

Bioenergy and the Clean Development Mechanism

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IEA Bioenergy **Task 38**

Task 38 **Greenhouse Gas Balances of Biomass
and Bioenergy Systems**



Structure of Presentation

1. **CURRENT CDM RULES**
2. **THE PROBLEM**
3. **THE POTENTIAL BENEFITS OF EFFICIENCY IMPROVEMENTS
IN BIOENERGY SYSTEMS**
4. **SUGGESTED AMENDMENTS**
5. **CONCLUSIONS**

The current rules

Categories of national GHG inventories (Annex A of the Kyoto Protocol)

- Energy
- Waste
- Industrial Processes
- Agriculture (all EXCEPT carbon and liming, which are included in LUCF)

Not included:

- Land-use change and Forestry (LUCF), carbon in croplands and grasslands (apart from single activities on national level (Art 3.3, 3.4) and on project level (Art 12 plus Marrakech Accords))

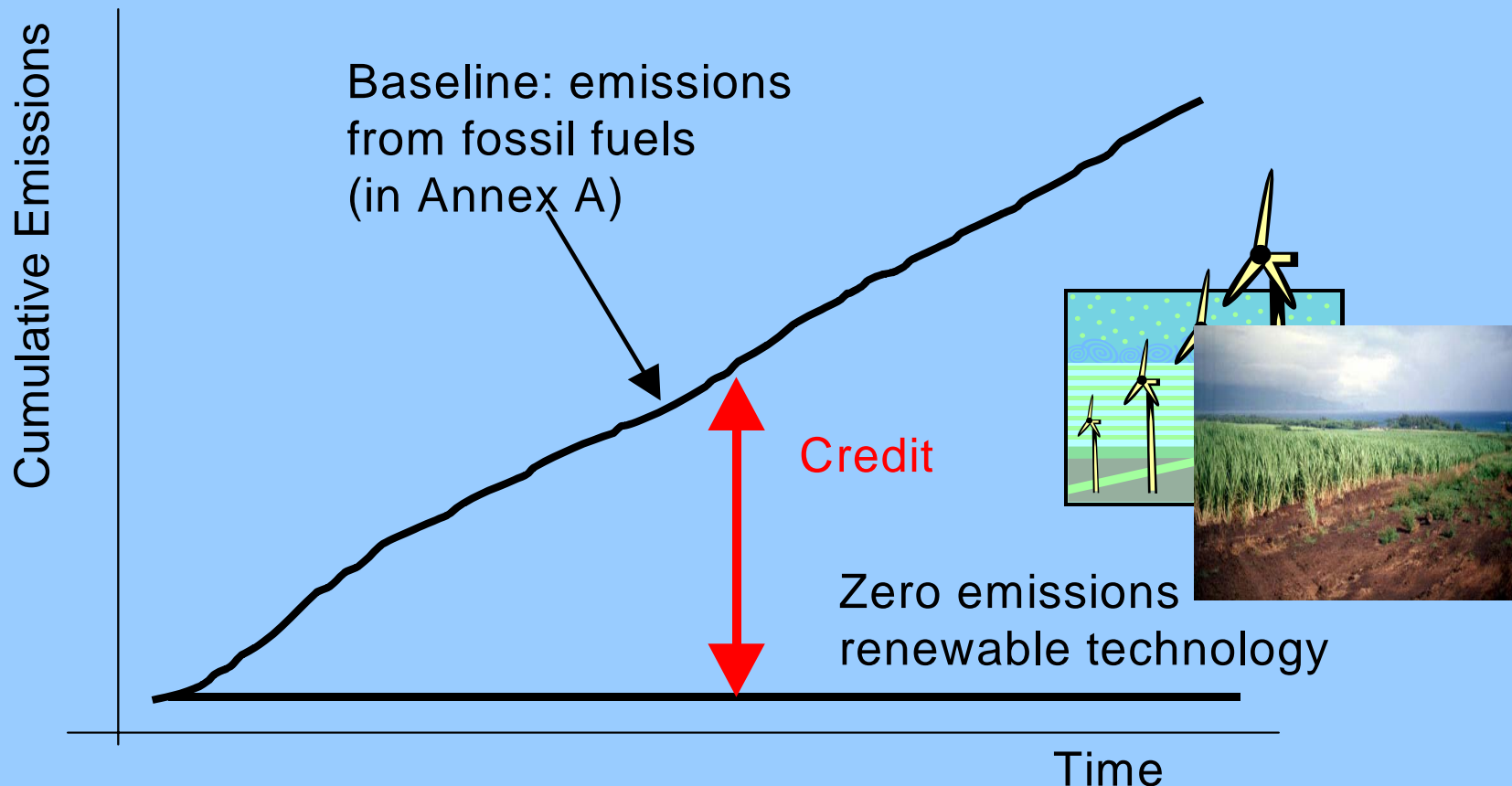
For Annex I (~ = OECD) countries the following LULUCF activities were brought back in

