

Info-package 2

Agricultural Advisory Services

Fact Sheet 2.2 – Irrigation schemes when using reclaimed water: Braunschweig case study

Costs benefits analysis and
feasibility of using reclaimed
water

Irrigation
schemes when
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SUWANU EUROPE is a H2020 project aiming to promote the effective exchange of knowledge, experience and skills among practitioners and relevant actors on the use of reclaimed water in agriculture. This factsheet is part of a total of 5 factsheets in Info-package 2 aimed at agricultural advisors, that describes long-term experiences of a German reclaimed water irrigation practitioner regarding operation and management of the irrigation scheme.

1. Introduction

The organisation 'Abwasserverband Braunschweig' (AV-BS) is using reclaimed water in irrigation for more than 60 years. In former times wastewater was used for agricultural purposes without any reclamation. Since 1979 the wastewater coming from the city of Braunschweig passes various steps within the Braunschweig reclamation facility.

2. Water Source, technology type, irrigation conditions

The reclaimed water used for agricultural irrigation is treated in the Braunschweig reclamation facility (360.000 PE) where it passes mechanical and biological treatment steps. The reclaimed water fulfils the German irrigation water quality requirements for energy crops and processed food which have no threshold regarding microbiological parameters. After treatment, the reclaimed water is transported via gravity flow pipes to four pumping plants located in the agricultural fields of AV-BS. From the pumping stations the reclaimed water is transported via pressure pipes to the irrigations systems. The irrigations technologies consist of hose drums with a classic sprinkler at the end. Each one can cover a radius of 3 000 – 5 000 m². In total the pipe network has a length of 130 km and distributes reclaimed water to 1 350 tapping points. Due to its flat topography, the high percentage of sandy soils and the negative climate balance during vegetation period the area has optimal conditions for high intense irrigation.



Figure 1: Tapping points with irrigation machines



Figure 2: Tractor shifting irrigation sprinklers

3. Scheme size

The area supplied with reclaimed water is about 2 700 ha. In total more than 100 farmers are supplied with reclaimed water. The figure 3 represents the total extent of the irrigation area. Accordingly to the four pumping stations the total area is divided into four irrigations districts with a similar agricultural area.

4. Management irrigation scheme

Especially during summer period the amount of reclaimed water is not sufficient to cover the increasing crops water demand. Then for irrigation of its fields AV-BS uses a mix of reclaimed water (90%) from the reclamation facility and groundwater (10%) which is abstracted on-site at the four pumping stations (see table 1).

In order to guarantee that every agricultural field receives irrigation at least once a month the irrigation machines are shifted regularly by employees of AV-BS. In total AV-BS has 80 employees working on the practical irrigation performance with tractor operators, mechanics, electricians and management staff. The four pumping stations work continuously which makes a 3-shift operation necessary. Regarding the machinery AV-BS has 170 irrigation machines, consisting of a hose drum and a sprinkler, and 10 tractors in operation.

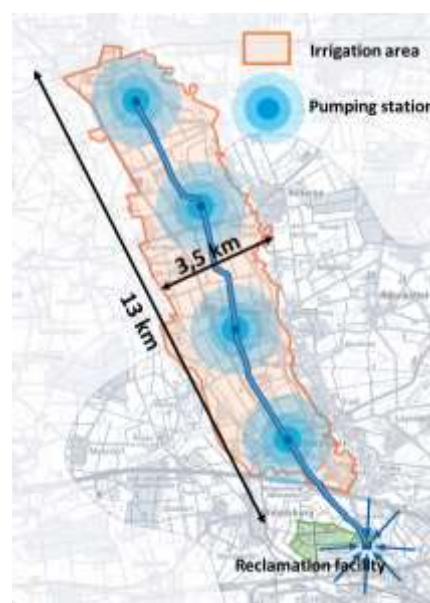


Figure 3: Extent irrigation area

Table 1: Amount of irrigation water (reclaimed + ground water)

Reclaimed water + ground water [m³]								
	2015		2016		2017		2018	
	reclaimed water	ground water.	reclaimed water	ground water.	reclaimed water	ground water.	reclaimed water	ground water.
Jan	0	0	0	0	0	0	0	0
Feb	740.379	0	764.483	0	748.645	0	478.592	0
Mar	903.994	0	839.717	0	845.499	0	936.379	0
Apr	1.026.133	0	970.501	0	811.095	0	963.742	0
May	1.148.492	81.227	1.242.344	79.200	882.328	6.400	1.218.571	281.100
Jun	1.187.915	549.000	1.156.681	80.100	1.205.379	179.200	1.348.109	561.700
Jul	1.325.812	158.100	1.165.732	229.400	1.181.262	10.300	1.265.590	426.700
Aug	1.181.153	206.000	1.119.734	231.400	1.111.463	0	1.244.118	368.300
Sep	1.087.134	0	1.084.532	73.800	1.005.711	0	1.191.498	44.500
Oct	885.870	0	1.089.021	0	965.883	0	1.186.392	0
Nov	817.235	0	918.963	0	772.060	0	935.575	0
Dec	0	0	0	0	0	0	0	0
	10.304.117	994.327	10.351.708	693.900	9.529.325	195.900	10.768.566	1.676.300
	11.298.444		11.045.608		9.725.225		12.444.866	

5. Financial and economic analysis

The irrigation area has average crop yields of 30 and 50 t/ha, respectively for grain crops and energy crops. In 2018 the costs for operating and maintenance of the reclamation facility were about 11 million €. For operating and maintenance of the irrigation system the costs were about 6 million €. The farmers using reclaimed water pay 80 to 110 € per irrigated hectare. The operating and maintenance costs of the irrigation systems are mostly covered by wastewater fees paid by the citizens of Braunschweig as the irrigation of the reclaimed water is considered as an additional treatment step regarding micro pollutants.

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