



Carbon capture system reduces emissions and provides food-grade CO₂

CHP case study

Winnington CHP with CCU Technology

The Site:

A sodium bicarbonate and CHP site owned by Tata Chemicals Europe.

The CHP consists of two Combined Cycle Gas Turbine (CCGT) CHPs and accompanying boilers with an innovative Carbon Capture & Utilisation (CCU) system as part of a demonstration program for the technology.

The steam and power produced are used in manufacturing processes on-site and by other industrial businesses in the area.

Location:

**Winnington,
Northwich UK**

Date Operational:

July 2021

Investment Cost:

£16.7 million

Annual CO₂ Reduction:

40,000 tonnes

Project Objective:

To reduce the carbon emissions from the existing high efficiency CHP and to enable further growth in Sodium Bicarbonate production (which uses the captured carbon).

- To reduce the carbon intensity of electricity produced by the CHP to below that of a CCGT provided by the grid.
- To capture and upgrade CO₂ within the flue gas to food grade standard for use in the onsite manufacturing of high-quality Sodium Bicarbonate.
- To demonstrate CCU technology at industry scale, with the support of BEIS through the Carbon Capture and Utilisation Demonstration (CCUD) innovation programme, found [here](#).

- The existing CHP system consists of two 39.6MWe gas turbines and 21.4MWe of steam turbines with supplementary gas fired boilers.
- An Advanced Amine Technology (AAT) captures, cleans and stores pure CO₂ from the CHP flue gases for use in the manufacturing of sodium bicarbonate products.
- The carbon capture process utilises steam and power produced by the CHP, with any surplus exported to other industrial businesses in the area.
- The largest challenge to successfully implementing this project was ensuring the CO₂ was of food grade quality.

- Carbon emissions are to be reduced by up to 40,000 tonnes per annum once operational.
- Allows the site to grow its exports of Sodium Bicarbonate and will no longer need to buy in CO₂. Assuming a 20-year lifetime of the CCU plant, the CO₂ captured would cost in the region of £20/tonne of CO₂.
- Electricity will initially be produced at a carbon intensity of 200g/kWh, with a second phase expected to drop this much further.
- Represents a milestone in the rollout of carbon capture technology at this scale.

Peter Houghton
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