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In-depth definition of indicators commissioning of networks to increase the reliability and efficiency of the city's power supply system

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ABSTRACT: This article discusses the methods of determining the indicators of deep penetration networks and applying deep penetration networks to increase the reliability and efficiency of the municipal power supply system. We determine the indicators of deep access networks as a way to develop existing urban networks. One of the main features of the modern and future development of urban electricity supply is the reduction of energy losses, material consumption, the number of intermediate network connections, and the operation mode of electricity receivers as a result of the introduction of high-voltage networks. Deep access networks and substations will be improved in cities or newly built cities.

KEY WORDS: city power supply, substation, deep penetration, energy voltage and circuits.

I. INTRODUCTION

Currently, in order to implement the priority directions for the modernization of the country's energy system for the rapid development of the economy of the new Republic of Uzbekistan, measures are being drawn up and programmed to develop the electricity supply system, the effective transmission of the supplied electricity, and the reduction of the energy waste generated in the system.
One of the main indicators that determine the level of development of any country is its energy development. As a result of rapid development, in all spheres of economy, agriculture, industry, machinery and production, including the power sector, one of the main tasks is to achieve energy savings in electricity supply to consumers and increase the reliability of their electricity supply system using new innovative technologies.

In the development of urban networks, deep access networks mean bringing the most economically optimal voltage to the load center with a minimum reduction of intermediate conversion stages and equipment [1].

II. SIGNIFICANCE OF THE SYSTEM

This article focuses on how to determine the performance of deep penetration networks and how to apply deep penetration networks to improve the reliability and efficiency of the municipal power supply system. Literature survey study in section III, methodology in section IV, section V includes the experimental results of the study and section VI discusses the actual research and conclusion.

III. LITERATURE SURVEY

Deep access networks**.** Depending on the ability of the deep penetration network to pass through the urban area, it can be implemented in the form of cable and aerial networks. The location of a deep access network substation is determined by the load patterns of existing or planned distribution networks. In single-transformer substations, centralized backup of transformers is usually implemented in the form of one or more transformers for all substations in the city. In the design

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of new residential buildings, deep access networks are usually implemented in the form of two-plus and two-transformer circuits [2].

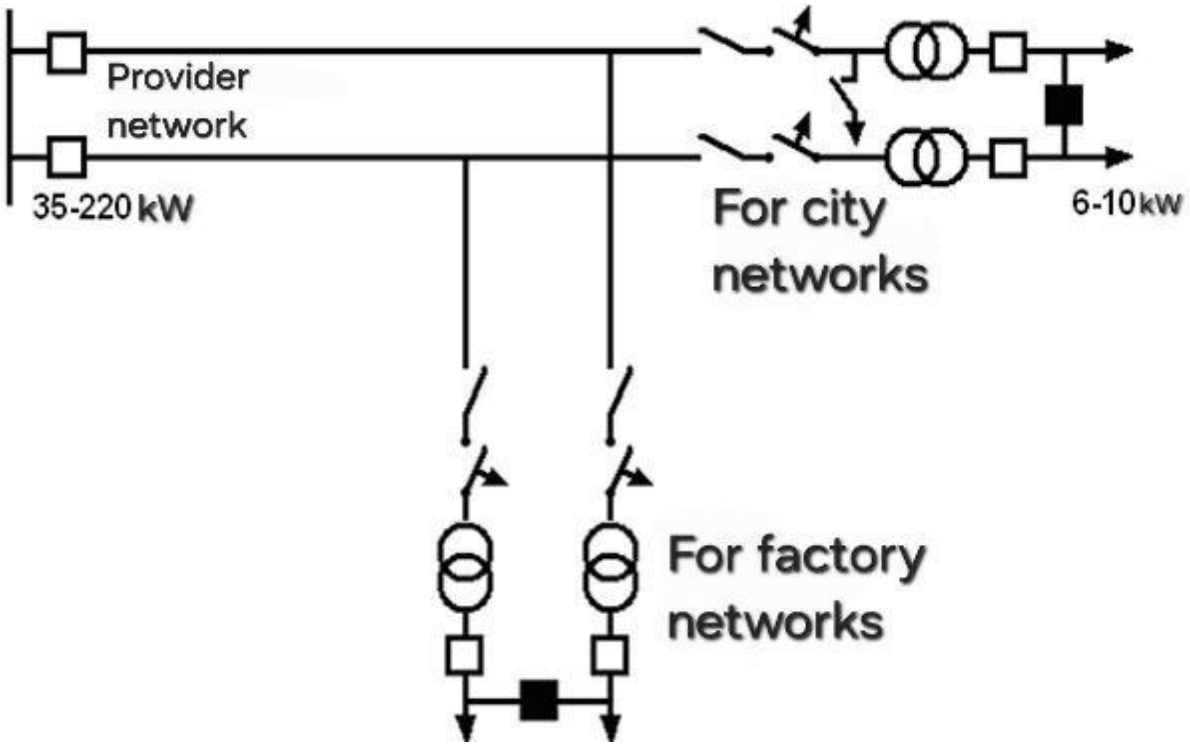

Fig. 1. Deep penetration designed for urban and industrial enterprises network diagram.

