



**Rockwell
Automation**

CARBON CAPTURE AND STORAGE TECHNOLOGY

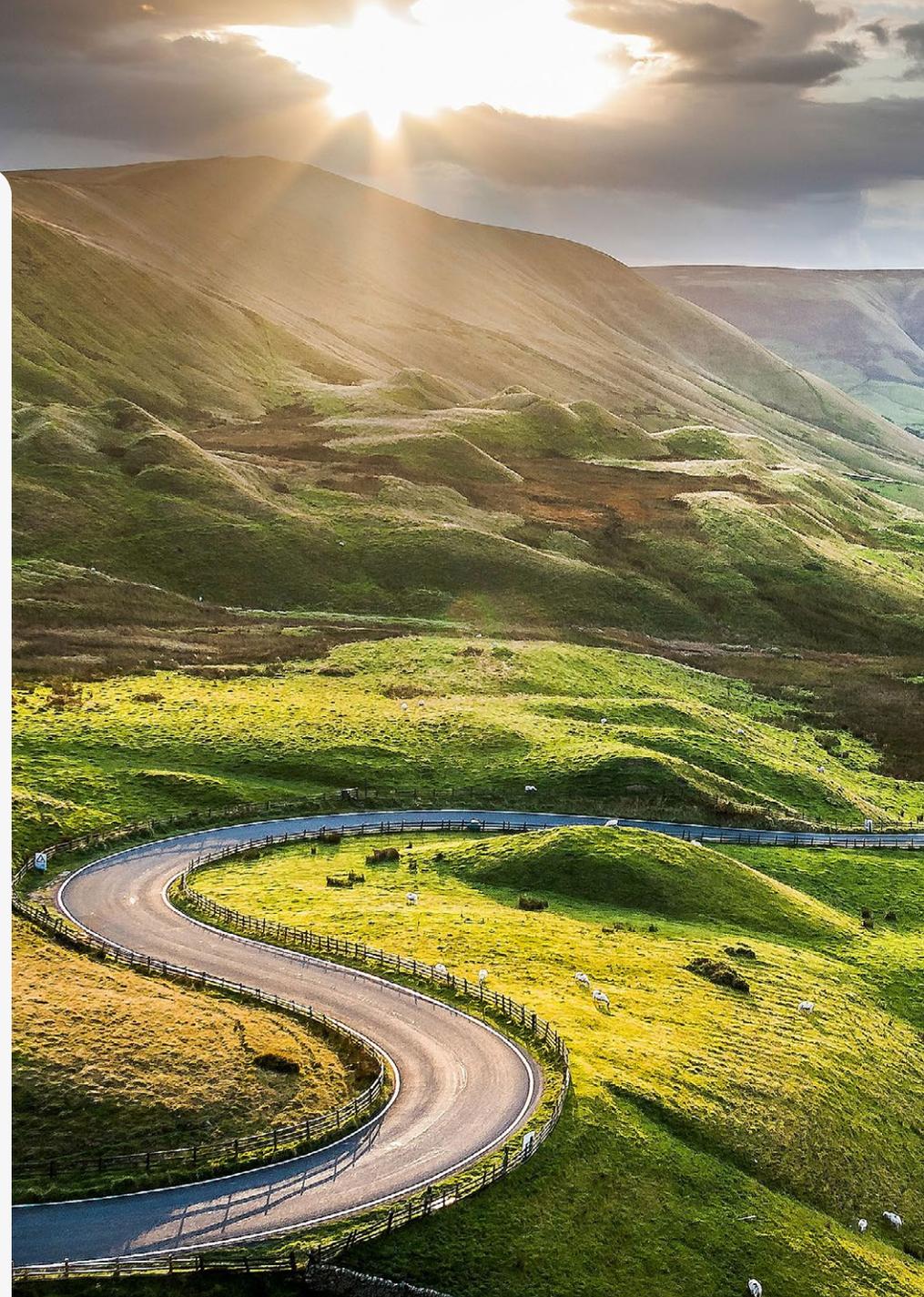
Capturing carbon emissions for improved sustainability outcomes

Carbon capture drives **sustainability** and **industry resilience** worldwide

In today's dynamic industrial landscape, the imperative for sustainability looms large. Carbon capture technology emerges as a beacon of hope, offering a transformative solution that not only mitigates environmental impact but also enhances the resilience and longevity of industries. Here's why it holds immense promise:

- **Environmental stewardship:** Carbon capture cuts greenhouse gas emissions, curbing climate change effects and preserving ecological balance.
- **Enhanced efficiency:** Integrating carbon capture optimizes resource use, cuts waste, and boosts operational efficiency for sustainable production.
- **Regulatory compliance:** Adopting carbon capture shows proactive adherence to environmental rules, averting penalties and reputational risks, and showcasing corporate responsibility.
- **Economic viability:** Carbon capture investment drives innovation, cost savings, and new revenue streams, positioning industries for sustainable growth and competitiveness.

