

Bioenergy Projects for Climate Change Mitigation

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Overall objective of our work

- To promote that agricultural activities are increasingly considered in and benefit from the growing carbon market
- Just like the forestry sector is active in carbon sequestration...
- ...the agriculture sector should realize its potential in carbon displacement through bioenergy fossil fuel substitution and energy efficiency improvements

Our goal is to bring agriculture and bioenergy to the core of climate change mitigation efforts with the objectives to:

- Promote sustainable agricultural and rural development
- Explore the full potential of bioenergy to provide environmental and social services, including reductions of global GHG emissions
- Attract direct foreign investment to the least developed regions

Structure of Presentation

1. THE MAJOR FINANCIAL MECHANISMS AND THE CARBON MARKET

- EXISTING MECHANISMS AND THEIR ELIGIBILITY CRITERIA
- THE CURRENT MARKET

2. BIOENERGY SYSTEMS AND CLIMATE CHANGE MITIGATION POTENTIAL

- ADDITIONALITY
- SETTING THE BASELINE
- LIFE CYCLE ASSESSMENT OF BIOENERGY PROJECTS
- EXAMPLES FOR ESTIMATES OF GHG EMISSION ABATEMENT THROUGH BIOENERGY

3. CONCLUSIONS

CDM small scale methodologies – eligible project types

TYPE I - RENEWABLE ENERGY PROJECTS

1. Electricity generation by the user
2. Mechanical energy for the user
3. Thermal energy for the user
4. Renewable electricity generation for a grid

TYPE II - ENERGY EFFICIENCY IMPROVEMENT PROJECTS

1. Supply side energy efficiency improvements – transmission and distribution
2. Supply side energy efficiency improvements – generation
3. Demand-side energy efficiency programmes for specific technologies
4. Energy efficiency and fuel switching measures for industrial facilities
5. Energy efficiency and fuel switching measures for buildings

TYPE III - OTHER PROJECT ACTIVITIES

1. Agriculture
2. Switching fossil fuels
3. Emission reductions by low-greenhouse gas emitting vehicles
4. Methane recovery and avoidance

Prototype Carbon Fund (CDF)

- Countries with economies in transition and developing countries.
- A major emphasis: renewable energy technology such as, but not limited to, geothermal, wind, solar and small-scale hydro energy projects.
- No more than ~10% of the Fund's assets will be invested in land use sector projects (excluding developing countries).

Community Development Carbon Fund (CDCF)

- The CDCF targets poorer communities in developing countries, with a minimum of 25% of the portfolio's first tranche to be used for projects in LDCs.
- The CDCF is likely to buy emission reductions (ERs) from biomass fuels including crop-residue fuels such as bagasse, rice and coffee husks, and wood fuels.
- Kyoto compliance

The BioCarbon Fund

- Rural development objectives as well as climate change mitigation
- Besides Kyoto-compliant projects (window 1) sequestration in replicable asset classes of high social and environmental value (window 2).

The Global Environmental Facility (GEF)

- As the financial mechanism for the United Nations Framework Convention on Climate Change (UNFCCC), GEF receives guidance from the COP on policy, program priorities, and eligibility criteria.
- Climate change projects are designed to reduce the risks of global climate change while providing energy for sustainable development

Fund	Type of eligible bioenergy project activity	Budget [mio \$US]
BCF	Besides Kyoto eligible projects (window 1): Prototyping sequestration in replicable asset classes of high social and environmental value (window 2), including: A/R forestation (incl. Fuel wood plantings at commercial scale), Cropland Management, and Biofuels	Target: 20-50
CDCF	Renewable energy, incl. biomass fuels including crop-residue fuels such as bagasse, rice and coffee husks, and wood fuels	Target: 100 Current: ~40
GEF	1) removing barriers to energy efficiency and energy conservation; 2) promoting the adoption of renewable energy by removing barriers and reducing implementation costs; 3) reducing the long-term costs of low greenhouse gas emitting energy technologies; and 4) supporting the development of sustainable transport.	884 (1991-1999)
Italian Carbon Fund	Examples of eligible projects include: Energy services, Electricity from agricultural waste, Urban Landfill Gas,	Initial: 15 Target: 80
CERUPT/ERUPT	Renewable energy, energy efficiency, fuel switch, waste management and forestry	At least 3 Mio CERs at a value of 3.5 – 5.5 €/CER
Netherlands CDM Facility	clean, sustainably grown biomass (no waste); energy efficiency improvement; fossil fuel switch and methane recovery;	35
PCF	Major emphasis: renewable energy technology	180
PCF <i>plus</i>	Supplement to the Prototype Carbon Fund (PCF) with activities in the area of outreach, research, and training.	

