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### Present situation and prospect discussed simply of wind-solar hybrid power generation in China

WANG Zong-ruì, LI Xi-zhen, SU Ze-li

(Hebei University of Engineering, Handan 056001, China)

**Abstract:** Green environmental protection was the theme of today's society, the rational development and utilization of renewable energy is extremely important, using its power generation has become the darling of the electric power industry. The purpose of this paper is mainly to discuss the application, technology development and research status of wind-solar hybrid power generation, and to analyze relatively development trend. On the basis of the existing results, in-depth study of the technology has been made the simple discussion and analysis.

**Key words:** renewable energy; wind generation; photovoltaic; wind-solar hybrid power generation

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### Research on regional decomposition of electricity consumption of Liaoning Province based on Gini coefficient method

MA Jing-fu

(School of Automation and Electrical Engineering, Shenyang Ligong University, Shenyang 110159, China)

**Abstract:** As an important representation of the levels of the regional economic development, electricity consumption is an important part of energy consumption. To control electricity consumption can control energy consumption indirectly. Decomposing the target of total amount control of electricity consumption to all regions in a fair way is an important condition for the control of electricity consumption. Firstly, we established the index system of regional decomposition of electricity consumption. Secondly, we built the model of regional decomposition of electricity consumption based on Gini coefficient method. Next, taking Liaoning Province as an example, we present an empirical analysis on the model of regional decomposition of electricity consumption. The target of total amount control of electricity consumption in 2020 was allocated to all regions. Finally, the applicability of the model was testified. The result showed that the model can combine with the actual situations of different regions and has general applicability.

**Key words:** electricity consumption; regional decomposition; Gini coefficient method

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### Analysis of the solar direct radiation effect on the floor cooling system

AO Yong-an, LI Hong-yu, LI Yang

(School of Municipal and Environment Engineering, Shenyang Jianzhu University, Shenyang 110168, China)

**Abstract:** This paper studied the effect of solar direct radiation on the water supply velocity in the pipe of the floor cooling system and on the floor surface temperature in order to recommend a suitable water supply

temperature. Firstly, the hourly indoor cooling loads in two conditions of considering the impact with and without the solar direct radiation were calculated by means of the harmonic response method, then the water supply velocity in different temperature difference between water supply and water return and the floor surface temperature in different average temperature of water supply and water return were analyzed and compared with the existing research. The cooling loads of the system and the water supply velocity in the pipe in different temperature difference between water supply and water return in two conditions were showed in tables, the floor surface temperature in different average temperature of water supply and water return and different water supply velocity in two conditions were showed in figures. The conclusions are that the solar direct radiation has a big effect on the floor cooling system; 14.5°C of the average temperature of water supply and water return is recommended in the day time with the effect of solar direct radiation, which could meet 75% ~ 80% requirement for a normal floor surface temperature need in the whole day; 16.5°C of the average temperature of water supply and water return is recommended at night time without the effect of solar direct radiation.

**Key words:** solar direct radiation; floor cooling system; average temperature of water supply and water return; floor surface temperature

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### Optimal operation of distributed combined cooling heating and power system with energy storage facility

YANG Tao, REN Hong-bo

(College of Energy and Mechanical Engineering, Shanghai University of Electric Power, Shanghai 200090, China)

**Abstract:** A mathematical model for optimal operation of the combined cooling heating and power system integrated with energy storage facility is established. Following which, the operation strategies of main devices based on the conventional optimization method and the sensitivity analysis method are examined. The simulation results indicate that, the application of the sensitivity analysis method can illustrate the effect of changes of energy storage status on operation strategies of the whole system. In addition, the energy storage facility can operate at a more stable state with no additional increase of system operating costs. Therefore, the introduction of sensitivity analysis method may reduce the burden of significant changes of the energy storage operational strategy on the facility and it is conducive to extend the working life of the facility.

**Key words:** combined cooling heating and power; sensitivity analysis; energy storage; optimal operation

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### The measurement of calorific values to several kinds of biomass common materials in Southern China

YANG Xiu-fei, HUANG Lei, XU Yu-mei, et al

(School of Civil Engineering, Luoyang Institute of Science and Technology, Luoyang 471023, China)

**Abstract:** The potential of biomass resource in our country is analyzed in this paper, the result show that there are abundant biomass resources in China. Oxygen bomb method is used in this experiment for calculating the calorific value of common biomass straw material in south China. The standard coal coefficient of every experimental material was obtained. The results show that biomass as a renewable energy in our country has great potential for development.

**Key words:** biomass materials; calorific value; the standard coal coefficient; renewable energy

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### Scrap tire colloidal particle gasification and desulphurization are forecasted by BP neural network

YANG Chun-yu, LIAO Hai-jiao

(Henan Kdneu International Engineering Co. Ltd., Zhengzhou 450000, China)

**Abstract:** The fluid bed test equipment is used to gasify the scrap tire colloidal particle and desulphurise the produce gas, and then obtains the sampled data. The BP neural network was used to establish model

to forecast heat value of produce gas and emissions characteristic of the sour gas, it made the tentative data reappearance very good. In the training process, the erroneous monotonous drop fast, indicated that this network's learning capability is very strong. Model forecast experiment operating modes very well, both of error's magnitude of predicted value and experimental value are in  $10^{-6}$ .

