"CALCULATION OF THE WASTE OF VOLTAGES FROM HIGH-VOLTAGE NETWORKS IN ANDMI BUILDINGS"

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INTRODUCTION

The electric power industry of Uzbekistan will develop if the energy efficiency of the use of energy resources increases. Electric energy is the only type of product that does not use other resources to move it from places of production to places of consumption. For this, part of the transmitted electricity itself is consumed, so its losses are inevitable, the task is to determine their economically feasible level. Reducing electricity losses in electrical networks to this level is one of the important areas of energy conservation. This task is associated with reducing electricity losses in the electrical networks of the energy system of Uzbekistan. The growth of energy losses in electrical networks is determined by the action of quite objective laws in the development of the entire energy sector as a whole. The main ones are: a tendency towards concentration of electricity production at large power plants; continuous growth in the loads of electrical networks associated with a natural increase in consumer loads and the lagging of the growth rate of the network bandwidth from the growth rate of electricity consumption and generating capacities.

Keywords: HIGH VOLTAGE, RT(receiving power),GIL,electric power,energy resources,electricity production,transmormers.

1. MATERIAL AND METHODS

Losses caused by theft of electricity are not a technical characteristic of the electricity network and electricity metering systems and their standards are not considered here. Technical losses - the sum of three components of losses in lines and equipment of electrical networks:

- losses depending on the load of the electrical network (load losses);
- losses, depending on the composition of the included equipment (conditionally constant losses);
- losses depending on weather conditions. Electricity consumption for auxiliary needs of substations is the consumption of electricity required to ensure the operation of the technological equipment of substations and the life of the maintenance personnel.

2. RESULTS

The division of losses into components can be carried out according to different criteria: the nature of losses (constant, variable), voltage classes, groups of elements, production units, etc. Considering the physical nature and specificity of methods for determining the quantitative

values of actual losses, they can be divided into four components.:

1. **Technical losses of electricity ΔWT** caused by physical processes in wires and electrical equipment occurring during the transmission of electricity through electrical networks.

2. **Electricity consumption for auxiliary needs of substations ΔWCH,** necessary to ensure the operation of technological equipment of substations and the vital activity of maintenance personnel, determined by the readings of meters installed on transformers for auxiliary needs of substations;

3. Power losses due to instrumental errors in their measurement (instrumental losses) ΔWIsm

TABLE I. PARAMETERS OF OVERHEAD TRANSMISSION LINES

Voltages level	**Line parameters per km**		
	Resistance per km	***Inductance per km***	***Susceptance per km***
230kv	0.050	0.488	3.371
345kv	0.037	0.367	4.518
500kv	0.028	0.325	5.2
765kv	0.012	0.329	4.978
1100kv	0.005	0.292	5.544

TABLE II. SIMULATION RESULTS OF OVERHEAD TRANSMISSION LINES

Voltages level	**Power in MW**			
	Sending end power(MW)	***Receiving end power(MW)***	***Losses(%)***	***Voltage drops(kv)***
230kv	94.97	93.94	1.10	11.4
345kv	153.5	152.2	0.53	6.8
500kv	255	254.2	0.315	5.4
765kv	361.9	361.6	0.3147	1.3
1100kv	521.2	521	0.115	-2

4. **Commercial losses ΔWK caused by theft of electricity,** inconsistency of meter readings with payment for electricity by household consumers and other reasons in the field of organizing control over energy consumption. Their value is determined as the difference between the actual (reported) losses and the sum of the

first three components:

5) **Technical losses** in electrical networks of power supplying organizations (power systems) should be calculated for three voltage ranges **ΔWК = ΔWRef- ΔWT- ΔWCH- ΔWMeas**.

- in high voltage supply networks of 35 kV and higher;
- in medium voltage distribution networks 6 - 10 kV;
- in distribution networks of low voltage 0.38 kV

At present, for each RES and PES of power systems, technical losses in grids of 0.38 - 6 - 10 kV are calculated monthly and summed up for a year. The obtained values of losses are used to calculate the planned rate of electricity losses for the next year. Losses in lines and power transformers, which in general form can be determined by the formula, thousand kWh:

$$\Delta W_{nep} = 3 \cdot R \cdot \int_0^T I^2(t)dt = 3 \cdot \Delta t \cdot \sum_{i=1}^{T/\Delta t} I_i^2$$

where I (t) is the element current at time t; Δt is the time interval between its successive measurements, if the latter were carried out at equal sufficiently small time intervals.

