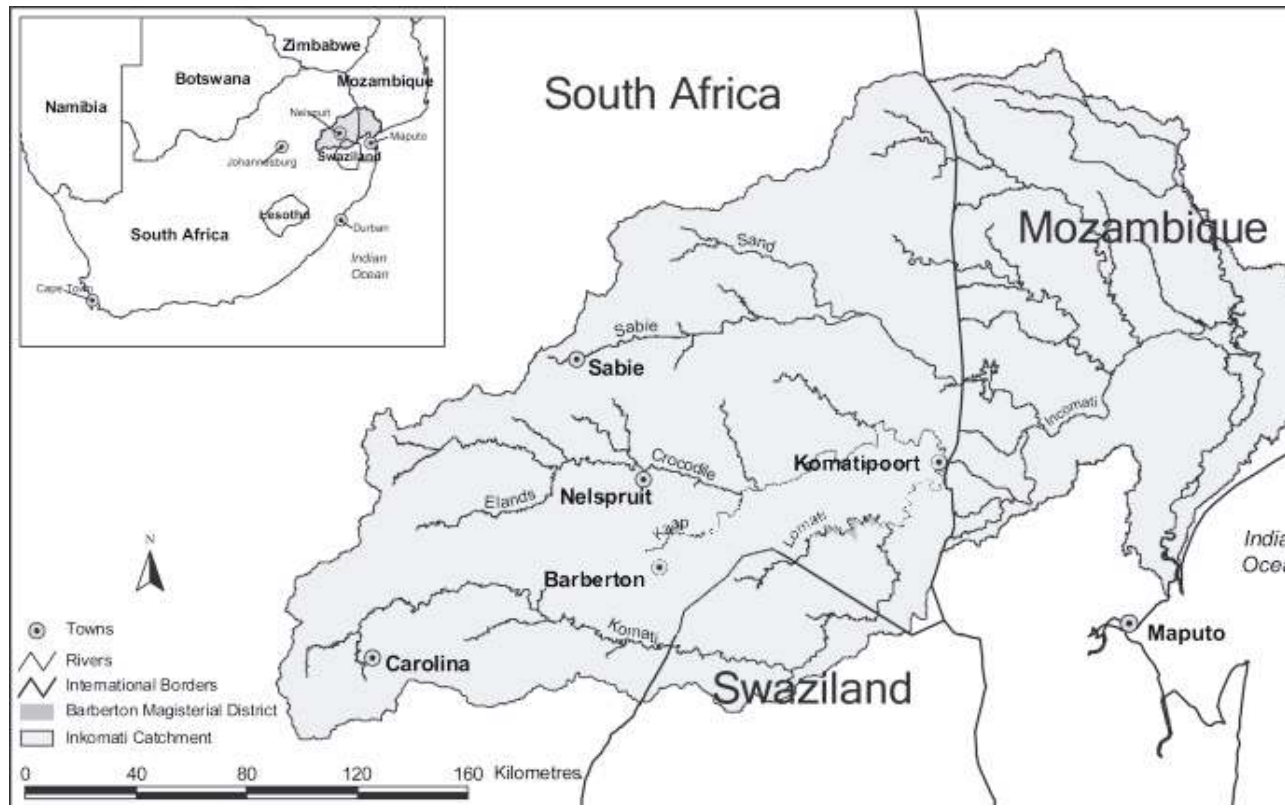


CHALLENGE

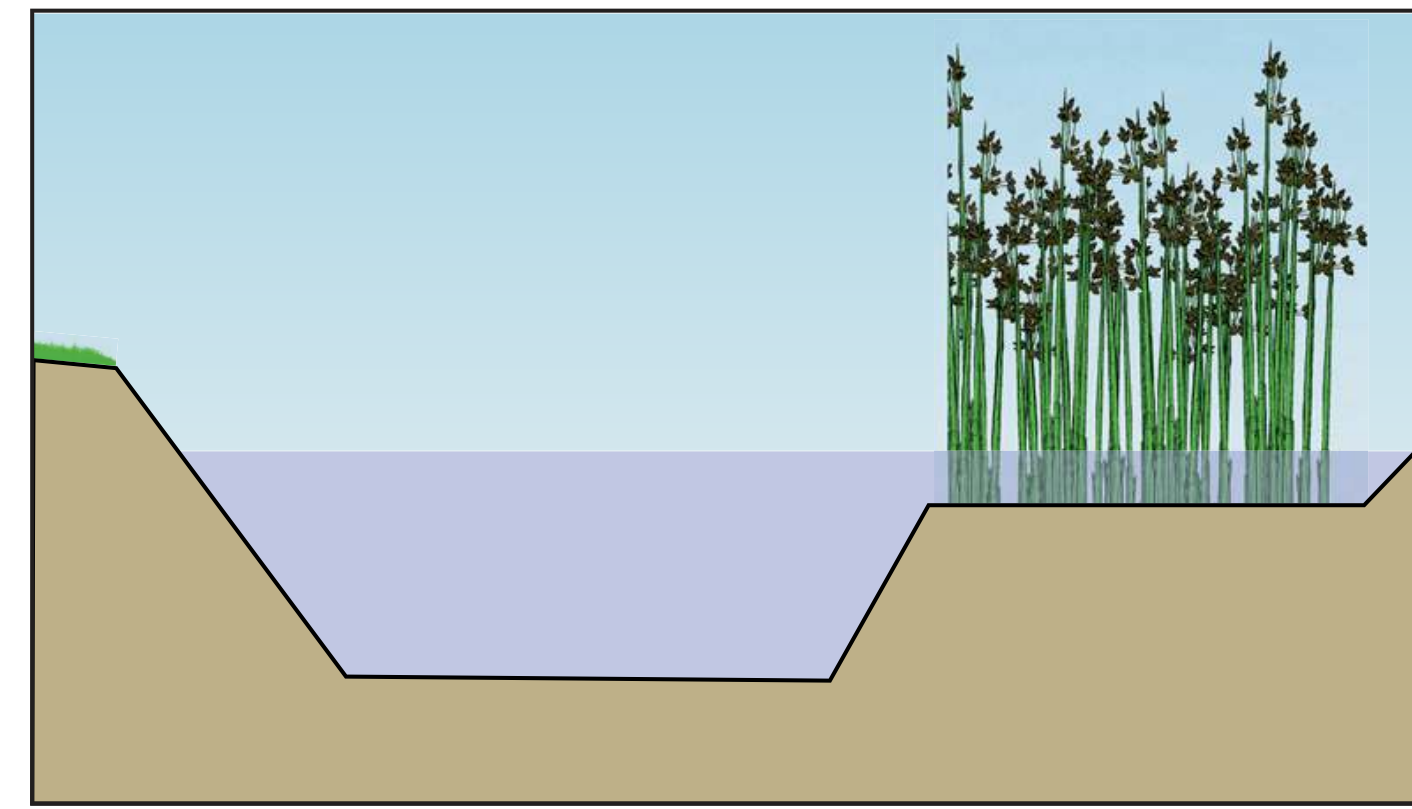
"Develop a product concerning the applicability of energy generation in combination with water conservation and other types of land use like water purification in the Incomati River Basin, in such a way that the product ensures the sustainable utilization of water resources and the involvement of local community." Waterschap Groot Salland



The study area is the Incomati River Basin in South Africa. There are areas with water shortages, which make use of water retention sites.



Retention sites can become overgrown and up to now we pay to get rid of the biomass in order to increase retention capacities.



Additional benefits besides increasing water retention capacity are natural water purification by using certain reed species and turning the biomass into biogas.



The main focus is at retention areas, but besides these sites there are a lot of invasive plant species being removed.

