

Few eye openers about discussion paper.

❖ Wrong data cannot lead to right decisions.

Data used in discussion paper are not suitable for purpose of comparing two traction. To elaborate- Using average depth of a river for calculation of flow of water is perfectly all right but fate of using this data for the purpose of crossing river is well known.

Do you decide your shirt size on the basis of average size of your family? The paper wants us to take decisions like that.

It may be noted that diesel traction runs on 90% single line, primitive signaling sections, as against 90% electrified sections are double line with CLS.

The ASS figures are only average figures of railways and does not take into account factors like mentioned above. Therefore, for decision making analytical approach should be used.

Average cost of haulage as printed in ASS and used in discussion paper cannot be the basis for working out of strategy for electrification. Reasons are discussed below.

1. Arbitrary specific energy consumption is used for calculating operation cost.

The figures printed in ASS for electric traction are based on empirical apportioning of energy consumption between sub-urban, passenger and freight services. **The SEC values for suburban and passenger services are pegged at unrealistically high levels of 40 kwh/1000 GTKM and 20 kwh/1000 GTKM respectively, artificially suppressing the SEC values for goods traffic. As per RDSO report of April'2000 the SEC of even ABB loco works out to be 14 kwh/1000 GTKM as against 8.08 printed in ASS-2001-02.**

2. Arbitrary allocation of 2- 5 % of energy consumed in traction to CLS artificially lowers the energy cost of operation of electric traction.

3. Average Loco utilization based figures printed in ASS does not reflect the capability of loco; therefore cannot be basis for comparing the relative economics.

Practice of calculating cost of diesel and electric locos based on the average utilization levels of electric and diesel locos is not rational.

The utilization of locos is not traction specific. It is primarily dependant upon the operating conditions such as average load, type of section - single/double line, maximum permissible speed of the section, gradients, engineering restrictions, type of signaling, condition of track etc. and is not an indication of the capability of the locomotives.

A perusal of the utilization figures expressed in terms of GTKMs/NTKMs earned per loco per day for passenger and freight services for the two tractions, as given in table below will reveal that the utilization on diesel traction have been consistently higher than electric traction on passenger service. It is only in the few years that the figure for electric traction has become higher than diesel traction. On freight service, the figures were comparable till 1990-91 but have recently shown an upward trend on electric traction. This has happened due to relegation of diesel locos to branch lines.

Further, a perusal of the railway-wise figures of utilisation for the two tractions (table below) reveals some interesting facts. As would be seen from the table below, the 2001-02 figures for **utilisation of diesel locomotives on N.F. Railway, which is purely on diesel traction, are higher than electric locomotives on all railways, except NR.** This only strengthens the argument that average utilization, as per ASS, cannot be used as a basis for working out the cost of two traction.

| LOCOMOTIVE UTILISATION | | | | |
|------------------------|--|--|--|--|
| Year | Diesel | | Electric | |
| | Passenger (GTKM/day/ loco on line (lakhs) | Freight (NTKM/day/ loco on line (lakhs) | Passenger (GTKM/day/ loco on line (lakhs) | Freight (NTKM/day/ loco on line (lakhs) |
| 1983-84 | 3.49 | 2.38 | 2.51 | 2.38 |
| 1984-85 | 3.63 | 2.44 | 2.58 | 2.30 |
| 1985-86 | 3.64 | 2.54 | 2.69 | 2.53 |
| 1986-87 | 3.61 | 2.54 | 2.81 | 2.63 |
| 1987-88 | 3.84 | 2.57 | 2.89 | 2.58 |
| 1988-89 | 3.65 | 2.38 | 3.10 | 2.55 |
| 1989-90 | 3.63 | 2.34 | 3.24 | 2.47 |
| 1990-91 | 3.15 | 2.21 | 3.24 | 2.45 |
| 1991-92 | 3.15 | 2.17 | 3.44 | 2.60 |
| 1992-93 | 3.07 | 2.04 | 3.59 | 2.62 |
| 1993-94 | 2.81 | 1.98 | 3.63 | 2.63 |
| 1994-95 | 2.57 | 1.96 | 3.58 | 2.55 |
| 1995-96 | 2.59 | 2.05 | 3.58 | 2.63 |
| 1996-97 | 2.64 | 2.00 | 3.58 | 2.62 |
| 1997-98 | 2.60 | 1.98 | 3.63 | 2.68 |
| 1998-99 | 2.63 | 1.92 | 3.82 | 2.67 |
| 1999-00 | 2.87 | 1.96 | 4.24 | 2.78 |
| 2000-01 | 2.94 | 1.99 | 4.22 | 2.83 |
| 2001-02 | 2.96 | 2.08 | 4.48 | 3.06 |

Source :- Planning Directorate, Railway Board.

