

Jury Member Report – Doctor of Philosophy thesis.

Name of Candidate: Kirill Abrosimov

PhD Program: Engineering Systems

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

Supervisor: Prof. Aldo Bischi

Co-supervisor: Prof. Andrea Baccioli

Name of the Reviewer: Dr. Henni Ouerdane, Associate Professor

I confirm the absence of any conflict of interest	
(Alternatively, Reviewer can formulate a possible conflict)	Date: 28-09-2024

The purpose of this report is to obtain an independent review from the members of PhD defense Jury before the thesis defense. The members of PhD defense Jury are asked to submit signed copy of the report at least 30 days prior the thesis defense. The Reviewers are asked to bring a copy of the completed report to the thesis defense and to discuss the contents of each report with each other before the thesis defense.

If the reviewers have any queries about the thesis which they wish to raise in advance, please contact the Chair of the Jury.

Reviewer's Report

Reviewers report should contain the following items:

- Brief evaluation of the thesis quality and overall structure of the dissertation.

The thesis contains 5 chapters, including the Introduction, which in fact is a thesis overview, and Conclusion and it is complemented by 7 appendixes that provide additional information necessary for a detailed understanding of some particular aspects of the work.

- The relevance of the topic of dissertation work to its actual content

The doctoral thesis is devoted to the study of the inverted Brayton cycle for high-temperature waste heat recovery applications, with a focus on techno-economic perspectives considering different industrial applications, including heavy-duty trucks and power generation. This work is a contribution to the broad field of energy efficiency, and is timely.

- The relevance of the methods used in the dissertation

Basic thermodynamics for the thermal engineering modeling and simulation tasks, as well as topsis decision making and Pareto fronts are used for the techno-economic analysis have been used appropriately.

- The scientific significance of the results obtained and their compliance with the international level and current state of the art

The scientific significance and their compliance with the current state of the art and international level standards is shown by the publications in leading international journal and the attention they have attracted.

- The relevance of the obtained results to applications (if applicable)

The doctoral work presented in the thesis focuses on waste heat recovery and conversion in electrical power with particular applications for internal combustion engines and gas turbines. Interestingly the proposed techno-economic analysis provides scope for implementation on the inverted Brayton cycle for such purposes.

- The quality of publications

The doctoral work presented in the thesis manuscript has resulted in 3 Scopus-indexed publications: 2 journal articles in two Q1 leading international journals and an international conference proceedings paper. The two journal articles are well cited, thus showing recognition by the energy engineering community.

- The summary of issues to be addressed **before**/during the thesis defense

- The text should be “polished”.
- The whole text in the thesis is written within a frame, and it should be checked that this corresponds to the current format and standards.
- The introduction should be rewritten:
 - 1/ The “Motivations” section simply summarizes the current trends for decarbonation, but does not state clearly the motivation for the work done. This is not satisfactory.
 - 2/ A thesis outline appears just after the section “Motivations”, to summarize each chapter. While the outline is useful, it cannot be an introduction to a doctoral thesis.
 - 3/ Essential things that are missing in the Introduction: A clear statement of the goal of the doctoral work; its main objectives; the hypotheses made to conduct the work; an overview of the methodologies employed to check the hypotheses.

Provisional Recommendation

I recommend that the candidate should defend the thesis by means of a formal thesis defense

I recommend that the candidate should defend the thesis by means of a formal thesis defense only after appropriate changes would be introduced in candidate's thesis according to the recommendations of the present report

The thesis is not acceptable and I recommend that the candidate be exempt from the formal thesis defense