

Smart demand voltage control in power networks

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INTRODUCTION

The goal of the project is to apply methods for storage energy, mitigate the instability of the power networks, decrease in power transmission losses, and protect the appliances against possible effect of power network instability or failure by using and upgrading the DFR-SmartBox devices. The DFR-SmartBox are a prototype devices for testing purpose algorithms and supervising the power networks at the end users. After testing the algorithms in these devices will be ready to be implemented in a mass production scale devices. These devices will manage the consumers appliances accordingly whit the real needs of the consumer, necessity of storage energy and flattening the demand of the modern power grid networks. Some of the consumer's devices have a good potential for storage energy by simple using them in a smart way. One of the problems with green energies (wind and solar) is that they are not available at all times. This leads to difficulties with integration onto the existing power network based on coals, and nuclear power plants.

Presently some technologies for power grid storage are available, but none of them have reached a high maturity in development due to reasons of conversion efficiency, life span and cost. For example the batteries are expensive, use environmentally harmful substances and have a very limited life span. Statistics shown that 60 to 80% total of energy in houses consumed in form of thermal energy for hitting or for cooling. Hitting usually is done by burning combustibile substance like cool, methane gas, fossil oil products, wood etc. which create on the global scale enormous amount of CO₂. In another hand are already available technologies as "ground source heat pumps" which usually have advertised efficiency between 250% and 400% this mean that can transfer for each KW electric energy consumed 2.5KW to 4KW thermal energy from the ground source. The electric batteries can have maximum theoretic efficiency of 100% usually 60 to 95%. Ground source heat pumps can provide also efficient hitting of homes and water in cold seasons and cooling in hot seasons. By simple using these devices in a smart way avoiding the highly electricity demanding time periods can save CO₂, improve the power network stability, reliability, and minimize electricity losses caused by the heat dissipation in the conductors in the power network at all levels of power distribution network. The green generators usually can cover the low demand time periods but in the high demand periods only a small quantity of electricity is produced by the green generators and most of the electricity came from coal based power plants. The project aims an implementation a simple and viable method for a very large scale integration of smart demand response of consumers. Therefore has to be almost no extra price for implementation of it, also be able to deploy in all kind of networks around of world. Voltage network is considered to be used as an indicator of the local needs of energy in the power network. A proposed approach is to collect measurement data of power network voltage over a specific period of time and detect specific patterns of power network where runs based predominant on green energy or are in low demand time period.