international starting points or documents;



- ▶ Directive 98/2008/EC on waste², defining the hierarchy of waste management on the basis of a circular economy in terms of preventing their formation, preparation for their reuse, recycling, other uses and their disposal
- ▶ Directive 2014/25/EU on public procurement³, which allows public contracting authority to make the award criterion not merely the lowest price, but also the best relationship between quality and price, and environmental and social aspects, giving the public authority a legal basis for the purchase of goods or services in accordance with the principles of a circular economy
- ▶ Environmental protection act⁴, which states in its Article 7 that any encroachment on the environment must be planned and carried out in such a way as to minimize the burden on it, which requires the use of best available techniques, and regulations relating to the handling of waste must be designed to coincide with the principles of a circular economy.
- ▶ Public procurement act⁵, which regarding public procurement reproduces criterias from Directive 2014/25 / EU
- ▶ An EU action plan for circular economy⁶, comprising a package of measures to promote competitiveness, job creation and sustainable growth in the context of the transition to the circular economy system
- ▶ Green public procurement and the EU action plan for the Circular Economy⁷, which represents the basis for the promotion of green public procurement.
- ▶ Inception Impact Assesment - Minimum quality requirements for reused water in the EU⁸, adopted in order to promote the use of recycled water.
- ▶ Roadmap towards the circular economy in Slovenia, made under the aegis of the Circular Change platform and a consortium of which IWM was part of, with the aim of recognizing and connecting circular practices and facilitating the transition of Slovenian economy from linear to circular⁹
- ▶ National strategic documents, such as Waste management program and Waste prevention program of Republic of Slovenia¹⁰, Strategy of development of Slovenia 2030¹¹ and Vision of Slovenia 2050¹², whose development goals include, among others, a low-carbon circular economy and sustainable management of natural resources, which at the same time represent two of the basic orientations of this Strategy.

² <http://eur-lex.europa.eu/legal-content/SL/TXT/HTML/?uri=CELEX:32008L0098&from=EN>

³ <http://eur-lex.europa.eu/legal-content/SL/TXT/HTML/?uri=CELEX:32014L0025&from=SL>

⁴ Uradni list RS, št. 39/06 – uradno prečiščeno besedilo, 49/06 – ZMetD, 66/06 – odl. US, 33/07 – ZPNačrt, 57/08 – ZFO-1A, 70/08, 108/09, 108/09 – ZPNačrt-A, 48/12, 57/12, 92/13, 56/15, 102/15, 30/16, 61/17 – GZ in 21/18 – ZN0rg

⁵ Uradni list RS, št. 91/15

⁶ https://ec.europa.eu/commission/sites/beta-political/files/circular-economy-factsheet-general_en.pdf

⁷ [http://www.europarl.europa.eu/RegData/etudes/STUD/2017/602065/IPOL_STU\(2017\)602065_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2017/602065/IPOL_STU(2017)602065_EN.pdf)

⁸ http://ec.europa.eu/smart-regulation/roadmaps/docs/2017_env_006_water_reuse_instrument_en.pdf

⁹ http://www.vlada.si/teme_in_projekti/prehod_v_zeleno_gospodarstvo/kazipot/

¹⁰ http://www.mop.gov.si/fileadmin/mop.gov.si/pageuploads/zakonodaja/varstvo_okolija/operativni_program/op_odpadki.pdf

¹¹ http://www.svrk.gov.si/si/delovna_podrocja/razvojno_nacrtovanje/strategija_razvoja_slovenije_2030_v_pripravi/

¹² <https://slovenija2050.si/>

The purpose of adopting the Strategy is fully in accordance with the United Nations Agenda 2030 from year 2015¹³, which sets out new, global sustainable development goals. These include equal access to clean and cheap drinking water, improved water quality by reducing pollution, preventing waste dumping and limiting emissions of hazardous chemicals and other substances, halving the proportion of untreated wastewater, and significantly increasing recycling to achieve more economical use of water in of all sectors, ensure sustainable water collection and treatment in response to water scarcity.

Furthermore, two important goals of the Agenda 2030 are to provide everyone access to affordable, sustainable and modern energy sources and to care for sustainable cities in accordance with the direction of Maribor's Strategy, which is and will be recognized as a city that accepts and implements a comprehensive policy and integration plans, resource efficiency, climate change mitigation and adaptation. The City of Maribor will achieve strategic goals by measures of sustainable production and consumption, which includes both the reduction of waste and sustainable public procurement.

”The City of Maribor will achieve strategic goals by measures of sustainable production and consumption, which includes both the reduction of waste and sustainable public procurement.”



PICTURE 1: SUSTAINABLE DEVELOPMENT GOALS
SOURCE: UNITED NATIONS, 2030 AGENDA FOR SUSTAINABLE DEVELOPMENT

¹³ http://www.mzz.gov.si/si/zunanja_politika_in_mednarodno_pravo/mednarodno_razvojno_sodelovanje_in_humanitarna_pomoc/politike_mrs/cliji_trajnostnega_razvoja/

1.3. The concept for circular and cooperative economy

”The central concept of circular economy is the idea of maintaining the value of materials and products as long as possible.”

Such a transition is an opportunity to transform our economy and create new and sustainable competitive advantages for Europe.

The current linear economic model “take, consume, discard” relies on large quantities of cheap, easily accessible materials and energy, and is a model that achieves its physical limitations. The circular economy is an attractive and viable alternative, launched by the European Union, countries, local communities and businesses¹⁴. The transition to a more circular economy, where the value of products, materials and resources is kept in the economy for as long as possible, while reducing waste generation, is an essential contribution to the EU’s efforts to develop a sustainable, low-carbon, resource-efficient economy and is also the basis for a competitive economy. Such a transition is an opportunity to transform our economy and create new, sustainable competitive advantages for Europe¹⁵.

The development of circular economy will require high quality secondary raw materials (waste as a source) that can be returned back to production processes. In this context, the waste management sector will have to become a key partner in building new business models, focusing both on waste prevention and on the transformation of waste into the resource. The EU’s Circular Economy Action Plan deals with how to incorporate circular thinking into different stages of the life cycle (especially in product-oriented policy instruments) and puts forward a much more concrete proposal for amended waste treatment regulations with specific objectives and targets for five waste streams: municipal waste, waste packaging, food waste, bio-waste and critical raw materials.

The central concept of circular economy is the idea of maintaining the value of materials and products as long as possible. This reduces the need to introduce new materials and energy into material flows, thereby reducing the environmental pressure associated with the life cycle of products, from the extraction of resources, production and use, to the end of their service life. The concept covers all aspects of economic activity, from the acquisition of resources, to production, storage and consumption, and ends with the disposal or, ideally, recycling. The approach to “reduce, reuse and recycle” is an important way to implement the concept, although avoidance of waste is a priority. The idea is to request cycles to return waste as a source¹⁶. Industry already has a strong business interest in improving productivity of resources. It is estimated that improvements in the efficiency of resource use across the value chain could reduce the material costs by 17% to 24% by 2030¹⁷ and better use of resources could represent a total savings of € 630 billion per year for European industry. Business studies based on modeling at product level show significant opportunities to save material costs for EU industry through circular economic approaches and the potential to increase EU GDP to 3.9% by creating new markets, new products and creating value for businesses. It is therefore not surprising that companies are constantly striving to improve the management of resources but are retained by many market and regulatory barriers.

