The World Bank’s 10 years of experience in carbon finance:

Insights from working with carbon markets for development & global greenhouse gas mitigation

[Interim findings]

Martina Bosi, Senior Carbon Finance Specialist, Carbon Finance Unit, The World Bank

Side event at Barcelona Climate Change Talks 2009
Room Aliso
November 5, 2009 (13:00 to 15:00)
Today’s discussion

Introduction

Insights & analysis

The impact of carbon finance

Considerations going forward
The World Bank’s carbon finance activities
An early market entrant and helped drive innovation

<table>
<thead>
<tr>
<th>World Bank focus</th>
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<tbody>
<tr>
<td><strong>Objectives</strong></td>
</tr>
<tr>
<td>❑ Strengthen capacity of developing countries to benefit from carbon market</td>
</tr>
<tr>
<td>❑ Assist in building, sustaining &amp; expanding carbon market</td>
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<tr>
<td>❑ Ensure CF contributes to sustain. development</td>
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<tr>
<td><strong>Means</strong></td>
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<tr>
<td>❑ Learning-by-doing approach &amp; diversification</td>
</tr>
<tr>
<td>❑ Model: create demand through carbon funds – and then originate projects</td>
</tr>
<tr>
<td>▪ Often purchase post-2012 vintages</td>
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<tr>
<td>▪ WB’s environmental &amp; social safeguards</td>
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<tr>
<td>❑ Investing in capacity building</td>
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<tr>
<td><strong>Impact</strong></td>
</tr>
<tr>
<td>❑ Increasing carbon fund volume over time: from $160 million in 2000 to ~$2.5 billion now</td>
</tr>
<tr>
<td>▪ 16 sovereign governments and 66 private sector participants from 3 continents</td>
</tr>
<tr>
<td>❑ Developer of – and contributor to – new methodologies</td>
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</table>

A catalyst for the CDM & JI primary market

**Value of CDM & JI transactions (per year)**

<table>
<thead>
<tr>
<th>Year</th>
<th>WB market share</th>
<th>World Bank</th>
<th>Other</th>
<th>Source: State and Trends of the Carbon Market (WB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>31%</td>
<td>$0.1</td>
<td>$0.1</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>14%</td>
<td>$0.3</td>
<td>$0.3</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>15%</td>
<td>$0.4</td>
<td>$0.4</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>39%</td>
<td>$0.9</td>
<td>$2.0</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>5%</td>
<td>$2.0</td>
<td>$2.5</td>
<td></td>
</tr>
</tbody>
</table>

**Capitalization of Carbon Funds (US$ billion)**

<table>
<thead>
<tr>
<th>Year</th>
<th>World Bank</th>
<th>Other</th>
<th>Source: ICF International</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>$0.1</td>
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<td></td>
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<tr>
<td>2008</td>
<td>$2.0</td>
<td>$2.5</td>
<td></td>
</tr>
</tbody>
</table>
The World Bank’s portfolio
Currently consists of about 200 projects in 57 countries with diverse technologies

World Bank carbon finance portfolio – by country

Key
- Country with active project
- Projects in country, if >4

Regional breakdown

Projects by region
WB n=212; CDM JI overall n=4,820

- E. Europe 18%
- Africa 21%
- LAC 26%
- S. Asia 25%
- E. Asia 21%
- Middle East 5%

World Bank
- E. Europe
- Africa
- LAC
- S. Asia
- E. Asia

CDM JI overall*
- E. Europe
- Africa
- LAC
- S. Asia
- E. Asia

*Source: UNEP RISØ
Building a portfolio: learning by doing

Significant time and resources are necessary to develop projects to create a strong portfolio

- World Bank carbon transaction work started in 2000, 5 years before the Kyoto Protocol entered into force
- Pioneering has meant engaging with a large number of projects, many of which were ultimately not pursued
- Still more learning ahead as more projects progress towards implementation, registration / final determination, GHG reductions and issuance of Kyoto credits
Methodology development: calculating & monitoring GHG reductions
There has been significant learning and development of methodologies. Once approved, a methodology is a “public good”.

