

EUROPEAN BIOENERGY TECHNOLOGY FOR THE EXPLOITATION OF THE HUGE AGRI-FORESTRY RESIDUES POTENTIAL IN CHINA

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ABSTRACT: Following the “Europe-Asia Cooperation Strategy for Energy”, there are three objectives which need to be considered in respect of energy co-operation between Europe and Asia: ★ strengthening the security of supplies of Asia and Europe ★ participating in Asia’s developing energy market and ★ protecting the global environment. In China, modernised biomass technology has great potential to provide improved energy services based on agri-forestry residues, above all in rural areas and accordingly it represents an emerging market for European bio-energy technology. The use of biomass for cooking, combined heat and power (CHP) generation, digestion, gasification, etc. addresses multiple social, economic and environmental bottlenecks that now constrain local development. This project can help to provide cleaner, more efficient bio-energy services to support local development, promote environmental protection, stem the use of coal as a home fuel, and improve the living conditions of rural people, especially women and children who currently face air pollution associated with inefficient indoor burning of agricultural residues. The aim of the proposed action is to elaborate a Market Place Monitoring studying the market conditions for European bio-energy technology as e.g. biomass processing and treatment and biomass conversion for the exploitation of the huge biomass residues Chinese market in order to provide information and assistance to companies from all over Europe in their evaluation and decision-making on the Chinese market and to identify future investment and cooperation opportunities. The Market Place Monitoring project is aimed at addressing and satisfying the needs of both - European manufacturers and Chinese customers in order to prepare durable and successful business co-operations between European and Chinese companies in the bio-energy technology. It should bring together market players in order to guarantee maximum results in terms of information exchange, discussion of possible co-operation strategies and first co-operation agreements.

KEYWORDS: agricultural residues, biomass residues, biomass utilisation, socio-economic aspects

1. IDENTIFICATION OF PERCEIVED NEEDS AND CONSTRAINTS IN THE TARGET COUNTRIES AND SECTORS

China is a rapid developing agricultural country facing the double pressure of economic growth and environmental protection for a sustainable 21st century. The transformation of traditional ways of energy production and consumption and the exploitation and utilisation of the large amount of agro-forestry biomass residues presents an opportunity to stand this double pressure. Bio-energy as a significant and clean energy source would contribute to a sustainable development in China, without sacrificing environmental quality.

In fact,

- China has a population of approx 1.3 billion inhabitants, 80% of which lives in rural areas. The annual rural energy consumption is more than 600 million tons coal equivalent, approx. 70% of that amount comes from biomass resources.
- In China, 65 million people live without electricity; 75 million bear shortages of cooking fuel; and 120 million people face the threat of desertification. In addition, inappropriate exploration and utilisation of biomass energy caused ecological deterioration, deforestation and soil erosion.
- In areas with rapid economic growth, farmers switch to commercial energy sources such as coal, oil, and

electricity. Large amounts of crop straws and stalks, previously used as energy source, are now directly burned in the fields, generating great environmental problems. Therefore, the need to transform these residues in a convenient utilisable product like e.g. pellets, briquettes, etc. is high.

The project addresses the whole bio-energy chain from biomass provision to biomass conversion. Compaction technology is a critical step for pre-treatment of all kind of agro-forestry residues for long term storage, for economic transportation and for efficiently making those utilisable in modern conversion and utilisation systems as e.g. water/space-heating systems, high efficient low-emission cooking and heating stoves, gasification, carbonisation systems, etc.. Joint co-operation efforts between Europe and China in this area will help to promote the development of bio-energy in China and its deployment towards a sustainable future. For example:

- compaction technology able to convert the huge amount of agricultural residues of approx. 200 million tons/year and forestry residues of approx. 25 million tons/year in more useful and convenient form,
- carbonisation technology to convert high density pellets in charcoal,
- gasification technology to convert pellets and briquettes in L.H.V. gas. Pellets, briquettes, charcoal, L.H.V. gas could cover the present shortage of cooking fuel of 75 million people living in rural areas of China. Several European companies are well experienced in the field of bio-energy related technologies and application and their strong willingness to collaborate jointly with China for bio-energy development in China will assure an effective and successful realisation of the presented project.

