Modelling of a CHP System with Electrical and Thermal Storage

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***Abstract*—Decentralised energy generation is increasing in popularity because it provides for higher efficiencies and is consequently more environment friendly than the current centralised solutions. Most of the inefficiencies of centralised power stations lie in the large amount of waste heat. This is largely overcome when using Combined Heat and Power systems where the heat as well as the electrical output is used, but these outputs are generally constant, while any demand would be continuously fluctuating. The only way to deal with this imbalance between supply and demand is through the use of energy storage, and therefore this paper investigates the benefits of combining energy storage systems with a CHP system to determine the potential efficiency improvements from such a combination. A full model of this system, which consisted of several sub-models to deal with the various elements of energy generation and storage was developed in Matlab/Simulink and used for simulation using some real-life demand data. The results show that through the addition of correctly sized thermal and electrical storage to a CHP system, the CHP system is able to run continuously at optimal efficiency.**

***Index Terms*—CHP; Electrical Storage; Internal Combustion Engine; Thermal Storage;**