

**Industrial Symbiosis for Regional Sustainable Growth
and a Resource Efficient Circular Economy**



ACTION PLAN

Pannon Novum

March 2019



Pannon Novum
Nyugat-dunántúli
Regionális Innovációs Nonprofit
Korlátolt Felelősségű Társaság

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Pannon Novum West-Transdanubian Regional Innovation Nonprofit Ltd.

Action Plan (West-Transdanubian Region)



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SYMBI Industrial Symbiosis for Regional Sustainable Growth and a Resource Efficient Circular Economy

The “Industrial Symbiosis for Regional Sustainable Growth and a Resource Efficient Circular Economy – SYMBI” project aims to improve the provisions and support the implementation of policy instruments and measures for the diffusion of industrial symbiosis, to add value, reduce production costs, and relieve environmental pressures through increased resource efficiency and greenhouse gas emissions. The overall improvement is anticipated to positively contribute in regional sustainable development and job creation.

Circular economy is an emerging model that keeps resources in the economy as long as possible. Resources can be reused, creating further value while relieving environmental pressures. Resource efficiency, as outlined in the circular economy model, is primarily based on: a) the "cradle to cradle" principle, focusing on eco-design and regenerative modes of consumption, and b) industrial symbiosis, which involves territorial synergies to manage waste and share services, utilities, and by-product resources. The territorial aspect of industrial symbiosis brings regions to the forefront of the transition towards circular economy.

Industrial symbiosis requires policy reforms measures at different levels. EU regions show very different levels of performance on each area relevant to industrial symbiosis, and advance at a different pace towards green growth models. There is thus a need to share and exchange practices, experiences, and knowledge within this fragmented context to: a) lift barriers by following successful examples, b) foster balanced territorial development and reduce disparities, and c) reverse the backwardness of least-favoured regions.

The SYMBI project brings together 9 partners from 7 countries to diffuse industrial symbiosis and align regional policies with the circular economy package of the European Commission (EC). To support the transition towards a resource efficient economy, the project includes a wide range of activities, focusing on promoting the interregional learning process and the exchange of experience among regional authorities.

Project activities include:

- Evaluation and analysis of existing regional and national policies on industrial symbiosis and circular economy.
- Mapping the investment potential of participating regions in industrial symbiosis.
- Identification of good practices and benchmarking of eco-systems of by-product and energy exchanges.

- Prescribing green public procurement as an enabler of industrial symbiosis.
- Promoting public dialogue and consultation process to build consensus and ensure the successful implementation of regional action plans, through the support and participation of key regional stakeholders.
- Fostering interregional learning and capacity building through workshops, study visits, and policy learning events.
- Joint development of action plans to promote the improvement of the policy instruments addressed by the project.
- Increasing awareness, promoting and disseminating the project results and knowledge beyond the partnership.

Produced by each region, the **action plan** is a document providing details on **how** the lessons learnt from the cooperation will be exploited in order to improve the policy instrument tackled within that region. It specifies the nature of the actions to be implemented, their timeframe, the players involved, the costs (if any) and funding sources (if any). If the same policy instrument is addressed by several partners, only one action plan is required.

Part I – General information

Project:	SYMBI
Partner organisation:	Pannon Novum West-Transdanubian Regional Innovation Nonprofit Ltd.
Other partner organizations involved (if relevant):	Ministry of Innovation and Technology, Department of Priority Public Services, Managing Authority for Regional Development Programmes
Country:	Hungary
NUTS2 region:	West-Transdanubian Region
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Part II – Policy context

- The Action Plan aims to impact:
- Investment for Growth and Jobs programme
 - European Territorial Cooperation programme
 - Other regional development policy instrument

Name of the policy instrument addressed:

Environment and Energy Operational Program (KEHOP) 2014–2020

Basic information about the policy instrument:

The Environmental and Energy Efficiency Operational Programme 20142020 of Hungary (KEHOP) foresees direct interventions to secure the environmental dimension of sustainability, and promote

green growth at national, regional, and local level. KEHOP addresses the resource efficiency and energy goals of the 5 national development priorities of the Partnership Agreement.

The name of the policy instruments named in the Environmental and Energy Efficiency Operational Program (KEHOP)2014-2020 in the Letter of Support from the relevant organization responsible for policy, by the Managing Authority were:

- Priority axis 3. Waste management and environmental remediation related developments
- Priority axis 5. Improve energy efficiency and the use of renewable energy sources

The SYMBI project is addressed the followings priorities: Priority axis 3: Waste management and environmental remediation related developments, Specific objective 1: Development of waste separation and collection systems. KEHOP foresees the following relevant measures: Development of waste management infrastructure to pretreat, recycle, & reuse different waste streams (electrical & electronic, metal, plastic, glass, biodegradable and nonhazardous construction & demolition waste), including the production of alternative fuels from waste. Support the emergence of scale economies on the exploitation of waste. The main reason for improvement of the policy instrument is that it does not adequately address the role and importance of regional and local businesses & SMEs in developing a modern waste management system that will treat waste as a resource.

Therefore, whilst industrial symbiosis can significantly contribute into achieving the goals of KEHOP, its measures do not emphasize on this aspect, nor the EC's forthcoming policy transition to a circular economy. The Hungarian Operational Programme main specific topics are the waste, resource and energy efficiency as the main parameters of the competitiveness of the economy and very important to focus on priority axis 5. Improve energy efficiency and the use of renewable energy sources as well.

