Wastewater Circular Economy Project

Invest Net Zero Cheshire

IKIGAI ea technology CATAPULT Energy Systems Cheshire and Warrington Local Enterprise Partnership Cheshire energy hub

Project reference number: 013

Project name: Wastewater Circular Economy Project

Project type*:* Wastewater Treatment Works ("**WwTW**") plant conversion to a thermal hydrolysis process ("**THP**") to facilitate biomethane production (for grid injection and use in an onsite combined heat and power plant) with, as a proposed second phase, installation of (i) carbon capture equipment on the THP and (ii) an alternative heat source. See also **National Grower regional greenhouses** for heat offtake and CO_2 reutilisation potential.

Project maturity:

- Phase1: Mid-stage development - the project has been developed to a 'definition' stage of design and was previously tendered to construction delivery partners.
- Phase 2: Involves fossil heat source replacement and carbon capture and is at an early development stage.

Key strategic drivers:

- Monetisation of process produced biogas by way of upgrading to biomethane and injection to grid.
- Ambitious decarbonisation objectives of United Utilities.
- Monetisation of recovered waste heat and captured CO_2.

Locations: The expansion has been earmarked on land already owned by United Utilities. Coordinates: N53.2637, W2.8650.

Proposed phases:

1. 2021: Commence development of conversion to a THP plant for biomethane production with commissioning anticipated in 2024. Private wire solar development and commission such that import capacity coincides with the increased electrical load.
2. Installation of carbon capture equipment, migration to sustainable heat source and connection to HyNet CO_2 distribution network and/or sale to nearby greenhouse project.

Total estimated carbon savings p.a.: 14,220 tonnes CO_2/year (phase 1 only pre-installation of carbon capture equipment.)

Total estimated biomethane production p.a.: 65,000MWh

Estimated project costs:

- Phase 1: £40-£50 million to complete upgrade of the WwTW to a THP.
- Phase 2: £[TBC] carbon capture and piping and replacement heat source (it is assumed that this phase could be separately financed on the basis of reutilisation sales).
- Electricity grid connection: Existing import/export connection would need to be upgraded to increase import capacity (as biogas will no longer be used for power production onsite). A more detailed study is required to estimate cost.

- Gas grid connection: subject to further due diligence, no upgrade is expected to be required.

Feedstock: Indicative 23,000 tonnes of sewage sludge plus opportunity for other waste streams (municipal solid waste, slurry).

Technology, construction and operation:

- Expansion of sludge reception facilities and new pre-treatment stage (Thermal Hydrolysis).
- Biogas upgrade equipment includes: dehumidification and scrubbing; CO_2 removal; gas analysis and propane addition; and grid injection.
- Heat Source: water source heat pumps or an electric boiler to be considered with prospective investors and technical adviser to ensure highest efficiency on a cost / production basis.
- Carbon capture and piping: multiple options being evaluated with a focus on proven technologies and nature of outputs (industrial grade CO_2 will be sufficient for greenhouse use such that equipment to upgrade to food grade is not required). In the absence of a greenhouse offtaker, options to reutilise CO_2 in fertiliser production may also be investigated.
- Construction: EPCM/EPC, to be considered for each Phase further with prospective investors.

Revenue streams:

- Biomethane sales revenue (injected into the national grid via an onsite injection point).
- Renewable Transport Fuel Certificates (a merchant revenue stream although negotiations are underway for potential “sleeve” contracts) and, subject to implementation, revenue under the Green Gas Support Scheme (which may facilitate a price floor at certain times, pending the outcome of the scheme consultation).
- Waste heat and CO_2 sales, either into the proposed local industrial heat network (being developed under this Invest Net Zero Cheshire project) or under a bilateral agreement with a proposed greenhouse.

Initial stakeholders: United Utilities (WwTW operator, landowner); Cadent (gas grid connection); a national grower (tenant of the proposed greenhouse to offtake, waste heat and CO_2 offtake) and HyNet (CO_2 distribution and permanent storage if required).

Professional advisors to date: Ikigai (bankability); Integrity Energy Services (technical); Gowling (legal) and Atkins (heat and biomethane).

Opportunity:

- Private sector funders / co-funders (alongside United Utilities)
- Technology and construction partners
- Green gas “sleeved” offtakers

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