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S U M M A R I E S

STRATEGIC PLANNING OF SUSTAINABLE DEVELOPMENT OF GEORGIAN POWER SECTOR USING LEAP MODEL. ***Z.Gachicheladze, N.Sumbadze, I.Pirveli.*** **"Energy". №4(72). 2014. Tbilisi. p. 5-15. geo. sum geo.engl.rus.**

Proposed paper aims to research sustainable development options for Georgian energy sector. Improving energy saving, utilization of renewable energy and energy efficiency potential is important challenge for Georgia. Currently, 2/3 of Georgia's energy needs are met from imported energy resources that have negative effect on current account balance, energy security and political stability. At the same time supersede of imported energy by domestic resources is limited and in many cases is impossible without abnormal environmental damage. Sustainable energy development is the main challenge for every nation and is especially crucial for the developing countries, such as Georgia. Meanwhile, unfortunately that is still unexplored topic for Georgia.

The paper describes sustainable energy development policy and strategy options and alternatives for Georgia obtained using computer software LEAP (Long range Energy Alternatives Planning System). Three scenarios has been developed regarding modeling of Georgian energy sector. These scenarios are: Reference scenario, renewable energy soursec development snecario and energy efficiency scenario. Due to the fact that Georgia is rich with hydro resources, it is important to create policy for successful and efficient utilization of these resources that ensures reduction of Georgia's dependence on imported energy resources and achieves the goals that are set in the renewable energy scenario. Ill. 6, tabl. 7, bibl. 13.

CALCULATION METHOD FOR SALINITY WEDGE INTRUDED INTO BOTTOM SPILLWAY STRUCTURES. ***M. Kodua, Sh.Gagoshidze.*** **"Energy". №4(72). 2014. Tbilisi. p.16-19. engl. sum geo.engl.rus.**

Within the scope of the present article the problem of interaction of sea and waste water at inflow reaches is considered and formulae to calculate the maximum dimensions of salinity wedge intrusion into bottom spillways are established. These formulae foresee end slopes of spillway bottoms which must be necessarily considered in hydraulic engineering construction, especially in the Black Sea regions of Georgia.

ON THE ENVIRONMENTAL HYDRO-EGINEERING PROBLEMS IN THE BLACK SEA REGION OF POTI AND THE WAYS OF THEIR SOLUTION. ***I.Saghinadze, Sh.Gagoshidze, I.Kadaria.*** **"Energy". №4(72). 2014. Tbilisi. p. 20-24. engl. sum geo.engl.rus.**

A list of problems related to hydro-engineering construction and environment protection in the Black Sea region of Poti is given from the historical background standpoint. To prepare projects on rehabilitationof the washed-out coast of the city and prevention of siltation of the inlet channel of the Poti sea port, it is proposed to carry out extensive field observations and theoretical studies using direct, asymptotic and numerical methods of applied mathematics. These methods will enable us to describe with high accuracy wave motions, alluvia transport processes and sea coast deformation in the Poti region. Ill. 6.

DETERMINATION OF CURRENT IN DAMPHER WINDING OF HYDROGENERATORS. ***Yakir Bijamov.*** **"Energy". №4(72). 2014. Tbilisi. p. 25-27. rus. sum geo.engl.rus.**

The article deals with the study of currents (from different nonsynchronous magnetomotive forces) in dampher winding rods of hydrogenerators and shows the importance of their accurate estimation for different operation modes of hydrogenerators. The article also presents the method and the equipment for experimental determination of currents in dampher winding in operating hydrogenerators. Ill. 2, bibl. 6.

REGULATION OF WATER LEVEL IN THE BOILER AND PRESSURE EFFECT ON THE WATER LEVEL. ***E.Pantskhava, K.Mchedzlidze.*** **"Energy". №4(72). 2014. Tbilisi. p. 28-30. geo. sum geo.engl.rus.**

Safe and reliable operation of the boiler needs to keep water level range in the boiler drum. The water level in the boiler drum depends to following factors: change of load, feedwater change in the boiler, change of thermal duty in the fire box, pressure change in the drum. Based on calculations for special particular cases, there is shown character of the drum pressure changes in different conditions of fuel caloricity. Operatingmode of the drum is variable that is caused by fuel caloricity changes (-1.3% to +1.3%). When the boiler operates in static operating mode, fuel caloricity corresponds to 37100 kg/m^3 and absolute actuating pressure corresponds to 9 Bara. In transient operating mode, the boiler drum pressure change caused by changing of fuel caloricity is more significant then caused by changing of feedwater temperature. Ill. 2, bibl. 2.

