1. Introduction

ALSTOM is involved for decades in the development and promotion of Carbon Capture Technology, and has a long experience in Steam Plant Integration and Optimisation. Oxy-firing is believed to be a promising technology to face the CCS challenge, and various Reference Concept studies have been conducted to evaluate the feasibility and economic parameters of integrated oxy-fired steam plants.

This publication will present the latest status of the Oxy-PC Reference Plant development, which is a major step to anticipate the emerging CCS market, demonstrate the commitment of ALSTOM for Integrated Oxy-fired CO₂ Capture Steam Plant solutions, support current “Capture Ready” and future “Capture Effective” plant offering with Oxy-firing technology, and provide valuable inputs for today’s Oxy demo plant projects.
2. Oxy-PC Reference Plant Objectives

The Oxy-PC Reference Plant is developed on the basis of the most advanced ALSTOM 900 MW-class, Pulverized-Coal, Ultra-Super Critical Steam Plant product (275 bar 600°C/620°C), with integration of the following high performance oxy-firing equipment and systems:

- a high efficiency ASU, designed for an optimal O₂ purity,
- an ALSTOM oxy combustion boiler optimised for oxy mode operation,
- an optimum flue gas recirculation scheme for minimization of accessory load and optimal control of the emissions,
- an ALSTOM low consumption GPU, designed to achieve required capture rate, deliver CO₂ at expected purity and pressure for transport and storage, and comply with expected emission standards in 2015,
- an optimal Heat Integration concept, leading to maximization of the plant output and efficiency, with the best use of the available heat from ASU & GPU compressors and flue gas cooling.

The major objective is to integrate all oxy-firing equipment and systems in the steam plant design:

- for a minimum CO₂ capture rate of 90%,
- with a CO₂ quality compliant with expected requirements for saline aquifer storage,
- with a minimum power consumption of CO₂ capture systems,
- with optimisation of equipment’s and systems for oxy-mode operation at nominal load,
- with a high level of heat integration for optimisation of the performance.

The ultimate goal is to offer the best global performance and economic value at plant level, to meet challenging targets on performance and costs, and reach a competitive Cost-of-Electricity for future power plants operating in oxy-combustion.

This presentation will show how these equipment and systems are integrated in the power plant design for a competitive solution.

3. Update of Cost of Electricity for CO₂ Capture Plants

In addition to the support of our development programmes, the reference plant design work also serves as a basis to evaluate the cost of electricity of the future CCS-enabled fossil-fuelled power plants. Every year, ALSTOM update these Cost-of-Electricity estimates and we plan to present the key outcomes of the ongoing 2013 update.

Here below are examples of extracts from our 2012 study showing the cost of electricity with and without CCS in Europe and North America (no CO₂ price accounted).