

Monday, February 14, 2005

Good Day

PREGA – NEPAL

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**Promotion of RE, EE & Greenhouse
Gas Abatement**

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PREGA Activities in Phase I

- **Pre-feasibility Study Report**
- **Country Study Review Report**

(Final Reports Submitted to ADB in March 2004)

Ranjan Prakash Shrestha

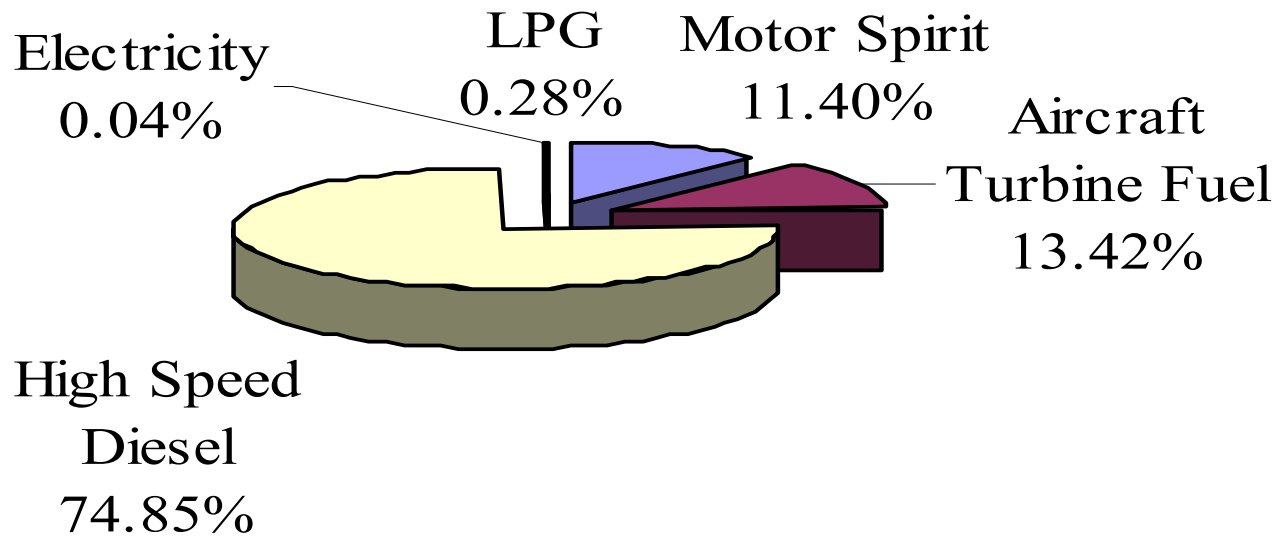
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Energy Consumption in Transport Sector (1999/2000)

Energy Consumption in Transport Sector (1999/00)




