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Theoretical Research on Three-dimensional Cultivation of Poultry and Fruit and Vegetable Based on Photovoltaic Solar Greenhouse under the Background of New Energy

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ABSTRACT

"China's carbon dioxide emissions are expected to peak early by 2030, with the goal of becoming carbon neutral by 2060," said the U.S. -China Joint Statement on Climate Change released in Beijing on November 12, 2014. Therefore, on the basis of maintaining economic development, accelerating the optimization of industrial structure and energy structure, and developing new energy will become the main direction of China's current and future development. The "14th Five-Year Plan" is a new stage, critical period and window period for the development of China's solar energy industry, and the "two-carbon" policy will play an important role in the development of solar energy, solar energy and other renewable resources. The photovoltaic industry needs to take advantage of favorable development opportunities, reduce power generation costs, and continue to play an increasingly important role in achieving the two-carbon goal. In the new energy field, "clean and low-carbon" is the symbol of the new energy industry. Agriculture is a basic industry in China, which is related to national security and stability. Because "agriculture + new energy" project has become a new direction of agricultural development. "Agriculture + new energy" refers to the use of rural wasteland and wasteland to build photovoltaic power generation projects, with photovoltaic power generation on the top and economic agriculture on the bottom, "one land dual-use", improve the yield efficiency per mu of land, to achieve comprehensive utilization of land, in line with the national 145-carbon economic background, but also to assist the local county government to build a demonstration base for common prosperity. Therefore, the development of "agriculture + new energy" project is significant to local economic development, ecological and social benefits. With the rapid development of agriculture in our country, farming and husbandry will realize intensification and scale gradually. The progress of science and technology also drives the development of smart agriculture. In the breeding industry, it actively responds to the new development mode of the country's "two-carbon economy". In order to reduce labor costs and resource consumption, it is necessary to integrate environmental space and resources, use modern technology to improve the automation rate of aquaculture, improve the quality of aquaculture products, and achieve sustainable income and green agricultural development. Based on photovoltaic solar energy, this paper installs photovoltaic solar panels on the top of the traditional conservatory, divides the fruit and vegetable growing area and poultry breeding area inside the conservatory, and designs a three-dimensional farming mode based on solar energy and fruit, vegetable and poultry. By combining the three, we can make full use of breeding space and breeding resources. It not only saves geographical space, but also makes use of new energy. It uses poultry for fruit tree fertilizer, which not only saves costs, keeps the organic fruits and vegetables, but also realizes the continuous increase of profits, reduces carbon emissions and improves the profit rate of planting and breeding. To sum up, the project "three-dimensional breeding of poultry and fruits and vegetables based on photovoltaic solar greenhouse under the background of new energy" plays a positive role in promoting the development of national new energy cause as well as local social, economic and ecological construction, so it is of great significance to study and promote it.

Keywords: *Carbon Neutrality, Agriculture New Energy, Photovoltaic Solar Energy, Three-Dimensional Culture.*

I. INTRODUCTION

Photovoltaic solar energy is known as one of the "cleanest energy sources". Due to the geographical characteristics of China, the western region has a vast area, low population density and long sunshine hours. Therefore, most photovoltaic solar energy projects in China are concentrated in the central and western regions of China. With the development of modern science and technology, the application of scientific and technological transformation results in agriculture has gradually increased. Research and development investment in combination with solar photovoltaic

technology continues. In addition to conventional large-scale land power stations, there are also many "agro-light complementary" photovoltaic power stations integrated with agriculture, and "forest light mutual" integrated with forestry.

