PULP AND PAPER EFFLUENTS FOR BIOMETHANE: AN UNDERESTIMATED POTENTIAL FOR GREEN ECONOMY DEVELOPMENT

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Abstract

The forest fiber and paper industry plays a strategic role for the European Climate Change Mitigation (CCM) strategy. Despite the expected increment in the pulp and paper demand and production during the next few decades, this sector is committed to reduce carbon emissions by 80%, comparted to the level of 1990, by 2050 [1]. This means that current emissions of close to 50 million tonnes CO_2 should be reduced to 12 million and, development of new energy efficient and GHG mitigating technologies/concepts is therefore crucial. In this context, the use of waste biomass for onsite biomethane production is a valuable contribution [2]. In Norway, the construction of a biogas plant at Norske Skog´s mill Skogn was started in 2016. The plant, owned by Biokraft AS, has the capacity to produce 25 million cubic meters liquefied biogas (LBG) and will be taken in operation by the end of 2017. Waste activated sludge generated by the onsite wastewater treatment plant (WWTP) processing 20 000 m^3 of the mill´s effluents per day, will be co-digested with fish waste biomass. Under current, conventional, operational conditions, the activated sludge treatment is run to minimize sludge production (about 0.2 kg SS/kg COD_{red}) to keep the costs for sludge disposal low. This strategy is associated with a high sludge age, often exceeding 15 days, and the sludge is characterized by low digestibility and low methane yields. Higher digestibility and methane yields (+30%) can be achieved by reducing the sludge age below 10 days [3]. At the same time, more sludge will be produced (over 35 kg SS/kg COD_{red} is expected) representing a valuable substrate for biomethane production. This concept, already demonstrated at pilot scale, will be implemented at Skogn during 2018-2019. Supported by the European LIFE programme under the project entitled *EffiSludge for LIFE*, the demonstration will verify the economic and environmental advantages for such operational conditions. As the sludge age decrease, less aeration time is required per volume of treated effluent (energy and carbon saving). Furthermore, the co-digestion of sludge with fish waste provides a stream of reject water post anaerobic digestion enriched in nitrogen and other nutrients. Recirculated into the onsite WWTP, this nutrient supply could replace current external dosing (ca. 700 kg/d of urea-N) providing additional financial and carbon saving.

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