### World Bank CDM methodology submissions

**World Bank Facts:** 52 new methods submitted. 64% accepted, 23% rejected, 13% currently being processed.

**Cost:** Approx. $125,000 per methodology.

**Time:** 2 years for development & approval of a new methodology.

#### Total cumulative CDM methodologies (approved; withdrawn/rejected; and pending)

<table>
<thead>
<tr>
<th>Year</th>
<th>New Meths</th>
<th>Approved</th>
<th>Withdrawn</th>
<th>Pending</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003-2004</td>
<td>350</td>
<td>0</td>
<td>0</td>
<td>350</td>
</tr>
<tr>
<td>2005</td>
<td>250</td>
<td>0</td>
<td>0</td>
<td>250</td>
</tr>
<tr>
<td>2006</td>
<td>150</td>
<td>0</td>
<td>0</td>
<td>150</td>
</tr>
<tr>
<td>2007</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>2008</td>
<td>50</td>
<td>0</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>2009</td>
<td>40</td>
<td>0</td>
<td>0</td>
<td>40</td>
</tr>
</tbody>
</table>

#### Approved CDM methodologies by sectoral scope

- Energy industries (#1)
- Manufacturing industries (#4)
- Afforestation and reforestation...
- Chemical industries (#5)
- Waste handling and disposal (#13)
- Energy demand (#3)
- Fug. emissions from halocarbons...
- Fug. emissions fuels (#10)
- Metal production (#9)
- Transport (#7)
- Agriculture (#15)
- Energy distribution (#2)
- Mining/mineral production (#8)
- Solvent Use (#12)
- Construction (#6)

- World Bank submissions
- Rest of CDM Submissions

- 0
- 5
- 10
- 15
- 20
- 25
- 30
- 35
- 40

- Number of approvedmeth

**INSIGHTS FROM WORKING WITH CARBON MARKETS FOR DEVELOPMENT & GLOBAL GREENHOUSE GAS MITIGATION**
Carbon finance on the ground: incentivizing climate action
Sparking the imagination of entrepreneurs

Use of renewable energy in the iron and steel industry in Brazil
Carbon finance was critical in supporting the Brazil Plantar Project – consisting of 3 CDM projects covering the supply chain – in becoming the only one producing pig iron entirely from renewable plantations. It is a sustainable development model that authorities now seek to replicate in Brazil.

Micro projects in Africa and LDCs
Carbon finance can make the difference to overcome first investment barrier and finance local energy efficiency programs (e.g., Senegal - Lighting Energy Efficiency in Rural Electrification; Rwanda - CFL Energy Efficiency Project; and Nepal - Biogas Program).

Construction sector in Bangladesh
Carbon finance has been the driver for greening this sector, characterized by small plant holders (Bangladesh - HHK Kiln Efficiency Project).

Transforming solid waste management
Carbon finance is providing critical incentives across the developing world to recover otherwise released methane gas. The China Tianjin Landfill Gas Recovery and Gas Utilization project applies state-of-the art technology to produce electricity using landfill gas.
Today’s discussion

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The impact of carbon finance

Considerations going forward
Features of successful CDM and JI projects
Key elements found in successful carbon finance projects mirror those for development projects

1. A committed project champion
   - Champion should be within project proponent company or ministry
   - External technical assistance also necessary when low capacity

2. Strong project design & planning at start (feasibility, financial, methodology assessments)
   - Detailed upstream (financial & technical) due diligence on project ideas
   - Important to consider monitoring requirements early on

3. Underlying financials must be strong
   - Projects must make financial – as well as technical - sense to lead “to real, measurable and long-term benefits related to mitigation of climate change” (Kyoto Protocol, Article 12)

4. Potential to reduce emissions
   - Projects that can reduce large volumes of GHG reductions relative to their baseline will be more attractive to investors and carbon buyers
   - The possibility of earning significant amounts of carbon revenues through certified emission reductions incentivizes performance over time
   - Projects w/ larger emission reductions volume better absorb CDM transaction costs
Insufficient predictability constrains carbon finance impact
Challenge of balancing learning-by-doing with need for regulatory predictability

