

Circular Economy Approaches in Solid Waste Management in Croatia (CERCLE)
Reimbursable Advisory Services Agreement (RAS) P173141



A study tour for representatives of the Circular Economy Committee on
Approaches to Circular Economy

Ljubljana, Slovenia, 2-3 June 2022

Summary Report



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Acknowledgments

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Front cover photo: Study tour group visiting reuse center PKV in Vrhnika, one of the Slovenian circular economy success stories where private and public interest successfully merged.

Group and Slovenian hosts from left: Sonja Polonijo, Sameer Akbar, Sanja Radović, Jasmina Karba, Tatjana Orhini-Valjavec, Nela Palarić, Dijana Mandić, Zdenka Kocmur, Bernarda Rozman, Marcela Kušević-Vukšić, Lucija Širić, Vladimir Kalinski, Andreja Martonja Hitrec, Tomaž Kačar.

Fun fact – most of participants are holding a white bag with black handles – those presents given by the reuse center, are made of re-purposed airbags and seat-belts.

1. Introduction

The aim of the study tour was for members of the Croatian Circular Economy Committee (CEC) to engage with stakeholders from Slovenia and to learn from good practices of national and local governments, exemplary facilities, and circular business experiences.

2. Day 1

In the center of Ljubljana, capital of Slovenia, Hotel Park, which is in the chain of the sustainable hotels of Slovenia, was the place where Croatian delegation started its journey of getting familiarized with Slovenia successful story in taking bold steps towards improving national circularity. Our hosts, **Ms. Marjana Dermelj**, Government office for Development and European Cohesion Policy, and, **Ms. Tatjana Orhini-Valjavec** and **Ms. Jasmina Karba**, from the Ministry of Environment and Physical Planning, after exchange of greetings, provided us with a helicopter view of the key strategic documents that were prepared to help Slovenia improve national circularity.

The highest representative of the Croatian stakeholders, **Ms. Sanja Radović**, Ministry of Economy and Sustainable Development, thanks the hosts and provide an overview of the state where Croatia is today in circularity development, what legislative steps it has taken and where are the biggest barriers. As expected, while legislation keeps up with introduction of EU legislative package on Circular Economy, there is much less progress in implementation. This is especially tangible in the solid waste management area but also in industrial processes. Transition from linear to circular is slow and sometimes erratic.

Slovenian presented their key legislative push towards circularity:

- The Slovenian **Development Strategy 2030** has circular economy as the base for planned future development, and it has connected its goals to those of the Sustainable Development goals (SDGs). This has helped synergy in achieving of both objectives.
- **Smart Specialization Strategy** (being now updated) has circular economy as one of focal areas / clusters aiming to support society in transition from linear into green and circular economy.
- **National Energy Climate Plan 2030**
- **Long Term Climate Strategy 2050**
- **Slovenian Industrial Strategy 2021-2030** combines green + smart + creative into processes design to help transition without losing competitiveness.
- **National Environmental Protection Plan 2021-2030**
- **Operational Programme for Waste Management and Waste Prevention** (link to Strategy for Reducing Food Waste and Residue Kitchen Waste)

Slovenian legislative journey was followed by an interactive discussion on several key issues. For example, so called landfill tax has been a sensitive subject in Croatia for over a decade. Although practiced in most EU member states, it is not applied in Croatia yet, although being widely advocated by many, especially “green” groups. In Slovenia landfill tax exists since early 2000’s. When introduced it was a kept very low (ca. 9 EUR per ton) and affordable to the users, but it has increased with each passing year and thus giving a chance to users to adapt. After 2004, landfill tax in Slovenia rose sharply, up to 130 EUR per ton making many to reconsider the practice of landfilling. However, landfill tax alone, a “stick”, is not the solution, and it can create more problems by increased wild landfilling. Landfill tax should be followed by a range

of options for users, including marketplace for waste, recycle centers, reuse centers, repurposing, end of waste status, and etc.

