Biofuels in China: Strategies and some implications

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12 January 2010
IGIDR-IGES Joint Session
International Symposium on a Sustainable Future (ISSF-2010)
Mumbai

Renewable energy policies in China

China has mapped out the possible sources of renewable energy including biofuels and is implementing comprehensive plans under the renewable law

- **The majority (approximately 70 percent) of China's primary energy from abundant domestic coal**
- **The majority of the remainder from oil (a half imported)**
- **Renewable Energy Law enacted in 2005**
- **Five-Year Plan (2005-2010) Renewable Energy Development Plan in 2008**
  - **RE share in 2006: about 8% → Target shares: 10 percent by 2010 and 15 % by 2020**
- **Development targets:**
  - **Increase in renewable energy generation and its share**
  - **Provision of electricity and energy necessary for daily lives (gas and heat)**
  - **Development of renewable energy technologies and industries**

Biomass utilization

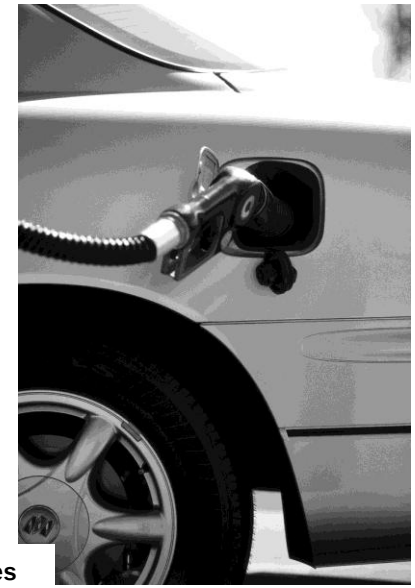
Biomass utilization in China is already progressing nation-wide except for liquid form

- **Power and heart generation from solid (pellets made of timber wastes) or gas (methane from livestock wastes)**
- **Rural electrification: already over 98 percent in rural**
- **Rural household biogas development: over 26 million households where electricity or other sources of energy not readily available**
- **Third largest bioethanol producer in the world (FAO 2008*), yet available only to limited areas in China where biofuels are produced and distributed**

***: FAO.2008. The State of Food and Agriculture. Rome, FAO.**

Transport sector

- Increased demand for gasoline from rapid increase in vehicle ownership
  - The number of passenger vehicles tripled between 2000 and 2006 with continuous increasing rate
- Total gasoline and diesel sales in 2006 by the two state-owned petroleum companies: 56.6 million and 121.5 million, respectively
  - Biofuels have negligible effect in reducing China's oil consumption nor enhancing energy security (GSI 2008*)
- Rapid development in both hybrid gasoline-electric and electric vehicles
  - Power grid development across the country



*: GSI. 2008. Biofuels - At what cost? Government support for ethanol and biodiesel in China. Geneva, Global Subsidies Initiatives of the International Institute for Sustainable Development.

Bioethanol production and policies

Bioethanol from food was capped and its successors are not off the ground yet.

- **Estimated production in 2008: 1.55 million tons**
  - **Of which 1.42 million tons from corn and wheat produced at the four designated state-owned plants**
  - **Originally started with recycling stale grains**
- **Since 2007 “no fuel from food” due to concerns about food price**
- **Bioethanol blending mandates (E10) in 10 provinces**
- **Consumption tax (5%) on bioethanol waived; value-added tax (17 percent) refundable to producers; and direct subsidies to biofuel plants**
- **Seeking for alternative feedstocks**
  - **Cassava (non-food feedstock) in Guangxi province (South of China)**

Cassava field in Guangxi province (October 2009)

Biodiesel production and policies

Biodiesel production is still limited to small operations but a large-scale production is under way.

- **Reported production in 2007: about 300,000 tons**
  - **A net importer of vegetable oil**
  - **Mainly from recycled cooking oil by many small-scale operation**
  - **Larger scale production is underway with large Chinese companies' investment**
- **Jatropha: one of the most promising feedstocks**
  - **Southwest region**
- **Biodiesel promotion policies still under development**
  - **No blending mandate**
  - **Neither tax incentives**
  - **A few direct subsidies (in the case of jatropha for forestry management)**

Jatropha fruits in Yunnan province (December 2008)

Implications in the agriculture sector

For the biofuel industry to grow in a sustainable manner, whether or not the agriculture sector can provide stable biofuel feedstock supply holds a key and in particular natural resources management and labor availability seem crucial.

