Dynamic Demand Control Technology

The current electricity supply and demand control system is highly centralised, end-consumers have no say in it, and, in many countries, the system is often stressed and under threat.

The most common existing local demand control is based on 70 year old technology called the Ripple system, which controls the Hot Water Cylinders (HWCs) on customer premises. It is used to switch off local loads (load shedding) during times of high electricity demand. Local electricity Distribution Companies (lines companies) can turn off HWCs in the entire area and end users will learn about it only under a cold shower. This system relies entirely on an ability to turn load off during high peaks or when prices are high. Many countries around the world have no such system in place and it would be almost impossible to implement such a system for any number of reasons.

Although renewable generation has potential to help with local demand, lines companies are reluctant to fully integrate it into the system because they can’t control it and it can add instability to the network.

Thirdly rapid development of the electric vehicle industry will make things even worse because the electricity networks are not designed for the expected huge demand for electric vehicle charging.

Grid support system

Dynamic Demand Local Control is a patented decentralised load management and grid support system designed to be inherently stable under a wide range of grid conditions. At lab scale it monitors the health of the electricity grid and manages electricity demand and utilisation within a very fast responding local network, based on demand targets set by a central authority, and on load priorities set by a consumer. Dynamic Demand Local Control works through continuous management of non-essential household loads within a discrete catchment area (typically 50-100 premises supplied by a local distribution transformer).

Self managing

The system is self-managing, operating to pre-set load limits and local grid conditions. This enables rapid response to changes within the grid. Users have the option to set their own priority levels or to allow the system to adapt to individual usage patterns determined by intelligent controllers. This ensures no noticeable user impact during control periods.

Dynamic Demand Local Control has been designed for a future grid with high levels of variability due to widespread distributed renewable generation and significant changes to demand profiles through the increasing use of electric vehicles. This balances intermittent generation (renewables like solar and wind) with local load demand.

The system has been tested at laboratory scale and modelled for use across the whole grid at the University of Auckland Department of Electrical and Computer Engineering.

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