NATURAL GAS FOR VEHICLES: GEORGIA AND THE WORLD. ***G.Ananiashvili.*** **"Energy". №4(72). 2014. Tbilisi. p. 31-36. geo. sum geo.engl.rus.**

The article reviews ecological and economic aspects of using natural gas as fuel for vehicles, world trends in terms of methanation of transport, as well as the prospects and the current situation in this regard in Georgia. The need for oil companies to develop marketing complexes at fuel stations is discussed. The article

presents statistics on the safety of natural gas fuel for vehicles, examples of incorrect exploitation of gas cylinder systems and the necessity to develop and enact legal norms from the side of the government on modifying transport to use natural gas fuel. Bibl. 22.

NATURAL GAS CYLINDERS FOR VEHICLES: HISTORY OF DEVELOPMENT, CLASSIFICATION AND FUTURE PROSPECTS. ***G. Ananiashvili.*** **"Energy". №4(72). 2014. Tbilisi. p. 37-40. geo. sum geo.engl.rus.**

The article reviews the history of development of manufacturing and the classification of natural gas cylinders for vehicles as well as several tests used by manufacturers to identify adequacy with established technical standards. The prospects of using adsorbed methan are briefly reviewed. The article presents quantitive data on the Georgian autopark of the vehicles with natural gas cylinders received as a result of using the method of research. The work will be interesting for the professionals in the fields of autogazification and vehicle manufacturing and repair as well as individual vehicle owners. I would like to express gratitude to the academician of the Academy of Energetics of Georgia, Mr. Evtikhi Machavariani for his support and assistance. Bibl. 6.

UNIFIED ENERGY SYSTEM OF THE WIND POWER PLANT AND IDENTIFICATION OF OPERATIONAL MODES. ***G.Kokhreidze, Z.Rekhviashvili, Sh.Pkhakadze, Z.Papidze, E.Tetuashvili.*** **"Energy". №4(72). 2014. Tbilisi. p. 41-44. geo. sum geo.engl.rus.**

The work deals with modernized structural and basic electrical scheme describing joint operation of the wind power plant and receiver alternating current. There is shown time dependence of magnitude of the electric compatible and on the base of the above-mentioned, there are determined eleven following modes of the unified converter system operation. Ill. 2, bibl. 2.

SOLAR COLLECTOR WITH FORM OF SPHERICAL GIRDLE. ***L.Papava, L.Gugulashvili, V.Gvachliani, E.Sadagashvili, G.Gugulashvili.*** **"Energy". №4(72). 2014. Tbilisi. p. 45-49. geo. sum geo.engl.rus.**

It is consideration of solar collectors meaning in living and industrial energy provide. Is showed, that for improvement of solar collectors working process, is necessary creation new construction and more effectively equipment. It is performance the new construction of solar collector with form of spherical girdle. With the help of construction peculiarity and towards exploitation place properly orientation, the new collector may guaranteed sun energy maximum application with foresee of sun movement in a year prep-during. Ill. 4, bibl. 5.

COMPARATIVE ANALYSIS OF THE EXCITATION SYSTEMS FOR SMALL HYDROPOWER PLANTS. ***D.Datashvili, A.Kokhtashvili, M.Rukhvadze.*** **"Energy". №4(72). 2014. Tbilisi. p. 50-53. geo. sum geo.engl.rus.**

The article provides a comparative analysis between various excitation systems for dynamic stability of generators. The simulation has been done for various emergencies by the program PSS/E. Electromachine excitation system with a simple self-excitation scheme is compared to the scheme of Electromachine excitation system using self-excitation with compounding. Displaying which one of the excitation system is most suitable for small hydro power plants. Ill. 7, bibl. 1.

