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Study on the Current Situation of Energy Use in Tibetan Farming and Animal Husbandry Areas and Analysis of Countermeasures for Optimizing Energy Use

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Abstract

As Tibet's agricultural and pastoral areas enjoy different natural resources under different geographical locations, different climatic conditions and other factors, and different production and living standards also reflect the different energy consumption needs of local residents, this paper first conducts relevant research on the living and economic conditions of rural households inside and outside the area, so as to reflect the energy demand of local farmers and herdsmen households through the production and living standards of farmers and herdsmen households in different regions.

Keywords

Tibet; Agricultural and pastoral areas; Living and economic conditions.

1. Introduction

In recent years, many hydropower stations in Tibet have been put into operation for power generation. The first unit of Zangmu Hydropower Station invested and constructed by Huaneng Group was put into operation for power generation in 2014, with a total installed capacity of 510000 kilowatts for 6 units; Jiacha Hydropower Station with an installed capacity of 360000kw will be put into operation for power generation by the end of 2020; Dagu Hydropower Station, with an investment of 12.2 billion yuan, is the largest domestic demand hydropower project under construction in Tibet. It was the first unit to generate electricity in May this year [1]. Since the 13th Five Year Plan, many power stations have been built and put into operation, easing the power supply situation of Tibet's high cost oil fired units and power shortage in winter and spring, and effectively improving the security and stability level of Tibet's power grid and its power security capability. In recent years, with the support of the national power grid, the power supply and demand situation in Tibet has been effectively improved, and the power consumption of the whole society has shown double-digit growth for many consecutive years. The relevant person in charge of State Grid Tibet Electric Power Co., Ltd. said that during the "Fourteenth Five Year Plan" period, State Grid Tibet Electric Power Co., Ltd. planned to invest 46.6 billion yuan in Tibet to further strengthen the interconnection between Tibet and the Southwest Power Grid, actively promote the preliminary work of Qinghai Tibet DC Phase II and other projects, and comprehensively strengthen county power grids, central towns and industrial parks [2].

2. Energy consumption structure

Since the early 1980s, Tibet has begun to develop and utilize solar energy, including solar thermal utilization and solar photovoltaic power generation. Up to now, the solar cooker technology in Tibet has been basically mature, the scientific and technological achievements have reached a certain depth and level, and the products have been promoted and applied in a certain amount, which has achieved certain results in alleviating the shortage of conventional energy and preventing the deterioration of the ecological environment in our region. Low cost

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and quick effect are the biggest advantages of solar cookers. It is estimated that each solar cooker can save 500 to 700 kg of firewood every year, with obvious energy saving and social benefits. Recently, the Tibet Energy Research and Demonstration Center has developed portable and foldable portable solar cookers based on the characteristics of nomadic users in our region, and plans to gradually promote them to the vast pastoral areas through demonstration, poverty alleviation and other channels in the next few years [3].

In addition, Tibet has also made remarkable achievements in the development and application of passive solar houses, solar heating technology, and solar photovoltaic power generation. With the increasing promotion of solar energy and the safety and cleanliness of the use of solar energy technology, the use of solar ovens and solar water heaters, as well as the construction of solar greenhouses and cattle and sheep warm circles, has become very common in Tibet. So far, Tibet has promoted more than 100000 square meters of solar water heaters, 200000 square meters of solar heating rooms and more than 100000 solar ovens.

It is reported that last year, Shuanghu PV Power Station in Naqu, Tibet, implemented an expansion project from 25KW to 105KW, and formally generated electricity after the expansion and regulation in November, becoming one of the largest PV power stations in China. The photovoltaic power station in Zhegu Town, Cuomei County, Shannan Prefecture, with a national investment of more than 16 million yuan, was also officially put into operation last December, with an installed capacity of 130 KW, making it the largest photovoltaic power station in Tibet. Up to now, Tibet has built seven solar photovoltaic stations with a scale of 10-100 kilowatts. The photovoltaic capacity of various solar energy facilities in the region is close to 7 MW, which has solved the problem of electricity consumption for more than 200000 people [4].

In recent years, the state has continuously increased investment in the application of solar energy in Tibet, and the relevant departments in Tibet have also paid more attention to the development and utilization of solar energy. They have successively implemented the "Sunshine Plan", the "Light of Science Plan" and the "Ali Optoelectronics Plan", which have solved the problem of electricity consumption for 70,000 people in Ali region, made Ali region bid farewell to the history of no electricity, and achieved all electricity consumption problems for farmers and herdsmen at the township level throughout the region. Solar energy belongs to "green energy". Its use is not only a good supplement to the shortage of conventional energy in Tibet, but also plays a positive role in environmental protection in Tibet.

3. Current situation of energy consumption

The current situation of the development and utilization of biomass energy in Tibet is difficult to develop due to the scarcity of conventional fossil energy resources and uneven regional distribution. However, water energy, wind energy and other energy resources are greatly affected by seasons, resulting in poor reliability of rural energy supply. Therefore, biomass energy has become the main energy consumption in rural areas of Tibet, accounting for more than 50% of the total energy consumption in the region. The per capita energy consumption in rural areas is 12% lower than that in the country. The contradiction between supply and demand of rural energy consumption is prominent, and the use of energy consumption is unreasonable [5].