- **Afforestation, reforestation**
- **Deforestation**
- **Forest management (includes degradation and its avoidance, see IPCC report Task 2)**
- **Carbon in cropland and grazing land management (includes degradation and its avoidance)**
- **Re-vegetation (but not de-vegetation or its avoidance)**

The problem

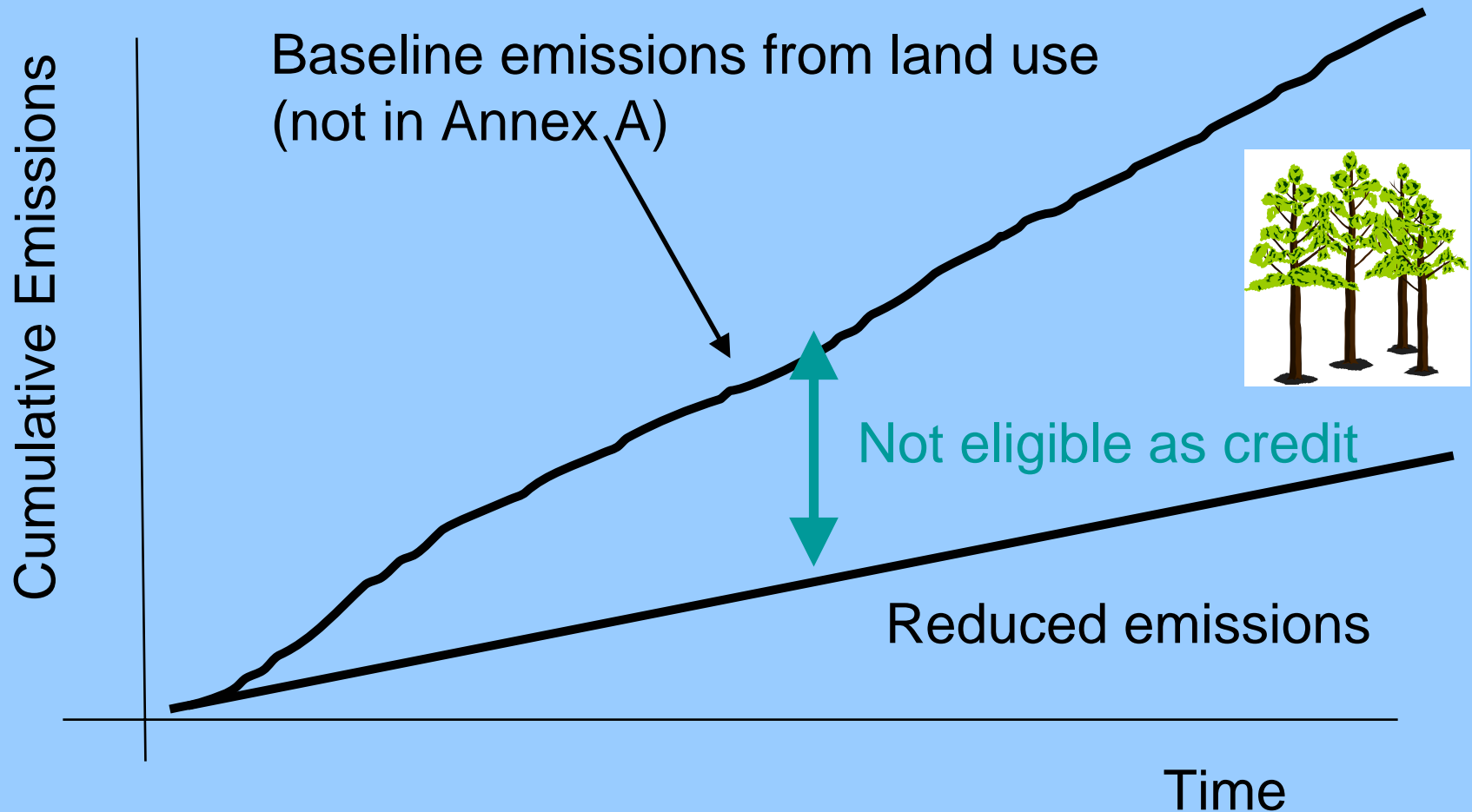
Baseline and GHG benefits from fossil fuel substitution