Supplement "photovoltaic power station, as well as a combination of traditional fishing and light complementary photovoltaic power station. As China becomes richer, the concept of fruit, vegetable and poultry consumption has shifted from the past of satiety to today's green organic. The concept of green agricultural development has been deeply rooted in the hearts of the people. Great importance has been attached to the development of agriculture, and the supply of green and high-quality agricultural products has been placed in an important position. The transformation of agricultural development to green needs to introduce modern machinery application, strengthen the introduction of technology, use biology, information technology, combined with modern big data Internet of things and other technologies to upgrade the traditional agriculture industry, form large-scale aquaculture, make smart agriculture gradually become the development direction and standard of modern agriculture, promote agricultural economy. In the present animal husbandry, more than 72% of the breeding is still using the traditional extensive breeding methods. With the continuous improvement of people's requirements for quality of life and the continuous improvement of China's agricultural standards, poultry production and breeding need to be stricter and more meticulous, improve the efficiency of breeding, deal with the pollutants in the process of breeding, so that the agricultural production process meets the requirements of resource-saving and environment-friendly development. Modern science and technology should be applied to breeding to achieve large-scale breeding and green breeding. The purpose of this study is to propose that by installing photovoltaic solar panels on the top of the conservatory, photovoltaic solar panels can absorb sunlight and generate electricity in spring, summer and autumn and sell it to the national grid to earn the first profit. In winter, the electricity generated by photovoltaic solar panels is heated by lead storage battery to heat the electric radiator inside the greenhouse, so as to achieve indoor thermal insulation effect, bid farewell to the traditional coal heating method, reduce carbon dioxide emissions and save costs; Third, setting sun on precious poultry in the solar greenhouse to ensure stable temperature, reduce disease, improve survival rate, enhance disease resistance, improve quality and increase income for farmers; Four is to plant fruits and vegetables in the photovoltaic solar greenhouse, also especially out-of-season fruits and vegetables, using the photovoltaic solar greenhouse in winter electricity heating principle, reduce the pollution of traditional greenhouse coal heating in winter to vegetables and to prevent pests and diseases sprayed pesticide residues, to achieve green organic fruits and vegetables; Fifth, in the three-dimensional farming system, the chicken manure is used as fruit and vegetable fertilizer to maximize the use of space and resources, so as to form a good and green three-dimensional farming of agriculture using natural resources, mobilize the enthusiasm of vegetable farmers, form an industrial scale and gradually become an important local feature, form an industrial chain, and promote the sustainable increase of farmers' income.

II. RESEARCH METHODS

This paper adopts the literature analysis method, with the help of various literature resource databases, as well as government publications and foreign documents. Through systematic literature retrieval and data reference from data sources such as newspapers, magazines and various statistical reports, combined with literature reading methods, the research status at home and abroad of this paper is combed and analyzed, so as to understand the existing research results in related fields and provide some reference research ideas for this study. AHP is a kind of easy to understand, easy to understand complex problem evaluation, it is very suitable for the quantitative and qualitative synthesis of evaluation objectives. Whether qualitative or quantitative, can use a pair of methods to compare. In the project of "new energy + agriculture", AHP is to divide the evaluation factors of different levels into different levels, and then compare the different factors. Statistical analysis method is the third. Multiple regression analysis: This paper uses multiple regression analysis to analyze the poverty reduction effect of photovoltaic poverty alleviation projects. The effects of grouping variables, time variables, interaction variables and control variables on the change of livelihood capital are evaluated. Independent sample test: This paper uses independent sample test to compare and analyze the difference of mean change of livelihood capital of different household groups under the implementation of photovoltaic poverty alleviation projects.

III. DISCUSSION

Sustainable Development Theory refers to development that meets the needs of the present without jeopardizing the ability of future generations to meet their needs. The principles of sustainable development theory are fairness, sustainability and commonality. The theory has gone through a long history of development. In recent decades, China's economy has developed rapidly, and the speed of environmental exploitation has accelerated, especially climate change, environmental pollution and ecological destruction. In this context, the importance of the environment has been realized, and sustainable development has received much attention and been put on the agenda. In China, the theory of sustainable development was accepted by the Chinese people until the 1990s. The universally recognized definition of sustainable development in the world was put forward by Mrs. Brant in 1987. Sustainable development refers to "the development that meets the needs of the present generation without damaging the ability of future generations to meet the needs".

