



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)

Presentation 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 of the Collaboration

- 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

Global Carbon Market

- **Project-based** (baseline and credit system)
 - Emission reductions are created and traded through a given project or activity (JI and CDM)
- **Allowance market** (cap and trade system)
 - Emission allowances are defined by regulations at the international, national, regional or firm level - Kyoto-ET, EU-ETS, Domestic: UK, Japan, Canada, Korea. Firms: BP, Shell
 - Linkage between EU ETS and project-based mechanisms
- **Voluntary market**
 - Individuals and companies account and trade their greenhouse gas emissions on a voluntary basis (carbon compensation and travel compensation schemes)
 - Several companies expressed interest in buying project-based credits (CERs and ERUs)

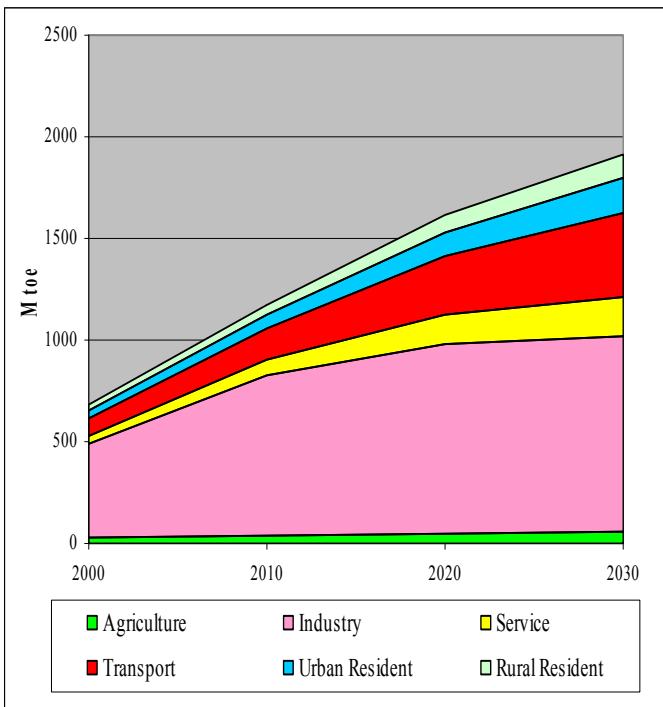
CDM Basics

- CDM allows Annex I countries to meet part of their emission reduction requirements for the first commitment period 2008-2012 at lower costs in non-Annex I countries than could be done domestically.
- Annex I countries are allowed to acquire Certified Emission Reductions (CERs) by participating in implementation of GHG reduction CDM projects in non-Annex I countries.
- Selling CERs is an additional stream of cash inflow to the project, which improves project economics.
- ODA (Official Development Assistance) funds can not be used in CDM investments.

Rationale for Bioenergy & CDM

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

CO₂ emissions Trends in China, WEO 2006



- Part of GHG mitigation menu
 - fossil displacement plus bio-sequestration
 - transport sector emissions increasing fastest in many developing countries
- 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%
N ₂ O	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 Risoec 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 no 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 facing Biofuel Projects

- Overall feasibility hinges on oil prices, sustained demand, open trade and opportunity costs (e.g. sugar): all volatile.
- On purely financial basis, not a clear winner
 - Typical ethanol production costs in LDCs: \$ 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 are becoming more competitive at current oil prices, but often require an initial boost as still a risky enterprise. .

Additionality issues for CDM

- 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
 - IRR for projects not generating CH₄ reductions +0.5 – 2.0%.
 - World Bank estimates \$0.03 –\$0.05 carbon value for biofuels per liter of petroleum fuel equivalent

Tough to demonstrate investment additionality, but carbon finance could help mitigate barriers and obviate subsidies.

“Barriers”