Also, Slovenian partners emphasized the necessity to use available EU funds in the transition period - something that they have done very well. As such, industry/companies can work on greening their operations through several funding instruments or use instruments of advice on how to transition and then ask for funding. There are also R&D funds available for companies.

Day 1 of the study tour has finished with visit to the **Reuse Center VRHNIKA** (in the town with the same name) near Ljubljana. The main host was **Mr. Tomaž Kačar**, Director of Municipal Enterprise Vrhnika ([Komunalno Podjetje Vrhnika – KPV](#)) and his associates. Although there was no separate collection in Slovenia until 2001, the town of Vrhnika has long ago opted for [Zero Waste strategy](#).¹ How did this small area go from landfilling everything to recycling most of its municipal solid waste (MSW) in 20 years? Without the tradition of recycling, this area of 18,000 inhabitants has leapfrogged the recycling rates, reached 76% separate collection of MSW and is aiming to reach 82% until 2025. Despite a national strategy focusing on incineration as a replacement for the country's addiction to landfill, and national separate collection rate of 42%, movements resisting the construction of incinerators have flourished and support for a Zero Waste solution has grown. In 1994 the town's landfill facilities were reaching their limits. Costs were rising rapidly to reflect this decreased capacity and the local authorities were searching for new solutions. Separate waste collection was the solution, even if no one in Slovenia was thinking about it and there were not even any national targets for separate collection yet. After 2004 landfill fees in Slovenia rose sharply, since 2006 the cost to Vrhnika of landfilling residuals has more than halved thanks to the increase in separate collection. Initially, activities focused on the separate collection of recyclable waste (glass, paper and cardboard, plastic and metal packaging), residual waste, organic waste, hazardous and bulky waste and construction & demolition waste. Recyclable municipal waste was collected from so-called 'eco-islands' on the streets, where residents could take glass, paper and cardboard and other packaging. Residual and organic waste was collected door-to-door. In 2002 KPV started a campaign called KOKO in which residents were encouraged to bring separately collected recyclables directly to a collection center, where the waste is weighed, and residents are rewarded with points that result in a reduction of their monthly waste collection bill. This *pay-as-you-throw* scheme was the first of its kind in Slovenia and now brings in around 30 tonnes a year of waste without the need for collection services. Specially equipped trucks stop in designated locations throughout the municipality to receive the separately collected hazardous waste. Overall, the number of people participating in hazardous waste campaigns has increased while the collected weight has decreased. Residual waste has also been reduced over the years, from 201 kg/capita of residual waste in 2004, concerted action has managed to reduce this amount to 80 kg/capita in 2013. KPV has based its activities around a coordinated awareness- raising campaign, starting with Vrhnika's youngest citizens – school children. They considered this the starting point for any change in citizen behavior and attitudes. Schools were provided with bins and discounted waste collection fees for sorting their waste at source. Given the savings this system represents, all schools and nurseries in Vrhnika now operate a source-separation of waste system. The company also provides educational lectures aimed at 5 different age groups, from nursery school age to university students. Building on this success, KPV moved to work with businesses. It developed special business contracts for waste management, including consultations on how to achieve savings through separation- at-source.

¹ Text has helped from source: A. Van Vliet, 2019, Case study no. 3 Vrhnika, Zero Waste Europe 2018

Businesses responded positively – some even asked KPV to help them manage their waste flows and organize on-site separate collection. From there, KPV went on to work with businesses outside the municipality with an ISO standard requiring separate waste collection. The awareness-raising campaigns in Vrhnika have been successful in encouraging residents to think and talk about waste issues and the results achieved in the municipality. The positive atmosphere this awareness has created has driven the municipality’s good results and is having a real multiplier effect beyond the district.

