

Status Quo and Prospect of Forest Biomass Development in Beijing



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Outline

- ☐ The development and utilization of biomass energy is imperative
- ☐ Potential resource and potential of forest biomass energy in Beijing
- ☐ Status quo of forest biomass energy development in Beijing
- ☐ Key problems
- ☐ Future development

林业生物质能源的开发利用势在必行

The development and utilization of biomass energy is imperative

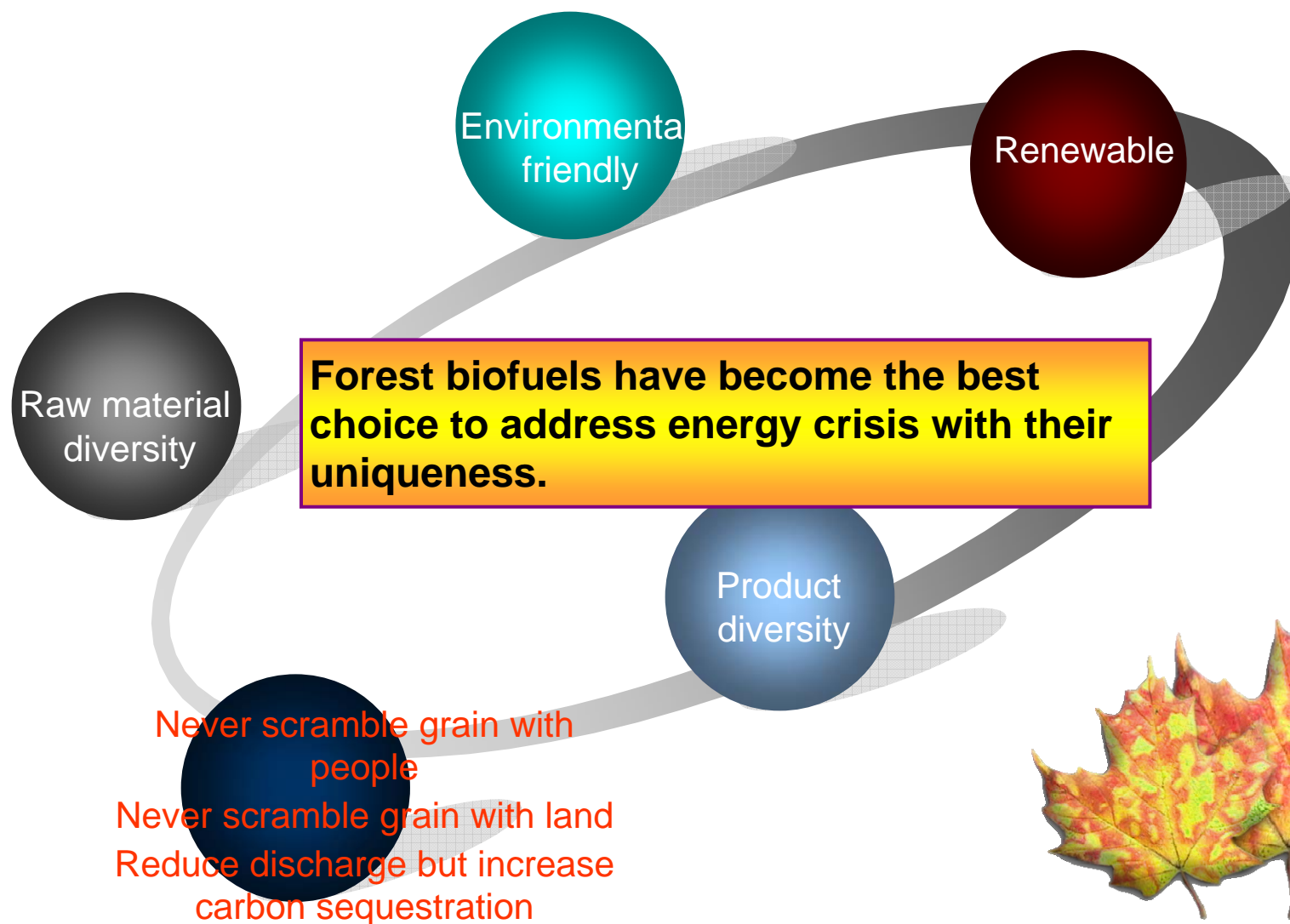


Current situation of world energy crisis

- ◆ Global coal resource can only support 230 years of exploitation, oil for 45 years and natural gas for 61 years.
- ◆ Since 1950s, three “energy crisis” occurred globally, causing great influence to world economy and triggering several wars
- ◆ Since 2002, world oil price entered into a new increasing period. In January 2008, world oil price broke US\$100, then experienced step-by-step increase until it came to US\$ 145.29 on Jul 3rd.
- ◆ On Jul 1st, Pan Jiwen pointed out in one speech made in China Foreign Affairs University, energy and food crisis are one of the “three global crises and challenges.”
- ◆ The International Energy Agency forecasted in the World Energy Outlook issued at the end of 2007 that the oil supply in international energy market will become more intense.
- ◆ Many scholars and politicians predicted: The world oil resource is running out, energy crisis is inevitable. Human being would face serious energy shortage in the near future if they failed to make great efforts on utilizing and developing various energy resources.



Biofuel has become the public-accepted choice to relieve energy crisis in the international society





All the countries are developing R&D and production of biofuels



US Department of Energy plans to produce over **12 million tons** of bio-diesel in 2010, and to replace **10%** fuel consumed by the country with biofuels in 2020. US Department of Agriculture announced to provide US\$ 4.4 million for 20 small enterprises for their development of **wood-based biofuels** utilization and new products.



In 2005, EU initiated **Biomass Energy Action Plan**, planning to produce at least **6 million tons** of bio-diesel in 2010, taking 2% of all fuels consumed by EU. In which, 5.75% transportation fuels will be replaced by fuel ethanol and bio-diesel, this percentage will be increased to **20%** in 2020.



Japan **began their research on biodiesel from 1995**. Currently, their annual bio-diesel production capacity has reached **400,000 tons**. Japanese Government published **Comprehensive Development Strategy of Biomass Energy Development** in Japan, saying that Japan will generate **330,000 kw** power by biomass energy in 2010 and use **670,000 kl** bio-heat.



