

# Status Quo of Biomass Standardization in China

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**Abstract:** The value of biomass energy has been highlighted once again since the carbon peak and neutrality targets were raised. However, the development of the industry needs to be guided and guaranteed by advanced standards. This paper reviews the status quo of standardization in China's biomass industry, including standard formulation and standard organizations in the fields of domestic waste incineration power generation, agricultural and forestry biomass cogeneration, clean biomass heating, biogas (bio natural gas), biomass analyzed pyrolysis and gasification, biomass liquid fuels, biomass solid fuels, and discussed problems existing in domestic biomass standardization work.

## 1 INTRODUCTION

The realization of the carbon peak and neutrality strategic goals requires a deep and thorough adjustment of the energy structure. As biomass energy is not just a zero-carbon option among today's renewable energy sources, and its industrial operation model is capable of connecting rural-county-urban areas, (Niu, 2020) it is an essential resource that can be utilized for in-depth and long-term development to achieve the goals of carbon peak and neutrality. (Huang, 2021)

At present, according to the different raw materials, end product forms, processes, etc., the biomass energy industry is divided into seven branches: domestic waste incineration power generation, agricultural and forestry biomass cogeneration, clean biomass heating, biogas (bio natural gas), biomass pyrolysis and gasification, biomass liquid fuels, and biomass solid fuels. The development of the seven segments is unbalanced at home and abroad, and the development of the standards as a support plays an important role in the status quo and development trend of the industry.

## 2 STATUS QUO OF CHINA'S STANDARDIZATION IN THE FIELD OF BIOMASS AND EXISTING PROBLEMS

### 2.1 Overall Situation

So far, China has formulated more than 200 relevant standards in the field of biomass. On the whole, national standards are lagging behind industry standards. Due to the unbalanced development of the industry, the standardization level of the branches varies. The industry standards for biomass solid fuels and biogas (bio natural gas) are relatively complete, while those for fuel ethanol and biodiesel, comprehensive recycling of agricultural and forestry biomass, biomass heating and power generation, and biomass gasification are yet to be improved.

In terms of the standardization technical organizations, China's standardization technical committees engaged in formulating relevant national standards mainly include: SAC/TC20/SC6 New Energy and Renewable Energy Sub-committee of the National Standardization Technical Committee on Energy Efficiency; SAC/TC515 National Standardization Technical Committee on Biogas; SAC/TC 416 National Standardization Technical Committee on Forestry Biomass Materials; SAC/TC 42 National Standardization Technical Committee on Coal; SAC/TC 280 National Standardization

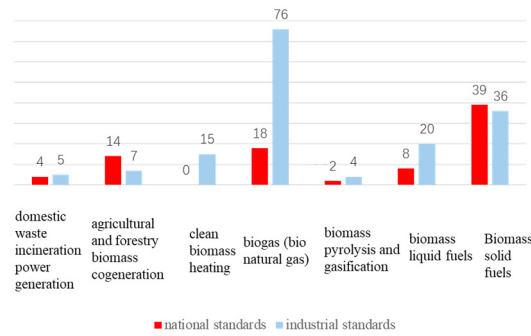


Figure 1: Standards of each branch of the biomass field.

Technical Committee on Petroleum Products and Lubricants; SAC/TC 349 National Standardization Technical Committee on Denatured Fuel Ethanol and Fuel Ethanol; SAC/TC275 JWG1 Biomass Resource Utilization Working Group of the National Standardization Technical Committee on Environmental Protection Industry, etc. The organizations engaged in formulating industry standards mainly include: the Standardization Technical Committee of the Energy Industry on Non-food Biomass Energy Feedstock, the Standardization Technical Committee of the Energy Industry on Bio-liquid Fuel Conversion Process, the Ministry of Agriculture, National Forestry and Grassland Administration, Ministry of Housing and Urban-Rural Development, etc.

Industry standardization technical committees and organizations	The Standardization Technical Committee of the Energy Industry on Non-food Biomass Energy Feedstock The Standardization Technical Committee of the Energy Industry on Bio-liquid Fuel Conversion Process The Standardization Technical Committee of the Energy Industry on Thermal Power and Power Grid Engineering The Standardization Technical Committee of the Energy Industry on Energy Industry Biomass Power Generation Equipment Ministry of Agriculture, National Forestry and Grassland Administration, Ministry of Housing and Urban-Rural Development,
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Table 1: Relevant standardization technical organizations in domestic biomass field.

