

Forth Regional EST Forum in Asia

Low Carbon Society & Green Growth

**Overall Strategy and Programs of the
World Bank in Carbon Finance and
Climate Change Mitigation Measures
in the Transport Sector**

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25 February 2009

Climate change “is a development, economic, and investment challenge.

It offers an opportunity for economic and social transformation that can lead to an inclusive and sustainable globalization.

That is why **addressing climate change is a critical pillar of the development agenda.”**



World Bank Group President Robert B. Zoellick

BALI, INDONESIA, December 12, 2007

... environmentally sustainable transport a part of this agenda

Contents

- **Challenges** in the transport sector
- **Strategies** for lower transport emissions
- World Bank financing **programs**
- Transport **project** examples

Challenges

Transport and Development

- Like energy use, the increase in transport services and related GHG emissions goes hand in hand with economic development.
 - Lower transport costs is a major contributor to economic growth (benefits of trade, agglomeration).
 - Rising incomes lead to more consumption of transport services.
 - Developing countries tend to imitate “western” models of development in the transport sector.
- *Is a decoupling of economic development and transport sector GHG emissions really possible?*

Transport and Climate

- Transport is a major contributor to GHG emission (~15%).
- Only sector in the world economy in which GHG emissions have consistently risen since 1990:
 - 1-2% in developed countries, 3-5% in developing countries,
 - 31% (1,400 mt CO₂) worldwide between 1990 and 2003.
- US, EU, Japan, and China account for 2/3 of global transport sector GHG emissions.
 - In 2030, 47% will come from developing countries.

<i>Country</i>	<i>Transport Sector Emissions (% of global)</i>	<i>Estimated change 1990- 2002 (%)</i>
United States	36	24
European Union	18	23
Japan	5	20
China	5	101
Brazil	3	60
Mexico	2	21
Total (MTCO₂)	4,600	28

The costs of climate change are dominated by other external costs of transport (US 2000)

TABLE 2
SUMMARY OF EXTERNAL COSTS

	cent/gal. ^a	cents/mile ^a
Central values for marginal external costs		
Fuel-related costs		
Greenhouse warming	6	0.3
Oil dependency	12	0.6
sum	18	0.9
Mileage-related costs		
Local pollution	42	2.0
Congestion, cents/mile	105	5.0
Accidents	63	3.0
sum	210	10.0

Notes

^aCosts converted assuming on-road fuel economy of 21 miles per gallon.

Transport and Technology

- Most motorized transport systems rely heavily on carbon intensive fossil fuels.
 - 95% of global transport energy use is based on oil.
 - Road transport accounts for 70% of global emissions.
 - Aviation 12%, shipping 11%, railways 2%.
- Technological alternatives to fossil fuels are still few and expensive.
 - Technical progress towards alternatives to oil has been slow.
 - Market penetration of fuel-savings and alternative technology is slow.
- Government policies often promote transport services.
 - Little success in promoting lower GHG emission technologies.
- The costs of technology substitution are particularly high in the transport sector.
 - High fixed and indirect costs (infrastructure lock-in, consumer behavior).

GHG emission reductions in the transport sector are often expensive ...

Project	Location	ER in 10 Years (Tons)*	Capital Cost US\$ / Ton*
Upgrade 100 Std Diesel Bus to Diesel Hybrid	India	49,000	~\$200
Upgrade 100 Std Diesel Bus to Fuel Cell	India	167,000	~\$180
Bus Rapid Transit Program	Mexico	465,000	~\$58
Install Electronic Dispatch System	Philippines	260,000	~\$3