Besides, separate collection achievements, Vrhnika center has two workshops where waste is repurposed or reused and sold. Two stores, one at the company grounds and one in the center of Vrhnika on very attractive business location, thus sell re-used, re-purposed, checked, and serviced goods at attractive prices and manage to create profit. The stores are an excellent idea for popularization of zero waste strategy as well as reuse of materials.



Figure 2 Vrhnika reuse center workshop for technicians.



Figure 1 Self-energy run bicycle blender.



Figure 3 KPV Director, Tomaž Kačar, discusses Vrhnika success story.

3. Day 2

Day 2 of study tour was dedicated to series of invited speakers who presented selected case studies relevant for circularity development.

Deep Demonstration Slovenia was presented by **Jasmina Karba**, Ministry of Environment and Spatial Planning and **Marjana Dermelj**, Government Office for Development and European Cohesion Policy. Deep Demonstration and its systemic approach is aimed to achieve the goal of becoming fully circular by activating a coordinated portfolio of innovation actions that will tackle production and waste flows across key economic systems and selected value chains, establishing the foundations for a sustainable future and providing knowledge transfer to empower the next generation of environmental leaders. Deep Demonstrations are led by EIT Climate-KIC. EIT Climate-KIC is the biggest European public-private partnership addressing climate change through innovation, with the objective of building a decarbonized economy. Deep Demonstrations are currently performed in several different countries across eight categories, including circular and regenerative economy category. The Deep Demonstration in Slovenia applies a cross-sectoral and cross-disciplinary approach to work across boundaries, silos and departments, establishing partnerships with a sizable number of stakeholders, from local communities and businesses to science institutions and policy makers, and placing a key emphasis on establishing an open platform of knowledge transfer for all. Deep Demonstration is about creating a living laboratory to foster innovation, and test and learn from actions in real time. The process ensures continuous learning and iteration through practice and feedback loops, which is crucial for achieving the desired changes to transform the whole system. The implementation of the Deep Demonstration in Slovenia will take place from 2021 to 2025.



Figure 4 Jasmina Karba, Ministry of Environment and Spatial Planning (right) and Marjana Dermelj, Government Office for Development and European Cohesion Policy (left) try to answer how large-scale transformations across value chains can push a country to higher level of circularity – as part of the Deep Demonstration initiatives.

The Strategic Research and Innovation Partnership – Networks for the transition into circular economy

(SRIP – Circular economy) was presented by Ms. **Nina Meglič**. SRIP – Circular economy is a connection of Slovenian business subjects, educational and research institutions (RRI), non-governmental organizations and other interested parties, in collaboration with the state, into new value chains according to the economic principles of closed material flows. SRIP – Circular economy goals include (i) long-term public-private partnership; (ii) improvement of the material efficiency index / productivity; (iii) establishment of new value chains with closed material flows; and (iv) development of new business models. By meeting the set goals, all the members of the SRIP – Circular economy contribute to the fulfilment of the goals of the Slovenian Smart Specialization Strategy (S4), i.e., to boost Slovenia’s competitiveness in global markets by increasing the added value per employee, the share of knowledge-intensive and high-tech exports in total exports, and overall entrepreneurial activity. The vision of the SRIP is for Circular economy to sustainably increase the efficiency and competitiveness of the domestic economy in the transition into circular economy. The long-term objective of the SRIP is the recognition of Slovenia as a circular economy hub that will set the reference standard for top professionals and foreign investors through its knowledge, R&D infrastructure, breakthrough technologies and services, as well as its regulatory support environment.

