



## Biological Wastewater Treatment Plant (Continuous Flow Process) of Town **Kardzhali** (Bulgaria)



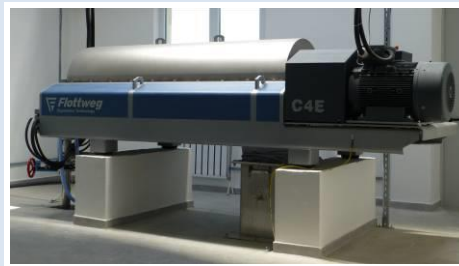
Biological wastewater treatment plant of town Kardzhali after start-up. Realized by Biogest International GmbH in cooperation with a local general contractor.

### Plant Load and Process Requirements

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|--------------------------|--|---------------------------------|--|
| • <b>Plant capacity:</b> | up to 75,000 p.e. (population equivalents)   | • <b>Industry:</b>              | up to 16,500 p.e.  |
| • <b>Population:</b>     | 58,500 p.e.  | • <b>Wastewater quantities:</b> | 6,120 m <sup>3</sup> /d (dry weather)<br>8,771 m <sup>3</sup> /d (average)<br>1,495 m <sup>3</sup> /h (rainy weather)                |
| • <b>Process target:</b> | BOD <sub>5</sub> < 25.0 mg/l<br>COD < 125.0 mg/l<br>N <sub>total</sub> < 15.0 mg/l<br>P <sub>total</sub> < 2.0 mg/l<br>TSS < 35.0 mg/l | • <b>Operation results:</b>     | BOD <sub>5</sub> < 10.0 mg/l<br>COD < 61.0 mg/l<br>N <sub>total</sub> < 8.0 mg/l<br>P <sub>total</sub> < 1.0 mg/l<br>TSS < 15.0 mg/l |



automatic coarse screens for first mechanical pre-treatment



dewatering centrifuge for sludge



collecting of solids and washed sand for final disposal

### Realization Schedule

- |                                    |  |  |      |
|------------------------------------|--|--|------|
| • <b>Design works:</b>             | Biogest International GmbH                     | • <b>Start-up:</b>   | 2014 |
| • <b>Civil works:</b>              | Biogest International GmbH / Kalistratov Group | • <b>Final acceptance test and handing over:</b>   | 2015 |
| • <b>Electrical installations:</b> | Biogest International GmbH / Oskar ood         | • <b>Cohesion Fund of the European Union 2007-2013 Contract for Plant and Design-Build (FIDIC Yellow Book)</b> |      |



### Process Information in Brief

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|--|---|
| <ul style="list-style-type: none"> <li>• <b>Operation concept:</b> automatic operation with Siemens-PLC, SCADA and remote maintenance</li> <li>• <b>Mechanical treatment:</b> automatic coarse screens, pumping station, 2-street compact pre-treatment station with fine screens, aerated sand trap, aerated grease trap and sand washer</li> <li>• <b>Pre-treatment:</b> 2-street primary settling tank</li> </ul> | <ul style="list-style-type: none"> <li>• <b>Biological treatment:</b> activated sludge process, designed according to A131 (DWA)</li> <li>• <b>Sludge treatment:</b> anaerobic digesting with production of Biogas; generation of electrical power</li> <li>• <b>Sludge dewatering:</b> high performance centrifuge with Simp-drive</li> <li>• <b>Features:</b> biological and chemical reduction of phosphorus, UV-disinfection of treated wastewater</li> </ul> |
|--|---|



2-street compact pre-treatment station, completely made of stainless steel including high-performance "Walzensandfang"



Combined heat and power plant for power generation out of biogas



high performance mixers are generating a circular stream

### Process Run

- automatic coarse screens remove large solids
- submersed pumps are lifting the wastewater
- submersed pumps are lifting rainwater to the outlet
- compact pre-treatment stations (2 ea.) are taking care of fine screening, sand removal and grease removal
- a sand-washer reduces the organic load of the sand down to 3 %
- primary settling tanks (2 ea.) are completing the mechanical pre-treatment
- a selector tank is supporting the biological treatment (biological P-elimination)
- combined reactors (2 ea.) containing aeration tank and central clarifier are responsible for biological treatment including nitrification and denitrification
- treated effluent is disinfected by UV-rays
- treated wastewater is reused for cleaning services
- primary sludge and biological sludge is pretreated and mixed for final processing
- an anaerobic digester generates methane gas under perfect process conditions
- an electrical power generator uses the gas for supplying electrical power to the wastewater treatment plant
- digested sludge is pre-thickened and finally dewatered by use of a high performance centrifuge