Advanced Carbon Capture Utilization and Storage Training Course



20 - 24 Dec 2026

Doha

5500 € (Per Person)

Ref: #OG1355_225594

Course Introduction / Overview:

This comprehensive course provides an in-depth exploration of Carbon Capture, Utilization, and Storage (CCUS), a critical suite of technologies for achieving global climate targets and facilitating industrial decarbonization. As nations and corporations strive for net-zero emissions, understanding the entire CCUS value chain is no longer optional but essential for strategic planning and sustainable operations. This program moves beyond theoretical concepts to deliver practical, actionable knowledge on the engineering, economic, and regulatory facets of CCUS projects. Drawing on foundational principles outlined in works like "Carbon Capture and Storage" by Stephen A. Rackley, the curriculum covers the full project lifecycle from initial technology selection to long-term monitoring. Participants will gain insights into the complex decision-making processes, informed by the pioneering research of academics like Dr. Sally M. Benson on geological sequestration. BIG BEN Training Center has designed this course to empower professionals with the skills to evaluate, plan, and manage complex CCUS initiatives, ensuring they can lead their organizations in the transition to a low-carbon future. This training is an indispensable resource for anyone involved in energy, environmental management, or corporate strategy.

Target Audience / This training course is suitable for:

- Engineers (Chemical, Petroleum, Mechanical, and Process).
- Geologists and Geophysicists.
- Project Managers and Directors in the energy sector.
- Environmental Scientists and EHS Managers.
- Corporate Strategists and Business Development Managers.
- Government Regulators and Policy Advisors.
- Financial Analysts and Investment Managers focused on energy and infrastructure.
- Research and Development Professionals.
- Operations and Plant Managers in heavy industries.

Target Sectors and Industries:

- Oil and Gas Exploration and Production.
- Fossil Fuel Power Generation.
- Heavy Manufacturing (Cement, Steel, and Aluminum).
- Chemical and Petrochemical Production.
- Natural Gas Processing and LNG Facilities.
- Waste-to-Energy and Biomass Plants.
- Governmental bodies, environmental agencies, and regulatory authorities.
- Engineering, Procurement, and Construction (EPC) companies.
- Financial institutions and investment firms.

Target Organizations Departments:

- Engineering and Technology Development.
- Operations and Production.
- Environmental, Health, and Safety (EHS).
- Strategic Planning and Corporate Development.
- Research and Development (R&D).
- Project Management and Execution.
- Regulatory Affairs and Government Relations.
- Finance and Investment.
- Sustainability and Corporate Social Responsibility (CSR).

Course Offerings:

By the end of this course, the participants will have able to:

- Analyze the complete CCUS value chain from capture to permanent storage or utilization.
- Evaluate the technical and economic feasibility of different carbon capture technologies.
- Assess the criteria for selecting and characterizing suitable geological storage sites.
- Understand the engineering principles behind CO2 transportation and injection.
- Develop a preliminary economic model for a full-scale CCUS project.
- Navigate the complex regulatory, legal, and policy frameworks governing CCUS.
- Identify and mitigate the key risks associated with CCUS project development and operation.
- Formulate strategies for public engagement and stakeholder management.
- Compare different carbon utilization pathways and their commercial viability.
- Integrate CCUS planning into broader corporate decarbonization strategies.

Course Methodology:

The training methodology at BIG BEN Training Center is designed to foster a dynamic and immersive learning experience that bridges theory with real-world application. This course employs a blended approach, combining expert-led presentations with highly interactive sessions. Participants will engage in detailed case study analyses of pioneering CCUS projects, dissecting their successes and challenges to draw actionable lessons. Collaborative group workshops will encourage teamwork and problem-solving, allowing attendees to tackle simulated project scenarios related to site selection, technology assessment, and risk management. Interactive discussions and Q&A sessions are integrated throughout the program to facilitate knowledge sharing and address specific participant queries. Practical exercises, including cost-benefit analysis and stakeholder mapping, will equip attendees with tangible tools they can apply in their professional roles. The course emphasizes a feedback-rich environment, where participants receive constructive input from both the instructor and their peers, ensuring a deep and lasting understanding of strategic CCUS implementation. This hands-on, participant-centered approach ensures that learning is not only comprehensive but also directly relevant to industry challenges.