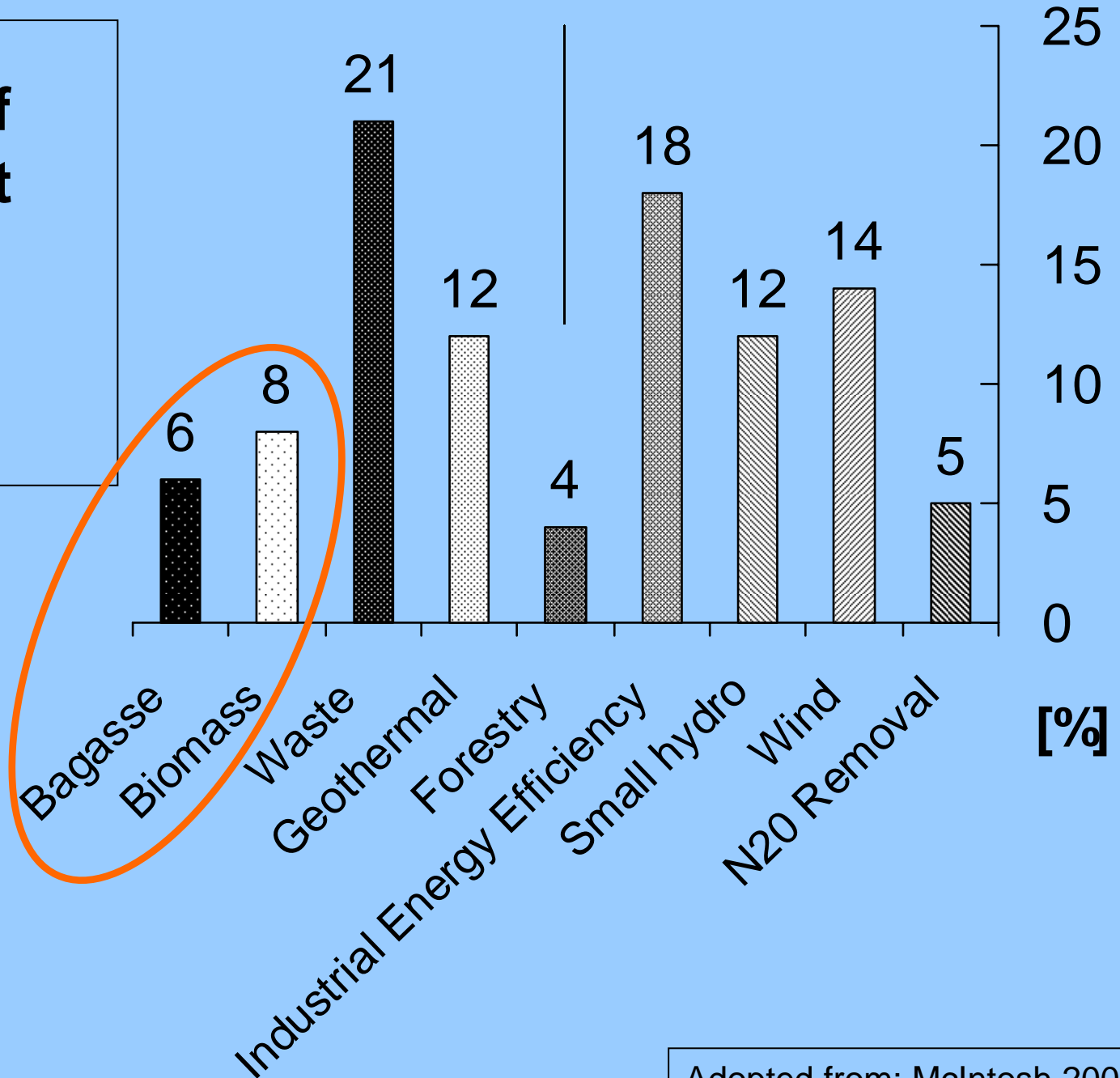
Size of the CDM market

Demand for emission reduction by developed countries (IETA) :

- 300-350 MtCO₂eq/yr for the first commitment period (2008-2012)
- thereof ~100 MtCO₂ eq/yr for CDM