1. The end of the Kyoto Protocol’s first commitment period
   - Credits start at time of registration; delays cannot simply be recuperated by later vintages because of 2012 deadline
   - Longer carbon finance revenue streams needed but uncertainty regarding post-2012 regime impacts demand

2. Long & costly CDM project cycle
   - Long and unpredictable project cycle is difficult for project viability; payments are based upon performance (delivery of CERs)

3. Frequent methodology revisions
   - Good to have continuous improvements through learning-by-doing; but too frequent revisions with lack of predictability and insufficient grace period creates instability and has cost implications

4. Recognizing & financing a viable CDM project
   - The greater the predictability, the better carbon finance can be understood by investors and the better the prospects for leveraging underlying finance
Key risks for carbon finance projects

Host country & implementation risk
- Carbon finance (CF) projects subject to underlying host country risks
- Enabling environment needed to attract carbon finance
- Capacity of developer to implement as per project design document (monitoring)
- Impact of technology performance on CERs and cash flows

CDM regulatory risk
- Lack of visibility post-2012
- Additionality interpretation & methodology delays
- CDM project cycle (~12 months for validation & 6 months for registration)
  - too long for private sector decision-making
  - too long for payments to reach project entities

Emission reduction success rates (by technology)**

- Geothermal
- Fugitive
- Fossil fuel
- LFG
- Wind
- HFCs
- Biomass
- Hydro

0% 50% 100% 150%

Registration process length*

- Months:
  - 2004-2007: 8, 11 (World Bank: 8, Registration: 11, CDM overall: 11)
  - 2008-2009: 19, 18 (World Bank: 19, Registration: 19, CDM overall: 18)

Validation: ~12 months
Registration: ~6 months

* Source UNEP RISØ
**Source UNEP RISØ – Issuance success
Costs of generating certified emission reductions
The World Bank’s experience shows a wide range of costs varying by project size and technology, with an upward trend

Carbon finance project costs

<table>
<thead>
<tr>
<th>Technology</th>
<th>$ / expected ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial Gases</td>
<td>$0.20 $0.40 $0.60 $0.80</td>
</tr>
<tr>
<td>Hydro</td>
<td></td>
</tr>
<tr>
<td>Methane Avoidance</td>
<td></td>
</tr>
<tr>
<td>Landfill Gas</td>
<td></td>
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<tr>
<td>Biomass Energy</td>
<td></td>
</tr>
<tr>
<td>Wind</td>
<td></td>
</tr>
</tbody>
</table>

- Development of carbon finance project from time of project idea acceptance to signing of emission reductions purchase agreement (ERPA):
  - ~2 years and costs on average ~$200k

- CDM costs (validation & periodic verification) are in addition

*Inflation-adjusted (2009 dollars) €/$ rate =1.40
Environmental integrity is essential but proving “additionality” remains a challenge

Environmental integrity is essential…

…for both the overall climate regime and the carbon market

Environmental integrity preserved through additionality …

….but additionality remains subjective in many cases
  ▪ the “without project” scenario cannot be verified – by definition
  ▪ individual investment decisions (and assumptions) are difficult to generalize

Clear, practical and predictable rules and criteria are needed…

…to clarify & streamline requirements for demonstrating additionality
  ▪ while reflecting different circumstances and local practices
  ▪ greater certainty in interpretation of additionality and time delays (for meth approval, validation, registration, and issuance of CERs) would strengthen carbon finance impact
Methodology development: opportunities and challenges

Despite impressive increases in the numbers of methodologies, broad applicability remains a challenge

Bottom-up approach provides flexibility & real project examples, but can be costly

- Developing methodologies demands resources and time
- Top-down guidance from regulators can increase efficiency & certainty without compromising environmental integrity

Too few methodologies have broad applicability

15 CDM methodologies used by 76% of registered projects or projects under validation; 71 methodologies only used once or never (to date)*

