

A NOTE ON BENEFIT COST ANALYSIS FOR THE FOREST LAND REQUIRED FOR THE PROJECT

1. GENERAL:-

As per the instructions contained in the Government of India (Deptt. Of Environment, Forest and Wild Life) New Delhi Letter No. 11-61/85 FRY (Cons) dated 13-01-85/86, benefit cost analysis for 113.4947 Ha. Forest land required for Jagdishpur-Haldia-Bokaro-Dhamra Natural Gas Pipe Line Project in Chatra, Giridih, Hazaribagh, Bokaro, Sarikela, Ramgarh, Ranchi, Khunti, Gumla & Simdega Districts in Jharkhand State is worked out and enclosed herewith.

2. EVALUATION OF LOSS OF FOREST: -

As per the guide lines mentioned in Annexure II of the above cited Govt. letter, details of the parameter wise loss to be accrued due to diversion of the said forest land are worked out. The details for parameters 1, 2 & 5 are obtained as per the guide lines given in conservation Act 1980. Loss due to parameters 3, 4 & 6 for the project are Nil as no population & public facilities will be affected due to the project.

2.1 ENVIRONMENTAL LOSSES

The environmental losses to be accrued for 50 years as per parameter No. 5 are worked out for the proposed area of the above Districts in Jharkhand, Forest Division wise. The details of the Forest densities are adopted from the Form "A" of the diversion proposals to be submitted vide then Sr. Assistant Inspector General of Forests to the Principal Secretary (Forests) under letter No. 7-69/2011-FC(Pt.) dated 01-08-2017. The copy of the Form 'A' is enclosed with the proposals. The total environmental loss to be accrued due to diversion of Forest land as compared to the Net benefits from the project to accrue in 50 years are given. Thus, the project gives a positive return as environmental loss and the benefits cost Ratio for the same works out. Thus, the project may be considered for clearance from environmental angle. Secondly the benefits from the project are also estimated as per the present Project IRR. These will also proportionately increase with increase in books rates.

3. EVALUATION OF BENEFITS FROM THE PROJECT NOT-WITH-STANDING LOSS OF FOREST

The details of the benefits to accrue from the scheme in 50 years are worked out as per the parameters in Annexure III of the Govt. of India letter dated 13-1.85/86. The same are described below.

3.1 COMMERCIAL BENEFIT

The cost of pipeline, over 542.142 Kms. In length will be Rs. 264229.1680 Lacs in Jharkhand section. The Project IRR is 12.02 % hence the return from

pipe line in Jharkhand for next 50 years will be $264229.1680 \times 12.02 \times 50/100 = 1588017.2997$ Lacs.

3.2 BENEFITS TO ECONOMY

The Gas transportation will be increased to 1.5 MMSCMD by 2019-20 and up to 5.724 MMSCMD by 2029-30 by JHBDPL Project in Jharkhand and 16.35 MMSCMD in totality by 2029-30 which will directly enhance the economic growth of the state. The transportation of gas through pipe line will be cheaper, which will help in cheaper supply of gas to consumers. Natural Gas is a green fuel, will reduce the dependency of people on fuel wood, which will directly save the millions of trees from felling. This will also help to save environment. City Gas Distribution in various cities in route will replace LPG as a thereby reducing huge subsidy burden for the company.

3.3 SOCIAL BENEFITS

Natural Gas pipeline will bridge demand – supply gap of fuel in the state. Ensured gas infrastructure is made available for the development of industries in and around the network. Natural Gas is an alternative to COAL, fuel wood and other liquid fuels which shall reduce environmental pollution to a large extent. Natural Gas being a clean energy will reduce emission of Green Houses, Gases from vehicles and industries at large. This proposed pipe line over 542.142 km. In length cover 12 districts in Jharkhand and can further expand up to 50 km. on either side of the proposed route. Industrial corridor can be developed by the state in order to facilitate the small scale and other gas-based industries to ensure easy and fast connectivity from the proposed pipeline. Transportation of natural gas through pipelines has no emission unlike transport of fuel through road wags & railways. Compressed Natural Gas (CNG) is also an alternative fuel in Automobile sector which is much cleaner and environment friendly fuel which also reduces loss on transport of liquid fuel. Over all the project is hugely beneficial in view of environment and economy of the country as well.

3.4 POPULATION BENEFITED

This proposed gas pipe line cover 12 Districts in Jharkhand & can expand up to 50 km on either side of the proposed route. Thus, the cities falling within 542.142 Km length & 50 km on either side of route will have direct gas supply facility at reduced cost. Near about total 4606995 families (approx.) will be benefited in this way.

