

Symposium on
Towards Low-Carbon Society in Asia,
22 February 2011, Tokyo

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

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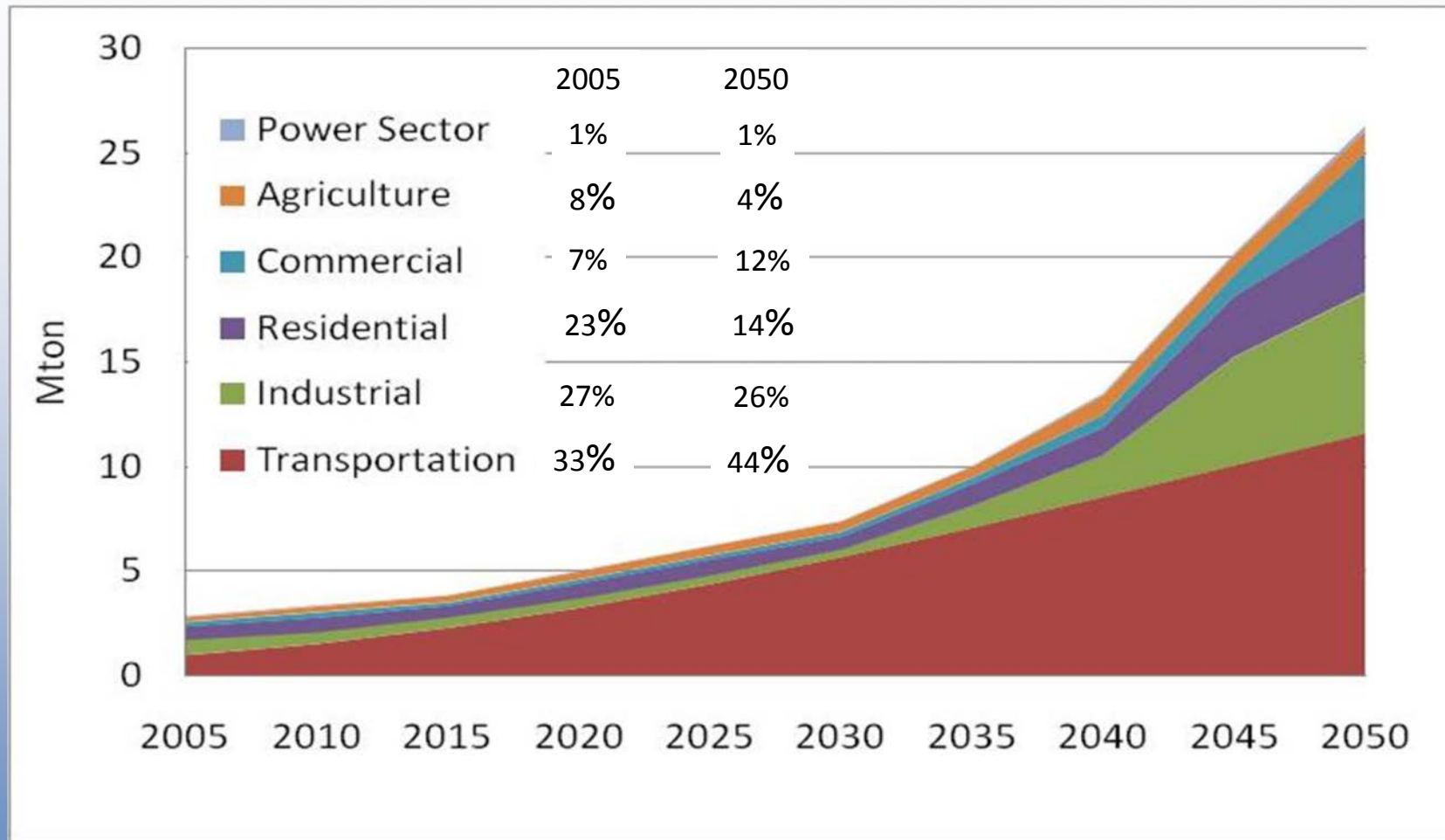
A Case of Nepal

Scenario Description

Base case and four emission reduction target scenarios:

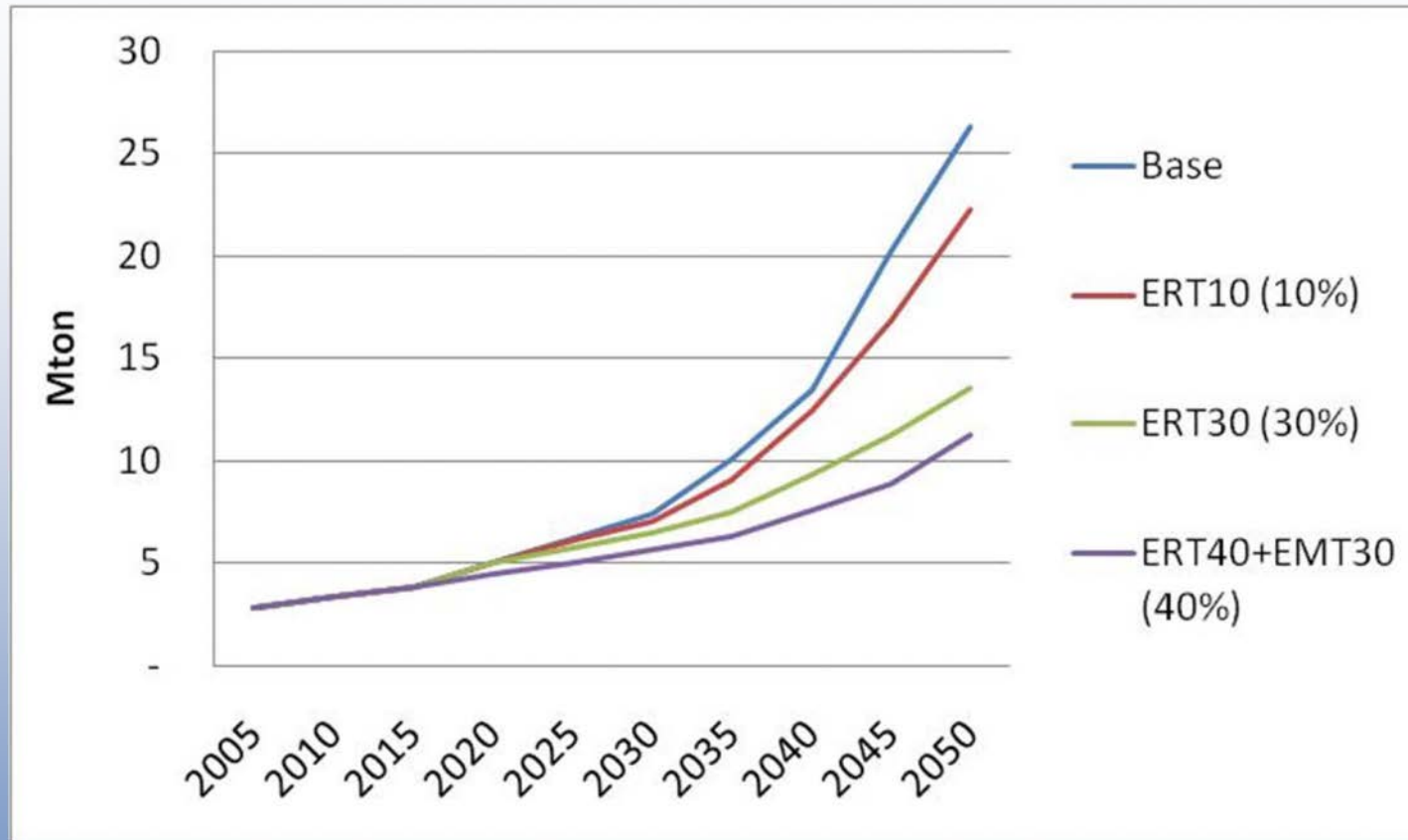
- 1) Base case (without Electric Mass Transport)
 - 2) 10% Emission reduction target (ERT10)
 - 3) 30% Emission reduction target (ERT30)
 - 4) 40% Emission reduction target with 30% Electric Mass Transport (ERT40+EMT30)
- Bottom-up modeling framework (MARKAL).
 - All prices are in 2005 US\$.

