

FOUR DISTINCT DURATIONS OF ENERGY STORAGE IN SYSTEMS POWERED LARGELY FROM RENEWABLES

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Abstract

Apart from not emitting carbon dioxide or other greenhouse gases, most renewable energy sources differ from fossil-fuelled generation mainly in the profile of their output power. Some flexibility must be introduced to reconcile the supply of power from renewable sources with the natural demand for power. That flexibility can and will be sourced from some combination of (a) over-capacity with turn-down, (b) demand-side management, (c) interconnection to spread power geographically and (d) energy storage to spread power over time. What proportion of the flexibility will be sourced from each of these is a big unknown but it is likely that energy storage will make the dominant contribution. Energy storage itself spans a very wide range of timescales, power/energy scales and technologies. In this paper we explain that there are four main ranges of timescale for energy storage and we outline an approach to decomposing the flexibility required from energy storage into these four main ranges. The method does not produce the “optimum” solution but is simple to operate and gives very good answers – certainly adequate for planning system development.