



Rijksdienst voor Ondernemend  
Nederland

## *Biomass energy sector in Jiangsu Province - CHINA*

*NBSO Nanjing*

*>> Duurzaam, Agrarisch, Innovatief  
en Internationaal ondernemen*



## Colofon

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## 1. Scope and definition of biomass sector in China

The use of biomass energy has the potential to greatly reduce greenhouse gas emissions. Biomass generates about the same amount of carbon dioxide as fossil fuels, but every time a new plant grows, carbon dioxide is actually removed from the atmosphere. The net emission of carbon dioxide will be zero as long as plants continue to be replenished for biomass energy purposes. These energy crops, such as fast-growing trees and grasses, are called *biomass feedstocks*. The use of biomass feedstocks can also help increase profits for the agricultural industry.

Biomass energy technology applications are:

- **Biopower**: burning biomass directly, or converting it into a gaseous fuel or oil, to generate electricity.
- **Biofuels**: converting biomass into liquid fuels for transportation.
- **Bioproducts**: converting biomass into chemicals for making products that typically are made from petroleum.

This report is mainly focused on the use of biomass for generating electricity (biopower). Biogas is a combustible mixture of gases produced by micro-organisms when livestock manure and other biological wastes are allowed to ferment in the absence of air in closed containers. The major constituents of biogas are methane (60 percent), carbon dioxide (35 percent) and small amounts of water vapor, hydrogen sulphide, carbon monoxide and nitrogen. Biogas is mainly used as fuel, like natural gas, while the digested mixture of liquids and solids 'bio-slurry' and 'bio-sludge' are mainly used as organic fertilizer for crops. Chinese companies are now finding numerous other uses for biogas, bio-slurry and bio-sludge in China. Bioenergy is also used at the domestic level in China, both in biomass stoves and by producing biogas from animal manure.

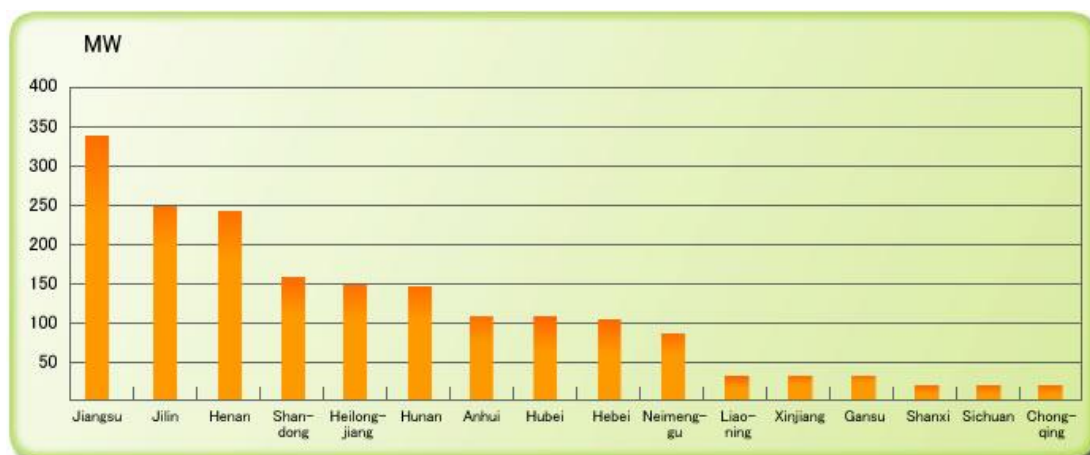
China's main biomass resources are agricultural wastes, scraps from the forestry and forest product industries, and municipal waste. Additionally, organic materials like poultry manure, fallen leaves and industrial waste, can be added to the supply mix and be converted to biomass energy.

The development of biopower in China started in the period 2000-2005 and has shown a gradual growth since. In absolute terms, the sector is expected to grow rapidly, as shown by the diagram below. However, compared with the fossile energy sources coal, oil and natural gas, the fraction of biopower in the energy market is expected to remain very low in the coming 10 to 20 years.



## 2. Biomass energy sector in Jiangsu Province

Jiangsu Province is the leading Chinese province for generation of bio energy, as shown in the diagram below.



Presently, there are altogether 41 biomass power generation projects completed and under planning and construction in Jiangsu Province, with a total installation capacity exceeding 1000 MW. Most projects have an installation capacity between 15 and 30MW. Annual biomass consumption accounts for about 6 million ton. Power generation techniques include gasification power generation, co-combustion power generation and direct combustion power generation.

The biomass activities in Jiangsu Province are concentrated in the northern part of the province, due to higher availability of agricultural waste products. Most projects can be found in the cities Yancheng (260 MW), Lianyungang (160 MW), Xuzhou (110 MW), Huai'an (100 MW) and Suqian (100 MW).

