

Sustainable development of modern agriculture based on straw returning after biogas treatment

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Abstract: China Rural widespread structural surplus straw is the major constraints and limitations of modern agriculture industry sustainable development. Straw returning after biogas treatment is an important way to solve the problem of straw, as well as effective means of achieving a low-carbon economy and the agricultural cycle, and can solve the problem of burning straw fundamentally, promoting sustainable agriculture and rural economic development.

Introduction

Straw is a significant biological resources, with high content of organic matter (80% to 90%), is an important source of biomass, about 50 percent of agricultural input factors into the final straw. Straw is a valuable resource for the lives of farmers and agricultural development, but with the rural social and economic development and the straw itself and current treatment of refractory Straw technical level is still limited, there is a serious problem of excess Straw^[1]. About 800 million tons of straw is generated per year, of which about 50% without effective treatment and use. A large number of straw are discard, not only cause a waste of valuable resources, but also serious pollution on air and water, and the deterioration of the ecological environment and rural living environment, has restricted the development of modern agriculture and a major constraint limiting factors. Straw utilization technology has matured, the core problem is poor economic efficiency. Straw gas processing, production of clean energy (biogas) improve rural environment and reduce greenhouse gas emissions, the production of organic fertilizers to field the development of ecological agriculture, improve the comprehensive utilization of straw economy, making straw utilization in the economy feasible^[2-5].

Straw returning after biogas treatment

China is a large agricultural country. Straw generation increased year by year. Due to the transfer of rural labor force in the improvement of the energy consumption structure and various alternative raw materials, as well as the high cost of straw utilization, more and more straw is discard.

Straw materials produced by microbial fermentation anaerobic for clean energy and high quality organic fertilizer, biogas energy can replace natural gas with in industrial production, improve the rural environment and greenhouse gas emissions; organic fertilizers (straw biogas residue) not only can save the application amount of fertilizers and pesticides, increasing soil fertility and organic matter content and improve soil physical and chemical properties, improve crop yield and quality, and promote the development of ecological agriculture, turning waste into recycling economy development model.

Favorable conditions and Obstacles of straw returning after biogas treatment

The important way of high value utilization of Straw

Straw has many application ways. In December 2014, "Straw utilization technology catalog" was issued by National Development and Reform Commission and Ministry of Agriculture, which lists a total of 19 application approaches on five aspects for straw application, namely fertilizer, feed, raw material, fuel and base material utilization. In the comparison of the above mentioned techniques, the presence of most of the technical are professional, single line, high operating costs.

Straw returning after biogas treatment aims to obtain clean energy (biogas) and high quality organic fertilizer, organic fertilizer can be storage by long time, with the low moisture, the straw can be directly used as organic fertilizer. Biogas slurry can be utilized as material moisture adjustment for the next batch fermentation. No biogas slurry emissions, is meet the requirements of circular economy, clean production process. Cleaner production process of straw biogas is environmentally friendly. Straw biogas is the product of clean energy, biogas and organic fertilizer, do not produce any harmful byproducts which can realize zero discharge of waste. Thus, it's a resource utilization technology.

Straw biogas transformation is appropriate for China's energy structure adjustment and environmental protection requirements. Livestock farm can take the advantage of straw and animal manure to generate biogas, biogas can purify to natural gas by de-carbonization. Biogas residue is an organic fertilizer with good quality. Straw returning after biogas treatment can fully exploit the straw feed, fuel and fertilizer functions.

In recent years, biogas conversion from straw with low cost, high efficiency, easy operation has been developed in China. Large biogas technology and equipment have made a breakthrough, straw gas industry technology is matured. The same device can also be processed into food waste and human manure. Therefore, straw biogas is an effective way to achieve a high value use of straw. Straw can solve the problem fundamentally.

Provide renewable energy to ease pressure energy

With the development of rural economy, the contradiction between supply and demand of rural energy will also be more prominent. The traditional energy sources such as straw, wood burning, oil, gas, electricity is not conducive to environmental protection, and rising tensions in commercial energy supply and demand. Methane is a clean renewable energy. Development of rural biogas optimize the structure of energy consumption in rural areas, is an important part of China's energy strategy. Reduce the pressure on national energy has great realistic and strategic significance. About 800 million tons of straw is produced per year, it can be obtained more than 2000 cubic meters biogas with the utilization rate of 95% per year, even if only 30%, also can produce more than 700 m³ of biogas. It can change the energy structure of China, reduce the pollution of the environment, promote the development of clean energy.