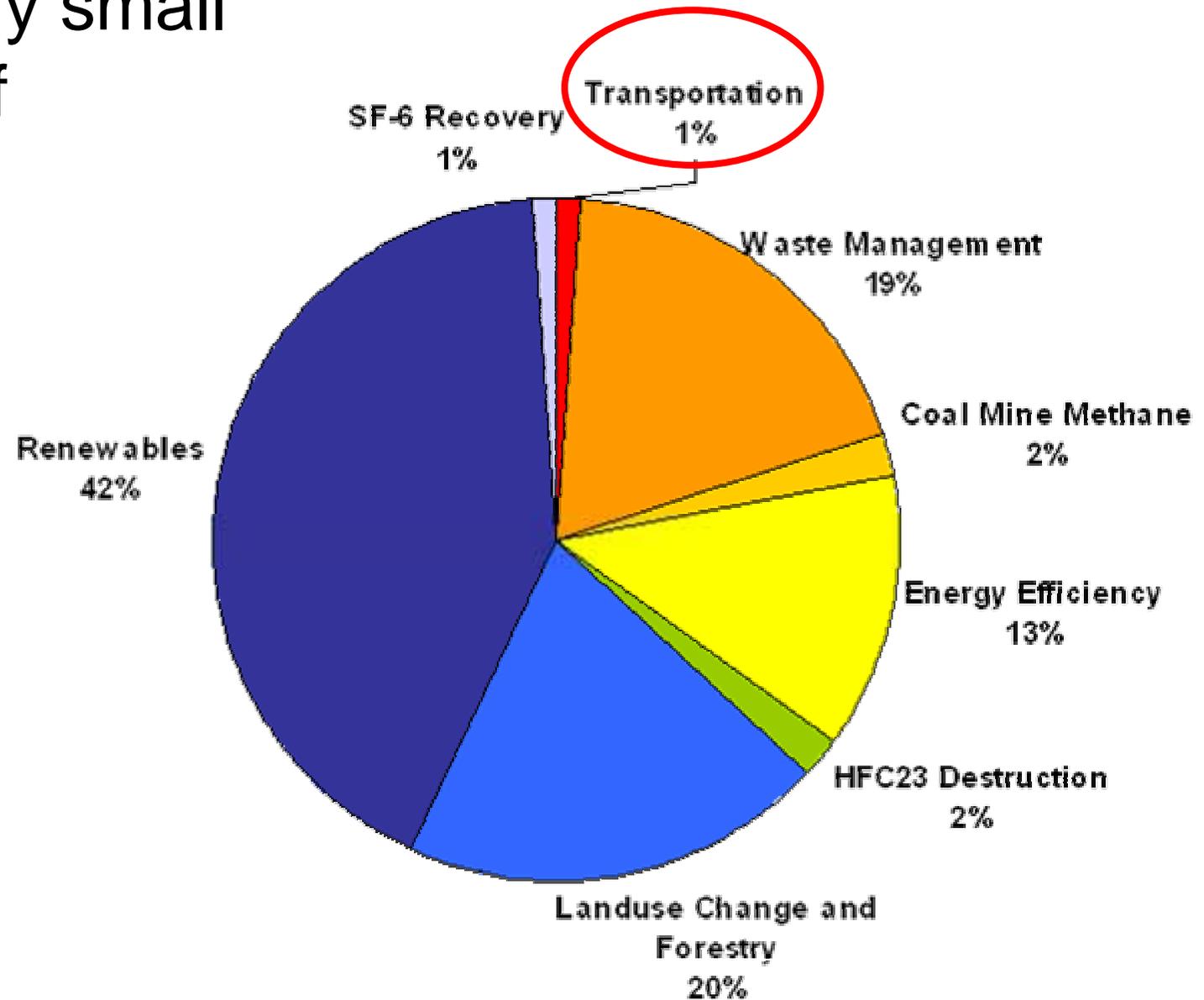
* Very rough estimates

- These few projects examples illustrate the range of cost per ton in transport sector GHG emissions reduction projects.
- Many projects are prohibitive without funding that is in addition to revenues from carbon credits.
- GHG mitigation in the transport sector can often not compete against lower cost opportunities in other sectors.

... and quantifying GHG reductions is difficult

- Monitoring transport sector emission reductions is inherently complex.
 - Uncertain cause-effect relationship between a project activity and the tonnes of CO₂ reduced.
 - Unclear project boundaries, rebound and free-rider effects.
 - Lifetime cycle emissions and other “leakages”.
 - Uncertain baseline, unclear additionality.
 - Expensive monitoring and complicated GHG calculations (computer modelling).
- Meeting the strict CDM requirements for Certified Emission Reductions (CERs) has proven particularly difficult:
 - Only 6 approved methodologies.
 - 14 “failed” methodologies.
 - Only 2 registered CDM transport projects.

Transportation projects comprise only a very small fraction of the World Bank's current carbon finance portfolio (1%).



Strategies

Development and Climate Change: A Strategic Framework for the World Bank Group

To help developing countries undertake “internationally appropriate **mitigation actions** in the context of **sustainable development**“ without compromising **growth**, by transferring **finance** and **technology** from developed countries in a “**measurable, reportable** and **verifiable**” manner (consistent with the Bali Action Plan).

- Recognizes the need for mitigation action in the transport and urban sectors.
- Areas of action:
 - Support climate actions in the development process.
 - Mobilize finance (governments, private sector, markets).
 - Support new, carbon-saving technologies.
 - Policy research, knowledge and capacity building.