“The baseline for a CDM project activity is the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases that would occur in the absence of the proposed project activity.”



GHG benefits from bioenergy efficiency improvements

“A baseline shall cover emissions from all gases, sectors and source categories listed in Annex A (of the KP) within the project boundary.”



Bioenergy projects that are eligible

- **Bioenergy displaces fossil fuel (most proposed CDM bioenergy projects)**
 - Use of biomass residues (fuel switching, e.g. biomass residues)
 - Replacing coal, oil, natural gas, kerosene etc.
- **Renewable biomass displaces non-renewable biomass or fossil fuel**
 - ***I.C. Thermal energy for the user:*** renewable energy technologies that supply individual households or users with thermal energy that displaces fossil fuel or non-renewable sources of biomass.
 - ***I.D. Renewable electricity generation for a grid*** renewables, such as [...] biomass, that supply electricity to an electricity distribution system [...] supplied by at least one fossil fuel or non-renewable biomass fired generating unit.
- **Non-CO₂ greenhouse gases are reduced**
 - landfill gas recovery
 - Methane recovery through enhanced animal waste management
 - N₂O and Methane avoidance in agriculture

Bioenergy projects that are not eligible

- **Demand-side management activities in bioenergy systems**
- **Improvement of the efficiency of biomass production and conversion that leads to**
 - Less consumption of fuelwood or other biomass fuels
 - (or the same amount of fuelwood used to provide energy to more users)
 - Less degradation of lands
 - Less deforestation
 - More build-up of carbon on the land

