

Development & Utilization of Biomass Energy and Related Supporting Policies in China

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1. There are Abundant and Various Biomass Energy Resources in China

- **Biomass resources which can be used as energy amount to 300 M Tce annually**
 - Among the annual production of 700 million tons of straw/stalk, 45%, or about 315 M tons(170 M Tce), can be used as energy fuel;
 - The annual reasonable used amount of forestry energy is about 160 million tons, equal to 90 million Tce;
 - Annual charge of industrial waste water in the whole country is about 23 billion tons, containing more than 5 million tons of BOD. By utilizing this, 9 billion m³ of biogas (about 8 million Tce) may be produced;

1. There are Abundant and Various Biomass Energy Resources in China

- Biomass resources which can be used as energy amount to 300 M Tce annually
 - Every year, 900 million tons of poultry and livestock excrement can be collected, equal to 160 million tons of dry materials.
 - 10 billion m³ of biogas (8 million Tce) can be produced in large and medium-size biogas plants
 - 5 billion m³ of biogas (4 million Tce) can be produced in household biogas digesters
 - Annual volume of garbage disposal in cities is 180 million tons, from which 18 million Tce of energy can be generated;
 - 10 million Tce of energy can be obtained from other resources (pasturage, energy crops, alga, waste water, etc.)

1. There are Abundant and Various Biomass Energy Resources in China

- Impact factors of biomass energy development
 - Biomass resources are renewable, their amount may vary from time to time;
 - Biomass resources are usually used for multiple purpose
 - Utilization of biomass energy has closed ties with environmental protection, e.g., returning fields to forestry;
 - The level of conversion technology of the biomass energy determines that of the biomass energy utilization .

2. At present, the amount of developed biomass energy in China is about 258 million Tce, most is utilized in traditional ways

- Annual utilization amount of biomass energy in rural areas amounts to 255 million Tce

-- Straw	330 million tons (141 million Tce)
-- Firewood	200 million tons (114 million Tce)

-- Key Technologies

Stoves	189 million including 47 million improved stoves and 19 million energy conservation Kang; 2.45 million improved stoves and 0.79 coal-saving Kang are popularized every year
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2. At present, the amount of developed biomass energy in China is about 258 million Tce, most is utilized in traditional ways

- Annual amount of biomass energy developed by new technologies

-- Family-sized Biogas Digesters

Family number	10.23 million
Annual increment	1.78 million
Total Output	3.7 billion m ³ / 3 million Tce

-- Large and Medium-size Biogas Plant

Pool volume / number	765.1 thousand m ³ / 1570
agriculture	425.1 thousand m ³ / 1351
industry	340.0 thousand m ³ / 209

-- Annual Biogas Production: 184 million m³ / 0.15 million Tce

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- Annual amount of biomass energy developed by new technologies

-- Gasification

Number of gas station	488
Family number	0.105 million
Volume of biogas	152 million m ³ / 24,000 Tce
Utilized Straws	100,000 tons

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- Annual amount of biomass energy developed by new technologies

-- Carbonization

Output	3,600 tons
Utilized Straws	9,300 tons

-- Briquette

Output	300 tons
Utilized Straws	400 tons

2. At present, the amount of developed biomass energy in China is about 258 million Tce, most is utilized in traditional ways

- Biomass only occupies a small percentage in the utilization of renewable energy
 - Amount : less than solar energy and small hydro power
28,000 MW small hydro power has been developed, equal to 33 million Tce per year;
Over 3.3 million Tce of solar heat and PV has been developed.
 - Speed: Lower than that of small hydro power, solar energy and wind energy

3. Future Biomass Conversion Technologies with Great Potentials

- Biomass is one of the safest and most stable renewable energies, which can be converted to different kinds of energy products.
- Power generation fueled by gasified biomass
 - the technology is matured
 - from the viewpoints of environment, safety and utilization mode, power generation and heating fueled by gasified biomass should be encouraged
 - main barriers: connection to the grid, electricity price

3. Future Biomass Conversion Technologies with Great Potentials

● Liquefied Biomass Fuel

- Liquid fuels such as ethanol and cracked oil are not only clean, but also a strategic measure to reduce our dependence on petroleum so as to guarantee the energy supply safety in China.
- At present, many countries are paying close attention to the technologies which using lignocelluloses (such as sawdust) to produce liquid fuels.

Biomass cracking and liquefaction

Producing ethanol by hydrolyzing and ferment

- MOST is supporting biogas cracking technologies to produce liquid fuels. Current pilot-scale experiment system can produce 600 tons of ethanol and 400 tons of cracked oil annually.

3. Future Biomass Conversion Technologies with Great Potentials

● From Biomass to Hydrogen

- There's no CO₂ emissions if we produce hydrogen by renewable energies
- Bio-technologies (alga and bacteria) are focused by the whole world
- MOST has finished the research of producing hydrogen by biomass. A demonstration system using biomass to produce and metal to store hydrogen has been established, which can produce 1,200 m³ hydrogen every day.

4. Supporting Policies

- **Due to the higher cost, renewable energies cannot be developed through market competition**
 - Related technologies is still under development. It needs large amount of investment and 20~30 years of time.
 - The scale is too small, and an mature biomass industry has not been formed
 - Supporting policies are quite necessary

4. Supporting Policies

- **There are already some local and regional policies, but supporting laws at macro level are absent**
 - State support to the development of technology
 - Investment subsidies, tax deductions, and waive of customs
 - Protective policies

4. Supporting Policies

- Environment and Resources Committee of China Parliament has made a plan to constitute *Law on Promoting Renewable Energies*

- Establishment of the “National Target Systems” by legal files
- Establishment and distribution of incumbency for the renewable portfolio system (RPS)
- Green certification, a combination of the government action and the market operation, will be a valuable securities, which can embody the environmental benefits, and can be traded and cashed in the market

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- Priority to enter the grid and production permission system
- Public bidding of concessions
- Promise to subscribe by free will (government purchase, volunteer subscribe)
- Increase investment to support the research, demonstration and development of technologies



Thanks for Listening!