The Managing Authority of the Environmental and Energy Efficiency Operational Program (KEHOP) 2014-2020 has been supported by the Ministry of National Development, but after the governmental structural changes in Hungary in 2018 by the Ministry of Innovation and Technology, the Department of Priority Public Services.

Overall two actions have been taken into account in the Environmental and Energy Efficiency Operational Program 2014-2020 (KEHOP). The Action I. connected to the funding sources are Priority Axis 3: Waste management and environmental remediation related developments KEHOP 3.1.2. Biological degradable waste management and Priority Axis 5: Promoting Energy Efficiency and the Use of Renewable Energy Sources, KEHOP 5.2.7 Modernization on the energy efficiency special elements of the buildings. The Action II. connected to Priority Axis 1: Adaptation to climate change impacts KEHOP 1.2.0. Local Climate Strategy Development.

INTRODUCTION

(Please put a short introduction including the regional context of the Action Plan)

West Transdanubian Region (WT) is a developed and industrialized region at Hungary's Western border. WT is specialized in automotive and machinery industries that are characterized by larger than the national average weight of FDI. Regional innovation performance is weaker than the national average, but industry-university collaboration is intensive.

Main basic data:

- Territory – 11 328.0 km
- Population– 983 933 thousand (2016)
- GDP per capita (PPS per inhabitant; % of the EU28 average, NUTS2): EUR 21 500; 75% (2015)
- Total R&D expenditure (GERD, NUTS2, % of GDP): 0.66 (2014)
- Unemployment rate (NUTS2, %): 2.7 (2016)

WT's industrial production per capita is the highest in Hungary: double of the national average. The industry is most specialized in is automotive. Consequently, the 2008-2010 crisis hit West Transdanubia particularly hard: the number of jobs decreased by nearly 7%. Since then, growth resumed and employment increased. The unemployment rate is much lower than the national average (6,8 % in 2016), only 2,7%.

Among the Hungarian convergence regions WT features the most spectacular development in terms of innovation performance, albeit starting from a low basis in the mid-2000s. WT used to rank last among Hungarian regions in terms of all major innovation indicators. Its meagre innovation performance, especially in the light of a relatively good economic performance, used to be referred to as WT's innovation paradox: innovation performance was much inferior to what the region's relatively good economic performance would suggest. Indicators represent WT's weaknesses in regard of innovation performance. These are especially: public-private co-publications (this is very low in WT); European Patent Office (EPO) patent applications; marketing or organizational innovations; trademark applications; international scientific co-publications; most-cited scientific publications; R&D expenditures public sector; and R&D expenditures business sector.

The West-transdanuban region Regional Innovation Strategy (RIS3) sets the main regional innovation priorities reacting to current problems and challenges:

- Creation of the missing institutions that form a well-functioning regional innovation system;
- Improvement of regional economic actors' innovation performance;
- Support to high value adding knowledge-based activities.

The identified key specialization sectors are the following:

- Machine industry, car industry, electro mechanics, Forestry and wood industry, Health, Thermal tourism, Logistics, ICT sector and Agriculture

The main EU policy objective is to create conditions for the development of a resource efficient economy by removing the constraints, hindering private sector investments in the field of circular economy and industrial symbiosis. The abovementioned policy initiatives address a number of needs and challenges that range from legislation, infrastructure, business models and funding to consumer awareness, and are related to the establishment of a favourable environment for businesses' involvement in industrial symbiosis schemes.

Hungary contributes to the implementation of the EU 2020 Strategy aiming at intelligent, sustainable and inclusive growth in the form set out in the Partnership Agreement. The key objective is to advance economic growth built on sustainable, high value added production and extension of employment. To this end, programmes serving not directly economic development objectives must be possibly also planned to enable them to directly contribute to advancing growth. The resolution adopted at the 2005 UN General Assembly, confirming the 2000 Millennium Declaration, identified three closely interrelated and interdependent dimensions of sustainable development: economic, social and environmental.

1. OBJECTIVES OF THE ACTION PLAN

(Please describe the objectives of the, eg. main objective vs. specific objectives)

According to the EU policies the Action Plan main objectives are in compliance with issues of the national objective list. The interventions of Environment and Energy Efficiency Operational Programme (KEHOP) primarily and directly serve strengthening of the environmental dimension of sustainability, yet, indirectly contribute to advancing economic growth as well. KEHOP policies and priorities are very close to the industrial symbiosis, secondary raw material regulations and circular economy goals.

- Determine the legal framework on by-products and waste materials reuse, aiming to help SMEs comply with their environmental obligations.
- Decreasing administrative burdens stemming from EU waste legislation (e.g. reporting obligations) to improve the business environment for small establishments and undertakings in the field of industrial symbiosis.
- Providing financial incentives for resource efficiency projects through the use of market-based instruments and the establishment of public–private partnerships.
- Strengthening the single market for waste and recycling to maximize the reuse of materials, and the development of new business models.
- Promoting cross-sectoral initiatives to improve resource-efficient business interaction across value chains.