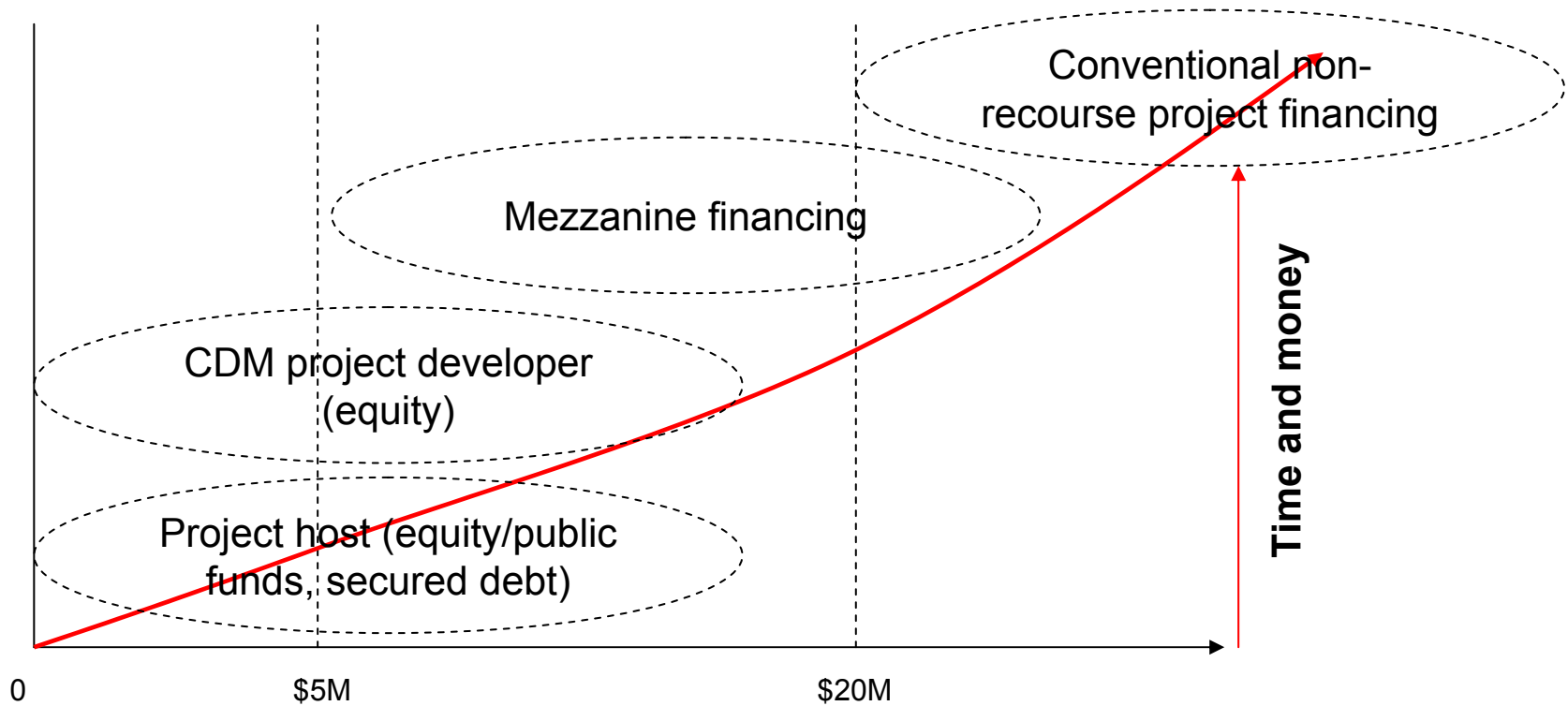
- High initial capital costs and other financing challenges
- High risk as underlying oil and crop prices volatile
- High degree of coordination needed
 - Upstream/downstream complementarities, fuel specifications
 - Social acceptability of new products
- Weak regulatory frameworks including renewables/IPP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

Guidelines needed to support developers using the barrier test.

Sources and types of finance available

- **Development phase**
 - Carbon funds (equity, advance on purchase)
 - Private sector CDM developers (equity, advance on purchase)
 - Project hosts (equity, public sector budgets)
- **Construction phase**
 - Lenders (debt – secured or unsecured)
 - Investors/private sector CDM developers/project hosts (equity)
 - Mezzanine finance providers (hybrid debt/equity)
 - Equipment suppliers (lease or credit)
 - CER buyers (advance on purchase)

Match the source of finance to the project



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

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 as an *ad hoc activity*

- Programmatic CDM unripe

- biofuel programs good test case, but modalities poorly clarified

Analysis seeks to establish right balance between accuracy and workability to manage transaction costs and induce incentive.

Upstream vs. downstream discussion in CDM EB

Subject of recent call for public inputs

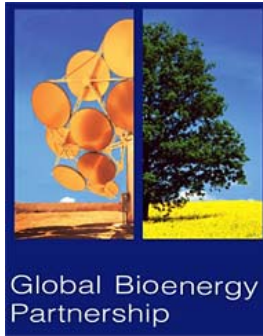
	Pure	Blended
Upstream		<p>EB 26: only if consumers are in project; amount of biofuel use by consumers is monitored.</p> <p>Why not monitor blending process?</p>
Downstream		<p>EB26: consumers + end users may be Participants</p> <p>But how to demonstrate that there is no leakage leading to less biofuel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

EB26 decision

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

Is most recent guidance heading in the wrong direction?

5. Next steps (1)



- 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)

CD4CDM
Capacity Development for the CDM



- Support definition of cost-effective monitoring schemes and protocols for biofuel trade
- Practical Case studies in CDM host countries

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!*