



University of Bahrain College of Engineering Department of Chemical Engineering

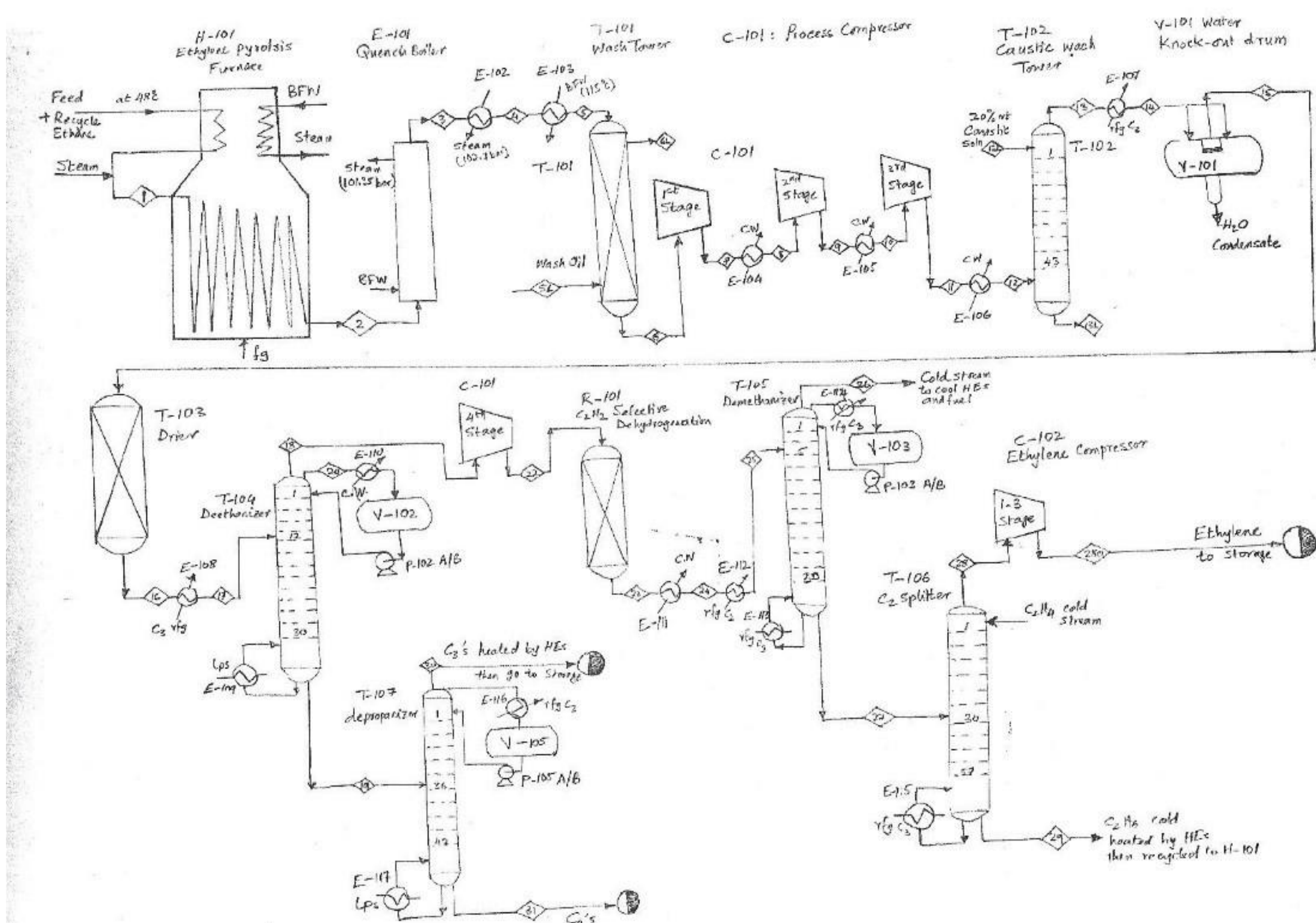
Performing a feasibility study for ethylene production from associated gas in Bahrain

Abstract

Ethylene is widely used chemical found almost in every material used in our daily life. Due to its huge demand project is proposed to conduct a feasibility study for an ethylene plant in Bahrain. The project aims to reintegrate harmful associated gas, which is disposed of in many processes in Bahrain to ethylene. Moreover, reduce the ethane content in the fuel gas to reduce carbon dioxide emissions from the combustion of carbon dioxide. Ethane in the associated gas will be used as a feedstock in producing a more valuable product as ethylene.

Design and Implementation

Ethylene produced by the thermal cracking of petroleum hydrocarbons with steam, consist of five main sections such as Ethylene pyrolysis furnace, Quench Tower, Process Compressor, Wash Tower, and Separator presented in process flow diagram.

