

Union "Science and Energetics"

ENERGY

SCIENTIFIC AND TECHNICAL JOURNAL

1(89)/2019

Tbilisi

CONTENTS

	P.
<i>D.JAPARIDZE, V.KAKHADZE.</i> Development of the calculation algorithm and the practical realization of the implementation economic efficiency of energy-saving means in artificial lighting.	5
<i>D.JAPARIDZE, K. UNGIADZE.</i> Optimal modeling of import substitution in Georgia with local production electric power.	15
<i>T. KOKHREIDZE, O. KHELADZE.</i> Current Conductivity of Wires and Losses in Energy Superconductor Inductive Collector System in Variable Magnetic Field.	27
<i>T. MUSELIANI, K. GUGUSHVILI.</i> Analysis of Normative Papers and Calculation of the Parameters of Lightning Protection of Energy Units.	34
<i>T. MUSELIANI, M. GURGENIDZE, G. MUSELIANI, N. LEBANIDZE-ASATIANI.</i> LED Bulbs and Their Harmonious Spectrum.	40
<i>G.NACHKEPIA, D.GABUNIA, M.TURASHVILI.</i> e-Apostille Using Blockchain Technology.	46
<i>M. QOBALIA, R.DOCHVIRI.</i> Process analysis after connection of new power consumers to the electrical network and definition of the list of requirements for connection.	51
<i>N.AVAGUMASHVILI.</i> Assessment of financial sustainability on the basis of abroad experience on the example of the energy distribution company.	56
<i>G.KHELIDZE, M.MARDALEISHVILI.</i> Assessment of environmental discharge for Georgia's rivers of different water content regime.	61
<i>G.KHELIDZE, B.PIPIA.</i> Evaluation of the energy potential of Georgian rivers taking into account climate change factor.	71
<i>M.AKHOBADZE, M.DOLIDZE, I.SHALAMBERIDZE.</i> United, integrated web platform for smart city.	76
<i>N. BOCHORISHVILI.</i> Increase of Longevity of Light Reinforced Concrete Structures by Adding Chemical Additives.	84
<i>ABULADZE V.SH, KHUNTSARIA J.M, .JORJADZE I.P., GIORGADZE G.B.</i> Voice signal transmission network security model.	90

SUMMARIES

DEVELOPMENT OF THE CALCULATION ALGORITHM AND THE PRACTICAL REALIZATION OF THE IMPLEMENTATION ECONOMIC EFFICIENCY OF ENERGY-SAVING MEANS IN ARTIFICIAL LIGHTING.

D.Japaridze, V.Kakhadze. "Energy". №1(89). 2019. Tbilisi. p.5-14. geo. sum geo. engl. rus.

In the article is analyzed the current practice of assessing the economic efficiency of the introduction of modern energy-saving tools in artificial lighting. Based on the conducted research, the criterion for evaluating the effectiveness was selected. Based on the requirements of the criterion and taking into account the specifics of Georgia, was developed a multifactor mathematical model for assessing the economic efficiency of introducing modern energy-saving devices. As a result is established an algorithm for calculating this indicator. The practical implementation of the proposed methodology was made in the system of artificial outdoor lighting of the Georgian Railway.

Ill. 1, tabl.2, bibl. 18.

OPTIMAL MODELING OF IMPORT SUBSTITUTION IN GEORGIA WITH LOCAL PRODUCTION ELECTRIC POWER.

D.Japaridze, K. Ungiadze. "Energy". №1(89). 2019. Tbilisi. p. 15-26. geo. sum geo. engl. rus.

In the article, based on the scientific research, it is established that in the average term (2018-2022) electricity consumption in Georgia will exceed its production. There are specified electricity import forecast options. Ability to replace imports with additional electricity generated using the maximum capacity of the generation of local power generation is studied in depth, by complex approach for solving problems. Due to the results of the research received, the criterion of optimal modeling for replacement of electricity imports has been developed and is established criteria requirements. Effectiveness of import substitution is assessed with local criteria, effectiveness of import substitution is estimated by comparative analysis of local production electricity and average weighted tariffs of imports. It is shown that the scheme of replacement in terms of economic efficiency is much more effective. Taking into consideration this, it is proposed to use the maximum capacity of local generation capacities in Georgia, the optimal modeling scheme for import substitution with additional electricity received, import's optimal modeling scheme and its practical implementation.

Ill. 5, tabl. 6, bibl. 8.

CURRENT CONDUCTIVITY OF WIRES AND LOSSES IN ENERGY SUPERCONDUCTOR INDUCTIVE COLLECTOR SYSTEM IN VARIABLE MAGNETIC FIELD.

T. Kokhraidze, O. Kheladze. "Energy". №1(89). 2019. Tbilisi. p.27-33. geo. sum geo. engl. rus.

Methods of calculating wire current conductivity and losses in the energy superconductor inductive collector system in the variable magnetic field are elaborated.

