



INVESTMENT FACT SHEET

I3 - Use of Rainwater and Purified Wastewater for producing recycled construction material in Maribor

Version 2

Project index number and acronym	CE1578 CityWaterCircles
Responsible partner (PP name and number)	PP5 - Maribor Water Supply Company (MBVOD)
Linked to pilot action (number and title)	O.I3.1 - Use of Rainwater and Purified Wastewater for producing recycled construction material in Maribor
Project website	https://www.interreg-central.eu/Content.Node/CWC.html
Delivery date	Jan 2020 - March 2022

Description and technical characteristics of the investment

The pilot action demonstrates the usability of purified wastewater and rainwater for the purpose of production of secondary raw materials-based construction products. Rainwater is harvested and stored in a reservoir and used in the production process, whereas purified wastewater is transported from the nearby wastewater treatment plant. Materials produced are used for road maintenance works and for revitalisation of degraded areas by Nigrad, d.o.o., a public company, owned by the Municipality of Maribor and is the concessionaire for public road maintenance. MBVOD showed that purified wastewater combined with harvested rainwater is suitable to be used in the production process.

Two underground storage tanks, each with a capacity of 16 m³, have been installed, one for storing treated wastewater, which is transported from wastewater treatment plant in Dogošë, Maribor, and one for storing rainwater.

A shaft was built in front of the two storage tanks to provide space for hydro-booster station and other equipment (water meters, valves etc.), which provides water for the construction process of SRM based construction products.

The shaft has a built-in hydro booster station with two pumps, both pumps are frequency controlled - control is set to maintain constant pressure in the pressure system. Two probe modules are installed in the energy cabinet for each pump separately. As long as both reservoirs are full, both pumps are running, each approx. 50%. If one of the reservoirs is emptied, associated pump is not running until the water reaches the pre-set level. An additional dose is mounted with two switches for remote switching on and off for each station separately. The energy cabinet contains fuses for each pump separately, fid switch, power switch, two probe modules with six probes included, additional fuse for light in the shaft, manual-automatic switch for each pump separately. Drain cocks for water sampling are installed on the pressure side after each pump. An additional cabinet with pump control is located outside the shaft in a dedicated space. In addition, pumps should be automatically shut down, if they run dry, in order to avoid damage to them.

A supply line (PEHD RC DN90) was installed from hydro-booster station to the connection point next to the concrete plateau, used for production process of SRM based construction products. The only connection point is an above-ground hydrant, which is equipped with a “non-potable water” sign.

The catchment shaft for the collection of rainwater mixed with discharged industrial wastewater from construction was built next to concrete plateau along with drainage around the plateau to collect the excess water used in the production process, along with rainwater - water that would otherwise sink into the ground. A pipeline was built from the catchment area to the storage tanks, where it is being stored for re-use in the production process. In between three sedimentation shafts were built to

eliminate small and large particles and other foreign matter. A filter was also installed to eliminate fine particles. In that way the water is being re-used multiple times.

Wastewater overload and water over-abstraction are one the main problems EU is facing in the future and is already being faced with today in some regions. Industry sector are one of the main users of the drinking water. The pilot action addresses this topic with an integrated circular economic approach, showing that reused water can be used in construction industry and can be used along with other recycled materials, circularly closing the material loop.

The implementation of the pilot action has demonstrated the usability of rainwater and purified wastewater for production of secondary raw material based (SRM) construction production and has therefore achieved the goals set at the start of the project,

FUA Maribor with Municipality of Maribor and surrounding municipalities has gained the experience and know-how in water reuse within the construction industry. Pilot action was presented in various local, national and international events and has therefore reached the dissemination objectives, communicating the results to stakeholders, local authorities and construction industry sector. As the project is transferable, we hope that similar projects can be implemented in the future, especially if EU, national and local measures could make similar projects economically more viable. Similarly, utilities sector could use the purified wastewater and rainwater for road maintenance works.

The implementation of the two demonstration pilots, CWC and Cinderela, is a perfect example of how material flows can be closed into loops. The synergies were evident early on in the preparation phase of the two projects. While Cinderela is using recycled materials as raw material for construction products and water being critical to production, CWC I3 pilot provides the whole process with recycled water. Therefore we have a whole cycle of material reuse. Produced concrete blocks have been tested for hardness with results showing the same or similar characteristics as non-recycled construction materials.

