

ENABLING CCS SOLUTIONS

Daryl Stothard discusses the importance of electric actuation in carbon capture and storage

Carbon capture is becoming an increasingly central part of international decarbonisation initiatives



Various 'low carbon' future energy solutions are being evaluated to complement intermittent renewable sources globally. According to National Geographic, over 80% of our energy comes from fossil fuels that, when burnt, further exacerbate our current climate emergency. Carbon capture and storage (CCS) is one potential solution to this problem.

By extracting carbon dioxide (CO₂) from point sources, such as the flue gas stacks, and sequestering it, CCS provides options for achieving net zero objectives. While the energy is produced from traditional hydrocarbons and industries, governments are incentivising new ways to decarbonise.

To meet climate change targets in the next 30 years, approximately 7,500 large-scale carbon capture facilities must be deployed (IEA, 'Net Zero by 2050', May 2021). Electric actuators can be part of the progressive solutions being developed today to meet this ambition for energy transition.

This significant growth in required CCS, is only possible by driving down

the costs to enable more companies to participate. Understanding the market needs is more important now than ever. Rotork can support three core needs of CCS, these being efficiency, risk reduction and optimisation.

Efficiency is fundamentally important to the productivity of CCS. Electric and electro-hydraulic on-off and control valve actuators enable carbon capture industrial processing plants to simplify valve control operations. Complete electric valve actuation removes the need for an intrusive compressed air instrumentation system, so overall installation time is dramatically reduced compared to pneumatic valve actuation. There is a need for simple systems to enable affordable carbon capture plant designs to be easily adapted to their site needs.

RISK REDUCTION

Air compressors, tanks, dryers, tubing, control panels and lubricator sizing are not needed to be changed between new customer project sites when installing

electric actuators such as the IQ intelligent range, saving significant costs in time and money.

Electric valve actuators meet more end-user specifications, as standard, for the same applications, where pneumatic valve actuation solutions would need modifications between customers. Due to existing brownfield legacy specifications, some customers will require inherent pneumatic valve actuation when carbon capture is added to their site.

OPTIMISATION

Electric valve actuators optimise space by eliminating the need for compressed air systems. When compressed air is already available at a brownfield site, it could be impractical and expensive, in need of detailed engineering and modifications for these sites to utilise for CCUS.

Electric actuation is less carbon-intensive by removing the instrument air system – including compressors, tanks, dryer filters, ring mains and local control panels. Carbon capture plants with many control valves

will see real power savings with electric actuation due to their relatively low power consumption compared to pneumatic alternatives.

The CCS industry is at a key stage of development. Many industries, such as power generation, have been encouraged to adopt CCS technologies. Some emerging technologies are nearing maturity and are being tested to establish if they can be scaled up to commercial levels. Many countries are confident that the cost per tonne of CO₂ capture will likely decrease over time.

Flow control is central to the operation of key processes in CCS. Whether plants are capturing carbon pre- or post-combustion, transporting it for use or long-term storage, flow control solutions should be carefully considered and specified.

THE ROLE OF ELECTRIC ACTUATION AS A SOLUTION

Intelligent electric actuation offers solutions to specific problems in the CCS industry, for sites with smaller capture volumes, land or sea transport is used. The captured CO₂ is transported to industrial hubs and combined with CO₂ from other

sources to be distributed to points of use or long-term storage. Intelligent electric actuators can help support the transport of carbon dioxide from the point of capture to the point of use. Accurate and reliable actuators provide modulating flow control to pipelines, transport vehicles, vessels, or short-term storage.

Electric actuators have a low lifetime cost of ownership. Many Rotork products are sealed for life, resulting in longevity. Commissioning and maintenance are non-intrusive, with a comprehensive user interface, removing the necessity to break the seals. Operation, tuning and testing can be performed from a pivotal point, removing the need for maintenance engineers to travel.

One of electric actuators' key design considerations is minimising their energy usage. This reduces OPEX and lessens the customer's "carbon footprint".

The next generation of the CCS market is aiming towards a low-risk and low-reward business model, so improvements need to be made to meet this goal.

The need for scalable and economically attractive solutions will become more pressing as the range of CCS technologies

expands to include pre- and post-combustion applications. The cost of capturing CO₂ can vary widely, so flexibility and reliability in selecting the right intelligent flow control solutions will be essential to the continued development of carbon capture. ●

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Intelligent actuators are ideally suited to CCS applications