CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

The purpose of this research aimed to apply pinch technology for reducing energy consumption in the PTT gas separation plant 5 (GSP5). Three techniques, including feed preheating, side reboiling, and process heat integration are very useful to recover energy in the process. The procedure of this research can be divided into three main steps. The first step is the data and information collection from the GSP5. The second step is the simulation of existing process (the heat exchanger networks and the distillation columns) via the commercial simulation software (PRO/II Provision). Performing and designing with the above techniques are the last step to find the modification options for the GSP5.

The GSP5 is an unpinch process (or low temperature process) with ΔT_{min} lower than the threshold ΔT_{min} of 21°C. There is still no hot utility usage, yet there is an existing cold utility of air and refrigerant-propane consumption of 0.0377 MM KW. The existing process has the ΔT_{min} of around 1.06°C. The modification of heat exchanger networks can not be done because the GSP5 has no process pinch (no pinch point), resulting in no heat transfer across the pinch and no wrong position utility.

Six promising retrofit options (A, B, C, D, E, and F) were performed. Options A and B benefit from a feed preheating of the depropanizer by using hot process streams of the background process and introducing a new heat exchange unit. Options C and D integrate the deethanizer with hot process streams of the background process by adding a side reboiler. Furthermore, the energy saving can be increased after combining options A and D (to become option E) and options B and C (to become option F). The results reveal that option F offers the highest energy savings, about 13.32% (6.1 million US$/yr) with a payback period of 0.65 years; whereas option D has the lowest energy savings, about 4.17% (1.9 million US$/yr) with a payback period of 1.28 years.

There are some suggestions and recommendations from this research work. Firstly, the modification designs should be further concerned with the impact on the operation, control, and safety constraints. Secondly, the economical evaluation should be re-calculated after obtaining the exact cost of new exchangers and installed equipment because these can affect the decision-making for choosing retrofit options. Thirdly, the better optimum solution for the trade-off between energy savings and investment can be achieved after incorporating with mathematical programming; moreover, data reconciliation software may be useful to turn real time process data into consistent and reliable information.