World Bank Transport Business Strategy for 2008-2012

“Safe, Clean, and Affordable Transport for Development”

- Increases World Bank engagement in the roads and urban transport subsectors and in transport for trade.
- Recognizes the need to reduce transport GHG emissions.
 - Supply and policy-induced modal shift.
 - Support adoption of carbon-saving technologies.
 - Policy integration / coordination, sector reform, and harnessing of co-benefits (global & local) reduces costs.
- Emphasizes sustainability and the impacts of transport on economic and human development:
 - Positive: contribution to the Millennium Development Goals.
 - Negative: external costs (pollution, congestion, safety, health, ...).
- Operational guidelines “Transport, Energy and Climate Change” is under preparation.
 - Integration of climate change issues into World Bank project appraisal.

Mitigation Finance in the Transport Sector

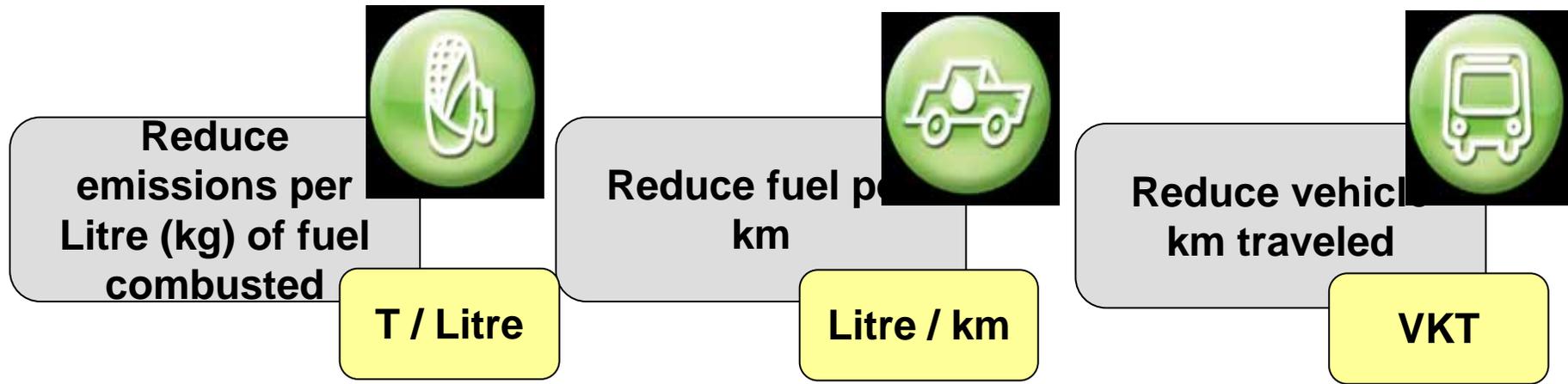
UNFCCC COP11 (2005):

- Set transport as a priority area for CDM,
- Agreed to CDM “Programs of Activities”,
- ➔ ... but little success so far.

World Bank Strategy:

- Development of new mitigation finance instruments (CPF, CTF).
- Leveraging an array of co-financing instruments.
 - GEF, carbon market, investment support, lending, guarantees, ...
 - Co-financing for (local) co-benefits, leveraging the credibility of the CDM process (e.g. monitoring and verification).
- New CDM methodologies and approaches for transport projects (small-scale combination methods, programs, regional, sub-sector methods).
- Carbon finance strategy paper for transport sector (under preparation).
- Integration with broader policies (e.g. urban planning) and programs.

New CDM Methodologies Category Break Down



- Switch to low-carbon fuels
- Switch to electricity

- High fuel economy vehicles
- Engine maintenance
- Operations improvement
- Anti-idling measures
- Improved driving surfaces
- Congestion relief
- Replacement tire standards

- Fleet management
- TOD planning
- Parking controls
- Fiscal incentives
- “Mode switch”
- HOT / HOV lanes
- Telecommuting programs
- Vehicle registration quota

Sectoral Approaches to Methodologies

- CDM Program of Activities
 - Combination of several small-scale methodologies (COP14), potentially important for some transport projects.
- Aggretate emission reductions: from tons towards trends.
 - A common, conservative baseline / emission factor for a (sub)sector or multi-project activities: e.g., carbon intensity or emissions per unit output (e.g. VKT).
 - Standardization of methodologies:
 - “Agreed” additionality (eligibility) of certain technologies or activities.
 - Approved benchmarks, emission factors, conservative baselines, discount factors, etc.
 - “Deemed savings” approaches: pre-determined savings or emission credits per unit of activity.
 - Spacial approaches: e.g., city-wide baseline and “project” emissions.