By embracing carbon capture, industries can embark on a journey towards a greener, more prosperous future – where environmental responsibility converges with industrial resilience, driving positive outcomes for both business and the planet.



Challenges faced by industry

Implementing carbon capture and storage (CCS) initiatives in industry poses multifaceted challenges. While there are many environmental, compliance and commercial benefits to CCS, meeting ambitious net-zero goals demands rapid adoption, which presents several hurdles.

Direct Air Capture (DAC) Challenges

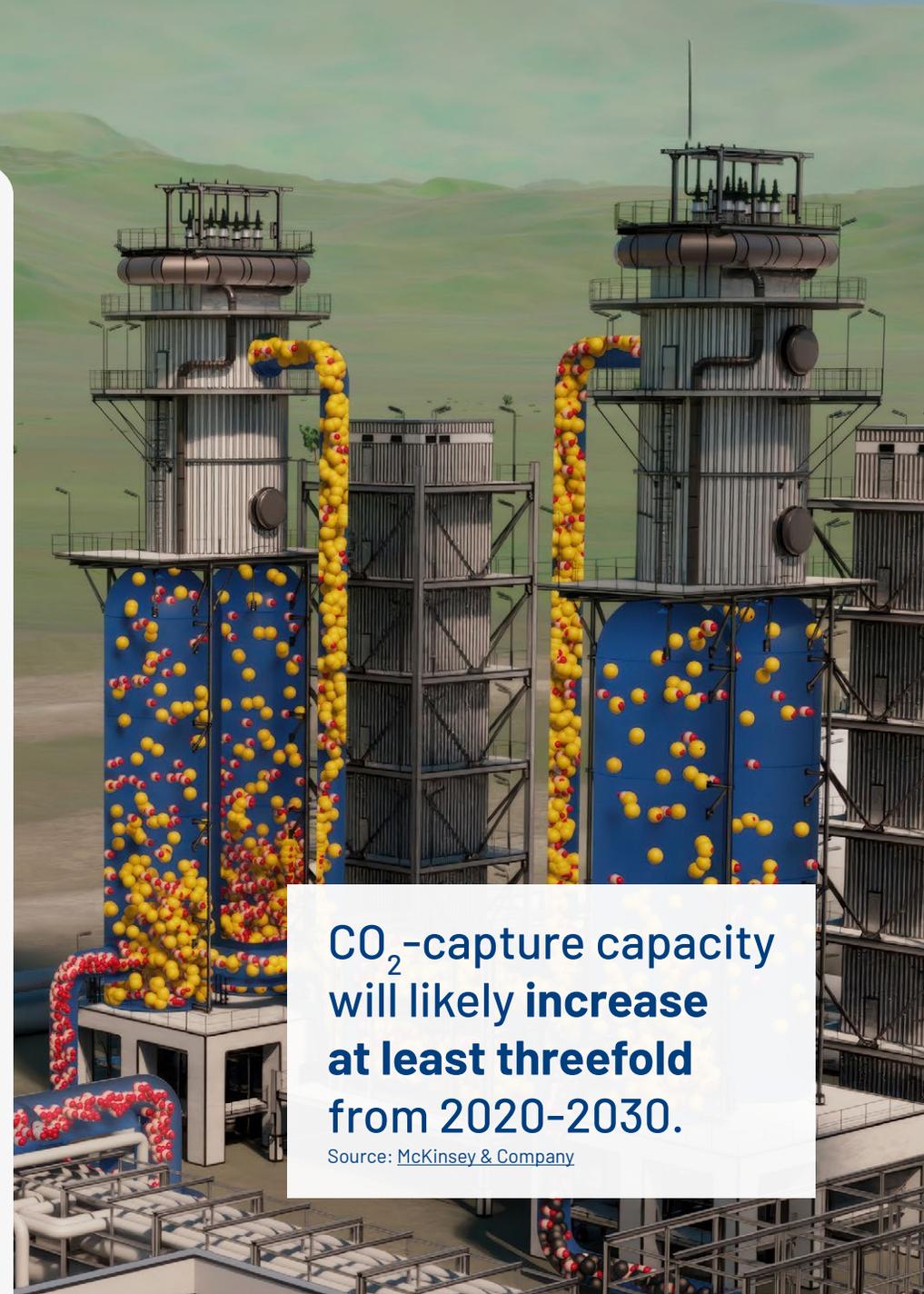
DAC systems require significant amounts of energy to capture CO₂ from the atmosphere. This can lead to higher operational costs and potentially negate some of the climate benefits if the energy used is not sourced from renewable resources.