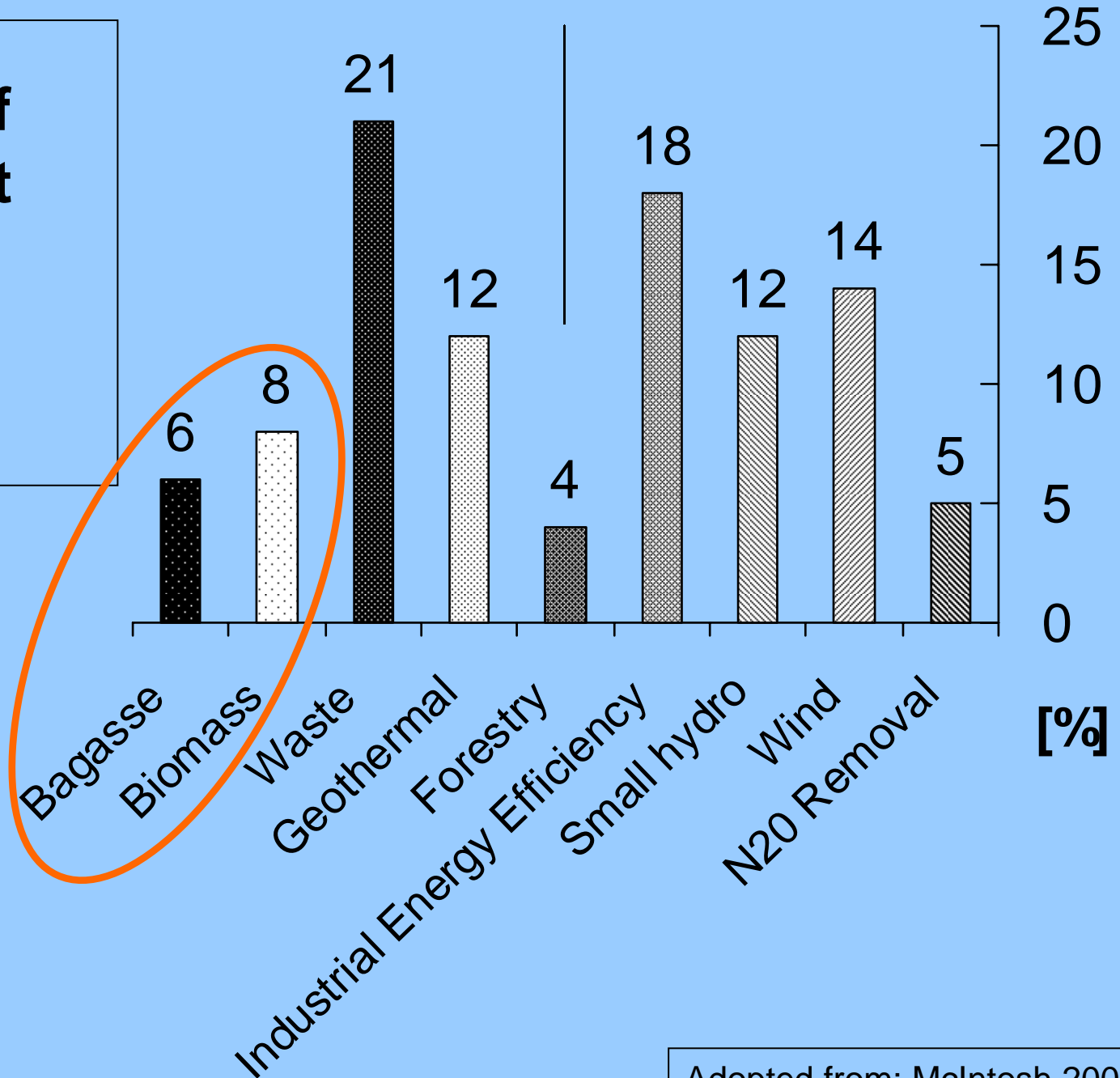
CDM and developing countries

- Biomass energy projects that displace the use of fossil fuel are 'in'

- Many developing countries do not have
 - Big opportunities for fossil-fuel reductions

- Most do have either:
 - High LULUCF emissions
 - Big LULUCF opportunities
 - Large share of biomass in primary energy

Share of different PCF Project Types



Geographical distribution of CDM projects

- According to the number of memoranda of understanding signed so far, the majority of CDM projects are expected to be carried out in India, China, South America, and South-East Asia.
 - Point Carbon 13/05/2004: *India currently boasts world leadership in the overall number of CDM projects in the official pipeline (methodology and validation submissions). Biomass energy is currently the prevailing project type*
 - Costa Rica and Chile hosting a combined total of 11 memoranda of understanding
 - CDM Watch (30/04/2004):
 - Total: 84 projects generating ~240 Million CERs
 - Thereof in SSA (excl. South-Africa): 5 Million CERs = ~2%

Source: *Venema and Cisse, 2004*

Use of biomass fuels in 7 developing countries (1997)

Country	Total energy consump. [PJ]	Bio-energy consump. [PJ]	Share of bio-energy [%]
Brazil	5,155	1,604	31.1
China	36,632	9,287	25.4
Egypt	1,502	380	25.3
India	16,554	8,543	51.6
Malaysia	1,488	663	44.6
Tanzania	954	925	97.0
Zaire	435	362	83.2