National standardization technical committees	SAC/TC20/SC6 New Energy and Renewable Energy Sub-committee of the National Standardization Technical Committee on Energy Efficiency SAC/TC515 National Standardization Technical Committee on Biogas SAC/TC416 National Standardization Technical Committee on Forestry Biomass Materials SAC/TC42 National Standardization Technical Committee on Coal SAC/TC280 National Standardization Technical Committee on Petroleum Products and Lubricants SAC/TC349 National Standardization Technical Committee on Denatured Fuel Ethanol and Fuel Ethanol SAC/TC275 JWG1 Biomass Resource Utilization Working Group of the National Standardization Technical Committee on Environmental Protection Industry
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## 2.2 Domestic Waste Incineration Power Generation

At present, there are only 4 national standards and 5 industry standards for domestic waste incineration power generation in China, and the standards are lacking as a whole. The existing national standards include the Standard for Pollution Control on the Municipal Solid Waste Incineration under the jurisdiction of the Ministry of Ecology and Environment, and the Municipal Solid Waste Incineration Bottom Ash Aggregate and Municipal Solid Waste Incinerator and Boiler under the jurisdiction of the Ministry of Housing and Urban-Rural Development, mainly focus on waste incineration fly ash and pollution control, engineering design and other related aspects. Standards for raw material supply and raw material quality control that are essential for pretreatment, technical procedures for core processes and links, design and test procedures for core equipment - waste incinerator and other related standards have been absent for a long time.

### 2.3 Agricultural and Forestry Biomass Cogeneration

There are more than 20 national standards and industry standards in agricultural and forestry biomass cogeneration in China. In terms of equipment, there are standards for smashed straw machines, balers, crop straw rubbing filament machines, and straw gasification devices. In terms of inspection and testing, there are standards such as Technical Specifications for Monitoring of Animal Manure. SAC/TC 20/SC 6 has developed the General Technical Specifications for Collection, Storage and Transportation of Raw Materials of Agricultural and Forestry Biomass as the general standards in the field of comprehensive recycling of agricultural and forestry biomass, which is expected to be released within 2021. However, special standards for pretreatment and quality control of agricultural and forestry biomass, and relevant standards for thermoelectric technology, process flow and project management are yet to be formulated.

### 2.4 Clean Biomass Heating

15 industry standards now exist for clean biomass heating in China, mainly focusing on biomass boiler heating. There is a significant lack of standards for decentralized biomass heating and biomass cogeneration. Due to the particularity of this branch, there are also questions about whether or to what extent the existing CHP standards can be applied to biomass CHP, and how the existing solid biomass standards can be applied to decentralized heating with solid fuels in specific modes.

### 2.5 Biogas (Bio Natural Gas)

There exist more than 90 national standards and industry standards for biogas (bio natural gas) in China, involving agriculture, machinery, and light industry. A great number of standards have been released. However, in terms of system and structure, the biogas industry standards for machinery and light industry fields all fall into the unified biogas industry system. Repetitions and even contradictions exist between the upstream and downstream standards, and general and special standards as they fall under different standardization technical committees or different industries. For example, the mechanical standard Medium/high-power gas engine technology - Part 3: Biogas engine partly overlaps with the agricultural industry standard

Biogas-powered generating sets and the national standard Medium/high-power biogas generating set; and the light industry standard Polyvinyl chloride coated fabrics for flexible anaerobic digesters partially overlap with Technical specifications for household anaerobic digesters of fiberglass reinforced plastics. In general, the current rural biogas standards mainly focus on the promotion and application of household biogas, especially specific products and technical conditions standards, while the basic and general standards for methods and safety are absent, and the problems of mismatched and uneven standards are obvious.

### 2.6 Biomass Pyrolysis and Gasification

In this branch there are 9 national standards and industry standards. The industry standards are mainly under the jurisdiction of the Ministry of Agriculture. The New Energy and Renewable Energy Sub-committee of the National Standardization Technical Committee on Energy Efficiency (SAC/TC20/SC6) formulated the only two existing national standards. The existing standards cover the control of tar content in the pyrolysis and gasification process, engineering design, construction of centralized gas supply stations, and sewage treatment. No relevant standards are available for gasification equipment, process flow, and quality control of combustible gas produced by pyrolysis and gasification, and product inspection and testing.