Course Agenda (Course Units):

Unit One: Fundamentals of CCUS in the Global Energy Transition

- The scientific basis of climate change and the role of CO2.
- Introduction to the full CCUS value chain.
- Global energy trends and pathways to net-zero emissions.
- The strategic importance of CCUS for industrial decarbonization.
- Overview of international climate agreements and national policies.
- Key terminology and concepts in carbon management.
- Historical context and evolution of CCUS technologies.

Unit Two: Carbon Capture Technologies and Applications

- Post-combustion capture processes (amine scrubbing, membranes).
- Pre-combustion capture technologies (gasification, reforming).
- Oxy-fuel combustion cycles and their applications.
- Direct Air Capture (DAC) systems and their potential.
- Technology selection criteria for different industrial sources.
- Process integration and energy penalty considerations.
- Emerging and next-generation capture innovations.

Unit Three: CO2 Transportation and Geological Storage

- CO2 compression, purification, and phase behavior.
- Pipeline design, integrity management, and safety protocols.
- Alternative transportation methods like shipping and rail.
- Geological storage fundamentals and trapping mechanisms.
- Site selection and characterization for secure storage (saline aquifers, depleted oil/gas fields).
- Reservoir modeling, capacity estimation, and injectivity analysis.
- CO2 injection well design and operational management.

Unit Four: Carbon Utilization and CCUS Economics

- Enhanced Oil Recovery (EOR) as a utilization pathway.
- Conversion of CO2 into valuable fuels and chemicals.
- CO2 utilization in building materials through mineralization.
- The business case for CCUS projects.
- Capital and operational cost estimation (CAPEX/OPEX).
- Impact of carbon pricing, taxes, and credits on project viability.
- Financing models and investment frameworks for large-scale CCUS.

Unit Five: Project Management, Risk, and Regulatory Aspects

- The lifecycle of a CCUS project from concept to decommissioning.
- Regulatory frameworks and permitting processes.
- Monitoring, Verification, and Accounting (MVA) for long-term storage security.
- Comprehensive risk assessment and mitigation strategies.
- Long-term liability and stewardship of storage sites.
- Public perception, community engagement, and social license to operate.
- Developing a strategic roadmap for CCUS implementation in an organization.

FAQ:

Qualifications required for registering to this course?

There are no requirements.

How long is each daily session, and what is the total number of training hours for the course?

This training course spans five days, with daily sessions ranging between 4 to 5 hours, including breaks and interactive activities, bringing the total duration to 20 - 25 training hours.

Something to think about:

Considering the immense upfront investment and long-term liability, how can public-private partnerships be structured to accelerate the global deployment of CCUS infrastructure effectively?

What unique qualities does this course offer compared to other courses?

This training course distinguishes itself by adopting a holistic, strategic management perspective on CCUS, moving beyond a purely technical or engineering focus. While many programs concentrate solely on the mechanics of capture or storage, this course integrates the entire value chain, emphasizing the critical interplay between technology, economics, policy, and project management. Participants will not only learn about different capture methods but will also master how to evaluate their economic viability within specific regulatory landscapes and how to manage the associated project risks from inception to long-term monitoring. The curriculum is built around real-world case studies, providing practical insights into the complexities of deploying large-scale projects. It addresses the crucial, often-overlooked aspects of public perception and stakeholder engagement, which are paramount for project success. By focusing on strategic decision-making, risk mitigation, and financial modeling, the course equips leaders to champion and execute CCUS initiatives effectively, rather than just understand them theoretically. This comprehensive approach ensures that graduates are prepared to navigate the multifaceted challenges of industrial decarbonization and contribute meaningfully to their organization's sustainability goals.