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Carbon dioxide capture —

Part 1: Performance evaluation methods for post-combustion CO_2 capture integrated with a power plant

Captage du dioxyde de carbone —

Partie 1: Méthodes d'évaluation des performances pour le captage du CO_2 post-combustion intégré à une centrale thermique

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Foreword

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Introduction

It is very important to reduce atmospheric carbon dioxide (CO_2) emissions in order to meet climate change mitigation targets. Inclusion of carbon dioxide capture and storage (CCS) among the variety of available emission reduction approaches enhances the probability of meeting these targets at the lowest cost to the global economy. CCS captures CO_2 from industrial and energy-related sources and stores it underground in geological formations. It can capture emissions from carbonaceous fuel-based combustion processes, including power generation, and is the only technology capable of dealing directly with emissions from several industrial sectors, such as cement manufacture and fertilizer production.

This document is the first in a series of standards for CO_2 capture. It is limited to evaluation of key performance indicators (KPIs) for post-combustion CO_2 capture (PCC) from a power plant using a liquid-based chemical absorption process. New or revised standards focused on other capture technologies and approaches will be developed at a later date.

PCC is applicable to all combustion-based thermal power plants. A simplified block diagram illustrating the PCC is shown in Figure 1.

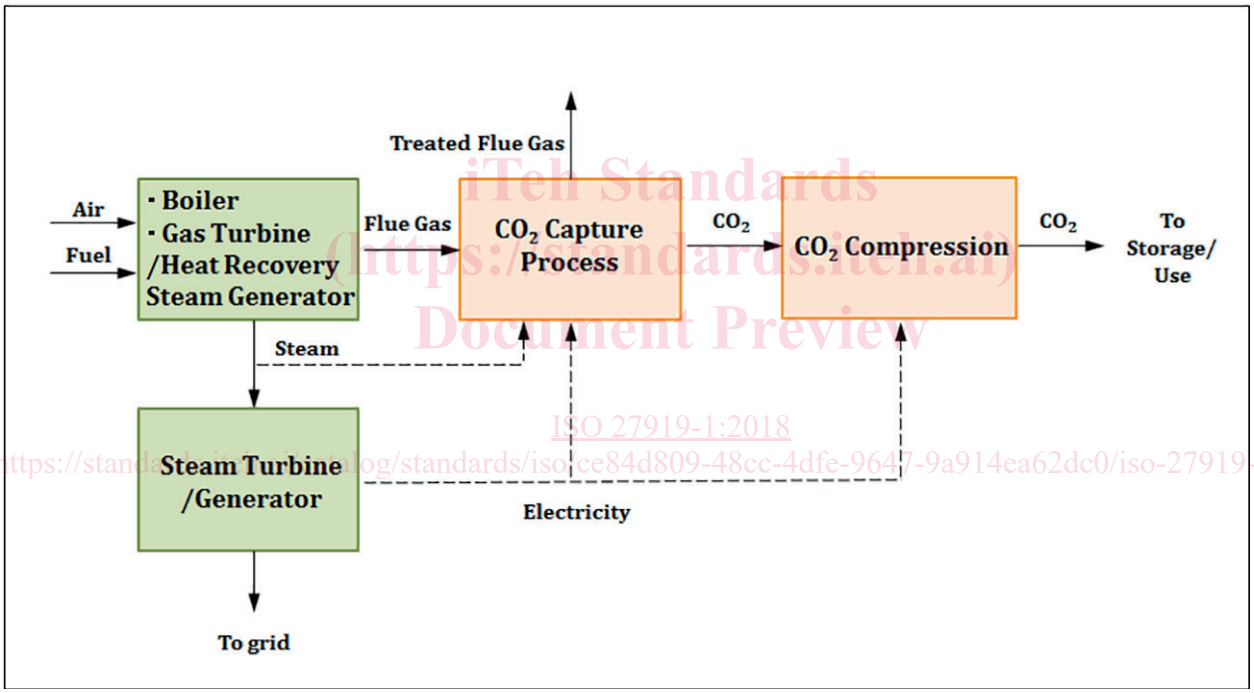

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Figure 1 — Simplified block diagram for PCC

In a typical power generation facility, carbonaceous fuel (e.g. coal, oil, gas, biomass) is combusted with air in a boiler to raise steam that drives a turbine/generator to produce power. In a gas turbine combined cycle system, the combustion occurs in the gas turbine to drive power generation, and steam generated through a heat recovery steam generator (HRSG) contributes to additional power generation. Flue gas from the boiler or gas turbine consists mostly of N_2, CO_2, H_2O and O_2 with smaller amounts of other compounds depending on the fuel used. The CO_2 capture process is located downstream of conventional pollutant controls. Chemical absorption-based PCC usually requires the extraction of steam from the power plant's steam cycle or, depending on the absorption liquid/process employed, the use of lower grade heat sources for absorption liquid regeneration.

The intended readership for this document includes power plant owners and operators, project developers, technology developers and vendors, regulators, and other stakeholders. The document will provide several benefits, as outlined in the clauses below. In brief, it provides a common basis to estimate, measure, evaluate and report on the performance of a PCC plant integrated with a power

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plant. It can help various stakeholders to identify potential efficiency improvements among different plant components. It can help to guide the selection of measurement methodologies, and serve as a resource in development of regulations. Finally, it provides the basis for future standards development.

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