CARBON CAPTURE, UTILIZATION AND STORAGE

SICK solutions for CCUS applications

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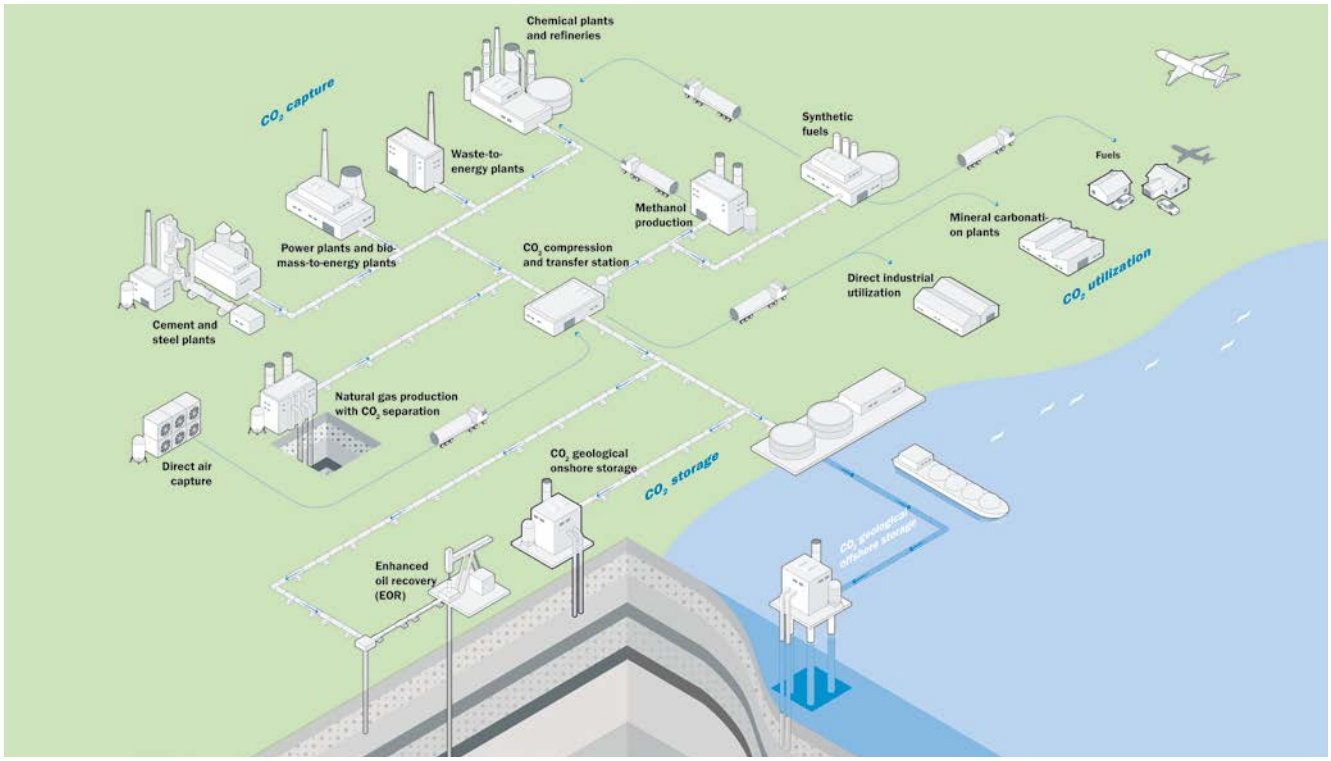
The amount of carbon dioxide (CO_2) released into the atmosphere has increased significantly since the beginning of the industrial age. Climate change mitigation calls for limiting global warming by 1.5 °C. This climate goal can only be achieved through a drastic reduction of the CO_2 concentration in the atmosphere.

Technology for carbon capture, utilization and storage (CCUS) will play an important role in mitigating climate change as a fundamental component of decarbonization and could pave the way to a low-carbon future.

www.sick.com/ccus

CCUS ECOSYSTEM

Carbon capture is a technology approach that can remove up to 90% of the carbon dioxide (CO_2) emissions produced from the use of fossil fuels in electricity generation and industrial processes, preventing the carbon dioxide from entering the atmosphere. The captured carbon dioxide can be transported to a permanent storage (usually deep underground) or recycled for further use via conversion into other substances or products with higher economic value (i.e. synfuel, plastics, concrete) while retaining the carbon neutrality of the production processes. With the development of CCUS technologies, new challenges are also arising for sensor solutions. SICK already has solutions to support carbon capture and CO_2 transport applications.



CHALLENGES

Reporting and accounting of CO_2 quantities

Flow metering will become necessary for fiscal purposes, custody transfer and compliance with future regulatory measurements. For each step of the CCUS network, accurate flow measurement allows for complete and precise reporting and the possibility of billing the captured carbon dioxide collected from different sources, transported via pipelines and stored or reused.

