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METHODS OF INFORMATION PROCESSING IN OPTIMIZING MICRO GRID SYSTEM WITH DISTRIBUTED ELEMENTS

Abstract: This article discusses the relevance of the creation and use of "smart" power grid, micro networks - micro grid in combination with renewable energy sources, the received information.

Key words: Micro Grid, micro-Network, intelligent network, a modular type of digital substation, hubs.

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Introduction

Tasks, based on actions on the most acceptable and rational use of reserves, while maintaining a certain degree of comfort of the existing (for a man) or a certain degree of existing production appear relevant to virtually every country.

It is permissible to create projects for clients systems and electric drives based on the established comfort level or order production.

Exceptionally claimed there is a problem with the requirements of the free market trade resource in which 1) there are options for the delivery of electricity and other resources, 2) in the presence of a variety of flexible tariffs, related to the period of the day, 3) the existence of variants of the origin of electricity. When such coincidence, there is a number of problems that need to be addressed.

One of the first problems is a clear prediction of power consumption. The next task may include a task related to the subject of the quality of information: how are true and correct all the data? In the case of information authentication problems occur, and suspicions about the correctness of the result. Another problem - the problem of energy conservation reserves detection - electricity used per day (a week), which can be saved under the specified conditions. Also among the important issues that today there are many power transmission and distribution organizations (including organization of water supply, gas transmission and gas distribution) are problems such as outdated network infrastructure, increasing the maximum loads, wide promotion of new power Generation technologies (renewable

energy sources) the need to improve the quality of customer service, the need to maintain network security. Consequently, the problem of planning and development of "smart" energy-saving automation of procedures and structures are modern crisis in the application of information standards (technologies) in resource conservation.

Micro Network or system-micro grid

Micro grid Complex ("micro-network") it encompasses, typically one or a number of distribution substations and systems savings system that allows it to operate as a stand-alone or be combined with an external power system. Micro grid Network have different sizes, from small networks to provide power a small number of residential units to large energy supply systems of business organizations and institutions. [1]

Usually micro grids are erected for a small period of time to meet the local needs in electric power and do not carry out the provision of electricity over long distances. [2]

Complex micro grid with renewable energy sources (for example, the use of hubs and solar, vertically positioned wind turbine and hydrogen stand-alone installation), as part of the power system Smart Grid provide an opportunity to create a full range of acquisition, use and conservation of electricity. All this is quite in demand for staying areas, work or life without complex approach to the central power.

The concept of "smart grid"

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Intelligent "smart" electricity grid - a fresh set of visions of the importance of technology to modernize energy infrastructure, to review our obligations both energy consumers and, ultimately, in the issue of preservation and protection of nature and the much-needed energy.

The formulation of the concept of "smart grid" US Department of Energy as follows: "Smart Grid - a method of producing electricity from energy companies to customers, combined with a variety of technologies and an improved power system activities explicitness, efficient customer service and presenting the environmental dignity>>.Despite the different interpretations of the concept of the smart grid is no doubt that communication network appears the foundation of intellectual power. Companies in the electricity sector are investing in communications networks to improve the situational awareness of the

reserves of the energy system with the desire for automation, control systems and unite them. The advantage of the intellectual energy is that electricity companies will be able to "soften" the need for electricity during peak periods, to renounce the use of hot resources, and reduce the need for long-term capital investments in the development of additional generating associations also reduce the need for other investments, for example, modification to the system to enhance the productivity. The existence of the four properties of the "smart" network combined to make intelligent power grid (Figure 1). The foundation of a modernized power grid are intelligent components, staying at the level of digital technology, which is connected to the electric power company established and current analog infrastructure of the energy system. [3]

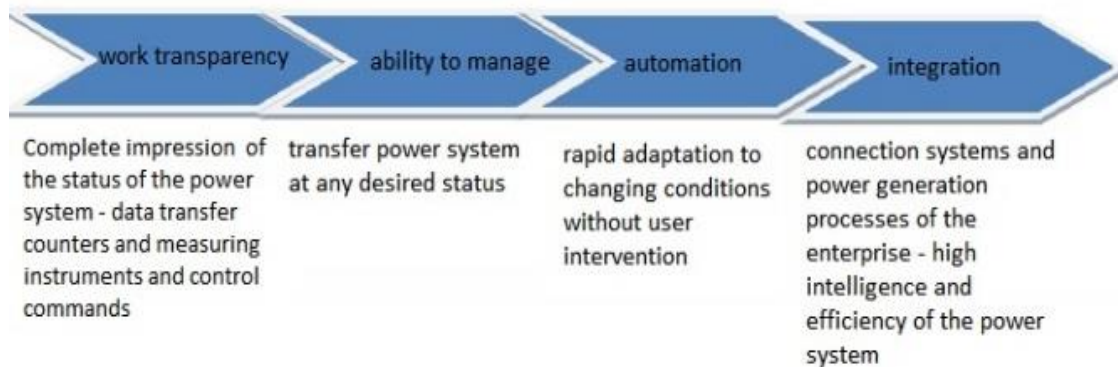


Figure 1- Smart Grid-element.