Programs

Global Environment Facility (GEF)

- GEF allocated US\$2.4bn to climate change (1991-2008).
- GEF-4 replenishment: \$1bn for climate change over 4 years.
- **Objective** – Reduce GHG emissions through transforming markets.
- **Mitigation target** – GHG emissions equivalent to 400m tCO₂.
- **GEF-4 strategic programs** for financing of mitigation:
 1. Energy efficiency in buildings.
 2. Energy efficiency in industrial sector.
 3. Market approaches for renewable energy.
 4. Sustainable energy from biomass.
 5. Sustainable, innovative urban transport systems.
 6. Management of land use, land use change, and forestry (LULUCF) to protect carbon stocks and reduce emissions.
- **GEF OP-11: Promoting Environmentally Sustainable Transport**
 - Target activities: Strategic planning, targeted research, capacity building, demonstration and investment projects, market transformation, dissemination.
 - Scope: Modal shift, non-motorized transport, fuel-cell / electric / hybrid vehicles, advanced biomass fuel.

WB Carbon Funds and Facilities

- Carbon markets surpassed US\$100bn by end 2007
 - CDM 7.4 bl, JI 0.5 bl
- WB 1st generation carbon funds (“Kyoto Funds”)
 - US\$2.2bn pledged – ca. US\$350m uncommitted
 - 10 funds with 16 governments, 66 companies
 - **Very few transport projects**
- WB 2nd generation CF facilities (“Post-2012”)

Carbon Partnership Facility (CPF)

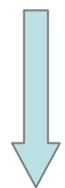
- An open platform for future World Bank carbon finance operations.
- “Larger scale” and “longer term” programs to help reduce emission trajectories in sectors and countries.
- **Transport is a target sector.**

CPF – Structure

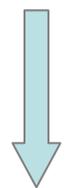
“A partnership for lower-carbon transformation”

Carbon Partnership Facility

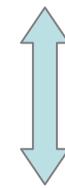
Seller and Buyer Participants + Partners (host governments & donors)



Participants & Partners provide funds



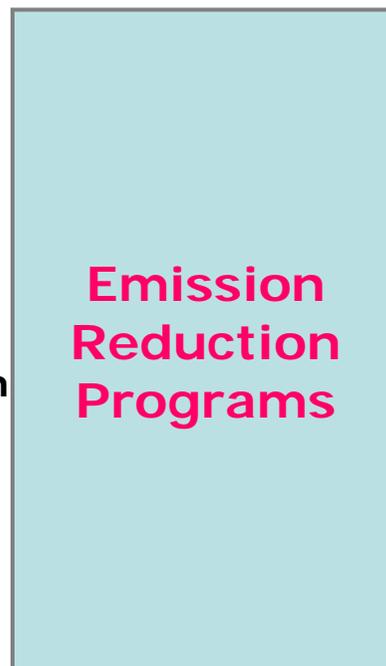
Sellers propose & develop programs



Buyers provide funds & receive ERs



Preparation funding



ERPAs



CPF: Objectives, Features, Portfolio

Objectives:

- Targeting long-term emissions
- Scaling up of mitigation action
- Strategic, transformational interventions in sectors
- Sustainable development

Features

- Programs (not only CDM Programs of Activities)
- Client execution, WB assistance to develop program framework
- Purchase for 10 years post-2012

Tranches and windows:

- First tranche open for contributions, target size: €350m, max. €700m
- Further tranches planned, overall size: potentially US\$5bn over 5 years

Portfolio (1st tranche):

- Energy generation, transmission, distribution - Energy efficiency - Waste Management - Oil and gas – **Transportation**
- Thematic approaches: **urban**, rural, industrial development

Program Criteria (CPF Tranche 1)

- Consistent with UNFCCC, Kyoto Protocol, or a future climate agreement.
- Broad program types with focus on priorities for each tranche.
- Manageable technology risk:
 - technology commercially available or demonstrated
 - or at an advanced stage of development.
- All Kyoto GHGs, anthropogenic emissions from specified sectors.
- Predictable GHG reductions, acceptable level of uncertainty.
- Reductions must be monitorable, reportable, verifiable.
- Combination with World Bank operation preferred.

