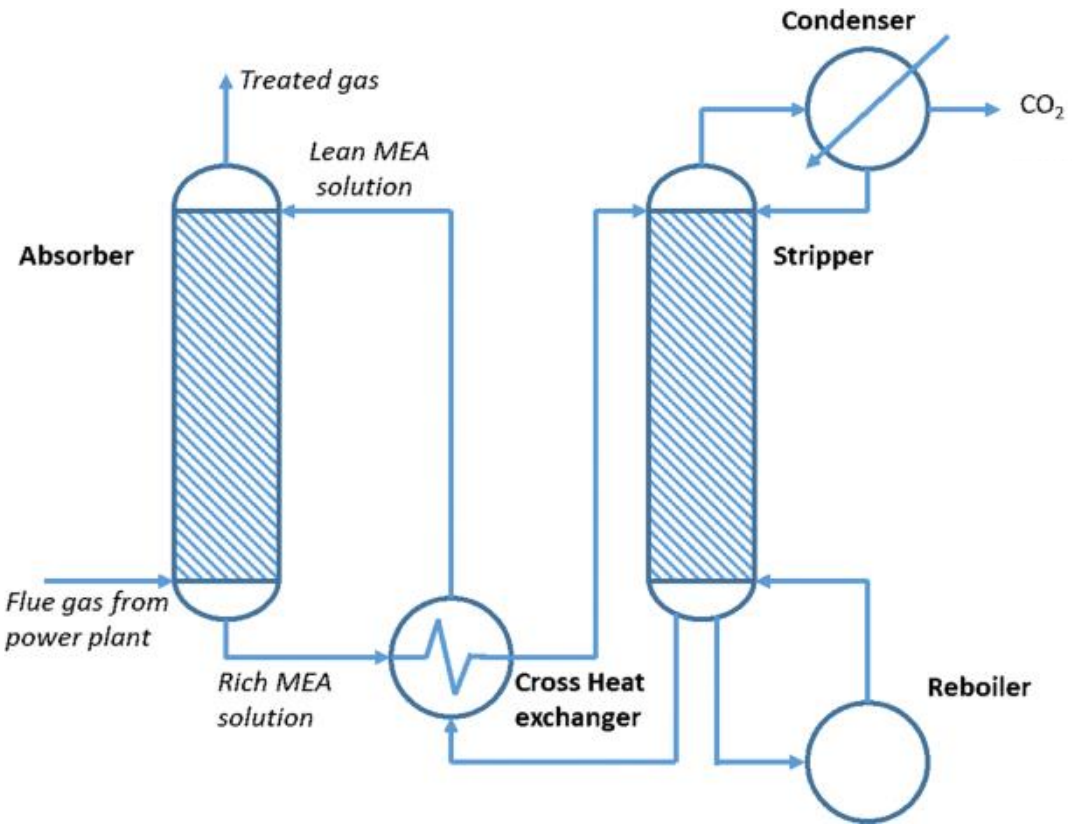
AUTOMATIC CO_2 CAPTURE PILOT PLANT

The CO_2 levels emitted into the atmosphere are too high and affect the environment adversely. In fact, the CO_2 emission is considered to be the main cause of the global warming and has been dramatically increased during the last years. Moreover, it is expected that it will still grow by almost 3% per year. For this reason, many initiatives, actions and efforts are underway to reduce the greenhouses gas emissions coming from the burning of fossil fuels. Specifically in the electricity production sector, the attention is focused on the carbon capture and storage (CCS) technologies which are expected to play a key role to reduce carbon emissions.

By definition, a CO2 capture plant is a process or facility specifically designed to capture or remove CO2 from a combustion flue gas stream, refinery gas stream, or other industrial gas stream sources. Historically, CO2 has been captured from gas streams for the purpose of either producing CO2 as a usable marketable product or to remove it from a marketable product such as natural gas. However, due to climate change, there is an increasing demand to capture CO2 whether or not there is a market in an effort to minimize the carbon footprint in our surrounding environment. Post-combustion CO2 capture plants are the most common type of process used at fossil fuel-fired power generating plants. Similar CO2 capture plant processes are used at refineries and other industrial sources. The process typically utilizes a chemical solvent, such as an alkanolamine in an aqueous solution, which when in contact with CO2 forms a chemical reaction. This reaction occurs in a column vessel known as the absorber, when feed gas from the bottom section of the column passes upward as the aqueous liquid from the top of the column passes downward. The reaction is reversed in the presence of heat in another packed filled column known as the stripper (Desorber) column. Heat is supplied to the stripper by a reboiler, which gets its heat supply from any available source such as steam, glycol, hot oil and direct heat. The aqueous solvent is continuously circulated between the absorber and stripper column via a series of strategically located heat exchangers, pumps, filters, and other associated equipment. CO2 is flashed off from the stripper, cooled to remove water content, and finally compressed to the required delivery pressure. The remaining gases from the absorber are scrubbed and vented back to the atmosphere. Basic Concept of the plant is as shown in the Figure



This pilot plant can evaluate the sustainability of absorption/desorption technology for CO_2 capture from a targeted unit specialized in industrial waste incineration. The purpose of this setup is to investigate chemical interactions between synthetic flue gas and solvents and their impacts on process performance. At the same time, we complete our prospection by laboratory experiments to study the influence of specific degradation products on process performance. In this pilot project, we choose to focus on gas absorption and desorption by creating an inlet condition of flue gases to study the performance of different solvents.

This pilot plant is designed in such a way that it can easily be mobilized at any location for pilot testing. It consists of a fully atomized panel for controlling the plant to operate it at the different conditions for evaluating different solvents and to record all the data. This system gives the flexibility to operate in batch vies process or continuous process for CO_2 capturing from the flue gases in a single setup. It helps in analyzing the performance of different solvents by operating them on different conditions to obtain the desired performance. Data acquisition and control are made seamless with the use of HMI. The entire operation of the pilot plant is automated with PLC controls and data logging via USB. The plant can also be remotely operated by an Ethernet connection and Wi-Fi.

The user can switch on the plant, make the selection as per the needs, run the plant and acquire the data through the HMI on PC. The system is also useful in explaining to students about the absorption / decoration of CO_2 from the waste gases of different industries and power plants.

balief CORPORATION

An ISO 9001:2015 Certified Company

Shed No. 126, Abhishree Industrial Park, B/H Grand Vishala, Near S.P.Ring Road, Odhav,
Ahmedabad-382415, Gujarat, India
(M): +91 8200890851
E-Mail: baliefcorporation@gmail.com
Website: www.baliefcorporation.com