



REFERENCE PROJECT

Wastewater Treatment Plant Oberengadin

Innovation through Digitalization –
Digital Twin supports Operational Scenarios

2017–2021

 German Water
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ARO | Abwasserreinigung
Oberengadin



KEY DATA

WWTP Oberengadin

PE: 90,000

Maximum intake: 450 l/s

Goal: economic and cost-effective wastewater treatment that meets high ecological standards and legal discharge requirements.

Result: first fully digitally planned wastewater treatment plant in Switzerland:

- Automation virtually simulated and tested.
- Modular design, allowing for expansion and adaptation at any time.

THE INITIAL POSITION

Strongly fluctuating load in a tourist area

Every wastewater treatment plant (WWTP) has its own characteristics, and its operation is shaped by the “wastewater behavior” in the catchment area. Wastewater treatment plants in tourist areas face particular challenges: while in the off-season wastewater with a population equivalent of 10,000 is generated, the wastewater treatment plant has to handle more than ten times that amount over the Christmas period and during the holiday season. This is also the case in Oberengadin, where the Inn meanders idyllically from Samedan to S-chanf. Numerous tributaries and alluvial areas make the river landscape a valuable nature reserve.

IMPLEMENTATION MEASURES

Digital Twins – optimum interaction of all components for integrated wastewater management

The new wastewater treatment plant in Oberengadin replaces the three existing plants in Staz, Sax and Furnatsch. In future, a 16 km long underground sewer will collect the valley’s wastewater and convey it to the new Oberengadin wastewater treatment plant at S-chanf. The Inn will thus remain completely free of wastewater up to this point – a great benefit for water quality and nature conservation. It was the first wastewater treatment plant in Switzerland to be planned completely digitally, and the automation was simulated and tested virtually.

The digital planning facilitated the renovation and conversion work during operation, as the various conversion phases could be planned and coordinated more easily and precisely. In the future, the digital content can also be used for training purposes.

Using VR goggles, the plant manager and employees familiarized themselves with their future workplace and its technology long before its completion. In particular, the coupling of the 3D model with the control technology, the virtual controller and the dynamic simulation for wastewater technology creates new possibilities for optimizing the WWTP's operation, among other things by simulating different operating scenarios such as heavy rainfalls, low wastewater volumes or cold winters. In addition, real data can be imported into the simulation environment and used for optimization.

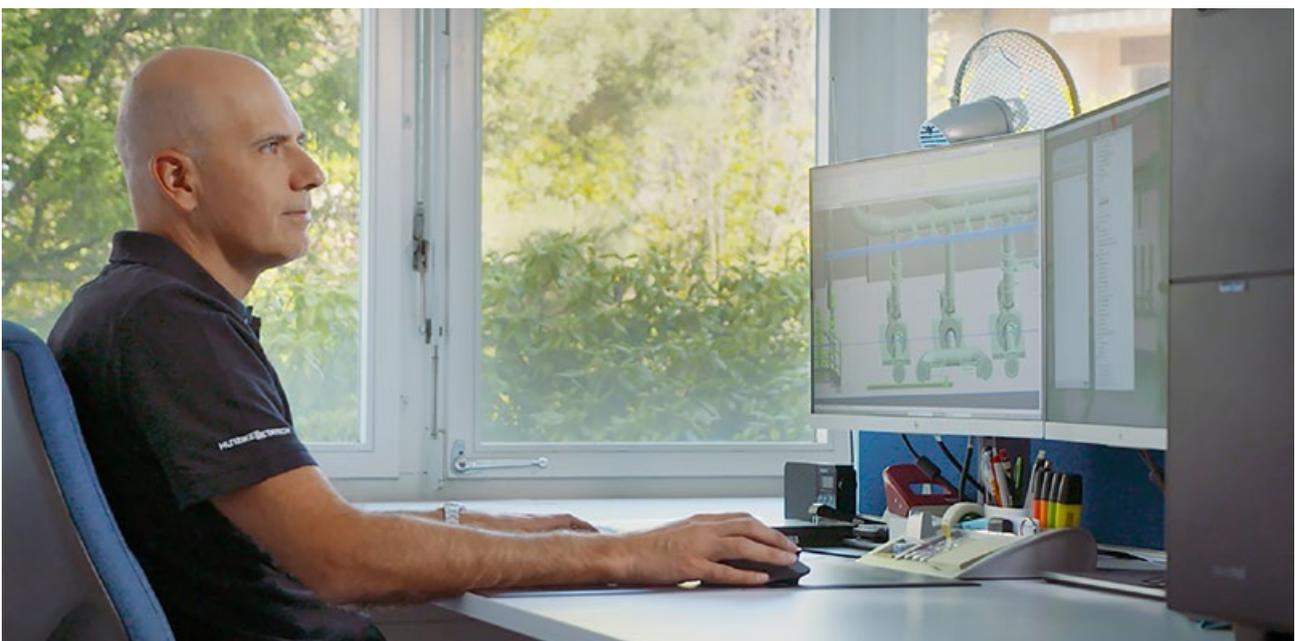
The Digital Twin also facilitates automation. Here, the technical processes are simulated in advance by means of virtual control, so the behavior of the numerous pumps and valves can be tested before the operating phase starts. Protecting the automated networks against unauthorized access is ensured using industry-leading network security components and architecture. The optimal interaction of all components, from the measurement technology, the pumps and agitators, the sand washing system and foreign matter separator, the positive

displacement blowers for aerating the clarification tanks to the process control technology, simulation, and 3D modelling results in one of the most modern and innovative plants in Switzerland.

CONCLUSION

WWTP Oberengadin – state-of-the-art technology, energy- efficient, sustainable, and economical

The Oberengadin wastewater treatment plant has met the highest standards since it went into operation in 2021. The Digital Twin, the coupling of real-time data from the control technology including the virtual controller and the connection of the dynamic process simulation, open up new possibilities for optimizing the operation of wastewater treatment plants. With biogas production from the purification process and a solar plant, WWTP Oberengadin covers its annual electricity consumption and even produces surplus heat.





German Water Partnership

Publisher:

German Water Partnership e. V.

Reinhardtstr. 32 · 10117 Berlin

GERMANY

www.germanwaterpartnership.de

Images:

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German Water Partnership e.V. (GWP) with its strong network of companies, trade associations and institutions from science and research within the water industry, drives innovation and information-sharing. This commitment demonstrates how cooperation and a holistic approach, supported by state-of-the-art digital concepts, can achieve significant efficiencies and remove barriers.



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