Promoting Modern Bioenergy under the Clean Development Mechanism

A joint working paper of:

UNEP Risø Center (URC)
United Nations Environment Program (UNEP)
U.N. Food and Agriculture Organization (FAO)
United Nations Conference on Trade and Development (UNCTAD)

Side Event at COP-12/MOP-2, Nairobi,10 November 2006

Outline

1. Objectives and rationale of working paper
2. CDM *status quo* and gaps
   - liquid biofuels in transport sector
   - displacement of non-renewable biomass in household sector
3. Overview of challenges
   - overall viability
   - additionality and methodological obstacles
   - global trade impacts and double counting
4. Future joint efforts

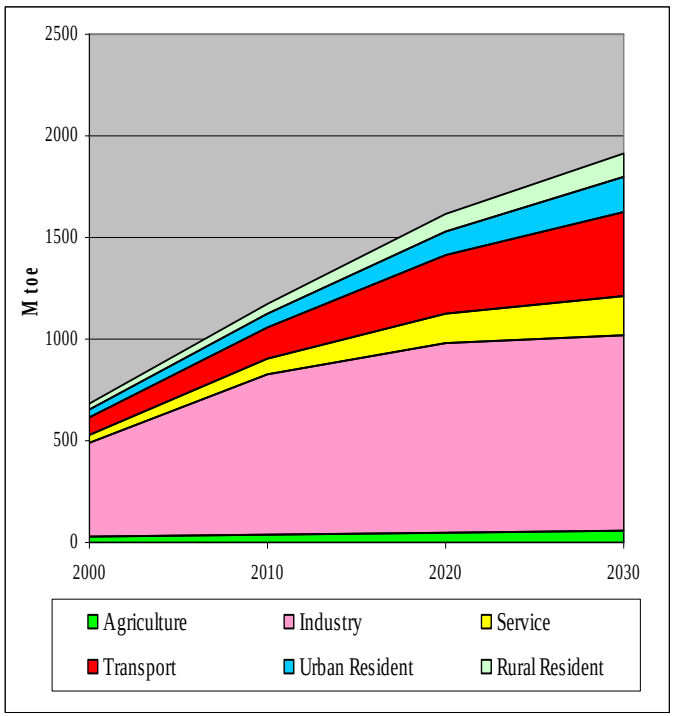
1. Objectives

- Outline status and gaps in bioenergy CDM pipeline
- Unlock CDM's potential to attract new investment in underrepresented typologies (e.g. biofuel production and use)
- Identify and mitigate barriers to approval
- Contribute to development of CDM methodologies and guidelines/tools for project implementation

Rationale

- Inefficient ‘traditional’ biomass predominant fuel in many countries
- Large scope for modern bioenergy alternatives in household, transport

CO_2 emissions Trends in China, WEO 2006



- Part of GHG mitigation menu
  - fossil displacement plus bio-sequestration
  - curb rising transport sector emissions
- SD benefits potentially high at macro-level and on ground
  - energy security and foreign exchange savings (reduce vulnerability to oil prices)
  - job creation and rural livelihood strategies
  - synergies with climate vulnerability reduction

2. *Status quo* : All CDM

CDM Pipeline, J. Fenhann, UNEP Risoe Center, 20 October 2006

Type	All CDM projects in Pipeline					
	number		Accumul. 2012 CERs (000)		CERs Issued (000)	
Biomass energy	282	22%	112341	8%	2534	15%
Hydro	209	16%	92478	7%	722	4%
Wind	153	12%	84506	6%	127	1%
EE Industry	144	11%	101509	7%	240	1%
Agriculture	142	11%	36595	3%	995	6%
Landfill gas	96	8%	144934	11%	73	0%
Biogas	74	6%	19798	1%	85	1%
Fossil fuel switch	47	4%	36146	3%	0	0%
Cement	24	2%	25483	2%	0	0%
EE Supply side	16	1%	29785	2%	0	0%
HFCs	15	1%	434927	32%	11714	70%
Coal bed/mine methane	13	1%	46168	3%	0	0%
EE Service	10	1%	541	0%	0	0%
Fugitive	10	1%	70150	5%	278	2%
N2O	9	1%	120988	9%	0	0%
Solar	7	1%	1151	0%	0	0%
Geothermal	7	1%	10088	1%	0	0%
EE Households	4	0%	510	0%	0	0%
Afforestation & Reforestation	3	0%	2351	0%	0	0%
Transport	2	0%	1785	0%	0	0%
PFCs	1	0%	542	0%	0	0%
Tidal	1	0%	1104	0%	0	0%
Energy distrib.	0	0%	0	0%	0	0%
Total	1269	100%	1373880	100%	16767	100%