| Rly. | Diesel Electric | Diesel Mainline (excluding WDS5/6) | Electric |
|------|-----------------|---------------------------------------|-------------|
| CR | 1.59 | 1.74 | 3.14 |
| ER | 1.20 | 1.48 | 2.33 |
| NR | 3.51 | 3.51 | 5.86 |
| NE | 2.95 | 2.95 | - |
| NF | 4.03 | 4.49 | - |
| SR | 1.21 | 1.29 | 2.93 |
| SC | 2.25 | 2.26 | 2.72 |
| SE | 1.68 | 1.94 | 2.92 |
| WR | 2.05 | 2.20 | 3.62 |
| IR | 1.87 | 2.02 | 3.11 |

Source:- ASS statement no. 22 page 153 col. 21

To give an example, cost of maintenance of loco is explained below

Railway Board finance Directorate issues a letter every year after elaborate calculation of maintenance and interest cost of rolling stock. As per latest letter no F(C) 2003/27/1 dated 15.09.2003 the cost of traction per engine hr is given below.

Cost of traction per engine hour (in Rs.)

| | DIESEL | | ELECTRIC | % variation |
|---|---------------|--|-----------------|--|
| | BG | | BG | |
| Repair & Maintenance (running & work shop) | 494.63 | | 572.80 | 16% (Maint. Cost of electric loco is 16% higher) |
| Depreciation charges | 63.86 | | 158.45 | |
| Interest | 54.47 | | 129.29 | |
| Total | 612.96 | | 860.50 | 40% (Electric loco is 40% costlier) |
| | | | | |

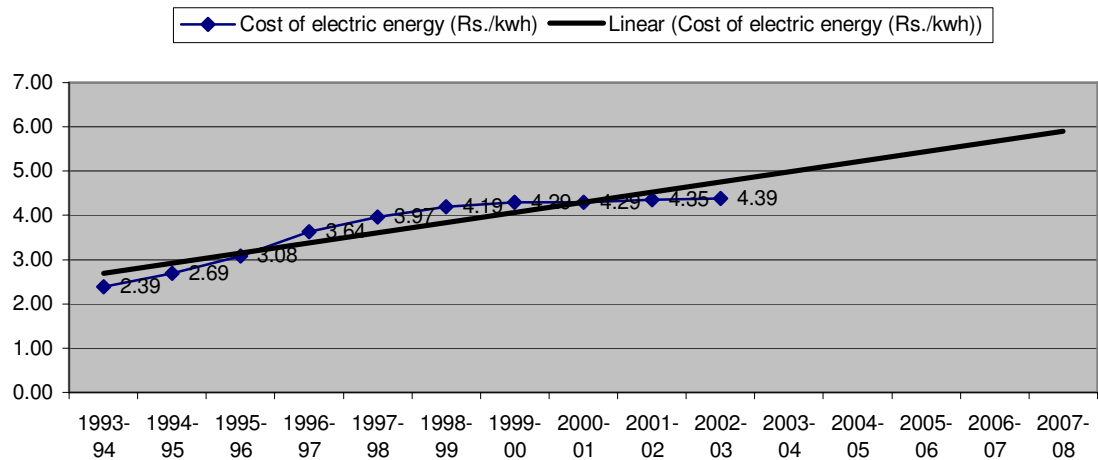
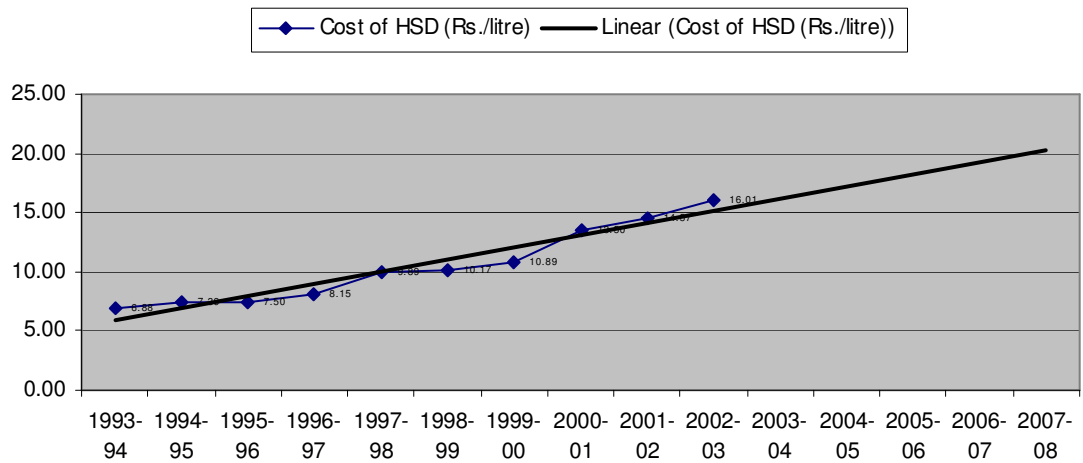
From the above it can be seen that the maintenance cost of electric loco is 16% higher than the maintenance cost of diesel loco.

