

Thesis Changes Log

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PhD Program: Engineering Systems

Title of Thesis: Inverted Brayton cycle for waste heat recovery application

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The thesis document includes the following changes in answer to the external review process.

- Section ‘Motivation’ of CHAPTER 1 was renamed to ‘Motivation and Research Questions’ and expanded with more details of the research motivation itself, as well as the research goal and research questions.
- Sections 2.4 and 2.5 were restructured.
- One “lost” paragraph under Figure 19 is added:

“Following the presented computational sequence, the set of cases/scenarios was processed. For better understanding of the scales and boundaries of the process, it is summarized in the scenario-tree in Figure 20. Every point of a lower level is calculated for each point of the higher level.”

- 3.5.3 Economic results. 2nd paragraph.

The information on the payback period of the noLNG scheme is added to the description of the Figure 28.

- 3.6 Discussion and conclusions, subsection ‘Conclusion’, paragraphs 2 and 3; 5.1 Conclusions, paragraphs 4 and 5

Information on the ‘noLNG’ configuration payback is added. A comparative assessment of ‘LNG’ and ‘noLNG’ configurations is added to explicitly articulate a response to the research questions.

- The 2nd paragraph after Figure 28.

The description of the figure is expanded.

- 3.4.5 IBC component weight and cost. Subsection ‘Cost of heat exchanger 1’

A heat exchanger cost example based on company quotation was given in 4th paragraph of the subsection:

“For example, if to compare the cost of plate-fin HE based on ESDU (1995) [93] and Xie (2008) [94], the result based on the first reference is larger by about five times. Besides, a study of the Chinese market [95] has demonstrated that the available costs of some components are much lower than they are according to the cost function methods. A quotation from Dongfang Boiler Co., ltd on the plate-fin HEs with similar inlet conditions has shown that the cost of plate-fin HE of 119 kW heat flow is 2.4 times lower than ESDU result, and of 4.5 kW is 5.8 times lower. Although ESDU cost functions presumably

consider the installation, custom clearance, shipping, and contingencies, the difference in the results is still remarkable enough to bring doubts about the reliability of suggested cost functions, especially for small-scale HEs. Thus, in an attempt to give a practically valid assessment of the technology, the cost of HEs was assessed as a range between low to high-cost boundaries based on several literature sources as described below.”

- Data in ‘Appendix F. LNG Price Statistics‘ is updated.
- FIGURE and TABLE are exchanged into Figure and Table.
- References in the text are unified according to the chosen format.
- “Table 29 – Continuation” inserted
- An additional Grammarly check was performed.
- Minor changes in the text were introduced here and there to improve its readability.