In this case, 35-220 kV overhead networks are double-circuit, and their use in urban conditions is more efficient than two-circuit networks. Currently, due to the improvement of technical indicators, it is recommended to design new city networks with a voltage of 10 kV, as a result of which difficulties arise in the use of new 10 kV networks and old 6 kV networks.

Therefore, it is recommended to use deep input networks with 35-110/10/6 kV three-phase transformers. However, the mass production of such transformers has not et been established, so it is time to recommend the design of such circuits. One of the main characteristic features of the modern and promising development of the city power supply system is to reduce energy losses, reduce material consumption, reduce the number of intermediate network connections and improve the operation mode of power supply.

The following factors are important when using deep access networks:
- urban housing - limited free area of land masses and high building density;
- impact of electromagnetic field and noise on human health;
- aesthetics of electrical network design.

One of the important tasks in the use of underground networks is to achieve small-sized substations, reduce their harmful effects on people, reduce the cost of underground networks and simplify them, and ensure compliance with the requirements of technical aesthetics [1.2].

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IV. METHODOLOGY

Deep access is a power supply system for cities, in which the high-voltage supply network is located close to consumer devices. This reduces the number of stages of converting electricity from the source to the receiver. Deep entry is a power supply system in which consumer loads with a voltage of 35 kV and above are approached with a minimum of intermediate transformation steps. Deep insertions of high voltage can be made by dividing ChK directly from the power supply by QM and the ring network [3].

Deep-entry substations - abbreviated as deep-entry substation is a substation with voltage from 35 to 220 kV, usually it is implemented using simplified switching circuits on the primary voltage side and receives power directly from the power system or the power grid. Deep-entry substations may differ according to the purposes of ChKP, as they are used not only for supplying electricity to urban areas, but also in power supply systems for large industries and urban consumers.
For what purposes are deep penetration networks used in energy systems. The use of deep penetration is associated with an increase in the length of the high-voltage network. The increase in the cost of the high-voltage network leads to a sharp reduction in the costs of the medium-voltage network by reducing its length. At the same time, the construction of distribution points and the laying of 6-10 kV supply networks are considered to be abandoned [3.4].

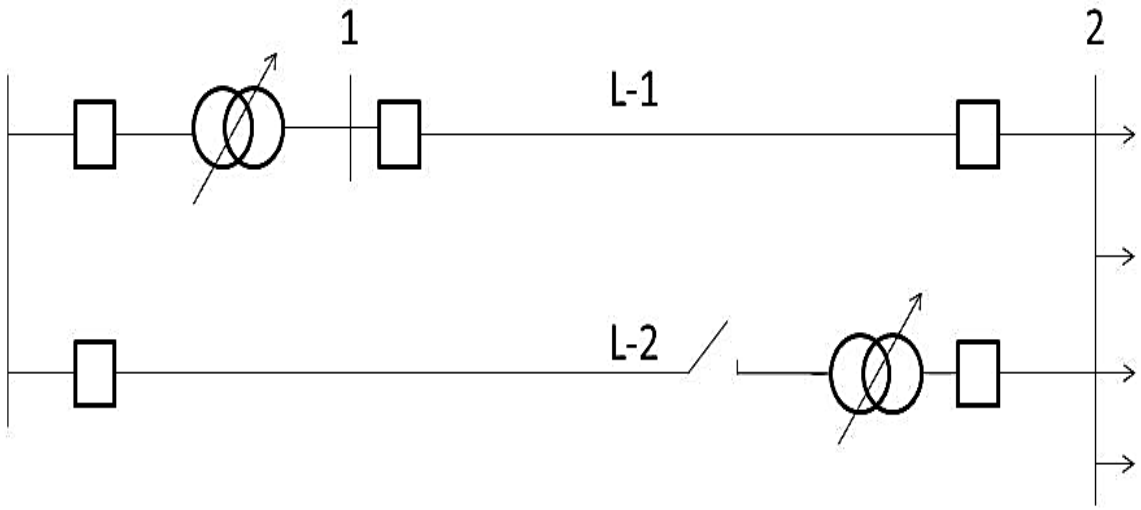

Fig. 2. A pit used in the city's energy supply system radial schemes of inputs.

