

## Performance analysis of turbocharger-based turbine design in a compressed air energy storage and floating photovoltaics (caes-fpv) system

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### Abstrak

The Renewable Energy market is quickly trending upwards as the dependence on fossil fuel decreases. With more eco-friendly energy sources entering the market, such as Solar, various investments have shifted into developing a cleaner future. However, most renewable energies face a clear challenge – intermittency. By shifting dependence on environmental factors towards a secondary assistive system, dependent solar energy source manipulation can be realised. The system used to test this thinking is the pairing between the Floating Photovoltaic (FPV) system and the Compressed Air Energy Storage (CAES). The solar panels will provide energy that will power a compressor to store compressed air within an air tank. This can then be converted to electricity at any time with the assistance of a turbine and generator. This highlights the importance turbine performance has on the system. Following conventions from radial turbine workings, a commercial Turbocharger (RHF4-IHI) will be modified into a working turbine. After doing so, a performance analysis will be carried out in the form of efficiency calculations. The aim of the research is to gather

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.....Karena Ketergantungan pada bahan bakar fosil berkurang, penggunaan pasar Energi Terbarukan cenderung naik dengan cepat. Dengan lebih banyak sumber energi “eco-friendly” seperti Solar, beragam investasi telah bergeser untuk pengembangan masa depan yang lebih bersih. Namun, sebagian besar energi terbarukan menghadapi tantangan yang jelas - intermittency. Dengan mengganti ketergantungan pada faktor-faktor lingkungan dengan sistem bantuan sekunder, kita dapat manipulasi sumber energi dependen yang realistis. Sistem yang digunakan untuk menguji pemikiran ini adalah pasangan kerjasama antara

sistem Floating Photovoltaic (FPV) dan Compressed Air Energy Storage (CAES). Panel surya akan menyediakan energi yang memberi daya pada kompresor untuk menyimpan udara terkompresi di dalam tangki udara. Ini kemudian dapat diubah menjadi listrik kapan saja dengan bantuan turbin dan generator. Oleh karena itu, kinerja turbin pada sistem ini sangat penting. Mengikuti cara kerja turbin radial, Turbocharger komersial (RHF4-IHI) akan dimodifikasi menjadi turbin yang berfungsi. Setelah itu dilakukan analisis kinerja dalam bentuk perhitungan efisiensi. Tujuan dari penelitian ini adalah untuk mengumpulkan data dan pengamatan seberapa baik desain turbin berbasis turbocharger dapat disesuaikan untuk sistem CAES-FPV.