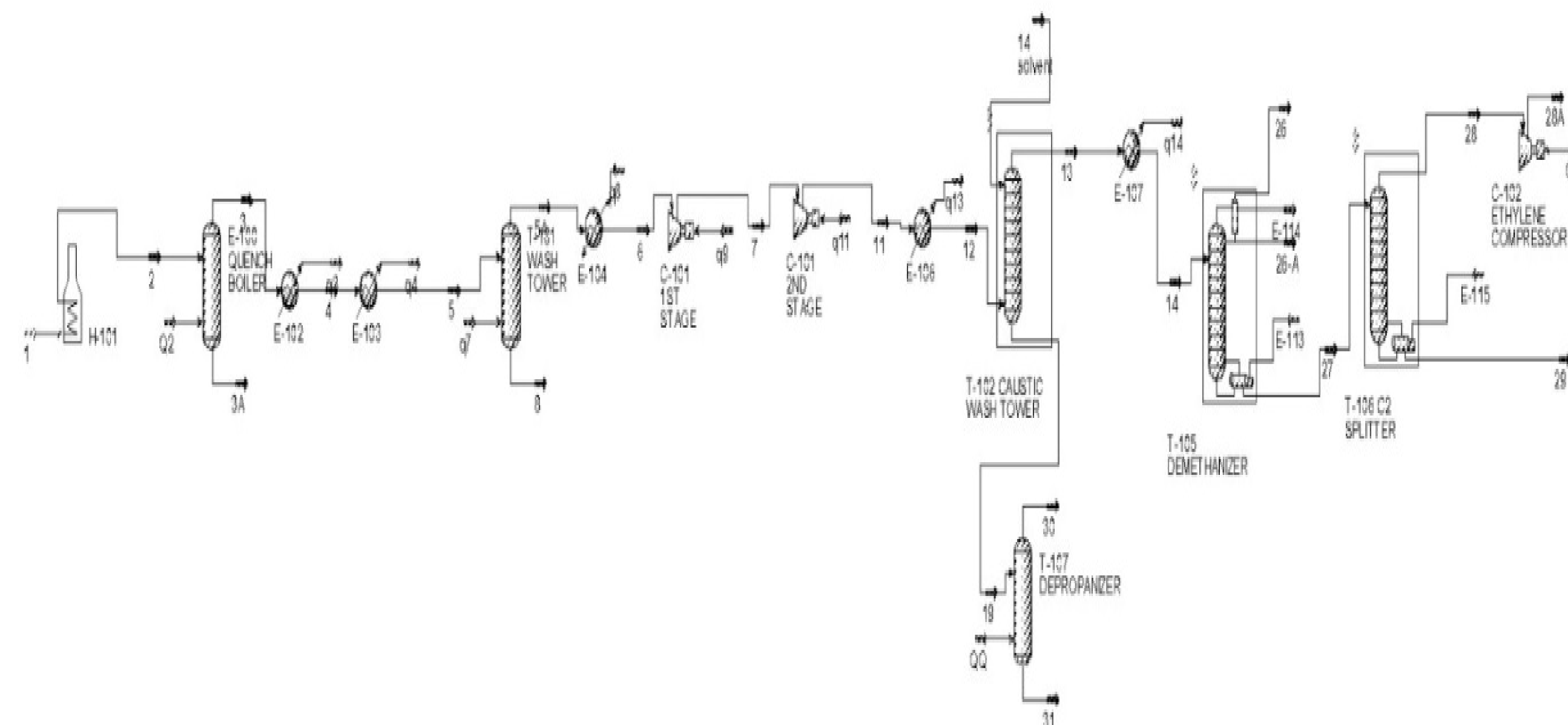


Objective and Motivation

This project is a model for studying the production of ethylene through associated gas at the lowest cost and high profit. Bahrain Field is currently producing 650 mmscf/d of associated gas and high percentage of C1 and C2 in the gas leaving the plant as residue gas produced. So, project aims to reduce the ethane content in the fuel gas to reduce carbon dioxide emissions from the combustion of carbon dioxide. Global demand for ethylene is forecast to reach 202.9 m in 2026. Where ethylene market growth and development is growing due to huge demand in agricultural, packaging production, end-use industries such as construction, automotive, packaging, and other.

Results

The new process flow diagram for the ethylene plant was successfully simulated and obtained a close value to that done manually, where 0.999 mol ethyl/total mol was obtained manually with 8,292,000 USD of total capital cost. While 0.9417 mol ethyl/total mol was obtained by HYSY with 9,760,370 USD of Capital cost.



Total Capital Cost [USD]	9,760,370
Total Operating Cost [USD/Year]	4,162,120
Total Raw Materials Cost [USD/Year]	0
Total Product Sales [USD/Year]	0
Total Utilities Cost [USD/Year]	2,209,100
Desired Rate of Return [Percent/Year]	20
P.O.Period [Year]	0
Equipment Cost [USD]	2,139,700
Total Installed Cost [USD]	3,949,300

Conclusion

The objective of project was achieved by submitting a feasibility study to produce ethylene from associated gas in Bahrain. It is a profitable project for any company that will implement it with 9,760,370 USD capital cost and 3,949,300 USD installed cost. Aim to reduce the ethane content in the fuel gas to reduce carbon dioxide emissions resulting from the combustion of carbon dioxide was achieved, as well as using the ethane for the production of a more valuable product as ethylene which is used to make a wide range of compounds, including polymers, antifreeze, and solvents.

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