- PNG Connection to Household: Reduction in cost of fuel consumption by converting from LPG to PNG per family per year will be Rs. 1537/-. Thus, benefit to 4606995 families in 50 years will be 354047.5658 Lacs (*Assuming 100% conversion from LPG to PNG*).
- Benefit to Government (by reduction in subsidy on LPG): Per cylinder subsidy borne by Government is Rs. 568.00. Assuming 12 cylinders per family is consumed yearly, subsidy burden to the Government is Rs. 6816.00. Thus, benefit to Government over 50 years by conversion of 4606995 families from LPG to PNG is Rs. 1570063.8960 Lacs.

3.5 EMPLOYMENT POTENTIAL

The Project will also bring employment potential for skilled, semi-skilled and unskilled work force in the State directly or indirectly. GAIL is going to invest approximately Rs. 264229.1680 Lacs in the State of Jharkhand. The labour component will be 0.5 % i.e. Rs. 1321.1459 Lacs at the time of actual laying of pipe line & its maintenance.

3.6 ACQUISITION OF FACILITY ON NON FOREST LAND

The Gas pipe line is proposed in 113.4947 Ha. of Forest Land & 1282.092 Ha of Non-Forest agriculture land is Jharkhand. As per Petroleum and Minerals pipeline Act 1962 for ROU (Right of Use) the agriculture land owners will be paid compensation of Rs. 467.1232 Lacs. Government land 226.9894 Ha. will be used for plantation towards compensatory afforestation. Thus, the amount of plantation in non-forest land for compensatory afforestation work out to 200 Lacs (approx.).

3.7 LOSS OF AGRICULTURAL & ANIMAL HUSBANDRY PRODUCTION

Assuring benefits notwithstanding the loss of forest by way of government land used for compensatory Afforestation the losses on account of this parameter are worked out at the present annual outturn of agricultural produce is Rs. 5000/- per Ha per year According for loss from 228.0474 Ha of Government land works out to Rs. 1.1478 Lacs per year i.e. 57.012 Lacs for. 50 Years. However, usually Government land would be not suitable for agriculture. Similarly, there is no loss on account of the animal husbandry production.

3.8 COST OF REHABILITATING AND COST OF SUPPLY OF FREE FUEL WOOD

As in the project no rehabilitation of the persons is required the cost of rehabilitation work will be NIL so also No workers will be residing in Forest during the period of laying of the pipe line the cost of supply of free fuel wood to workers, will be NIL.

3.9 OVERALL BENEFITS

The overall benefits due to laying of pipeline under the project are evaluated as per the parameters 1 to 8 of the Annexure III of the Govt. of India's letter and it is revealed that overall value of benefits to be accrued from the project in 50 years.

4. **CONCLUSION**

From the benefit cost analysis, it is revealed that the project gives positive returns over environmental losses as noted below and is therefore proposed for early clearance. Environmental losses per Ha. of forest land to be accrued in 50 years are less than Benefits from Project.

Date:

Place:

M/s GAIL (India) Limited



Rakesh Kumar
Manager (Construction)

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**IAGDISHPUR-HALDIA-BOKARO-DHAMRA NATURAL GAS PIPE
LINE PROJECT**

BENEFIT COST ANALYSIS

A) Total Forest losses (including environmental losses) to be accrued in 50 years as per Annexure No. I

Parameter No. 1	Rs. 1481.31 Lacs
Parameter No. 2	Rs. 42.76 Lacs
Parameter No. 3	Rs. Nil
Parameter No. 4	Rs. Nil
Parameter No. 5	Rs. 7630.34787 Lacs
Parameter No. 6	Rs. Nil

Total	Rs.9154.41787 Lacs

B) Total Benefits from the project to be accrued in 50 years as per Annexure No. II

Parameter No. 1	Rs. 1588017.2997 Lacs
Parameter No. 2	Rs. 15880.1730 Lacs
Parameter No. 3	Rs. 1570063.8960 Lacs
Parameter No. 4	Rs. 660.5730 Lacs
Parameter No. 5	Rs. 667.1232 Lacs
Parameter No. 6	Rs. 56.75 Lacs
Parameter No. 7	Rs. Nil
Parameter No. 8	Rs. Nil

Total	Rs. 3175345.8149 Lacs

Net Benefits = 3175345.8149 – 9154.41787 = 3166191.39703 Lacs


$$\text{Benefit Cost Ratio} = \frac{3166191.39703}{9154.41787} = 345.864853668$$

Thus, the project has positive benefit cost ratio. The monetary returns of the project are positive over the environmental losses and hence proposed for early clearance from environmental angle.