Carbon Asset Development Fund (CADF)

- Provides grants to host countries and/or sellers for:
 1. Upstream program identification and related capacity development
 2. Program Idea Notes (Program PINs)
 3. Development of CPF programs and program framework (plans, procedures)
 4. Application of CDM / JI Methodology and program documentation
 5. Identification of / training for program Managing / Coordinating Entity
 6. Specific program-related work on enabling environment
- Governments can sign a Partnership MoU with the WB.
 - Work in partnership with WB to identify and develop ER programs.
 - Participate in governance of the Facility in an advisory role.
 - May enter into Grant Agreement for technical assistance (1 & 6 above).
 - May become a Seller Participant by submitting a PIN and signing a Participation Agreement.

Clean Technology Fund – A World Bank Trust Fund

Multilateral Development Banks (MDBs) and government donors have joined forces:

- to establish a portfolio of funds and deliver financing,
- that will scale up investments to meet the challenges of climate change, and
- unleash the potential of public and private sectors to address climate change.

Partnership Forum (Climate Investment Funds)

CTF Trust Fund Committee

equal representation

(8 members from both donors and recipient countries)

Observers

from relevant organizations (GEF, UN, ...)

Decides about investment proposals.

Available funds: US\$5.2bn / 4 years

CTF: Objectives, Features, Portfolio

Operational objectives:

- Scaled-up financing ...
- for demonstration, deployment and transfer of low-carbon technologies
- with a significant potential for long-term GHG emissions savings
- to begin the transformation towards more climate friendly economic development
- based on country strategies and programs.

Operational features:

- Joint MDB investment plan (for East Asia: IBRD, IFC, ADB)
- Concessional finance, grants, guarantees
- Can be used together with other funding sources (IBRD, CDM...)
- Client executed

CTF portfolio (priority sectors):

- Power sector – renewable energy, highly efficient technologies
- **Transport – efficiency and modal shifts**
- Energy efficiency – buildings, industry, agriculture

CTF Investment Criteria

Eligible for CTF funding are countries that:

- are eligible to receive development assistance (ODA).
- have an active program with the WB or a regional MDB.

Investment criteria:

- Potential for significant GHG emissions savings
- Cost-Effectiveness
- Demonstration Potential at Scale
- Development Impact
- Implementation Potential
- Additional Costs and Risk Premium

Source: “CTF Investment Criteria for Public Sector Operations”
(<http://www.worldbank.org/cif>)

CTF Financing Terms

- **Grants:**
 - largely for program / project preparation (ca. US\$1 million per project),
- **Soft financing:**
 - IDA-like terms to be co-financed with MDBs
 - Grant component on average 50%: covers identifiable additional costs / risk premium that makes the investment viable.
- **Guarantees:**
 - to mitigate specific investment risks.
- Combination with other financing instruments (GEF, CDM) is possible for larger impact.

CTF – First Experience

- CTF funding available for 15-20 investment plans.
 - To tap large-scale investment and reduction potentials.
 - Projects should average around US\$100m in CTF co-financing.
- CTF Committee: Convincing transformation to lower GHG emission trajectory is most important criterion for CTF financing.
- CTF is developing GHG evaluation framework:
 - “Criteria for Assessing the GHG Reduction Potential for Transport Sector Projects Proposed for CTF Financing”.

CTF – “First Movers”

- First investment plans endorsed by CTF Committee (1/09)
- Mexico:
 - **Urban transport (country-wide BRT implementation)**
 - Renewable energy (wind)
 - Energy efficiency (lighting, appliances)
- Egypt:
 - **Urban transport: City-wide (Cairo) transport upgrading (BRT, LRT, CNG-hybrid buses, ...)**
 - Wind energy scale up
- Turkey:
 - Renewable energy (several)
 - Smart grid (for wind power management)
 - Energy efficiency

Projects

Mexico City Insurgentes BRT

A Comprehensive Initiative that Reduces Emissions from Many Sources

The Project:

- Pilot BRT corridor
- 19.3 km long crossing the city
- 2 terminals, 34 stations
- 80 articulated buses, replacing around 350 buses and micros
- 250,900 trips per day
- Average Speed: 23.0 Km/hr

Emission Reductions:

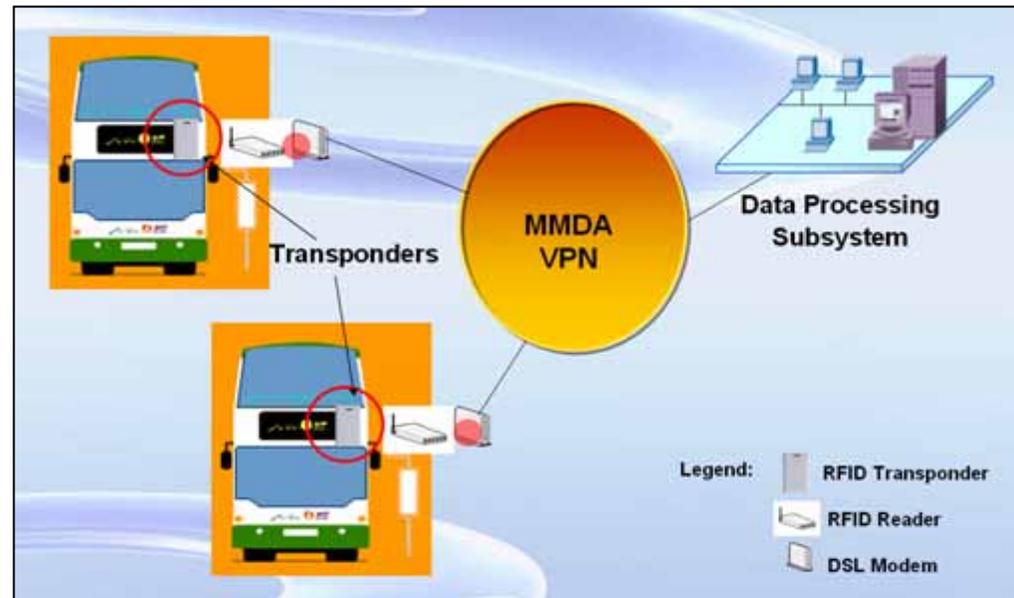
- 46.5 Kt CO_{2e} p.a.
- 38% improvement on buses
- 38% improvement on other vehicles
- 27% due to modal shift
- -3% impact on other vehicles (leakage)



Electronic Bus Dispatch System for Manila

An Affordable Transport GHG Emissions Reduction Solution

- Radio Frequency Identification (RFID) tag system will enable local transport authority to enforce driving rules, thereby reducing driver deviation from specified routes and “trolling” practices.
- System optimizes the number of VKT required to transport a given number of riders over a given distance.
- Carbon finance can cover the capital costs of the system.
- Expected GHG emissions reductions: ~25,000 tons per year.
- World Bank is preparing a new small-scale CDM methodology to support the project.



Tianjin Eco-City

GHG savings as part of environmentally friendly city planning

- New urban development:
 - Integration of economic and ecological concerns
- Transport concerns built into city design:
 - Transit oriented development
 - Walking, cycling within urban precincts
 - Access to transport hubs along a new metro
 - Integrated public transport system
 - Low pollution transport modes
 - “Intelligent” traffic management system
 - Limitations to car usage within eco-city
- Identification of CDM opportunities:
 - World Bank is working on methodologies to support eco-city concept (modal shift, LRT, hybrid buses, ...)
- Concept study “Eco2”:
 - Lessons for ecologically and economically sustainable cities.

Conclusions

... towards climate friendly transport

- Developing a climate friendly transport sector is a long-term commitment.
- The effective use of financing instruments for mitigation of transport GHG emissions requires:
 - Excellent understanding of the role climate finance can play in the transport sector.
 - Consideration of, and funding for, public co-benefits in transport projects.
 - A strategy for integration and leveraging of financial flows from different sources.
 - Programmatic approaches for cost-effective replication and scaling up.
 - CDM rules and methodologies that are better suited for use with transport sector projects.
 - *Integration of transport planning and policy making under climate constraints.*

More information

<http://www.carbonfinance.org>

<http://www.worldbank.org/cif>

<http://www.thegef.org>

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Thank you!

Back-up Slides

Approved CDM Methodologies for Transport Projects

1. **AM0031** Bus Rapid Transit
2. **AM0047** Production of biodiesel based on waste oils and/or waste fats from biogenic origin for use as fuel
3. **AMS III.C** Emission reductions by low-greenhouse gas emitting vehicles
4. **AMS III.S** Introduction of low-emission vehicles to commercial vehicle fleets
5. **AMS III.T** Plant oil production and use for transport applications

World Bank Transport CDM Projects & “Meths”