- **Limited availability of marginal arable land, fragmented land**
  - **Estimated at about 1 percent of currently cultivated land for biofuel feedstock in 2012 (Huang, Qiu et al. 2008*)**
- **Limited water availability**
  - **Meeting the biofuel production target could cause a serious problem in northern provinces (Yang, Qiu et al. 2008**)**
- **Possible labor shortage**
  - **As in the case of jatropha production in Yunnan province**
- **Seeking for additional benefits such as sales of by-products and improved materials recycling**
  - **E.g. starch from cassava processed into a higher value product**

***: Huang, J., H. Qiu, et al. 2008. Strategies and options for integrating biofuel and rural renewable energy production into rural agricultural for poverty reduction in the Greater Mekong Subregion: a case study of China. Manila, ADB.**
****: Yang, J., H. Qiu, et al. 2008. Fighting global food price rises in the developing world: the response of China and its effect on domestic and world markets. Agricultural Economics 39 (supplement): 453-464.**

Jatropha production in Yunnan province

- As an afforestation effort managed by the forestry department
- Additional opportunity for income generation
- Planted on unutilized hillside (neither on farmland nor existing forests)
- Approximately 50,000 ha in 2007, aiming at 667,000 ha
- Labor input for the production
  - Labor-intensive work: hole-digging for planting jatropha, planting, and weeding so far
  - Already dependent on hired labor (approximately 40% of total labor needed for jatropha production)
  - An increase in labor demand for harvesting is anticipated as trees mature
- Profits from seedling sales at the moment
- “Wait and see” attitude of farmers because of great uncertainties of future jatropha market price

Jatropha planted hillside (top) and seedlings (bottom) in Yunnan province (December 2008)

Implications of state-owned companies

- **Production and distribution dominated by a few large state-owned companies**
  - **COFCO (food processing and trading, the China's largest), Sinopec and PetroChina (petroleum and its distribution), etc.**
  - **Limited participation by foreign investors**
  - **Ensuring limited competition for existing producers (Huang, Qiu et al. 2008)**
- **Advantages**
  - **Financial base of these large state-owned companies**
  - **Control of quantities both demanded and supplied**
- **Disadvantage**
  - **Uncompetitive and inefficient market**

Implications of subsidies

- **The burden of subsidies stemmed from the government's support on domestic fossil fuel price (USDA 2008*)**
  - **Offering subsidies to state refineries on gasoline and diesel production**
  - **Domestic gasoline and diesel prices have been lower than international prices by a range of 30-60 percent (USDA 2008)**
  - **Pricing regime discourages the private sector's investment (GSI 2008; USDA 2008)**
- **In principle, many reports against subsidies**
  - **"Avoid supporting biofuels through distortionary incentives that might displace alternative activities with higher returns" (World Bank 2007**)**
  - **"Direct financial incentives could also be considered with clear 'sunset' provision and/or subsidy caps built in from the start" (UNCTAD 2008***)**
  - **Some degree of subsidies likely, but the question is the size and duration of subsidies (ICRAF China 2007****)**

***: USDA. 2008. China Bio-fuels Annual 2008. GAIN Report Number CH8052. Washington.**
****'World Bank..2007. Agriculture for Development. Washington,**
*****: UNCTAD.2008. Biofuel production technologies: status, prospects and implications for trade adn development. Geneva, UNCTAD (United Nations Conference on Trade and Development).**
******: ICRAF China. 2007. Biofuels in China: An Analysis of the Opportunities and Challenges of Jatropha Curcas in Southwest China Beijing, China, ICRAF (World Agroforestry Centre) China.**

Summary

- ***China possesses a large production capacity of biofuels (bioethanol in particular), but its implementation scale is relatively small compared other forms of RE or other forms of biomass utilization (solid/gas)***
- ***Both bioethanol and biodiesel are looking for alternative feedstocks.***
- ***Biofuel's contribution to the transport sector seems limited.***
- ***Resource availability (land, water, labor) and economic viability at the household level (feedstock crop production) may be determining factors for scaling up and sustainability at the production level.***
- ***State-owned companies offer both advantages and disadvantages.***
- ***Subsidies hold a key for the future of the industry.***

Acknowledgement:
The research for this presentation was conducted as a part of the research project on "Biofuel use strategies for sustainable development" supported by the Global Environment Research Fund of the Ministry of Environment, Japan. Authors would also like to thank Dr. Jikun Huang, Director of the Center for Chinese Agricultural Policy (CCAP), Chinese Science of Academy (CAS) and his staff for their cooperation in conducting the field survey in Yunnan province.