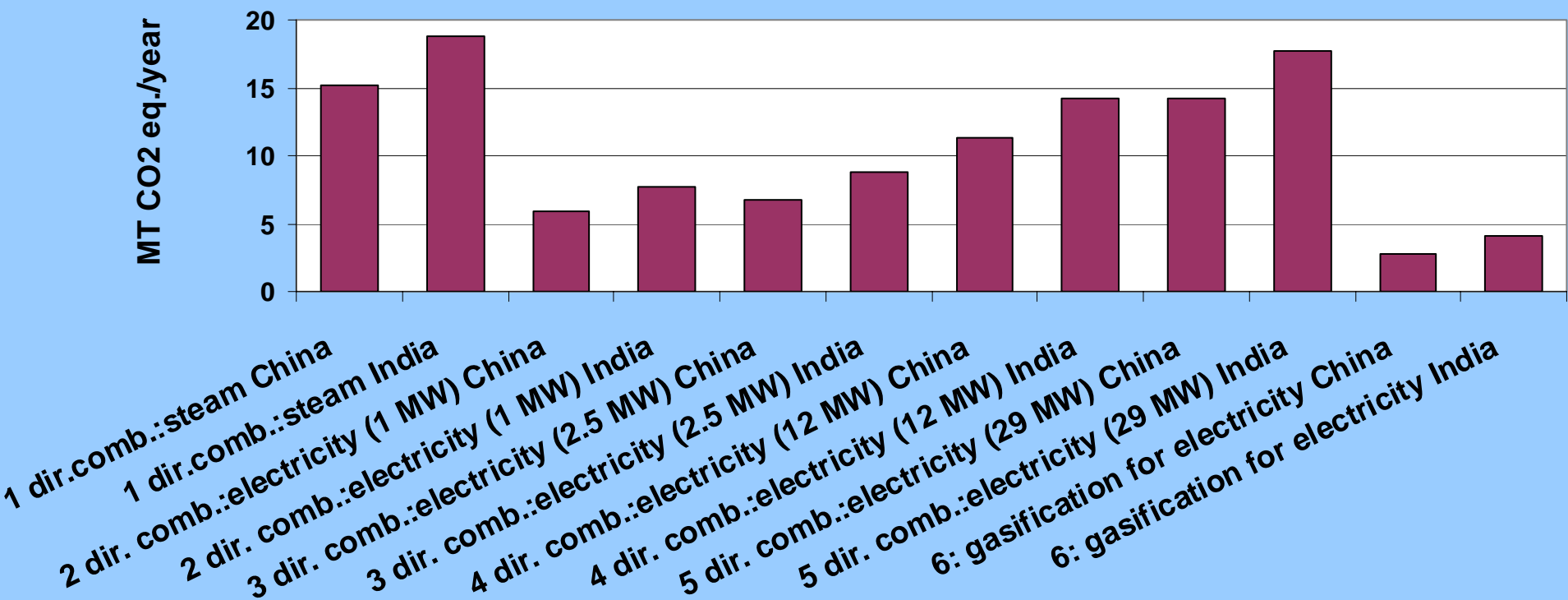
The Potential Climate Change Mitigation Benefits from Improved Efficiency of Biomass Conversion

Different categories of emission reductions from efficiency improvements have to be distinguished.

- Land-use related emission reductions and additional benefits
- Non-CO2 emission reductions related to end use efficiency (and possibly, conversion)
- CO2 emission reductions related to energy inputs into the fuel cycle, mostly during the production and conversion stages
- But: The land-use related emission reductions are not considered in the current rules!
- Additional benefits of efficiency improvements: indoor air quality, less time spent on fuel gathering

