The final major step in the process is the conditioning and compression such that the CO2 is suitable for entry to the transport and storage system. Post cooling, the CO_2 enters a knock-out drum to remove any water droplets from the stream before entering a multi-stage centrifugal compressor. For HyNet the onshore transport system is planned to always operate with CO_2 in gas phase, as such inlet conditions for the CO_2 require compression up to a maximum of 43 bar. To achieve this the CO_2 stream from the absorber, which is marginally above atmospheric pressure will go through 4 or 5 compressor stages, with intercooling and knockout between each stage. This will achieve a dry CO_2 at the required inlet temperature of around 40 to 45°C. There will be requirement to for further drying to reach the <50 mol ppm requirement of water, likely through a desiccant bed.

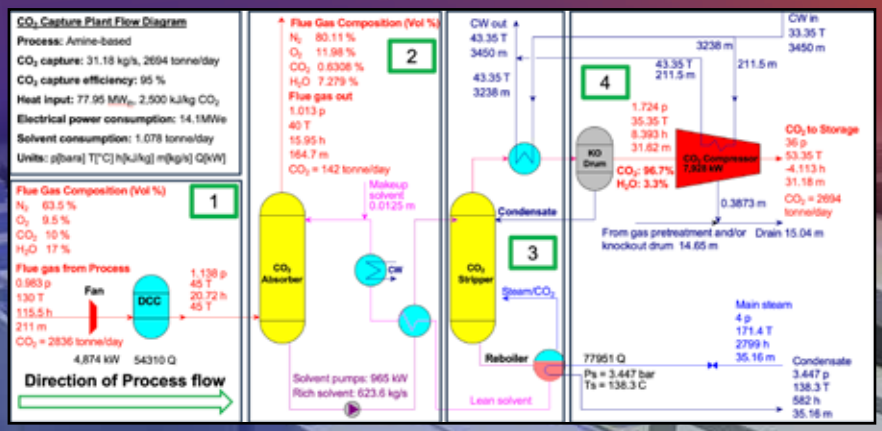
Outside of the core process there are other considerations which can optimise the overall efficiency of the capture process. This includes steam provision, optimisation of the DCC, clean flue gas heating, cooling water supply, and electrical power consumption.

Much of these optimisations are based on the configuration of the existing process that is being decarbonised. The simplest system is to provide steam from a dedicated package boiler or CHP, but this may not be the most cost-effective approach from a capital perspective or overall efficiency. On a plant with an existing steam provision, such as a refinery or EfW the system can be re-purposed to provide some, or all of the steam to the capture plant.

There is a significant cooling requirement for the process flue gas to cool it down to 45°C. Conversely the exit from the absorber at 40°C is too cold for the plume to be buoyant, adequately disperse and potentially meet plume visibility requirements. An air-to-air heat exchanger to cool the inlet flue gas from the process, and heat the exit flue gas from the absorber can significantly optimise the process. Further optimisation is done on a plant-by-plant basis.

The post-combustion capture plants within HyNet being deployed in the hard to decarbonise industries. They offer a cost competitive solution with a high technology readiness level. Whiles cost of capture currently will require a form of subsidisation, via a Contract for Difference (CfD) model for the emitters, it is predicted that as CO_2 emission price increases it will become less costly to capture and store the CO_2 via this method than to pay the via the UK Emissions Trading Scheme. These are also plants with stable CO_2 generation which enables a steady flow, this enables the CO_2 transport and storage system to have a high utilisation versus capture plant with a less stable output, such a post-combustion capture on the back end of a dispatchable power plant. The higher utilisation should result in lower overall transmission and storage cost per tonne of CO_2 captured.

For further information visit https://hynet.co.uk/ and www.progressive-energy.com



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