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Eawag Seminar Invitation

A New Approach to Resource Recovery from Municipal Wastewater

Speaker **Prof. Linda Figueroa**
Colorado School of Mines, Golden, US

When **December 11, 11.00 – 12.00 a.m.**

Where **Forum Chriesbach C20, Eawag Dübendorf**

Abstract The current treatment paradigm wastes the resource content in domestic wastewater. Reimagined designs transform domestic wastewater plants to produce water for direct potable reuse, biogas for energy, and concentrated nitrogen and phosphorus for fertilizer, Figure 1. For example, anaerobic primary and secondary treatment that converts organic matter to methane maximizes the biogas potential of wastewater. Membrane processes can then be used to produce a permeate stream for direct potable reuse and a concentrate stream with higher concentrations of nitrogen and phosphorus that enhance cost effective recovery of fertilizer using currently available technologies. For adoption of any new technology at wastewater utilities, operational simplicity is a key decision element. A low-complexity treatment scheme as described above will allow current domestic wastewater treatment facilities to become resource recovery facilities of the future.

We have demonstrated the first part of the transformative paradigm by methane production during enhance primary treatment of domestic wastewater. Anaerobic treatment of domestic waste water with methane production can be achieved in a process scheme consisting of an anaerobic baffled reactor (ABR) for primary treatment, an anaerobic expanded granular sludge bed reactor for secondary treatment and a microscreen to polish the effluent solids from the secondary effluent and release dissolved methane.

Potential issues related to membrane fouling in anaerobic membrane bioreactors providing secondary treatment are eliminated. A separate mesophilic anaerobic digester is not required for methane generation. All methane is generated in the primary and secondary anaerobic reactors. An ABR was operated for two years treating raw municipal wastewater at ambient water and air temperatures of 12 to 23°C and -10 to 35°C, respectively. The 1000-liter pilot reactor operated at a 12- hour hydraulic residence time and was located in the Headworks building of the Plum Creek Water Reclamation Authority.

The average removal of TSS and BOD5 was 83% and 47%, respectively. The TSS and BOD removal exceeded that of conventional primary clarification, with no wasting of the settled solids over the two-years and stoichiometric production of methane. This year a secondary anaerobic treatment process will be added to the existing pilot system. The effluent produced will be low in carbon and nutrient rich. The next steps include investigation of methane utilization, resources recovery options for water and nutrients and short cut nitrogen removal processes.

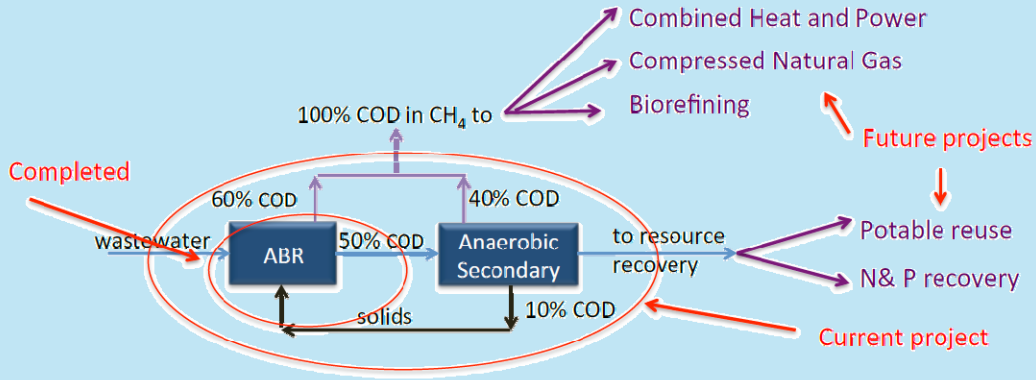

Figure 1 - path forward on carbon redirection to methane followed by recovery of water and nutrient resources.