Assessing socio-economic drivers for bioenergy and biomass supply

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Interest in bioenergy and other RES is greater than *actions* or *adoption* by agents

- FES *vs*. RES = 80.3 : 13.2% (IEA, 2006)
- An increase of "new" renewables of 300% over last 20 years = 0.4% in TPES
- Examples:
  - Canadian target set in 2000 for biodiesel production by 2010 was 500 million litres (2007 production: 100 million liters).
  - The target of 12% share for RES in the EU energy mix by 2010 would reach 9-10% if the current trend is sustained.
  - The Biofuels Directive sets a target of 5.75 % for 2010 while the achieved share for 2005 was only 0.8 % on average.

Outline

- The environment of the biomass and bioenergy market.
- The roles of personal preferences, incentives, regulations, knowledge and information and the structure of the bioenergy market.
- How do economic agents (households, firms, governments) make decisions with respect to energy sources?
- A matrix of the economic and social drivers which influence agents' decisions from the supply and demand sides of the market.
- The policy implications of the findings and suggestions for future research initiatives are discussed.

Agents:
households, firms and government(s)

The level and type of bioenergy use in an economy will ultimately be determined by two base conditions:

(1) availability of appropriate inputs for bioenergy production (system requirements)

(2) decisions made by agents in the economy whose actions will influence supply and demand

Economic theory on market structure indicates that bioenergy initially requires governmental support

- **Inputs**: directly affected by agricultural, forestry and waste management practice and policy.
- **Outputs**: highly concentrated markets of heat, electricity and motor fuel

The key advantage of bioenergy (and other renewables) is its **social and environmental impact** which is not reflected in energy prices.

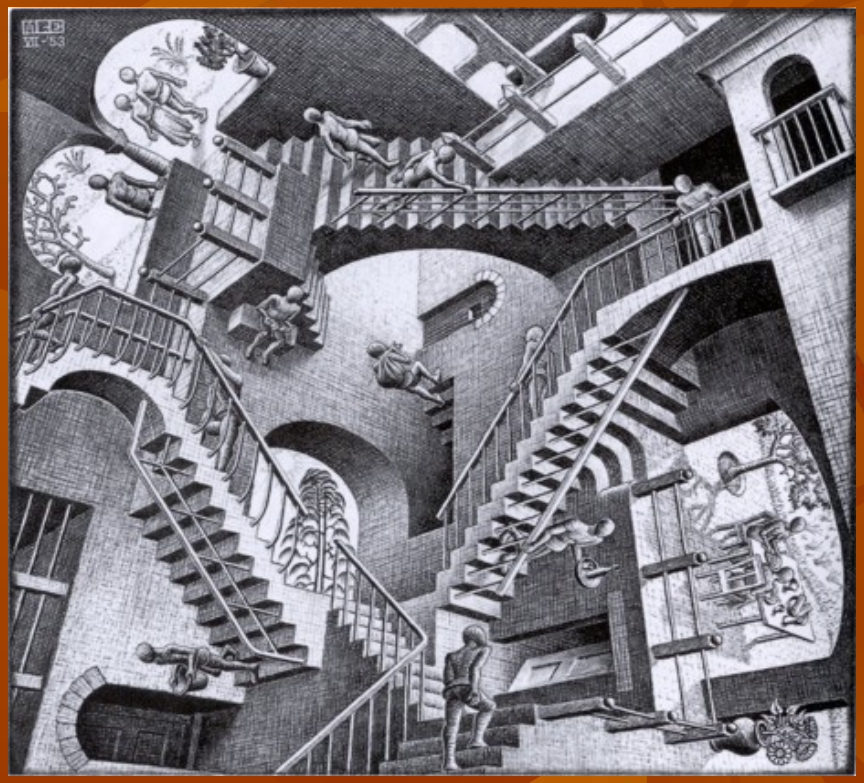
Bioenergy firms must become vertically integrated through strategic alliances and public-private partnerships to succeed in highly concentrated energy markets.

The assumption of “full information” rarely applies to the real world

- Information is a tool used by industry (private marketing), NGOs (social marketing) and government in an attempt to modify consumer behaviour.
- Not all messages will be received by all agents so they have to be aware that information exists and know where to look for it.
- Governments often lack the capacity to completely close the information gap for firms and households.

Shared attitudes and values of agents participating in the bioenergy market:

- Environmental concern
- Energy supply
- Energy affordability
- Energy security
- Expanding economy
- Job creation
- Stable energy prices
- Liberalisation



…but different ideas about how to reach them.

Who are the agents? What are their drivers?

Agents participating in the bioenergy market: households, firms and government

Household

1. Consumer of bioenergy
2. Supplier of biomass

Primary driver:
improved utility

Firm

1. Produces bioenergy for its own purposes;
2. Sells excess bioenergy after satisfying own energy purposes;
3. Bioenergy production as core business;
4. Produces and sells biomass;
5. Uses bioenergy as an energy source;
6. Supplies equipment and/or services to the bioenergy sector.

