Low Carbon Development Scenarios: Co-benefits and Challenges in a Developing Country

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Scenario Description

Base case and four emission reduction target scenarios:

1) Base case (without Electric Mass Transport)
2) 10% Emission reduction target (ERT10)
3) 30% Emission reduction target (ERT30)
4) 40% Emission reduction target with 30% Electric Mass Transport (ERT40+EMT30)

• Bottom-up modeling framework (MARKAL).
• All prices are in 2005 US$. 
Total CO₂ emission would increase by more than 8 times during 2005-2050 (CAGR: 5%), i.e., 2.8 million tCO₂ in 2005 to 26.3 million tCO₂ in 2050.
CO2 emission reduction under ERT

- With out electric mass transport the maximum feasible emission reduction target is 34%.
- Introduction of electric mass transport would allow emission reduction potential up to 43%.
- Electric mass transport as a potential option for the national emission reduction?
Sectoral Contributions in CO$_2$ Emission Reduction

- Industrial sector share: 68% under ERT10 and 33% under ERT30.
- Share of transport sector: 2% in ERT10 and 44% under ERT40+EMT30.
Environmental Co-benefits: Reduction in local pollutant emissions

- **SO₂** reductions in the range of 5% under ERT10 to 9% under ERT30 as compared to the base case.
- **NOₓ** reductions in the range of 1% under ERT10 to 7% under ERT30 as compared to the base case.
- Electric mass transport helps to further reduce local pollutants emissions.
- Improvement of local environment and health.

<table>
<thead>
<tr>
<th>Case</th>
<th>SO₂</th>
<th>NOₓ</th>
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<tbody>
<tr>
<td>ERT10</td>
<td>-4.7%</td>
<td>-0.8%</td>
</tr>
<tr>
<td>ERT30</td>
<td>-8.9%</td>
<td>-6.8%</td>
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<tr>
<td>ERT40+EMT30</td>
<td>-13.8%</td>
<td>-17.9%</td>
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Energy Security Co-benefit: Total Imported Energy Supply

- Decrease in total imported energy supply during 2005-2050 by 8% in ERT10, 26% in ERT30 and 37% in ERT40+EMT30.
- Improvement in energy supply security and lower import dependency
Hydropower requirement and investment challenges

- Hydroelectricity generation to increase by 36% (288TWh) in ERT40+EMT30 during 2020-2050.
- 40% more investment in hydropower during 2020-2050 in ERT40+EMT30
- Additional investment in the hydropower during 2020-2050: 3.2% of the cumulative GDP.
- Electric mass transport investment: 15% of total transport sector investment during 2020-2050.
- Investment in electric mass transport constitute 1% of the cumulative GDP during the period.
Poor Role of CDM in Transport Sector?

As of 1 February 2011:
- Total No. of CDM projects in pipeline: 2,863
- Transport sector projects in CDM pipeline: 33
  - No. of transport projects registered: 5
  - No. of transport projects under validation: 27
- Total estimated CER of all projects in the pipeline: 789,019 kCER/year
- Total estimated CER of 33 projects: 3,539 kCER/year
  
(Source: http://www.cd4cdm.org)

- Unique features of transport CDM projects?
Other Issues

• Institutional and management challenges in mass transport system development and operation
  – Role of PPP?
• Inter-sectoral coordination for integrated development of the power and transport systems
• Need for a fundamental shift in long term transport planning, matching with population density
• Financing scheme?
Thank You