It is shown that the development and design of the energy superconductor inductive collector aimed at using for energy purposes required use of superconductive wires with high current conductivity and low losses. This can be achieved with the magnetic field localized with multi-venous superconductive wires within which mutual impact of particular magnetic fields is brought to minimum. With such a coil performance, the current conductivity of each superconductive vein is defined by its own magnetic field and parameters.

Ill. 2, bibl. 4.

ANALYSIS OF NORMATIVE PAPERS AND CALCULATION OF THE PARAMETERS OF LIGHTNING PROTECTION OF ENERGY UNITS.

T. Museliani, K. Gugushvili. "Energy". №1(89). 2019. Tbilisi. p. 34-39. geo. sum geo. engl. rus.

Based on the comparison of the available normative papers on the lightning protection of the power units, it was determined that it is necessary to elaborate new normative papers that should include as many unit types as possible and should provide clear solutions rather than vague general policies. There is an obvious need of designing such algorithms that allow to expand the abilities of the applicable normative papers as well as the automation of maximally quick design process.

Ill. 2, bibl. 8.

LED BULBS AND THEIR HARMONIOUS SPECTRUM.

T. Museliani, M. Gurgenidze, G. Museliani, N. Lebanidze-Asatiani. "Energy". №1(89). 2019. Tbilisi. p. 40-45. geo. sum geo. engl. rus.

As seen from LED bulb studies, they can generate high current harmonics in the network and there may be high risk of the negative cases in the 0.4 kW voltage networks. Therefore, it is most likely that simple mechanic replacement of a filament bulb by LED bulb without additional measure of fighting against the harmonics will not provide any desirable effect.

Ill. 4, bibl. 5.

E-APOSTILLE USING BLOCKCHAIN TECHNOLOGY.

G.Nachkepi, D.Gabunia, M.Turashvili. "Energy". №1(89). 2019. Tbilisi. p. 46-50 geo. sum geo. engl. rus.

The article refers to the structural side of e-Apostille, namely to feasibility of certification of the electronic documents with e-Apostille by the Legal Entity of Public Law – Public Service Development Agency of the Ministry of Justice of Georgia throughout Georgia and safety of the certified document. The authors think that proceeding from the current reality it is possible to find innovative ways, establishing of which and making the relevant legislative changes will make it possible to introduce new services in the country, which, on its part, will make the service more secure and comfortable and contribute to creation of a quality product. Furthermore, the use of new analyzed Blockchain technology system guarantees the most up-to-date way of archiving due to its peer-to-peer and decentralized structure. Namely, thanks to the most state-of-the-art method of documents archiving created using cryptographic elements it is virtually impossible to forge the Apostille.

A new model of the given process is represented in the article, as a result of which the relationships of the State with the society will become more efficient.

Tabl. 1, bibl. 7.

PROCESS ANALYSIS AFTER CONNECTION OF NEW POWER CONSUMERS TO THE ELECTRICAL NETWORK AND DEFINITION OF THE LIST OF REQUIREMENTS FOR CONNECTION.

M. Qobalia, R.Dochviri. "Energy". №1(89). 2019. Tbilisi. p. 51-55. geo. sum geo. engl. rus.

As a result of the conducted research, it is established, that at connection of new objects to the system of power consumption of a network, to the electric consumer there have to be not General but individual, differentiated requirements.

Accordingly, on the basis of the study of the modes of electromagnetic regime, located by the consumer, should be determined what kind and what parameters of conductive noise will occur in the network elements, what will be the quality indicators of electricity, and how they will meet international standards for electromagnetic compatibility.

Tabl. 1, bibl. 8.

ASSESSMENT OF FINANCIAL SUSTAINABILITY ON THE BASIS OF ABROAD EXPERIENCE ON THE EXAMPLE OF THE ENERGY DISTRIBUTION COMPANY.

N.Avagumashvili. "Energy". №1(89). 2019. Tbilisi. p. 56-60. geo. sum geo. engl. rus.

Recent attention is paid to the concept of financial risk forecasting. Financial models, which consider the combination of numerical and qualitative indicators of the unit, may be more useful for forecasting financial risks. In this case we are talking about A-score, known as the Argenti's method. Many criteria and multifunctional analysis methods, this method reveals not only the insolvency of the company, but also provides a qualitative indicator, such as company management.

Tabl.1, bibl. 3.

ASSESSMENT OF ENVIRONMENTAL DISCHARGE FOR GEORGIA'S RIVERS OF DIFFERENT WATER CONTENT REGIME.

G.Khelidze, M.Mardaleishvili. "Energy". №1(89). 2019. Tbilisi. p. 61-70. geo. sum geo. engl. rus.

