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## The impact of forestry biomass energy on environment and its development and utilization

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### ABSTRACT

It is an irreversible trend that petrochemical energy would be dried up. At the same time of ensuring the exertion of forest ecological function, the proper development of forestry biomass energy will be the direction for the demand alteration of future society and energy transformation. Although China has abundant forest resources, there are many difficulties in reality, such as unstable policy and regulation operation; insufficient raw material supply; unsound market security mechanism system; weak energy and environment awareness of the people; unsmooth investment and financing system; incomplete diversified investment channel; objective factors: how to face the difficulties of forest resource on wide range, scattered resource, collection, purchase and transportation; and subjective factors: different impact from different development and benefit groups under the limitation of different interests target function. Therefore, we need effective solutions to handle the difficulties in future so as to develop and utilize forest biomass energy sufficiently.

### KEYWORDS

Forest biomass energy; Impact; Development.



## INTRODUCTION

Forest biomass energy is not only the expression of forest ecological function, but also the presentation of forest energy development. Through the general survey of the relation between human and forest resource, it has gone through the stages of collection, hunting, food acquisition, fuel, fertilizer, material, industrial raw material, acquisition of ecological environment service, till the current comprehensive utilization stage of forest carbon storage and sequestration for energy cycle so as to obtain a large number of biomass energy. Energy acquisition from forest is a reasonable choice under the double pressure of economic development and environment protection. As the largest biomass energy storage system in the earth, forest treats CO<sub>2</sub> in the atmosphere through photosynthesis and solidifies it in the form of biomass. It exerts critical function on maintaining the ecological balance of earth, especially the carbon balance. This is a critical function that traditional petrochemical energy can't match. The feature of forest biomass energy drives the transformation of forest resource function towards the direction of providing biomass energy to the benefit of human society development. It provides the biological environment service to human; meanwhile, offers a large number of biomass energy.

### IMPACT OF FOREST BIOMASS ENERGY ON ENVIRONMENT DEVELOPMENT

Forest biomass energy refers to the chemical energy which solidified and stored in the biomass by solar energy through direct or indirect photosynthesis. The development and utilization method of forest biomass energy mainly includes direct combustion, thermal chemical conversion, biotransformation, and liquefaction technology, regarding gasification power generation, heat supply, fuel ethanol and biodiesel as the key points. Therefore, the final product of forest biomass energy can be divided into five groups according to its utilization property: 1. Transfer grease biomass into biodiesel; 2. Transfer lignocelluloses into fuel ethanol; 3. Process woodiness into solid fuel; 4. Transfer woodiness into fuel gas; 5. Generate electricity by wooden fuel.

Because the development of forest biomass energy needs more cultivation and construction of forest base, so its space for realizing CO<sub>2</sub> emission reductions is bigger, mainly on the aspect of replacing petrochemical energy by forest biomass energy; absorbing capacity of CO<sub>2</sub> during forest growth; emission volume of CO<sub>2</sub> by petrochemical energy during the production process of woods. Through selective breeding and intensive cultivation of energy plant, the continuous development and utilization of forest biomass energy, especially the construction of forest base of biomass energy, will increase the forest coverage rate in our country greatly, accelerate the speed of forestation, and avoid land desertification.<sup>[1]</sup> Meanwhile, in the development of national economy, the progress of forest biomass energy not only realizes the partial substitution of "coal, fuel, gas and petrochemical energy" by "solid, liquid and gas biomass green energy", but also exerts positive impact on the aspects, such as creating employment opportunities; solving three rural issues (agriculture, rural area, farmer); realizing modern agriculture; stimulating people's livelihood improvement; building ecological culture; transforming development mode; handling the problem of global warming, environment issues, and energy crisis; realizing sustainable development.

### ISSUES OF DEVELOPMENT AND UTILIZATION OF FOREST BIOMASS ENERGY

Abundant forest biomass resource and strong product scientific research capability provide advantages for the development and utilization of forest biomass energy. The development and utilization of forest biomass energy have series advantages on resource and technology. In addition, it can exert positive impact on rural economy development and ecological environment construction. However, as a new emerging industry, there is big uncertainty for the development of forest biomass energy in future. From the point of overall development, there are many detail problems.<sup>[2]</sup>

#### **Insufficient raw material supply**

Due to the diversified landform and wide rural area in China, the forest biomass resource locates in different province. There is also difference in the northern and southern area. The dispersion of time and space distribution requires multiple transactions. In addition, the feature of small density and scattered distribution lead to high cost for resource collection and transportation. At the same time, the cultivation of forest energy plant in our country has not reached large scale utilization degree now. The proper area for cultivating forest biomass plant mainly includes marginality land, such as saline-alkali soil, sand, mine, oil field reclamation land, and waste mountains and land that suitable for forest. The productivity level in these areas is relatively fall behind. Large scale of planting not only has the problem of insurmountable natural geographical barriers, but also meets the problem of long period planting for energy forest. It is difficult to get sustainable capital support. With big operation risk, the acquisition of forest biomass raw material is insufficient to support the development demand of large scale of forest biomass energy.<sup>[3]</sup>

