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Subject Area	Energy and Environment
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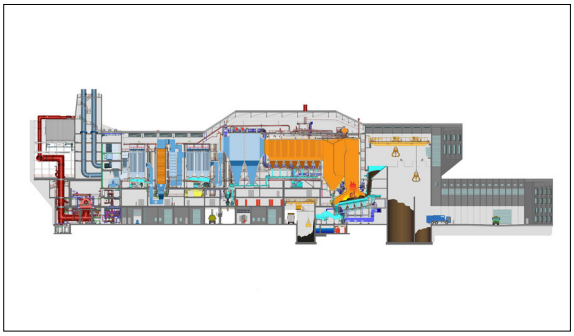
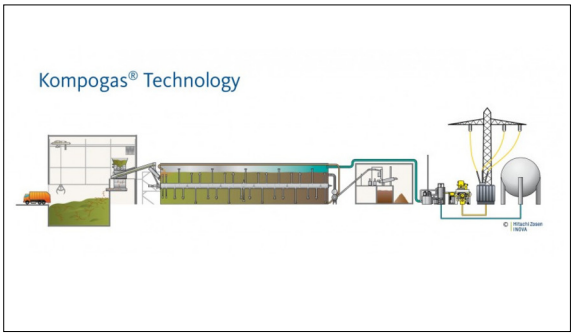
Integration of Anaerobic Digestion and Power-to-Gas into Energy-from-Waste Plant



Energy-from-Waste Plant
Renergia Zentralschweiz AG

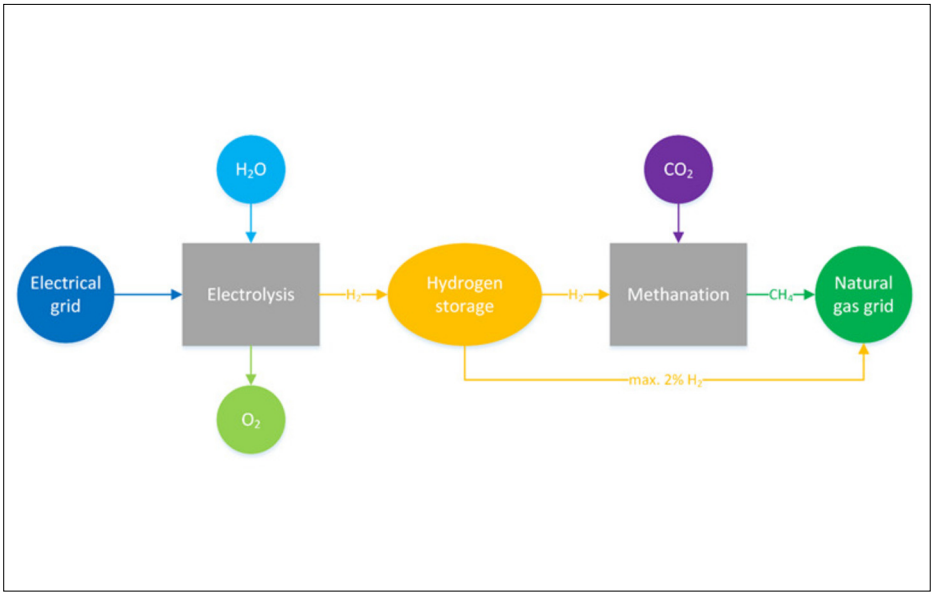


Anaerobic Digestion Plant
Hitachi Zosen Inova AG

Introduction: Nowadays, different technologies exist to treat different types of waste. An Energy-from-Waste plant converts municipal waste into electrical and thermal energy by incineration. The anaerobic digestion is a biological way to produce biogas from organic waste, which is collected separately. For the shift to renewable energies, the energy production has to become more flexible and the importance of storable energy sources, such as gases, increases. This is where Power-to-Gas processes like electrolysis and methanation come in.

Objective: Hitachi Zosen Inova AG (HZI) is a world leading company for facilities and solutions in the field of Energy-from-Waste technology based in Zurich. As they have several different technologies in-house, the integration of these is of special interest from an ecological and economical perspective. The aim of this master thesis is to have a closer look at these technologies and identify synergies. An economical calculation and comparison of different integration scenarios should lead to an estimation of the economic viability.

Approach: Firstly, a literature study and paper / patent research about the technologies and existing integration solutions were carried out. Based on these information and talks to internal experts at HZI, the possibly useful synergies between the technologies were defined. The integrated system was modelled in a modular established MATLAB code. The single plants are implemented as separated functions including simplified mass and energy balances and enhanced with economical values for internally used streams. The mass and energy streams interchanged between the plants are economically accounted when leaving the overall system. For the estimation of investment costs, empirical equations were derived from real data. The key result to compare different scenarios is the net present value of the integrated system. Due to its modular structure, the model can be extended or adapted to other scenarios.



Power-to-Gas Process
Own presentment