Losses in high-frequency communication interceptors. The total losses in the air intake and the connection device on one phase of the overhead line can be determined by the formula, thousand kWh:

$$\Delta W_{ВЧ} = (\Delta P_{ном} \cdot \beta_{ВЗ}{}^2 + \Delta P_{пр}) \cdot T \cdot 10^{-3}$$

where βvz is the ratio of the rms operating current of the VZ for the calculated period to its rated current; ΔPпр - losses in connection devices.

4. DISCUSSION

1. Losses of no-load electricity in a power transformer, which are determined over time T according to the formula, thousand kWh:

$$\Delta W_X = \frac{\Delta P_X}{U_H} \cdot \int_0^T U^2(t)dt$$

where ΔPx is the no-load power loss of the transformer at the rated voltage UH; U (t) - voltage at the connection point (at the HV input) of the transformer at time t. For open circuits of 6-10 kV, the loads on the head section of each line (in the form of electricity or current) are known.

METHODS FOR CALCULATION OF ELECTRIC POWER LOSSES IN DISTRIBUTION NETWORKS

0.38-6-10 KV

Networks of 0.38 - 6 - 10 kV power systems are characterized by the relative simplicity of the circuit of each line, a large number of such lines and low reliability of information about the transformer loads. The listed factors make it inexpedient at this stage to use methods for calculating electricity losses in these networks, similar to those used in higher voltage networks and based on the availability of information about each network element. In this regard, methods based on the representation of 0.38-6-10 kV lines in the form of equivalent resistances have become widespread [3]. Equivalent resistance of lines 0.38-6- 10 kV at unknown loads of elements is determined where I (t) is the element current at time t; Δt is the time interval between its successive measurements, if the latter were carried out at equal based on the assumption of the same relative load of transformers. In this case, the calculation formula is.

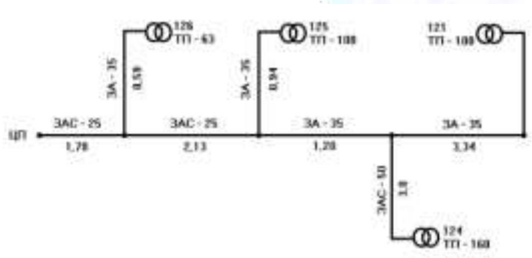
$$R_{эк} = \frac{\sum_{i=1}^{n} S_{Ti}^{2} \cdot R_{лi} + \sum_{j=1}^{m} S_{Tj}^{2} \cdot R_{Tj}}{S_{T.Г}^{2}}$$

where Sтi is the total rated power of distribution transformers (RT) receiving power from the i-th section of lines with resistance Rli, n is the number of line sections; Sтj - rated power of the i-th PT with resistance Rтj; t is the number of RT; St. г - total power of RT connected to the line under consideration.

Calculation of Rek according to (2.13) assumes processing of the circuit of each line 0.38-6-10 kV (numbering of nodes, coding of wire brands and RT powers, etc.). Due to the large number of lines, such a calculation of Req can be difficult due to high labor costs. In this case, regression dependencies are used, which make it possible to determine Req based on the generalized parameters of the line: the total length of the line sections, the wire cross-section and the length of the trunk, branching, etc. For practical use, the most appropriate dependence is:

$$R_{эк} = R_{Г} + \frac{a_1 \cdot l_{м}^{a} + a_2 \cdot l_{м}^{c} + a_3 \cdot l_{o}^{a} + a_4 \cdot l_{o}^{c}}{F_{м}}$$