The special goals of the Action Plan are to

- promote networking and between the Universities and the industry transfer new knowledges
- encourage by the action plan the policy makers in Hungary to apply this concept into the possible policy instruments
- stimulate the county governments and other relevant institutions to build up the circular economy models in the county level climate protection strategies
- raise awareness among SMEs about the concept of circular economy and the benefits of industrial symbiosis schemes

2. REGIONAL ANALYSIS OF THE CURRENT SITUATION

a) Key intermediate actors in the promotion of industrial symbiosis and circular economy in the region (please include actors from the Quadruple Helix* concept if possible)

- Government, Ministry of Innovation and Technology, Department of Priority Public Services, National Research and Innovation Office, County Municipalities
- Research institutions and universities, Regional Innovation Agencies, University of Sopron Simonyi Károly Faculty of Engineering Wood Sciences and Applied Arts
- Industry and companies
- Civil society and public institutions

**The Quadruple Helix concept (industry-academia-government-citizens) is preferred due to the fact that industrial symbiosis and circular economy are involving different spheres of actors, each contributing according to its function.*

b) Main barriers that hinder industrial symbiosis or circular economy development

Barrier 1: There is no regulation supporting circular economy and industrial symbiosis In Hungary within the period 201-2020.

- The regional political level was eliminated in Hungary and in local level at the moment no regulation in field of industrial symbiosis and circular economy
- There is no national regulatory frame and policy tool also in national level
- Lack of good practices as a sample in field of industrial symbiosis;
- Slow progression ahead of the implementation in the circular economy regulation within the governmental ministries and interdepartmental agencies;
- Lack of tax regulations and information awareness to help the companies in field of industrial symbiosis.

Barrier 2: Lack of secondary raw material market in Hungary, missing wide range waste management cooperation:

- Lack of knowledge about the use of secondary raw materials in working processes;
- Lack of interest among companies for closer collaboration;
- Lack of knowledge for companies about market, trends and potentials in field of waste and secondary raw materials;
- There is no platform collected data on waste and by-products which can be useful for all industrial territory.
- There is no relevant interest for the green public procurement processes;

Barrier 3: There is nocooperation among institutions and governmental bodies in circular economy and industrial symbiosis.

- o Lack of circular economy industrial park, innovation centers, and comprehensive industrial symbiosis zones;
- o Low investments in field of the industrial symbiosis.
- o Lack of specific financial incentives to promote the circular economy
- o Despite the innovative ideas there is a low cooperation between the universities, research institution and governmental county level and governmental level bodies

3. IDENTIFICATION OF BEST PRACTICES IN THE IMPLEMENTATION OF INDUSTRIAL SYMBIOSIS AND CIRCULAR ECONOMY PROMOTING ACTIVITIES:

- a) **Identification of good practices from SYMBI project with the highest potential to be transferred to the project partner territory:**

Case studies related to barrier 1:

- o Case study of waste treatment in Western Macedonia, study visit in Kozani (Greece)
- o National regulatory frame, study visit in Campobasso (Italy);
- o Case of region Andalusia, study visit in Seville (Spain)
- o Case study of the Fortum Riihimäki especially the recycling of plastics (Finland)
- o Case study of MASPEX S.A Tymbark the segment of food products (Poland)
- o Case study of bark board of University of Sopron Simonyi Károly Faculty of Engineering Wood Sciences and Applied Arts (Hungary)

Case studies' relevance mainly focus on the waste to energy or waste reuse or recycling, furthermore also in food production, in the processed vegetables segment and in bio waste reutilization and circular economy sector. These activities related to the Environment and Energy Efficiency Operational Programme Priority axis 3., in waste management topic, especially in field of bio waste.

Case studies related to barrier 2:

- Case study of olive pomace refinery, study visit in Seville (Spain)
- Case study of the Uusioaines Oy company in field of Glass recycling (Finland)
- Case study Loimi-Hämeen Jätehuolto Oy, study visit in Hameenlina (Finland)
- Case study of Zala County Municipality in field of Climate protection strategy (Hungary)
- ECO Park Hotel circular economy model (Slovenia)
- Case study of MOL and Pannon University on tire waste chemically stabilized rubber bitumen (Hungary)

Many case studies' aspects focus on not only the circular economy sector, but especially for the climate change aspects also. These activities can be very important examples, how we could integrate the circular economy components in the Climate Strategies. The County Climate Strategy Programs are the part of the Environmental and Energy-Efficiency Operational Programme 2014-2020., as a Priority 1. topic, so one of the main challenge how we can support the climate protection by the circular economy activities.

Case studies related to barrier 3:

- Industrial park Denmark, collection good practices, activity 1.3 of SYMBI (Finland)
- Case study of waste treatment in Western Macedonia, study visit in Kozani (Greece)
- Case study of the Fortum Riihimäki especially the recycling of plastics (Finland)
- Case study AquafilSLO; study visit in Ljubljana (Slovenia);
- Case study of Zalavíz Zrt. on sludge and waste water management, activity 1.3 of SYMBI (Hungary)

Case studies' mainly focus on the waste management and energy efficiency topics, so these have a relevance to promote the circular economy process and innovation for the start-up companies in their waste management and energy efficiency activities. The National Research, Development and Innovation Fund could support these actions such as priorities with support also the circular economy.

b) Other referent promoting activities and good practices identified outside the region (optional):

4. IDENTIFICATION OF ACTIONS TO BE IMPLEMENTED

Hungary contributes to the implementation of the EU 2020 Strategy aiming at intelligent, sustainable and inclusive growth in the form set out in the Partnership Agreement. The key objective is to advance economic growth built on sustainable, high value added production and extension of employment. To this end, programmes serving not directly economic development objectives must be possibly also planned to enable them to directly contribute to advancing growth. The resolution adopted at the 2005 UN General Assembly, confirming the 2000 Millennium Declaration, identified three closely interrelated and interdependent dimensions of sustainable development: economic, social and environmental.