Based on the above concepts, more and more researches extend sustainable development to social research and economic research and in the field of political studies. In the study of regional economy, regional sustainable development involves many aspects such as economy, politics, environment, society, culture and ecology. Moreover,

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the realization of the Sustainable Development Goals needs to focus on the organic integration of environmental protection, social development and economic development. Although the initial concept of sustainable development originated from issues related to environmental protection and ecological research, in the subsequent further development, the development problems contained in this theory are not only environmental problems, but also combine social and economic issues with ecological and environmental issues, and treat them as a strategic deployment related to social and economic development. As one of the most important theories in today's social and economic development, the theory of sustainable development has been deeply rooted in people's hearts and has been continuously enriched and extended. In most projects related to economic and social development, priority is often given to sustainable ecological development and sustainable environmental development to avoid environmental damage caused by blind development. China has been the world's largest energy consumer, accounting for 23.2 percent of global energy consumption. Rural energy

Has become a key determinant in slowing the growth of carbon emissions. Energy pollution caused by unreasonable energy consumption and its development mode is an important reason for the intensification of rural ecological environment pollution, and also affects the development of rural economy and residents' living standards. China's rural energy consumption structure has shifted from traditional energy (such as firewood, straw and other agricultural waste, human and animal waste) to commodity energy (including coal, oil, electricity and natural gas) purchased in the bulk commodity market. At present, more and more rural families begin to pay attention to the use of clean energy, such as electric energy, solar energy, natural gas and so on. In economically developed rural areas, more and more households are using natural gas or liquefied petroleum gas. The supply of modern energy not only helps to improve mankind

Living standards and productivity, but also contribute to improved social welfare (such as education and women's empowerment). Therefore, the transformation of energy use from traditional energy to green energy in rural areas can improve the energy use and allocation type of rural residents.

Principle of photovoltaic power generation: Photovoltaic effect is a special photoelectric action; it is caused by the light source of heterogeneous semiconductor and metal parts of the voltage difference. First, it converts light into electrons and its energy into electricity. The second is voltage generation. Photovoltaic power is generated by irradiating the light energy generated by the photoelectric effect onto a semiconductor pn junction, thus creating a new hole-electron pair in the pn junction field. Under the influence of the pn junction electric field, a current is generated when the circuit is opened from n regions to the holes in the p region and from the electrons in the p region to the n region. This is a solar cell that uses the photoelectric effect.

Common types of photovoltaic solar energy: commonly used photovoltaic cells are monocrystalline silicon cells, polycrystalline silicon cells, amorphous silicon cells, etc. The conductivity of monocrystalline silicon is less than that of metal, and it is used more in semiconductor silicon devices. It is used to make high-power rectifiers, diodes, switching devices, high-power transistors and so on. Monocrystalline silicon photovoltaic cell is one of the fastest developing photovoltaic cells at present, its structure and technology are relatively mature, and has a high level, in the development of new materials in the hot spot. Monocrystal silicon has great advantages in crystal structure and has great application scenarios and high rate of return as an efficient silicon cell. Considering the evolution process of silicon-based semiconductor cells and practical power generation process in terms of conversion efficiency, monocrystalline silicon has a long-term value advantage. Although the production cost of polysilicon solar cells is lower than that of monocrystalline silicon solar cells and the production process is relatively simple, the photovoltaic conversion efficiency of polysilicon solar cells is much lower and the service life of polysilicon solar cells is shorter than that of monocrystalline silicon solar cells.