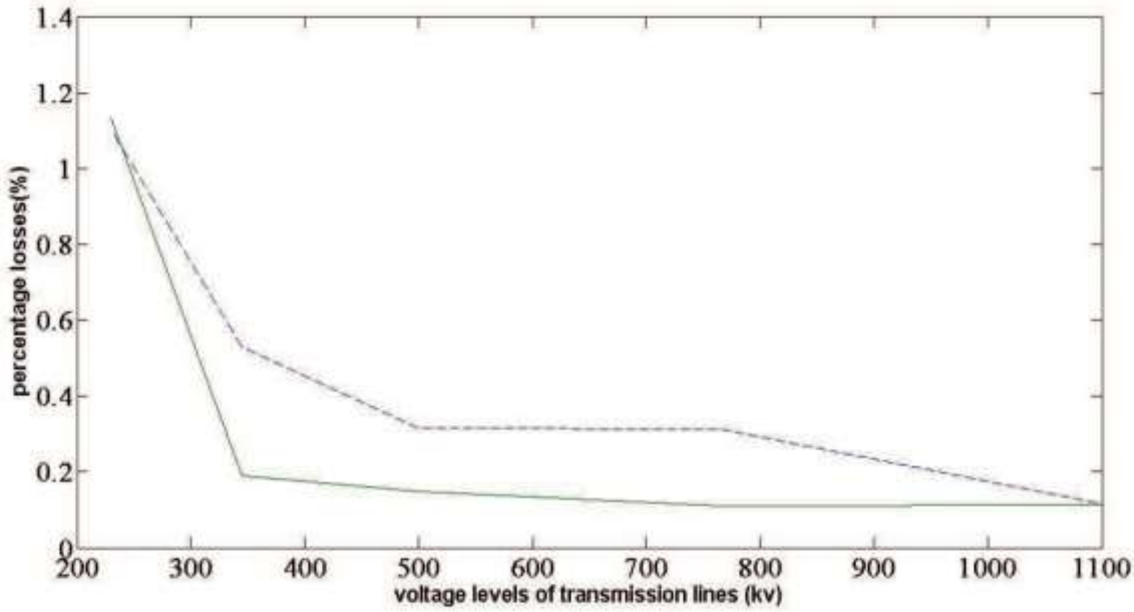
For 6-10 kV networks, as a rule, only the supply of electricity through the head section of the feeder is known, i.e. in fact, the total load of all transformer substations 6-10 / 0.38 kV, including losses in the feeder. According to the energy release, the average values of P and Q at the head section of the feeder can be determined. To calculate the values of P and Q in each element, it is necessary to make some assumption about the distribution of the total load between TP. Usually, the only possible assumption in this case is the distribution of the load in proportion to the installed power of the transformer substation.When calculating losses in 0.38 kV networks with known schemes of these networks, it is theoretically possible to use the same algorithm as for 6-10 kV networks. Application of software for calculating electricity losses in distribution networks 0.38 - 6 - 10 K One of the most laborious is calculating electricity losses in distribution networks 0.38 - 6 - 10 kV, therefore, to simplify such calculations, many programs based on on various methods. In my work I will consider some of them.



Design diagram of a 10 kV distribution network. The initial data for the calculation are the measured current at the head section of the feeder and the voltage on the buses 0.38 - 6 - 10 kV on operating days, as well as the rewards of all or part of the transformer substations.

TABLE III. LINE PARAMETERS OF GIL

Voltages level	**Line parameters per phase per meter**		
	Resistance per phase per meter(μΩ)	***Inductance per phase per meter(μH)***	***Capacitance per phase per meter(pF)***
145/170kv	18	0.187	59
245/300kv	16	0.211	52
362kv	13	0.210	53
420/550kv	11	0.205	54
800kv	10	0.247	45
1200kv	8	0.208	42


percentage losses(%)
voltage levels of transmission lines (kv)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
200
300
400
500
600
700
800
900
1000
1100

5. Conclusion

Based on the results of the work, the following main conclusions can be drawn. The electrical energy transmitted through electrical networks consumes part of itself for its movement. Part of the generated electricity is consumed in electric networks to create electric and magnetic fields and is a necessary technological expense for its transmission. 0.38 - 6 - 10 kV, a large number of such lines and low reliability of information about the loads of transformers, in these networks, to calculate losses, methods are used based on the representation of lines in the form of equivalent resistances. The use of such methods is advisable when determining the total losses in all lines or in each, as well as for determining the centers of losses. The process of calculating electricity losses is quite laborious. To facilitate such calculations, there are various programs that have a simple and convenient interface and allow you to make the necessary calculations much faster. Such an estimate of losses, especially for a variety of branched networks of 0.38 - 6 - 10 kV, can significantly reduce the labor costs for calculations. An example of calculating electricity losses in a 10 kV distribution network showed that the most effective is the use of networks with a sufficiently high load (kZTP = 0.8)

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