The interventions of Environment and Energy Efficiency Operational Programme (KEHOP) primarily and directly serve strengthening of the environmental dimension of sustainability, yet, indirectly contribute to advancing economic growth as well. KEHOP policies and priorities are very close to the industrial symbiosis, secondary raw material regulations and circular economy goals.

The agreement with EU identifies the five national development priorities whose joint implementation makes it possible to achieve the overall development goal. Of them KEHOP primarily and directly contributes to enhancement of energy and resources efficiency. The KEHOP strategy was developed by fully taking into account the country specific recommendations for Hungary, for 2014 and 2015, approved by the European Council on 8 July 2014, of which the encouragement of improvement of energy efficiency is also a specific objective of the KEHOP.

5. ACTIONS

5.1. Action 1: Supporting the separation of the bio industrial waste materials for utilization and innovation in the energy efficiency system

A. The Background

(Please describe the lessons learnt from the project that constitute the basis for the development of the present Action Plan.)

Pannon Novum participated in policy workshops in Kozani, Greece in June 2019. The focus of the workshop was three thematic areas, EU policies and initiatives about Public-private Partnerships; the PPPs in the context of circular economy; and sustainable use of resources and Barriers and challenges related to PPPs. The indicative topics were discussed in international presentations, and roundtable discussion or interactive exercises, where participants talk it through the specific topics or issues raised during the presentation. We have learned the following topics in the policy workshop from the other partners:

Greek partner: Public-Private Partnerships in Greece, District heating system of Kozani, Integrated Waste Management System of Western Macedonia. Finnish partner: Public-Private Partnerships in Finnish Water Services. Slovenian partner: Integral Green Economy of Local Community of Municipality of Sentrupert.

The Riihimäki&Häme University of Applied Sciences, HAMK, Hämeenlinna, the SYMBI project partner, hosted a two-day study visit on 18-21 September 2018 within the activity Study visits "SHARING PRACTICES ON WASTE TO ENERGY SYSTEMS IN CIRCULAR ECONOMY". The aim of the study visit was to discuss the waste recovery, separation and processing systems with the context of boosting the circular economy and promoting the waste to energy. Important part of the event was the field visits in Circular Economy Park/Village of Fortum Ltd., Forssa Eco Industrial park:, Envor Group Oy, Loimi-Hämeen Jätehuolto Oy, Uusioaines Oy, and the FRUSH conference event in this topic.

In the **Policy workshop to Kozani, Western Macedonia, Greece** cases know about the interregional good examples of the green project implementation in the field of circular economy and sustainability. The European Commission has adopted an ambitious new Circular Economy Package to help European businesses and consumers to make the transition to a stronger and more circular economy where resources are used in a more sustainable way. The proposed actions will contribute to "closing the loop" of product lifecycles through greater recycling and re-use, and bring benefits for both the environment and the economy. In the policy workshop the representatives introduced the implementation of infrastructure of the Integrated Waste Management System of Western Macedonia and the district heating system of Kozani

In Hungary the waste materials industrial sector there were some transformations in the public services sector last years. Following the valid public service laws the **Zalai Public Services Non-profit Ltd.**,

Zala County, Hungary took over public service activities from the ancient public company. The new, non-profit company carries out complete communal waste collection public services in Zalaegerszeg and 64 neighbouring settlements, provides selective collection systems for our customers; for example collection islands and collection in sacks from households. The main activity of the company is managing waste in a way that is least harmful to the environment. They carry out waste management public services, communal and selective waste collection and selective and organic waste collection at houses. It is very important to separate the bio waste materials from the other, because these materials can be used a lot of renewable and energy efficiency territory.

In the Finland one of the most interesting program was the **Study visit to Circular Economy Park of Fortum Ltd. Riihimäki**. In June 2016, Fortum set up a Circular Economy Village in Riihimäki, Finland. The Village is a refinery complex developed by Ekokem, which Fortum acquired in 2016. In the village, municipal waste is processed through the Eco Refinery - an automated sorting plant, the Plastic Refinery - the first in Finland to produce recycled plastic, and the Bio Refinery, which produces biogas and is owned by the company's partner Gasum. The concept of the Circular Economy Village is unique, both nationally and internationally.

Once fully operational, the **Eco Refinery of the Circular Economy Village** will annually receive around 100.000 tons of municipal waste, from which the refinery will separate bio waste (about 30% of the waste), plastic (4%), metal (3%) and recovered fuel suitable for industrial use (50%). The remaining amount is rejected, which is not suitable for recovery. The bio waste will be turned into biogas and fertilisers, and the plastic and metal into recycled raw material for industry use. The reject will be used to generate electricity and district heat in the waste-to-energy plants in Riihimäki.

In the **University of Sopron Simonyi Károly Faculty of Engineering Wood Sciences and Applied Arts, Sopron, Hungary** a very interesting research team work started on the tree bark waste raw materials. The exploration of alternative fuels is increasingly necessary. The burning of bark has been presented as a source of energy. Its energetic utilization is mostly influenced by the fact that the ash content of the bark is much higher than that of wood. Real possibilities are hidden in European forests, and the energetic utilization of wood will grow in the coming years demonstrated that the average heating value of 10 tons of totally dried bark is equal to the heating value of 7 tons coal. The heating value of the bark per kilogram is similar to the wood.