SOLUTION

Input biomass



Reeds

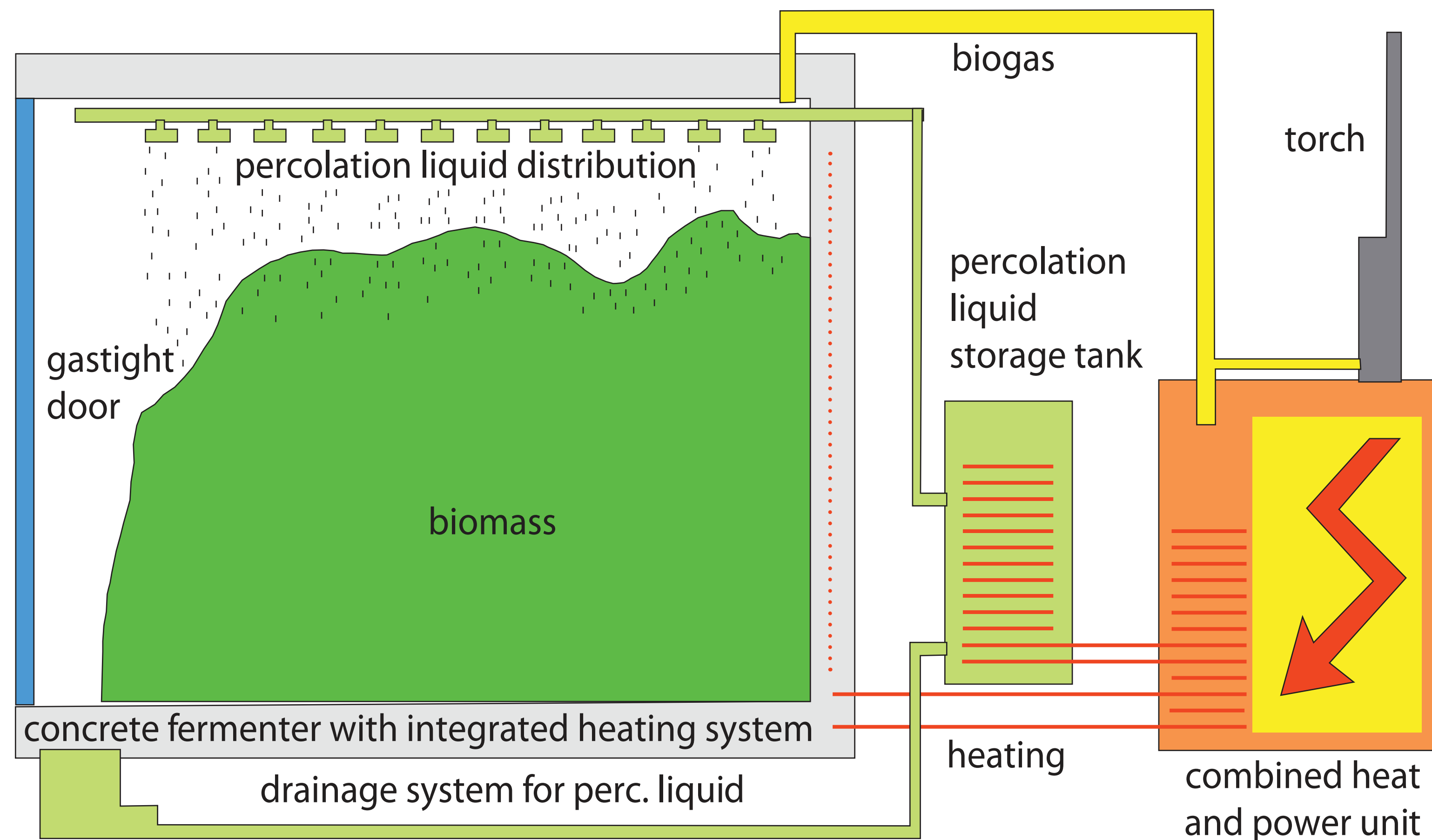


Grasses



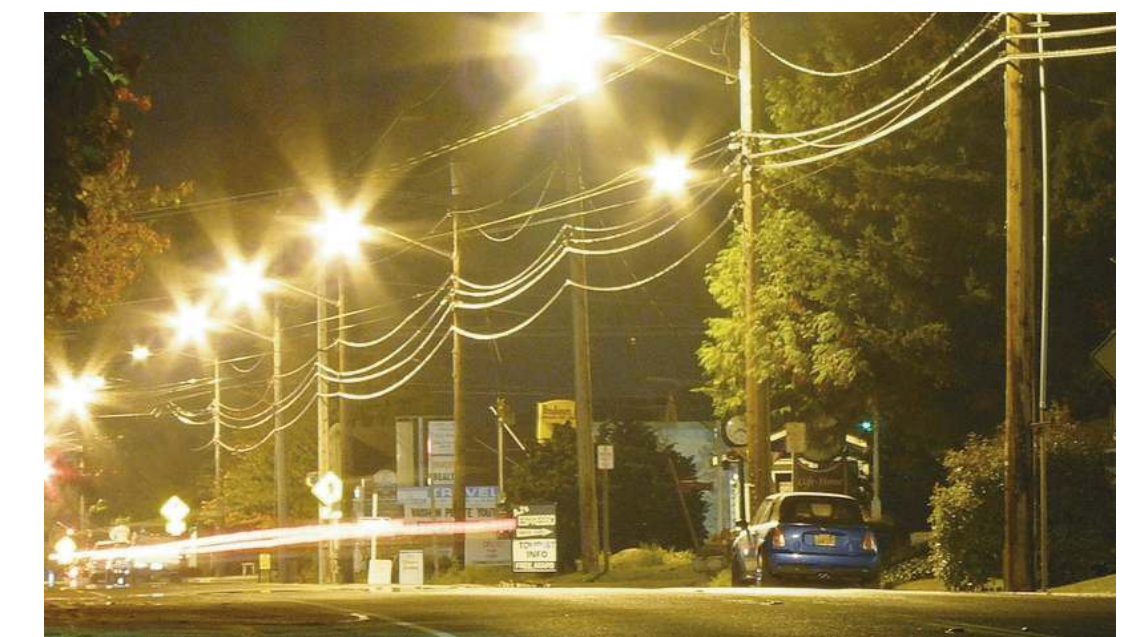
Crop residues

Dry digester

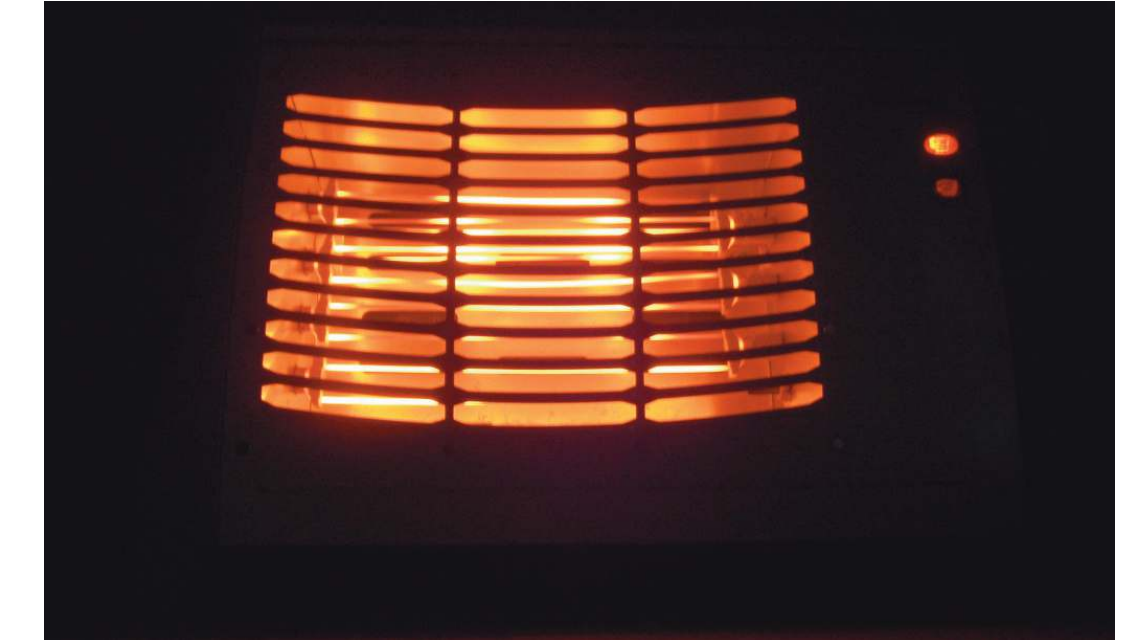


The biomass is put in an airtight box after which a bacteria solution is percolated over the biomass to produce biogas (CH₄). The biogas is converted into electricity and heat using a combined heat & power generator (CHP).

Output



Electricity



Heat



Compost (post-processing)

ADVANTAGES

- Replaces conventional energy sources like wood and paraffin
- Direct use of biogas (fuel, cooking, etc.)
- Invasive species could be used to fuel the dry digester
- Applicable to residential and commercial food waste
- Installation is easily adaptable to the surrounding area's
- Low start-up, operation and maintenance costs
- Ideal for a non-continuous supply of biomass
- No pre-treatment of biomass material
- Low heat input, due to optimal temperature of 34°C - 37°C
- One ton of biomass can yield 130-140 m³ of high quality biogas

RECOMMENDATIONS

- Research optimized composition of different plant species in biomass; harvesting age of the biomass and time per batch of biomass to digest
- Obtain a native plant species to purify the water in a retainment area and yield high amounts of biogas

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