EXAMPLES OF CDM PROJECTS

Tunis, 21st September 2011
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Outline

Registered CDM projects

- Bus Rapid Transit, Bogota, Colombia
- Kinoya Sewerage Treatment Plant GHG Emission Reduction Project. Suva, Fiji
- Olkaria III Phase 2 Geothermal Expansion Project in Kenya

AfDB projects candidate to CDM (on going)

- Introduction
- Lagos Cable Propelled Transit, Lagos, Nigeria
- Itezhi Tezhi Hydro power, Zambia
- ACSP project screening activity: next steps
Introduction

• The aim was to establish an efficient, safe, rapid, convenient, comfortable and effective modern mass transit system.


• 130 km of new dedicated lanes, 1200 new buses, 1.8M passengers to be transported/day.

• Why BRT?

  ➢ Improve environment: less GHGs emissions
  ➢ Improve social well being: less time lost in traffic congestion
  ➢ Creation of employment: 1500 unskilled jobs during construction
  ➢ Economic benefit: reduce economic cost of congestion

• Project registered to the UNFCCC: Dec.2006.
Bus Rapid Transit- Colombia

Estimation of CO₂ emission reductions induced by the project

- **Baseline scenario**: BAU, the continuation of conventional passenger transport modes and systems

- **Project scenario**: the use of efficient mass bus rapid transit

- **Methodology**: AM 00031

  “Baseline Methodology for Bus Rapid Transit Projects”

  \[
  ER = \text{Baseline emissions} - \text{Project emissions}
  \]
Bus Rapid Transit- Colombia

Annual CO\textsubscript{2} emission reductions and carbon revenue
during the 1\textsuperscript{st} crediting period

<table>
<thead>
<tr>
<th>Year</th>
<th>ER (tCO\textsubscript{2})</th>
<th>Revenue ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>94,567</td>
<td>945,670</td>
</tr>
<tr>
<td>2007</td>
<td>134,011</td>
<td>1,340,110</td>
</tr>
<tr>
<td>2008</td>
<td>230,201</td>
<td>2,302,010</td>
</tr>
<tr>
<td>2009</td>
<td>304,432</td>
<td>3,044,320</td>
</tr>
<tr>
<td>2010</td>
<td>298,719</td>
<td>2,987,190</td>
</tr>
<tr>
<td>2011</td>
<td>336,735</td>
<td>3,367,350</td>
</tr>
<tr>
<td>2012</td>
<td>327,276</td>
<td>3,272,760</td>
</tr>
</tbody>
</table>

- Total investment cost: about US$ 2 bn
- Consider the price of CER to be US$ 10
- Renewable crediting period, i.e 7 + 2x7 (21 years).
- Revenue per crediting period: US$ 17,259,410
- Revenue for the 3 CP (21 years): US$ 51,778,230 (2.6%)
- This revenue will improve cash flow and the IRR of the project.
- This revenue stream would not have been realized in the absence of CDM.
Introduction

• The aim is to recover methane generated by the existing sewage treatment plant
• The project activity introduces methane recovery and combustion system to the existing and proposed anaerobic sludge treatment units
• It will reduce methane emissions in an economic and sustainable manner
• Currently the methane is vented into the atmosphere.
• Registered by UNFCCC in May 2011.
Kinoya Sewerage Treatment Plant Project. Suva, Fiji

**Benefits of the project:**

- Avoids venting of methane
- Address the immediate concerns raised by the local population and communities in terms of improving the local environmental hygiene by eliminating obnoxious odor and air pollution in the project vicinity
- Revenue through the selling of CERs to improve cash flow and IRR of the project
Kinoya Sewerage Treatment Plant Project. Suva, Fiji

**Estimation of CO₂ emission reductions induced by the project**

- **Baseline scenario**: BAU, the continuation of venting methane to the atmosphere during treatment of WW
- **Project scenario**: biogas digester flaring unit that will capture and flare the biogas generated
- **Methodology**: AMS.III.H

  “Methane recovery in waste water treatment”

  \[
  ER = \text{Baseline emissions} - \text{Project emissions}
  \]
Kinoya Sewerage Treatment Plant Project. Suva, Fiji

Annual CO₂ emission reductions and carbon revenue during the crediting period (10 years)