The high cost of capture and subsequent processing or storage of CO₂ can be prohibitive and will require substantial investment in infrastructure and technology development.

Point-source Capture (PSC) Challenges

Integrating PSC systems into existing facilities can be complex and costly, requiring significant modifications to accommodate the capture units and manage increased energy demands. Tailoring systems to specific emission profiles is necessary but can complicate deployment. Once captured, CO₂ must be transported and securely stored. This adds logistical challenges and costs, particularly if storage sites are not in proximity to the capture sites.

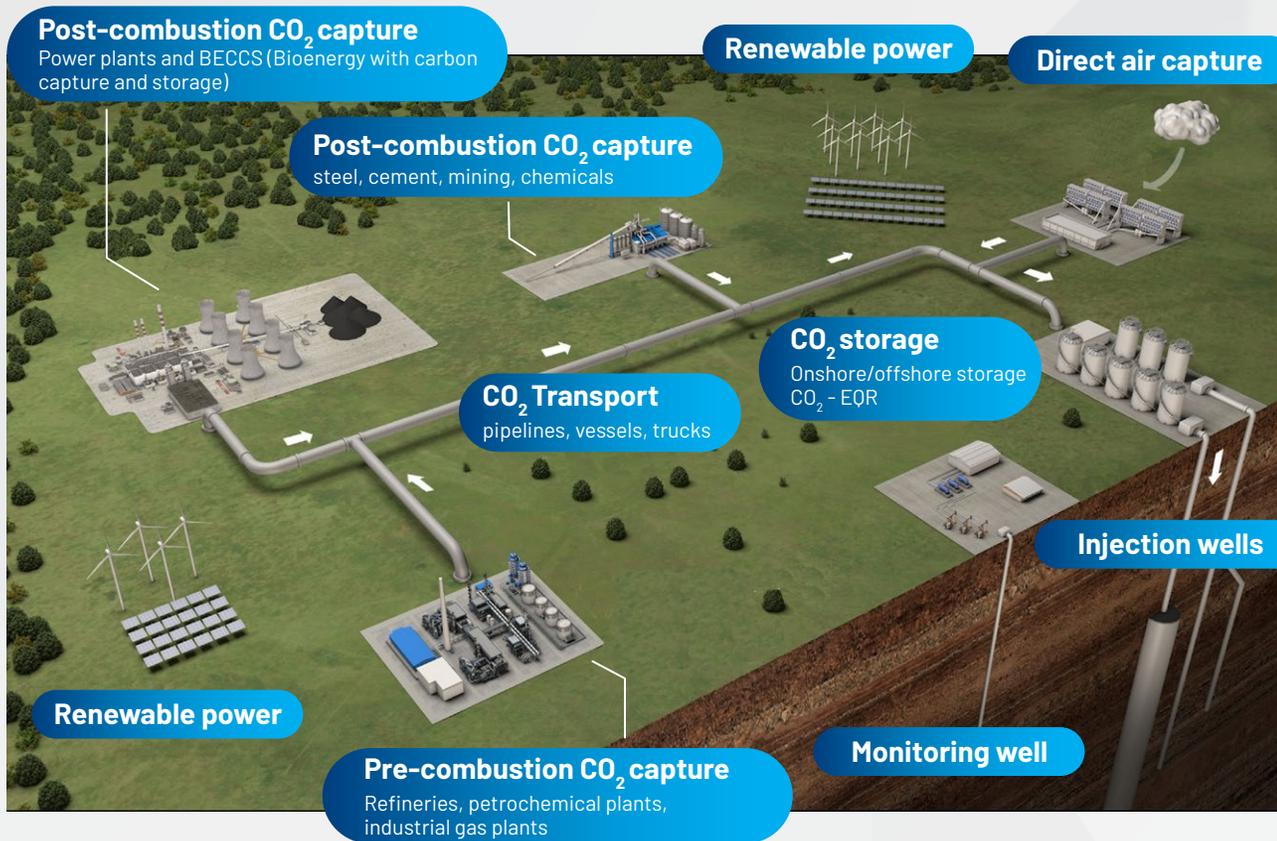
Both DAC and PSC technologies share some common challenges, such as the need for compliance, reporting, and the development of a skilled workforce. These challenges can be daunting, but should not dissuade investment, given the huge potential that CCS technology promises for companies and communities alike.