Current situation of China's energy crisis

- ❑ China lacks of energy resources, the exploitable reserves of oil and natural gas per capita only account for 7.7% and 7.1% of world average level, even the relatively rich coal reserve only equals to 58.6% of world average level.
- ❑ China's coal resource can only be exploited for 83 years, oil for 15 years and natural gas for 30 years.
- ❑ China's energy consumption keeps increasing with the development of economy and society, and has become the world second larger energy consumption country in 2006. Meanwhile, total energy import has increased to the world second due to heavy dependence on foreign energies.
- ❑ The energy consumption structure is unreasonable and ecological environment takes high pressure. Among the on-off energy consumptions, coal accounts for 70% or so, energy structure still focuses on coal, causing more and more serious environmental pollution.
- ❑ International environment is complex and ever-changing, it becomes more and more difficult to utilize improved energies.



Developing biomass energy suits for China's situation

“Biomass energy is an important renewable energy, developing and utilizing biomass energy are important measures to increase energy supply, protect environment and realize sustainable development.”

--Chen Deming, the former Deputy Director of the National Development and Reform Commission on the **National Biomass Energy Development and Utilization Conference** in August 2006

China has **a large population but limited lands**, forestry **takes leading position** for biomass energy and is of obvious advantages and characteristics. To develop forestry and increase forest biomass energy supply are of irreplaceable significance to maintain energy safety, recover eco-system and advance rural economic development.



China actively cultivates and develops biomass energy industry

Chinese Government emphasizes the development of biomass energy industry

Laws and regulations

- On Jan 1st 2006, the **Renewable Energy Law of the People's Republic of China** came into effect, followed by more than 10 detailed rules on implementation from relevant departments.
- In Jun 2007, **China National Climate Change Program** was issued, including renewable energy development as biomass energy, wind energy and solar energy.
- In Dec 2007, **China's Energy Condition and Policies** whitepaper listed renewable energy development as an important part of national energy development strategy.
- In Jun 2008, the officially issued the **Central Committee of the CPC and the State Council, Opinions on Promotion of Collective Forest Tenure System Reform** supports "biomass energy forest" development.