¹⁴ Circular Economy Overview, The concept of a circular economy, Ellen Macarthur Foundation

¹⁵ European Commission, EU Action Plan for the Circular Economy, Brussels, December 2015, p. 1, 2

¹⁶ European Parliamentary Research Service, Scientific Foresight Unit (STOA), Towards a circular economy – Waste management in the EU, Bruselj, september 2017, str. 11 - 17

¹⁷ Meyer, B. et al., Macroeconomic modelling of sustainable development and the links between the economy and the environment, 2011

“Cooperative economy creates new opportunities for consumers and entrepreneurs.”

A cooperative economy is a new way of offering and using products and services. It covers many sectors and brings new opportunities for all. What's more, it is a wider concept of some already concepts that are already known - many imaginative people in Europe are developing new business models. The co-operative economy is growing rapidly. Gross revenues in the EU from cooperative platforms and providers were estimated at € 28 billion in 2015. Growth in recent years has been spectacular, with revenues almost doubling from 2014 to 2015. The Eurobarometer survey in 2016 revealed that more than half of all EU citizens are aware of a cooperative economy, while one out of six users are already its user¹⁸.

Cooperative economy creates new opportunities for consumers and entrepreneurs. European Commission believes that it can therefore make an important contribution to employment and growth in the European Union, if it is promoted and developed responsibly. Due to innovation, new business models have significant potential to contribute to competitiveness and growth. The success of collaborative platforms is sometimes a challenge for existing market operators and practices, but by enabling individual citizens to offer their own services, we also promote new employment opportunities, flexible working arrangements and new sources of income. For consumers, cooperating economy can benefit from new services, expanded offer and lower prices. It can also promote a greater sharing of resources and their more efficient use, which can contribute to EU's sustainability agenda and to transition to a circular economy. Given the important benefits new business models can bring to the economy, Europe should be open to accepting new opportunities. The EU must proactively support innovation, competitiveness and growth opportunities, offered by the modernization of the economy. At the same time, it is important to ensure fair working

conditions, adequate and sustainable consumption and social protection for the entire population¹⁹.



¹⁴ Circular Economy Overview, The concept of a circular economy, Ellen Macarthur Foundation

¹⁵ European Commission, EU Action Plan for the Circular Economy, Brussels, December 2015, p. 1, 2

¹⁶ European Parliamentary Research Service, Scientific Foresight Unit (STOA), Towards a circular economy – Waste management in the EU, Bruselj, september 2017, str. 11 - 17

¹⁷ Meyer, B. et al., Macroeconomic modelling of sustainable development and the links between the economy and the environment, 2011

¹⁸ The Collaborative Economy Factsheet, European Commission, Brussels, junij 2016

¹⁹ A European agenda for the collaborative economy, Evropska komisija, Bruselj, junij 2016, str. 2, 3

1.4. The role of urban environment in the transition to circular economy

“Due to many factors, cities are uniquely positioned to lead the global transition to a circular economy and to make great use of the benefits of such a transition.”

Approximately 359 million people, 72% of the EU's total population, lives in cities and suburbs. Urban areas are facing many interconnected challenges in terms of employment, migration, demography, pollution of water, soil, air, etc. However, urban areas are also drivers of new ideas and solutions, they are dynamic areas where changes occur on a larger scale and quickly. In order to respond to the increasingly complex challenges they face, urban authorities must go beyond traditional policies and services- they must be bold and innovative. In the coming decades cities will become increasingly important, as an even greater degree of urbanization is predicted, and important infrastructure investments and urban development are expected. **Cities are in a unique position to guide the global transition to the circular economy through its high concentration of resources, capital, data and talents in a small geographical area and could benefit greatly from the results of such transition²⁰.**

Cities are highly dependent on external sources to meet the demands of their citizens on food and energy. Likewise, in cities where most goods are consumed, large amounts of waste are generated. Cities therefore represent the ideal environment for the development of a circular economy due to its proximity to its inhabitants, service providers and businesses. Urban authorities have many years of experience in ensuring sustainable waste management as a service in the public interest. Cities may also encourage a change to more sustainable ways of production and consumption, including the untapped potential of re-use of water. To adapt to a circular economy, a skilled workforce will be needed with specific and sometimes new knowledge that creates new employment opportunities and social dialogue. The creation of new enterprises (including social enterprises), the development of business models and the cooperation between manufacturers and retailers for the production of more durable, repairable and recycled products, will be required²¹.



Picture 2: Circular triangle
Source: GM - Circural Change

The circular city incorporates the principles of circular economy in all its functions and establishes an urban system that is, according to its design, regenerative, accessible and diverse. The goal of the circular city must be to eliminate the concept of waste, to keep resources at the highest possible values and to enable the development of digital technologies. The circular city strives to create prosperity for its people, to increase the viability and improve the resilience of the city and its citizens, while at the same time striving to separate the creation of value from the final use of resources. Cities will play an important role in the global transition to a circular economy. Due to many factors, cities are uniquely positioned to lead the global transition to a circular economy and to make great use of the benefits of such a transition. Local authorities have a major and direct impact on urban planning, the design of mobility systems, urban infrastructure, the development of local entrepreneurship and the local labor market. Local authorities therefore can play an active role in integrating the principles of a circular economy into all urban functions and city politics²².

²⁰ Cities in the circular economy: an initial exploration, Ellen MacArthur Foundation, 2017, str. 4

²¹ Urban Innovative Actions (UIA), Circular Economy, 2016

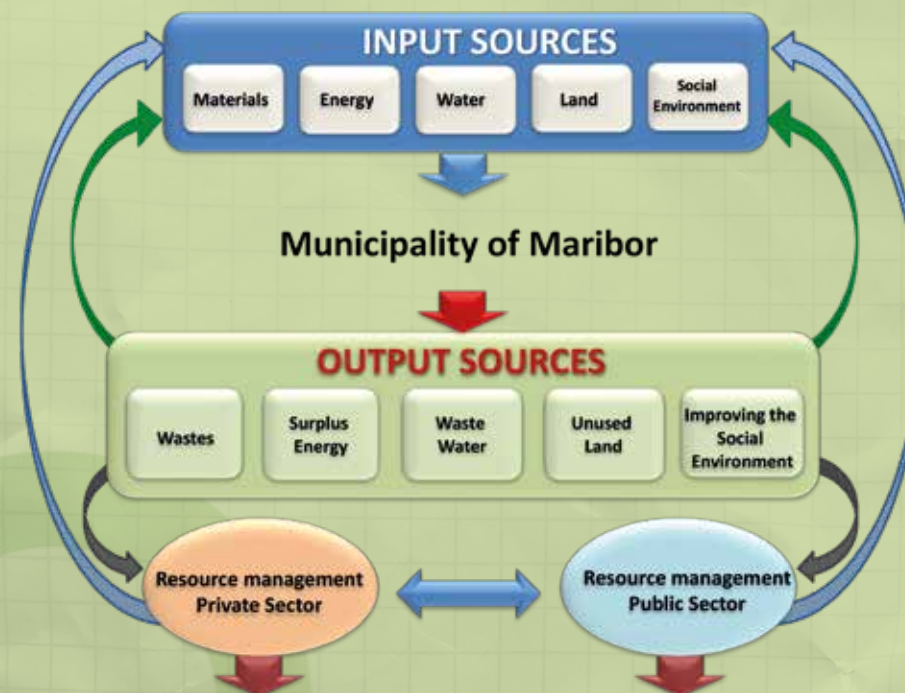
²² ibid., Cities in the circular economy, str. 8 - 11

2. Strategy for the transition to circular economy in Municipality of Maribor

2.1. Basic concept of the model for the transition of Municipality of Maribor to circular economy

Wcycle project: The basic design of the model for the transition of MOM into circular economy is based on the design and implementation of the Wcycle project as a new business and economic model for the efficient management of resources in the city of Maribor as an urban center on the basis of a circular economy policy. In its territorial area, MOM, through the design and implementation of the Wcycle project, will effectively manage the following identified sources of energy: waste, excess heat, wastewater, unused space and improvement of social environment.