Current market prices for CERs: US\$3–US\$6.5 per t CO₂-eq

Share of different PCF Project Types



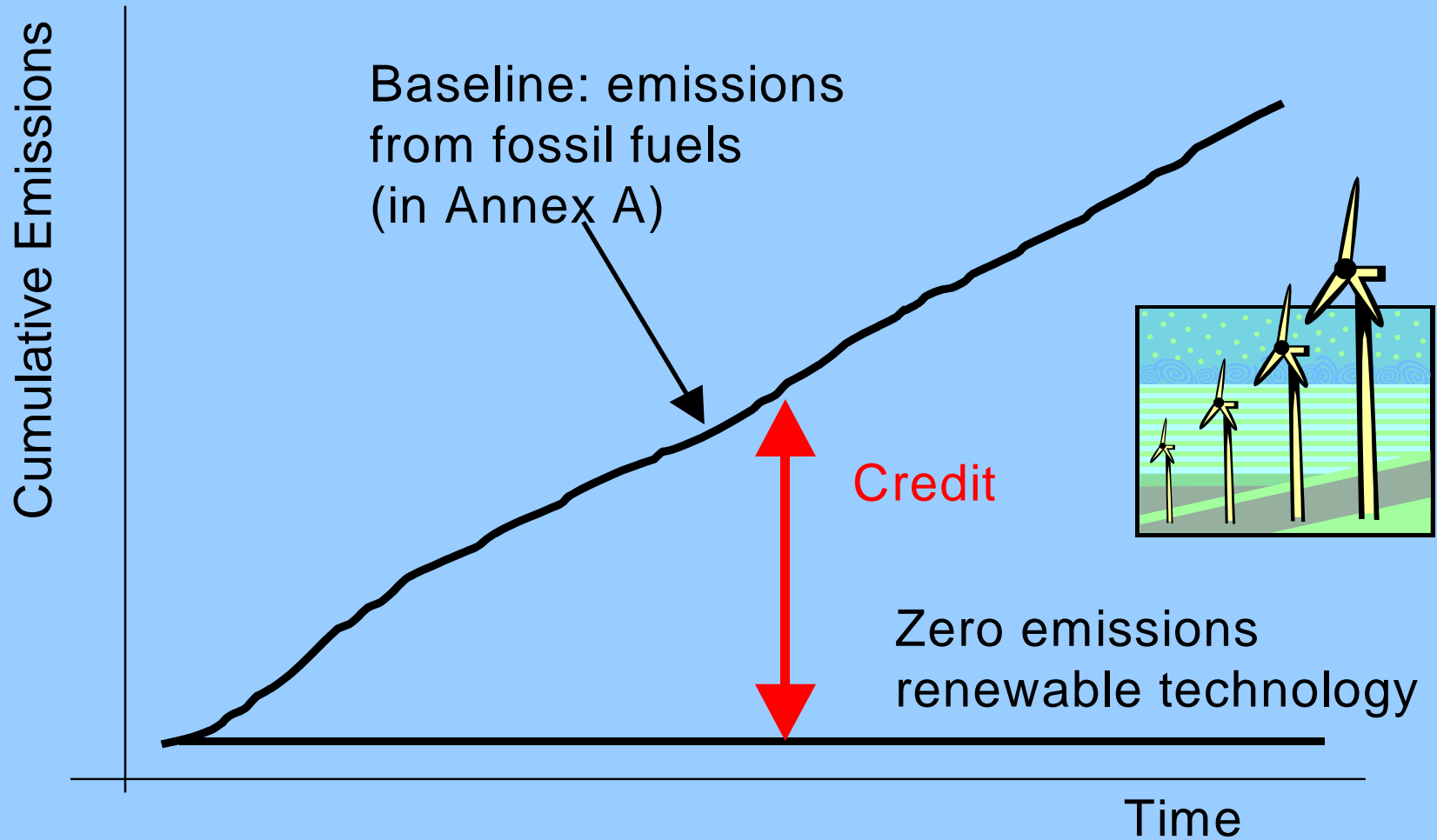
Additionality

Emissions reductions through the CDM must be “additional to any that would occur in the absence of the certified project activity”

Two components of additionality:

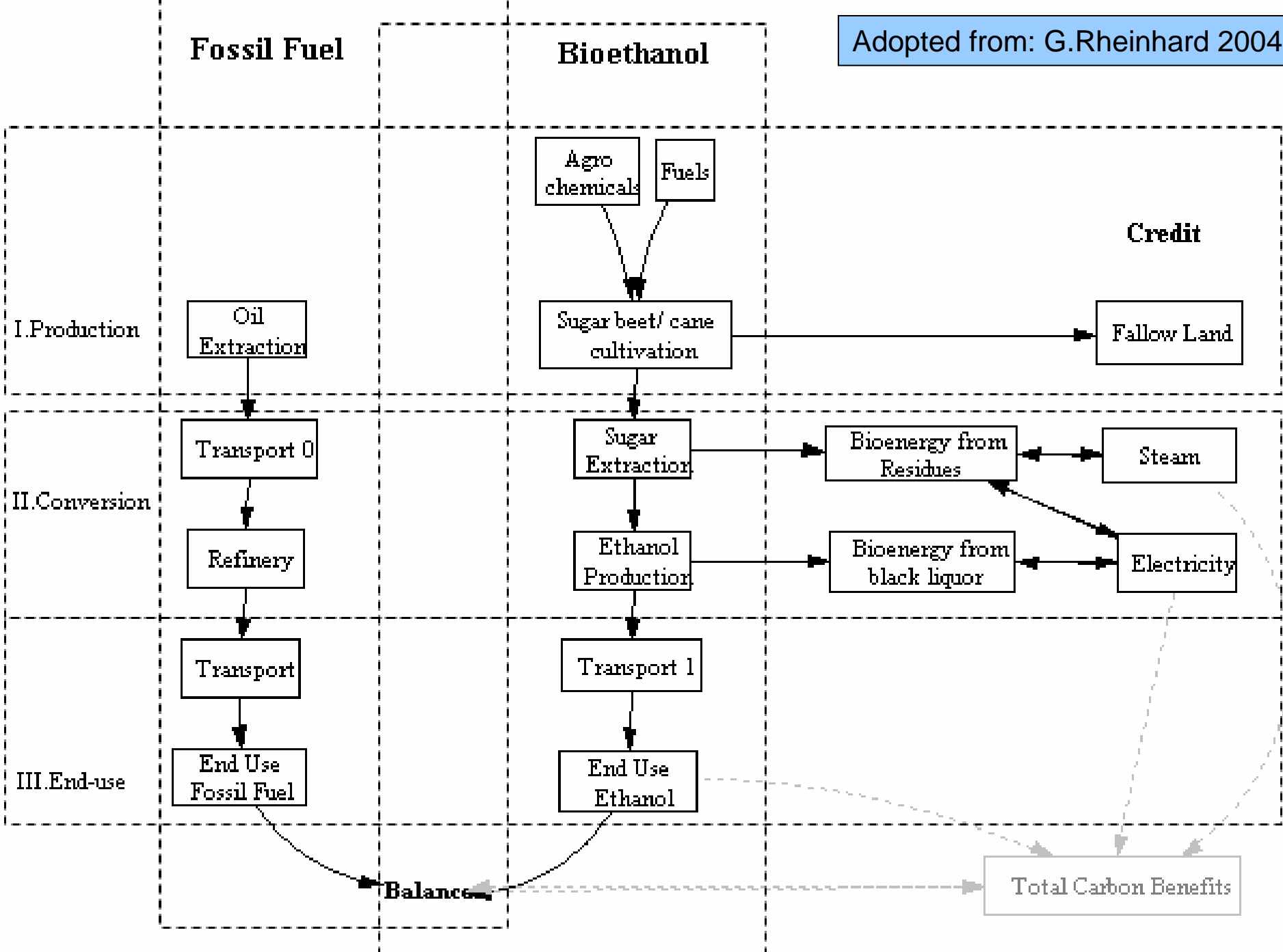
1. **environmental additionality**: emissions of project should be lower than baseline, i.e. BAU/reference activity
2. **financial additionality**: the investment for CDM projects must be additional to existing finance and resource channels:
 - Negative returns to the investor,
 - but positive returns including carbon payments
 - even including carbon payments, but other public benefits (social, environmental) associated with the project are high
 - Positive returns to the investor, but:
 - small business or household with limited access to financing
 - information about the new technology is limited and
 - investment generates a direct but uncertain monetary return.

