Demand as Frequency Controlled Reserve: Implementation and practical demonstration

One of the challenges in electric power systems with a high penetration of renewable generation is the provision of ancillary services. Traditionally these services have been provided by conventional generation, but as power from renewable sources (wind and PV) displaces conventional generation, new providers of ancillary services are needed. Frequency regulation is critical because fluctuating energy sources increase the need for this service. At very high levels of renewable penetration, all available frequency regulation services will be called on, including demand-side resources. Electric loads that provide thermal energy services are attractive because their heat capacity allows electric power consumption to be moved in time without degrading the quality of service. This concept is being demonstrated in field tests on the island of Bornholm, Denmark.