A pilot demonstration facility is currently being built with the produced recycled materials made from the recycled water from CWC I3 pilot as part of the Cinderela project at the CWC/Cinderela pilot site. The facility along with the whole pilot site can be used in the future as a circular economy hub, showcasing the results and synergies of CWC and other connected and similar projects to local, national and international organizations, general public, potential public and private investors. This could provide a springboard for initiatives for similar projects for years to come.

Investment costs (EUR) including a break-down of main cost items

Description of cost	Real amount (based on contract) (EUR)
Pumps	3.176,00
2 underground storage tanks (16 m ³) and filters	5.272,00
Transport of purified wastewater	3.609,60
Land work (preparation work, landwork, concrete laying & unexpected costs)	9.269,02
Shaft	3.850,00
Land works and installation works for rainwater harvesting	3.973,05
Total	29.149,67

Investment location

NUTS 3	Address (Street, house number, postal code, city, country)	GPS coordinates
SI012, Podravska	Ulica Anice Černejeve, 2000 Maribor, Slovenija	46.521305, 15.699967

Duration and process of investment implementation

Start date	End date
January 2020	March 2022

Major milestones of investment implementation

Activity	Start Date	End date
1. FUA-level pilot concept	Jan 2020	Sept 2020
2. Permission to carry out the pilot from the land owner	May 2020	May 2020
3. Bidding - collecting offers for equipment & infrastructure works	June 2020	July 2020
4. Decision on optimal offers	Sept 2020	Sept 2020
5. Orders for equipment & infrastructure works	Oct 2020	Oct 2020
6. Investment preparation package	Sept 2020	Mar 2021
7. Landworks and installation of equipment	Nov 2020	June 2021
8. Intermediate self-evaluation report	Feb 2021	Mar 2021
9. Test run	July 2021	July 2021
10. Additional installation works - drainage, sedimentation tanks, filters - for harvesting rainwater mixed with discharged industrial wastewater from construction	Feb 2022	Mar 2022
11. Monitoring	July 2021	May 2022
12. Results	July 2021	May 2022
13. Reports	September 2020	May 2022

Ownership and durability of the investment (e.g. maintenance, financing)

The owners of the pilot site are the Municipality of Maribor, who are also the owners of public companies (PP-5 MBVOD (Mariborski vodovod) and Nigrad, d.d.). Municipality of Maribor and Nigrad have a lease agreement on the pilot site for the purpose of conducting pilot demonstrations (namely Cinderella Horizon 2020, Circ-01-2016-2017 and City Water Circles pilot projects). Furthermore, Nigrad d.d. have issued a »Permit to carry out the demonstration within the CWC project«, which allows PP-5 MBVOD to conduct pilot demonstration within the CWC project. The permit is valid for an indefinite time, until revoked. MBVOD is the owner of the installed equipment, Nigrad d.d. are the operators of the site.

Operation of the plant is mainly automatic (see technical description) and does not require special training. Operation will be supervised by MBVOD and Nigrad d.d.. Maintenance will be performed by MBVOD and/or/assisted by manufacturers of equipment.

References to related pilot action (output fact sheet) and relevant deliverables (e.g. pilot action report, studies) and web-links.

If applicable, additional documentation, pictures or images to be provided as annex

DELIVERABLES:

D.T2.4.2. - FUA-level pilot concept (Maribor)

D.T2.4.4. - Investment preparation package for pilot action in Maribor

D.T2.6.3. - Intermediate self-evaluation report on the implementation of the pilot action in Maribor

D.T2.7.1. - Final self-evaluation report on pilot implementation in Maribor with upscaling plans

D.T2.4.3. - Report on the mentoring visit to upgrade and fine-tune the pilot concept in Maribor

D.T2.5.3. - Report on the peer-review visit in Maribor

LINKS:

Video about CWC I3 Pilot Action in Maribor:

<https://www.youtube.com/watch?v=Yv9qDQLBEn0>

Video about CWC I3 Pilot Action in Maribor in cooperation with Cinderella Pilot Action:

<https://www.youtube.com/watch?v=k9d9rB0XuTo>

CWC I3 Pilot Action in Maribor website:

<https://www.interreg-central.eu/Content.Node/Secondary-raw-material-from-wastewater-in->

[Maribor.html](#)

PHOTOS:



Figure 1: Underground storage tanks and equipment shaft during construction



Figure 2: Hydro-booster station with two pumps inside the shaft



Figure 3: Concrete blocks made from SRM (secondary raw materials) including recycled water provided through pilot investment