Baselines

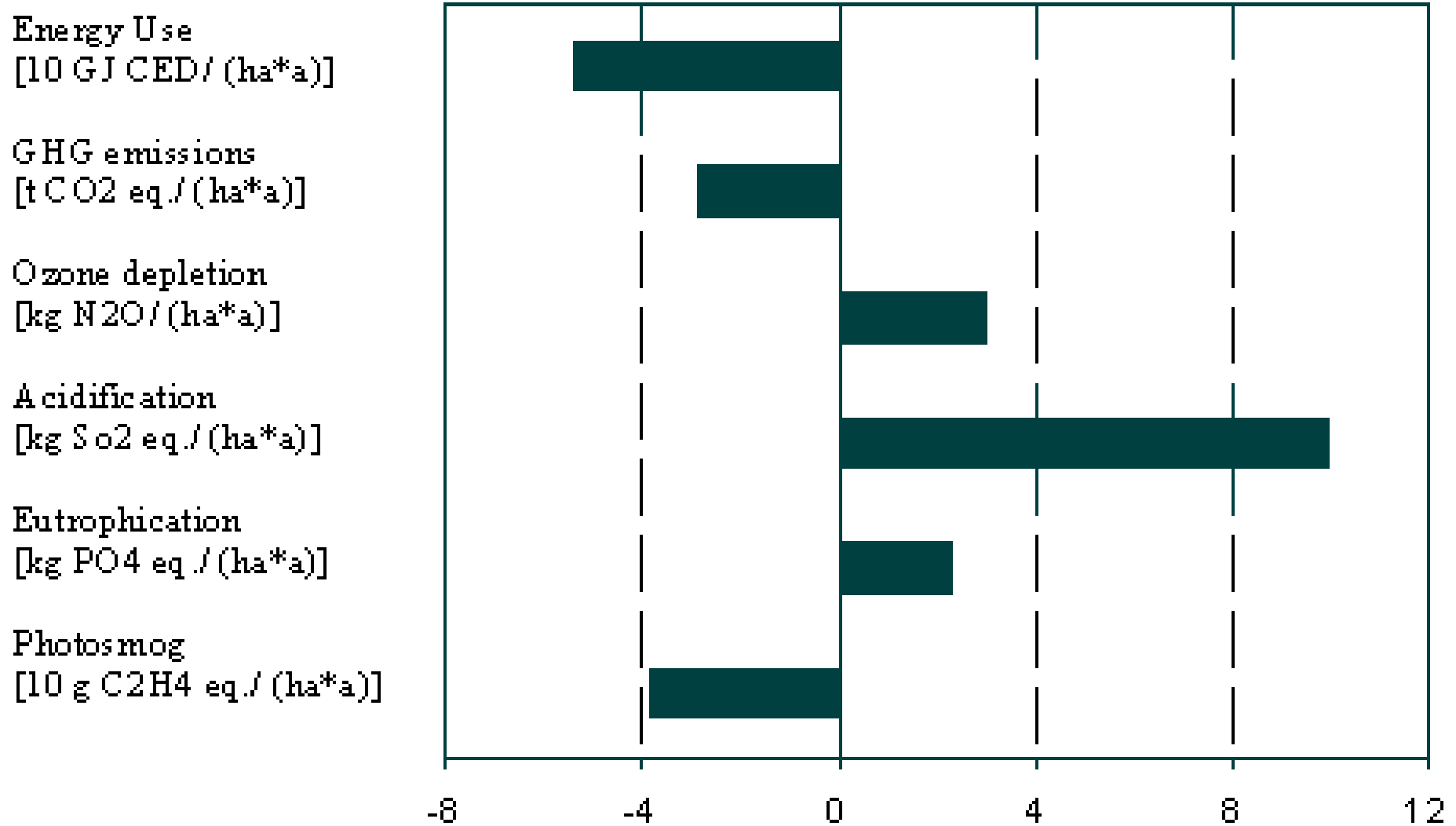


Project and baseline scenarios in Conventional CDM projects
(Source: Schlamadinger et al. 2004)

