

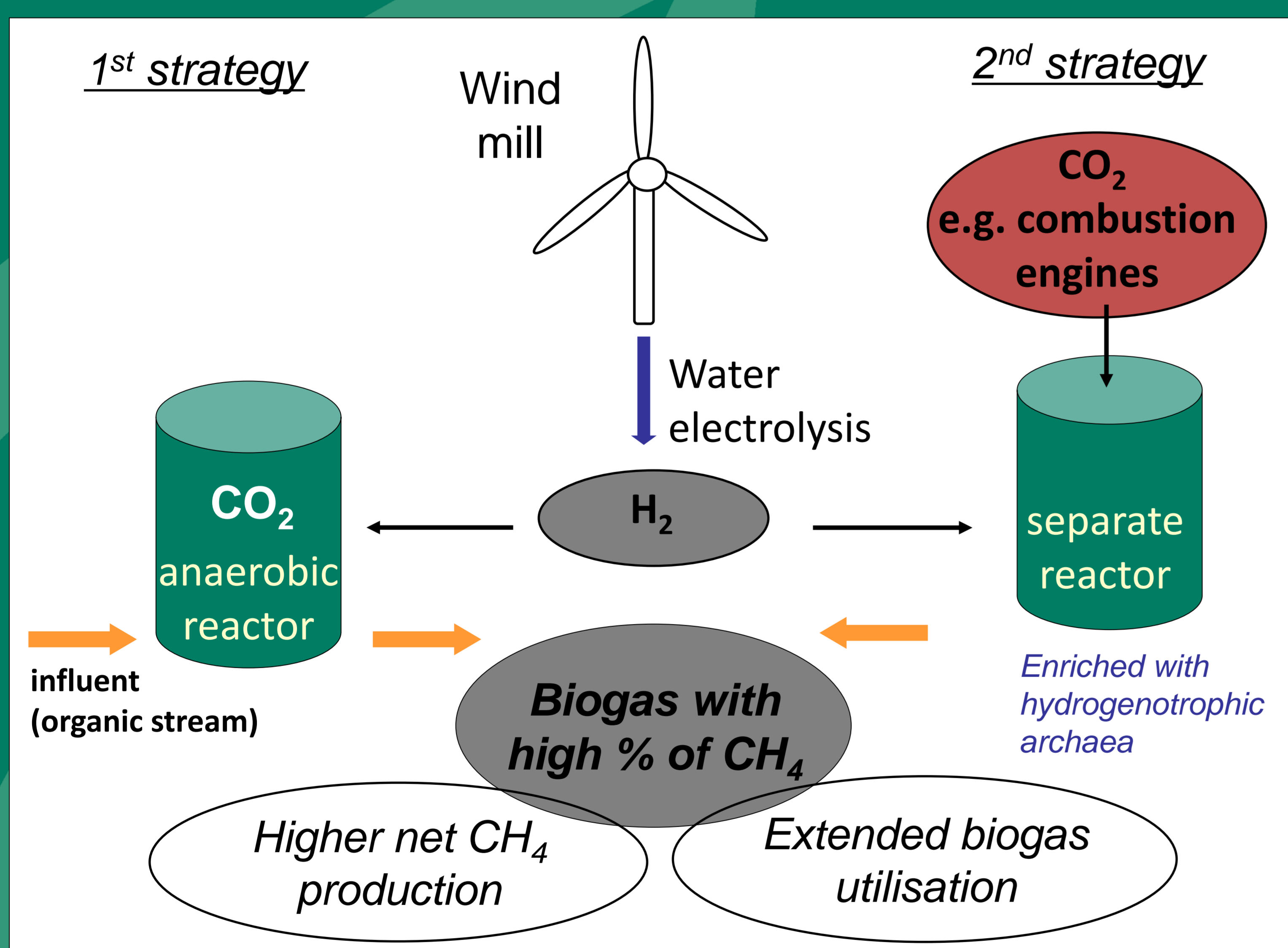
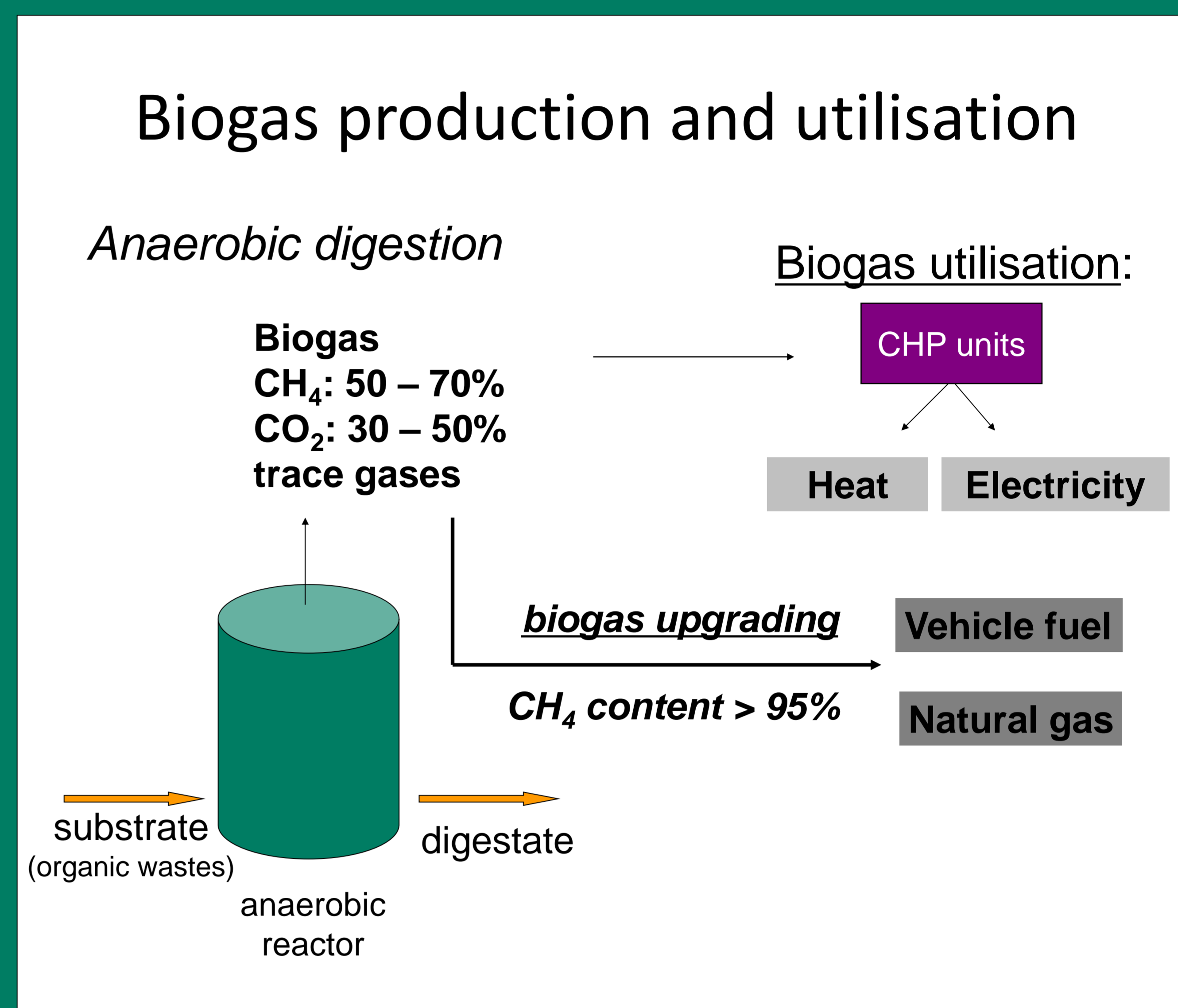
Project 5.1: Surplus electricity to biogas via hydrogen