2. IDENTIFICATION OF TARGET GROUPS AND ESTIMATION OF POSSIBLE NEEDS

The main target groups addressed by the proposed

action are :

- Private sectors as e.g. industry, SMEs working within the concerned business segments willing to do business in China
- Institutions engaged in design, implementation, and management of bio-energy projects
- Governmental and financial institutions on European as well as international level
- Chinese rural population
- Chinese farmers and agricultural associations

The beneficiaries and needs satisfied will be various within this project. This market place monitoring project is not an end in itself but a means for improving the chances of selecting a sound and profitable strategy for European companies interested in cooperation with China.

3. REASONS FOR THE SELECTION OF THE TARGET GROUPS AND ACTIVITIES

According to statistics of 1995, the resources of straw and stalk in China amounted to about 604 million tons, equal to 400 MTCE. Much of these straw and stalk resources are used for cooking and heating in rural households, most at low efficiency. Large amounts of the remaining crop straws and stocks are directly burned in the field or dumped, the quantity of which are estimated at around 200 million t/year.

Although China is developing fast from a rural and agricultural society to an urban industrial society, the rural population (80% of the total national population) remains dominant. Straws and stalks are widely distributed and available in all of the regions, but difficult to transport and use without compaction pre-treatment.

The following table shows the fuel used in relation to the income.

End use	Household income		
	Low	Medium	High
Household			
Cooking	Wood, residues, dung	Wood, charcoal, dung, kerosene, biogas	Wood, charcoal, coal, kerosene, biogas, LPG, electricity
Lighting	Candles and kerosene	Candles, kerosene, gasoline	Kerosene, electricity, gasoline
Space heating	Wood, residues, dung	Wood, charcoal, dung	Wood, charcoal, dung, coal
Other appliances	Batteries (if any)	Electricity, batteries	Electricity, batteries
Agriculture			
Tilling	Human	Animal	Animal, gasoline, diesel
Irrigation	Human	Animal, wind pumps	Diesel, electricity
Post-harvest processing	Human, sun drying	Animal, water mills, sun drying	Diesel, electricity, solar drying
Rural Industry			
Mechanical tools	Human	Human, animal	Human, animal, diesel, electricity
Process heat	Wood, residues	Coal, charcoal, wood, residues	Coal, charcoal, wood, kerosene, residues
Transport			
Motive power	Human	Human, animal	Human, animal, diesel, gasoline

Taking into consideration that in China approx. 200 Mio people are living in households having a budget of less than 1 dollar per day – therefore living in the situation mentioned in column low income – the vast resources of agri-forestry residues and the available European bio-energy technology – able to give an important contribution to sustainable development and overcoming social, economic and environmental problems – are most convincing reasons for this initiative and the selected target group. And, the Chinese market is a big business opportunity for European bio-energy technology companies.

4. RELEVANCE OF THE PROJECT TO THE TARGET GROUPS

Bio-energy systems have a wide range of potential socio-economic and environmental impacts. First, because bio-energy is land intensive – producing a large amount of energy requires a large amount of land. Second, bio-energy is labour intensive and acquiring biomass feedstocks involves a large amount of typically low-skilled labour. If well designed, the project will contribute to sustainable livelihoods and help address environmental problems such as land degradation or agri-forestry residues disposal.

Selected Indicators of socio-economic sustainability of the project for the target groups

Category	Impact	Quantitative indicators, based on assessment of:
Basic needs	Improved access to basic services	Number of families with access to energy services, quality reliability, accessibility, cost.
Income generating opportunities	Creation or displacement of jobs, livelihoods	Volume of industry and small-scale enterprise promoted, jobs/\$ invested, jobs/ha used, salaries, seasonality, accessibility to local labourers, local recycling of revenue, development of markets for local farm and non-farm products.
Gender	Impacts on labour, power, access to resources	Relative access to outputs of bio-energy projects. Decision-making responsibility both within and outside of the project, changes to former division of labour, access to resources relating to the project activities
Land use competition and land tenure	Changing patterns of land ownership. Altered access to common land resources. Emerging local and macroeconomic competition with other land uses.	Recent ownership patterns and trends, price effects on alternate products, simultaneous land uses (food-feed-biofuels production etc.)

5. SUMMARY

The scope of this project is to repeat and enlarge this type of co-operation introducing many more EU biomass pre-treatment, conversion, utilisation technologies. The common business can therefore sustain a significant expansion of this co-operation activity in rural areas of China.

This project will assess the Chinese market potentialities for biomass compaction, conversion and application technology – current status, market potential – and the attractiveness for market entry. Analysis a market is crucial to developing sound objectives and strategies. This project will inform European bio-energy technology industry about the business potential and invest opportunities in the Chinese market.

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