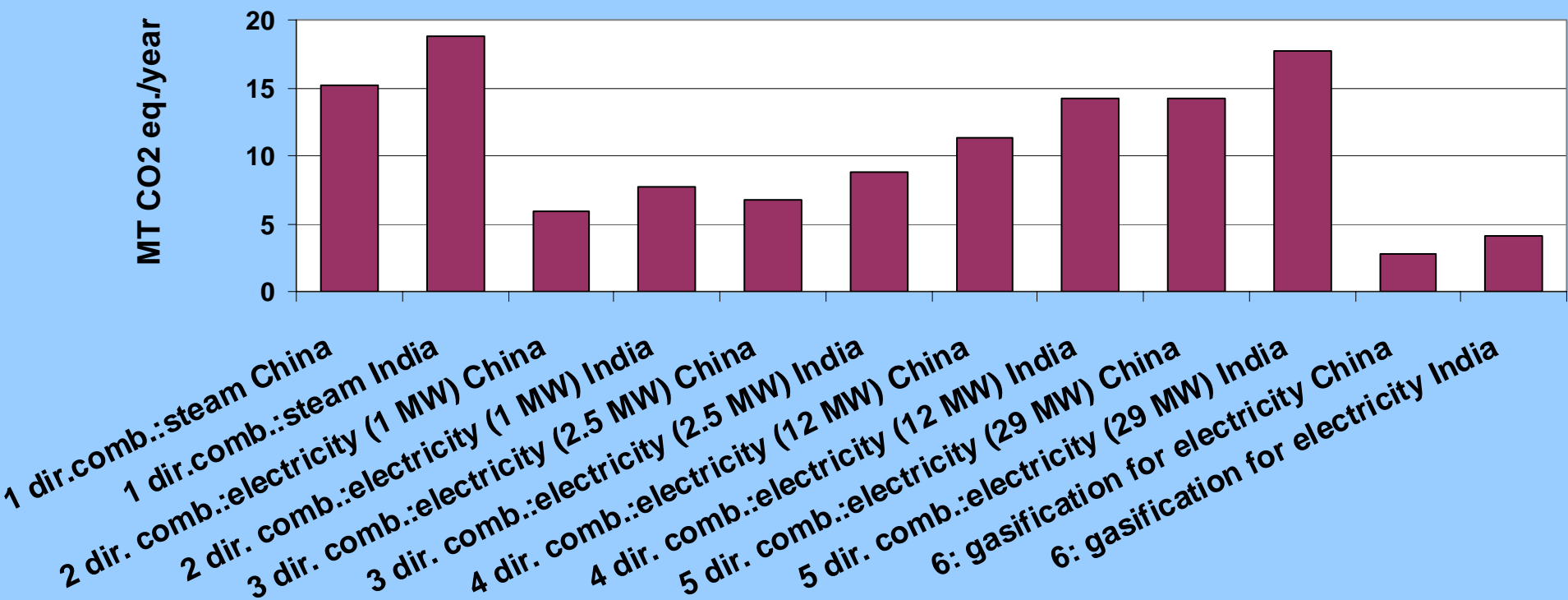
Adopted from: G.Rheinhard 2004



Results from an LCA of rape methyl ester (RME), with fossil diesel as reference case



GHG emission mitigation potential of more efficient use of rice husk in different applications in India and China



Source data from: Asian Regional Research Programme in Energy, Environment and Climate (ARRPEEC)

Avoided CO2 Emissions [1000 MT/a] and share of total anthropogenic CO2 Emissions of respective region [%]

		N-America	Latin-America	Asia & Middle East	Africa	Europe	Ex-USSR	Sum
Status quo	[1000 MT/a]	1.01-1.87	0.42-1.38	0.29-1.15	0.17-0.92	0.46-0.86	0.51-0.98	2.87-7.19
	[%]	15-28	46-150	4-14	20-112	10-19	22-42	12-30
Improve I	[1000 MT/a]	1.02-1.89	0.55-1.63	0.42-1.34	0.30-1.18	0.46-0.86	0.52-0.98	3.27-7.87
	[%]	15-28	60-176	5-16	37-144	10-19	22-42	14-33
Improve II	[1000 MT/a]	1.08-2.01	0.82-2.39	0.67-2.05	0.55-2.01	0.49-0.91	0.56-1.04	4.17-10.41
	[%]	16-29	89-258	8-25	67-245	11-20	24-45	18-44

Source: Kaltschmitt 2002

Conclusions for

The Demand Side:

- Carbon market still a buyers' market, with the public sector still the strongest buyer, mainly through government (carbon credit purchase) programmes
- With compulsory emission goals for energy intensive sectors, private companies are increasingly entering the market. Voluntary agreement in Japan.
- The demand for credits from CDM projects will depend on the effectiveness of domestic policies and measures, and other trading opportunities.
- Buyers need to be made aware of the strong potential synergies between bioenergy and sustainable development
→ high quality = high sustainability = high price market segment?

Conclusions for

The Supply side

- Large climate change mitigation potential of bioenergy fuel-switch and efficiency improvements