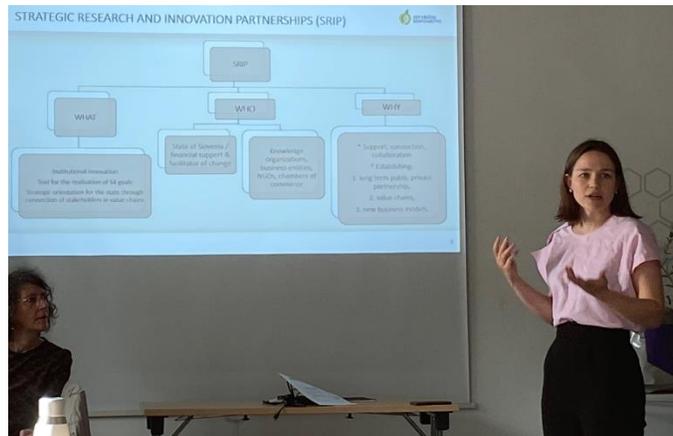


Figure 5 Ms. Nina Meglič presents SRIP - Circular economy, which is an essential part of the Strategic Research and Innovation Partnership network.

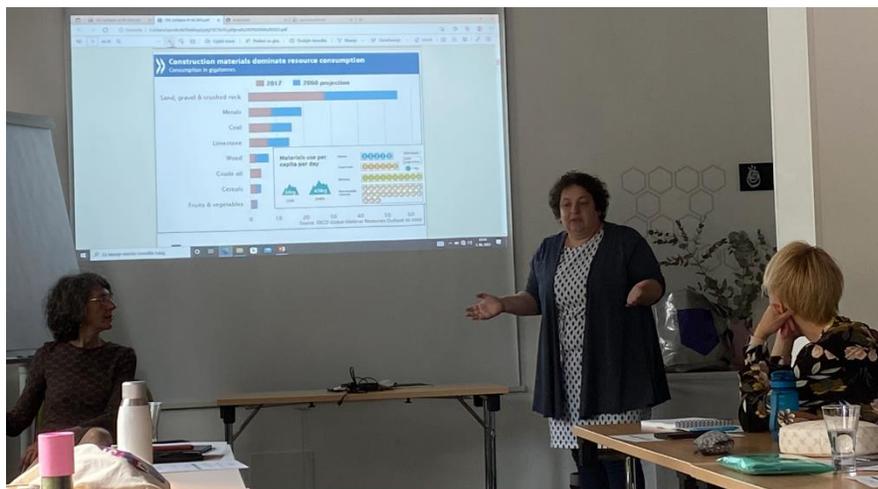


Figure 6 Alenka Mauko Pranjic, PhD, from the Slovenian National Building and Civil Engineering Institute talks about CINDERELA project and its component on construction and demolition waste (CDW).

Case presentation 1: **CINDERELLA** (Construction and demolition waste (CDW) circularity in Slovenia) was presented by **Alenka Mauko Pranjic**, from the Slovenian National Building and Civil Engineering Institute. The CINDERELA project aims to use construction and demolition waste (CDW) potential as a secondary raw material (SRM) by developing and demonstrating a new business model

(CinderCEBM) to assist companies in setting up successful circular economy business cases based on *waste-to-resource* opportunities. The business model will be accompanied by a *one-stop-shop* (CinderOSS)

service offering all that companies need to know for manufacturing and application of SRM-based construction materials in buildings and civil engineering works.

Case presentation 2: **BioApp: Plastic free lifestyle** project was presented

by **Uroš Novak**, from the Chemical Institute. The main objective of the project was to establish a new technology platform to accelerate the development of pilot technologies in the field of advanced biopolymers. Global aquaculture and shellfish production currently produces over 10 million tonnes of biomass per year, generating a considerable amount of waste in the form of shells and exoskeletons. These abundant yet under-utilized renewable biomasses have enormous potential for the production of advanced materials (biopolymers), and fall within the scope of the Key Enabling Technologies and the key areas of the Smart Specialization Strategies identified by the “New Materials, Green Chemistry and Health” program. Numerous research institutes and companies are actively involved in various biopolymer product development stages; however, the synergies and technology transfer dynamics between them are still insufficient. To overcome these obstacles, the BioApp project developed a **new supra-regional technology platform** and combined the complementary knowledge and skills of partners, with a vision to promote solutions, development and applicability of commercially interesting highly innovative biopolymers and biomaterials. Mr. Novak used the opportunity to showcase some of the products and materials developed of biopolymer as alternative for plastics which stirred a lot of interest among the study group.