In 2012, China began to put forward the concept of smart agriculture and promote the research and development of precision agriculture technology. In 2016, agricultural information technology was proposed on the basis of precision agriculture. With the decrease of traditional energy and the change of environment, countries are actively developing clean energy applications. Solar energy as a kind of clean energy, large resources, wide distribution, become the focus of development. In 2013, the first batch of photovoltaic vegetable greenhouses were completed in Shandong, which not only solved the electricity problem, but also reduced the influence of seasonal changes on vegetable planting. In recent years, the combination of photovoltaic power generation with planting, livestock and aquaculture has become a new type of agriculture, which is also the main direction of green agriculture development. In 2017, China introduced related policies in the application of agro-light complementarity. Jia and others combined photovoltaic power generation with pig houses, which can not only reduce the temperature of pig houses in summer, but also meet the electricity consumption of pig houses. Photovoltaic power generation is used in agricultural irrigation and aquaculture to improve product quality and save energy. Photovoltaic panels convert solar energy into electricity for agricultural application, saving resources and solving the problem of agricultural electricity in remote areas.

China has a strong production capacity of poultry meat and eggs. As a major country in the world in poultry raising, production and consumption, China lacks unified standards and complete automation system in production mode and breeding equipment, and it is mainly small and medium-sized enterprises. Agricultural breeding is mainly concentrated in a single family, the number is small, the variety is small, the raising process takes up a separate space, and the accumulation of animal feces, causing a certain impact on the environment. How to effectively use space, reduce costs, increase income, and reduce environmental pollution has become a question that aquaculture experts need to think about. In the process of green agriculture development, three-dimensional culture has become a trend. Three-dimensional culture of fish and vegetable and three-dimensional comprehensive culture of rice, shrimp and eel can

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reduce the risk of eutrophication of water, optimize the culture mode, and three-dimensional culture of rice, duck and fish has high yield, good benefit and low cost. Modern three-dimensional aquaculture has become a new innovative direction of aquaculture. The theory of three-dimensional cultivation of fruit, vegetable and poultry in photovoltaic solar greenhouse was put forward.

With the development of photovoltaic industry, "photovoltaic + aquaculture" as a clean and low-carbon innovation model has attracted more and more attention. At present, more than 200 "photovoltaic + agriculture and fishery" projects have been established across China. Compared with traditional photovoltaic projects, "photovoltaic + aquaculture" has a shorter payback period, lower risk and higher return, and has great market prospects. A poultry house is set up on the conservatory, and photovoltaic panels are laid on the roof of the conservatory to build an integrated mode of "poulter-fruit and vegetable - power generation". Fruits and vegetables are planted on the land, and a poultry house is set up next to it, with photovoltaic power generation on the roof of the house, which has a high utilization rate of space, energy saving and environmental protection.

Participative development effect of photovoltaic solar housing project. The long-term benefits of PV projects depend on the sustainability of the projects, which is largely influenced by the participation behaviors of project stakeholders in the process of project management. PPAP projects emphasize the active participation of farmers. For household PPAP, it mainly refers to the construction of small photovoltaic power generation systems on the roofs or courtyards of farmers, "self-use and redundant Internet access". The idea proposed in this paper is to change the location of photovoltaic solar installation from farmer's roof or yard to that of the field and on the roof of the greenhouse. Through distributed solar power generation, each household will have one or more micro solar power stations. In this model, farmers all participate in the construction, operation and maintenance of the project as the main participants. For village-level PPaps and centralized PPaps, relevant policies encourage households with working capacity to actively participate in the daily management and care of PPaps, such as the establishment of public welfare posts for PPaps.

Benefit guarantee of photovoltaic solar greenhouse fruit, vegetable and poultry three-dimensional breeding project. This project belongs to a kind of industrial technological innovation, but also a kind of asset income. Therefore, its income distribution and income expectations are the key to the realization of the project. The specific segmentation of assets related to poverty alleviation mainly includes the assets formed by special financial funds and other agriculture-related funds, and some provinces also include other types of assets. The assets generated by poverty alleviation funds are of great importance to improving the quality and sustainability of poverty alleviation programs. Among them, the premise is to clarify the source of capital, the key is to clarify the property rights, the focus is to improve the quality of management, the core is to optimize income distribution.