- Project developers, national authorities and communities need to be involved in the process and understand the potential of carbon credits for bioenergy development.
- Implications for SD should be considered and used to promote bioenergy. Life-cycle analysis offers a flexible (modular) and transparent tool.
- There is more to bioenergy services than energy and climate change mitigation

Conclusions for

The regulatory side

- CDM rules are not clear enough about the eligibility of *Efficiency improvements of bioenergy systems*, hampering the biggest share of potential small-scale projects in developing countries
- Baseline and monitoring methodologies need further development, to include bioenergy efficiency and additional benefits (i.e. countries' sustainable development goals).
- There is more to the carbon market than the CDM

Final remarks

International Collaboration

- Currently, the majority of CDM projects will take place in Latin America (Costa Rica and Chile hosting a combined total of 11) and South-East Asia
- Technology has to be transferred and capacity developed
- Important role for UN and private (bio) energy sector
- A joint effort between all sectors concerned is necessary – incl. the rural (agriculture, forestry, ...) and the energy sector – in order to grasp this opportunity
- Low current prices, but large potential market for bioenergy technology in developing countries due to increasing availability of direct foreign investment in CC mitigation activities

FAO has started to establish and is looking for new strong partnerships in this field

→ Country projects and case studies to be launched

Grazie!

<http://www.fao.org>

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