Figure 7 Uroš Novak, PhD, from the Chemical Institute presents new biopolymer material based on shells and exoskeletons – to replace plastic wherever possible.

Case presentation 3: **Saša Muminović**, Director of **Aquafil**, presented a second chance for plastics – new plastic-based product based on **ECONYL Regeneration System** – new material made of recycled plastics, especially focused on nylon based fishing equipment as a source. Aquafil core business is production of ECONYL® regenerated nylon made of nylon waste. Econyl can be produced as yarn for production of flooring material or as textile thread for



Figure 8 Saša Muminović, PhD, Director of Aquafil, offers second chance for plastic and cleaner oceans. Plastic and nylon-based abundant fishing gear has been recycled into new endlessly recyclable material ECONYL, which can be used as yarn or other forms a material for many purposes, from apparel to specialized gear.

production of water and sport apparels. The range of possible products is endless as it can be used for variety of purposes. It can be recycled endlessly.

Case presentation 4: Presentation about **Food waste: [Life IP Care4Climate](#)** project was given by Ms. **Lara Habič**, Ministry of Environment and Spatial Planning. LIFE IP CARE4CLIMATE is an integrated project that, through awareness-raising, education and training of key stakeholders, will encourage the implementation of measures to help Slovenia meet its greenhouse gas emission reduction targets by 2020 and 2030. The project covers six areas that contribute greatly to the causes of, or the mitigation of climate change. Food waste is one of the six areas. The food waste part of the project has two ambitious objectives: obtaining data on the amount of food waste in Slovenia, and on the basis of which various awareness-raising campaigns will be conducted resulting in reduction of food waste amounts in Slovenia by 30% by the end of the project.



Figure 9 Ms. Lara Habič, Ministry of Environment and Spatial Planning speaks about LIFE IP CARE4CLIMATE project and food waste.

Each presentation session was followed by engaging discussion highlighting similarities of problems among two countries, but also differences in approaches and awareness levels.

The last session of the study tour was a visit to showroom and store of [Donar](#), a company owned and founded by Mr. **Matej Feguš**. Donar is building its image and philosophy on socially responsible and sustainable design. It uses recycled materials to build products (furniture, office supplies, bags, etc.) whose design will make them easily recyclable or repairable. Donar believes that one of the important points of circular awareness is to educate each customer of what he/she is buying and how product can be used with minimum impact on the environment and what to do with it once it has come to end of its life. Sustainable products should have socially responsible price, but it does not mean they need to be overpriced. Donar believes that good design should be functional and affordable to all people.



Figure 10 Visiting **Donar** showroom. Good design should be functional and affordable to all people. Matej Feguš on the left leaning on his tranquility chair made of recycled material and equipped with state-of-art sound equipment for complete relaxation experience. Office and leisure chairs to the right photo and bags far right, all made of recycled material with famous contemporary designers' signature.

4. Concluding Remarks

The study tour provided a good opportunity for representatives of the Croatian Circular Economy Committee to learn about the government and private sector led circularity initiatives in Slovenia. It also helped them make contacts with stakeholders who could potentially be collaborators or coaches for Croatian initiatives on circularity. The government's efforts at maximizing the use of EU funds towards CE stood out in sharp contrast to Croatia and offered a possible clue to why and how Slovenia has raced ahead on circularity. Other reasons include the enabling national framework for CE and ongoing support being provided by the government. However, it also was evident that circularity can make business sense and provide good returns on investments for the public and private sectors. The important role of communications, coordination, and collaboration across stakeholders was also one the key take away's from the study visit.