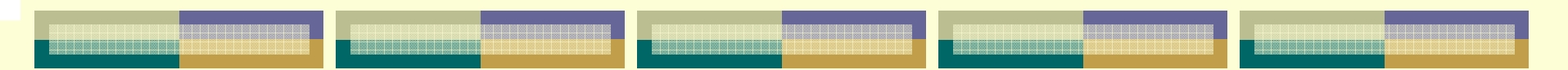


Kathmandu Valley




Trolley Bus in Ring Road: Baseline

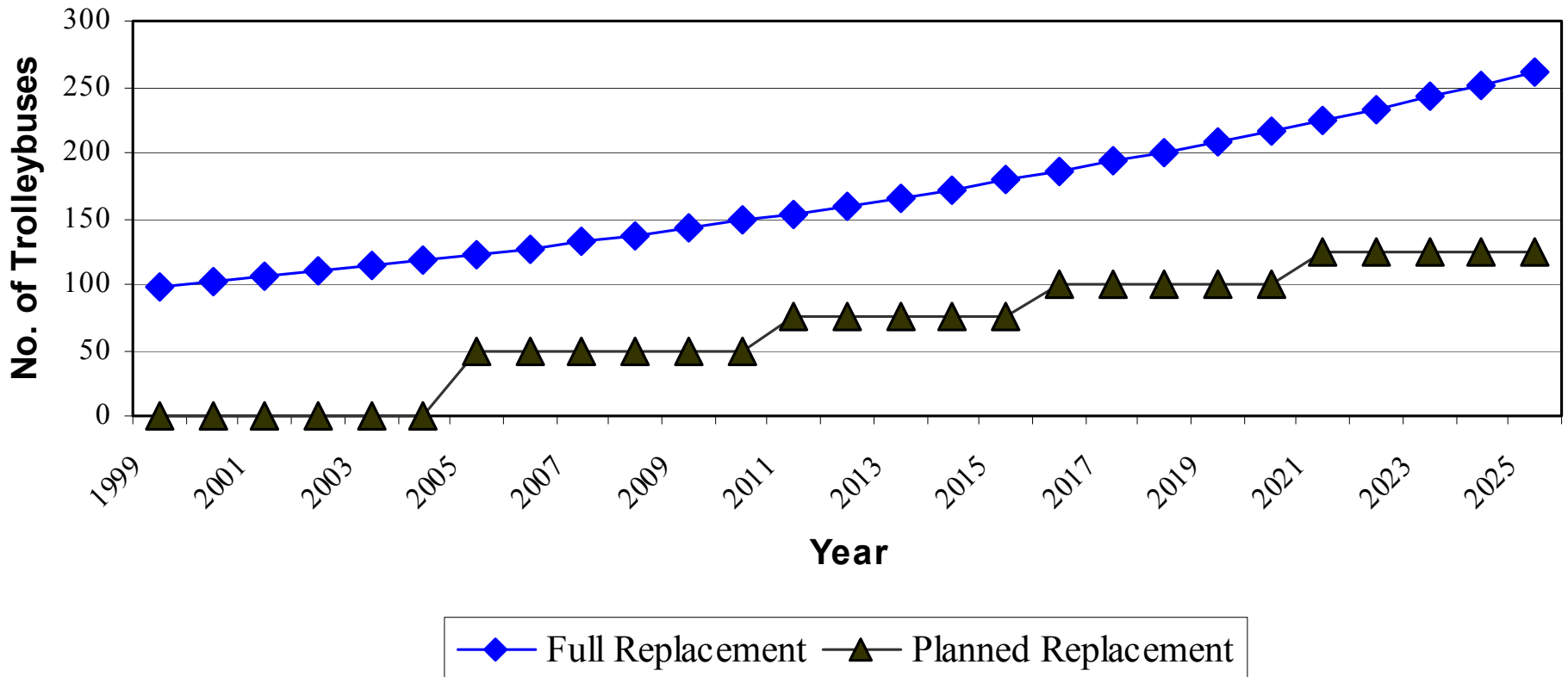
- **Average Daily passengers in 2001: 141,000**
 - **Expected growth rate: 8%**
 - **Passenger trips that take place in large buses: 44%**
 - **No. of passengers per diesel bus trips: 113**
 - **No. of passengers per diesel mini-bus trips: 111**
 - **Daily operating hours: 15**
 - **Road Capacity in two lanes in two directions: 35,000 vehicles**
 - **O&M cost (including diesel) bus/trip: US\$ 5.9**
- 



Trolley Bus assumptions

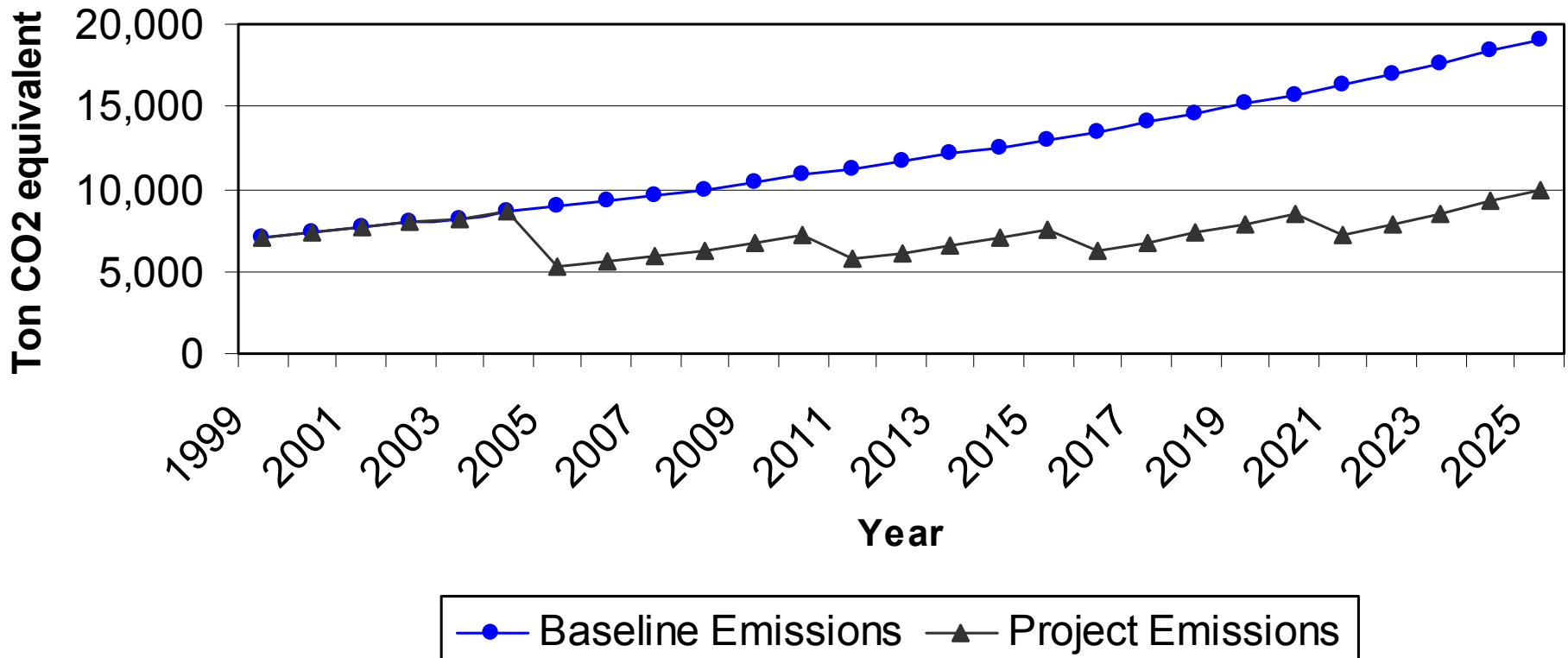
- **Average passengers per trolley bus: 150**
 - **Replacement of old (20 yrs) buses/mini-buses every year: 37%**
 - **Yearly decrease of buses/mini-buses: 1.1%**
 - **Fuel economy of buses: 0.365 liter/km**
 - **Fuel economy of mini-buses: 0.2 liter/km**
 - **Km per vehicle trip: 28**
 - **Bus operation: 330 days**
 - **No. of loops per trolley bus per day: 8**
 - **O&M cost/trolley bus/trip: US\$ 7.76**
- 

