

Sludge-to-energy process solves disposal problems in Poland

The Cambi thermal hydrolysis process digester retrofit reduced by half the quantity of final dewatered sludge cake at the Kapusciska wastewater treatment plant in Poland. **Stefan Kawecki, Piotr Pastwa, and Harald Kleiven** report.

After one year in operation, the Cambi® Thermal Hydrolysis Process installation at the Kapusciska wastewater treatment plant in Bydgoszcz, Poland, significantly increased biogas production and reduced biosolids production, according to the plant operators.

Sludge volumes in Poland have been increasing rapidly since the early 1990s when the government began upgrading many of its wastewater treatment plants. The trend is expected to further increase volumes. The current annual output of 500,000 tons dry solids (tds) is expected to rise to 800,000 tds within five years and to double by 2015.

Until recently the preferred solution was to compost or burn the sludge; however more attention has been given towards anaerobic digestion including disintegration methods in order to increase biogas production, stabilize sludge, and minimize the amount of biosolids.

The Kapusciska wastewater treatment plant, located along the river Wisla, had existing anaerobic digesters. Due to the high secondary content of the mixed sludge the digestion and dewatering process was not very effective, and it was therefore decided to install sludge pretreatment equipment to upgrade the existing digestion plant. The Cambi Thermal Hydrolysis Process (THP) was the chosen technology that was installed in August 2005. The THP plant treats mixed primary and secondary sludge from the wastewater treatment plant in order to minimize volumes of dewatered



One of the two THP reactors. Photo by Cambi AS

cake and produce a biosolids product suitable for agriculture and re-cultivation purposes. It also enables the digestion plant to double the biomass loading, which is now at 10% dry solids into the digesters.

The contract included pre-dewatering, THP and a combined heat and power (cogeneration) plant for electricity production, including all necessary civil works for the installation. Designed for an annual capacity of 7,650 tons of total dry solids, the plant operates at full capacity during the winter season. The thermal hydrolysis process increases the degradation rate in the two existing anaerobic digesters, which substantially increased biogas production and sludge dewaterability. The biogas is used in the combined heat and power station, consisting of two gas engine-driven generator sets followed by exhaust boilers and a main boiler to produce steam for the thermal hydrolysis process. Hot water surplus from the process is

used to heat buildings at the Kapusciska wastewater treatment plant.

About 70% of the project was financed by the EcoFund programme, a “debt-for-environment swap” fund established in 1992 by the Polish Ministry of Finance to administer money derived from the conversion of part of Poland’s foreign debt into a fund intended to support environmental protection projects.

Cambi AS commissioned the plant in August 2005 and transferred operations to plant managers in March 2006. The plant increased biogas production and minimized biosolids production within the first year in operation.

The average dry solids content of the sludge increased from an average of 20% in 2004 to 31% in 2006, within the first full year of Cambi THP operations. The dry solids content was kept at 33% for three months during the autumn of 2006 and is now stabilized at 31% to min-

imize polymer use; the dewatering centrifuge uses only 3-5 kg of polymer per dry tonne of dewatered cake. Cake production decreased to less than half, from a total of 19,600 tons in 2004 to 9500 tons in 2006. No load change occurred in the wastewater treatment plant within the same period. The biosolids produced in the plant are black, crumbly, and pathogen-free with minimal odor.

The installation of the Cambi THP also resulted in significantly higher biogas production. The biogas power station provides nearly 40% of the treatment plant’s electricity needs. In addition, the engine exhaust-heat boilers produce most of the steam needed for the Cambi THP. The digesters do not require any extra heating.

In summary, the implementation of the Cambi technology at Kapusciska pasteurizes and substantially reduces the volume of sludge for disposal, boosts digester capacity, significantly increases gas production, and produces electricity for sale and use at the wastewater treatment works. The plant is expected to receive green credits for its production of renewable electricity.

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Dewatered Class-A biosolids (31% DS). Photo by Cambi AS