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Annexure No. I

Jagdishpur-Haldia-Bokaro-Dhamra Gas Pipeline Project in Jharkhand

Evaluation of Loss of Forest

(As per Forest (Conservation) Rules 6, From 'A' S. No. 1 (V) and Guidelines - application of Forest Act 1980, Chapter -II (2.6))

Sr. No.	Parameters	Analysis				
		S.No.	No of Trees	Quantity (m ³)	Amount (Lacs)	Remark
1	Parameter - 1	The losses due to timber and fuel wood.				
	Loss of value of timber, fuel wood and minor produce on an annual basis including loss of man hours per annum of the people who are of deprived livelihood and wages from the harvest of these commodities (To be quantified & expressed in monetary terms)	1	26888	1223.581	80.41781397	As per Annexure A attached (Timber Loss has been calculated @ maximum rate considering all trees as Teak)
		Total Losses due to Timber & fuel wood considering increment in trees over 50 year including compound interest at Indian economy Rate at 6 % works out to = 80.42 (1+6/10) ⁵⁰				
		= 1481.31 Lakhs				
2	Parameter - 2	The Forest area 113.4947 Ha. Proposed to be diverted is devoid of good quality of grasses. It is estimated that the grass production will be 0.5 MT per Ha. Per year. Therefore, the total production of grasses from 113.4947 Ha. For 50 years will be				
	Loss of animal husbandry productively including loss of fodder (To be quantified & expressed in monetary terms)	Area 113.4947 Ha X 0.50 = 56.74735 MT Production per year				
		Cost of Gross @Rs. 1500/ per M.T. will be Rs. 85121.025/-				
		Total Loss for 50 years will be Rs. 42.56 Lacs				
3	Parameter - 3					
	Cost of human resettlement (To be quantified & exposed in monetary terms)	As No population is affected due to the project no human resettlement is required				
		NIL				
4	Parameter - 4					
	Loss of public facilities and administrative infrastructure (Roads buildings, schools, dispensaries, electric lines, railways etc) on forest land or which would require facilities were diverted due to project (To be quantified & expressed in Monetary terms)	As no public facilities and administrative infrastructure is affected due to project, there is no loss as per the parameter.				
		Nil				

5	Parameter - 5	<p>1) As per thumb rule Environmental losses per Ha of area having density 1.0 occurred over 50 years = 126.74 Lakhs.</p> <p>2) As the Forest Division wise density of forest varies as below, the Environmental losses, Division wise and total Environmental losses will be as under.</p>					
	Environmental losses (Soil erosion, effect of hydrological cycle, wild life habitat, microclimate, upsetting of ecological balance) (To be quantified & expressed in monetary terms)	Sr. No.	Division	Area in Hectare	Forest Density	Average Density	Multiplying Factor* Loss to Environment (in Lacs)
		1	Chatra North	13.0825	0.2 to 0.6	0.4	126.74 663.23042
		2	Chatra South	5.2673	0.1 to 0.5	0.3	126.74 200.273281
		3	Hazaribagh East	12.7184	0.6 to 1.0	0.8	126.74 1289.5444
		4	Hazaribagh West	21.774	0.2 to 0.6	0.4	126.74 1103.8547
		5	Giridih	3.2344	0.2 to 0.6	0.4	126.74 163.971142
		6	Bokaro	22.65	0.4 to 0.8	0.6	126.74 1722.3966
		7	Saraikela	7.5425	0.2 to 0.6	0.4	126.74 382.37458
		8	Ramgarh	1.8789	0.6 to 1.0	0.8	126.74 190.505429
		9	Ranchi	15.9036	0.5 to 0.9	0.7	126.74 1410.93558
		10	Khunti	0.7292	0.5 to 0.9	0.7	126.74 64.6931656
		11	Gumla	0.2518	0.1 to 0.5	0.3	126.74 9.5739396
		12	Simdega	8.4621	0.2 to 0.6	0.4	126.74 428.994622
		Total		113.4947		Total	7630.34787
6	Parameter - 6	As in the project, no human resettlement & rehabilitation is required there is no loss as per the parameter					
	Suffering to oustees (The social cost of rehabilitation of an oustees in addition to the cost likely to be incurred in providing residence, occupation and social services to him) be worked out as 1.5 times of what he should have earned in two years had he been not shifted.	NIL					

Date:

Place:

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Annexure No. II

Jagdishpur-Haldia-Bokaro-Dhamra Gas Pipeline Project in Jharkhand

Evaluation of Benefits

Sr. No.	Parameters	Analysis
1	Parameter - 1	1) The cost of pipeline in Jharkhand section will be Rs. 264229.1680 Lacs. 2) The project IRR is 12.02 % hence the return from pipeline in Jharkhand for next 50 years will be
	Increase in productivity attributable in the project for 50 years (To be quantified and expressed in monetary terms)	= $264229.1680 \times 12.02 \times 50 / 100 = 1588017.2997$ Lacs.
2	Parameter - 2	It is assumed that there will be over all benefit to economy on account of reduction in LPG price reduction in dependency on fuel wood and reduction in subsidy burden @ 1 % of the total project IRR will be
	Benefits to economy (Value judgment)	1 % of 1588017.2997 Lacs = 15880.1730 Lacs
3	Parameter - 3	The proposed pipeline 542.142 Km. covers 12 Districts in Jharkhand. The cities falling within 50 Km on either side of route will have direct gas supply facility at a reduced cost. This Total 4606995 Families will be benefited at Rs. 1537/- (per year per family)
	No. of population benefited (Value judgment)	Thus the population benefited will be (No. of Families X Net saving per year X 50 = 354047.5658 Lacs (<i>Assuming 100% conversion from LPG to PNG</i>).
	Benefit to Government (by reduction in. subsidy on LPG)	Per cylinder subsidy borne by Government is Rs. 568.00. Assuming 12 cylinders per family is consumed yearly, subsidy burden to the Government is Rs. 6816.00. Thus, benefit to Government over 50 years by conversion of 4606995 families from LPG to PNG is Rs. 1570063.8960 Lacs.
4	Parameter - 4	Employment generated during actual laying of pipe line in Jharkhand will be 0.5 % of the total investment by GAIL of Rs. 1321.1459 Lacs in Jharkhand.
	Employment Potential (Value Judgment)	Thus total Employment generated will be $0.5 \times 1321.1459 = 660.5730$ Lacs.
5	Parameter - 5	
	Cost of acquisition of facility on non forest land wherever feasible (To be quantified & expressed in monetary terms)	In Jharkhand 542.142 Km Gas pipeline is proposed in 113.4947 Ha. of Forest Land & 1282.092 Ha Of agriculture land. The compensation towards right of use to be paid to agriculture owners. Will be Rs. 467.1232 Lacs. Government land 226.9894 Ha. will be used for plantation towards compensatory afforestation. Thus, the amount of plantation in non-forest land for compensatory afforestation work out to 200 Lacs (approx.). Total Rs. 667.1232 Lacs.

6	Parameter - 6	As the pipeline is underground once the pipeline is laid, the affected agriculture land can be used for agriculture purpose. Thus, loss of agriculture towards land acquire under ROU is NIL Total loss of agriculture land of 226.9894 Ha. used for compensatory afforestation, with annual outturn of agriculture produce at Rs. 5000/- per Ha. per year will be
	Loss of (a) agriculture & (b) Non forest land wherever feasible (To be Quantified & expressed in monetary terms)	226.9894 X 5000 X 50 = 56.75 Lacs.
7	Parameter - 7	
	Cost of Rehabilitating the displaced parsons as different from compensatory amounts given for displacement (To be Quantified & expressed in monetary terms)	Under this project of Natural Gas pipe line, no human displacement is proposed Thus the cost of rehabilitating the displaced parsons will be NIL
		NIL
8	Parameter - 8	
	Cost of supply of free fuel wood to workers residing in or near forest area during the period of construction.	During actual laying of pipeline & refilling the workes on this project will reside outside forest area & will not require free fuel wood. Thus cost of supply of free fuel wood will be Nil
		NIL

Date:

M/s GAIL (India) Limited

Place:



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Manager (Construction)

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Annexure A

Value of Trees as per girth class wise enumeration of trees for Under FCA 1980 by GAIL (India) Limited Jharkhand State

Division	0/30	31/60	61/90	91/120	121/150	151 & Above	Total
Chatra North	1706	1529	290	85	33	59	3702
Chaatra South	672	938	96	36	17	54	1813
Hazaribagh East	907	624	120	43	13	32	1739
Hazaribagh West	523	406	181	59	19	41	1229
Giridih	6	17	24	21	4	10	82
Bokaro	673	681	436	235	81	52	2158
Saraikela	3709	364	176	54	11	36	4350
Ramgarh	192	55	52	15	10	11	335
Ranchi	1806	929	275	77	23	22	3132
Khunti	93	143	91	10	2	2	341
Gumla	0	2	4	0	1	2	9
Simdega	4975	1633	722	349	146	173	7998
Grand Total	15262	7321	2467	984	360	494	26888
Form Factor	0.007	0.037	0.094	0.211	0.385	0.542	
Cubic Meter	106.834	270.877	231.898	207.624	138.6	267.748	1223.58
Rate Per Tree	205	1083	2750	6173	11264	15858	
Total Value	21900.97	293359.8	637720	1281663	1561190	4245948	8041781

Date:

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