<table>
<thead>
<tr>
<th>Year</th>
<th>ER (tCO₂)</th>
<th>Revenue ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>18,791</td>
<td>187,910</td>
</tr>
<tr>
<td>2013</td>
<td>19,768</td>
<td>197,680</td>
</tr>
<tr>
<td>2014</td>
<td>20,799</td>
<td>207,990</td>
</tr>
<tr>
<td>2015</td>
<td>21,831</td>
<td>218,310</td>
</tr>
<tr>
<td>2016</td>
<td>22,319</td>
<td>223,190</td>
</tr>
<tr>
<td>2017</td>
<td>22,808</td>
<td>228,080</td>
</tr>
<tr>
<td>2018</td>
<td>23,839</td>
<td>238,390</td>
</tr>
<tr>
<td>2019</td>
<td>24,327</td>
<td>243,270</td>
</tr>
<tr>
<td>2020</td>
<td>24,870</td>
<td>248,700</td>
</tr>
<tr>
<td>2021</td>
<td>25,359</td>
<td>253,590</td>
</tr>
</tbody>
</table>

- Investment: not mentioned in the PDD
- Consider the price of CER to be **US$ 10** (conservative).
- Fixed crediting period, i.e. 10 years
- Revenue per crediting period: **US$ 2,247,110**
- This revenue will improve cash flow and the IRR of the project.
Introduction:

- The aim is to add 35MW to the existing power plant (13MW).
- The electricity will be sold to Kenya Power and Lighting Company (KPLC) under PPA.
- The project will reduce greenhouse gas (GHG) emissions by avoiding CO2 emissions from fossil fuel power plants like coal, HFO, and Diesel. In 2009/2010 thermal contributed about 45% of electricity mix.
- Power rationing due to recurrent drought in East Africa will lead into thermal production increase to meet demand.
- The current grid emission factor of Kenya is high (about 0.65 tCO2/MWh).
- Registered by UNFCCC in March 2010.
Benefits of the project:

• Employment (1,000 during construction and 11 permanent).
• Reduce dependence on electricity from imported fossil fuels.
• Contribute to reducing poverty.
• Generate hard currency to Kenya through the sale of carbon credits.
• Reduce GHGs emission.
Geothermal Expansion Project in Kenya (Olkaria III Phase 2)

Estimation of CO₂ emission reductions induced by the project

- **Baseline scenario**: BAU, generating electricity from fossil fuel
- **Project scenario**: electricity generation from geothermal
- **Methodology**: ACM 0002

“Consolidated methodology for grid-connected electricity generation from renewable sources”

\[
ER = \text{Baseline emissions} - \text{Project emissions}
\]
Geothermal Expansion Project in Kenya (Olkaria III Phase 2)

Annual CO₂ emission reductions and carbon revenue during the crediting period (7 years)

<table>
<thead>
<tr>
<th>Year</th>
<th>ER (tCO₂)</th>
<th>Revenue ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009/2010</td>
<td>177,600</td>
<td>1,776,000</td>
</tr>
<tr>
<td>2010/2011</td>
<td>177,600</td>
<td>1,776,000</td>
</tr>
<tr>
<td>2011/2012</td>
<td>177,600</td>
<td>1,776,000</td>
</tr>
<tr>
<td>2012/2013</td>
<td>177,600</td>
<td>1,776,000</td>
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<tr>
<td>2013/2014</td>
<td>177,600</td>
<td>1,776,000</td>
</tr>
<tr>
<td>2014/2015</td>
<td>177,600</td>
<td>1,776,000</td>
</tr>
<tr>
<td>2015/2016</td>
<td>177,600</td>
<td>1,776,000</td>
</tr>
</tbody>
</table>

- Investment not mentioned in the PDD
- Consider the price of CER to be **US$ 10** (conservative).
- Renewable crediting period, i.e 7 + 2 x7 (21 years).
- Revenue per crediting period: **US$ 12,432,000**.
- This revenue will improve cash flow and the IRR of the project.
AfDB projects candidates to CDM (ongoing)

Introduction

• The Bank, through ACSP, is assisting the task managers and the project owners to develop the CDM component of their projects.

• To date, a total of 9 PINs of the potential projects to CDM have been developed.

  1. CODER hydropower project in Gabon
  2. KISCOL cogeneration project in Kenya
  3. ESKOM wind farm project in South Africa
  4. Domestic biogas-digesters project in Zambia
  5. Lagos cable propelled transit project in Nigeria
  6. Ethiopia-Kenya power interconnection in Ethiopia
  7. Itezhi Tezhi hydro power project in Zambia
  8. Concentrated Solar Power plant project in Morocco
  9. Menengai geothermal project in Kenya (under development)
Lagos Cable Propelled Transit Project- Nigeria

Introduction

• The project involves construction of three Cable Propelled Transit (CPT) systems for mass transit in Lagos.

• The project is owned by Ropeway Transport Ltd.