Current projects are mainly straw fired power plants. These projects simultaneously address problems which arise from the nationwide prohibition of straw burning and the lack of heat supply in development zones. Before entering the furnace for power generation, straw has to undergo multiple treatment processes, such as reaping, drying, bundling and crushing. The small stacking density of straw causes relatively high costs of transport, labor and storage. As a result, the cost of straw accounts for 60 to 70% of the total operation costs of power plants.

Recently there is a trend to build facilities with multi-fuel capabilities. These facilities can use a broad range of agricultural waste, such as rice husk, corn stalk, woodchips, and cotton and bean residues.

The current standard selling price of agro-forestry power generation is 0.75 RMB per kWh, of which 0.35 RMB is government subsidy and 0.40 RMB is paid by the National Grid.

### 3. Innovative biomass projects in Jiangsu Province

1. In March 2015, a Letter of Intent was signed between the Maassluis-based company Dahlman Renewable Technology BV (DRT) and Jiangsu Antai New Energy Co., Ltd (JAE). JAE wishes to realize a biomass gasification power plant demonstration project in Jingjiang (Taizhou City, Jiangsu Province). JAE selected DRT's MILENA-OLGA technology to produce 18 MW clean product gas from locally available straw. The gas will fuel 6 engines to deliver 6 MW electricity. The MILENA-OLGA technology, developed in close cooperation between DRT and ECN, is considered to be the most efficient gasification system available on the market. The Letter of Intent was signed in the presence of Prime Minister Mr. Mark Rutte. Further details of this project you can find on: [www.royaldahlman.com/assets/Uploads/Press-Release-China.pdf](http://www.royaldahlman.com/assets/Uploads/Press-Release-China.pdf)
2. In June 2014, Hong Kong based company China Everbright International Ltd announced cooperation with Suqian City and Lianyungang City (both in Northern Jiangsu), to start up agricultural biomass utilisation and central heating projects. Both projects will use a biomass pellet fuel manufacturing plant to convert agricultural waste and straw into pellet fuel, and a heat source plant which will use the pellet fuel to produce heat and steam for industrial use. The projects will adopt advanced biomass central heating and gas treatment technology, equipped with three 45 t/h furnaces. The gas emission standard will be higher than the Emission Standard of Air Pollutants for Coal-burning Oil-burning Gas-fired Boilers. The annual agricultural waste and straw processing capacity will be approximately 120,000 tonnes.  
In June 2015, Everbright signed contracts for three 30 MW biomass power plants in neighbouring Anhui Province.
3. In 2013, work has begun on the ¥250 million Kaiyou Green Energy Biomass (Rice Husks) Power Generating project located in the Suqian City Economic Development Zone in Jiangsu Province. The Kaiyou Green Energy Biomass Power project will generate 144 GWh/year and use 200 kilotons/year of crop waste as inputs.
4. In 2010, Wuhan Kaidi Electric Power acquired three biomass power plants from its parent, Wuhan Kaidi Holding Investment. One of these three projects is Suqian Kaidi Green Energy Development (in Northern Jiangsu). The company uses 2x15 MB turbo generators and consumes around 300.000 ton biomass material per year. The company generates 150 MW of on-grid electricity and besides gets some return from selling ash slag, which is a residu after straw firing.



## 4. Major Jiangsu companies active in biomass energy

### 1. Jiangsu Antai New Energy Technology Co., Ltd

Website: [www.chinajae.com](http://www.chinajae.com)

The company is a large low speed gas engine and gas generator set manufacturer and integrates design, equipment manufacturing, EPC contracting, installation, commissioning and start-up, operation training and maintenance. The generators are used for fuel gas, including natural gas, coal gas, biomass gas and LPG, and waste heat utilization. The company is a JV of Jiangsu Antai Power Machinery Co., Ltd. (a major engine manufacturer) and SUMEC Complete Equipment & Engineering Co., Ltd. (engineering company). The company is located in Jingjiang Xingang Economic Development Zone (Yangzhou City), just north of the Yangtze River.

### 2. Jiangsu Guoxin Rudong Biomass Power Generation Co., Ltd.

Website: [www.jsqx.net](http://www.jsqx.net)

The company is a biomass power project developer and among China's first companies engaged in straw burning power generation projects. The project in the city Rudong (in Nantong Municipality) was put in operation in July 2008. The company was established by the Jiangsu Guoxin Investment Group. Besides the biomass power plant in Rudong, the group has also started up projects in Huai'an, Siyang and Yancheng, all in Jiangsu Province.

In 2012, Jiangsu Guoxin Investment Group revealed that its 4 biomass plants have long been in the red. Some plants had to burn bark, wood scraps, rice husks and the refuse from medicinal plants, with straw accounting for only 20%.

