GRAVITY POWERED DEDICATED FREIGHT CORRIDOR FOR INDIAN RAILWAYS : ESTIMATES FOR PROJECT COST, RUNNING COSTS AND PROFITS

Gravity Powered Cargo transportation at 100 kmph for typical 1000 km route in India on standard surface railway

Implementation for a route of 1000 km

Parameters **Max Speed** **108 Kmph** **163.94 Gross M tonnes bothways capacity**

Automated Driving &Control: Absolute Block System: only one rolling module per one driving cable between two GP Towers, spaced at 500 m.

			Unit Cost in Rs cr	Cost Rs Cr	Annual OM %	Depreciation %	Annual O&M, Depreciation
GP Towers		2222					
	Structure		0.3	666.67	2.00%	2.00%	26.67
	CV gear system		0.2	444.44	5.00%	5.00%	44.44
	Embedded intelligence		0.4	888.89	5.00%	10.00%	133.33
	Cables		0.1	222.22	10.00%	20.00%	66.67
Rail guidance track							
	Existing--modifications :side bearing walls R km	1000	0.5	500	5.00%	5.00%	50
Includes interfacing with road transport	New route km double line	1000	10	10000	5.00%	5.00%	1000
Rolling stock							
	Existing : modification to provide anti-derailment fittings/ grips to hold cable and microprocessor control	4500	0.05	225	5.00%	10.00%	33.75
	New stock Skywheels based	4500	0.2	900	5.00%	10.00%	135

Total cost of project, O&M,depreciation,interest charges Energy,		Capital	O&M +Depreciation	Interest	Energy*	Total expenses incl interest, O&M, Depreciation In Rs crores	Cost per tonne.km
	Existing Railway	2947.22	354.86	294.72	992.88	1642.46	0.10
	New One	13122.22	1406.11	1312.22	992.88	3711.21	0.23 Rs/tonne.km

	Headway	20
	Throughput units/d	4140
	At 55 t/unit	81.97 gross. million.tonnes per annum per direction
	23 hr day and 360 day year taken.	
	*The system if run at steady peak speed then the energy consumption is	14.39 Kwh per 1000gtkm
	Current IR system consumes.....	114 Kwh per 1000gtkm
	Saving in energy	87%
	Annual energy consumption to be paid for.....	2.36 Million Mwh
	At Rs 4.21 per unit it means	9928.77 m Rs.

Revenue, expenses profits	Revenue @0.81ps	Rs 9295.62 cr	0.81 rs/t.km for net.tonne.km, NTKM=0.7 x GTKM	
	Net Profit for New route	5584.41 cr	42.56% for new rolling stock	
	In case of existing route	5262.86 cr	178.57% here net tonne= 0.52 x GTKM, taken asper IR stock.	
	For existing routes we have to consider surrendering the locomotives , running staff, loco-sheds and the associated costs saved.			
	These are not taken into account.			

Notes:

1. Provision for debt to be serviced for 100% of the project cost at 10% is made.
2. Variable depreciation figures as indicated provided as indicated.

3. Automated system , hence no running staff is needed. Other manpower costs are covered in 10% of O &M and energy cost is added.
4. Conventional surface rail is considered here with additional cable guides & side walls for derailment protection. There are no signals. Design average speed is 90 kmph.
5. The net.tonne.km to gross.tonne.km for IR train is on average 0.52 as seen from the statistics

Average train load (tonnes)

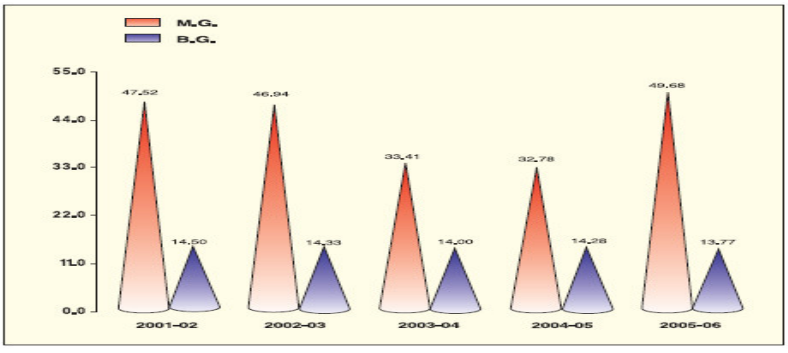
Year	Net load		Gross load (including weight of engine)	
	B.G.	M.G.	B.G.	M.G.
1950-51	489	185	1,068	435
1960-61	656	298	1,354	648
1970-71	737	378	1,507	753
1980-81	884	487	1,721	871
1990-91	1,079	562	2,122	962
2000-01	1,233	414	2,533	806
2001-02	1,280	393	2,604	784
2002-03	1,327	331	2,636	719
2003-04	1,490	341	2,876	713
2004-05	1,466*	386	2,909	781
2005-06	1,529	489	2,949	870

*revised

presented in the IR year book; this includes the weight of locomotive and the guard van weights for the gross load of a train. The referred table is attached.

Net of gross tonne.kmfor tonne.kmis 0.52 IR

6. For the Gravity Powered Rail, the module for the carriage of gross 50 tonnes is lighter using only 14 to 15 tonne axle load and the weight of the power transmission cable is accounted for by an additional 5 T . The net is given by a factor of 0.7 because:
   1. there are no locomotives nor brake vans
   2. there is no need to provide for derailment and buffing forces of train handling; the spatial frame hence become substantially lighter.
   3. There is no brake gear nor brake blocks; in its place gripping arms, a microprocessor control module, compressed air tank to operate grip arms to engage the traveling cable - relatively much lighter gear added.
7. Energy consumed on IR:



ENERGY CONSUMPTION (IN COAL EQUIVALENT) GOODS SERVICES
(KGS. OF COAL/1000 GTKMS.)
14kg coal equivalent is equal to 114kwh