In the implementation of efficient resource management, priority will be given primarily to the internal processes of closing the loops of managing the output resources in and modularly between enterprises in the predominantly public domain of MOM. The latter will be followed by the external processes of modular closure of the loops of managing the output resources by working with other public and private sectors, with the goal of maximizing the return of useful resources to urban use. The rest of the output resources will be identified as lost for the city, but the goal and the purpose will be to constantly reduce them.



PICTURE 3: DESIGN OF THE MODEL FOR THE WCYCLE PROJECT
SOURCE: MOM

“The city has no landfill and does not want to have it, nor does it want to dispose waste with incineration”

Legend of the design of the model for the Wcycle project:

- ▶ Primary internal processes of managing the output resources – LEVEL 1
- ▶ Delivering output sources into controlled external behaviour
- ▶ Secondary external management processes with still useful output sources - LEVEL 2
- ▶ For the environment of City of Maribor useless / lost output sources

Project basics: Considering the strategic starting points set out in Chapter 1 of this document, the project baselines for the design and implementation of the Wcycle project are as follows:

- ▶ The city has no landfill and does not want to have it, nor does it want to dispose waste with incineration
- ▶ All in the urban area generated output sources, preferably from the population, utilities, construction, industry, agriculture, water management and service activities, must be included in the process of processing and appropriate handling, with the aim of maximizing re-use
- ▶ The advantage of processing output sources is in material use; in recycling of materials and water and in production of new composite materials, followed by the energy use
- ▶ The holders of processing the output sources for each strategic project area are enterprises in predominantly municipal ownership, which are already performing public services for the city, while the holder of soft contents of the social environment is the city administration
- ▶ New processing and service capacities for the management of output sources are planned primarily in the area of urban degraded areas with the aim of their regulation and regeneration
- ▶ Only close cooperation between public companies, citizens, industry and local government leads to a successful interconnected system that optimizes resources and brings economic, environmental and social results

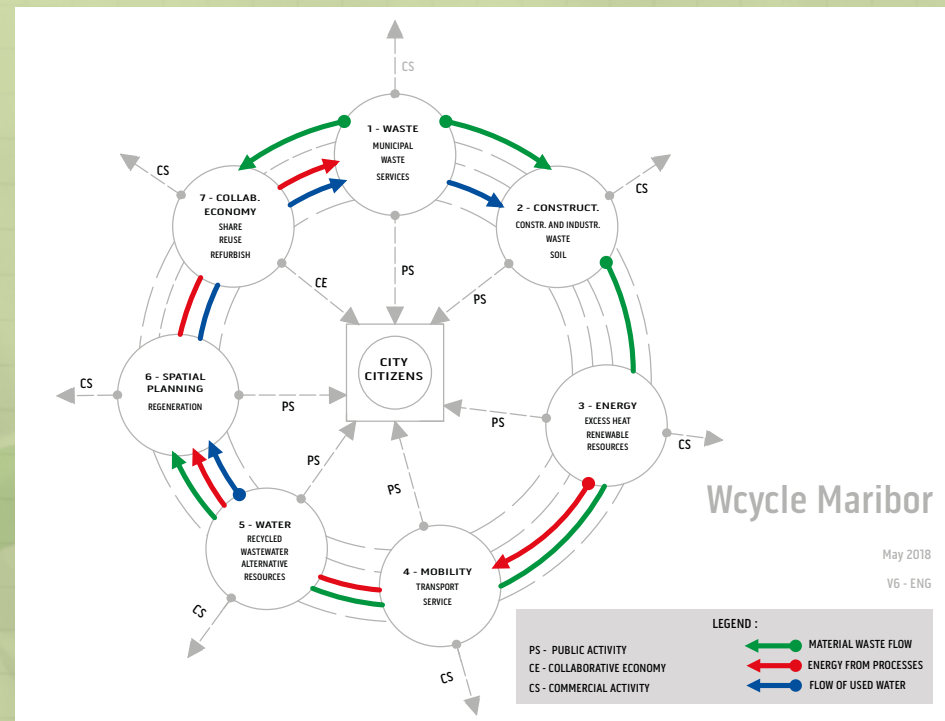
The project objectives for planning and implementing the Wcycle project are:

- ▶ Reducing the environmental burden
- ▶ Reducing the use of natural resources
- ▶ Increasing the use of renewable sources, energy and water
- ▶ Quality use of land
- ▶ Development of cooperative economy
- ▶ Creating new, predominantly green jobs
- ▶ Creating added value and economic growth
- ▶ Use of new technologies, own research and development

2.2. Horizontal organizational model of the project

The horizontal organizational model of the project is based on the establishment and mutual primary co-operation of seven strategic project areas - service pillars of resource management, which are:

- ▶ **Holders of resource management by individual project areas - service pillars are municipal and other enterprises in predominantly municipal public ownership, which already provide certain public services for townspeople**
- ▶ The city administration is responsible for the content of social environment in the cooperative economy
- ▶ Cooperation between utility, enterprises in predominantly municipal public ownership and city administration as bearers of strategic project areas - service pillars are a priority in order to achieve the project goals
- ▶ The output source from one area is to be used as material, product, energy or service in the operation of another area
- ▶ Implementers of project areas also perform secondary market services for the public and private sector, following the goals of maximizing the return of still useful output sources back to urban use