The heat and sound insulating properties is very good, and its mechanical properties met requirements. In the **Sopron University, in Hungary** is still in process the investigation of thermal insulation panels made of black locust tree bark by the researchers. The use of bark as thermal insulation board is still in its infancy. It is unclear how the lumbering difficulties, quality differences, and difficult handling could be tolerated. Because bark usually has a lower fiber content than wood, its solidity is lower as well, but in Scandinavia, it still meets standards. Some trees have a relatively high resin and wax content that is advantageous because no glue is necessary when clamping boards together; it is enough to press at high temperatures. The utilization of large amounts of bark is coming from the timber harvesting process poorly.

During the study visit in Krakow we made an interesting visit to the MASPEX S.A. in their packaging and composting plant. Maspex's mission is to offer food products that are highly valued by consumers. The company is not only in Poland but also in many nearby countries the leader in juice, nectars and soft drinks. Also a leading manufacturer of instant products (cappuccino, cocoa, coffee, cream, instant tea)

for vitamins and dietary supplements, as well as various sauces (jams, ketchups and sauces). In addition, it is a leader in the Polish pasta market and in the ready-to-eat and processed vegetables segment.

The activities carried out by MASPEX S.A. are related to the Environment and Energy Efficiency Operational Programme Priority axis 3.

B. Action

(Please list and describe the activities to be implemented within this action. Please include* the information if this action impacts on the programme or on a specific projects founded within the programme)

*only for ERDF instruments

The most important policies in the Environment and Energy Efficiency Operational Programme are the Priority Axis 3: Waste management and environmental remediation related developments and Priority Axis 5: Promoting Energy Efficiency and the Use of Renewable Energy Sources

The responsible use of natural resources and the enforcement of the aspects of sustainability are of outstanding importance. Therefore, the primary aim is to support developments that are linked to the establishment of local, decentralised small- and medium-sized generation units adapting to the local resources and demands in a better way and the generation of energy with higher efficiency.

Supporting the separation of the bio industrial waste materials for utilization and innovation in the renewable energy and energy efficiency system (in connection with the initial policy instrument, KEHOP 3. and 5.). This action supporting the cooperation between R&D institution, universities and the innovative small and medium sized enterprises in field of industrial waste management utilization, mainly in field of renewable energy and energy efficiency, to use different wastes for this purpose.

- Continuously discussion with the governmental Ministry of Innovation and Technology, Department of Priority Public Services with the aim to take into consideration the priorities the separation and utilization of the bio waste materials, supporting the innovation and research action to utilize new materials and help the renewable energy and energy efficiency activities
- Coordination the University of Sopron Simonyi Károly Faculty of Engineering Wood Sciences and Applied Arts research activities in field of bark industrial wooden waste and the industrial utilization at the possible participant companies.
- Following the funding opportunities for circular economy and industrial symbiosis projects
- Current trends and policies and regulatory measures in county and country level
- Cooperation in the policy instruments in support of private sector investments in circular economy sector with the Managing Authority

C. Players involved

(Please indicate the organisations in the region who are involved in the development and implementation of the action and explain their role.)

The organisations in county, regional and national level, who are involved in the implementation of the action:

- Government, Ministry of Innovation and Technology, Department of Priority Public Services,
- University of Sopron Simonyi Károly Faculty of Engineering Wood Sciences and Applied Arts
- Chamber of Commerce and Industry of Győr-Moson-Sopron County
- Chamber of Commerce and Industry of Vas County
- Central-transdanubian Regional Innovation Agency,

Responsible institution: Pannon Novum West-transdanubian Regional Innovation Nonprofit Ltd.

Number of days, needed to carry out this task: 48 days.

D. Timeframe

(Please indicate the timeframe with particular emphasis on what you will implement within the phase 2 of the SYMBI project.)

4 period, 24 months, permanent task

2nd phase, 01.04.2019 – 31.03.2021

E. Costs

(Please list the costs for implementation – if relevant.)

ERFA budget for all granted projects for the addressed policy instrument priority calls, KEHOP Priority Axis 3.: 150.000 HUF, approx. 468.750 EUR), KEHOP Priority Axis 5.: 300.000 HUF, approx. 937.500 EUR (exchange rate 320 HUF/EUR).

F. Funding sources

(Please list the funding source for the above mentioned costs for implementation – if relevant.)

Addressed policy instrument “Environment and Energy Efficiency Operational Programme for Hungary 2014-2020”

Funding sources are Priority Axis 3: Waste management and environmental remediation related developments KEHOP 3.1.2. Biological degradable waste management,
and Priority Axis 5: Promoting Energy Efficiency and the Use of Renewable Energy Sources, KEHOP 5.2.7 Modernization on the energy efficiency special elements of the buildings.

5.2. Action 2: Integration the circular economy components in the Zala County Climate Strategy Program

A. The Background

(Please describe the lessons learnt from the project that constitute the basis for the development of the present Action Plan.)

The 3rd policy workshop of the SYMBI project was hosted by the Chamber of Commerce of Molise Region, in March 2018 in Campobasso, Italy with the participation of all the project partners. The 4th policy workshop was hosted by the **Ministry of Environment and Spatial Planning, General Direction for Environmental Prevention and Quality, in Sevilla, Spain**, on 19-20th June 2018, in Centro Andaluz de Arte Contemporáneo (Monasterio de la Cartuja) with the participation of all the project partners. The policy workshop was organised in two days and in situ at Olive pomace refinery, Puente Genil (Córdoba) with two different topics, 1. Political and Financial instruments to launch IS and CE projects and 2. Industrial Symbiosis Projects.