- Insufficient incentive to submit & defend a broadly applicable methodology
- Insufficient flexibility in methodologies to accommodate evolving project designs

Challenge of defining sufficient “conservativeness” in the face of uncertainty

Perfect accuracy is not possible or too costly, so methodologies need to be conservative to ensure environmental integrity. But defining what is acceptably conservative is a matter of subjective interpretation

- Tools to control risks & define uncertainty (as in accounting or insurance fields) could help streamline assessment of project and enhance consistency and predictability

*Source: UNEP RISØ
Joint Implementation (JI) and Green Investment Scheme (GIS)
Opportunities and challenges from greater national role & responsibility over market mechanisms

- **EU-ETS and JI**
  - Emissions trading and JI can be complementary but interplay difficult to manage
    - For many potential JI projects, EU-ETS offered better opportunity
    - But for others, it created difficulties (double counting concerns)

- **Greater role & responsibility for national authorities**
  - It takes time and resources to build national systems, institutions & capacities
    - New host country risks: national guidelines and approvals, ERU transfers
    - Opportunity and challenge of managing new national asset

- **Green investment schemes (GIS)**
  - Environmental integrity maintained by compliance with overall emissions cap; importance of host-country management & implementation capacity
    - Buyer & seller agree on (i) activities; (ii) quantification of results and (iii) reporting
    - Revenues from AAU sales can cover upfront financing for reductions that occur later (e.g., through improved delivery of programs)
Some decisions and rules create barriers for projects in least developed countries
Addressing them could help improve LDCs’ attractiveness under the CDM

- **Difficulty in integrating situations of suppressed demand**
  Baselines tend to assume continued low / poor quality of energy services which is not compatible with sustainable development

- **Treatment of projects that replace non-renewable biomass**
  Conservative decision on treatment of non-renewable biomass disproportionately affected sub-Saharan Africa and projects in poor communities

- **Treatment of forestry projects and exclusion of agriculture**
  Sectors relatively more important for LDCs are not well covered under the CDM and are excluded from some markets

- **Transaction costs & onerous requirements**
  Streamlined methodologies and registration procedures are crucial for LDCs. Documentation requirements should recognize differences in practices and contexts
Today’s discussion

Introduction

Insights & analysis

Leveraging the impact of carbon finance

Considerations going forward
Carbon finance: provides an additional revenue stream that can help:

- reward more GHG-friendly investment and purchase decisions,
- create incentive for good management / operational practices to sustain emission reductions over time,
- enhance the financial viability of the project,
- leverage capital for underlying investments by
  - addressing the initial investment barrier;
  - providing incentives to overcome social inertia, lack of awareness, transaction costs and financing of programs, etc.
Carbon finance: important catalyst of development finance

- Carbon revenues unlock low-carbon investment in host countries by complementing and leveraging other resources.
- Global CDM transactions over 2002-2008 catalyzed an estimated **$106 billion in underlying low-carbon investment** (mostly private).*
- The leverage potential of carbon finance has not yet been fully exploited: significant opportunities remain for **carbon finance to tackle (along with other resources) the financing barriers to low-carbon opportunities at scale.**

* Taking into account ratios obtained from WB portfolio and the 1,900 million CERs contracted from 2002 to 2008.

**“local private investment” includes local branches of foreign financial institutions.**
The benefits of market mechanisms to combat climate change
Supports GHG mitigation and sustainable development

**Contribution to meeting greenhouse gas commitments**

- Expected overall emission reductions from CDM and JI ('08-'12*)
- Estimated total country emissions over the period ('08-'12**)

<table>
<thead>
<tr>
<th>Country</th>
<th>Emission Reductions (Mt CO₂e)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Netherlands</td>
<td>-1,214</td>
</tr>
<tr>
<td>Spain</td>
<td>-159</td>
</tr>
</tbody>
</table>

