# Increased Penetration of Renewable Energy using Demand Side Management: Immersion Heater Analysis

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**Extended Abstract**

The project suggests a method for increasing the maximum amount of electricity generation capacity that can be provided by wind generated electricity without the need to curtail generators during times of maximum production and with no negative impact on end-of-line customers. The aim of the project is to analyse the potential of wind energy to reduce the amount of $CO_2$ associated with electricity generation and to evaluate its capacity to be further exploited by employing methods of Demand Side Management (DSM) such as load shifting and strategic load growth. This will become ever more significant in the operation of European electrical grids as increasing amounts of intermittent renewable energy sources such as solar, hydro, and wind are implemented in an effort to combat climate change and increase energy security.

This project focuses on Ireland's electricity market as an example of a country aiming to reduce $CO_2$ emissions, increase renewable penetration, and utilise a significant wind energy resource. This paper examines the potential for Demand Side Management and Dynamic load shifting to increase the theoretical limit imposed on Wind Energy integration.

This limit is determined by the financial implications of wind energy curtailment. The following analysis uses the heating schedule of a domestic immersion water heater to show that price driven demand flexibility can increase this limit while offering financial benefits to the consumer. Furthermore, the increased use of wind generated electricity and a minimal increase in overall demand results in reduced consumption of conventionally generated electricity.