TECHNICAL REPORT

ISO/TR 27918

First edition
2018-04

Lifecycle risk management for integrated CCS projects

Gestion du risque du cycle de vie des projets CSC intégrés

Reference number
ISO/TR 27918:2018(E)

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Published in Switzerland

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 265, *Carbon dioxide capture, transportation, and geological storage*.

Introduction

Carbon Capture and Storage (CCS) is a process that can mitigate the CO_2 emissions from power plants and other industrial sources of CO_2. CCS draws on many decades of experience in the electricity generation, industrial gas separation, chemical and manufacturing industries, and oil and gas industries, including substantial experience with subsurface injection techniques.

Many of the individual processes (or project phases) that are linked together to comprise a CCS chain have been proven for some time, albeit often in different contexts. Others are still being developed or adapted to this new application. Additionally, bringing them together in a CCS configuration represents a new application, with which there is limited global experience to date. As a result, there is an important need for knowledge development as real experience is gained in the comprehensive application of these technologies.

As with most technologies, CCS has inherent risks which need to be analysed and managed. Integrated projects, given their especially long-term and multi-component aspects, impose particular importance and challenge upon comprehensive risk identification. Risk assessment (detailed risk description and quantification) is completed using all available data, and assessment refreshed with updated numerical simulations which enable comprehensive risk analysis throughout the project lifecycle. The project lifecycle extends across all project phases from business development to site selection through post-closure. Together, risk identification, assessment, analysis, evaluation, management, and treatment are integrated into a risk management plan. The risk management plan aids in decision-making by the owner/operator and, to the extent the results of planning are communicated, aids other stakeholders in evaluating the project.

Keys to the success of the risk management plan are the integration and iterative application of risk assessment, risk data, and risk analysis. Risk analysis and numerical simulation help to identify, estimate and mitigate risks that may arise from CCS projects. These tools are also useful to optimize the design and operation of the monitoring, verification, and accounting aspects of the projects and can serve to inform and facilitate more effective site characterization and model improvement. Importantly, risk tools can be used to shape the design and operation of preventive and remediation options at every stage in the project lifecycle. Effective risk management communication to stakeholders who may be affected is crucial to the success of the project. The risk management plan can serve as a key component of the information handled through the public outreach and communication plan.

Lifecycle risk management for integrated CCS projects

1 Scope

This document is designed to be an information resource for the potential future development of a standard for overall risk management for CCS projects. The risks associated with any one stage of the CCS process (capture, transportation, or storage) are assumed to be covered by specific standard(s) within ISO/TC 265 and other national and/or international standards. For example, the risks associated with CO_2 transport by pipelines are covered in ISO 27913. The scope of this document is intended to address more broadly applicable lifecycle risk management issues for integrated CCS projects. Specifically, the focus of this document is on risks that affect the overarching CCS project or risks that cut across capture, transportation, and storage affecting multiple stages. It needs to be noted that environmental risks, and risks to health and safety should be very low for CCS projects provided the project is carefully designed and executed. Risk identification and management is part of the due diligence process.

A list of acronyms is included in Annex A.

Clause 5 includes an analysis of how a CCS standard could address aspects of risk analysis that apply to all elements of the CCS chain, such as:

— risk identification (identifying the source of risk, event, and target of impact)[1)];

— risk evaluation and rating;

— risk treatment;

— risk management strategy and reporting.

Clause 6 comprises an inventory of the overarching and crosscutting risks. These include issues such as:

— environmental impact assessment;

— risk communication and public engagement;

— integration risks between capture, storage, and transportation operators, such as risk of non-conformance of CO_2 stream to required specifications;

— integration risks associated with shared infrastructure (hubs of sources, common pipelines, hubs of storage sites);

— risks resulting from interruption or intermittency of CO_2 supply and/or CO_2 in-take;

— risks associated with policy uncertainty;

— incidental risks from activities related to the capture, transportation or storage processes without being specifically covered in the respective standards (e.g. management or disposal of water produced as a by-product of CO_2 storage).

Clause 7 describes implications and considerations for a potential standard on lifecycle risks for integrated CCS projects.

1) As defined in ISO 31000.