The advantages of the intelligent network are:

- Effectiveness in operations - reduce power embezzlement - and improving interminableness payments through automated complexes reading data recording devices;
- Perfect reaction - to minimize the maximum possible load with smart fixtures accounting allows you to enter the rates associated with the use of time;
- Network security - forming predictions of resource use to improve the set of network settings in real time, which will contribute to the art work in full force its actual capacity;
- Actual current communication standards - the ability to integrate the intelligent options in all electrical infrastructure, from power substation to customer equipment.

Intelligent network device can be described by the following categories:

- intelligent grid includes options for monitoring and observation of mains producing capacities in order to diminish the load, measurement of protection also supports reliable and productive energy delivery.

- Renewable energy;
- Intelligent transfer of information covers and sharing current data devices and counters located throughout the country;
- Intelligent control spending and ensure increased efficiency, reliability and security of the network by automating the supply and control the reaction to unforeseen circumstances.

One of the main components of the smart grid appear on the digital substation, in which embodied urgent solutions and standards to monitor the power grid equipment.

Economic circumstances and the business advantages of digital substation automation:

- Reducing the current embezzlement.
- Modern substation make it possible to reduce the current embezzlement due to the merger of a number of control and monitoring into a single IP-based network. This fact provides the highest degree of importance for traffic control and operational data.
- Reduction of capital embezzlement. Due to the fact that the demand for electricity is growing electric power companies need to find methods of

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generating power to meet these needs during peak periods. One method is the use of the automation station techniques for large-scale reduction of the maximum load and demand management, which will enable to reduce the number of additional power plants to provide power during periods of peak demand on the electricity grid.

- providing a distributed intelligence. Because intelligent network control options within reach, not only in terms of limited control center, but also for sub-stations, there is a possibility of designing new applications that allow to distribute options protection, control and automation technology.[4]

- Increased security of the power system. Question to guarantee power system information security covers not only the protection of the substation borders, but also the formation of an absolutely secure architecture that allows to find the maximum plausible concept of the entire network, mechanisms and accidents.

Renewable energy sources

Many Russian regions have all the requirements for the formation of distributed generation, we are talking about the possibilities of solar energy and wind energy. Renewable energy sources have great importance in solving the issues of energy security, the environment and corruption of climate change. [5, 6]

To motivate electricity generation production facilities, operating on the basis of renewable energy sources is required to adopt manual calculation of tariffs for electricity created in renewable energy facilities. [7, 8]

Intelligent data exchange

Without reliable and accurate communications grid - this is nothing more than 'deliver.' Power. To make it "smart" is necessary to ensure the exchange of information in both directions.

Sharing information allows energy production to solve several major problems: intelligent surveillance, protection and guarantee of "smoothing" the load. Through the exchange of information in both directions, and the readings of meters located throughout the network, accumulate and are available directly to the network controller to the operator.

The communication structure of intelligent networks have identified a number of sections:

- Regional - WAN. It includes a large territory and connects the control center with local networks.

It can be created using fiber or wireless communication method in accordance with the Ethernet or cellular protocols.

- Local - NAN. This network manages all data transmitted between the regional and domestic network of high-voltage rails. In this case, used or wireless communication, or communication power supply rails.

- Home - HAN. It creates conditions for an extreme objects - residential buildings or organizations.

All of these sections are interconnected via devices - hubs, set between the regional and local network, or electronic devices between the home and the local network. [9]

"Smart" Energy consumption and control

It is significant to modernize the management and control of energy consumption, this requires a complex aggregate measurements. Communication, broadcasting and returns information about how to use energy, creates advantages and helps to reduce the loss. While more distinct and clear data for power consumption allows users to master their indifference to energy issues. [10]

These error-free measurements are needed in order to investigate, approve or modify one of the samples of energy wastage. It is essential to realize the management of the use of energy and to receive data service systems and recognition of deviations.

Conclusion

In the complexes of "smart" accounting be applied one or multi-phase modular instruments. "Smart" sensors can check the relationship of power usage by time and allow the utility companies to provide discount system for customers to change the structure of energy consumption. For the unlimited introduction of automation, we need to provide customers with an alternative to the admissibility and the increased range of services.

Client due to smart metering is always on time gets through, which clearly expresses the information on consumption. This helps the client time to pay the bills and, as a result, favorable to conquer much of the honest taxpayers in each consumer structure.

Moreover, information about consumers can easily combine data from external systems check the solvency of consumers to improve risk assessment. This is the most significant in cooperation with corporate customers.

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