The field visit to industrial symbiosis **in Eco-industrial Park, in Forssa region, Finland** consists of three main symbioses between ten companies showed in the figure below. Two of the symbioses are bio-based symbioses, which are based on material exchange. The symbiosis generates secondary materials such as big feed, fertilizers, biogas and biofuels from waste and by-products. The majority of the biogas is used as energy for the manufacturing process of glass wool insulation at a local construction company. The third symbiosis is based on the utilization of biogas in the area. The importance of the symbiosis is significant regionally as it reduces the need for exported materials such as soybean for big feed of fossil fuels for energy and fuel. Forssa region is one of the main regions in Häme, where the Finnish SYMBI partners are also located.

Loimi-Hämeen Jätehuolto Oy, in Finland operates with municipal solid waste (MSW) from its 16 owner municipalities in Southwest Finland. The company's office and Kiimassuo waste center locates in the city of Forssa and they also have another waste center in Säkylä and seven smaller waste stations around the area total of 130 000 inhabitants. Loimi-Hämeen Jätehuolto Oy is the was presented in a bus tour around the site. During the tour, a representative of the company explained the recycling processes and future schemes of the company.

The company **Uusioaines Ltd. in the Forssa area** has specialized in recycling of glass since 1995 collects and recycles packaging glass and float glass. On the packaging glass side, the major suppliers are PalpaLasi Oy Ltd, drinks' companies and waste management companies. Suppliers of float glass

(windows and windscreens) include glass sellers, cutters, downstream operators and construction companies. The glass is crushed, cleaned and sorted according to colour. The collectable glass is refined for reuse as raw materials, in other words as cullet and delivered for industrial use. Uusioaines Oy also makes foam glass, which is an insulating product and low-capillarity lightweight-fill, manufactured from cleaned recycled glass. The capacity of the glass treatment plant is sufficient to meet the needs for the whole of Finland parentcompany to LHI Group, which consist of four companies providing business-to-business services in comprehensive waste management.

The Development of Climate Strategy in **Zala County in Zalaegerszeg, Hungary** was a very important activity in last year. The reconciliation version of the Climate Strategy of Zala County was prepared in the framework of the project "Developing the methodology and capacity development related to the development of the Zala County Climate Strategy" which will be part of socializing with the comments and suggestions of the Climate-friendly Settlements Alliance.

One of the decisive challenges of the future, like other parts of Hungary, will be climate change in Zala County. The increase in the frequency, length and intensity of summer heat waves, the annual precipitation distribution, which is becoming more extreme for droughts and rainforests, is a clear symptom of climate change, which needs to be intensified As a result of the increase in extreme weather events, the population of Zala County, its natural, near-natural habitats, its flora and fauna, and its built environment face many challenges in the coming decades. The climate strategy identifies targets and measures based on detailed situational mapping for each of the identified problem areas, whose common feature is to support timely preparation in the form designed for expected changes.

The climate strategy of Zala County, besides encouraging direct awareness-raising activities aimed at the population target group, also places great emphasis on addressing the staff of close, day-to-day institutions, based on the conviction that personal exemplification and direct addressing lead most to achievement. The fight against climate change and the same degree of adjustment are common to all Zala County residents, institutions, businesses and non-governmental organizations. One of the keys to successful implementation of the climate strategy is the interplay between these actors, the establishment and successful operation of long-term partnerships.

The strategy defines the climate protection vision of Zala County, which builds upon the capabilities and the development concepts laid down in the existing plans and programs that have already defined the steps taken by the County for sustainable development and climate protection. Accordingly, the climate strategy puts the Green way into Zala's climate-friendly solutions as a slogan for the future of the climate strategy, according to which Zala County becomes a successful implementer of coordinated, climate-friendly and planned tourism, forestry, agriculture, water management and settlement management programs and projects.

In case of a successful implementation of the county climate strategy, which includes 42 measures under the target of a total of 15 mitigation, adaptation and awareness-raising targets, Zala County will

by 2050 invest in sustainable climate protection investments in tourism, forestry, agriculture and green areas. the renewable energy and energy efficiency improvements of the settlements effectively reduce its emissions. Thanks to its adaptive development, it protects its natural resources, natural and built environment, vulnerable areas and settlements, and excellent tourist facilities. Its institutions, businesses and its population are utilizing new climate-friendly solutions and actively engage and contribute to climate-friendly solutions and good example.

B. Action

(Please list and describe the activities to be implemented within this action. Please include* the information if this action impacts on the programme or on a specific projects founded within the programme)

*only for ERDF instruments

Integration the circular economy components and the innovation element in the Zala County Climate Strategy (targeted in the same Operative Programme, KEHOP, but in the policy instruments Priority 1.). Zala County is more influential, than a triggered territory and caused less for climate change. In the fields of energy, building management, transport, agriculture and waste management has been taken a lot of climate protection activity, caused local and short term additional benefits, but independently needed to integrate a long term and wide range circular economy aspects in the local climate strategy program.

Action performances:

- Continuously discussion with the Zala County Municipality and the KEHOP Managing Authority body in connection to build up the circular economy aspect into the strategy goals.
- Supporting the innovation and research action in field of the circular economy, renewable energy and energy efficiency.
- Coordination the different sectors and participant who are involved in the strategy development process.
- Encourage regional waste transformation systems and promote the regional secondary raw materials market.
- Support the investments by the financial actors in county level in field of circular economy.
- Help the ecosystems of the industrial innovation management activities in field of circular economy.
- Promote green public procurement possibilities in local level.

