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Performance Investigation of Steam Boiler of PLTU Tello Makassar Using Energy – Exergy and Entropy Balance Approach

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Abstract

This work aims to investigate the performance of the boiler of a power plant in Tello Makassar. The boiler has generated an electricity power of 50 MW in order to fulfil the electricity needed by people in Makassar city. Performance investigation of the steam generator is very important due to the operation of the boiler is a long time since 1971. The methodology in this study uses energy and exergy analysis as well as the entropy generation approach. The methodology will be applied in all the boiler components, namely Combustion Chamber, evaporator, superheater IA, superheater IB, superheater II, air heater I, economizer, and air heater II. The result shows a significant decrease in the efficiency of energy and exergy for superheater II of 28.98% and 21.28% respectively. The performance of superheater I and air heater II shows energy efficiency above 90%, while the exergy efficiency is lower than 50% for both components. The economizer has been in the middle performance by placed the efficiency of energy and exergy in 64.48% and 48.35% respectively. In general, boiler components are working very well by the reach an energy efficiency of 90% on average. However, by applications, the exergy analysis of the performances of the components does not reach 50%. The result of the study also shows that the energy and exergy efficiency of the boiler are 41.96% and



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29.36% respectively. Meanwhile, the heat inducted to the steam turbine is 35.98 MW and 15.12 MW by energy and exergy analysis when the plant has been working on 10.3 MW of a load.

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Keywords

Energy; Exergy; Entropy; Steam Boiler; Power Plant

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The reviewer(s) have recommended a MAJOR REVISION. This is an opportunity for you to respond to their major concerns and to incorporate improvements in the paper according to their suggestions. It is also an opportunity for you to add new results. We normally only permit one major revision before an accept or reject decision is made. So please take the concerns of the reviewers seriously.

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Sincerely,
Dr. Santolo Meo, Editor-in-Chief of International Review of Electrical Engineering (IREE)
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Reviewer Responses:

After a complete review of the article, we strongly suggest the editor and author to undergo a major revision. A revised version after evaluation can be considered for publication.

Below the summary of the main remarks:

- The submission showed a lack of attention to the signs of our template denoting little care in the preparation of the manuscript.
- The Authors have not used a nomenclature therefore it is not easy for the readers to understand the contents of the paper. Please add a Nomenclature section.
- English is understandable but needs correction of grammatical errors and style. We suggest to use our service "English Language Editing". More information can be found to http://www.praiseworthyprize.com/english_service.htm
- Photo/schema of the power plant are missing in the paper. The review section should be supported by more references' titles recently published

(2017-2019). We strictly encourage the authors to visit our wide database of titles where they could search for references, at the page <http://www.praiseworthyprize.org/jsm/index.php?journal=index&page=search>

- Unit of measure in the equations should be not in the italic style, they are not physical quantities.
- At the end of the Introduction add a paragraph on how the rest of the paper is organized and developed, typically a summary on the rest.

For any questions don't hesitate to contact us.

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Best Regards,

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