Objective of planning

- The **Middle and Long-term Renewable Energy Development Plan** points out: **to 2010**, biomass power generation will reach 5.5 million kw, liquid bio-fuels will reach 2 million tons, solid formed bio-fuels will reach 1 million tons, the annual utilization of biomass energy will account for 1% of energy consumption; **to 2020**, the biomass power generation capacity will reach 30 million kw, liquid biofuels will reach 10 million tons, solid formed biofuels will reach 50 million tons, the annual utilization of biomass energy will account for 4% of energy consumption.
- In Oct 2006, the National Energy Forest Construction Plan and the Eleventh Five-year Bio-diesel Raw Material Forest Base Program were approved, determining China will establish **12.5 million mu** of demonstration energy forest bases during the eleventh five-year plan period and will cultivate **200 million mu** of energy forests **by 2020** to meet the demand on raw material for the production of **6 million tons of biodiesel** and **15 million kw power generation**.

Guarantee measures

- In 2006, the **Interim Measures on Management of Special Fund for Renewable Energy Development** and **Opinions on Implementation of Financial and Taxation Supportive Policies for Biofuel and Biochemistry Development** were carried out, with biomass energy with non-grain raw material being placed on the first position of special fund, financial and taxation policies.
- In 2007, the Ministry of Finance carried out **Interim Measures on Control of Subsidies for Biofuel and Bio-chemical Raw Material Bases**, each mu of raw material base (energy forest) for biomass energy development will be subsidized by RMB 200 yuan from national financial department.
 - The SFA set up **Forest Biomass Energy Leading Group** headed by the Vice President, Mr. Zhu Lieke and **established office** on Jul 28th 2005.
 - Forest Biomass Energy Offices were established in 11 provinces as Hebei, Shanxi, Shaanxi, Inner Mongolia, Liaoning, Jiangsu, Yunnan, Hubei, Sichuan, Jiangxi, Fujian and Daxing'anling Forestry Group.

All the works are implemented in an orderly manner

- The SFA conducted researches and investigations on current situation and development potential of forestry waste biomass and energy forest resources, based on which SFA presented their basic idea on cultivation and development of China's forest biomass energy resources to the Energy Bureau of National Development and Reform Commission.
- In Jul 2008, the SFA's Report on Strategic Research on Forest Biomass Energy Development was demonstrated and justified by experts.
- The forest biomass energy industry is developing vigorously across all provinces and cities.



Developing forest biomass energy is a necessity for urban development of a capital

- ① The urban function positioning of Beijing: The capital of China, international city, famous cultural city and livable city;
- ② Beijing is a city lacking of energy resources and a city consuming large quantity of energy resources. As the economy develops, the conflict between energy supply, environmental protection and economic development will become more and more obvious;
- ③ Energy depends heavily on import, consumption structure is unreasonable, overusing coals and causing high pressure on eco-environment;
- ④ There are rich terrestrial heat, solar, biomass and wind energies, but the use of new energy generally does not meet the development of Beijing;
- ⑤ The Outline of the Eleventh Five-year Plan for National Economy and Social Development of Beijing proposes to actively develop recycling economy and establish environmental friendly city.
- ⑥ The Plan on Energy Development and Energy Saving during the Eleventh Five-year Plan Period for Beijing emphasizes: To promote development and utilization of new energy and renewable energy, the development of terrestrial heat energy, solar energy, biomass energy and wind energy shall be given priority.

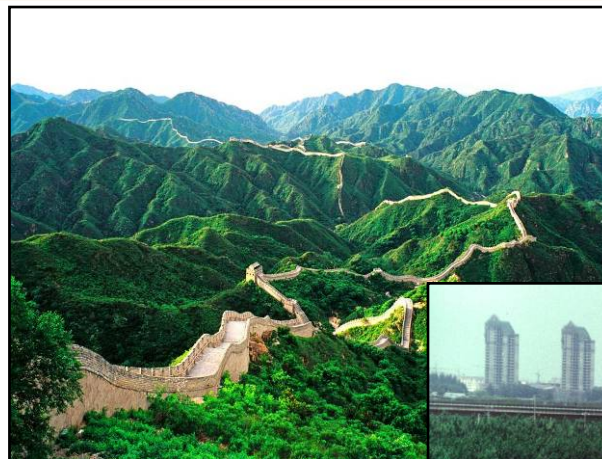
北京市林业生物质能源潜在资源及发展潜力

Potential resource and potential of forest biomass energy in Beijing



Status quo of forest biomass energy development in Beijing --Forest resources

By the end of 2007, the forestland area has reached 1.05 million hectares, forest tree coverage has reached 51.6%, forest coverage has reached 36.5%, forest tree coverage in mountainous areas reached 70.49%; greenery coverage reached 43%. At present, the three green eco-barriers in mountainous area, on plain and urban green belt area have basically been created. Beijing took on beautiful appearance with green mountains and vigorous forests.