- Issued to date
  - CDM: -333

- CDM and JI projects have mitigated GHG emissions – and will mitigate more

**Significant developmental benefits**

1. Raised awareness about low carbon solutions

2. Provided opportunities for supporting basic development needs (socio-economic co-benefits), e.g.: energy access and energy services; development of local resources; solid waste management solutions; reductions of local pollution; and employment generation

3. Contributed to technology transfer and technology diffusion

4. Grass roots capacity building and local empowerment

5. Leveraged capital for projects in host countries

*Source: UNEP RISØ; **Source: UNFCCC & World Bank projections
Today’s discussion

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Leveraging the impact of carbon finance

Considerations going forward
Paving the way for scaling-up
Stepping stones to facilitate greater numbers of projects

**Methodologies to have a broader reach and be more accessible**
Working towards workable consolidations & revisions of existing methodologies
- Making them more user-friendly
- Providing choices between conservative or simpler discounting to improve usability

**Scaling-up by advancing programs**
Making programs of activities (PoAs) implementable and attractive
- Opens door for dispersed micro activities, particularly demand-side energy efficiency
- Key challenges: (i) liability of DOEs; (ii) greater complexity of CDM project design; (iii) capacity of coordinating entity; (iv) need for practical sampling guidance

**Streamline project cycle and increase communication with practitioners**
Continually examine streamlining opportunities throughout the regulatory process
- Increase avenues for stakeholder consultations and outreach to industrial expertise

**Pragmatic approach to monitoring**
Establishing reasonable and practical sampling procedures
- An approach that can accept less than perfect accuracy when GHG impact is negligible

**Greater certainty with deemed (default) values & benchmarking**
Conservative deemed values and / or benchmarks can be used to calculate reductions
- Help lower monitoring costs
- A relevant industry sector benchmark can also be used to calculate the baseline
## Carbon finance: building on experience and looking forward

### Market mechanisms and carbon finance: a proven tool to support policy-makers
- Can help leverage low carbon investments, address barriers and help sustain projects over time
- Potential to better exploit synergies between policies and various financial instruments

### Scaling-up carbon finance to meet the climate challenge
- Longer term visibility on commitment period(s) to enhance long-term carbon revenues and help sustain viability of projects
- Examine governance structure for processing larger volumes, build consistency, coherency and trust
- Address practical hurdles for Programs of Activities (PoAs)

### Sustaining and enhancing capacity building in host countries

### Consolidation of learning and predictability enhancement (for greater consistency & lower transaction costs)
- Ensure greater compatibility between the carbon finance project cycle and typical investment cycle – to increase efficiency (investment decisions and cash flow needs)
- Clarify and streamline rules, procedures & documentation requirements
- Consider greater standardization, benchmarks, pre-defined additional projects (applicable under specified circumstances) and deemed values
- Work towards defining approaches which can be considered adequately “conservative” (as an alternative to seeking 100% accuracy) whilst not compromising environmental integrity
- Increasing opportunities for exchange between regulatory bodies and practitioners

### Some technical decisions could help reach new areas (project types and countries)
- Broadening of scope, coverage and eligibility criteria of methodologies; practical monitoring requirements
- Potential to enhance attractiveness of Africa and LDCs to carbon markets

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**Maintaining environmental integrity is essential**
1. Do the World Bank’s experience and insights roughly reflect that of other practitioners in the primary carbon market?

2. Are there major lessons that have been left out?

3. What kind of information is most useful / constructive for climate change negotiators, policy-makers and other carbon market stakeholders?

4. Are there particular insights, lessons or issues that merit further examination?

5. What would be most useful format to disseminate these insights and lessons?

Please send comments, questions and suggestions to Martina Bosi (mbosi@worldbank.org)

THANK YOU.