Bioenergy most popular project type.
Excluding HFCs, largest share of CERs issued to date.

Status quo : Bioenergy

Bioenergy CDM Pipeline, UNEP Risoe Center

	Number of projects				Of these			MW
	At validation	Request registration	Registered	Total	Only heat	Electricity		Total
Bagasse power	83	4	36	**123**	2	121		3016
Palm oil solid waste	6	0	8	**14**	1	13		111
Agricultural residues: other kinds	38	1	17	**56**	9	47		510
Agricultural residues: rice husk	28	2	17	**47**	0	47		330
Agricultural residues: mustard crop	1	0	4	**5**	0	5		38
Agricultural residues: poultry litter	2	0	1	**3**	0	3		8
Forest residues: sawmill waste	0	1	7	**8**	0	8		114
Forest residues: other	8	0	2	**10**	4	6		55
Forest biomass	3	0	1	**4**	3	1		1
Industrial waste	5	0	2	**7**	3	4		56
Gasification of biomass	3	0	0	**3**	1	2		4
Gasification of MSW	2	0	0	**2**	1	1		6
MSW incineration	1	0	0	**1**	0	1		0
Biodiesel	1	0	0	**1**	1			0
Ethanol	0	0	0	**0**	0			0
Biogas flaring	52	8	52	**112**	112			0
Biogas power	37	22	11	**70**	14	56		91

Unequal distribution: almost <u>no</u> transport biofuel or household sector renewable biomass projects in portfolio.

Projects & Methodologies
Liquid Biofuels

- At validation:
  - only one small-scale project, unlikely to pass
- Ethanol
  - one meth. under development (NM #185/82), not yet approved
- Bio-diesel
  - four under development, none yet approved
    - palm oil (NM #108/69),
    - sunflower oil (NM #129/109),
    - waste grease or cooking oil (NM #142, NM #180)

Biofuel projects are stalled.

Projects & Methodologies
Non-renewable biomass

- Registered:
  - Biogas Sector Partnership Nepal 1 & 2 (6500 units each)
  - Bagepalli, India Biogas Programme (5500 units)
  - Aceh, Indonesia Solar Cooker Project
- At validation:
  - Kupang, Indonesia Cook Stove Projects
  - Bagepalli, India Solar Hot Water Heater Programme
- All used AMS-I.C, but revised 11/10/05, disallowing applicability
  - Proposed alternative assumes fossil baseline (e.g. kerosene)

Household renewable bioenergy projects are unlikely to be viable unless more plausible methodologies can be developed.

3. Challenges

- Risky: overall feasibility hinges on oil prices, sustained demand, open trade and opportunity costs (e.g. sugar) -- *all volatile*.
- On purely financial basis, not clear winner:
  - Typical ethanol production costs in developing countries:
    $ 0.36 - $ 0.60/litre (DSD, 2005); Brazil $ 0.23/litre (IEA, 2004)
  - Tanzania (Dar): cost of gasoline $0.43/litre and diesel (excluding taxes and tolls) ~$ 0.36/litre @ US $50/bbl. (GTZ, 2005)
  - India: $0.46/litre biodiesel or bioethanol from cane, roughly on par with cost of petrol and diesel. (UNCTAD, 2006)

Biofuel projects becoming more competitive at current oil prices, but often require initial boost as still risky.