A RESEARCH ON HYDRO-ABRASIVE WEAR IN FRANCIS HUDRO-TURBINES. ***I.Lomidze, G Khelidze, Z. Chubinidze, A. Kantaria.*** **"Energy". №4(72). 2014. Tbilisi. p. 54-58. geo. sum geo.engl.rus.**

The wear of Francis horizontal hydro-turbines' channeled particles of Racha hydroelectric power station located on River Ritseula has been studied. Based on the study of visual inspection of erosion-prone areas of hydro-turbines, the instrumental measurement, solid sediment grain size in the water and mineralogical composition of hydro-turbines' channeled parts' metal hardness, it has been established that the runner blades have suffered minor wear while the front and the rear lids and the guide apparatus suffered considerable abrasive erosion. T-period (less than 0.5 year) quantitative determination of solid particle concentration in water for the guide apparatus has been carried out on the basis of their shape, thickness, hardness and the velocity of the water flow in the turbine which corresponds to the actual term of the turbine maintenance and repair. Foto 4, bibl. 7.

EQUATIONS OF ASYNCHRONOUS VALVE ENGINE FOR INSTANT VALUE OF VARIABLES. ***D.Kokhreidze, G.Kharshiladze, N.Kereselidze.*** **"Energy". №4(72). 2014. Tbilisi. p. 59-62. geo. sum geo.engl.rus.**

This article considers the Rotor three place voltage of the food at the instant values of variables in equations valve engine, the coordinate transformation using simultaneous. The complex equations are common, based and transient processes. Transform inverse matrix allows for be calculated Currents instant values. There are the relevant images. Bibl 1.

THERMAL IMAGING DIAGNOSTICS OF ELECTRICAL EQUIPMENT. ***L.Tevdorashvili.*** **"Energy". №4(72). 2014. Tbilisi. p. 63-65. geo. sum geo.engl.rus.**

In present work the principles of operation of thermal imagers and distribution methods of a thermal field are concidered and also the accurancy of temperature measurement and those interfering external factors that distort the real picture of the temperature distribution on a body's surface.

It describes methods of detection of the existing defects in the energy device with use of thermal imagers and advantage of thermal imaging diagnostic in comparison with other methods of diagnostics. Ill. 1, bibl. 4.

MATHEMATICAL AND COMPUTER MODELING OF ELECTROMAGNETIC AND TRANSITIVE PROCESSES IN THREE-PHASE ONEROPE CONTROLLABLE ADJUSTERS. ***Kokhreidze G., Gabrashvili M., Pkhakadze Sh., Tetunashvili E.*** **"Energy". №4(72). 2014. Tbilisi. p. 66-70. geo. sum geo.engl.rus.**

The work deals with current circuit transmission in one-rope semi-circuit controllable adjusters and the issues of Mathematical and computer modeling of electromagnetic and transitive processes.

Modeling is based on processing of complex and spectral-operative transformation methods of variables. There are given curves of transitive processes during adjuster start up. Ill. 1, bibl. 2.

TRANSFER OF THE REFRIGERATION SYSTEM WITH CAPILLARY TUBE FROM AN OZONE DEPLETING REFRIGERANT TO NATURAL ALTERNATIVES. ***S.Suladze, N.Maglakelidze, Z.Kvinikadze, L.Kvinikadze.*** **"Energy". №4(72). 2014. Tbilisi. p. 71-75. geo. sum geo.engl.rus.**

The possibility of transferring a refrigeration system having a capillary tube from an ozone depleting refrigerant to hydrocarbons by retrofit has been studied. In frame of the study software which allows predicting the parameters of the operating mode of the refrigeration system retrofitted to an alternative refrigerant and choosing a capillary tube with optimum geometrical characteristics has been developed and experimentally approved. It is shown that for retrofit of refrigeration system from the ozone depleting refrigerant to hydrocarbons it is necessary to increase length of the system capillary tube. Ill. 1, tabl. 1, bibl. 5.

CALCULATION METHODS OF LONGITUDINAL ASYMMETRY. ***T.Pipia.*** **"Energy". №4(72). 2014. Tbilisi. p. 76-80. geo. sum geo.engl.rus.**

Presence of non-symmetric mode in the electric system occurs due to various reasons. However, its value exceeds admissible limits and it is necessary to either eliminate or reduce it. For this purposes preliminary calculations are run asthe existing method which is based on generating complex replacement scheme from direct, reverse or zero sequence schemes does not allow to do the above, in particular, for each case, replacement scheme should be changed (re-calculated) which does not allow to make generalized mathematical model. Just one sequence is established for each sequence in new methodology and it is not changed in the system according to the accident enabling to make generalized mathematical algorithm which is why it is advantageous. Ill 3, bibl. 3.

