Trends in Life Sciences
An International Peer-reviewed Journal
ISSN: 2319–4731 (p); 2319–5037 (e)

ECONOMICAL ALGORITHM IN DEMAND SIDE MANAGEMENT OF ELECTRIC MARKET

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ABSTRACT
In this paper, energy resources are in two situations as off grid or grid connected considered. And also all kind of renewable energy sources applications in smart micro grids and smart control of generation and electrical energy dispatch is studied hierarchical management in micro grids is a novel trend in smart dispatch energy, and an opening in large amount of transmission, producing and dispatching electrical energy with less tolerance and maximum network reliability.

KEYWORDS: Demand side management, hierarchical management, smart control and smart grids.

INTRODUCTION

Electrical energy producing systems are changes a lot till now, on the other hand meaning the systems were working independently and far from each other and they had to connect grids in large scales. Nowadays for economical reasons, using large systems and building power plants with huge mass is not efficient enough, so that, beside the existence traditional plants, use small scale generators or distributed generations (DG)'s which creates by consumers, provide the network supply and improve the network. Consumption optimization, and make alter in using time can solve the problem and make network stable. Increasing the consumption percentage and problems in building the plants, make need to distribute generators also making the system being stable when fault occurs and making system being stable when fault occurs and supply energy in peek hours on the other hand. Operating the hierarchical power control method with saving energy steps try to control producing power and avoid reacting of increase and decries of consumption or production, and standardize network stability

TRADITIONAL METHODS IN PRODUCED AND CONSUMED POWER CONTROL

Using the DSM and DG's and main providers is use to controlling the network power nowadays. DSM & DG not only supports main plants inability but also decries peek hours in network, and in same hours consumers treat such as providers. The propose in this control is, to constant providing power and consumption or production being equal and system become stable, so that in this case the producing power with wind turbine or other DG's with renewable resources is variable, just because of natural and environmental quantities, but with large amount of producing and counts of DG's, this variable amount being near zero and the output result will be constant. This products and the displacement of load can make network stable, and the total cost will increase, but this paper is about producing the power when the network is critical situation need to inject power for a limited time to handle the network. The aim of this paper is power control in network according to the DSM with using the storage by saving the more produced the recommended improves traditional methods one-step policy and stability.

MATERIALS AND METHODS

We use DSM, DG and storage device for electrical energy storage. For these propose we use salt or in the better words molten salt tank, which used in cellular mirrors. Energy stored as heat in molten salt, so when we use energy, makes steam and generator moves the turbine and produce power. Energy storage as heat in molten salt tank, can be more than 10 dozens to hundreds Mega Watts, it depends on tanks and solar power plant capacity, also In the lack of load or peek time we can use this capacitors, and in the time of the over load it can save as heat in molten salt for a week, this is also suitable for saving solar energy during the night. The over energy during the less of consumption.

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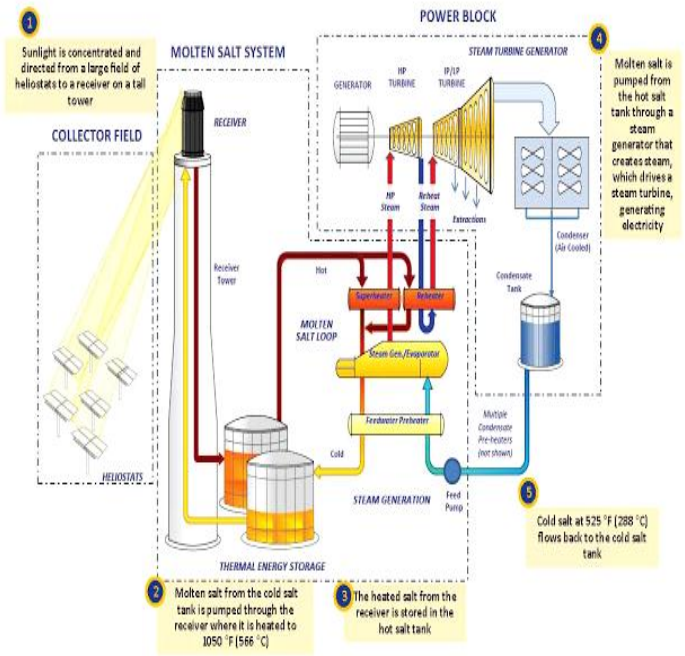
can also use to save in cylinders. The times such as peek duration or network is in the loss of production because of fault in generators, or networks, which plan to feed from neighbor networks, and the network work as an island and need energy. We can use these storages to make this critical network stable. The recommended method is not only introduce us the new way for store but also make hierarchical to use production and stored energy for make the power constant in network. In other words, with considering the network frequency and its changes the network can be controlled. For this purpose, we consider two frequency limits and the conditions are according to these two zones if frequency is in valid limit no changes will be occur on system but grid power shortage or access with lead to increase or decrease the grid frequency.