Additionality

- Many countries already have biofuel targets or policy directives in place
  - free rider problem, unclear what constitutes ‘additional’ effort?
  - need to take into account subsidies including those for diesel
- Relatively small carbon finance boost
  - Net IRR gain for projects not generating CH_4 reductions average +0.5 to +2.0%.
  - World Bank estimates $0.03 –$0.05 carbon value for biofuels per liter of petroleum fuel equivalent

Carbon finance could help mitigate barriers and obviate subsidies, but tough to demonstrate investment additionality.

“Barriers”

- High initial capital costs and other financing challenges
- High risk
- High degree of coordination needed
  - Upstream/downstream complementarities, fuel specifications
  - Social acceptability of new products
- Weak regulatory frameworks including renewables/IPP
- Constraints to new technology adoption

Many barriers to development and implementation, but clearer guidelines needed for CDM developers using the ‘barrier test’ for eligibility.

Toward Approval of Methodologies for Biofuels

- Ensuring consumption in host country can be monitored
- Avoiding double counting of CERs claimed by producers and consumers (upstream vs downstream)
  - Checking consumption against production, feedstock vs. final products trade and use for net fossil energy replacement
  - Ensure ERs happen in non Annex-I countries
  - Project boundary potentially infinite with global trade
- Land-use leakage, including impacts on deforestation
  - same problems in AR, and combined projects
  - Projects based on waste oil etc. can get around the latter

The key methodological issues have been identified. They are challenging but not insurmountable.

- Data limitations
  - Wide range of LCA emissions for different crops (i.e. taking into account differences between agricultural operations)
  - most GHG lifecycle analyses not appropriate for LDCs, often don't include impacts of secondary products
  - too costly *ad hoc*

- Programmatic CDM unripe
  - biofuel programs good test case, but modalities poorly clarified

Analysis seeks to establish <u>right balance</u> between accuracy and workability to manage transaction costs and induce genuine incentives.

Upstream vs. downstream

Subject of recent call for public inputs

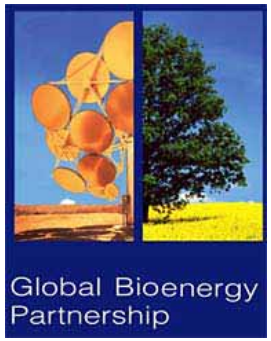
	Pure	Blended
Upstream		**EB 26:** only if consumers are in project; amount of biofuel use by consumers is monitored. **Why not monitor blending process?**
Downstream		**EB26:** consumers + end users may be Participants **But how to demonstrate that there is no leakage leading to less biofuel use elsewhere?**

EB26 decision

- Public submissions were critical
  - Preferable to focus on producers (cost effective, may prevent leakage)
  - Include blending entity for gasohol/e-diesel blends (@10-20%)
    - ensures ‘real’ reductions as no other substitutes
- Priority should be given to “consumer biofuels,” otherwise
  - Little atmospheric benefit
  - Only few project types (large consumers) qualify

Is most recent guidance heading in the wrong direction?

5. Next steps (1)



CD4CDM
Capacity Development for the CDM

UNCTAD
UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT
Biofuels Initiative

- Disseminate draft for comment at UNCTAD inter-governmental Expert Meeting on 30 November
- Establish partnerships and links to work plans
  - Global Bioenergy Partnership
  - UNCTAD Biofuels Initiative
  - UN Energy
  - UNEP Forestry/Bioenergy CDM Project in 7 African countries (funded by FFEM)
- Support definition of cost-effective monitoring schemes and protocols for biofuel trade

Next steps (2)

- Contribute toward methodology development process
  - Analysis toward EB-approvable methodologies
    - Biofuel GHG data for non-Annex I countries
- Develop analytical tools to assist CDM developers
  - Resource assessments and sustainable production guidelines
  - Business models and SME support
    - pinpoint scale and other critical thresholds for viability
    - guidebooks and CDM templates
- Collaborate with donors and CDM developers on pilots

This is the first phase of a cooperative effort.
We welcome your participation!