Hydrographs of rivers corresponding to different types of nourishments reflects different water content regimes of the rivers, the analysis of which showed that the environmental discharge for the rivers whose water content during the high-water period is at least 60% of the annual streamflow and is concentrated in the spring-summer and the discharge during the high-water period significantly exceeds the discharge of the rest of the year, must be observed during the low-water period with minimal average discharge rate (average in terms of existent observations) and during the high-water

period – no less than 10% of the average monthly discharge of this period's each month. For the rivers whose water content during the high-water period is within 50% of the annual streamflow, the environmental discharge during the low-water period should be based on minimal discharge rate of this period's each month (average in terms of existent observations) and during the high-water period – no less than 10% of the average monthly discharge of this period's each month. For the rivers that do not have a specific water content regime, the environmental discharge can be obtained using 10% value of average monthly discharge of each month, but no less than the value of minimal discharge observation. The proposed approach is somewhat compromised because it considers the interests of both the participants of the industrial water complex as well as the main environmental conditions. Ill. 8, bibl. 2.

EVALUATION OF THE ENERGY POTENTIAL OF GEORGIAN RIVERS TAKING INTO ACCOUNT CLIMATE CHANGE FACTOR.

G.Khelidze, B.Pipia. "Energy". №1(89). 2019. Tbilisi. p.71-75. geo. sum geo. engl. rus.

Theoretical hydropower potential of Georgian rivers was assessed in the 80s of the last century. Over the last several decades, the global climate change has had some impact on the water content of rivers. This article proposes the assessment of energy potential of Georgian rivers under the influence of climate changes. For this purpose, 17 river areas in seven regions of Georgia that were not subject to anthropogenic influence were reviewed. Conducted reports showed substantial change of the theoretical energy potential of the rivers in comparison with the results given above, indicating the expediency of re-evaluation of the energy potential of the rivers.

Tabl. 1, bibl. 6.

UNITED, INTEGRATED WEB PLATFORM FOR SMART CITY.

M.Akhobadze, M.Dolidze, I.Shalamberidze. "Energy". №1(89). 2019. Tbilisi. p.76-83. geo. sum geo. engl. rus.

Smart City Platform, based on modern technologies like GOOGLE MAPS and web systems, has a competitive advantage with other similar programs. One clear example is the fact that web technology allows the user to access the platform from such devices as mobile phones and any tablet. In addition, it is important that the Google maps will be updated in daily mode, which will automatically reflect on the platform and have a lot of resources for mapping updates that require other platforms. The key role of the platform's technological success is to generate financial resources that are automatically generated on the platform through online payment methods, which is an additional competitive advantage. The novelty of the platform is its systemic structural paradigm, which is unique and adapted to the needs of users. The platform allows large corporations to automatically publish data from the platform through the Restful API, which can be used by other organizations.

Bibl. 9.

INCREASE OF LONGEVITY OF LIGHT REINFORCED CONCRETE STRUCTURES BY ADDING CHEMICAL ADDITIVES.

N. Bochorishvili. "Energy". №1(89). 2019. Tbilisi. p.84-89. rus. sum geo. engl. rus.

One of the prospective directions of the development of the concrete and reinforced concrete technologies, use of chemical additives resulting in the increase of the longevity and improvement of the quality of the reinforced concrete structures, is analyzed.

Four methods of filling the filler pores with chemical additive mixture are reviewed. Experiment results showed that the most effective method of the application of the chemical additive was the one that provided the best chemical additive concentration at the contact zone of the filler and cement stone providing intense development of the binding processes resulting in high concrete hardness, high binding ability of the cement stone and porous filler significantly improving concrete's physical and mechanical features. Bibl. 5.

VOICE SIGNAL TRANSMISSION NETWORK SECURITY MODEL.

Abuladze V.SH, Khuntsaria J.M, Jorjadze I.P., Giorgadze G.B. "Energy". №1(89). 2019. Tbilisi. p.90-95. geo. sum geo. engl. rus.

VoIP-Voice over Internet Protocol based on SIP-Session Initiation Protocol (VoIP-Voice over Internet Protocol) was developed as a de-facto standard for voice communication, and support for open SIP-based interfaces is becoming increasingly important with private telephone communication system (IP-PBX-Private Branch Exchange). It is used for interactive communications between users.

It is an emerging technology. Nevertheless, it has been revealed that it is the biggest threat to users' organizations that appear to be a significant loss of money through illegal or unauthorized use. With more dissemination of VoIP systems, security risks and challenges are increasing, and appropriate security measures should be taken. The paper deals with network security risks, shortcomings, and existing methodologies for SIP-based VoIP networking. Developed SIP based VoIP system security model. The implementation of Model ensures availability, integrity and confidentiality of VoIP network users' voice traffic. The technique of processing the processed model is described. Ill. 2, bibl. 5.