### 2.7 Biomass Liquid Fuels

At present, there are 28 national standards and industry standards for biomass liquid fuels in China, mainly focusing on fuel ethanol and biodiesel which are used as the mainstream biomass liquid fuels. The terminology, raw material requirements, production technical regulations, production equipment, pollution control, composition determination, etc. are involved. One of these standards is the mandatory national standard Biodiesel fuel blends (B5) (GB 25199-2015) under the jurisdiction of the National Energy Administration. Compared with some other technical branches in the biomass field, China's biomass liquid fuel standards have made rapid progress in promoting the transformation of the technical content and achievements of some large enterprises and projects.

## 2.8 Biomass Solid Fuels

39 national standards as well as 36 industry standards are under the jurisdiction of coal, energy, agriculture, forestry and other related departments. In terms of content, the composition determination of biomass solid fuels accounts for a large share, in addition to product grading and classification, determination of physical properties, terminology, and operation procedures. Most of the composition determination standards are transplanted coal chemical industry standards or adopted foreign standards. There is a large gap between the large-scale biomass solid fuel industry in foreign countries and the small-scale family workshop industry in China. The international standards mainly focus on traditional physical and chemical experimental methods, while the relevant standard system in China is transplanted from that of the European Committee for Standardization (CEN), which is outdated in terms of content and technology. In practice, inspection and testing rely on large equipment, and the upstream resources are organized through "decentralized" small-scale family workshops. Therefore, there is a problem that China's standards are not quite applicable for domestic production methods.

## 2.9 Existing Problems

### 2.9.1 Lack of Top-Level Design for Standard Formulation

At present, many standardization technical committees are involved in relevant standards. From different perspectives of the industry chain, the standards proposed by different committees have shown the problems of overlapping, repetition and incomplete coverage. Due to the lack of top-level design for the development of standards at different levels and the lack of a standardization roadmap, the standards are not yet coordinated and unified, resulting in the absence of key standards and important indicators. The operation of the standard system and the application of standard integration yield poor results, and no synergy has been formed yet in supporting the implementation of relevant policies.

### 2.9.2 Absence of Key Standards and Uneven Standard Formulation

The standards in the field of domestic waste incineration power generation mainly focus on

waste incineration fly ash and pollution control, engineering design, etc. Standards for raw material supply and raw material quality control, technical procedures and standards for core processes and links and core equipment have been absent for a long time. There is a lack of standards for pretreatment and quality control of agricultural and forestry biomass, thermoelectric technology, process flow, and project management. In the fields of biogas (bio natural gas), the basic and general standards for methods and safety are absent. In the field of biomass pyrolysis and gasification, there are no relevant standards for gasification equipment, process flow, and quality control of combustible gas produced by pyrolysis and gasification, and product inspection and testing. Without these key standards, the standardization of China's biomass industry has fallen short of truly meeting the needs of industrial development and enterprise production.

### 2.9.3 Failure to Deeply Penetrate into Production Relations and Play the Role of a Filter

For some special problems in the current production relations of the biomass industry, such as the bargaining of straw price (Zhang, 2020), and the sole reliance of some producers on subsidies, the existing standards cannot provide solutions or guide the industry to carry out self-regulation, and fail to play the role of a filter to regulate the industry.

## 3 CONCLUSION

At present, the development level of biofuel technology in China urgently needs to be accelerated, especially considering the reality that the limitations in production efficiency and innovation of biomass energy processing seriously confine the promotion and application of biofuels (Tian, 2021; Li, 2021). Intensifying the efforts in the formulation and revision of standards in the field of biofuels is conducive to refining and standardizing the advanced technological achievements in the industry, promoting the rapid transformation of technological achievements into productivity, enhancing the practicality and promotional value of technological achievements in the industry, improving the market adaptability of scientific research results, and accelerating the development of biofuels in China. Standard setters need to plan and formulate standards from the perspective of overall industrial development and the realization of

carbon peak and neutrality goals, so as to enhance the value and utility of standards.

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