City networks must be powered from a 10 kV city substation busbar (1) through one L-1. (2) - with an increase in the load on the circuit, it is necessary to increase the cross-sectional area of the supply networks or their number (by 10 kV). When using a 35-220 kV deep penetration line, a 35-220/10 kV transformer with L-2 construction and voltage regulation is provided near the circuit. In normal mode (2) - the circuit is energized through L-2 and L-1 remains in reserve. The development of this network will reduce capital and operating costs, as well as reduce the consumption of non-ferrous metals and energy losses.

Metro networks have the following technical advantages:
a) due to the absence of parallel operating networks, the means of voltage testing are located closer to the load center;
b) simple use of relay protection;
c) additional reserve is created in low-voltage networks with the possibility of automation;

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g) in low-power transformers, the short-circuit current is reduced, because the city networks are connected through a transformer with a high resistance, and not to parallel networks with a voltage of 6-10 kV.
Currently, the following short-circuit power limits are used in the municipal power supply system:
- 6 kV - 200 MVA
- at 10 kV - 350 MVA } - depending on the calculation of these powers,
- 35 kV - 600 MVA electrical equipment is produced.

The maximum power of the transformer corresponding to the short-circuit power does not exceed the values specified for the secondary voltage deep-entry network:
- network 6 kV - 16 MVA;
- network 10 kV - 32 MVA.
In big cities, it is necessary to install high-power transformers. In this case, measures are taken to reduce short-circuit currents, that is, sampling of reactor circuits [4.5].

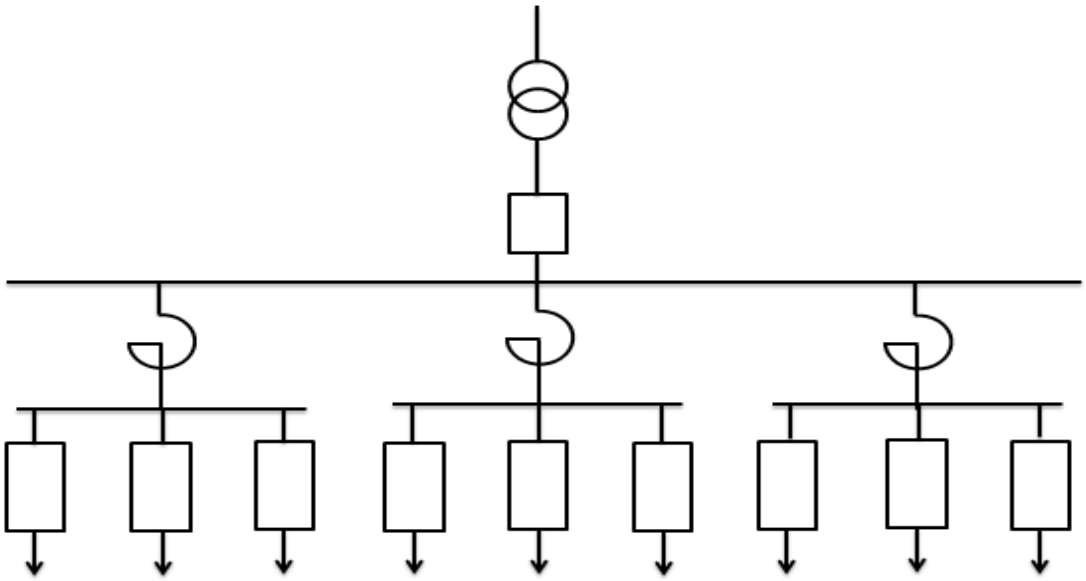

Fig. 3. Pp - group reactors with three outgoing lines.