CO₂ emission in the base case during 2005-2050



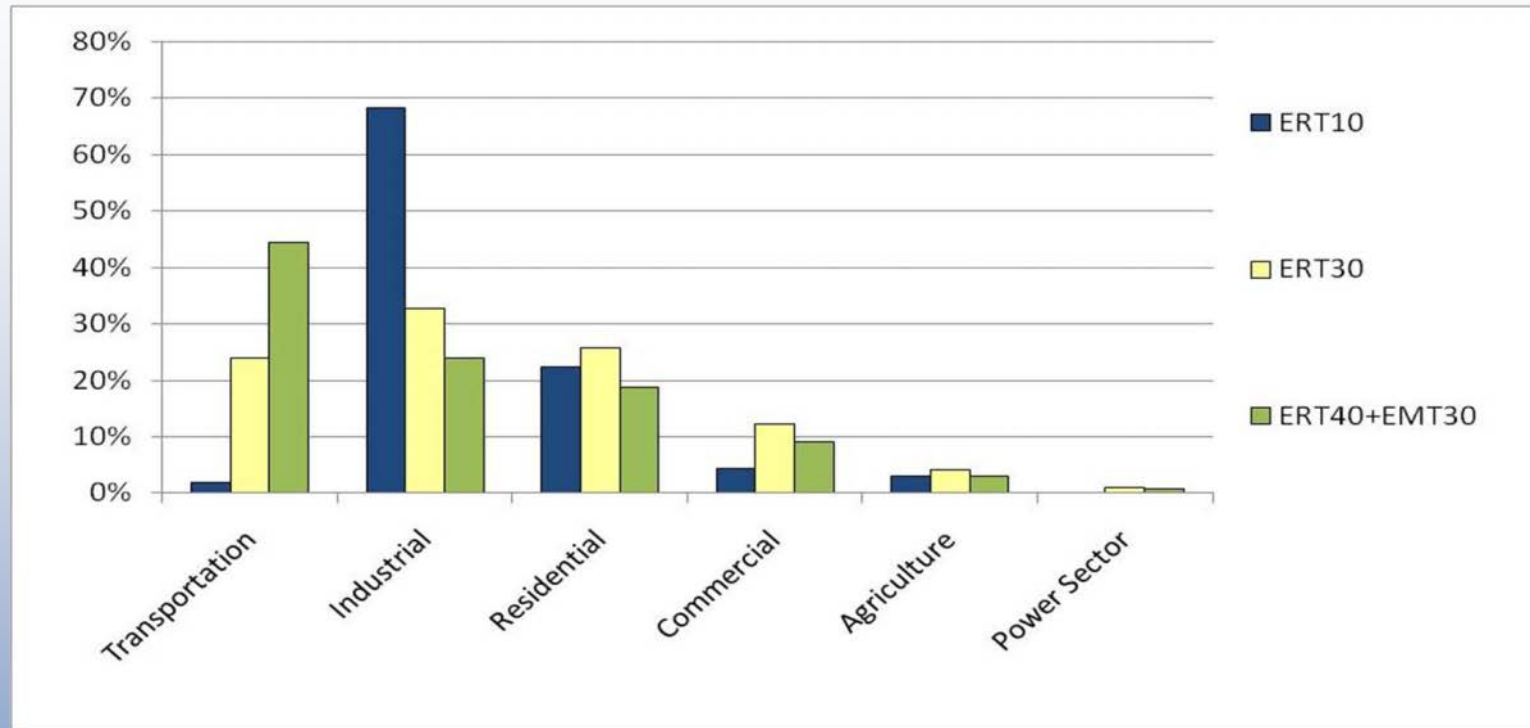
Total CO₂ emission would increase by more than 8 times during 2005-2050 (CAGR: 5%), i.e., 2.8 million tCO₂ in 2005 to 26.3 million tCO₂ in 2050.

