Abstract
Sustainable wastewater treatment scenarios for cities of the future place an emphasis on utilizing anaerobic bioprocesses rather than aerobic activated sludge to achieve organic pollutant removal from wastewater. This is because anaerobic systems may use significantly less energy than aerobic activated sludge. Until recently the shift in technology has been more theoretical than practical since traditional anaerobic bioprocesses have not been able to produce effluent with BOD$_5$ concentrations under permissible discharge limits (i.e., 30 mg/L) – especially in cold climates. However, the development of the anaerobic membrane bioreactor (AnMBR) has overcome this challenge and may make anaerobic treatment a viable alternative to activated sludge. This work outlines the fundamental design concepts surrounding anaerobic membrane bioreactor technology, highlights the design challenges of implementing anaerobic bioprocesses for municipal wastewater treatment, and describes preliminary results of several AnMBRs that have successfully achieved BOD$_5$ concentrations less than 10 mg/L, even at temperatures as low as 10 °C.