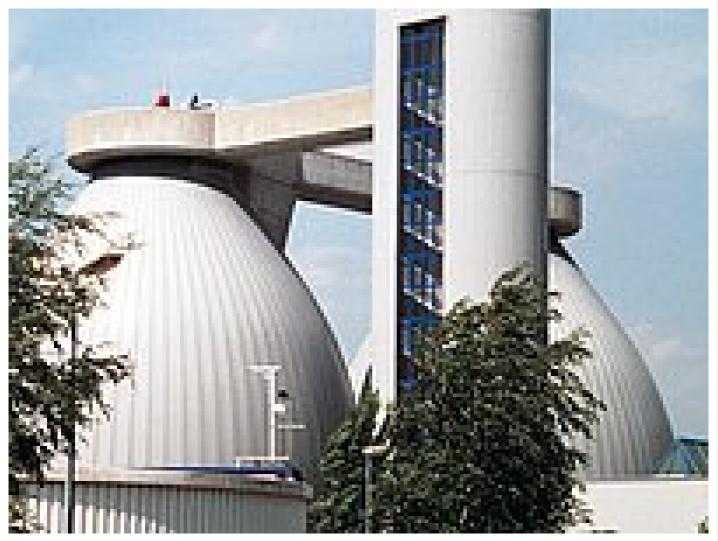
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Energy-Efficient Mechanical Treatment



Power consumption of primary clarifiers is low. Scrapers and primary sludge pumps have a power consumption in the order of 0.1 kWh/(PE•a).

However, dimensioning of primary clarifiers has a big impact on the energy balance of entire treatment plants.

- Where no primary clarifiers are provided, the entire organic freight enters the biological stage and is mostly oxidized, with high power consumption, to water and CO₂.
- For energy reasons, simultaneous aerobic sludge stabilization or extended aeration should be limited to small plants below < 10,000 TP.
- Where primary clarifiers with a dry weather detention time of 0.5 1.0 h are provided, only around 20 % of the BOD is removed.
- Short detention time provides sufficient BOD for denitrification, but supply of easily degradable carbon from other sources, e.g. hydrolized substrate from primary thickeners, is far more energy-efficient and can be controlled.
- Primary clarifiers with a detention time of 2.0 h remove at least 30 % BOD. Less organic substance is oxidized, power consumption of biological treatment is reduced, and more digester gas is produced from primary sludge; power and heat cogeneration is thus increased.
- Long primary clarifier detention time, in combination with anaerobic sludge digestion, reduces energy consumption of treatment plants by over 50 %. This is the single most important decision concerning a plant's energy-efficiency.
- Plants without nitrification can be energy-self-sufficient. As much power and heat is co-generated from digester gas as required for its entire operation.

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• Primary clarifiers should be designed such that their detention time can be varied in a wide range, e.g. by provision of several parallel tanks. This permits operators to optimize the plant's energy efficiency depending on actual wastewater characteristics.

See also Biological Wastewater Treatment and Sludge Stabilization.

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