CO2 emission reduction under ERT



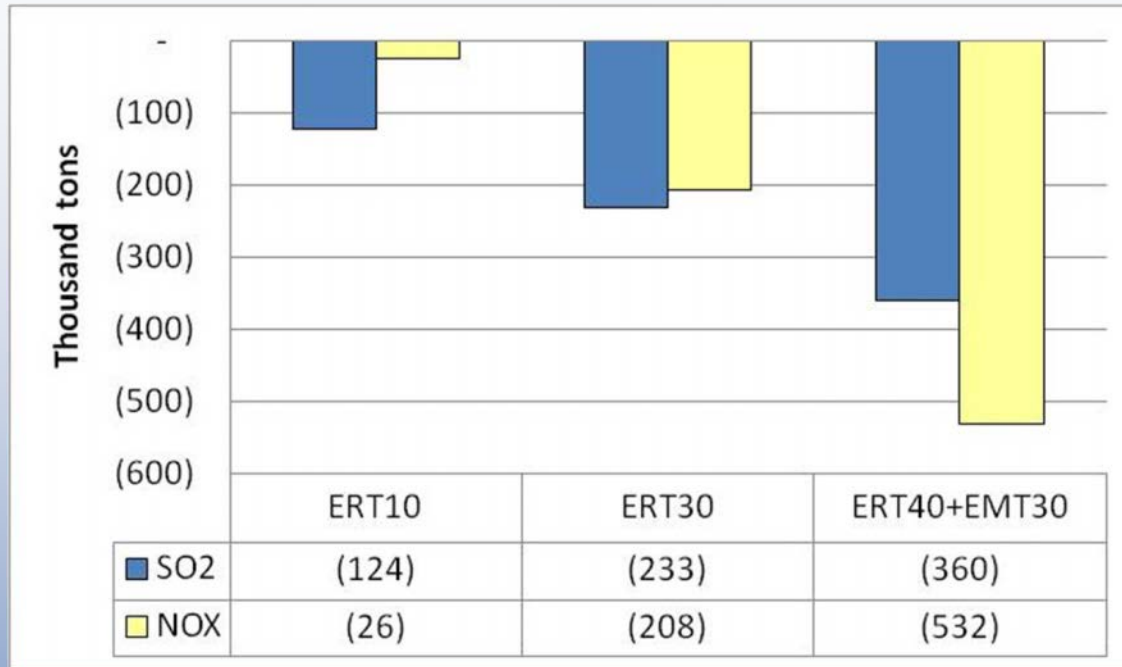
- With out electric mass transport the maximum feasible emission reduction target is 34%.
- Introduction of electric mass transport would allow emission reduction potential up to 43%.
- Electric mass transport as a potential option for the national emission reduction?
- Cumulative emission of CO2 during 2005-2050: 421 Mton in base case.

Sectoral Contributions in CO₂ Emission Reduction



- Industrial sector share: 68% under ERT10 and 33% under ERT30.
- Share of transport sector: 2% in ERT10 and 44% under ERT40+EMT30.

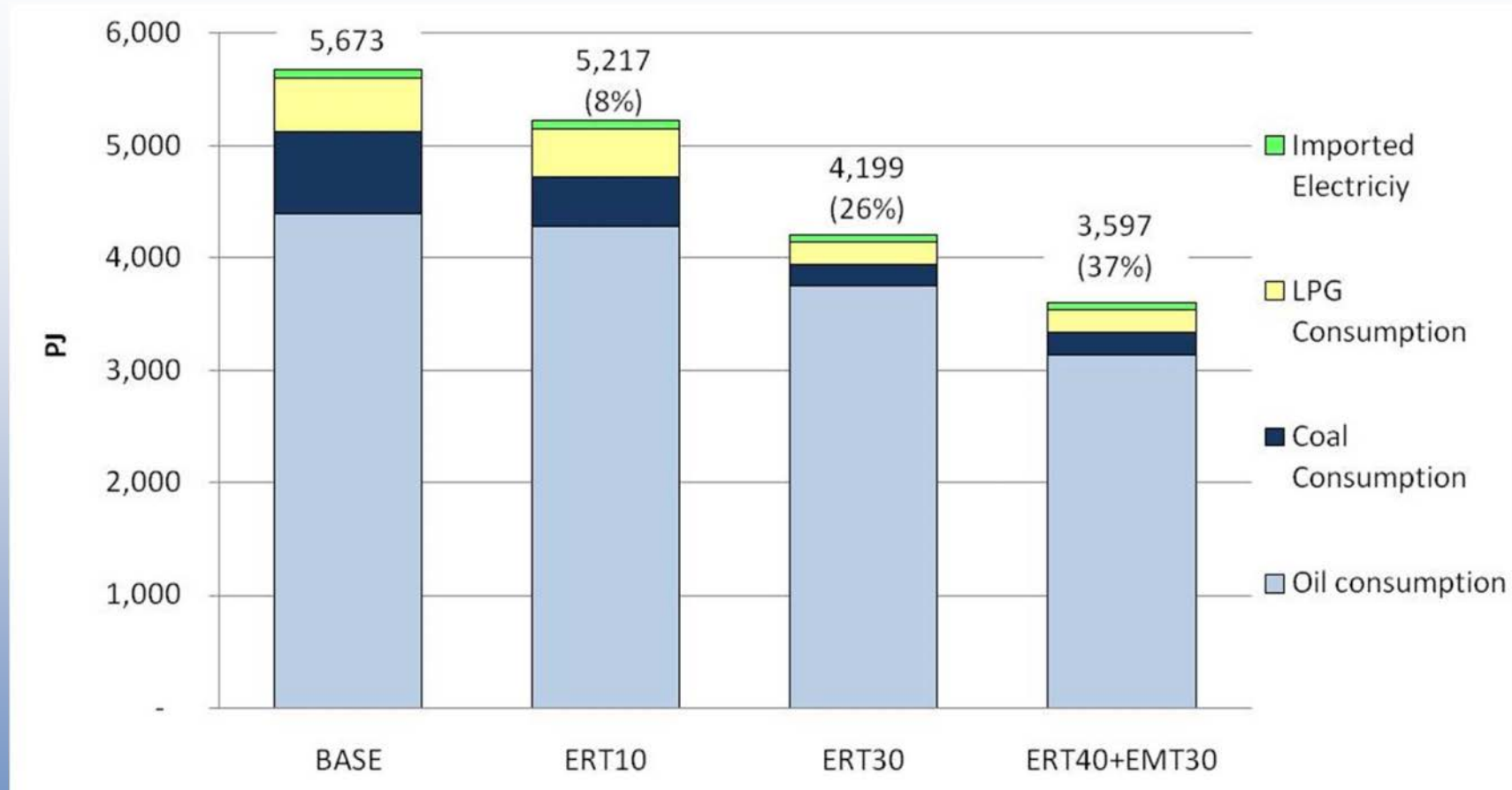
Environmental Co-benefits: Reduction in local pollutant emissions