Status quo of forest biomass energy development in Beijing --Usable biomass resources

In production practice, the raw materials of biomass energy mainly include “three residues” of firewood forest and oleaginous species’ fruits after forestry production, branchwood and undersized trees created in levelling stubble, fruit tree trimming, fostering and thinning-out process, together with residues of stem cutting of forest seedling and trimming of urban greenery.

According to the data published by the National Development and Reform Commission at the beginning of 2008, Beijing can produce about 2.13 million tons of wood biomasses each year, including 600,000 tons of residues after fruit tree trimming, 170,000 tons of residues from seedling management and 1.36 million tons of residues from forestry production, fostering and thinning-out.

In addition, there are large amount of usable waste biomasses from urban gardening and greening each year. The statistics show that the eight urban districts produced 1.67 million tons of wastes from gardening and greening in 2007.

We think, in general, the usable waste biomasses are around 3 million tons or so each year in Beijing. According to estimation, 5 tons of wood biomass can replace 1.5 tons of coarse oil after processing, 1.5 tons of wood biomasses can replace 1 ton of standard coal. The 3 million tons of usable wood biomasses each year in Beijing can replace 900,000 tons of coarse oil and 2 millions of standard coals.



Development potential analysis of biomass energy in Beijing --Natural resource aspect

Land resource potential. By the end of 2008, there are still 412,000 mu of bare mountains suitable for afforestation. For marginal land resource, the research in 2006 showed that 76,000 mu wasted mineral mountains needed ecological rehabilitation. As the close-down of wasted mines is more and more emphasized, this figure will increase in the future. According to the Desertification Prevention and Control Plan of Beijing during the Eleventh Five-year Plan Period, there are still 1.65 million mu desertified and potentially desertified lands to be controlled. According to the Office of Desertification Control, there are still 100,000 mu of gravel pits to be controlled.





Development potential analysis of biomass energy in Beijing --Natural resource aspect

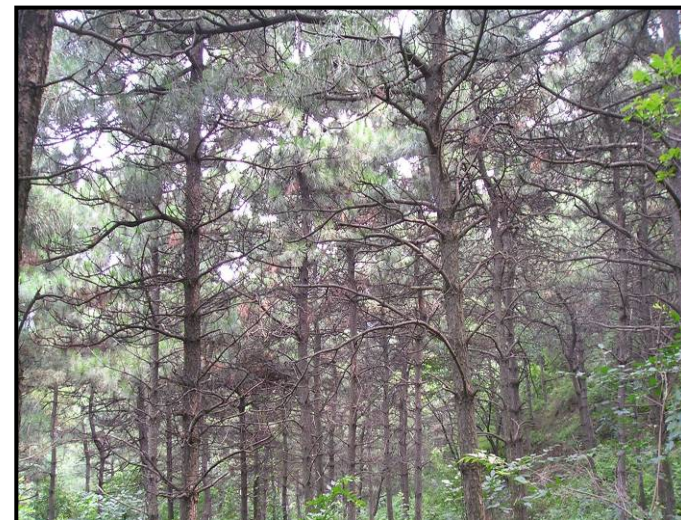
Species resource potential. There are many energy species in Beijing, many of them can be used to produce solid formed fuels, including arbors as robur, acacia, poplar and willow, and shrubs as vitex negundo, seabuckthorn, prunus davidiana, Chinese Tamarisk Twig and amomorpha fruticosa. These species are characterized by stable growth, strong adaptability, high biomass and large energy density, which are suitable for developing compressed biofuels. Woody oleaginous species—Shinnyleaf Yellowhorn and Chinese pistache are distributed in the form of natural falling seeds and artificial cultivated seedlings. Although being poor in quantity, their biological and ecological characters appear well, showing great potential.






