clarke energy

# Turning emissions into *solutions.*

## Carbon Capture Utilisation and Storage (CCUS)

Engineer - Install - Maintain

# Capture and reduce your carbon emissions to deliver a more *sustainable future*.

Carbon capture, utilisation & storage (CCUS) is the process of capturing $CO_2$ from energy intensive processes before it enters the atmosphere and finding a market use or transport to a storage facility. CCUS is now a key focus globally, with many government's offering incentives to encourage investment.

Clarke Energy has a history of innovation in power generation technologies and is now revolutionising $CO_2$ recovery in the energy sector. We can help your business harness the transformative potential of CCUS for a variety of applications and integrate the technology under a reliable single supplier.

**EMISSIONS REDUCTION**
Reduce / avoid carbon dioxide emissions from your business and align with global sustainability targets.

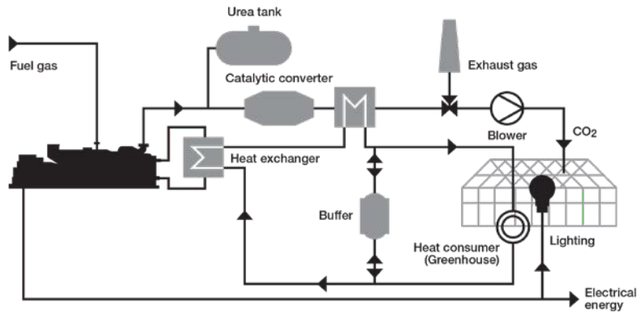
**IMPROVED EFFICIENCY**
Improving energy efficiency of operations can drive cost and carbon savings, boosting profitability.

**FLEXIBLE FUTURE**
Apply CCUS to new and existing energy assets to stay agile in a rapidly changing energy landscape.

## Leveraging $CO_2$ for Greenhouse Fertilisation

One approach for CCUS involves utilizing flue gas from power generation. This process, ideal for $CO_2$ fertilization in greenhouses, substantially boosts crop yields. Not only does it capture $CO_2$ but it also eliminates toxic elements such as $NO_x$ and CO.

The $CO_2$ concentration matches that of the exhaust gas (around 5% for natural gas operation). However, it doesn't increase $CO_2$ concentration, making it unsuitable for liquefaction and transportation. Challenges arise when dealing with biogas due to contaminants like $H_2S$ and the variability of feedstock materials. Furthermore, consumables, such as urea, must be considered.



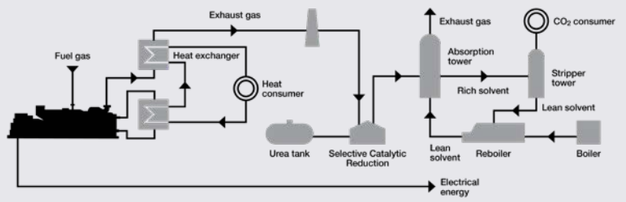

## High Grade $CO_2$ for Food and Drink

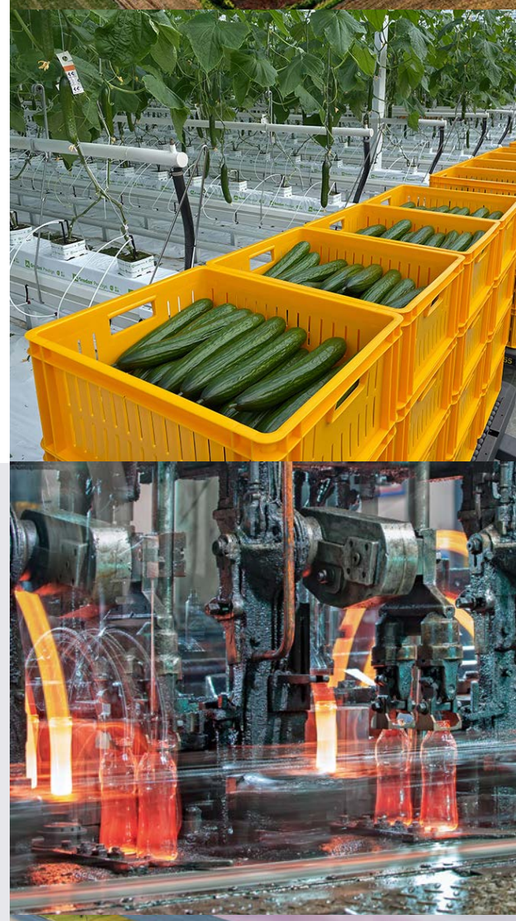
Another efficient method focuses on flue gas from engines, particularly those with low $CO_2$ concentrations. This approach meets the high-purity $CO_2$ requirements of food and beverage standards.

However, toxic components, namely $NO_x$ and CO, necessitate removal using equipment akin to the Selective Catalytic Reduction & CO Catalyst solution.

Solvents like amines or hot potassium carbonates are employed to capture $CO_2$. Although this system incurs substantial capital and operational costs, it currently stands as the sole commercially viable method for achieving high-purity $CO_2$ from hot flue gases.

Keep in mind the need for consumables, including steam for solvent regeneration, electricity, and chemicals, as well as cooling water.

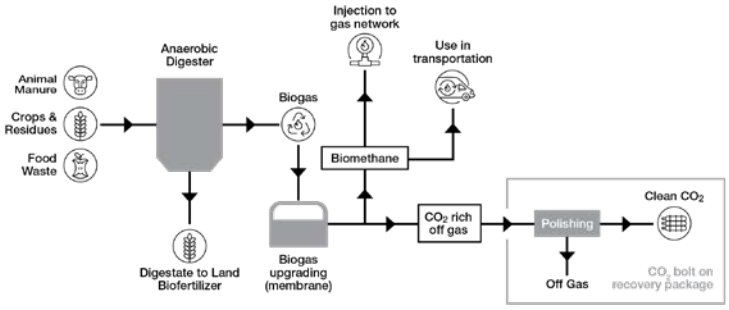


## Reliably Monetise Your Biogas with $CO_2$ Recovery

This approach revolves around the off-gas generated during biogas upgrading, specifically the $CO_2$ separation process. It is particularly well-suited for gases with high $CO_2$ concentrations and can meet the stringent purity requirements of food and beverage standards.

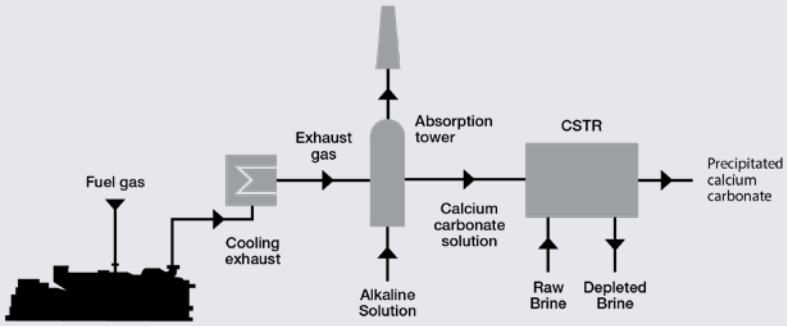
Notably, it enhances the overall efficiency of the biogas upgrading system by separating the remaining methane in the off-gas and recirculating it to the inlet of the upgrading system. Considerations include electrical consumption and absorbents for purification, albeit in minor quantities.




## Calcium Carbonate from Advanced Mineralisation

This technique transforms carbon dioxide into high-grade precipitated calcium carbonate. The process utilises brine and alkaline solutions, offering a unique and promising approach to carbon utilisation and storage.

Calcium carbonate can be used in various applications such as construction materials, aggregates and other industrial products.





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