### 3. Jiangsu Hualong Biomass Power Co., Ltd

Websites: <http://en.cdpe.com.cn/index.html>, <http://cnhlkj.com/>

This company is involved in biomass energy projects and is located in Yancheng, together with its sister company Jiangsu Hualong Environmental Protection Technology Co., Ltd. Both companies are subsidiaries of China Dragon Power Engineering Co., Ltd. from Heilongjiang Province.

### 4. Jiangsu Taihu Boiler Co., Ltd

Website: <http://en.taihuboiler.com/d269948112.htm>

The company develops and produces a wide variety of boilers, among which biomass boilers. The company is a part of a large conglomerate of Chinese companies from all over China, engaged in boilers and related business. The company is located in Wuxi.

### 5. Muyang Biomass Machinery Co., Ltd

Website: [www.muyangbiz.com](http://www.muyangbiz.com)

Design, production and installation of wide variety of machinery, among which biomass machinery. The company is a subsidiary of Jiangsu Muyang Group. For specific information about Muyang's biomass machinery, see [www.myfeedmachinery.com/index.php/muyang-biomass-machinery/](http://www.myfeedmachinery.com/index.php/muyang-biomass-machinery/)

### 6. Wuxi Huguang Industrial Furnace Co., Ltd

Website: [www.wxhuguang.com/english/company.asp](http://www.wxhuguang.com/english/company.asp)

Company is specialized in design and production of biomass gasification systems and heat treatment furnaces.

## 5. Challenges for the sector, as opportunities for Dutch companies

Despite strong growth of the sector in recent years, the Jiangsu biomass sector is still in its infant stage. Generally speaking, it hardly generates profit. At least 70% of the combustion power plants are reported to make long term losses, or depend heavily on government subsidies or intercompany funding. The biomass sector was mainly developed by Chinese companies, with limited expertise from abroad. This has resulted in a fragmented sector, with inadequate connections between farmers, logistic companies, power plants and the state grid.

More specifically, the main challenges are the following. After each challenge the opportunities for Dutch companies are mentioned.

### ***Challenge 1: Inadequate fuel supply***

A substantial part of the biomass power plants was forced to decrease production or close down due to lack of fuel, due to unstable supply and an incoherent collection system. Regarding supply of straw, a general assumption is that it should be supplied in a radius of 50 km. However, it is often sourced from a 100 to 200 km radius, causing high transport costs.

Due to high intermediate costs, the purchase price of straw is 4 to 6 times higher than the selling price of farmers. On average, the selling price is only 50 to 70 RMB per ton, which often does not cover the farmers' costs of reaping and transport. As a consequence, farmers often opt for burning or other methods of disposal.

In general terms, the position of the biomass power plants regarding the logistic chain of the agricultural waste can be considered as too passive.

**=> Opportunities for Dutch companies:** Offer support for development of a chain approach and intra-industry cooperation, in order to guarantee long-term and stable supply.

### ***Challenge 2: Inadequate connection with the power net***

The market mechanism for power transmission and distribution is inefficient, which causes relatively low financial returns for the electric power generated by biomass power plants.

**=> Opportunities for Dutch companies:** Arrange better coordination with the National Grid and explore possibility of direct power supply to end users.

### ***Challenge 3: Lack of sufficient management capability***

Biomass projects in China are often not approached holistically nor integrated across the different stages of a project, leading to inconsistencies between the design, specification, production, and operation processes. This often results in a system with poor quality and inefficiencies leading to low output and unacceptable financial returns.

**=> Opportunities for Dutch companies:** Support with designing the whole chain in the initial stage of a project.

### ***Challenge 4: Technological immaturity***

In many cases, the used technology is not the most advanced world wide available, while the technical requirements are actually very high. For example, in order to guarantee sufficient fuel supply, it is crucial that the power plants are able to use different kinds of agricultural waste as fuel and switch between these with ease.



Besides, the agricultural waste is often rather humid, so the plants should have the capacity to deal with this material. Meanwhile, the low oil prices and economic slowdown have put more pressure on the efficiency of the power plants.

**=> Opportunities for Dutch companies:** Supply advanced technology or redesign technology to make it suitable for the local circumstances, in order to make the production process cost-effective.

To make use of these opportunities, the Dutch government network of Embassy, Consulates and Netherlands Business Support Offices can offer support. They can give you information about local projects or connect you with local governments and companies.

## 6. Relevant trade fairs and conferences

### **China Renewable Energy Conference and Exhibition**

An annual event in the city Wuxi, in southern Jiangsu. In 2015, the event will take place from 5-7 November. Website: <http://en.crecexpo.com>

### **China International Biomass Energy Exhibition & Conference**

Held twice a year in Shanghai, in May and December.

Website: [www.biochina.org.cn/en/](http://www.biochina.org.cn/en/)

## 7. Relevant authorities and branch organizations

### **Jiangsu Provincial Commission of Agriculture**

Website: [www.jsagri.gov.cn](http://www.jsagri.gov.cn)

This commission is the provincial authority responsible for legislation, technological development and usage of biomass energy.

