

# RESEARCH SYNOPSIS

## Simulation and Life Cycle Assessment of Post Combustion Carbon Capture Technologies

The environmental consequence of increased post combustion CO<sub>2</sub> emissions have made it pertinent for us to either reduce our dependence on fossil fuels through increased uptake of renewable forms of energy or develop novel techniques of capturing the ubiquitous CO<sub>2</sub>. Renewable energy sources have been hailed as the future and as a result have attracted huge investment and subsidies from government. However due to the need for immediacy in the reduction of CO<sub>2</sub> emissions and the fact that despite the growth in renewable energy sources fossil fuels are still projected to constitute up to 80% of global energy portfolio now and in the nearest future, there is a need therefore to focus on the latter by developing Carbon Capture and Sequestration (CCS) technologies that can immediately cut carbon emissions while renewable energy technologies becomes mainstream.

However as post-combustion CCS technology is poised to play a crucial part in efforts aimed at tackling increasing atmospheric CO<sub>2</sub>, previous studies have highlighted some negative environmental impacts associated with CCS not least the fact that it uses considerable more energy and the potentially devastating consequences for marine ecosystems caused by acidification of oceans and aquifers due to geo-sequestration. This research therefore will carry out a rigorous assessment of the environmental impacts associated with the post-combustion carbon capture and sequestration technologies. It will apply the Life Cycle Assessment methodology to assess the environmental impacts associated with the construction, use and decommissioning of a simulated post-combustion CCS plant.

Life Cycle Assessment as a tool of choice for this analysis stems from its ability to comprehensively apply the system approach in identifying potential environmental hotspots within a system from its design to end of life, and also help provide accurate information to engineers to design and build CCS systems that will have minimum impact on the environment.