Development potential analysis of biomass energy in Beijing --Demand potential of gardening and greening development

At present, the main construction project of urban green belts and the construction project of green eco-barrier on plain have basically finished. Over 90% bare mountains suitable for afforestation in Beijing have been covered with forests. However, forests are still unequally distributed in quality, unreasonable in structure, poor in forest stand quality and low in forestland productivity. Therefore, Beijing initiated and implemented a series of forest management projects including middle and young-aged forest fostering, poor-quality and low-efficiency forest upgrade and forest health management. Waste biomasses produced by these projects and urban gardening and greening each year need to be properly digested, developing forest biomass energy is an important way to utilize them as an innocuous resource.





Development potential analysis of biomass energy in Beijing --Demand potential of rural development and urban environment construction

Demand potential of rural development.  Currently, the new rural socialist countries in capital area is in a key construction period, the suburb area has huge demand for clean renewable energy. Forestry wastes can be used for farmers' daily life and production after being compressed or gasified, which can efficiently improve utilization efficiency and reduce pollution caused by direct combustion of biomass. Thus it is of great significance to realize the objective to construct “developed, clean and well-off” new countryside.





Development potential analysis of biomass energy in Beijing --Demand potential of rural development and urban environment construction

Demand potential of urban eco-environment construction. Although Beijing keeps optimizing its terminal energy consumption structure, the percentage of coal and coke still accounted for 20%. Coal is heavily used in social production and daily life, causing increasingly serious greenhouse gas emission, flue and dust pollution, as well as high pressure over urban eco-environment.





Development potential analysis of biomass energy in Beijing --Potential of R&D, production capacity



R&D potential. There are numerous scientific research institutes in Beijing, where professionals are gathered, this provides great convenience and advantages for relevant studies on forest biomass energy industry.



Production potential. Beijing is of comparatively positive advantages on forest fostering skill and model, forest management idea and means, as well as professional teams of gardening and greening. In addition, as the capital, Beijing also has rich human resources.



北京市林业生物质能源发展现状

*Status quo of forest biomass energy
development in Beijing*



Status quo of forest biomass energy development in Beijing (I)

- ✿ In 2004, Beijing Municipal Development Commission implemented a demonstrative program of production and application of pelletized bio-fuels, dealing with R&D of pelletization equipment, professional stoves and key techniques. The demonstration result in winter of 2005 showed the pelletized biofuel can absolutely replace coal.
- ✿ In 2006, Beijing Municipal Environmental Protection Bureau implemented biomass gasification program in Daxing, which pyrolyzes forestry wastes into biomass gas with alkyl as main content by carbonization technology, and supplies the biomass gas for farmers' use in cooking.
- ✿ Beijing Municipal Science and Technology Commission implemented a demonstration project of development and application of rural biomass energy technology, which starts from increasing biomass stove efficiency, reducing biomass pellet price and stove price, as well as developing centralized biomass gasification to support biomass technology R&D, demonstration and promotion in Pinggu, Fangshan, Huairou and Yanqing, and obtained favorable result.





Status quo of forest biomass energy development in Beijing (II)