Case	SO ₂	NO _x
ERT10	-4.7%	-0.8%
ERT30	-8.9%	-6.8%
ERT40+EMT30	-13.8%	-17.9%

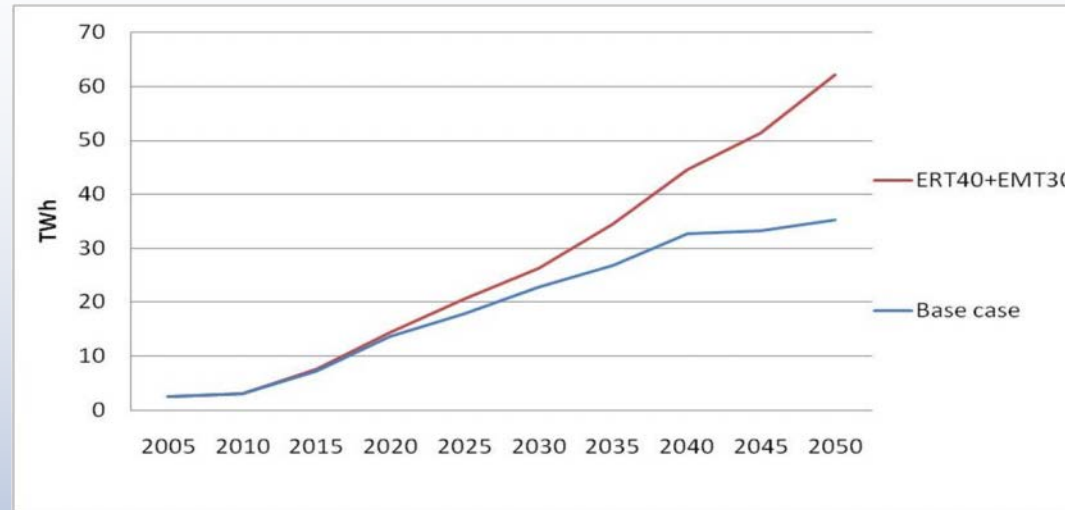
- SO₂ reductions in the range of 5% under ERT10 to 9% under ERT30 as compared to the base case.
- NO_x reductions in the range of 1% under ERT10 to 7% under ERT30 as compared to the base case.
- Electric mass transport helps to further reduce local pollutants emissions.
- Improvement of local environment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

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