Once the system senses the frequency alteration and detects the frequency zone. In case of valid frequency nothing occurs. If the frequency exceeds the upper limit and reaches the second zone so there is a return time defined to prompt for a change in generation and consumption balance through the system algorithm. To achieve the stability of the system, some changes in system will be happen as soon as frequency absolute value exceeds the second zone by means of the algorithm. This system is hierarchical, which means that in critical situations when the frequency violates the acceptable limit the system begins to perform specified procedures, so if the frequency is lower than the reference point and also out of the allowed region the saving mode is become disabled and the power will be increased based on frequency slope in a leveled manner, in order to change the frequency slope from negative to zero and eventually positive value within the allowed zone. Increase in power generation will be in a terraced manner and depends on frequency slope value as well as number of steps used to change the negative condition of frequency slope to reach the reference position. It will be necessary to save the energy in case of distributed units power addition and the main units maximum operation frequency slope doesn't reach the accepted interval. Load elimination is the fine step of stabilization so if the frequency gets more values than the reference point and exceeds the allowed limit the system enters the storage devices step by step in order to stable the consumption and generation power, so the power becomes balanced.



(Figure1): The results of model (4) for Clothing industry

To prevent the frequency increase the distributed units (DG's) and the main units load will be lowered finally. Consequently the main objective of this grid stabilization method is to use the existing opportunities for energy

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saving to use in proper times to help power improvement, stabilization and optimization. The defined limits are close to reference point to achieve the frequency stability and to maintain other parameters almost constantly.

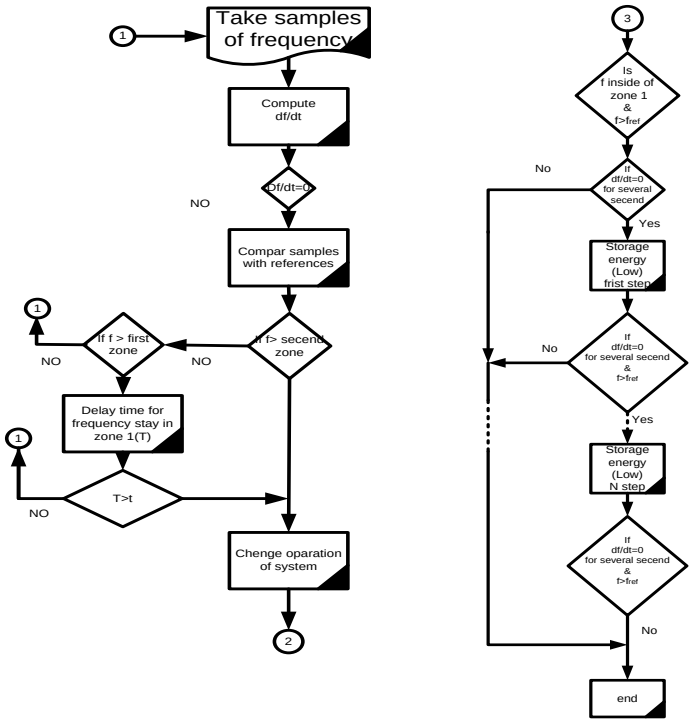

Figure2): a) the frequency sampling by this algorithm b) recognizing the zones happen with this algorithm.

THE SIMULATION RESULTS

By applying the algorithm on grid in Power factory software, these results happen for stabling the network:

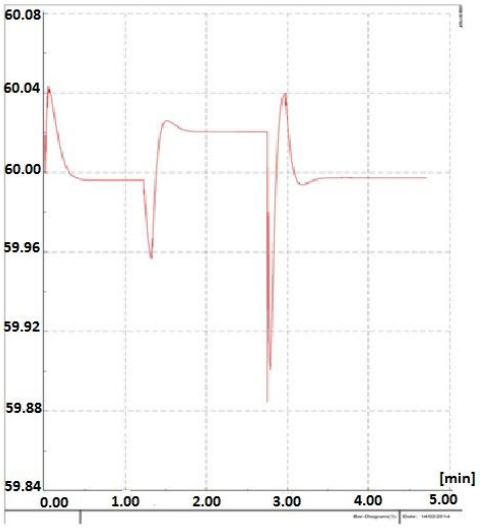

Figure3. frequency changes in island case with DG presence for make frequency constantly stable in zone 1

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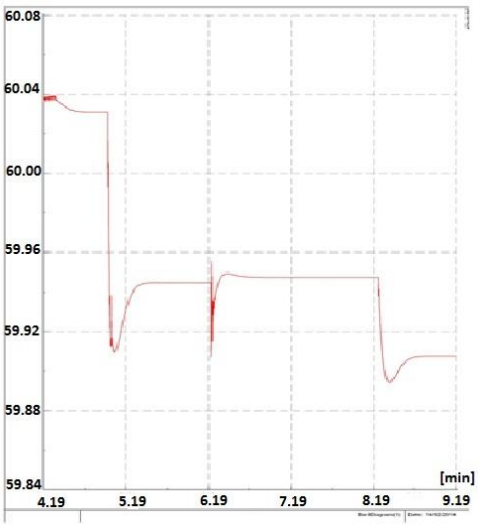

Figure4. Frequency changes in island case, in situation of algorithm performance to use storages and other power providers

The recommended method is not only can increase the productivity of main providers but also can cause long life of instruments. The economic benefits and increase the efficiency of network.

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