The development of ecological agriculture agricultural sustainable development

Biogas is not only a low carbon clean energy through reuse a variety of organic wastes in the production process, which can effectively eliminate the pollution to the environment, and reduce air pollution and greenhouse gas emissions. In the construction of ecological agriculture, biogas is the energy conversion, material circulation system and a central part of the comprehensive utilization of organic waste, for the establishment of the ecological balance of agricultural circulation system, and maintaining the system. Disposal of straw is a serious pollution source, but as an important biomass resource, it can be converted into valuable energy. The use of chemical fertilizers for a long time will result in land harden problem and soil damage. Organic fertilizer can improve the soil, enriching the soil fertility. Combine together with biogas as a link to a project can be implemented other industries and the benign circulation, is the resources - products - waste - renewable resources

circular economy development mode, it will improve the comprehensive agricultural production capacity, promote crop growth, accelerate the local economic development, increase farmers' income, reduce the production risk has a positive role.

Straw returning after biogas treatment conforms with development of agricultural and multiple utilization of straw comprehensive utilization of the basic principle of economic efficient straw return to agricultural production system, realize the high value and comprehensive utilization of straw, promote resource saving and environmentally friendly new rural construction, the development of the urbanization process will solve the problem of straw burning fundamentally.

Direct economic efficiency is low

Practice has proved that straw biogas is a mature rural energy technology, but the direct economic efficiency is not high. Due to the density of straw and large volume, poor liquidity, front-rear difficulties, scum crusting and slow, low efficiency of mass and heat transfer problems, high content of lignocellulose, it can not be effectively degradation by anaerobic bacteria. Compared with traditional biogas technology, straw biogas with content of sulphur, in energy conservation and reduce cost, low Sulphur content in gas, a variety of advantages at the same time, relative to the material such as livestock and poultry dung digestible, creatures of straw gasification technology of anaerobic digestion process requirement is much higher.

Straw biogas utilization efficiency is relatively low. Industrial driving force is not strong. Comprehensive utilization of straw industry a striking feature is its excellent positive external effects, but the existing policy for its quantification. Under existing policy and technical conditions, comprehensive utilization of straw greater investment, high costs, less profit, economic not worthwhile, result in comprehensive utilization of straw enterprise quantity, small size, less type bibcock, and it is difficult to run for a long time. Some companies to focus on comprehensive utilization of straw, not form a leading dominance, nor is form chain relationship with the interests of the farmers, thus driving force not strong.

Insufficient government support policies

The government support is insufficient, the farmers' enthusiasm is not high. Methane is a quasi-public product, its external benefit is greater than its direct economic benefits. Straw biogas development need the support of government policy and financial subsidies. But now many of the local government to solve the problem of straw burning focus on relevant mandatory policy, farmers burning straw, and punishment in violation of provisions of farmers. Although in recent years, with the increasingly prominent environmental problem and the increase of rural energy supply pressure, especially the straw burning question, to the development of comprehensive utilization of straw, straw biogas is becoming more and more widely attention. But local governments with ecological compensation principle and technology do not understand, of straw is one of the important material base to develop modern agriculture and the insufficiency, lack can fundamentally solve the problem of straw, promote the comprehensive utilization of straw, foster the development of comprehensive utilization of straw emerging industry systematic support policy, especially no biogas and organic fertilizer subsidy policy of terminal products.

Prospect

With straw as raw material to produce biogas, not restricted by time and space, do not produce the tar, wastewater and waste gas pollutants, which can realize completely ecological cycle and efficient utilization of straw. Not only can solve the problem of a large number of straw environmental pollution, but also open up new sources of commodities, for biogas production in larger and larger scale biogas provide material guarantee. Returning straw biogas is different from the traditional sense of the biogas project, not only is an effective measure of crop straw, more important is an important part of modern three-dimensional circular agriculture. Blend in biogas

technology in the process of agricultural production, as an energy source and organic fertilizer producers of biogas industry and more than planting constitute a material energy cascade cycle within the sustainable development of modern ecological agriculture industry system. Industrial biogas and planting combined to form a three-dimensional circulation of modern agricultural production mode, material is multilevel utilization, the pollution control in the process.

Develop returning straw biogas, will effectively solve the crops straw open burning and discard, terminate the regional ecological environment on the constraints and restrictions of agricultural production, promoting the ecological, economic and social sustainable development and increasing farmers' income, the development of sustainable agriculture, the environment and energy cycle has important significance.

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