A Scenario Analysis Approach to Distributed Energy System Optimisation

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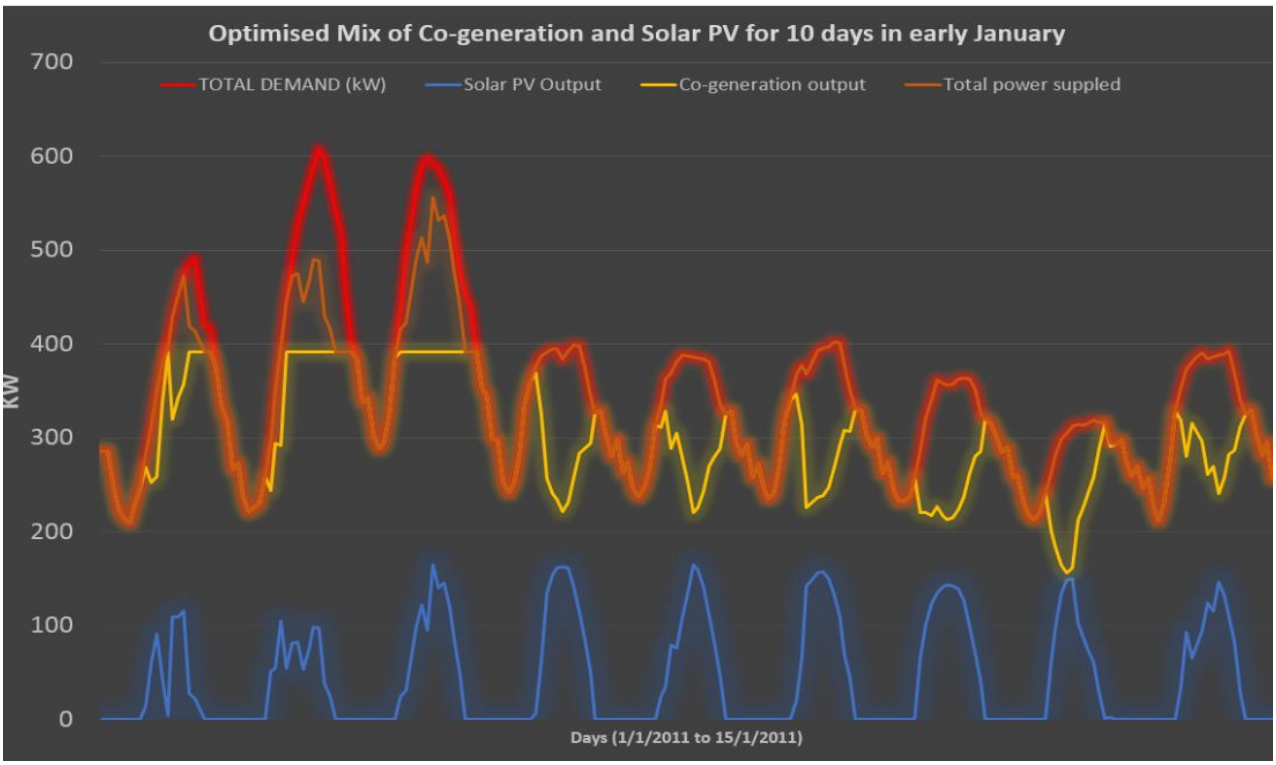
Abstract: This work presents a scenario analysis approach to the planning and optimisation of distributed energy resource systems (DER). Increasing concern relating to the depletion of fossil fuels and the generation of greenhouse gasses from traditional centralised power generation has led to an increased interest in more sustainable distributed technologies. Traditional assessment methodologies assume that the key inputs (load profile, feed in tariffs, usage tariffs etc.) are constant throughout the lifetime of the system. Not only is this definitely not the case but many of the inputs will exhibit significant uncertainty over the systems lifespan. Hence to account for these uncertainties scenario analysis is used to identify the key drivers for each input variable such as building vacancy, recession, advances in energy saving appliances, behavioural changes, policy changes etc. and therefore develop a number of possible future scenarios. Each future scenario provides different input parameters, each varying over the lifespan of the project. Using these final scenarios optimisation can occur to find the most robust or preferred DER system.

Methodology: The process of optimisation begins with identifying the drivers for different scenarios. These influence of these drivers are then assessed to determine the impact on the key input parameters of the energy system to be optimised (i.e. Electricity tariff, gas prices etc.). Each of these parameter variations are combined to capture a range of master scenarios. Finally the system is optimised (in terms of net present value) over its lifespan for either a single set scenario or a weighted average of multiple scenarios.



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