Please visit: www.carbonfinance.org
Purpose and goals
To share insights and lessons from the World Bank’s 10 years of experience in carbon finance

Why are we doing this?
- To take stock of World Bank’s experience since establishment of Prototype Carbon Fund in 2000
  - Focus predominantly on CDM
  - Also cover Joint Implementation (JI) and Green Investment Schemes (GIS)
- To provide a technical assessment of what worked well - and what did not work so well
  - Based on concrete project examples and data
- To share insights which could inform negotiators, policy-makers and other stakeholders
  - Contributing to scaling-up mitigation to help meet climate challenge

How are we conducting our analysis?
- Analysis is based on data and experience from projects which have entered WB pipeline
  - Both successful and unsuccessful projects
- Consultation and surveys
  - WB carbon finance family; Fund participants; members of WB Host Country Committee; delegates to UNFCCC negotiations
- Analysis conducted in context of broader global carbon market experience
Background: CDM project cycle
Carbon credits are created project-by-project under the CDM regulatory process

1. Project & design
   → Project entity/ project developer

2. National approval
   → Host Country Designated National Authority (DNA)

3. Validation
   → Designated Operational Entity “A”

4. Registration
   → CDM Executive Board

5. Monitoring
   → Project entity

6. Verification / certification
   → Designated Operational Entity “B”

7. Issuance of Certified Emission Reductions (CERs)
   → CDM Executive Board

Project design document (PDD)
Monitoring report (MR)
Verification report / request for issuance
Certified emission reductions (CERs)
Why is the World Bank in the carbon market?

- **Intergovernmental Panel on Climate Change (IPCC) finds that warming of climate system is unequivocal and mostly due to human activities**

- **Impact of climate change on development**

- **Efficiency of market-based instruments to reduce GHG emissions**

- **Carbon finance: powerful tool to reduce emissions and to transfer financial resources and clean technology to developing world while contributing to their sustainable development**
The World Bank carbon finance activities and business model

The World Bank currently has 10 carbon funds and 2 facilities; with 16 governments and 66 firms participating

<table>
<thead>
<tr>
<th>Specialty funds/facilities</th>
<th>Country funds/facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prototype Carbon Fund</strong></td>
<td>Netherlands Clean Development Mechanism Facility</td>
</tr>
<tr>
<td><strong>Community Development Carbon Fund</strong></td>
<td>Netherlands European Carbon Facility (jointly managed with IFC)</td>
</tr>
<tr>
<td><strong>BioCarbon Fund</strong></td>
<td>Spanish Carbon Fund</td>
</tr>
<tr>
<td><strong>Umbrella Carbon Facility – Tranche 1</strong></td>
<td>Italian Carbon Fund</td>
</tr>
</tbody>
</table>

**Umbrella Carbon Facility – Tranche 1**
Focused on two China HFC 23 projects

**Plus 2 new facilities focused on post-2012**

- **FCPF** focused on reduced emission from deforestation and degradation (REDD)
- **CPF** focused on long-term investments programs and technologies for transition to low-carbon economy
Note on the findings

1) Unless otherwise noted, all data is sourced from the World Bank’s 10 years of project experience. Due to the dynamic nature of the project cycle, the figures cited are best approximations that are subject to change.

2) Analysis is based on data (performance and costs) and experience from projects that have entered the WB pipeline. The authors reviewed both successful and unsuccessful projects and sought to put findings in context of broader carbon market experience.

3) The authors invite and welcome feedback. Please send your comments to Martina Bosi at mbosi@worldbank.org

Report definitions

**Active Project**: Projects that are registered / finally determined, in validation / determined or active in the World Bank pipeline

**ERPA**: Emission Reductions Purchase Agreement (contract)

**Other Sectors**: In the World Bank portfolio ‘other sectors’ are defined as Biomass energy, Cement, Fossil fuel switch, Fugitive, Geothermal, HFCs, PFCs & SF7 and Transport

**Project**: Unless noted, PDD is used as proxy for a project; each Project Idea Note (PIN) is used as proxy for project in the pre-PDD phase for World Bank pipeline projects

**Project Costs**: Costs include project preparation costs (before ERPA signing), project implementation / supervision and CDM / JI related costs (validation, registration and verifications). Costs do not include early business development expenses related to the project as well as overhead

**Regulatory Process**: For this report, covers the period between beginning of validation up until registration. Start of validation is taken as the beginning of the Global Stakeholder Process date