



rotork[®]

Intelligent Flow Control Solutions
**Carbon Capture and
Storage (CCS)**

Enabling a Sustainable Future



Why Carbon Capture?

Carbon capture technologies are important for achieving climate objectives, widening the portfolio of low-carbon power sources, and decarbonising hard-to-abate industries.

Carbon capture storage (CCS) has consistently been identified as an integral part of a least-cost range of technologies needed to support the transformation to low-carbon power systems globally. For Industry, CCS technologies are among the cheapest abatement options.

In order to meet climate change targets by 2050, approximately 7,500 large-scale carbon capture facilities must be deployed.

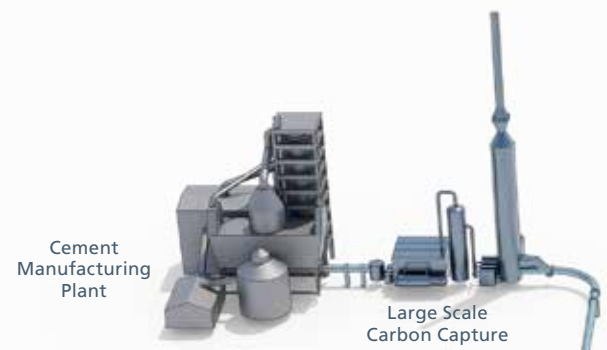
Source: IEA, 'Net Zero by 2050', May 2021

As a broader range of CCS technologies emerge for pre and post combustion applications, solutions will need to be scalable and made economically attractive as the cost of capturing CO₂ can vary significantly. Flexibility and standardisation of equipment selection will play a key role in control and automation designs to ensure efficiency, optimisation and risk reduction.

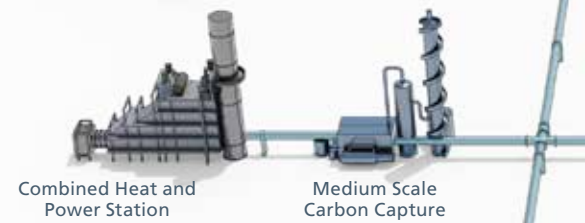
In this document, we identify the needs and challenges facing the CCS industry, and the flow control solutions that Rotork's electric actuators have to meet those needs. Our products are designed and engineered to very high-performance levels for durability, resulting in a low lifetime cost of ownership.

400,000 tpa
CO₂ Emissions - Tonnes Per Annum (tpa)
10,000 tpa

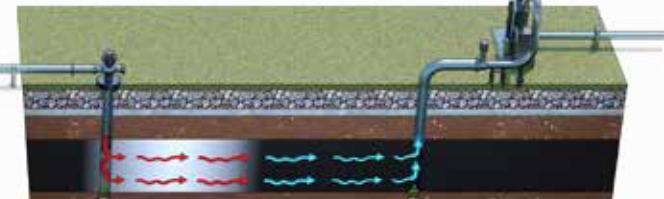
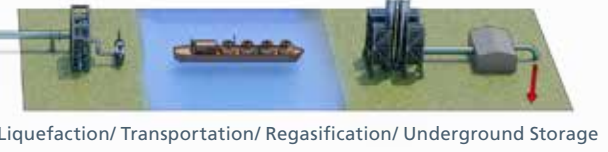
High CO₂ Output



Medium CO₂ Output



Low CO₂ Output





Rotork and Sustainability

As the physical effects of the global climate crisis become more apparent with each passing year, Rotork is committed to being an integral part of the solution to these momentous challenges.

Rotork is focused on the sustainability agenda laid out by our ESG committee and we have focused our efforts to encourage environmentally beneficial choices for the industries and applications we supply.

In this section, we detail our commitment to sustainability and our overall performance across ESG metrics.

Rotork and Sustainability

Our leading ESG ratings

MSCI

AA

Leader

S&P Global CSA

Top 20%

Ranked in the top quintile in our industry globally

Sustainalytics

Top

Industry top rated

Bloomberg ESG

56.5

Leading ESG disclosure score among peers



2021 performance across key ESG & Sustainability metrics:

2021 CO₂ Emissions
Reduced by

7%

Carbon Emissions
(per £m revenue)

-1%

Electricity Usage

-8%

Water Usage

-1%

Rotork's commitment to sustainability

Rotork has made a commitment to become a net-zero business by 2045, including scope 3 emissions. This promise is integrally important as an industry leader focused on accelerating the transition to a low-carbon economy.