Primary driver:
profitability

Government

1. Provide an environment and system for bioenergy market development
2. Consumer of bioenergy
3. Leading example
4. Producer of bioenergy
5. Provide information

Primary driver:
improved social welfare

THE BIOENERGY ECONOMIC DRIVERS' MATRIX

Position in the market →		Consumer (demand side)		Producer (supply side)	
Key motivation → / Agents ↓	Attitudes and values	Regulatory environment	Dominant driver	Regulatory environment	Dominant driver
Household	Environmental concern Energy supply Energy affordability Energy security Expanding economy Job creation Stable energy prices Liberalisation	Legislation related to personal income and way of living	Improved utility	Legislation related to personal income and way of living	Improved lifestyle Better standard of living Improved utility
Firm		Legislation related to business activities Quality standards	Profitability	Legislation related to business activities Quality standards	Profitability
Local government/ community		Regional developing strategies Regional/federal legislation on natural resources, forestry, agriculture and waste management Regional environmental protection strategy	Improving social welfare of the community	Regional developing strategies Regional/federal legislation on natural resources, forestry, agriculture and waste management Regional environmental protection strategy	Improving social welfare of the community
National government		Legislation related to foreign affairs Legislation on energy market Environmental protection strategy Strategic documents for development Legislation on natural resources, waste management and agriculture policy and related development programmes	Improving social welfare of a country with improving its position within the international community	Legislation related to foreign affairs Legislation on energy market Environmental protection strategy Strategic documents for development Legislation on natural resources, waste management and agriculture policy and related development programmes	Improving social welfare of a country with improving its position within the international community

Economic drivers for a **household** participating in a bioenergy market

Attitudes and values	Position in the market			
	Consumer (demand side)		Producer (supply side)	
	System requirements / regulation	Dominant driver: Improved standard of living	System requirements / regulation	Dominant driver: Improved standard of living
Ecocentric More comfortable Potential job creation Inertia/ reluctance to change Intergenerational equity	Penalty (i.e. mineral fuel tax, carbon tax) Subsidy (i.e. reimbursement of costs for purchasing a biomass boiler) Support (information, service) Availability of technology	Cost Service Reliable energy source Supporting local economy Personal pride	Existing market Subsidy	Small and medium enterprises Additional income Potential job/investment opportunity Existing market Conversion from food to non-food cultures is more profitable

Economic drivers for a **firm** participating in a bioenergy market

Attitudes and values	Position in the market			
	Consumer (demand side)		Producer (supply side)	
	System requirements / regulation	Dominant driver: Profitability	System requirements / regulation	Dominant driver: Profitability
Environmentally conscious Corporate responsibility Stability/ risk aversion	Penalty (i.e. mineral fuel tax, carbon tax) Subsidy (i.e. tax exemption for less carbon) Low barriers to entry Waste legislation Quality standards Availability of technology	Less cost More profitable Availability of raw material Complimentary good Stable energy supply Organising horizontal and vertical organizations (strategic alliances and public-private partnerships) Globalisation	Penalty (i.e. polluter pays) Subsidy (i.e. feed in tariff, less interest rate on the loan) Industry/ sector requirements Low barriers to entry Quality standards Availability of capital (financing) Availability of technology Availability of raw material	Export Energy sufficiency Better utilisation of waste Complimentary good New market opportunity Product diversification

Economic drivers for **a community/local government** considering a bioenergy market

Attitudes and values	Position in the market			
	Consumer (demand side)		Producer (supply side)	
	System requirements / regulation	Dominant driver: Improved social welfare of the community	System requirements / regulation	Dominant driver: Improved social welfare of the community
Political points Improved environment Increased standard of living/health Expanding local economy Leadership example/ community pride Enhancing entrepreneurial spirit Organising horizontal and vertical associations Diversifying economy Respond to globalisation Optimal use of natural resources	Regional development strategies Grant availability More revenues from income tax and VAT	Cheaper source of energy Backward and forward linkages Ability to lower the implementation cost in terms of economies of scale Diversification of energy supply Keeping money within the community Market development through demonstration	Regional development strategies Grant availability More revenues from income tax and VAT Availability of technology and service Availability of capital (financing sector)	Imports substitutions Optimal use of local natural resources Additional income to the community Local job creation Keeping money within the community Waste management

Economic drivers for a **national government** considering a bioenergy market

Attitudes and values	Position in the market			
	Consumer (demand side)		Producer (supply side)	
	System requirements / regulation	Dominant driver: Improved social welfare of the community	System requirements / regulation	Dominant driver: Improved social welfare of the community
Desire to participate in the international agreements (i.e. Kyoto Protocol, European Energy Community…) International pressure Strategic interest Security in terms of long term of energy supply and price Social welfare Diversifying economy Optimal use of natural resources Job creation policy Respond to globalisation Distribution of wealth	International treaties Environmental protection strategy Strategic documents for development Energy market liberalisation Natural resources and agriculture policy Availability of raw material	Less social cost Availability of raw material Opportunity to mitigate more than one issue (i.e. energy security, rural community, waste management…) Trade balance improved Potentially income to the budget (imports substitution) Keeping the multiplier effect in the country	International treaties Strategic documents for development Export Environmental protection strategy Energy market liberalisation Natural resources and agriculture policy	Energy security Energy supply Energy affordability Climate change mitigation and adaptation Trade balance improved Additional income to the budget (tax income) Keeping the multiplier effect in the country Backward and forward linkages Distribution of wealth Less cost

How to move from “this is a really good thing; people and firms should use more bioenergy”:

- Firms can target areas such as cost, convenience and full information.
- Households desiring more bioenergy use for environmental reasons, must convince governments that this will improve social welfare.
- Governments can use their command and control authority through regulation and taxes or through simply being a clearinghouse for information which will move bioenergy use closer to an optimal level for societal welfare.

Conclusions

- Bioenergy market will develop only if system requirements are met and agents participate.
- Economic drivers expressed in monetary units are not sufficient to fully describe actions of the agents participating in the bioenergy market.
- In the presence of market failure, governments must tailor corrective policies to the social environment.
- Attitudes and values (often called “social drivers”) play a crucial role in bioenergy utilisation.
- The matrix should be the path for tailoring of the optimal mix of private actions and governmental interventions for a specific socio-economic environment defined by system requirements.

Questions?

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IEA Task 29: Socio-Economic Drivers in Implementing Bioenergy Projects

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