Introduction

Biogas production is a mature technology. However, possible ways for its efficient direct utilisation and upgrading are yet to be explored. Biogas can be upgraded to natural gas quality and be used as vehicle fuel, or it can be injected into the existing natural gas grid. In order to achieve biogas upgrading, the biological process for H₂ and CO₂ utilisation based on hydrogenotrophic methanogenic archaea can be optimized/developed.



An attractive way for H₂ production is to exploit surplus wind mill electricity production for water electrolysis. Hence, in times of surplus energy the excessive energy can be converted into a storable gas.



Advantages

- increased net CH₄ production for biogas plants
- increased heating value of biogas
- in situ biogas upgrading
- conversion of excessive wind energy into a storable gas
- use of H₂ and CO₂ mixture, independent on biomass availability

Objectives

- Develop an efficient process for the utilisation of H₂ and CO₂ mixture, regardless the availability of biomass
- Modify the anaerobic configuration so that H₂ is used to upgrade the biogas efficiency
- Optimize H₂ consumption by the hydrogenotrophic methanogens in anaerobic reactors

Tasks & Methodology

Task 1: Literature research (in progress)

Task 2: Design of lab - scale reactors (in progress)

Task 3: Operation and monitoring of lab – scale configuration

Task 4: Calculation of efficiency and costs

Task 5: Design & operation of large – scale reactor