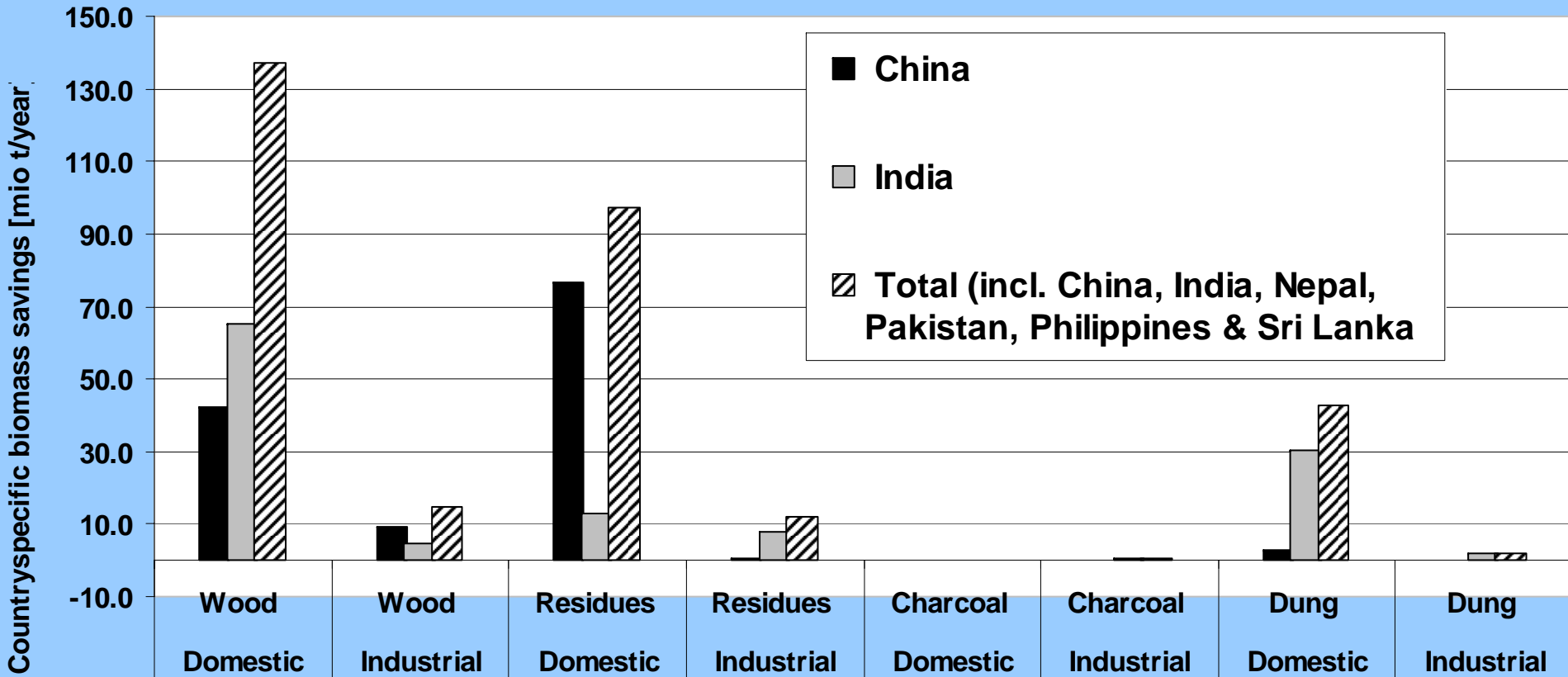


GHG emission mitigation potential of more efficient use of rice husk in different applications in India and China



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

Biomass savings due to increased energy efficiency of domestic fuel stoves and industrial bakery ovens, boilers, furnaces and kilns



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

Suggested Amendments of the CDM modalities and procedures for small scale project activities

CDM small scale project types

- **TYPE I - RENEWABLE ENERGY PROJECTS**, comprise renewable energy project activities with a maximum output capacity equivalent to up to 15 MW.
 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**, cover energy efficiency improvement project activities which reduce energy consumption, on the supply or demand side, by up to the equivalent of 15 GWh per year, and
 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**, cover other project activities, including methane capture and agriculture.

Three kinds of changes have been suggested:

1. The definitions of baselines have been slightly altered in order to include non-renewable biomass energy
2. The consistent differentiation between renewable and non-renewable biomass, in order to separate the respective baseline case from the project activity case.
3. The (explicit) inclusion of typical bioenergy technologies and appliances in the definition of the technologies and measures of the different relevant types of project activities.

One example for suggested amendments

- II.C. Demand-side energy efficiency programmes for specific technologies
- **Baseline**
- If the energy displaced is a fossil fuel or non-renewable biomass, the energy baseline is the existing fuel consumption or the amount of fuel that would be used by the technology that would have been implemented otherwise. The emissions baseline is the energy baseline multiplied by an emission coefficient for the fossil fuel or non-renewable biomass displaced. IPCC default values for emission coefficients may be used.

The BioCarbon Fund

- “The Biocarbon Fund explicitly requires that projects include rural development objectives” as well as climate change mitigation
- Besides Kyoto eligible projects (window 1) the BCF aims at prototyping sequestration in replicable asset classes of high social and environmental value (window 2). The following classes (can) include bioenergy:
 - Afforestation and Reforestation, i.a. fuel wood plantings at a commercial scale
 - Forest Management , i.a. alternatives to fuel wood for forest/environmental protection
 - Cropland Management
 - Biofuels
- For the BCF 2nd window the use of crop residues to produce energy combined with a carbon sequestration asset is considered as eligible project activity

Conclusions

- CDM rules are inconsistent and unclear about the eligibility of *Efficiency improvements of bioenergy systems*, hampering the biggest share of potential small-scale projects in developing countries, particularly in Africa
- Baseline and monitoring methodologies need further development, to include bioenergy efficiency.
- The potential benefits from efficiency improvements are significant, also compared to other types of project activities
- There is more to the carbon market than the CDM
- Collaboration between FAO and IEA bioenergy has been a very good experience



Grazie!

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