• CDM prior consideration has been submitted to UNFCCC and registered on the 8th July 2011 (http://cdm.unfccc.int/Projects/PriorCDM/notifications/index.html).

• Project Idea Note (PIN) has been developed.
Lagos Cable Propelled Transit Project- Nigeria

Benefits of the projects

• Improvement of economic activities by reducing time wasted in traffic congestion
• Employment creation
• Development of new skills for the construction and the operation of the cable car system
• Reduced travel cost especially over difficult terrain
• Health improvement through reduction of emissions
• Reduced number of accidents: the technology has high safety profile
• Avoid resettlement.
Lagos Cable Propelled Transit Project - Nigeria

Estimation of CO₂ emission reductions induced by the project

- **Baseline scenario**: BAU, the continuation of conventional passenger transport modes and systems in Lagos
- **Project scenario**: the use of efficient cable propelled cars

**Methodology**: AMS III.U

“Methodology deployed: AMS.III.U, “Cable Cars for Mass Rapid Transit System (MRTS)”

ER = Baseline emissions - Project emissions
Lagos Cable Propelled Transit Project- Nigeria

Annual CO₂ emission reductions and carbon revenue during the 1st crediting period

<table>
<thead>
<tr>
<th>Year</th>
<th>ER (tCO2)</th>
<th>Revenue ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>90,000</td>
<td>900,000</td>
</tr>
<tr>
<td>2015</td>
<td>90,000</td>
<td>900,000</td>
</tr>
<tr>
<td>2016</td>
<td>90,000</td>
<td>900,000</td>
</tr>
<tr>
<td>2017</td>
<td>90,000</td>
<td>900,000</td>
</tr>
<tr>
<td>2018</td>
<td>90,000</td>
<td>900,000</td>
</tr>
<tr>
<td>2019</td>
<td>90,000</td>
<td>900,000</td>
</tr>
<tr>
<td>2020</td>
<td>90,000</td>
<td>900,000</td>
</tr>
</tbody>
</table>

- Investment cost: **275 M US$**
- Consider the price of CER to be **US$ 10** (conservative)
- Renewable crediting period i.e 7 + 2 x7 (21 years)
- Revenue per crediting period is **US$ 6,300,000**
- Revenue for the 3 CP (21 years) **US$ 18,900,000** (6.9%)
Itezhi Tezhi Hydro Power Project- Zambia

**Introduction**

- The project involves the construction and operating a 120 MW hydropower plant at the existing Itezhi Tezhi dam on Kafue river
- It is owned by Itezhi Tezhi Power Corporation (ITPC), a SPV (TATA Africa & ZESCO, 50:50)
- Power will be evacuated with a transmission line of about 300 km, 330 kV
- ITPC will generate electricity while transmission line will be constructed and maintained by ZESCO
- The electricity produced is to be dispatched to the SAPP (9 countries)
- CDM prior consideration has been submitted to UNFCCC and registered on the 3rd May 2011 (http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html)
- Project Idea Note (PIN) has been developed.
Benefits of the projects

• Increase electricity supply and access to electricity in Zambia & neighboring countries
• Improve district health facility and reduce the usage of diesel generators
• Reduce GHGs emission
• Promote private public partnership
• Promote entrepreneur activities such as retail business
• Create skilled and unskilled job opportunities
• Generate additional revenue in hard currency to the government.
Estimation of CO\textsubscript{2} emission reductions induced by the project

- **Baseline scenario**: BAU, the continuation of using fossil fuel fired power plants in SAPP countries
- **Project scenario**: generation of electricity from hydro

**Methodology**: ACM 0002

“Consolidated methodology for grid –connected electricity generation from renewable sources”

ER = Baseline emissions - Project emissions
Itezhi Tezhi Hydro Power Project- Zambia

Estimation of CO₂ emission reductions induced by the project

- Emission reductions will be claimed in the SAPP b’se Zambia GEF is very small.
- The new SAPP grid emission factor is 1.0136 tCO₂/MWh- this need to be approved by all countries. The approved SAPP GEF will stimulate projects from countries with low emission factor like DRC and Lesotho.
- In the initial emission reductions estimation, a conservative value of 0.5