**CO₂-capture capacity
will likely increase
at least threefold
from 2020-2030.**

Source: [McKinsey & Company](#)

Aligning investments with innovation



Addressing the intricate challenges of implementing CCS initiatives, **Rockwell Automation accelerates carbon capture projects with a modular, standardized solution** that can be rapidly deployed across various sites and industries, facilitating quicker adoption and scalability.

By leveraging advanced automation and digitalization, our approach adopts a “design one, deploy many” strategy, enabling efficient achievement of net zero goals at scale.

We enhance CCS efficacy and reduce operational costs through innovative control and monitoring systems, while also building resilience into industrial systems to ensure safety and security throughout the CCS lifecycle.

Our approach empowers people by providing comprehensive training and support, addressing the shortage of skilled workers in the CCS domain. Through these efforts, we enable industries to navigate CCS adoption seamlessly. Let’s accelerate the journey towards a sustainable future!

Rockwell Automation has entered into a direct air capture carbon removal credit agreement with 1PointFive

Source: [Rockwell Automation Announces Direct Air Capture Carbon Removal Credit Agreement With 1PointFive | Rockwell Automation | US](#)

Accelerate transformation

In today's fast-paced industrial landscape, agility is key to success. Industries are faced with mounting pressures to innovate, streamline processes and comply with evolving regulations. Yet, traditional methods of project design and operation can stifle progress and undermine competitiveness. Accelerated digital transformation is essential to swiftly address these challenges.



MODULAR DESIGN

Our integrated, flexible control systems empower quick adoption, efficient scaling, and innovation. Embracing modular principles streamlines workflows and fosters continuous improvement.



DIGITAL ENGINEERING

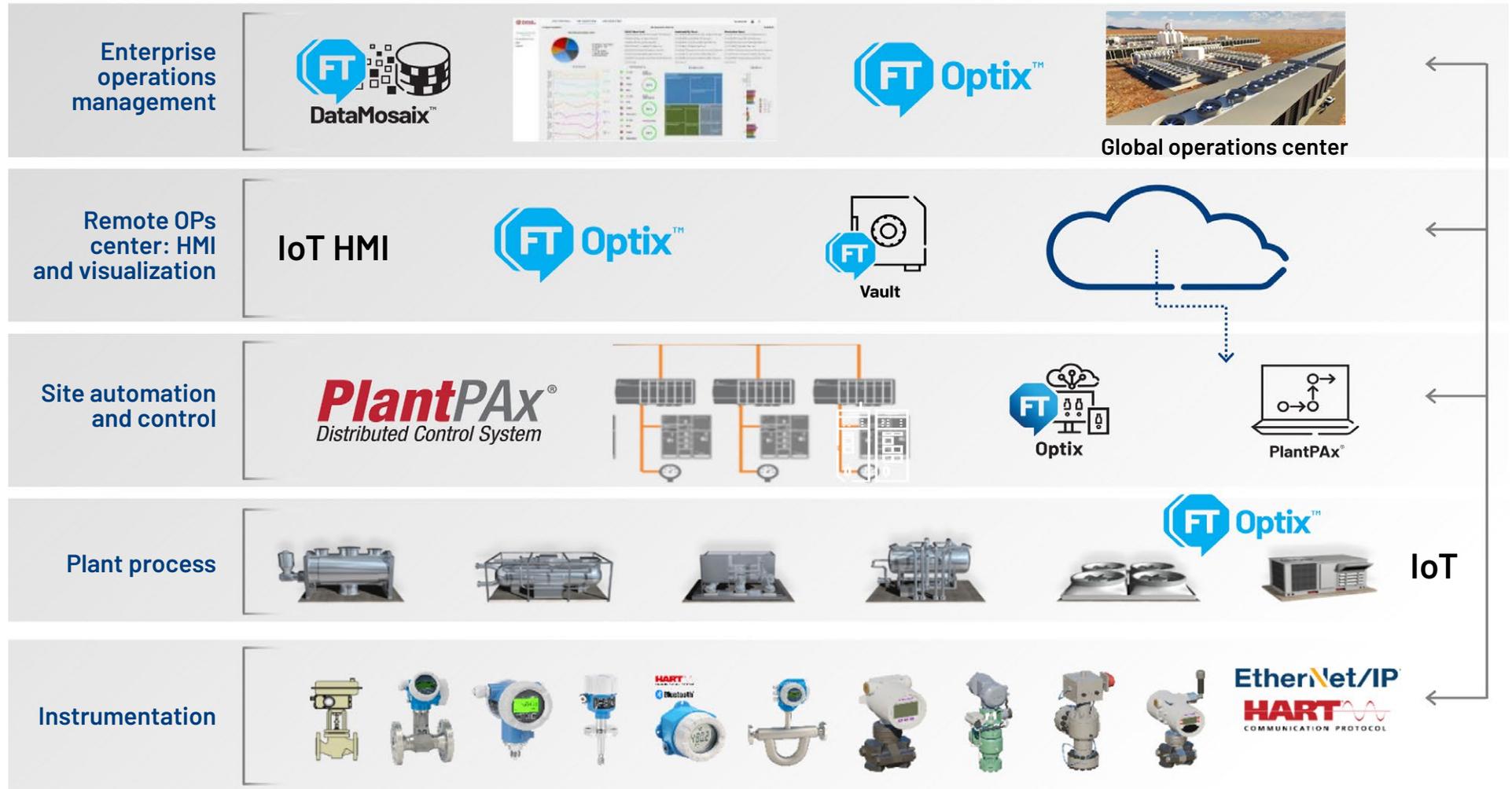
In the digital age, our tools enable industries to match the pace of innovation. From simulation to maintenance, they expedite project lifecycles and enhance operational excellence.