**Key words:** scrap tire colloidal particle; gasification; neural network

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### Distributed variable frequency pump heating system compared with traditional heating system energy saving

ZHANG Xiao-xia, ZHANG Jie

(Hebei University of Engineering, Handan 056001, China)

**Abstract:** Heating engineering is closely related to people's production and living, with the continuous development of city planning and construction, people's demand for energy is becoming more and more big, many northern cities of central heating system has been adopted to save the energy consumption. Distributed variable frequency pump heating system is a new type of heating form, the characteristic of the circulating pump distributed in the pipe network layout is better than the heating pipe network circulating pump layout in the heat source. In order to study its energy saving effect, in this paper, by analyzing the contrast between the basic operation principle and the water pressure diagram of them, and combined with engineering example, it is concluded that the distributed variable frequency pump heating system has a good effect in energy saving. We should promote it.

**Key words:** distributed variable frequency pump; heating system; operation principle; water pressure diagram; energy saving

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### Application of energy bus system in a community building

GAO Yue-fen, NAN Shan-shan

(Department of Power Engineering, North China Electric Power University, Baoding 071003, China)

**Abstract:** Energy bus system can effectively utilize the renewable energy and unused energy in community, and integrate it in time and space to meet the supply and demand balance of community building energy. According to the resource supply and load demand of a community in Baoding, a set of energy bus system scheme of surface water source, soil source, cooling tower and solar energy is proposed, and facility allocation of the planning is studied. The energy usage and carbon emission of energy bus system are compared with the traditional energy system. The results showed that compared with the traditional energy, the primary energy efficiency of energy bus system improved by 0.05, the energy loss reduced by  $17.19 \times 10^6$  GJ. The effect of energy saving and emission reduction was remarkable, the relative energy saving rate reached 0.11, and emission reduction rate of  $CO_2$  was 12.70%.

**Key words:** energy bus system; renewable energy; community building; allocation; energy planning

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### Building water supply and drainage PPR pipe insulation layer of delay freeze computation model

ZHU Shao-yi, ZHAO Jing-de

(Dezhou Kaiyuan Thermolectricity Co. Ltd., Dezhou 253034, China)

**Abstract:** Established a building water supply and drainage PPR pipe insulation layer of delay freeze calculation model. Proposed calculation method for PPR pipes delay freezing of insulation thickness. Analysis and compared the results of this method and Code for design of industrial equipment and pipeline insulation engineering, and Guide for design of thermal insulation of equipments and pipes is for building water supply and drainage pipe delay freeze insulation layer thickness calculation, to given the reduced rate of common PPR pipeline delay freeze insulation layer thickness of and the save volume of insulation material. In order to provide reference for the design calculation of building water supply and drainage delay freeze insulation layer thickness.

**Key words:** PPR pipe; delay freezing; insulation thickness; pipe thermal resistance; insulation material savings

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### Optimization suggestions and performance analysis of water source heat pump heating system

LI Wen-lei, ZHANG Yue, FAN Yao, et al

(College of Energy and Environmental Engineering, Hebei University of Engineering, Handan 056000, China)

**Abstract:** The construction and application of water source heat pump in a northern residential heating project as an example, the test of winter heating operation of this system, and the test results are analyzed, calculating the energy efficiency ratio of the system and each part of the system energy consumption. According to the test results and the actual operation of the system, the paper puts forward some reasonable suggestions.

**Key words:** water source heat pump; test; energy efficiency ratio; energy consumption.

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### Energy consumption statistics and energy saving analysis of a passenger car manufacturing plant

WU Da-de, LI Cheng-lin, WANG Dong-jie

(HuBei Province Engineering Consulting Company, Wuhan 430070, China)

**Abstract:** Focusing on a bus manufacturing company in Wuhan, the analysis of the company in a normal year needed for the production of energy consumption structure mainly for electricity, natural gas, carbon dioxide, diesel, argon and fresh water, the energy consumption in electricity and natural gas. The consumption direction of the company's energy is statistically analyzed. The comprehensive energy consumption, the comprehensive energy consumption value and the total energy efficiency level of the per unit output value of the company are obtained, and the comprehensive energy consumption of unit products is analyzed by analogy. Finally, according to the characteristics of the enterprise, combined with the idea of energy saving, specific and effective energy saving measures are put forward, which can provide reference for energy-saving problems of similar enterprises.

**Key words:** bus manufacturing company; energy structure; unit product of comprehensive energy consumption

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### Operation optimization of central heating system from chemical industries waste heat source

LIU Lin, ZHAO Bin, GAO Ming-fei, et al

(College of Metallurgy and Energy, North China University of Science and Technology, Tangshan 063210, China)

**Abstract:** The chemical industry is rich in low-temperature waste heat resources, while the use of waste heat for winter heating can effectively reduce the environmental pollution in the northern towns. From the analysis of replacing waste hot water of Sanyou Chemical Industries Company Limited with low vacuum heat source of the power plant, absorption heat pump and steam water heater through the establishment of mathematical model is selected and transformation of heat source of central heating system in Nanbao development zone of Tangshan is carried out; through the operation analysis of the heating system of lithium bromide absorption heat pump unit, the operational optimization strategy and method are put forward. The results show that the heating mode of the heat pump unit and the steam water heat exchanger can be used in parallel to ensure the heating quality, and the effect of energy saving is obvious. The results of the study can provide reference for the transformation and operation of the chemical industries waste heat source heating system.

**Key words:** central heating; replacement of waste heat source; selection of the main engine; operation optimization

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