PICTURE 4: HORIZONTAL ORGANIZATIONAL MODEL OF THE WCYCLE PROJECT

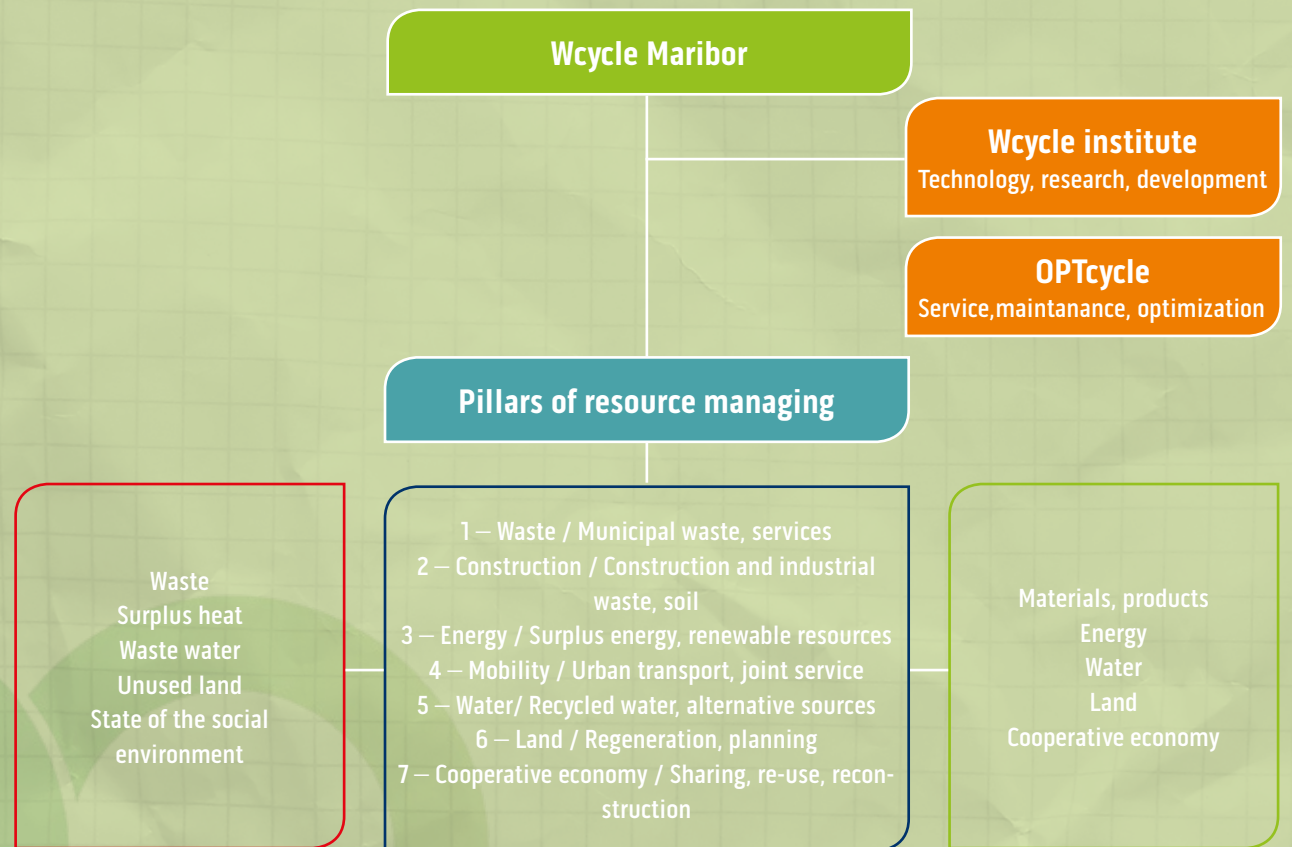
SOURCE: MOM

2.3. Vertical organizational model of the project

Wcycle Institute: The design and implementation of interconnecting processes for efficient resource management in otherwise horizontally six self-operating companies in predominantly public ownership of the City of Maribor and its city administration, is vertically organized and coordinated by the Wcycle Institute - The Institute for Circular Economy, established by five urban communal companies.

Wcycle Institute is a highly professional core of the Wcycle project for implementation of the development, research and introduction of the use of selected technologies, work processes and an integrated IT tool for informing and monitoring the operation of the project.

“Wcycle Institute is a highly professional core of the Wcycle project for implementation of the development, research and introduction of the use of selected technologies, work processes and an integrated IT tool for informing and monitoring the operation of the project.”



PICTURE 5: VERTICAL ORGANIZATION MODEL OF THE WCYCLE PROJECT
SOURCE: MOM

”The Wcycle model is transferable to other urban environments”

Goals and Vision: Wcycle's objectives are to support the development of Wcycle's processes as a model of efficient sectoral resource management in the urban environment by implementing technology, research and development optimizations. The development of processes will be directed to new good material, energy, water, economically justified and mutually related projects that will help the urban environment to increase material, energy and water independent supply and optimize the operations of public utility companies and other enterprises to provide the citizens of Maribor the highest possible quality of utility services at a reasonable price. **The implementation of the Wcycle project will have a positive impact on the local economy and its strengthening by closing material, energy and water loops, together with the most appropriate use of land.** The vision of the Wcycle Institute is responsible and careful management, affiliation and connection with the city, as well as professionalism and teamwork.

Main tasks: The Wcycle Institute will, as a priority, support the development of Wcycle's processes as a model of efficient sectoral resource management in the urban environment of the City of Maribor through the implementation of technology, research and development optimization. Based on their demand, model development services and implementation of efficient processes among sectoral resource management will also be offered to other urban areas, both in Slovenia and abroad, as well as to national, research institutions and to economic and service organizations. The Wcycle model is transferable to other urban environments, of course with an appropriate adaptation to the given local baseline and situation, degree of development of the area, economic strength, level of objectives, applicable legislation, etc.

Other tasks: Beside the implementation of the main tasks, the Wcycle Institute will also perform tasks in the following project areas:

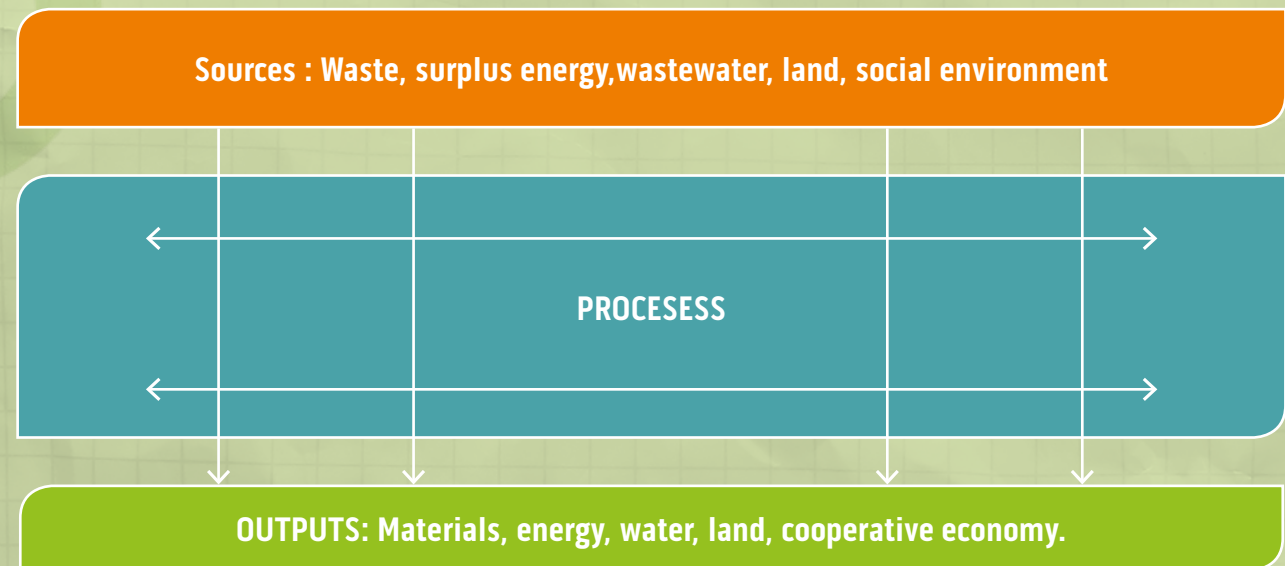
- ▶ Recognition and mapping of waste resources in the city
- ▶ Circular planning and forming resource management policies
- ▶ City agenda for the circular economy
- ▶ Establishment of a resource management center in the functional area of the city of Maribor
- ▶ Requirements for the use of secondary resources
- ▶ Circular Procurement
- ▶ Sustainable use of land
- ▶ Sustainable food production
- ▶ Circular knowledge management
- ▶ Circular funding
- ▶ Environmental signs and other information for consumers and subscribers

OPTCycle is a specialized company for the implementation of highly professional services, maintenance and, in case of recognizing the justified need of managing the production and technological processes for the needs of the Wcycle project itself, its strategic project areas, subsystems and continuous improvements of performance and efficiency.