REMOTE OPERATION

Our dedication to remote operation provides real-time insights for informed decisions. Harnessing data-driven approaches optimizes performance, efficiency, and competitiveness. More than simple monitoring, remote operations enable proactivity.

Our digital solutions enable enterprise operations management



Optimize operations

Getting the most from CCS initiatives takes advanced technologies and prioritizing efficient asset management.

Through **PlantPax**®, our distributed control system that's tightly integrated with our **PowerFlex**® range of variable frequency drives, we achieve seamless integration and coordination, maximizing resource utilization.

Elevate productivity with Advanced Process Control, powered by **FactoryTalk**® **Analytics**™ **Pavilion8**® and **PlantPax MPC**® (Model Predictive Control). This technology optimizes real-time process parameters, yielding several key benefits: it significantly cuts energy usage and emissions, boosts the efficiency of carbon capture, and enhances overall process sustainability. The outcomes are a more sustainable operation, reduced operational costs, and an improved environmental impact.

Sensia's MMV (Monitoring, Measuring and Verification) capabilities, complemented by PlantPax, facilitate optimized CCS operations capable of handling various challenges, particularly during storage and sequestration. PlantPax seamlessly integrates data sources, including monitoring and measurement devices, enhancing decision-making and operational efficiency. Leveraging PlantPax, Sensia's solutions boost reliability and minimize downtime with advanced analytics and predictive maintenance.

Combining Sensia's MMV capabilities with PlantPax's robust control features improves both operational and financial performance. Optimized operations reduce maintenance, repair, and overhaul (MRO) costs, refine storeroom processes, and pinpoint obsolescence risks. This comprehensive, data-driven approach ensures the success and sustainability of CCS implementations, driving productivity and delivering significant bottom-line impact.



Build resiliency

Through strategic partnerships and innovative solutions, Rockwell Automation empowers industries to build resilience in CCS implementations. From enhancing process safety to addressing cybersecurity risks, our collaborative approach ensures operational continuity and sustainability in the face of evolving challenges.



Remote monitoring: Remote monitoring provides continuous surveillance of critical assets and processes. Dashboards, sensors, and real-time data analytics enable proactive responses to emerging issues, preventing disruptions and optimizing performance.



Emission Management: Rockwell Automation and Sensia's expertise in digital solutions, combined with integrated automation, enhances pipeline integrity management. Advanced leak detection systems and predictive analytics help identify and address leaks promptly, minimizing environmental impact and ensuring operational continuity.