Since the maintenance schedules of diesel as well as electric locos are time-based, the maintenance cost is dependant upon the number of locos in

operation and not on the GTKMs earned. The “per loco” maintenance cost should, therefore, be logical basis for calculating the maintenance cost and not the cost “per 1000 GTKM”.

4. Cost of Diesel and electricity

The above-referred note only considers cost of fuel/electricity for last three years, for the project appraisal having life span of 30 years, long-term trend should be considered. From the data given below for last 10 years it can be seen that the trend of price of HSD and electric energy is same. Further IR does not pay the rate of petrol pump for HSD purchase, rates are much lower for IR and further it gets back Rs. 1.50 per Lt., which is charged as a road cess, from Central Govt. Future power plants being built in India are petroleum product based.



5. Cost of operation

Considering the cost of energy, SFC/SEC and lube oil consumption as mentioned above, the hauling cost by two tractions is given below.

| Fuel/Energy cost per 1000 GTKMs | | | |
|--|---------------|-----------------|----------------|
| | Diesel | Electric | Savings |
| Fuel cost | | | |
| Goods | | | |
| SFC/SEC | 2.69 | 13.9 | |
| Price (ASS-2002-03) | 16.51 | 4.39 | |
| cost per 1000 GTKMs | 44.41 | 61.02 | -16.61 |
| Passenger | | | |
| SFC/SEC | 4.67 | 19.70 | |
| Price | 16.51 | 4.39 | |
| Cost per 1000 GTKMs | 77.10 | 86.48 | -9.38 |
| Lube oil cost per 1000 GTKMs | | | |
| Lube oil cost | | | |
| Goods | | | |
| Consumption per 1000 GTKMs | 0.02838 | 0.004754 | |
| Price | 54.27 | 54.27 | |
| cost per 1000 GTKMs | 1.54 | 0.26 | 1.28 |
| Passenger | | | |
| Consumption per 1000 GTKMs | 0.0487 | 0.010399 | |
| Price | 54.27 | 54.27 | |
| cost per 1000 GTKMs | 2.64 | 0.56 | 2.08 |
| | | | |
| Net saving per 1000 GTKMs | | | |
| Goods | | | -15.33 |
| Passenger | | | -7.30 |

From the above table it can be seen that the cost of operation per 1000 GTKMs is higher for electric traction. For goods service it is higher by 15.33 Rs. and for passenger services by Rs. 7.30.

6. Cost of maintenance of OHE does not get reflected properly due to its charging in heads like - Demand 7 sub-head 460 and Demand 8 sub-head 610, which are heads for natural calamities and General Electrical works.

7. Capital-at-charge on account of OHE retained with CORE and not passed on to the Railways is artificially lowering line haul costs of electric traction.

As per the Explanatory Memorandum of the Railway Budget, 2001-02, the capital-at-charge of the "Central Organisation for Railway Electrification" is Rs. 4148.35 crores (RE figures for 2000-01). The total cumulative expenditure incurred on Railway electrification till 31.03.2001 is Rs. 4561.53 crores. It is thus

evident that bulk of the capital-at-charge on OHE account continues to be on the books of the RE Organisation and is not passed on to the Railways.

It is necessary that capital-at-charge on account of OHE gets passed onto the Railways so that depreciation and interest on OHE is correctly reflected while calculating the line haul cost.

8. Depreciation/interest burden of OHE not passed to railways lowers the cost of electric traction in the data books like ASS.

Depreciation/interest on account of the capital cost of OHE is not taken into account while calculating the line haul cost for electric traction. In this context, a letter from the Statistical Officer, S.C. Railway addressed to Board has brought out that – *“the expensive OHE element of electric traction is not included under locomotives. This is included in the “excluded heads” resulting in neither depreciation being computed nor it being included to arrive at the cost of electric traction”*.

9. Opinion of professional and independent agencies:

World Bank and CAG appraisal of electrified projects

Independent appraisal of electrified sections

| Section | Projected ROR | Actual ROR | Appraisal done by |
|----------------------|----------------------|-------------------|--------------------------|
| Jhansi-Itarsi | 23.40% | 9.00% | World Bank |
| Ballarshah-Vijaywada | 40.50% | 2.00% | (Year-1995) |
| Delhi-Ambala | 14.50% | -10.25% | CAG |
| Bina-Katni | | -ve* | (Report no. 9 of 2000) |

* Cost of Diesel traction for entire traffic - 68.98 crores

* Cost of electric traction for entire traffic - 110.79 crores