2.4. Concept of process development

The concept of developing the processes of implementing the Wcycle project is based on the next approach of the use of waste resources as new materials / products, energy, water, land and services of the cooperative economy:

- ▶ Waste, surplus heat, wastewater, unused land and the state of the social environment should be used as a new source
- ▶ Today, the city is in a position when it has only the costs of generated waste, it does not use surplus heat and wastewater, it has a lot of unused land and an unused state of the social environment
- ▶ Design and implementation of processing processes, re-use and resource development; the design and implementation of waste recovery processes, the utilization of surplus heat and waste water, the utilization of unused and degraded land, and the development of a cooperative economy, offers the city the creation of new revenues, added value, new green jobs and multi-faceted development
- ▶ Use of new materials / products, energy, water, use of land and services of a cooperative economy
- ▶ Use of new materials / products, energy, water, utilization and regeneration of land and the provision of services for the co-operative economy is a source of new revenues and a reduction of own costs



PICTURE 6: SCHEMATIC REVIEW OF THE DEVELOPMENT AND IMPLEMENTATION OF THE PROCESSES
SOURCE: IWM

2.5. Strategic project areas

The implementation of the Wcycle Maribor project is based on the organization and operation of the following strategic project areas as the pillars of circular efficient resource management in the transition of the city of Maribor into circular economy:

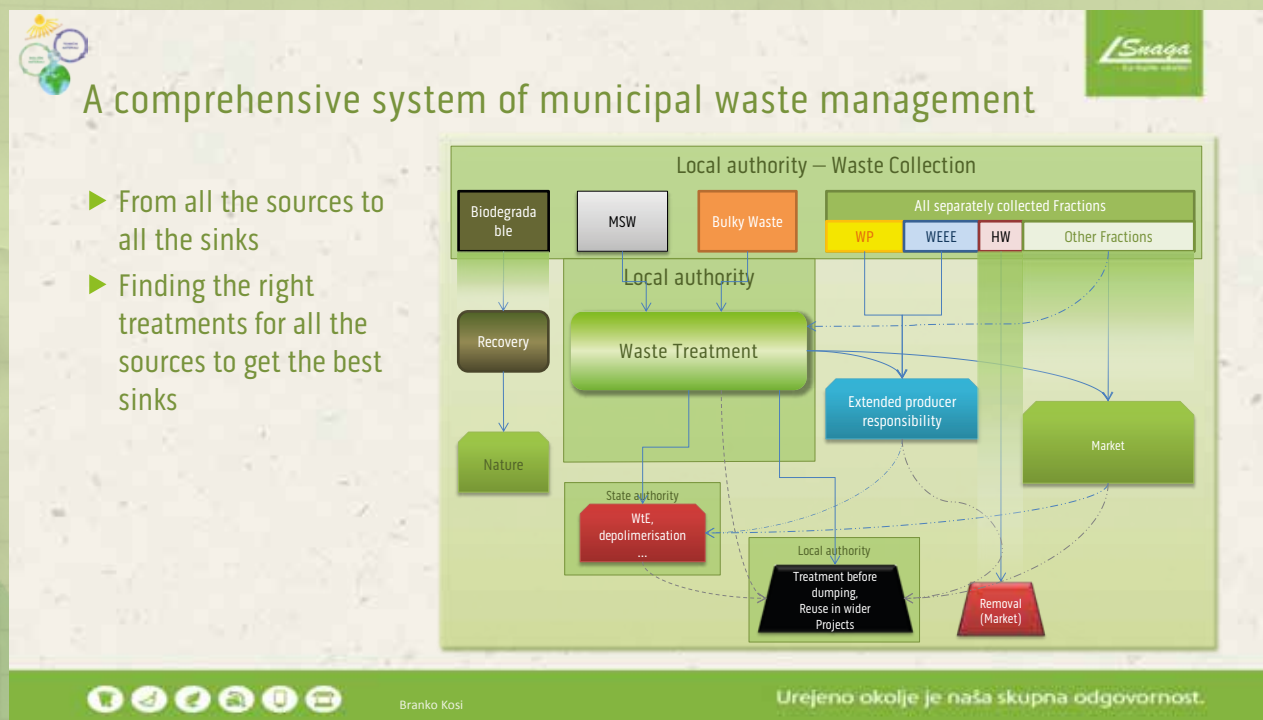
1. Treatment of municipal waste and associated services
2. Use of processed construction and demolition waste and soil in urban construction
3. Managing surplus heat and renewable energy
4. Sustainable mobility - Urban transport and joint service
5. Reuse of recycled water and alternative water resources
6. Sustainable management of land and regeneration of degraded areas
7. Cooperating economy network



2.5.1. Treatment of municipal solid waste and related services

The strategy for developing the management of municipal waste management and related services is based on the following principles:

- ▶ all activities are subordinate to the transition to circular management
- ▶ own comprehensive business system for managing mass flows of municipal waste
- ▶ integration into meaningful links with other public and economic stakeholders with a view to meeting the principles set out in the first and second indent



PICTURE 7: A COMPLETE MANAGEMENT SYSTEM FOR COMMUNAL WASTE
SOURCE: SNAGA MARIBOR

Activities of transition to the circular economy are mainly:

- ▶ ensuring the maximum possible recycling of already generated municipal waste by closing circular loops along the hierarchy in the local, national, regional and European frames
- ▶ encouraging and participating in projects to change consumer habits of people
- ▶ establishment and monitoring of the network for prolonging the usability of products already in use (re-use, storage of useful discarded things, organization of service for repairs and replacement of spare parts, repair shop, etc.)
- ▶ education, raising awareness and integration of all groups of stakeholders (citizens, organizations, administrations, industry, NGOs, etc.)



PICTURE 8: DESIGN OF CIRCULATION OF COMMUNAL WASTE
SOURCE: SNAGA MARIBOR

2.5.2. Use of processed soil and construction and demolition waste in urban building

”New waste products can be marketed”

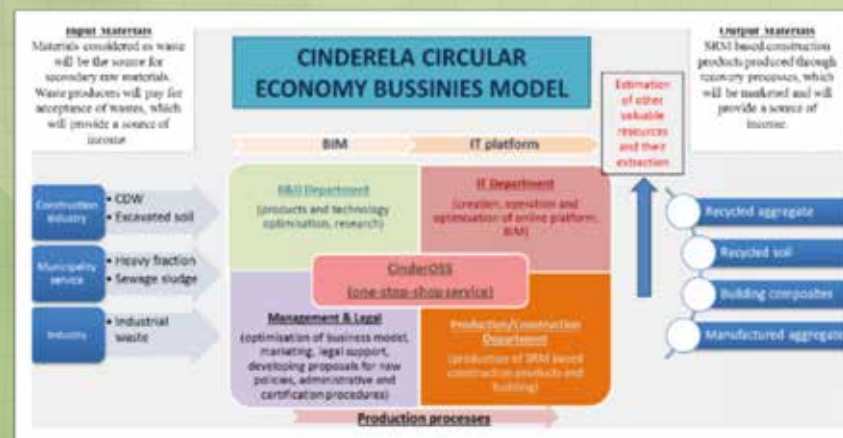
One of the directions of sustainable construction is the treatment of waste as a source of new raw materials. For Europe, which depends on the import of energy and raw materials, this has many advantages: reduced energy demand, natural raw materials and storage space, reduction in greenhouse gas emissions and other negative environmental impacts, and the stimulation of circular economy with green jobs. Construction is the most suitable area for the use of many recovered waste, mainly for two reasons:

- a large amount of materials can be used in this area
- in cases where they are not environmentally inert, potentially dangerous components can be permanently immobilized by various binders or processes

Such a sustainable approach is also required by the EU Construction Products Regulation (CPR), which is a new essential requirement that encourages sustainable use of resources. Materials do not discriminate against their origin, which is considered to be the characteristics and associated usability and environmental footprint of materials, for which the appropriate tool is available - Life Cycle Assessment. Therefore, the construction legislation, generally permits and allows recycling, although

some documents are still missing that could accelerate the use of these raw materials. New waste products can be marketed, for example by the Slovenian Technical Approval or the certification process to an appropriate pre-existing standard.