Cybersecurity: With cyber threats always real and lurking, Rockwell Automation and our partnerships bolster defenses against these challenges. By implementing robust cybersecurity protocols and leveraging cutting-edge technologies, we safeguard critical infrastructure from potential breaches, ensuring operational resilience.



Scalability and integration with existing systems: Our solutions seamlessly integrate with existing processes, ensuring smooth implementation and operation of carbon capture technologies, reducing the overall investment of time and capital. Our platforms are flexible, scalable and allow for easy expansion, handling larger CO2 volumes without significant additional investments as your operation grows.

Petroecuador Balao monitors the process variables and manages valves for pumping – tripling capacity, reducing downtime and enhancing system safety and reliability.



Empower people

As carbon capture gains momentum as an emerging industry segment, the demand for skilled workers outpaces the available talent pool. Addressing this gap requires innovative solutions that marry human expertise with cutting-edge technology.

Knowledge transfer and training initiatives play a pivotal role in equipping workers with the requisite skills to navigate CCS systems proficiently. By fostering a culture of continuous learning, comprehensive training programs ensure personnel are adept at harnessing the full potential of these transformative technologies.

Remote assistance serves as a cornerstone of this collaboration, providing real-time support to field workers. Leveraging technologies like Remote Operations and Augmented Reality (AR) with Vuforia® Chalk, experts guide on-site personnel through troubleshooting and maintenance tasks from afar. This integration of human ingenuity with technological innovation not only enhances operational efficiency but also ensures the reliability and safety of CCS systems.

Embracing the Connected Worker paradigm enables industries to harness the collective expertise of individuals and the capabilities of CCS technologies. By bridging the gap between skilled workers and emerging industry demands, this holistic approach drives sustainable practices and fosters environmental stewardship, propelling CCS into the forefront of the global energy transition.



Drive sustainability

In today's era of heightened environmental awareness and regulatory scrutiny, CCS has the potential to make an impact for industries worldwide. The key to sustainable operations is not only reducing our carbon footprint but allowing operations to maintain profitable margins during the energy transition.

Accurate emission accounting: Sensia's MMIS and Emissions Monitoring solutions provide industries with precise accounting of companies making progress with reducing emissions. Sensia's solutions also improve GHG emissions reporting and compliance, enabling industries to meet stringent regulatory requirements with ease. By leveraging advanced monitoring and reporting capabilities, businesses can ensure transparency and accountability in their environmental practices.

Energy usage reduction: Through FactoryTalk® Energy Manager™, industries can effectively reduce energy usage and carbon footprint throughout the CCS value chain. By optimizing energy management processes and identifying areas for improvement, businesses can achieve significant reductions in greenhouse gas emissions while enhancing operational sustainability.

In essence, the integration of MMIS, emissions monitoring, and energy management technologies empowers industries to drive sustainability across their operations. By providing accurate emission accounting, reducing energy usage, and improving GHG emissions reporting, these solutions allow for complete visibility over the process of decarbonization and meeting regulatory expectations.



LEADING THE WAY IN CCS TECHNOLOGY:

Partner with Rockwell Automation

As the global demand for sustainable solutions continues to rise, CCS technology emerges as a pivotal tool in mitigating greenhouse gas emissions and combating climate change. At Rockwell Automation, we stand at the forefront of this technological revolution, positioning ourselves as the ideal partner to lead the development and implementation of CCS solutions.

Design one, build many approach: With a commitment to innovation and efficiency, Rockwell Automation embraces a “design one, build many” approach. By standardizing processes and technology, we streamline implementation, reduce costs, and accelerate time to market, ensuring rapid deployment at scale and widespread adoption of CCS systems.

Understanding industry needs: With over 100 years of experience serving diverse industries, Rockwell Automation has a deep understanding of the engineering challenges and regulatory landscape facing many industries. From energy and utilities to manufacturing and beyond, we have a proven track record of applying technology and services to drive operational excellence and sustainability. Our customer-centric approach ensures that CCS technologies are not only effective but also seamlessly integrate into existing workflows, maximizing value and minimizing disruption.

Extensive partner network: Collaboration is key to success in the adoption of CCS, and Rockwell Automation boasts an extensive partner network comprising industry leaders, technology innovators, and solution providers. Through strategic partnerships and alliances, we harness collective expertise and resources to deliver comprehensive CCS solutions that address the complex needs of anyone embarking upon a CCS project.

One customer is reducing emissions by 30% while plugging captured carbon into the circular economy.

[READ THE CASE STUDY](#)



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