Rotork's smart, low power solutions assist the electrification of industrial processes. Electrification is becoming a critical economy-wide tool for cutting emissions.

Rotork and ESG

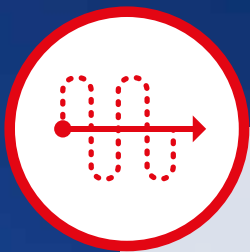
S&P placed Rotork in the 87th Percentile in the machinery & electrical equipment industry in its 2021 Corporate Sustainability Assessment. Sustainalytics ranks Rotork 10th out of 514 companies in the machinery industry (June 2022).

Rotork aims to reduce emissions associated with the use of our products to meet our targets and customer needs.

Rotork's eco transformation portfolio

The eco-transition portfolio comprises our 'water & wastewater'; 'methane emissions reduction'; 'new energies & technologies' portfolios, and others.

Carbon capture is an essential part of our new energies and technologies portfolio as we build our presence in sustainability.



Efficiency: Market Needs and Their Solutions

For CCS to be commercialised on a large scale it needs to become a more efficient industry.

CCS is a relatively low profit margin market, so ensuring that every part of the operation works effectively is essential.

In the following section, we describe areas that have high efficiency needs and how electric valve actuation can be part of the solution.

Efficiency: Market Needs and Their Solutions

Need: OPEX Reduction

CCS is a low-profit margin market with relatively high annual operating expenditure (OPEX) to initial capital expenditure (CAPEX), leading to a need for OPEX cost reduction.

Solution

Rotork electric valve actuators have a low lifetime cost of ownership, providing OPEX certainty.

Many of our products are 'sealed for life'. Commissioning and maintenance are non-intrusive, with a comprehensive user interface that removes the need to break product seals.

Rotork's electric actuators with on-board data loggers enable sites to download information for reviewing the health of valves and actuators, reducing unnecessary intervention and maintenance.

Need: Improve Installation Time

Simple and fast installation is critical to effective deployment. As private equity will enable this market to grow rapidly, these investors will need certainty in projects being delivered on time.

Solution

Rotork manufacture robust and user-friendly electric and electro-hydraulic on-off and control valve actuators that enable carbon capture industrial processing plants to simplify their 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.

Need: Operational Flexibility

In order for CCS to be effective, it needs to be streamlined. The removal of complex systems enables CCS technology to be more flexible and meet customer challenges more effectively.

Solution

As many new industries look to carbon capture to meet their decarbonisation goals, there is a need for simple systems to enable affordable carbon capture plant designs to be easily adapted to their site needs.

Rotork standard electric actuators meet a large range of specifications and comply to the most demanding customer needs.



Risk Reduction: Market Needs and Their Solutions

CCS will incorporate new progressive technologies, while financial investment in the sector will need certainty to enable projects to be sanctioned.

Here we discuss the ways that standardisation, simplified scaling and easy specification can help reduce risk.

Risk Reduction: Market Needs and Their Solutions

Need: Standardisation

Reducing waste, improving predictability, and increasing productivity all require standardisation of products.

Solution

Rotork standardises electric valve actuators to comply with a large range of application demands. This enables the same Rotork electric actuator to meet many customer and regulation needs. Rotork products are certified for use in hazardous, dusty, wet, hot, cold and other arduous environments.

Need: Rapid Scaling

CO₂ emitters will require different volumes of CO₂ captured. Auxiliary system modifications are an obstacle to meeting this need.

Solution

Electric valve actuators have no need to change air compressors, tanks, dryers, tubing, control panels or lubricators sizing/specifications, between new customer project sites, saving significant costs in time and money.

Need: One Specification for all Customers

Standardised procurement specifications are needed to enable scaling and standardisation opportunities.

Solution

Rotork's electric valve actuators meet more oil and gas end-user specifications, as standard, for the same applications, where pneumatic valve actuation solutions would need modifications between customers.

Rotork understands that some customers, due to existing brownfield legacy specifications, will require inherent pneumatic valve actuation when carbon capture is added to their site, which Rotork's comprehensive product range can provide.