Analysis on the sustainable development model of biomass energy in rural areas of Tibet In most of Linzhi and Changdu areas with high forest coverage, conversion of farmland to forests and natural forest protection, due to rich water resources, mild climate conditions and abundant biomass resources, small hydropower stations and biogas demonstration projects can be vigorously developed, and solar energy can be given consideration; In the "One River and Two Rivers" area, the main agricultural areas along the river valley pay equal attention to solar energy and small hydropower, and give consideration to the development of biogas; In

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the arid areas of Ali, Naququan, Changdu and some high altitude counties in the "one river and two rivers" region, due to the rich light resources, it is necessary to focus on the development of solar energy, give consideration to the development of biogas technology, and form a general pattern of complementary and coordinated development of rural energy in Tibet. At present, the problems faced by the sustainable development of biomass energy in Tibet are as follows: only focusing on scale development and neglecting technology upgrading have resulted in the disproportionate investment and return of many biogas projects, wasting a large amount of national funds [6]. Therefore, it is necessary to carry out scientific and technological research on core technologies in the next few years. First of all, in view of the problems such as the basic use of wet fermentation technology and single fermentation raw materials in biogas engineering, the wet fermentation and dry fermentation technologies with high concentration and mixed raw materials are developed to achieve efficient production and high-value utilization of biomass gas. Secondly, in view of the low level of biogas engineering equipment and the single way of biogas utilization in Tibet, research and develop technologies such as efficient preparation of methanated biogas from agricultural wastes to achieve the transformation of the diversified utilization mode of biogas resources. In addition, after the use of biomass gasification technology, biogas technology and distributed utilization of some biomass resources, there is still a vast majority of biomass resources remaining. The large-scale transformation of the remaining large biomass resources can take a three-step strategy: first decentralized primary processing (compression molding), then commercialization and centralization, and then high-quality transformation. This method can effectively avoid the shortcomings of small-scale gasification, low liquefaction efficiency and unsustainable, and convert the waste biomass resources in rural areas into high-grade energy on a large scale. This not only reduces the damage to Tibet's ecological environment caused by energy consumption, but also increases the income and employment opportunities of farmers and herdsmen, protects and improves the agricultural ecological environment, thus promoting the virtuous cycle of agricultural economy and promoting social progress, and achieving the unity of ecological, economic and social benefits.

4. Summary

Tibet is relatively rich in biomass energy, with a total resource of about 1.28 billion tons. The prospect of development and utilization is considerable. In the early stage, the utilization of biomass energy was simple incineration, which not only resulted in low utilization level of biomass energy, but also greatly polluted the ecological environment [7]. After the 1980s, the research on biomass energy conversion and processing technology was carried out by introducing technology and equipment from the mainland. From 1981 to 1982, the Bureau of Agricultural Machinery of the Tibet Autonomous Region carried out a promotion experiment on energy-saving stoves in Chengguan District, Lhasa City. The thermal efficiency of farmers using old stoves to burn livestock manure, firewood and straw was only 9.72% to 11.31%, with an average of 10.58%, while the thermal efficiency of energy-saving stoves was 15.5% to 20.6%, with an average of 17.36%. The thermal efficiency of energy-saving stoves is far higher than that of traditional stoves. In the mid-1980s, the plateau biogas project was also successfully tested. The thermal efficiency of biogas made from livestock dung was 1.43 times higher than that of the old stove. The traditional biomass was converted into biogas, changing the form of traditional biomass energy and improving the utilization efficiency of biomass energy [8]. As of 2006, 1180 biogas digesters have been built in the suburbs of Shigatse, Shannan, Linzhi, Changdu and Lhasa, with an average total volume of 11800 m3, which has solved the domestic energy consumption problem of 2950 people, and gradually formed a systematic ecological project integrating biogas, solar energy, breeding, planting and toilet [9]. This new energy

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construction project has achieved good results in agricultural and pastoral areas, creating a new way for rural energy development in Tibet, and has broad prospects.

References

[1] Wang Guozhong. Research on the strategic planning of Huaneng's development of solar power resources in Tibet [D] Beijing: Department of Water Resources and Hydropower Engineering, Tsinghua University, 2014, 14-20.

[2] Lausangjiang Village. The government work report delivered by the President of Lausangjiang Village at the Third Session of the Tenth People's Congress of the Autonomous Region [N] Tibet Daily (Han), 2016-02-06 (01).

[3] Development and Reform Commission of the Tibet Autonomous Region. Outline of the National Economic and Social Development Plan of the Tibet Autonomous Region during the 13th Five Year Plan Period [N] Tibet Daily (Han), 2016-04-24 (01).

[4] Development and Reform Commission of the Tibet Autonomous Region The Eleventh Five Year Plan for the Development of Tibet Electric Power and the 2020 Long term Goal Suggestions [Z]. Development and Reform Commission of the Tibet Autonomous Region, 2005.

[5] Development and Reform Commission of Tibet Autonomous Region. Rural Energy Construction Plan of Tibet Autonomous Region (Draft) 2003-2010 [Z]. Development and Reform Commission of Tibet Autonomous Region, 2003.

[6] Min Qingwen, Cheng Shengkui. Discussion on Poverty, Ecology and Development in Tibet [J]. Resource Science, 2001, 23 (3).

[7] Deji Baizhen, Gesang Zhuoma, Nimalazong, et al. Analysis of sunshine change characteristics in Xigaze, Tibet in recent 30 years [J] Tibet Science and Technology, 2015 (05): 62-64+76.

[8] Chen Qiying Economic Analysis of Tibet's New Energy Investment [J] Tibet Science and Technology, 2019 (05): 7-9+12.

[9] Bai Jun, Qin Wei, Jiang Mei. Feasibility Study on Multi energy Complementary Heating System in Tibet [J]. Energy Conservation, 2020, 39 (08): 107-109.

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