The main features of this paper are as follows: 1) Make full use of the local climate conditions, combine the traditional photovoltaic solar power generation with the greenhouse, and have obvious spatial stratification advantages. (2) Compared with traditional greenhouse, it has more obvious advantages in promoting farmers' production increase and income; (3) The development of this industry can promote the development of local modern agriculture, drive the four-in-one linkage mechanism of capital flow, technology flow, logistics and population flow, form local characteristic industries, and further promote the development of real estate industry, transportation industry, commerce, education, healthcare and other industries; (4) The promotion of the project can better promote the implementation efficiency of the local government. It is a holistic strategy that requires the cooperation of the whole departments, such as agriculture, commerce, finance, finance and other industries. At the same time, the most important thing is the support and supply of capital and technology, which is a test of the government's ability. The dilemma of new knowledge. Therefore, the tripartite alliance of the government, residents and enterprises is also a favorable opportunity for the government to test the active participation of state-owned enterprises in national construction and assume social responsibilities, so as to lay a good foundation for local industrial upgrading and promoting economic development.

The innovation of this paper is reflected in the following three aspects: (1) It constructs the multi-level and multi-angle theory of the combination of new energy and modern agriculture, deepening the past photovoltaic solar energy can only be used for residential lighting function to sell the surplus electricity generated by photovoltaic energy to the country, changing the farmers from selling agricultural products to selling electricity in the past, and changing the types of products sold by the farmers; (2) The project changed its income from fruit and vegetable farming to fruit and vegetable farming and electricity sales, and the income increased significantly. (3) This project has obvious advantages in cost saving. Cost saving is not only reflected in the saving of coal in the heating cost of greenhouse in winter, but also in the saving of fertilizer in the process of fruit and vegetable planting. The effective use of poultry feces as raw materials not only reduces the dependence on chemical pesticides, but also further improves the organic quality of fruits and vegetables. It can not only carry out picking activities, but also form a breakthrough point for new rural tourism. Not only in line with the national carbon neutral, new energy goals, but also can achieve a steady increase in income, sustainable energy development.

Limitations of this article: This paper is a theoretical research and is currently in the exploratory stage. In the actual construction, the economic benefits involved will be impressed by many factors, such as whether the funds are in place on time, the calculation of the planting area and type of fruits and vegetables, the amount, area and method of installing photovoltaic solar energy, the roof bearing capacity of the greenhouse, the variety and number of poultry and the participation of farmers. Enthusiasm and acceptance of new knowledge and market acceptance of products are uncertain factors, which are also the focus of further research in this paper.

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IV. CONCLUSIONS

The application of photovoltaic solar energy in the field of agriculture will be a good solution to the shortage of resources, the use of new energy, the reduction of emissions, the discovery of cushion agriculture program, it will be a good development direction. Agricultural and optical complementarity fully reflects the "symbiosis" between photovoltaic and agricultural production, realizing the sharing of land and light resources, and realizing the effective utilization of resources. Photovoltaic agriculture of our country puts forward, includes above two aspects. This will help better integrate optoelectronic technology with agricultural technology and integrate it with agriculture. Therefore, photovoltaic agriculture in the future will be a new research direction. The economic, ecological and social benefits of Nongguang project are analyzed through photovoltaic solar energy fruit, vegetable and poultry benefit breeding project, and gradually promoted. It can be used as the basis of photovoltaic + project decision, and has certain reference value.

In this paper, the "agricultural light complementary" project as an example, combined with the mature practical project of photovoltaic solar energy in modern agriculture and has achieved good results. In view of the credibility of these data and the representative conclusions of the evaluation, we must find a development model that is more suitable for the actual domestic conditions in this period of large-scale development of photovoltaic. China is a typical agricultural country, rich in land resources, especially in remote, poor, rich forest resources, economic development is not fast enough, and the new photovoltaic power generation project provides us with a new agricultural development road. In a region with little rain, plenty of sunshine, long hours of sunshine and long cold winters, this new development will not only boost the local economy, but also improve the quality of life of residents.

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