In this area, the goal is to develop its own systematic eco-innovative approach to new circular business models for sustainable construction in the urban environment. As construction is a major consumer of raw materials, new, more sustainable approaches are needed, which will also be economically more efficient. Such an approach envisages, inter alia, the use of new materials and products, generated by the recycling of construction, industrial and certain waste from utility activities and excavation materials. The cascade use of new raw materials, materials or products for new construction will be important in this field. The organizational goal is also to develop a one-stop model for the provision of services, which will enable users to have a comprehensive overview of the available waste for processing, the products that have already been processed and their characteristics and characteristics according to the user's needs, using appropriate IT technology, platforms and modern planning tools.



PICTURE 9: DEVELOPMENT OF A BUSINESS MODEL FOR CONSTRUCTION AND INDUSTRIAL WASTE MANAGEMENT
SOURCE: NIGRAD MARIBOR

2.5.3. Management of surplus heat and renewable energy



The field of energy is one of the key areas in society, which must provide on the one hand a fundamental basis for living and on the other hand, in a modern society, it is necessary for the convenience of the users. In cities or in urban areas, the energy sector is particularly confronted with environmental challenges, as it has a direct impact on the environment and through it on the quality of living space. An important challenge in this area is the exploitation of the potentials of a circular economy for heating.

In order to achieve the goals of energy circulation in the field of heat supply, efforts to increase the energy efficiency of technologies and the use of renewable sources (RS), in particular in district heating systems (DH), must be intensified by increasing the efficiency of energy use through the renovation of existing buildings. These measures represent the starting point for the urgently needed accelerated development of sustainable heating (and cooling), which is one of the priorities of the European Energy Union.

Technologically suitable DH systems provide cost-effective, environmentally-friendly and reliable energy supply for heating, which include the use of surplus heat, especially in manufacturing processes in industry, and the effective use of RS. Technological, environmental and climatic criteria have already been laid down and in force in different directives (eg. the Energy Efficiency Directive), which need to be achieved through the implementation of properly planned energy plans in cities and local communities. But they need to be upgraded with the philosophy of a circular economy²³.

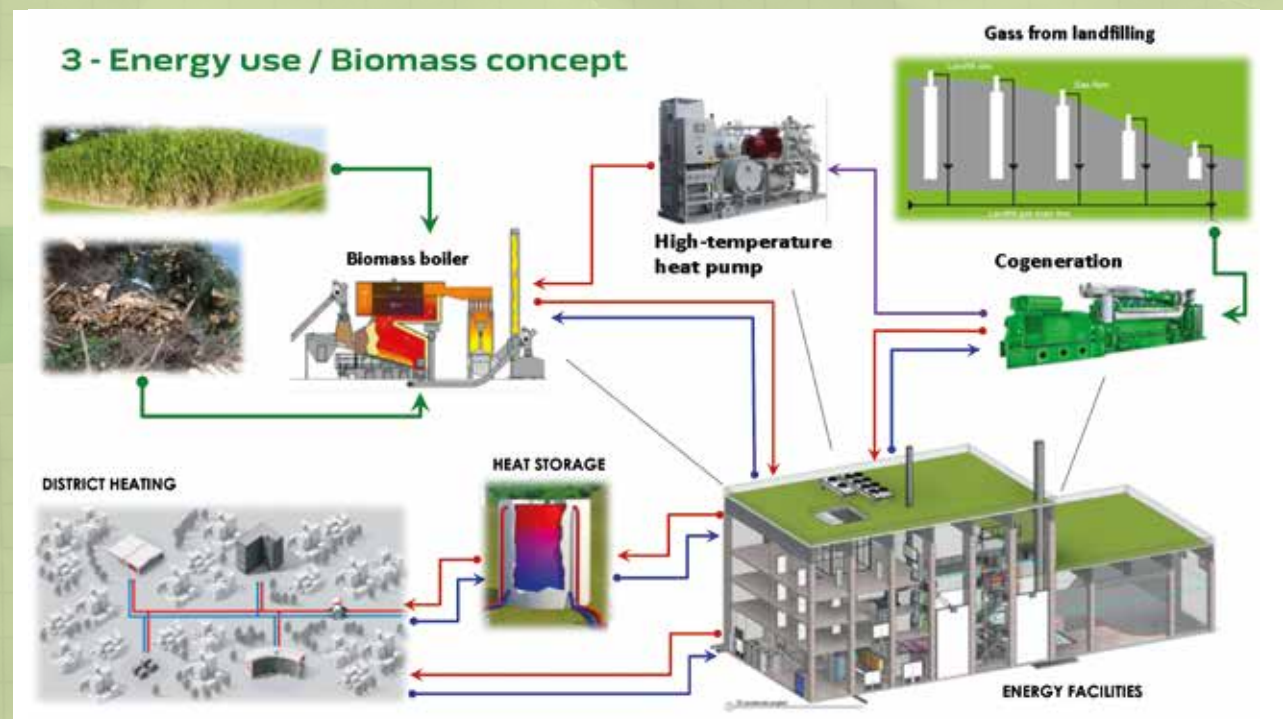
Ensuring sustainable heat supply, which takes into account the importance of energy efficiency (EE), the use of excess heat and,

above all, RS, thus contributing to reducing emissions, costs and energy poverty, requires a sound and well-founded reflection on the role of DH networks, especially from the perspective of modern approaches to connecting to “smart” energy networks of the future and the philosophy of the circular economy. An appropriately documented overview of the state of energy and energy trends in the form of a thermal map, and on this basis, a spatial model of heat consumption, enables planners and authorities better, targeted, project-oriented planning and easier achievement of national and local objectives of EEU, RS and reduction of environmental burdens especially in densely populated (urban) environments.

²³ Direktiva 2012/27/EU Evropskega parlamenta in Sveta z dne 25. oktobra 2012 o energetske učinkovitosti, spremembi direktiv 2009/125/ES in 2010/30/EU ter razveljavitvi direktiv 2004/8/ES in 2006/32/ES

In order to achieve the above objectives, the development of DHs will need to be systematically built on the following starting points:

- ▶ Production and regular renewal of the concept of spatial analysis of the use and production of heat, as a starting point for further development planning (DH)
- ▶ Optimization of energy use for production of heat, electricity and implementation of system services by building heat storage
- ▶ Introduction of available renewable resources: landfill gas from closed landfills, biogas or synthesis gas obtained from the processes of processing (biological) waste, and the energy use of the available biomass (fast growing plants, unpolluted wood biomass such as debris, green trim, ...)
- ▶ Introduction of alternative fuels derived from waste
- ▶ Use of available surplus heat (with condensing technological solutions, heat pumps, geothermal, ...)