5. Annexes:

Annex 1: Study Tour Program

Annex 2: List of Participants

5.1. Annex 1

Program

Study Tour of the Croatian Circular Economy Committee to Slovenia 2-3 June 2022

DAY 1 - Thursday, 2 June 2022

AGENDA			
TIME	EVENT	LOCATION	SPEAKERS
14.00 – 14.20	Welcome address by Slovenian ministry Short address by the WB and address from the CEC		Marjana Dermelj, Government Office for Development and European Cohesion Policy
14.20 – 14.40	Helicopter view of the key strategic documents	Hotel Park	Marjana Dermelj, Government Office for Development and European Cohesion Policy
14.40 – 14.50	A short overview of key issues and challenges related to the transition to a circular economy in Croatia – with particular focus on solid waste management		CEC
14.50 – 15.45	Interactive discussion on the key challenges towards the transition to circularity Key success factors, key challenges Similarities and differences of approaches		Moderated discussion
15.45 – 17.30	Visit to the re-use centre VRHNIKA (Re-use centre, waste management)	Vrhnika (20' min drive)	

DAY 2 - Friday, 3 June 2022

AGENDA			
TIME	EVENT	LOCATION	SPEAKERS
8.30 – 8.40	Introduction to the day with coffee		World Bank
8.40 – 9.00	Deep Demonstration Slovenia		Jasmina Karba, Ministry of Environment and Spatial Planning Marjana Dermelj, Government Office for



9.00 – 9.20	Strategic research innovation Partnerships on Circular economy	Hotel Park	Development and European Cohesion Policy
9.20 – 9.40	Case presentation 1: Cinderella (Construction and demolition waste (CDW) circularity in Slovenia), possible presentation of Restart Life+ project		Nina Meglič, SRIP Circular Economy Alenka Mauko Pranjč, PhD, Slovenian National Building and Civil Engineering Institute
9.40 – 10.00	Case presentation 2: National Institute of Chemistry: Bioapp: plastic free lifestyle		Uroš Novak PhD, Chemical Institute
10.00 – 10.30	Q&A		
10.30 – 11.10	Break/coffee		
11.10 – 11.30	Case presentation 3: ECONYL Regeneration System		Saša Muminović PhD, director, Aquafil
11.30 – 11.50	Case presentation 4: Food waste: Life Care4Climate		Lara Habič, Ministry of Environment and Spatial Planning
11.50 – 12.10	Q&A		
12.10 – 13.00	Lunch		
13.00 – 13.30	Walk to the location of the site visit		
13.30 – 14.30	Site visit: Donar showroom in Ljubljana	Gospodsvetska 10, Ljubljana	Marjana Dermelj Matej Feguš
14.30	End of program		

5.2. Annex 2: List of Participants

Circular Economy Approaches in Solid Waste Management in Croatia (CERCLE)

Reimbursable Advisory Services Agreement (RAS) P173141

Study Tour: Ljubljana, Slovenia, 2-3 June 2022

Participant list

Stakeholders (Circular Economy Committee members):

No.	Participant Name			Affiliation / Institution
	Ms/Mr	First Name	Last Name	
1	Ms.	Sanja	Radović	Ministry of Economy and Sustainable Development
2	Ms.	Nela	Palarić	Ministry of Economy and Sustainable Development
3	Ms.	Lucija	Širić	Ministry of Economy and Sustainable Development
4	Ms.	Marcela	Kušević-Vukšić	Ministry of Economy and Sustainable Development
5	Ms.	Bernarda	Rožman	Ministry of Economy and Sustainable Development
6	Ms.	Andreja	Martonja Hitrec	Ministry of Agriculture
7	Ms.	Dijana	Mandić	Ministry of Physical Planning, Construction and State Assets
8	Ms.	Sonja	Polonijo	Cities Association
9	Ms.	Zdenka	Kocmur	Croatian Association for Consumers Protection

World Bank:

No.	Participant Name			Affiliation / Institution
	Ms/Mr	First Name	Last Name	
1	Mr.	Sameer	Akbar	World Bank (TTL)
2	Mr.	Vladimir	Kalinski	World Bank (Project Coordinator)