#### **Unsound market security mechanism system and weak energy and environment awareness of the people**

At present, the liquid fuel of forest biomass still stays in the stage of "basing sales on production, planned supply". It has big gap to market competition and operation. It can't form sustainable and stable market demand, while missing continuous driving force. As green energy product, its price formation mechanism is not complete. The high investment and cost can't bring profit to green energy enterprise. This becomes another bottleneck for the development of forest biomass

energy. The unsound system of resource evaluation, product inspection and authentication mechanism make no basis for the enforcement of forest biomass energy product. Meanwhile, because forest biomass energy industry is an emerging object, the public do not have deep understanding on its concept, features, or detail execution and function. Therefore, once the development and utilization benefit from forest biomass energy fails to meet the ideal expectation by the farmers, the farmers may quit together. It is bad for the sustainable development and utilization of forest biomass energy.<sup>[4]</sup>

### **Unsmooth investment and financing system; incomplete diversified investment channel**

There is obvious directionality on the investment mechanism of the development and utilization of forest biomass energy. To some extent, it has extremely strong "monopoly". During the development and utilization process of forest biomass energy, the biggest problem for the investment companies is the serious shortage of capital flow. The capital chain is easily broken at that time. Because of the unsound investment and financing mechanism, and unsmooth diversified investment channels, the investment companies are mainly high-tech industries. Their invisible assets are far more than the fixed assets. Without sufficient fixed assets as mortgage and guarantee, these companies are difficult to get the loan from the bank. The fair market competition environment has not formed completely. It can't motivate the enthusiasm of the private enterprise and foreign merchant to join in the development of forest biomass energy. As a result, the diversified investment channel has not formed. The governments in some regions do not put enough leading investment. Although they offer favorable policy, without sufficient capital flow, many enterprises are difficult to apply loan from the bank due to insufficient capital or guarantee. The difficulty of financing seriously restricts the expansion of production scale in biomass energy industry. In addition, there are many other factors that restrict the industry development, for example, the innovation difficulty of research and development on material energy technology, lacking of technical regulation and product quality standard, incomplete technology assurance and service system.<sup>[5]</sup>

Besides the above problems, during the process of developing and utilizing forest biomass energy, it needs to face the objective difficulties, such as wide range of forest resource, scattered distribution, hard collection, purchase and transportation; meanwhile, it also needs to face the subjective difficulties, such as different impact from different development and benefit groups under the limitation of different interests target function.

## **DEVELOPMENT TREND OF FOREST BIOMASS ENERGY**

The future development potential of forest biomass energy industry is huge. China needs to clarify the responsibility of the government so as to provide industrial supporting system on policy, technology and market for its construction. It is expected to push the great development of forest biomass energy industry.

Firstly, through learning the advanced experience from the development and utilization of forest biomass energy in foreign country, make detail protective policy to control the market from the point of coordinating the benefit relationship between enterprise and peasant so as to make up the insufficient market strength. As for enterprise, it not only needs to set up special policy on the development of forest biomass energy industry, but also needs to complete the policy and regulation. It makes up the insufficient enterprise strength so as to reduce the investment risk. As for peasants, they need to enhance the awareness of public environment protection and get the subsidy from the policy; meanwhile, the strength of attracting investment in the proper area should be increased. Stimulate the participation enthusiasm of the peasants by assuring the sales of forest energy product and relieving the concern of the peasants.

Secondly, set up complete technical supporting system on industry development. It can reduce the processing and conversion cost of the raw material effectively; collect the cost; and finally save the development cost of enterprise and peasants. Therefore, assure the technology development direction on forest biomass energy; establish production and technology system of raw material with sustainable development, and special supporting policy on technology research; build good processing and conversion technical system of raw material. All these above mentioned factors play important role on the formation of technical supporting system and realization of technology breakthrough on forest biomass fuel, i.e. ethyl alcohol, biodiesel:

Finally, construct complete market supporting system. The region location for the development of forest biomass energy industry is rural area. In addition, conduct market level division on the development and utilization of forest biomass energy by regarding provincial unit as research area. As a result, bring up the development mode of forest biomass energy industry, mainly through the integration mode of forest and electricity by "government + leading enterprise", the mode of "government + specialized cooperatives + enterprise", the integration mode of forest and oil by "government + industrial cluster drive", to accelerate the industrialization of forest biomass energy.

In a word, the development of forest biomass energy in China not only obtains good economic benefit, but also makes great contribution on the environment protection, energy conservation and emission reduction.

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