Code	Description	Location	Status
AMS-IIIC	Mumbai EMU Regenerative Braking	India	PDD Complete
AM 0031	Cartagena BRT	Colombia	Preparing PDD
AM 0031	Bucaramanga BRT	Colombia	PIN Approved
AM 0031	Protransporte BRT	Peru	PIN Approved
AM 0031	Metrobus Expansion	Mexico	Reviewing PIN
AMS-IIIC	India Railways Regenerative Braking	India	Reviewing PIN
NM xxxx	India Highways	India	Reviewing PIN
NM xxxx	Fleet Fuel Economy (Goods)	Chile	Reviewing PIN
NM xxxx	Light Rail Transport	Egypt	Drafting PIN
NM 0029	Metrobus Insurgentes	Mexico	Rejected; Reapplying
NM 0237	Bus Dispatch System	Phillippines	Rejected; Reapplying
NM 2079	Transit Oriented Development	China	Rejected
NM xxxx	Fleet Fuel Economy (Transit)	India	Preparing NM
NM xxxx	Green Pavement Production	India	Preparing NM

World Bank Carbon Funds & Facilities

(1st generation “Kyoto Funds”)



16 governments, 66 companies: funds pledged: US\$2.2bn – ca. \$300m uncommitted.

Specialty funds (CLOSED)



Prototype Carbon Fund: \$180m, multi-purpose, pilot fund.



Community Development Carbon Fund – T1: \$128.6m, small-scale CDM projects.



BioCarbon Fund – T1: \$53.8m CDM and JI LULUCF projects.



Umbrella Carbon Facility – T1: \$737.6m (2 HFC-23 projects in China).

OPEN for new projects:

BioCarbon Fund – T2: \$38.1m

Community Development Carbon Fund – T2: planned.

Country funds (CLOSED)

Netherlands European Carbon Facility: NL Min. Economic Affairs. JI projects.

Spanish Carbon Fund – T1: €220m, multi-purpose.

Carbon Fund for Europe: €50m, multi-purpose.

CLOSING:

Netherlands Clean Development Mechanism Facility: NL Min. Env., CDM energy, infrastructure and industry projects.

Italian Carbon Fund: \$155.6m, multi-purpose.

Danish Carbon Fund: €58m, multi-purpose.

OPEN for new projects:

Spanish Carbon Fund – T2: \$70m, multi-purpose.



What is an ER Program?

- A series of the same and/or associated activities for which a common approach can be developed
- Involves scale-up through replication and “mass-production”
- May include multiple entities undertaking the investments, and involve one or several ERPAs
- May be undertaken through a program implementing agent
- Would support sectoral strategies and transformation
- May include elements that help create or improve the enabling environment, and assist with technology dissemination

Possible Transport Sector Programs

- Address transport emissions in the context of an urban low-carbon program in cooperation with a municipal government, e.g.
 - Investment in Urban public transport (e.g., BRT, Metro,)
 - Infrastructure maintenance and traffic management systems e.g., minimize fuel consumption through routing and passenger load optimization
 - Fleet management and vehicle upgrade (e.g., effective maintenance and hybrid vehicle)
- A country-wide low-carbon transport program in collaboration with the national government, e.g.
 - System improvements (rail cars, ships, highways)
 - Strengthen fuel efficiency and emission standards
 - Fuel replacements (e.g., hybrid, H2, sustainable biofuel)
 - Non-motorized transport

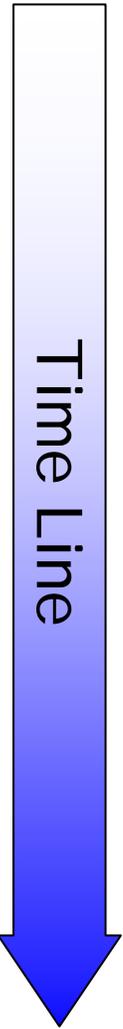
New CDM Methodologies

There are still many untapped opportunities
in transport and CDM.

- Green Pavement
 - Bank is developing a new small scale methodology for emissions reductions in asphalt production.
 - Developing a pilot project to be tied to a national highway Bank lending project in India
- Improved Fleet Fuel Economy through O&M Measures
 - Bank is working with local bus companies in India and international bus manufacturers to estimate impact of various O&M measures (e.g., use of low-emissions tires, driver behavior training, etc.) on fuel economy for mass passenger transport vehicles
 - Bank is also working with Chilean government to determine impact of similar measures on goods movement vehicle fleets.