C. Players involved

(Please indicate the organisations in the region who are involved in the development and implementation of the action and explain their role.)

The organisations in county, regional and national level, who are involved in the implementation of the action:

- Government, Ministry of Innovation and Technology, Department of Priority Public Services,
- Chamber of Commerce and Industry of Vas County, Szombathely
- Vas County Municipality, Szombathely
- Zala County Municipality, Zalaegerszeg
- ÖKO - INNOVA Association, Nagykanizsa

Responsible institution: Pannon Novum West-transdanubian Regional Innovation Nonprofit Ltd.

Number of days, needed to carry out this task: 48 days.

D. Timeframe

(Please indicate the timeframe with particular emphasis on what you will implement within the phase 2 of the SYMBI project.)

4 period, 24 months, permanent task

2nd phase, 01.04.2019 – 31.03.2021

E. Costs

(Please list the costs for implementation – if relevant.)

ERFA budget for all granted projects for the addressed policy instrument priority calls, KEHOP Priority Axis 1.: 300.000 HUF 937.500 EUR (exchange rate 320 HUF/EUR). The addressed policy instrument can be influenced only in county level.

F. Funding sources

(Please list the funding source for the above mentioned costs for implementation – if relevant.)

Addressed policy instrument “Environment and Energy Efficiency Operational Programme for Hungary 2014-2020”

This action expected will finance from the next KEHOP sources, where the first versions of the Climate strategies was developed earlier.

Funding sources are Priority Axis 1: Adaptation to climate change impacts KEHOP 1.2.0. Local Climate Strategy Development.

5.3. Action 3: Promoting the circular economy process and innovation for the Start-up companies in waste management and energy efficiency

A. The Background

(Please describe the lessons learnt from the project that constitute the basis for the development of the present Action Plan.)

In the **Policy workshop to Kozani, Western Macedonia, Greece**, in June 2017 partners and stakeholders got to know with the public-private partnership solutions on the case of regional waste treatment company. The basis for forging such partnership was the study that contained the elements of industrial symbiosis. Within PPP the municipality provided public service (waste collection), while private companies took care of waste treatment and their processing to be used as secondary raw materials for further use. This experience shows that PPP could be an efficient model to solve waste management issue and includes the industrial symbiosis activities. It could help to implement in industrial park or innovation center and incubator house, furthermore in circular economy zone systems, which can help the innovation activities in this field and in the industrial symbiosis.

The **Government Office for Development and European Cohesion Policy of the Republic of Slovenia**, the SYMBI project partner, hosted a two-day study visit on 21 and 22 November 2017 within the activity 3.4. The aim of the study visit was to discuss the waste recovery, separation and processing systems with the context of boosting the circular economy and promoting the industrial symbiosis. Important part of the event was the field visits in Aquapark Atlantis and paper company VIPAP Videm Krško.

Pannon Novum also participated in the **Study visit University of Applied Sciences, HAMK, Hämeenlinna, Finland**, the SYMBI project partner, hosted a two-day study visit on 18-21 September 2018 within the activity Study visits "Sharing practices on waste to energy systems". The aim of the study visit was to discuss the waste recovery, separation and processing systems with the context of boosting the circular economy and promoting the waste to energy. Important part of the event was the field visits in Circular Economy Park/Village of Fortum Ltd., Forssa Eco Industrial park, Envor Group Oy, Loimi-Hämeen Jätehuolto Oy, Uusioaines Oy, and the FRUSH conference event in this topic.

In the Finland one of the most interesting program was the Study visit to **Circular Economy Park of Fortum Ltd. Riihimäki**. In June 2016, Fortum set up a Circular Economy Village in Riihimäki, Finland. The Village is a refinery complex developed by Ekokem, which Fortum acquired in 2016. In the village, municipal waste is processed through the Eco Refinery - an automated sorting plant, the Plastic Refinery

- the first in Finland to produce recycled plastic, and the Bio Refinery, which produces biogas and is owned by the company's partner Gasum. The concept of the Circular Economy Village is unique, both nationally and internationally.

One of the important parts of the Park was the construction engineering laboratory, the **Sheet Metal Centre of HAMK**. Sheet Metal Centre and the construction laboratory has research and development projects that aim at improving the competitiveness of Finnish sheet metal products and manufacturing. The centre is the oldest research unit of Häme University of Applied Sciences (founded in 1998). The centre has Finland's first near zero-energy hall for retail space and commercial premises. The hall is being used for research, development and teaching purposes by the university, Ruukki Construction and HAMK's Sheet Metal Centre. The purpose of the construction project was to show that a hall exceeding today's strict energy-efficiency requirements by 30 percent can be built for profit.

A practical case that has been analyzed in Slovenia was the symbiosis between **AquafilSlo company and Aquapark Atlantis, in study visit in November 2017 Ljubljana, Slovenia**, that set up a symbiosis to share the heating. The decisive factor to make such symbiosis was the geographical proximity, while the big stake was played a proactive role of the local administration. Besides good practices that have been identified within SYMBI project, there are other projects with similar goals going on in Slovenia.

The measure supports in Hungary in the continued management of separately collected waste, the development of the necessary selection plants, as well as the establishment of complex waste management centers realizing the combination of selection and biological and mechanical treatment the main topics could be the prevention: „Recycling centers”; Home and community composting; Raising public awareness. It is needed the development of the collection: increasing transport capacity for the separate and mixed collection of waste; collection boxes and vehicle and the collection points; furthermore establishment of waste yards.