PICTURE 10: THE DESIGN OF THE MODEL FOR HEAT GENERATION AND HEAT STORAGE
SOURCE: ENERGETIKA MARIBOR

2.5.4. Sustainable mobility-Urban transport and joint service



The area of mobility is already very well addressed in the Integrated Transport Strategy of the City of Maribor (May 2015) regarding traffic in the MOM. The proposed measures are consistent with the EU calibrations in mobility, in particular with recommendations from the European Strategy for Low-Drop Mobility²⁴, but in the context of the circular economy and its development in the city, this area should be further integrated in the future with other fields, covered by the Strategy. The Slovenian reference basis for sustainable mobility planning is the document Sustainable Mobility for a Successful Future - Guidelines for the Preparation of an Integrated Transport Strategy²⁵.

The planned activities are also consistent with the accepted Roadmap towards the circular economy in Slovenia²⁶, taking into account all of the above mentioned starting points, based on the actual situation in the city at the time of the creation of this document and the anticipated integrated approach to joint action in the field of mobility, as well as other areas of development of the circular economy in Maribor. **The realization of the planned tasks will contribute to improving the quality of air in the city, reducing the carbon footprint of the city and improving the quality of living conditions and living standards for residents of the City of Maribor.**

Priority actions in the field of sustainable mobility in the city are as follows:

- ▶ Establishment of a common service for public transport vehicles and all public-sector companies
- ▶ Implementation of joint purchase of new vehicles, powered by renewable sources, in the public sector for the needs of public transport, and the implementation of other necessary activities of public companies. It is also important to introduce a transition to renewable sources in the private transport sector, such as regarding taxi services, delivery services, etc.
- ▶ Establishment of Park and Ride Systems (P + R) and Park and Bike (P + B) in line with the adopted Sustainable Urban Strategy (February 2016)
- ▶ Planning of the distribution center for the city center (closed for traffic) for local supply, using alternative delivery forms in accordance with the principles of cooperative economy
- ▶ Designing a central urban space for the marketing of locally produced food, accessible by public transport to renewable sources and with a potential common delivery system
- ▶ Establishing a bicycle sharing system and providing additional electric cars that will be accessible on key points in the city
- ▶ Increasing the attractiveness of the use of public transport, including by enabling access to the pedestrian zone and shared use zone (for certain groups of road users), which will arise when renovating public spaces
- ▶ Increasing the attractiveness of using bicycles in traffic in the city by building bicycle tracks and providing an adequate number of stands
- ▶ Continuous raising awareness about individual areas of mobility regarding the sharing of bicycles and cars, as well as the use of renewable sources. Carry out a campaign about coming to school, workplace, etc. on foot / bicycle, and if necessary, develop a system of remuneration for raising awareness of the population Lack of water affects a third of the territory of the EU throughout the year. Although water scarcity is more pronounced in southern Europe, it is becoming increasingly important in other parts of the EU. Excessive water abstraction is one of the main threats to the EU's aquatic environment, not only in arid regions, but also

²⁴ European Commission - Fact Sheet: A European Strategy for low-emission mobility, Bruselj, julij 2016

²⁵ Trajnostna mobilnost za uspešno prihodnost - Smernice za pripravo Celostne prometne strategije, Ministrstvo za infrastrukturo, 2012

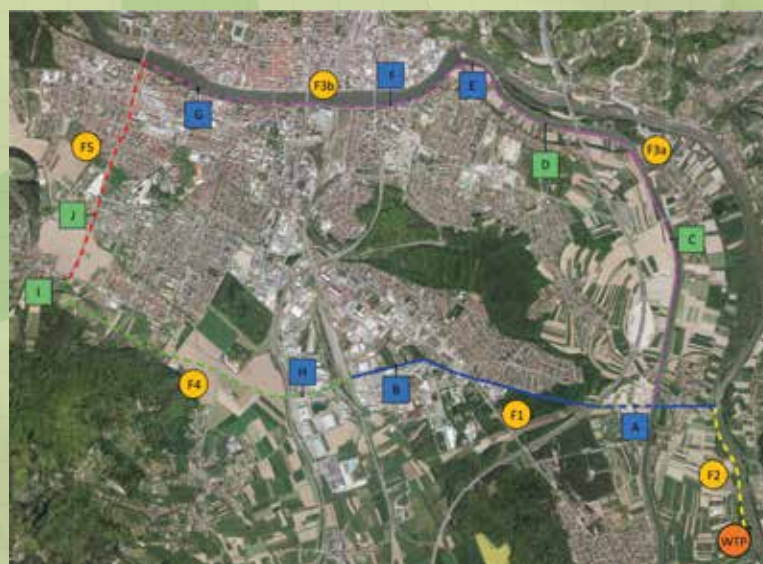
²⁶ Kažipot prehoda v krožno gospodarstvo Slovenije; http://www.vlada.si/fizpostavljene teme/prehod_v_zeleno_gospodarstvo/kažipot

2.5.5. Reuse of recycled water and alternative water resources

”Although water scarcity is more pronounced in southern Europe, it is becoming increasingly important in other parts of the EU”

in parts of Europe with high water levels. In addition, the sewerage networks in many countries are in a rather poor condition and the increasing number of extreme rainfalls, induced by climate change, often causes damage in the urban environment and ground-water pollution²⁷. The expansion of cities makes a major contribution to increasing the consumption of resources, such as, among other things, the consumption of water. This requires the adoption of water-saving measures to a much greater extent than current practices indicate.

Smart water economy and society should manage all available aquatic resources (including water on the surface, underground water, wastewater and purified water) in order to avoid water scarcity and pollution, increase resistance to climate change, manage water related risks appropriately and ensure that all useful substances, which can be obtained from waste water treatment processes or are integrated into water courses, are obtained. Proven water retention measures in urban areas include collecting rainwater (collecting rainwater from roofs, car parks, etc.) that brings many advantages, such as reducing strong rainfall effects and contributes to water conservation. In a circular economy water reuse plays a key role, which brings significant environmental, social and economic benefits. In addition, gray water (ie waste water from bathrooms, laundry and kitchen) that accounts for approximately 50 to 80% of residential waste water, is widely used for irrigation in the urban environment and for domestic purposes (such as eau de toilette), as well as rainwater.



PICTURE 11: DESIGN OF DISTRIBUTION SYSTEM FOR RECYCLED WATER SOURCE: IWM

²⁷ Optimising water reuse in the EU, Final Report – Part I, European Commission, DG Environment, marea 2015, str. 9, 10

This valuable potential is already being exploited by many countries in southern and north-western Europe, while in most parts of the EU the use of water re-use solutions is still limited. Thus, active involvement in effective and repeated use, recycling, reuse of water, acquisition of energy and materials (such as nutrients, minerals, chemicals and metals) from the water, water demand management and efficient allocation of resources, exploitation of alternative water sources, prevention of water pollution, degradation of aquatic environment and soil, the cost-effective and smart management of the water system and infrastructure is needed. Low awareness of potential benefits between stakeholders and the general public, limited institutional capacity to design and institutionalize re-use measures and lack of financial incentives are the main barriers that currently prevent a wider range of these practices²⁸.