Program overview

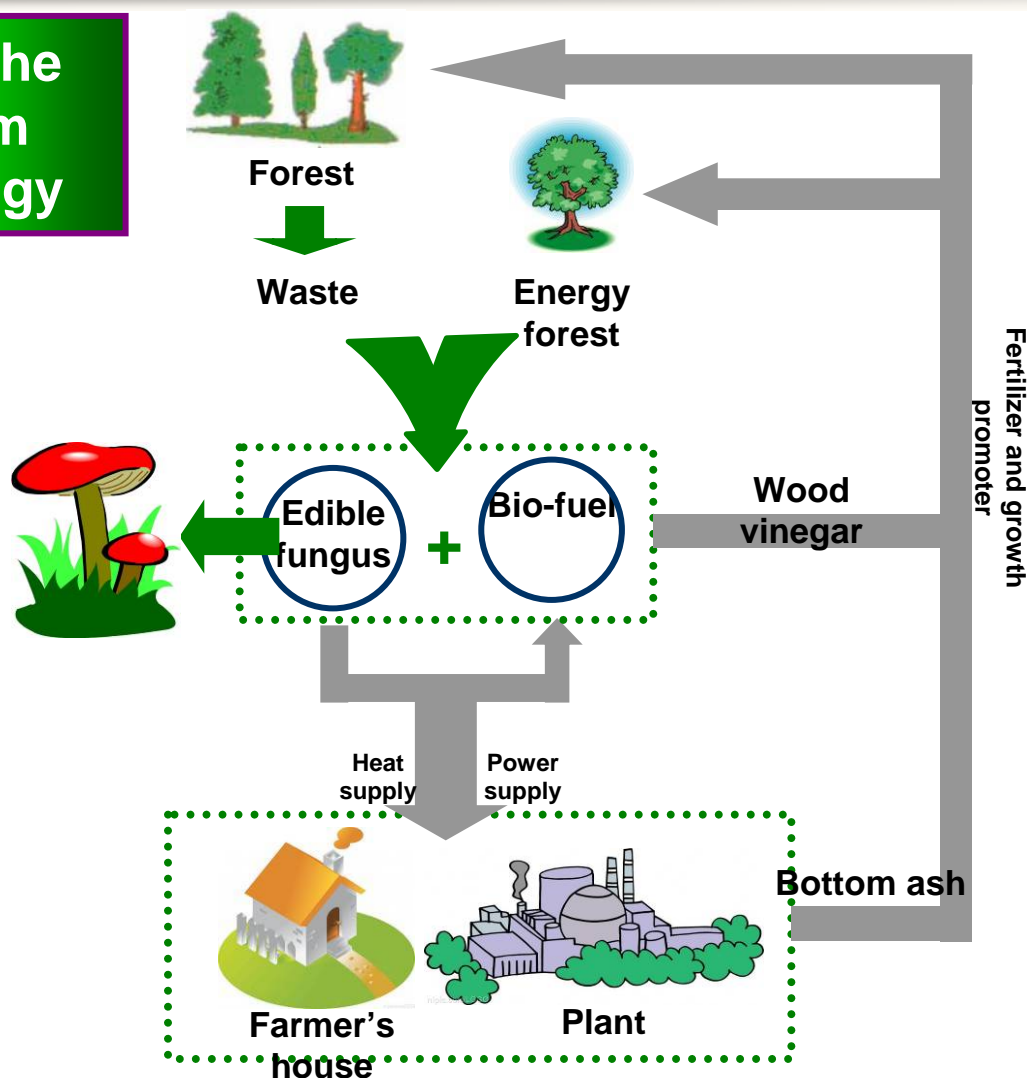
In 2008, Beijing Municipal Bureau of Parks and Forestry initiated and implemented two demonstrative programs of forestry biomass energy, namely they are Study on R&D, Utilization Technology of Forestry Biomass Energy and Demonstration of Forestry Recycling Economy, Recycled Utilization of Biomass Energy Materials and Study on R&D of Solid Forestry Economy.

These two programs efficiently used wastes produced in the forestry production and management process in Beijing, turning “waste” into “treasure” and aiming at developing new energy and recycling economy, as well as speeding up the change of economic growth pattern of Beijing. The programs used wastes of forestry production and management (including wastes from forest fostering and management, fruit tree trimming and crop straws) as main raw materials in study and demonstration of agro-forestry wastes development and utilization technology.



Status quo of forest biomass energy development in Beijing (III)

Flow of the program technology



The best
explanation of
recycling economy



Status quo of forest biomass energy development in Beijing (IV)





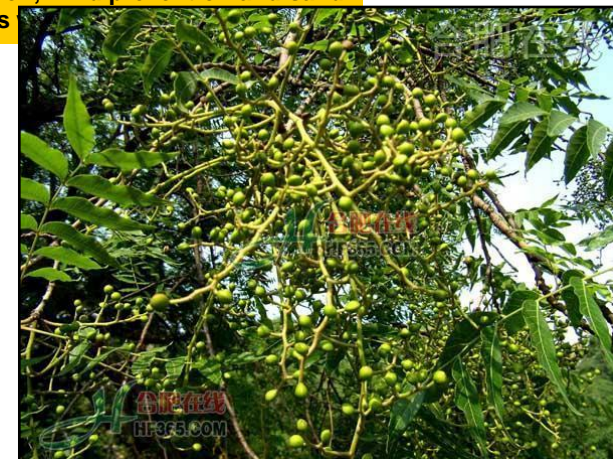
Status quo of forest biomass energy development in Beijing (V)

Program output

1. Established a 200-mu demonstration base of shinyleaf yellowhorn energy forest cultivation in Fangshan, making material preparation for construction of energy forest in Beijing.
2. Constructed 5 demonstration bases of solid fuel production and processing by agro-forestry wastes in Changping, Daxing, Fangshan, Pinggu and Yanqing, by which to introduce and promote production equipment and technology of patch fuel made by biomass under constant temperature, increasing combustion heat of agro-forestry wastes to 4800 ~ 6300 kcal/kg from usual 4000 ~ 4800 kcal/kg.
3. Established 2 production and processing demonstration bases of edible fungus with forestry wastes as raw material, upgrading edible fungi planting to bi-seasonal from uni-seasonal in year.