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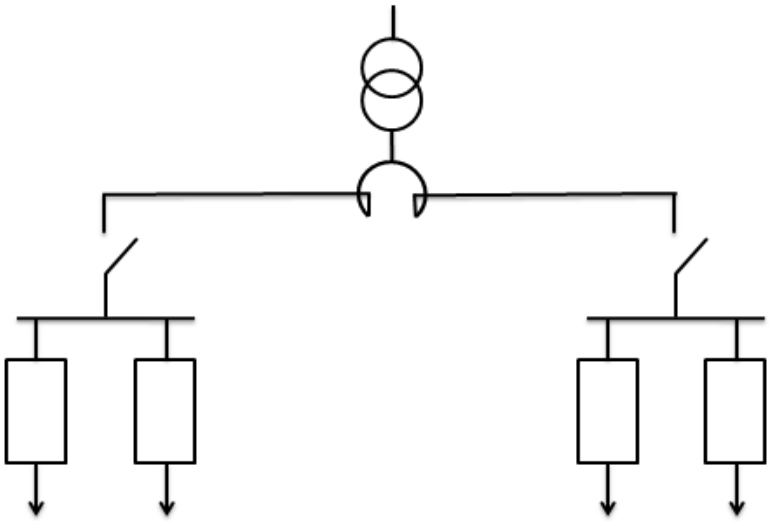

Fig. 4. Rg is a split reactor.

To increase reliability, a deep access network was connected from another trunk network, and an automatic control system was installed in the distribution center.

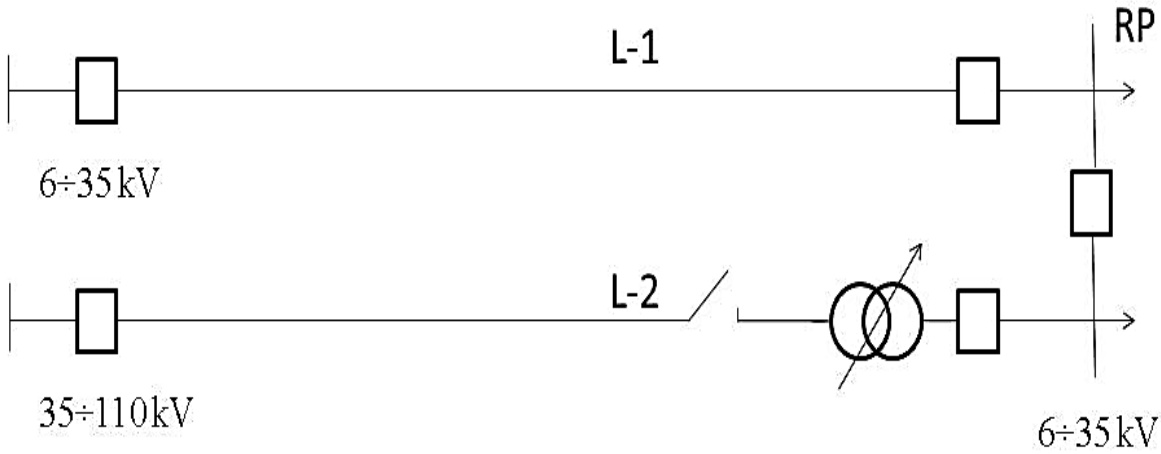

Fig. 5. Two distribution sources are fed from the mains detailed diagram of distribution point RP.

V. EXPERIMENTAL RESULTS

Power supply of deep access substations can be carried out according to different schemes of the high-voltage network: radial, main networks with one or two-way power supply, ring circuits with two-way power supply. Consumption of

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substations and deep penetration networks under various high voltage network schemes, ie. radial and basic versions show the main structural schemes of deep inlets used in the power system of cities [2.3].