Process efficiency

Carbon capture processes require a high degree of efficiency to improve their economic and environmental attractiveness. The measurement of CO_2 content after the capture process is essential for control and optimization purposes.

Quality control

Regardless of the destination of the captured CO_2 (storage or utilization), it is important to control the quality of the gas and possible impurities that can have a negative influence on the later steps of the CCUS network and ensure protection of the environment.

8026797/2021-08-05
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Gas flow measurement for transfer and process applications

Carbon dioxide can be captured from a variety of emission sources, collected, and transported via pipelines or by ship for subsequent storage or use. This requires gas flow measurements at each transfer point to check the amount of CO_2. Precise gas measurements allow correct billing of the companies that want to use the carbon dioxide. CO_2 taxes and allowances can also be calculated on the basis of the measurements. Whether as a stand-alone device or part of a system solution, the FLOWSIC600 and FLOWSIC600-XT gas flow meters provide reliable and precise data for successful control of processes along the CCUS chain.

- FLOWSIC600 and FLOWSIC600-XT gas flow meters

➜ www.sick.com/FLOWSIC600

➜ www.sick.com/FLOWSIC600-XT

Reliable turnkey solution for CO_2 metering

The FLOWSKID flow metering system from SICK offers a complete turnkey solution for gas flow measurement. The system can be flexibly configured and provides highly accurate measurement data. At the heart of the metering skid is a FLOWSIC600 or FLOWSIC600-XT ultrasonic gas flow meter, which makes the system very reliable. The metering skid can be extended to include gas analyzers, gas chromatographs and flow computers, thereby enabling it to be tailored to the specific application requirements. The system is manufactured according to ISO standards and meets all current quality requirements according to DIN, ANSI and ASME. This ensures conformity to the applicable local regulations and requirements.

- FLOWSKID flow metering system

➜ www.sick.com/FLOWSKID

Measurement of the concentration of captured CO_2

Before the CO_2 released by various industrial processes can escape into the atmosphere, it can be captured with the help of a special device installed at a suitable location. To monitor and optimize the efficiency of the CO_2 capture, the GM35 in-situ gas analyzer precisely measures the CO_2 concentration directly within the gas channel without the need for sampling. The reliability, accuracy and short response time of the GM35 are highly advantageous to the efficiency of control loops. Furthermore, the gas analyzer is able to perform H_2O, temperature and pressure measurements, thus making it an ideal addition to any process control system. Continuous monitoring of the CO_2 concentration is also important when transferring the captured gas for further processing as well as for billing purposes.

- GM35 in-situ gas analyzer

➜ www.sick.com/GM35

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Quality measurement: analysis of the CO_2 concentration and impurities in the captured CO_2 gas matrix

Carbon capture produces a highly concentrated gas with a CO_2 volume fraction of over 90%. This gas matrix, however, also contains other components that are considered impurities. It is essential to measure these components. The extractive analyzers from SICK monitor multiple components simultaneously, continuously and precisely, thereby enabling CCUS processes to be optimally controlled and improved. Hot/wet extractive measuring devices such as the MCS200HW, for example, are suitable for measuring CO_2, H_2O, HCl, SO_2, CO, NO_x, NH_3 and O_2. Cold/dry extractive measurement technology is used for applications with lower corrosion exposure, or when only a few components need to be monitored.

- MCS200HW, GMS800 extractive gas analyzer, MCS300P HW process solution

➜ www.sick.com/MCS200HW

➜ www.sick.com/GMS800

➜ www.sick.com/MCS300P_HW

Greenhouse gas (GHG) monitoring

EU Directive 2003/87 / EC, which establishes a scheme for greenhouse gas emission allowance trading, requires that the CO_2 emissions from all CO_2 sources at a power plant and other installations covered by the directive be documented. Since the exact CO_2 concentration is difficult to calculate, emission measurement directly within the flue offers a useful alternative. SICK has developed an excellent CEMS solution for direct monitoring of CO_2 emissions: GHG-Control. This solution from SICK also provides plant operators with the necessary information to produce measurement uncertainty certificates in accordance with the EU emissions trading regulations. GHG-Control is a complete measurement system comprising not only the GM35 in-situ gas analyzer, the FLOWSIC100 ultrasonic flowmeter, and the MEAC GHG data acquisition system but also services.

- GHG Control CEMS solution

➜ www.sick.com/GHG-Control

Space and protection for measurement and analysis technology

Container solutions are primarily used to protect the installed analyzer systems from extreme ambient conditions such as heat, cold, dust, wind, earthquakes and corrosive or explosive atmospheres. They also offer advantages for transport as well as on-site installation and maintenance. At the factory, everything is coordinated and pre-installed in the container in a clear manner. Each container can be equipped to fit individual customer requirements. The installation of transformers and UPS, extinguishing, climate and gas warning systems is possible, as is the implementation of sample point switching or complex redundancy and signal concepts.

- Shelter Solutions

➜ www.sick.com/shelter_solutions

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