1. Introduction

Air Liquide is ready to build industrial size air separation units for oxy-combustion and CO\textsubscript{2} cryogenic carbon capture units (Cryocap\textsuperscript{TM} Oxy offer). As such, Air Liquide has been gathering real life data from pilot plants (Callide and Ciuden notably, which are described in details in separate papers). In parallel of this effort, in 2012 Air Liquide was involved in two major FEED or pre-FEED studies in order to develop and improve Oxycombustion offer in the framework of these particular projects and get ready for a project execution phase coming up. This paper will present those two major FEED and pre-FEED studies, respectively the Endesa FEED OXYCFB300 FEED (funded by European Economic Recovery Plan) and the Futuregen 2.0 updated pre-FEED (funded by US DOE). In 2013, the next phase of the project (FEED phase) has been approved. The early progress of this FEED phase will also be presented.

2. The Endesa FEED – OXYCFB300

In 2012, Air Liquide was part of the FEED for the OXYCFB300 project. The project aims at building a 300MWe oxy-combustion power plant using CFB (Circulating Fluidized Bed) technology with support from EERP funding. In this framework, Air Liquide has included its advanced design for Air Separation Units. Those large size ASUs (5000 mtpd +) have achieved a remarkably high efficiency (extra low energy consumption), therefore driving down the cost of CO\textsubscript{2} capture significantly. Extensive studies have been performed including detailed mass balance and utilities, process flow diagrams, process control, sensitivity analysis, thermal integration strategy, bill of quantities, plot optimization, project master schedule... This FEED was also the opportunity to assess implementation of Air Liquide’s ALIVE\textsuperscript{TM} energy storage technology.
The key technical features of ASU designed by AL for this project will be presented during the conference.

Preliminary 3D view of the Air Liquide’s ASU for the Endesa project

3. The Futuregen 2.0 updated pre-FEED

Aiming at capturing and storing originally 1.3 millions tons of CO₂ per year, the Futuregen 2.0 project is supported by DOE and will repower in Oxycombustion an existing plant located in Merediosa (Illinois).

Decision has been approved by US DOE to update the preFEED performed in 2011 after reducing the CO₂ capture down to 1 million ton per year.

The purpose of this pre-FEED update was for AL to improve overall economics of the project by reducing capital cost, as well as maximizing CO₂ capture rate. Both ASU and CPU have been redesigned in this perspective.

During this pre-FEED, significant steps have been reached in terms of:

- Technical risks mitigation
- Reduction of operating and capital costs
The key technical features of ASU and CPU designed by Air Liquide for this project will be presented during the conference.

Recently, the next phase of the Futuregen 2.0 (phase 2: FEED phase) has been approved and is starting early 2013. The early progress of the FEED phase will be presented during the conference.