<table>
<thead>
<tr>
<th>Year</th>
<th>ER(tCO₂)</th>
<th>R (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>360,000</td>
<td>3,600,000</td>
</tr>
<tr>
<td>2</td>
<td>360,000</td>
<td>3,600,000</td>
</tr>
<tr>
<td>3</td>
<td>360,000</td>
<td>3,600,000</td>
</tr>
<tr>
<td>4</td>
<td>360,000</td>
<td>3,600,000</td>
</tr>
<tr>
<td>5</td>
<td>360,000</td>
<td>3,600,000</td>
</tr>
<tr>
<td>6</td>
<td>360,000</td>
<td>3,600,000</td>
</tr>
<tr>
<td>7</td>
<td>360,000</td>
<td>3,600,000</td>
</tr>
<tr>
<td>8</td>
<td>360,000</td>
<td>3,600,000</td>
</tr>
<tr>
<td>9</td>
<td>360,000</td>
<td>3,600,000</td>
</tr>
<tr>
<td>10</td>
<td>360,000</td>
<td>3,600,000</td>
</tr>
</tbody>
</table>

- Investment cost: 378 M US$
- Consider the price of CER to be US$ 10
- Fixed crediting period i.e 10 years
- Revenue for the crediting period is US$ 36,000,000 (9.5%)

INTERNAL RATE OF RETURN

<table>
<thead>
<tr>
<th></th>
<th>Project IRR (%)</th>
<th>Equity IRR (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without CERs</td>
<td>10.5%</td>
<td>15.7%</td>
</tr>
<tr>
<td>With CERs</td>
<td>13.2%</td>
<td>20.7%</td>
</tr>
</tbody>
</table>
ACSP project screening activity: next steps

- ACSP will develop new methodology for Ethiopia-Kenya interconnection and facilitate approval of SAPP grid emission factor
- ACSP will send out call for proposals to buyers who will express their interest to buy the carbon credits to be generated and cover upfront costs (forward selling). Interest is high to projects from LDCs
- Some project owners to sort out ownership: ITPC and ZESCO; EEPCo and KPLC
- ACSP will provide TA to project owners to negotiate and sign ERPA with a buyer
- ACSP will assist the owner through the whole CDM project cycle (PDD, Validation, Registration)

Projects are expected to be registered before end 2012: a challenge!
Thank you

Damian C. Barnabas
Carbon Limits

AfDB-ONEC3

dba@carbonlimits.no

d.barnabas@afdb.org
**Introduction**

- The project involves construction of a transmission line to evacuate power from Wolayta/Sodo in Ethiopia to Longonot in Kenya: 1000 – 1200 km.
- It is owned by Ethiopian Electric Power Corporation (EEPCo).
- The electricity will be generated primarily in hydropower plants in Ethiopia and exported to Kenya where electricity is generated from thermal power plants.
- It will result in emission reductions in Kenya and increased power supply to meet the increasing demand.
- The implementation will be two phases: 1000 MW by 2012 (expected) and 2000 MW by 2020.
- PIN and CDM prior consideration are reviewed by the project owner.
Benefits of the projects

• The importing country will get relief from relying on imported oil for electricity generation, with high and unpredictable prices
• The exporting country will earn much needed revenue from the sale of electricity and CERs
• The construction of the transmission lines will create both temporary and permanent jobs in both countries
• Emission reductions for the benefit of the global and local environments
• Improved wellbeing of the local population through cash generated from employment
Estimation of CO$_2$ emission reductions induced by the project

- **Baseline scenario**: BAU, the continuation of using fossil fuel fired power plants in Kenya
- **Project scenario**: generation of electricity from hydro in Ethiopia and export to Kenya
- **Methodology**: No suitable approved methodology. The project requires new methodology to be developed.
- Emission reductions will depend on the current grid EF for Ethiopia and Kenya: to be calculated.
Ethiopia-Kenya Hydro power interconnection- Regional

Initial estimation of CO₂ emission reductions to be induced by the project

<table>
<thead>
<tr>
<th>Year</th>
<th>ER(tCO₂)</th>
<th>R (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1,631,440</td>
<td>16,314,400</td>
</tr>
<tr>
<td>2</td>
<td>1,639,880</td>
<td>16,398,800</td>
</tr>
<tr>
<td>3</td>
<td>1,729,560</td>
<td>17,295,600</td>
</tr>
<tr>
<td>4</td>
<td>1,604,600</td>
<td>16,046,000</td>
</tr>
<tr>
<td>5</td>
<td>2,287,360</td>
<td>22,873,600</td>
</tr>
<tr>
<td>6</td>
<td>2,391,640</td>
<td>23,916,400</td>
</tr>
<tr>
<td>7</td>
<td>2,277,880</td>
<td>22,778,800</td>
</tr>
</tbody>
</table>

• Investment cost: figure not available.
• Consider the price of CER to be US$ 10
• Renewable crediting period i.e 7 + 2x 7 (21 years).
• Revenue for the crediting period (7 years) is US$ 135,623,600