The shinyleaf yellowhorn is suitable to live in Beijing, its seed contains 45% ~ 50% oil and its seed kernel contains 70% oil. It is an important woody oleaginous species and also an important species for afforestation on bare mountains, water and soil conservation, wind prevention and sand fixation, as



Chinese pistache is local species of Beijing, its seed contains 35.05% oil, and seed kernel contains 56.5% oil. It is an important woody oleaginous species and also leading species of water and soil conservation, as well as ornamental species.



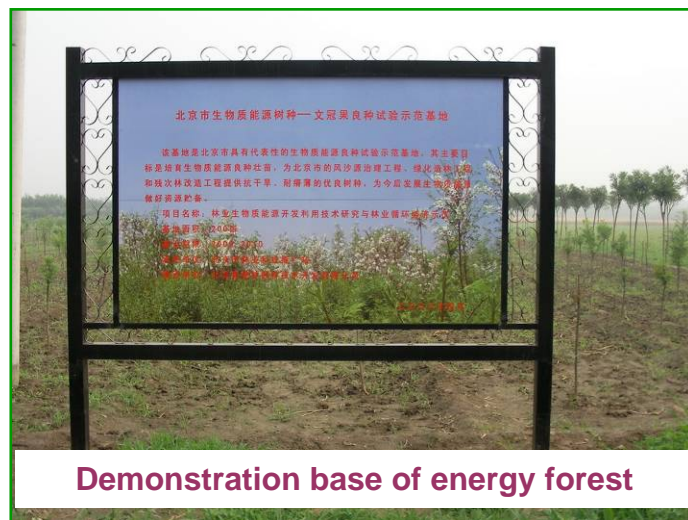
Status quo of forest biomass energy development in Beijing (VI)



Production and processing demonstration base of solid formed fuel



Processing demonstration base of edible fungi



Demonstration base of energy forest



Fruit and seeds of shinyleaf yellowhorn

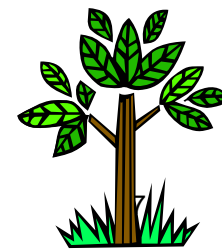
存在的主要问题

Key Problems



Key problems existing in forestry biomass energy industry development of Beijing

- ◆ Insufficient understanding and emphasis;
- ◆ Lack of capital and policy support;
- ◆ Absent of prophase research and development planning;
- ◆ Lack of efficient operation mechanism and model;
- ◆ Limited industrial expansion range and superficial research.



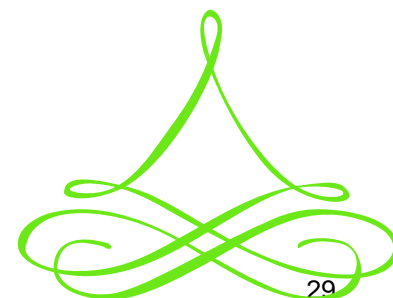
今后的发展思路

Future Development



Thinking on development of forestry biomass energy industry of Beijing

- ❑ Conduct research and assessment over status quo of citywide forestry biomass energy resources asap.
- ❑ Carry out studies on introduction, selective fostering, propagation and cultivation of improved species of energy tree species.
- ❑ Cultivate energy forest by large scale.
- ❑ Emphasize solid formed fuel in development and combine other methods.
- ❑ Establish and complete collection, storage and transportation system of forest biomass resource.
- ❑ Increase scientific and technological investment, improve industrialization and cut down production cost.
- ❑ Formulate industrial support policy and increase capital support.
- ❑ Accelerate research and formulation of forest biomass energy industry development plan of Beijing and industrial standard.
- ❑ Study industrial development pattern in-depth and promote leap-forward development of forest biomass energy industry.
- ❑ Establish and complete industrial management and service agencies, reinforce the cultivation of talent team.



Thank you!