REGENERATION OF OUTDATED TRANSFORMER OIL. ***I. Vakhtangadze.*** **"Energy". №4(72). 2014. Tbilisi. p. 81-84. geo. sum geo.engl.rus.**

It is considered the purpose of transformer oil in high voltage equipment, the operational conditions and process of outdating of transformer oil through the influence of the operational factors. It is described outdating products of transformer oil and their properties. There are also considered worsening reasons of characteristics of transformer oil caused by outdated products.

It is considered methods of outdated transformer oil regeneration and regeneration methods of transformer oils by using different types of artificial and natural adsorbents. The future step is the laboratorial analysis of the usage of "Gumbrini" clay in order to regenerate outdated oil of transformer. Ill. 1, bibl. 5.

RESULTS OF BIOCHEMICAL ANALYSIS OF THE BLACK SEA DEPTH WATERS. ***V.Jamarjashvili, N. Naskidashvili.*** **"Energy". №4(72). 2014. Tbilisi. p. 85. geo. sum geo.engl.rus.**

In order to provide Black Sea structures with reliable operation of co-evolutionary heat and cold supply systems, it is necessary to biochemically research the Black Seadepth waters and determinerespective parameters. This is why experimental researches have been performed,the obtained results aredescribed in the article. Bibl. 5.

THERMAL PUMPS IN IMPROVEMENT SERVICE OF THE RECREATION AREA OF THE BLACK SEA OF THERMAL PUMPS IN IMPROVEMENT SERVICE OF THE RECREATION AREA OF THE BLACK SEA OF GEORGIA. ***K.Vezirishvili-Nozadze, L.Papava, M.Razmadze, H.Kejeradze.*** **"Energy". №4(72). 2014. Tbilisi. p. 86-89. geo. sum geo.engl.rus.**

In the article it is discussed using geat pump for strengthening the Black Sea shore recreation zone located heating-cooling systems, apartments, hospitals and hotels in order to increase longitude of tourism season and defend environment from pollution.

For implementation of air conditioning it is reasonable to use the same equipment with heat pump scheme, which will enable to use Black Sea water as a source of law temperature.

Combined heating-cooling provision through heat pump is more effective than using any other source of heating or using refrigerator for cooling. Therefore, we strongly recommend to use heat pumps in Black Sea shore recreation zone. Ill. 1, bibl. 4.

BASICS OF EXPERIMENT PLANNING. ***Z.Gubelidze, V.Dvalishvili, O.Giorgishvili, T.Ninidze.*** **"Energy". №4(72). 2014. Tbilisi. p. 90-97. geo. sum geo.engl.rus.**

In the work are considered issues of planning of experimental works on research of physical and mechanical properties of materials: construction of mathematical model by approximation of researched phenomenon; sound selection of means of measurement; determination of permissible error level; selection of processing method of test data; check the significance of assessments; the validation of adequacy of obtained equations by the regression of original mathematical model. Ill. 2, tabl. 3, bibl. 3.

MAKING INVESTMENT DECISION USING FUZZY LOGIC. ***M.Gudiashvili. S.Lomidze.*** **"Energy". №4(72). 2014. Tbilisi. p. 98-101. geo. sum geo.engl.rus.**

In this document is described investment decision making on choosing a new power plant using fuzzy logic. Determined for each type of plant the technical and economic parameters and are estimated the average values of the criteria by using the computer program, which helped us to make a final decision. Ill. 6, bibl. 3.

STUDY OF PHYSICAL-CHEMICAL FEATURES OF DRY AND HUMID GYPSUM. ***M. Lordkipanidze, T. Jojua.*** **"Energy". №4(72). 2014. Tbilisi. p. 102-105. geo. sum geo.engl.rus.**

According to rigid body adsorption theory, rigid body creep has reverse character and is caused by the effect of surface-active substances in micro-cracks. In order to check this, we ran experiments on dry and humid gypsum in stretching and compressing environment.

Analysis of the resultshowed that creep of humid gypsum is described by two relaxation periods. Gypsum stone is the material with open pores. Initial micro-cracks are formed quite quickly as transportation of water molecules to the crack head is quite short (I period). Further the water moves with narrow channels between increasing crack walls and the process slows down (II period). Ill 3., bibl. 3.