Increasing the preparation prior to recycling: The sorting of waste collected; Other pre-treatment activity; Utilization of bio-waste in material. According to the studied examples there is also possibilities in Hungary to investigate the coherent portfolio of competitive calls, which can be developed by the National Research, Development and Innovation Office, to facilitate the purpose-oriented and value-creating use of RDI funds coming from European sources and the National Research, Development and Innovation Fund. The coordinated calls of the portfolio support scientific research projects, corporate development and the realization of innovative ideas in a well-balanced manner. The NRDI Fund Programme Strategy for the year 2017, scheduling calls with a total budget over HUF 90 billion (EUR 295 million) has been endorsed by the Government decree.

The timing and the budget of European-financed non-refundable and refundable RDI schemes under the EDIOP (GINOP) and CCHOP (VEKOP) programmes have been approved by the Government within the Annual Development Framework Programme, upon the proposal of the NRDI Office. The amendment of certain Government Decrees related to development policy due to the Government being restructured,

the 2nd priorities of the EDIOP/GINOP and CCHOP/VEKOP (i.e. research, technology development and innovation) operational programmes are commanded to the political responsibility of the Ministry of Innovation and Technology (MIT) instead of the National Research, Development and Innovation Office as from 16 June 2018. National Research, Development and Innovation Fund made up of the innovation tax paid by enterprises.

B. Action

(Please list and describe the activities to be implemented within this action. Please include* the information if this action impacts on the programme or on a specific projects founded within the programme)

*only for ERDF instruments

Promoting the circular economy process and the innovation for the Start-up companies in waste management and energy efficiency (at the same Ministry and the Managing Authority, Ministry of Innovation and Technology, connection with a new policy instrument, NKFIH Program). This action is promoting the small start-up innovative companies to increase their innovation capacity, integrate circular economy and industrial symbiosis elements in their activities and the identification of potential customers which more appreciate this scheme in this field.

- Continuously discussion with the governmental Ministry of Innovation and Technology, National Research, Development and Innovation Office with the aim to take into consideration such requirements to set up circular economy zones that will contribute to improve the waste and energy better utilization in the industrial zones, with the also help of start-up companies.
- Support to pilot projects to set up start-up companies in industrial park or innovation center and incubator house, on field of circular economy or industrial symbiosis within (potentially additional) agreements on local development
- In cooperation Soós Ernő Water Technology Research and Development Centre, Municipality of Nagykanizsa Asset Management Plc. and Nagykanizsa Innovation Centre and Incubator House to the possibility to move certain areas from functional degraded list to such, where potential national and foreign investors can take new and so called brownfield investments for the circular economy and industrial symbiosis possible activities in these areas.

C. Players involved

(Please indicate the organisations in the region, who are involved in the development and implementation of the action and explain their role.)

The organisations in county, regional and national level, who are involved in the implementation of the action:

- Government, Ministry of Innovation and Technology, National Research, Development and Innovation Office,
- University of Pannonia Nagykanizsa Campus
- SoósErnő Water Technology Research and Development Center, Nagykanizsa
- Municipality of Nagykanizsa Asset Management Plc.
- Nagykanizsa Innovation Center and Incubator House

Responsible institution: Pannon Novum West-transdanubian Regional Innovation Nonprofit Ltd.

Number of days, needed to carry out this task: 48 days.

D. Timeframe

(Please indicate the timeframe with particular emphasis on what you will implement within the phase 2 of the SYMBI project.)

4 period, 24 months, permanent task

2nd phase, 01.04.2019 – 31.03.2021

E. Costs

(Please list the costs for implementation – if relevant.)

For all granted projects for the addressed policy instrument priority calls, NKFIH frame Marketable product, service development on RDI demand by SMEs or start-ups, Support: 10-150 million HUF, approx. 31.250 – 450.000 EUR (exchange rate 320 HUF/EUR). maximum support rate 60%.

F. Funding sources

(Please list the funding source for the above mentioned costs for implementation – if relevant.)

Ministry of Innovation and Technology, National Research, Development and Innovation Office, connection with a new policy instrument, (NKFI Found Program)

6. MONITORING OF ACTION

Please describe the self-defined performance indicator of each action.

Action 1			(Name of the action)			
Self-defined performance indicator			Semester 7 (IV 2019 – IX 2019)	Semester 8 (X 2019 – III 2020)	Semester 9 (IV 2020 – IX 2020)	Semester 10 (IX 2020 – III 2021)
1	Supporting the separation of the bio industrial waste materials for utilization and innovation in the energy efficiency system	Achieved (so far)				
		Target				
2	Integration the circular economy components in the Zala County Climate Strategy Program	Achieved (so far)				
		Target				
n	Promoting the circular economy process and innovation for the Start-up companies in waste management and energy efficiency	Achieved (so far)				
		Target				

- additional skype tele conference and personal consultancy two times per periods with Ministry of Innovation and Technology, Department of Priority Public Services in semester 7-10.
- half annual report of implementation activities and status
- monitoring meeting first half of 2020 in semester 8 and 9
- any problems occurred and potential other measures to be taken
- update of indicator figures, very brief status of implementation
- stakeholder meeting in semester 8 and 9

Signature

Date: 31 March 2019

Signature: _____

Stamp of the organisation (if available):