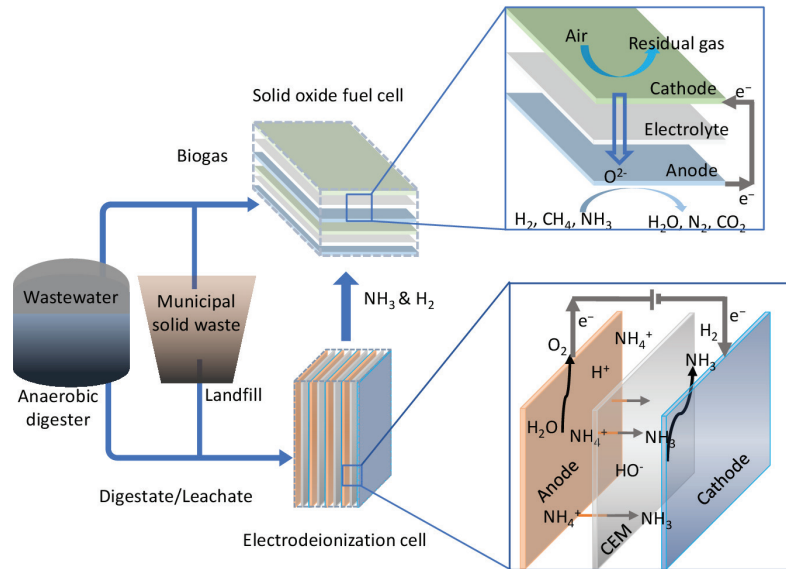
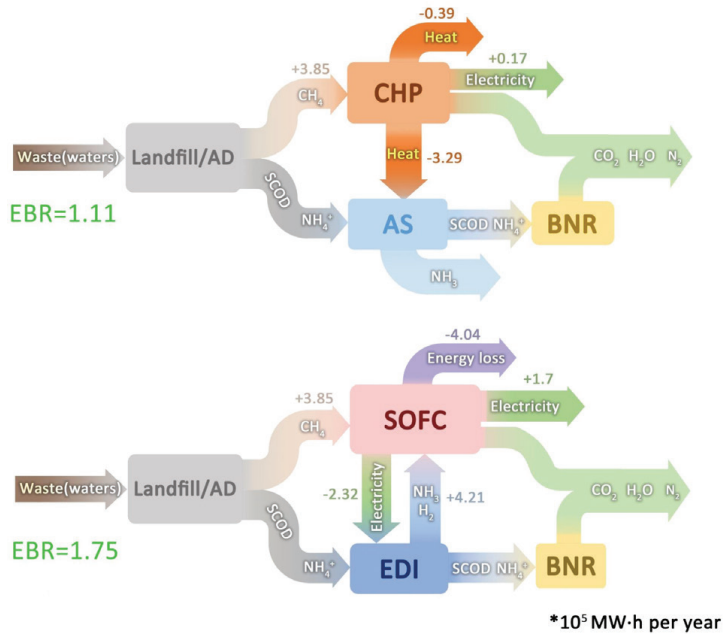


Sustainable Waste-water Derived Energy Generation System

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The development of wastewater-derived energy system (EDI-SOFC) is feasible to fit into existing anaerobic treatment plants. The optimization of the system and its net energy balance assessment with different strength of wastewaters. The present groups AD, EDI and SOFC to convert energy in organics and nitrogen pollutants to electric energy. In this invention, the microorganism community of AD process metabolizes complicated organics to biogas and digestate containing NH_4^+ . Biogas collected and NH_3 gas converted into NH_4^+ collected yield electricity. O_2 is not

a need for NH_4^+ removal from wastewater by EDI, which saves about 40% energy input for aeration of the nitrification and denitrification, but also produces less sludge yield. The effluent of EDI cathode recycles to AD and neutralizes H^+ , which can prevent from the inhibition of low pH and increase biogas yield. Conservative 50% electricity conversion efficiency can be obtained by SOFC fed with a mixed gas of biogas and $\text{NH}_3\text{-H}_2$ and 20% higher electricity conversion efficiency than 30% of gas fired turbine. This invention can help handling landfill leachate, digestate, wastewaters, sludge and positively net energy output can be realized.