

Smart Demand Response: A South African Pragmatic, Non-Destructive and Alternative Advanced Metering Infrastructure-Based Maximum Demand Reduction Methodology

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Abstract : The National Electricity Grid (NEG) in South Africa has been under strain for the last five years. This overburden of the NEG led Eskom (the State-Owned Entity responsible for the NEG) to implement a blunt methodology to assist them in reducing the maximum demand (MD) on the NEG, when required, called Loadshedding. The challenge of this methodology is that not only does it lead to immense technical issues with the distribution network equipment, e.g., transformers, due to the frequent abrupt off and on switching, it also has a broader negative fiscal impact on the distributors, as their key consumers (commercial & industrial) are now grid defecting due to the lack of Electricity Security Provision (ESP). This paper provides a pragmatic alternative methodology utilizing specific functionalities embedded within direct-connect single and three-phase Advanced Meter Infrastructure (AMI) Solutions deployed within the distribution network, in conjunction with a Multi-Agent Systems Based AI implementation focused on Automated Negotiation Peer-2-Peer trading. The results of this research clearly illustrate, not only does methodology provide a factual percentage contribution towards the NEG MD at the point of consideration, it also allows the distributor to leverage the real-time MD data from key consumers to activate complex, yet impact-measurable Demand Response (DR) programs.

Keywords : AI, AMI, demand response, multi-agent

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