

ARA Foce Maggia, Locarno TI

By replacing a sludge pump, the Foce Maggia wastewater treatment plant (ARA) has cut electricity consumption for the pumping station by 50 to 60% and saved around CHF 15 000 per year.

Consorzio Depurazione Acque del Verbano (CDV) operates two wastewater treatment plants (ARAs): ARA Foce Maggia in Locarno processes wastewater from the city of Locarno and the surrounding valleys, while ARA Foce Ticino in Gordola is responsible for the communes of the Magadino Plain up to Bellinzona. For some years now, sludge from both ARAs has been used to produce biogas at ARA Gordola, meeting part of both plants' heat and electricity requirements. The plants are linked by a 9-km pipeline that runs along the shores of Lake Maggiore.

At ARA Foce Maggia, a pumping station ensures that the some 250 m³ of sludge generated daily arrives in Gordola at the biogas facility. It is operating 3-4 hours per day. As a pumping station breakdown would seriously affect ARA operation, there is system redundancy with two sludge pumps.

Although pump housings and impellers have been replaced several times over the years, the original direct current motors manufactured by the company BBC had remained. In addition to high electricity consumption, this solution which evolved over time had further drawbacks: motors and couplings required cooling and were so loud that the walls were eventually soundproofed. Moreover, it was necessary every year to replace the motors' carbon brushes that had worn out during operation. In turn, the carbon dust generated had to be reliably extracted, to keep it from penetrating the control cabinets and causing a disastrous short circuit.



Clarification basin at ARA Foce Maggia. Photo: Topmotors



The pumping station with the two sludge pumps. Photo: Topmotors

Given the many drawbacks, it was an obvious decision to invest money for once in a modern sludge pump instead of annual maintenance. As the number of operating hours per year are low, the payment on investments in the pumping station takes longer than with continuously used facilities. Accordingly, a decision was taken to begin by replacing only one of the two pumps.

A new submersible sludge pump was installed, which can also be set up dry in the pumping station. It is equipped with an efficient motor and controlled by a frequency converter. As far as pump operation is concerned, only the new pump will be used from now on. The second pump provides continuing redundancy and is operated briefly once a month, to avoid deterioration in storage and ensure readiness for use at any moment.

The differences are striking: whereas the old system still required some 130 kW of electrical power, the new one can operate with only 50 to 60 kW and only needs to dip selectively into its high power reserve, for example during start-up or when the sludge is more viscous than usual. Speed control can be used to regulate flow rate. With lower flow rates, although the system runs somewhat longer than before, pipe friction losses and thus energy consumption are lower overall. In 7-8 years, the investment will be amortised thanks to the savings on electricity and maintenance. A decision has already been taken to subsequently replace the second pump as well with a new system.



«Why should we keep the direct current system? Today a replacement costs us more, but we will save this amount many times over during the service life of the system.»

Matteo Rossi, Director



Left: the old pump with the original direct current motor, cooling and extraction. Right: the new pump in a housing. Photo: Topmotors

Topmotors

About one-third of the electricity consumption in Switzerland comes from industry. More than 70% is due to electric motor systems. Topmotors' priority is to give an impulse by encouraging the use of highly efficient motors and intelligent controls. All the Topmotors events, together with practical information, can be found here: www.topmotors.ch

Comparison before / after		
	Before	After
Pump	Sludge pump Egger T8-125	Submersible pump FLYGT NZ 3315
Key figures	Flow rate 162 m ³ /h, Delivery head 80.5 m	Flow rate 130 m ³ /h, Delivery head 75.3 m
Motor	Direct current machine BBC GN 225 S35 F, 157.7 kW, built in 1979	FLYGT N3315.180, 119 kW, max. motor efficient 94.4%
Transmission	Direct	Direct
Operating hours	ca. 1 100 h/a	ca. 1 300 h/a
Energy consumption	ca. 140 000 kWh/a	ca. 60 000 kWh/a
<ul style="list-style-type: none"> ■ Electricity saving per year: ca. 80 000 kWh ■ Cost saving per year: CHF 12 000 - 15 000 ■ Investment costs: ca. CHF 100 000 ■ Payback: 6 to 8 years 		