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# ABSTRACTS

## IAPWS European HRSG Forum (EHF2025) Highlights and Press Release

The eleventh annual IAPWS European HRSG Forum was held on the 13th–15th May 2025 in Prato, Italy. It was chaired by Barry Dooley of Structural Integrity and Bob Anderson of Competitive Power Resources. EHF2025 attracted 95 participants from 20 countries and included 27 users.

EHF2025 was developed and continues to be supported by the International Association for the Properties of Water and Steam (IAPWS) and is held in association with the Australasian Boiler and HRSG Users Group (ABHUG) and the US HRSG Forum (HF). The EHF2025 event was organized by Mecca Concepts, Australia and had 17 sponsors: Precision Iceblast Corporation, NEM, Dekomte, Freudenberg Flow Technologies, TÜV Rheinland, New Componit, Advanced Valve Solutions, Tuff Tube Transition, TesTex, Quest Integrity, Metroscope, OMB, Pruss, Fuel Tech, Arnold Group, IMI and Thermic Systems.

PPCHEM® 2025, 27(4), 210–212

## Chemical Compositional Changes in Coal Fly Ash through an Integrated Amine-Based Post-combustion $SO_2$ and $CO_2$ Capture Process

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Combustion of coal in air leads to a gaseous product stream (flue gas) that mainly contains nitrogen ($N_2$), carbon dioxide ($CO_2$), water vapor, and small quantities of many other gases such as sulphur oxides ($SO_2$ and $SO_3$) and nitrogen oxides ($NO_x$ mainly, NO, and $NO_2$) as well as particulates (mainly coal fly ash (CFA)) at different concentrations depending upon the content of the coal and the quantity of air used for its combustion. The need to maintain reliable power while reducing greenhouse gas emissions has been driving governments and companies worldwide toward $CO_2$ capture and storage/utilization. One such initiative is SaskPower's Integrated Carbon Capture and Storage (CCS) project at its Boundary Dam Unit 3 (BD3), which is amine based and just passed 10 years of commercial operation. The listed impurities in coal flue gas, of which CFA is the current focus, can cause degradation of the amines and have many other adverse effects on the capture process. Indeed, current electrostatic precipitators or fabric filters are designed to remove most of the CFA (typically up to ~ 99.9 % or 99.99 %, respectively), yet accumulation of the relatively small unremoved fraction within the CCS process is documented as causing physical barriers to the operation. One aspect of the effect of CFA on the amine-based $CO_2$ capture system which is very poorly elucidated is its interactions with the gaseous acidic impurities in the flue gas and with added treatment chemicals as it traverses various sections of the process under different conditions such as pH and temperature, and how these can affect the overall performance of CCS systems. In this

current paper we present the chemistry behind changes in the composition of CFA as it travels through the flue gas pretreatments and the integrated amine-based post-combustion $SO_2$ and $CO_2$ capture process at the BD3 CCS facility. Generally, through the various stages of treatment, CFA is modified in various ways including a) extensive depletion of water or acid leachable ions of metals like aluminium (Al), iron (Fe), magnesium (Mg), sodium (Na), and potassium (K) at the pre-scrubbing stage (pH ~ 2); b) co-deposition with CFA of sulphate and phosphate salts of Na, Fe, and barium (Ba) due to leaching of the respective ions from CFA (and from steel material corrosion in the case of Fe) at the flue gas cooling and the $SO_2$ absorption stages, at high enough levels to exceed their saturation point or solubility products; and c) silicon dioxide or silica ($SiO_2$) removal at certain sections within the $CO_2$ capture stage due to its leaching from CFA under some high pH and temperature conditions.

PPCHEM® 2025, 27(4), 216–240

## IAPWS Press Release – Annual Executive Committee and Working Group Meetings 2025

Between June 22nd and 27th, 96 scientists, engineers and 10 guests representing 20 countries met at the Hanaholmen Convention Centre in Helsinki, Finland for the annual meetings of the IAPWS Executive Committee and Working Groups. This series of meetings began in 1929 in London, UK with the purpose to connect scientists and researchers with the industry operators, engineers and managers who use their work. Collaboration and engagement across these varied groups provides guidance to the researchers on topical problems within industry and provides the engineers with the latest research results for direct application in their facilities.

IAPWS produces releases and guidelines on the recommended scientific formulations for physical and chemical properties of water in its various forms as well as technical guidance documents that are the concerted opinion of IAPWS members on the best operating practices for power plant chemistry. IAPWS also documents certified research needs that represent the opinion of experts in their respective fields that a research topic is greatly needed to fill a current gap in knowledge. All this information is freely available and can be found on the IAPWS website at www.iapws.org.

PPCHEM® 2025, 27(4), 248–250