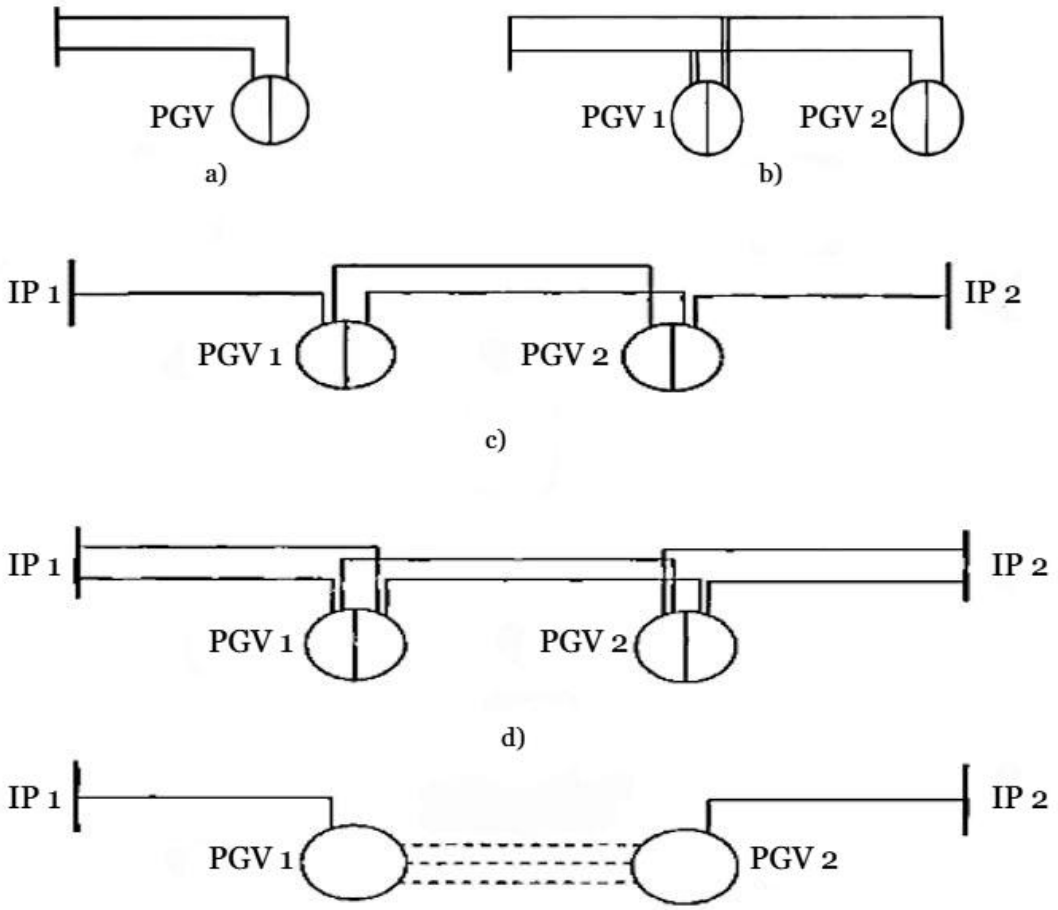

Fig. 6. The main types of deep access substation schemes.

a) radial diagram of a two-transformer deep input substation.
b) trunk scheme of a deep entrance substation with two transformers.
c) loop diagram of a deep input substation with two transformers.
g) two-circuit loop scheme of a deep input substation with two transformers.
d) one-circuit radial scheme of a single-transformer deep-entry substation. Reserve 10 kV network by doing.

The practice of designing urban electrical networks shows that the radial deep access scheme (Fig. 6. a) is the simplest, easy to implement and widespread. The construction of a deep access according to the radial-berk principle provides the required level of reliability. The main deep access scheme (Fig. 6 b) is mainly used as a continuation of the development of radial deep access networks with a load density of at least 30 MW / km, a city radius of more than 15 km and a voltage of at least 220 kV. Basically, the schemes (Fig. 6. v, g and d) are applied in practice in countries with very large electric power systems.

In the system, the deep input of the line block, which is structured according to the scheme - the transformer, two elements: the line and the transformer - form a single whole. The latter defines the mutual redundancy of the blocks, a joint approach to solving network and transformer relay protection issues, the design of the considered elements, etc. If we analyze

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based on the above information, substations and deep access networks are widely used in the energy systems of developed foreign countries [1.2.3]

VI. CONCLUSION AND FUTURE WORK

If we analyze the use of deep access network circuits, we can achieve high quality, continuous and low power losses. The construction of the system requires the adaptation of existing electrical equipment and the construction of new equipment and networks. This leads to long periods and high costs. Modern equipment of domestic and foreign manufacturers that meet all requirements of high reliability, ease of use and environmental and technological safety are used in the deep access networks under construction. Substations should be designed keeping in mind the latest requirements.

All the objects under construction are closed type substations, which allows to preserve the image of the city. Therefore, each substation is built according to a separate project, agreed upon by city architects and approved by its own, original solutions.

Currently, in order to meet the expected needs in the electricity supply system, as well as to achieve efficiency and energy saving in the system, program work is being carried out at the government level. In practice, works of reconstruction, replacement and re-equipment of electrical equipment and networks, which have expired and have passed their useful life, are being carried out.

Taking this into account, in order to meet the needs of electricity, as well as to increase the reliability and energy efficiency of the electricity supply system, it is time to use new modern innovative devices and networks in the system of newly built factories and factories, institutions, residential buildings based on the experiences of foreign countries. remains in demand.

What are the purposes of deep penetration networks in energy systems:
- energy system and its elements.
- electric networks
- electric power systems.
- easic concepts and definitions.

From a technological point of view, energy is a sector of the economy that covers the extraction of energy resources, the production, conversion, transportation and use of various types of energy. However, from a modern point of view, the set of listed processes can be effectively used only when they are organized according to the principle of the "big system", which is the fuel-energy package (UEK).

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