### **Jiangsu Key Lab of Biomass-based Green Fuels and Chemicals**

Website: <http://eng.njfu.edu.cn/info.php?id=130>

Research institute affiliated to the Nanjing Forestry University.

### **Jiangsu Power Design Institute Co, Ltd (JSPDI)**

Website: [www.jspdi.com.cn](http://www.jspdi.com.cn)

The institute is part of the China Energy Engineering Group and was established in 1960. In China it has a leading market position for high efficient, innovative, sustainable energy solutions. JSPDI has over 1.000 employees and has constructed over 250 power generators, with a total capacity of 40.000 MW.

### **China Renewable Energy Industries Association (CREIA)**

Website: [www.creia.net](http://www.creia.net)

CREIA was established in 2000 with support from the UN Development Program (UNDP). It serves as a bridge between authorities, research institutes and industry professionals, to support renewable energy development and give strategic advise to the Chinese government. CREIA brings together (inter)national project developers and investors, promotes technology transfer and raises awareness of renewable energy investment opportunities through an online Investment Opportunity Facility and regional networking and training activities. CREIAI now has

over 200 members from industries, academics, organisations and individuals.

## 8. Other online sources

### Netherlands Enterprise Agency (RVO)

Report about Biomass market opportunities in China, which can be found on:

[http://english.rvo.nl/sites/default/files/2014/06/Country%20monitor%20China%20-%20Final\\_April%202014.pdf](http://english.rvo.nl/sites/default/files/2014/06/Country%20monitor%20China%20-%20Final_April%202014.pdf)

### Asia Biomass Office

Website: [www.asiabiomass.jp/english/](http://www.asiabiomass.jp/english/)

Good source of information about research and projects in the field of bio energy in East Asia. The website is established and managed by the New Energy Foundation in Tokyo.

### European Union Chamber of Commerce in China

Website: [www.eurobiz.com.cn/bio-potential-eu-smes-chinas-biomass-sector/](http://www.eurobiz.com.cn/bio-potential-eu-smes-chinas-biomass-sector/)

Article about opportunities for Europeans SME's to enter the Chinese market of biomass energy.

### Liaoning Province Energy Resource Research Institute

Website: [www.kzsnv.com/en/newsinfo.php?id=382](http://www.kzsnv.com/en/newsinfo.php?id=382)

Study on current problems and countermeasures for biomass power industry in Jiangsu Province (English translation of study is available at NBSO Nanjing).



## Appendix: Overview of Jiangsu Province

Jiangsu Province is located along the east coast of China and the lower reach of the Yangtze Rivers. It is facing the Yellow Sea in the east, neighboring with Anhui Province to the west, Shandong Province to the north, Zhejiang Province and Shanghai Municipality to the south. Jiangsu is 2.5 times bigger than the Netherlands and it has a population of 79 million people, 6% of nation's total.



Jiangsu is economically one of the strongest provinces in China, with a GDP per capita of 12.049 USD (2013), the highest of all Chinese provinces. In 2013, its GDP reached 955 billion USD, accounting for 10% of the national total GDP, ranking second after Guangdong Province. The total import and export value was 550.5 billion USD, also second in China, with the Netherlands as the second largest trading partner in Europe.

As one of the birthplaces of Chinese traditional industries, Jiangsu is among the most important production bases for textiles, machine building, electronics, petrochemicals and building materials in China. Other sectors which play an important role nationally are the automotive industry, shipbuilding sector, pharmaceutical industry and light industry. Recently, the software and BPO industries, new energy industry, like solar PV and wind power, have grown rapidly. Jiangsu is attracting a lot of China's foreign investment. In 2013, the total realized foreign investment was 33.3 billion USD, ranking no.1 in the whole country. More than 400 companies listed in the Fortune Top 500 have already invested in Jiangsu. Well-known Dutch investors are Philips, Akzo-Nobel, Shell, DSM, Stork, NXP, Twentsche Kabel, Vopak Terminal, ARCADIS, Tebodin, KPMG, Randstad, VDL, KeyTec, etc.

The capital of Jiangsu Province is the city Nanjing, which has been capital of China in many periods in Chinese history. In recent years, the city strongly aims at developing emerging sectors, such as ICT, new energy and life sciences. However, the city Suzhou has economically surpassed Nanjing, mainly due to its proximity to Shanghai. Besides, the cities Wuxi, Changzhou and Nantong are of great importance.

The Netherlands Business Support Office (NBSO) in Nanjing supports trade and investment of Dutch enterprises in Jiangsu Province. Besides, since 1994 the provinces Jiangsu and Noord-Brabant have a sister province relationship, which covers governmental, cultural and economic relations.

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