Trolleybus Fleet during Project Period (2005-25)



CO₂ eq Emission with and without Trolleybus Project

Baseline and Project Emissions



CO₂ eq includes CO₂, N₂O, CH₄ & fuel transport emission

Year	Baseline	Project	Reduction
2005	3,647	71	3,576
2006	3,647	71	3,576
2007	3,647	71	3,576
2008	3,647	71	3,576
2009	3,647	71	3,576
...
2021	9,137	178	8,959
2022	9,137	178	8,959
2023	9,137	178	8,959
2024	9,137	178	8,959
2025	9,137	178	8,959
TOTAL	131,490	2,563	128,927

in ton CO₂ eq.


Net Emission Reduction



Financial Analysis

Investment required per trolley bus in Rs

	Imported	Locally assembled
Cost per Trolley bus	5,500,000	4,200,000
Land		557,619
Construction		551,510
Other costs		807,333



Financial Analysis ... contd

Estimate of total costs using imported trolley bus

in million Rs

	2005	2011	2016	2021.
Land	27.88	13.94	13.94	13.94
Construction	27.58	13.79	13.79	13.79
Other costs	40.37	20.18	20.18	20.18
Vehicle costs, imported	275.00	137.50	137.50	137.50
Elec. Infrastructure	151.66	26.15	0.00	26.15
Annual Operation cost	59.20	88.80	118.41	148.01
TOTAL	581.69	300.37	303.82	359.57
No. of Trolleys	50	25	25	25

Financial Analysis ... contd


Year	No of Trolley	Capital cost	Operation expenses	Revenue	Sum
2005	50	-522	-59	112	-470
2006	50	0	-59	112	53
2007	50	0	-59	112	53
2008	50	0	-59	112	53
2009	50	0	-59	112	53
...
2021	125	-212	-148	279	-80
2022	125	0	-148	279	131
2023	125	0	-148	279	131
2024	125	0	-148	279	131
2025	125	0	-148	279	131
				FIRR	8.9%



Scenarios

FIRR%

Imported buses, no carbon credit	8.9
Locally assembled buses, no carbon credit	11.7
Imported buses, with payment for carbon in lump sum in the beginning @ \$ 16/ton	14
Locally assembled buses, with payment for carbon in lump sum in the beginning @ \$ 6.5/ton	14
Imported buses, with payment for carbon upon delivery @ \$ 57/ton	14
Locally assembled buses, with payment for carbon upon delivery @ \$ 23/ton	14



Economic Analysis

Economic internal rate of return (EIRR) calculations

	Type of bus	EIRR
Without carbon credit	Imported bus	17.4%
	Local assembled bus	21.0%
At US\$ 2/ton of CO₂	Imported bus	17.6%
	Local assembled bus	21.2%
At US\$ 5/ton of CO₂	Imported bus	17.9%
	Local assembled bus	21.5%
At US\$ 10/ton of CO₂	Imported bus	18.3%
	Local assembled bus	22.0%
At US\$ 25/ton of CO₂	Imported bus	19.6%
	Local assembled bus	23.4%



Risks and Uncertainties

Political

Managerial

Policy change

Kyoto Protocol and Carbon finance





Way forward

Conduct detailed feasibility study

SOON!

**Thank you so much
for your kind attention.**