Procedures for CTF Financing

Time Line



- Initial discussions on country interest and potential in participating in CTF.
- Client country (CIF focal point) requests joint mission.
- Under country leadership WBG & ADB develop joint Investment Plan (IP)
- CTF Committee reviews IP and endorses further development of projects in the IP for CTF financing
- Project preparation follows MDBs's procedures
- TF committee reviews and approves CTF co-financed projects at pre-appraisal stage

CTF Investment Plan Outline

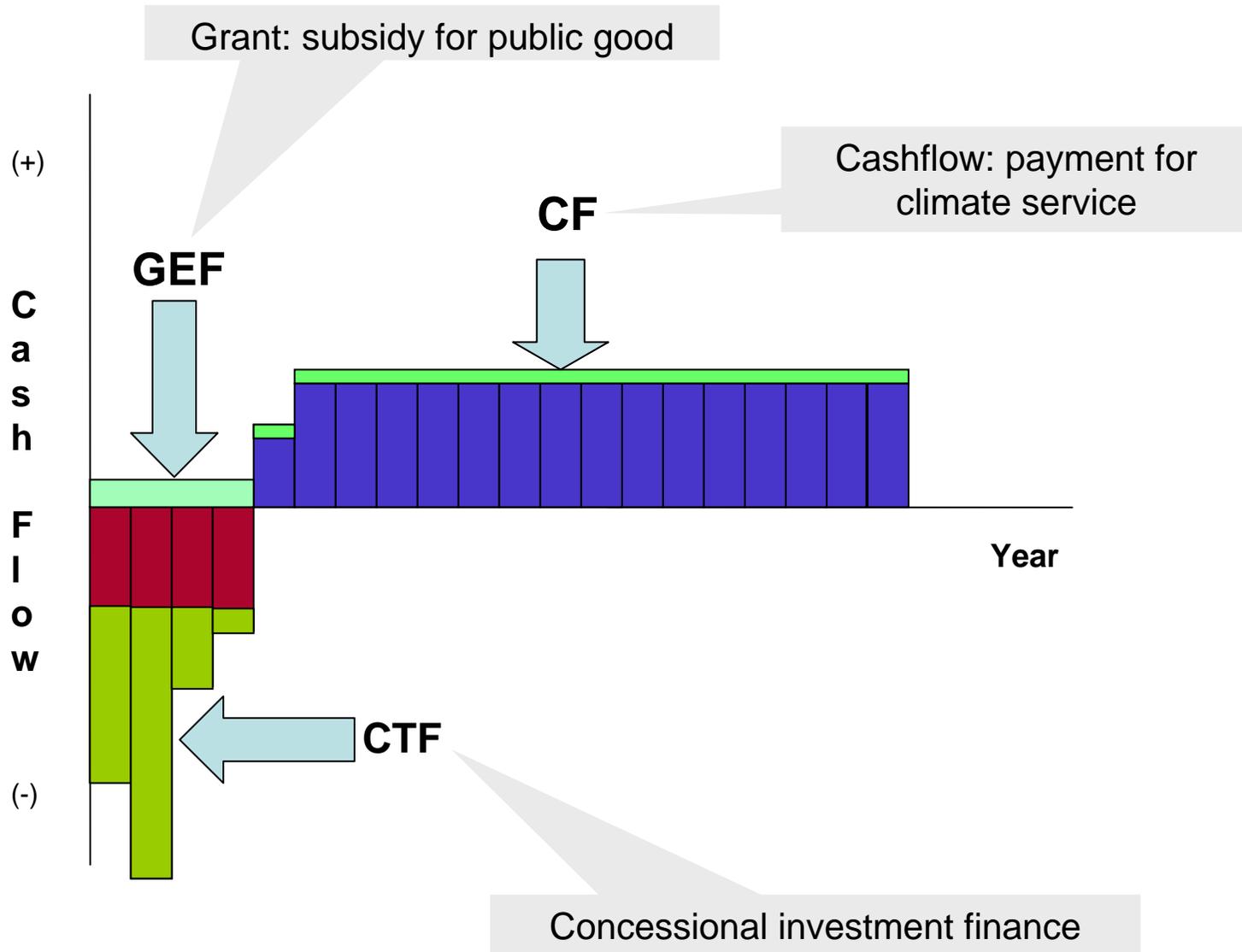
Main Part:

- **Description of the country and sector context**
- **Identification of priority sectors/sub-sectors for GHG reduction interventions**
- **Rationale for selected sector or sub-sector for CTF co-financing**
- **Enabling policy and regulatory environment**
- **Implementation potential, including risk assessment**
- **Financing plan and instruments**

Annex:

- **Summary of proposed project pipeline**
- **Notional CTF resource allocation**
- **Problem statement, rationale for CTF financing**
- **Financing plan, project preparation timetable**

Synergies in Project Finance



More information

<http://www.carbonfinance.org>

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<http://www.thegef.org>

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Thank you!