Optimisation: Market Needs and Their Solutions

A significant optimisation solution that can enable the next generation of CCS technologies is digitisation.

Digitisation can enable process cycles to be remotely operated; provide insight into first of a kind (FOAK) project technology for the Nth of kind (NOAK) update improvement benefits with speed.

Here we discuss the needs for process and space optimisation along with reducing the carbon intensity to stay true to the CCS cause.

Optimisation: Market Needs and Their Solutions

Need: Optimise Processes

As the next generation of technologies develop, there is a need for improvements in sub-systems to help a low margin industry optimise and provide certainty for investors.

Solution

Rotork intelligent electric actuators include, for example, on-board data loggers that provide operational insight, as standard.

Additionally, 'Rotork Site Services' programmes include 'lifetime management' and 'intelligent asset management' to enable new technologies to build, measure and learn for rapid scaling.

Need: Optimise Space

As many carbon capture plants will be installed on existing brownfield sites, modularised and compact plant technologies are emerging to meet space constraints.

Solution

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

Need: Reduce Carbon Intensity

There is a need to decrease the amount of unnecessary assets that affect the carbon footprint across the entire process.

Solution

A public dialogue report commissioned by the UK government in July 2021, illustrated the need for CCS to be 'effective' in reducing emissions, but also with the lowest carbon footprint, when compared to alternative renewables.

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 a high number of control valves, will see power savings with electric actuation, compared to pneumatic alternatives.

Why Rotork?

Enabling a sustainable future

Rotork was founded in the 1950's with the invention of the modern-day electric valve actuator.

Generations of Rotork employees have continued to break boundaries with electric valve actuation and at the same time Rotork has expanded its portfolio to include electro-hydraulic, hydraulic and pneumatic solutions.

Enabling a sustainable future is integral to everything we do and our purpose of "keeping the world flowing for future generations" is core to all our development and innovation.

As many next generation CCS technologies emerge, we are well positioned to provide the solutions for tomorrows' needs - today.

Challenging traditional mindsets

Rotork is here to support your needs, to think differently and enable your progressive technologies to become more efficient, optimised and reduce risk.

Rotork are market leaders in electric actuation and we have enabled customers to challenge the status quo in valve control. Today, Rotork increasingly supports customers to transition from traditional pneumatic systems to electric solutions which result in lower costs and greater digital capabilities.

If your company wants to think differently and challenge the traditional mindset, then Rotork are here to support you as we have done so for over 60 years. If you are looking for greater flexibility and lower costs through modular and standardised designs, then reach out to Rotork, as we are here to support in your aspirations to go all electric.







rotork®

Site Services

Our service engineers work with industrial partners to design, update and maintain their plant and equipment.

Rotork's Site Services offers specialist expertise and insight into the maintenance of mission-critical flow control equipment. We offer global frontline support backed by dedicated in-house experts.

Our services increase plant efficiency and reduce maintenance costs, while workshop services return equipment to as-new condition. Our experience and understanding of the flow control industry means we have extensive insight and ideas of what we can do to provide significant value to our customers and their operations.

We deliver our site service products, with a variety of unique features that set us apart. On the next page, we list some of the most valuable services we provide.

Find out more, and download our brochure at www.rotork.com/en/services-support/site-services



Field Support

- Maintenance planning and scheduling
- Site repairs and commissioning
- Upgrades



Actuator Workshop Overhaul

- Rotork and non-Rotork products
- OEM certified workshop facilities
- Large OEM spares stock in all workshops



Valve Automation Services

- Correct product selection to suit the process demands
- System integration
- Power supplies, motor control centres, etc.



Lifetime Management

- Increased uptime/reduced downtime
- Maximised productivity
- Reduced operational risk



iAM Report (Intelligent Asset Management)

- Predictive diagnostics with actionable insights
- Annual report gives snap-shot of asset(s) condition
- Quarterly reports give rolling view of asset(s) condition



Parts

- Genuine Rotork OEM parts
- Global availability
- Protect original build specification/certification



A full listing of our worldwide sales and service network is available on our website: www.rotork.com

Contact our Business Development Manager for CCS, Daryl Stothard
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