Therefore, MOM, together with Mariborski Vodovod, public water supply company, and the Wcycle Institute, focus their funds in order to try to explore the possibilities of implementing the distribution system for the recycled water in the city with a goal to later implementation. As systemic implementation is currently not economically feasible due to the abundance of fresh water, representatives of the abovementioned organizations cooperate with local, national, international and European institutions in the preparation of the necessary documents, which would allow for appropriate incentive measures on the demand side.

The designed distribution system of recycled urban water is based on the idea of maximum reuse (of over 7.0 million m³) of purified and discarded water at the Central Wastewater Treatment Plant in at least 6 existing urban industrial zones, 4 central planned urban depots (urban gardens, urban greenhouses, energy planting zones, snowmaking) and an unspecified number of other potential large hauliers (Magna, ERM Airport, ...).



²⁸ Water resources across Europe — confronting water scarcity and drought, EEA, 2009, str. 9 - 11

2.5.6. Sustainable land management and regeneration of degraded areas

”The land is limited and finally recognized at EU level as an essential natural resource.”

The land is limited and finally recognized at EU level as an essential natural resource. The quality of land in the EU is extremely affected by degradation, resulting in the loss of ecosystem benefits from green areas. In terms of spatial planning, it is precisely local communities' responsibility to care for more efficient land use and at the same time offering promotion of sustainable land use solutions in the sense of revitalizing previously degraded urban areas. Especially in cities, where there is a high concentration of people, the impact of sustainable urban planning on the welfare of people is greatest, as it presents more opportunities for the contact with nature.

Urban environment has a limited space that needs to be used better and multi-purposely: improving biodiversity and providing many ecosystem services with green infrastructure, improving the quality of life, health and well-being of people and protection against negative effects of climate change contributes to the overall improvement of life for the population, preventing or reducing the risk of natural disasters, regenerating cities and increasing the diversity of activities in the local economy, creating innovative, sustainable jobs, innovative business models, management tools, and improving health and well-being of the population²⁹.

The implementation of blue and green infrastructure and natural solutions for urban regeneration (which local authorities need to co-create with the public), give a greater sense of community, contribute to combating social exclusion, reduce the process of adapting certain areas of cities to higher social classes (gentrification) and lower the inequalities within and between cities.

The City of Maribor, of which 12% of the total area represents degraded areas, is therefore oriented towards the policy of sustainable urban model that wants to use its land efficiently, sustainably and restricts the unnecessary spatial expansion of the built city.

Maribor will focus on internal development, which means regeneration and revitalization of degraded land that will be re-used for greening the city and establishing new built-up areas, where appropriate. Such approach requires physical, social, economic regeneration, and often goes hand in hand with natural solutions with simultaneous environmental benefits. As such measures ultimately directly affect the quality of life of the population, the municipality will involve the local environment in the preparation of project solutions for individual areas in order to achieve the best ecological and social results.

²⁹ Urban sprawl in Europe, Joint European Environmental Agency – Swiss Federation Federal Office of the Environment report, 2016

2.5.7. Cooperative economy network

In the city of Maribor, the non-governmental sector is very active in the co-operative economy, which has in recent years established the entire network of co-operative economies, where individual initiatives go into business models and thus contribute significantly to the promotion of sharing of goods and resources. MOM supports non-governmental organizations by facilitating activities in its premises in accordance with legislation on more favorable terms.

For example, a re-use center has been operating in the city for a long time, where the Smetka brand is being developed as a centre for re-use and repair, also Bikelab - a bicycle repair shop is operating in the center of the city, and in the Tkalka facility, which is intended for NGOs and social enterprises, for years there are organized events on the theme of circular and cooperative economy, which contributes to the spread of knowledge and awareness of the need to move to different resource management models. In order to ensure the conditions for developing a bottom-up approach, it is necessary to provide conditions for the functioning of the environment to promote cooperative business models and to provide successful pilot projects with a wider implementation in the urban environment - an urban laboratory, where solutions and models will be tested in the real environment of daily use.

3. SWOT analysis

The presented SWOT analysis of the advantages, opportunities, disadvantages and threats is presented for the presented Strategy:

Advantages	Opportunities
<ul style="list-style-type: none"> ▪ The Wcycle project ▪ Size of the city and region ▪ Visibility of Wcycle project in Slovenia and EU ▪ Strategic research and innovation partnerships for circular economy ▪ Sustainable Urban Strategy adopted ▪ Stakeholder involvement in MOM ▪ Legislation adopted at the EU level ▪ Center for the development of a circular economy in Slovenia and the region ▪ Prepared Roadmap towards circular economy in Slovenia 	<ul style="list-style-type: none"> ▪ Sustainable development projects for the city and the region ▪ Integration of all segments of society ▪ Stakeholder involvement in the region ▪ Regeneration of degraded areas ▪ Reducing environmental pressures on agricultural and green areas ▪ A new approach to city management ▪ A new approach to land management ▪ Increasing the city's competitiveness ▪ Economic exploitation of natural resources, resource management in the region ▪ There is no need for landfill ▪ No need to burn waste
Weaknesses	Dangers
<ul style="list-style-type: none"> ▪ Awareness of the necessary changes ▪ Poor understanding of the local community and decision makers at all levels ▪ Weak commercial financing ▪ Poor cooperation between stakeholders in the city and the region ▪ Late investment in information technology ▪ Lack of enforcement of legislation 	<ul style="list-style-type: none"> ▪ Negative demographic trends ▪ Negative personnel selection, political recruitment ▪ Global economic trends ▪ Unpreparedness of population and economy to changes in business models and procedures ▪ Potential economic unsustainability of individual projects in the short term

4. Conclusion



The Strategy is another proof that the transition from a linear to a circular economy is truly a strategic development priority and opportunity for the city of Maribor, which has thus become the only city in Slovenia as well as in the wider area with this kind of strategic document, also approved in the city council. Although the awareness of the constant increase in population and the limited availability of natural resources is always greater, it is possible to realize, on the basis of this Strategy, of establishment of IWM and on the basis of appointing IWM as a city manager for circular economy, that the city of Maribor is truly aware of the importance of efficient use of resources, preservation of nature and, consequently, the quality of life of its inhabitants.

An innovative approach to the transition from linear to circular economy within the Municipality of Maribor, which is based on the new business and economic model of efficient resource management, is also reflected in this strategic document, which additionally obliges all stakeholders in the city to long-term mutual cooperation and actual implementation of interconnection processes, not only between public companies and city administration, but also on other levels.

With the professional support of IWM, the Strategy provides city decision makers and all others participating in the processes of the city's transition to a circular economy a basis and additional support in the implementation of new, also economically viable projects that will lead to greater material, energy and water self-sufficiency, better land management, to the interlacing development of co-operative economy and last but not least, to a better and more responsible implementation of public and other services for the inhabitants, at a reasonable price.

The successful work on the transition of the City of Maribor to the circular economy, supported by numerous projects won in various European tenders, will undoubtedly continue in the future, taking into account the orientations of this strategic document, so the inhabitants of MOM will feel positive effects of the successfully implemented innovative circular approaches in the city in the very near future.

Therefore, the Strategy makers believe that the Strategy is a central strategic document at the local government level, which serves the city as a support for the implementation of the Wcycle project, and its adoption will at the same time give a clear indication that Maribor is truly among the more innovative circular cities not only Slovenia, but also in Europe.

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