

CHAPTER V

CONCLUSIONS AND RECOMMENDATION

In this research, life cycle assessment (LCA) technique is used to evaluate the environmental impacts of the natural gas production in Thailand. The life cycle inventory (LCI) covers the processing of natural gas supplied from the gas fields in the gulf of Thailand. Three gas separation plants (GSP units 1-3) of PTT PLC in Maba-put, Rayong are the main focus of the LCI and impact assessment (LCIA) analyses. The yearly production data for the last three years (2004-2006) is provided by PTT and gathered by PTIT. The data are then processed and analyzed by using SimaPro 7.0 software with Eco-indicator 95 and Eco-indicator 99 for impact assessment analysis.

The results obtained from the LCA study on the three GSPs reveal the general pattern that the main environmental damage is the resource depletion from the use of natural gas which is the fossil-based raw material of this upstream process. The major environmental impact is climate change resulting from CO₂ emission which appears to come mainly from the use of electricity of the GSPs from two sources: an in-house gas turbine and grid-mixed of EGAT. The second and third environmental impacts are respiration inorganics and acidification as a result of NO_x emission from electricity utilization as well. When comparing among the three GSPs, GSP2, the smallest unit, has shown to be the least efficient in terms of natural gas utilization as the CO₂ removal unit is not installed and propane is not being produced. GSP1 has shown to release the lowest amount of CO₂ since it is the only unit which has the CO₂ removal unit installed. For GSP3, the use of electricity only from EGAT's grid-mixed has shown to enhance its environmental performance as the in-house gas turbine has much lower efficiency than the combined cycle system. Based on the results, the more efficient electricity utilization and the use of a more environmental friendly source of electricity can be suggested in order to improve the environmental performance of the natural gas production in Thailand. In addition, the installation of the CO₂ removal unit has shown to be an important factor which increases the efficiency of the natural gas separation process and, at the same time, decreases the environmental impacts as CO₂ can be sold as a co-product.

Recommendation can be offered particularly on the allocation procedures. Firstly, the proper allocation of the energy used and emissions within PTT complex comprising the three GSP units is needed in order to accurately and fairly analyze the efficiency and environmental performance of each GSP unit. Secondly, the allocation of environmental loads based on both market price and weight of the products being produced may be considered and compared with the allocation based only on weight currently used in this study.