

Cost Benefit Analysis for diversion of 6.131 ha forest land to explore the hydrocarbon prospect through drilling of one exploratory location GOAN at Tekka RF, South Tripura District.

Guidelines for concluding cost-benefit analysis for projects Involving forest diversion

- (i) While considering proposal for diversion of forest land for non-forestry use, it is essential that ecological and environmental losses and eco-economic distress caused to the people who are displaced are weighted against economic and social gains.
- (ii) Whenever the forest land is involved in the development projects, the cost of ecosystem services and fragmentation of habitat of wildlife and economic distress caused to people dependent on forests and the cost of settlement of people dependent on forest should also be added as the cost of forest diversion in addition to the standard project cost which would have been incurred by the user agencies without involvement of forest land while conducting the cost benefit analysis of the project. Similarly the benefits from the project accruing due to diversion of forest land and used in the project should also be accounted for in the benefits component in addition to the standard benefits of the project which would have been accrued without involvement of forest land while conducting the cost benefit analysis and determining the benefit and cost ratio (BC ratio).
- (iii) the cost of compensatory afforestation and its maintenance in future and soil & moisture conservation at present discounted value and future benefits from such compensatory forestation accruing over next 50 years monetised and discounted to the present value should be included as cost- and benefits respectively of compensatory afforestation while conducting the cost benefit analysis and determining the benefit and cost ratio (BC ratio).
- (iv) **Table-A** lists the details the types of projects involving forest land for which cost-benefit analysis will be required **Table-B** lists the parameters according to which the cost aspect of forest land diverted for the development projects will be determined, while **Table-C** lists the parameters for assessing the benefits accruing to the project using of forest land.
- (v) A cost-benefit analysis as above should accompany the proposals sent to the Central Government for forest clearance under the Forest Conservation Act.



Cost Benefit Analysis Guidelines for forest land diversion-2017

Table-A: Cases under which a cost-benefit analysis for forest diversion are required

No.	Nature of proposal	Applicable/ Not applicable	Remarks
1	All categories of proposals involving forest land upto 20 hectares in plains and upto 5 hectare in hills	Not applicable	These proposals may be considered on a case to case basis and value judgment
2	Proposal for defence installation purposes and oil prospecting (prospecting only)	Not applicable	
3	Habitation, establishment of industrial units, tourist lodges complex and other building construction.	Not applicable	
4.	All other proposals involving forest land more than 20 hectares in plains & more than 5 ha in hills including roads , transmission lines, minor , medium & major irrigation projects, hydel projects, mining activity, railway lines, location specific installations like micro-wave stations, auto repeater centres, T.V. towers etc.	Applicable	Here Cost Benefit Analysis is applicable since the forest land is 6.131 hectares



Cost Benefit Analysis Guidelines for forest land diversion-2017

Table-B: Estimation of cost of forest diversion

No.	Parameters	Remarks
1	Ecosystem services losses due to proposed forest diversion	Economic value of loss of eco-system services due to diversion of forests shall be the net present value (NPV) of the forest land being diverted as prescribed by the Central Government (MoEF&CC). Note: In case of National Parks the NPV shall be ten (10) times the normal NPV and in case of Wildlife Sanctuary the NPV shall be five (5) times the normal NPV or otherwise prescribed by the ministry or any other competent authority.
2	Loss of animal husbandry productivity, including loss of fodder.	Nil
3	Cost of human resettlement	Nil- No displacement
4	Loss of public facilities and administrative infrastructure (Roads, Building, Schools, Dispensaries, Electric lines, Railways etc.) on forest land, which would require forest land if these facilities were diverted due to this project	No loss of public facilities is taking place and no administrative infrastructure (Roads, Building, Schools, Dispensaries, Electric lines, Railways etc.) will be destroyed. 3.591 ha is for diversion of existing road which is partially black top and brick soiled. The road will be broaden and developed for local communities.
5	Possession value of forest land diverted.	Considering Class-I open forest, NPV @ Rs. 7.30 lakhs/Ha. 100% NPV + 30% of environmental cost (NPV) for 6.131 Ha is Rs. 58.17 lakhs.
6	Cost of suffering of oustees	Nil
7	Habitat Fragmentation Cost	Considering Class-I open forest, NPV @ Rs. 7.30 lakhs/Ha. 50% of NPV for 6.131 Ha is Rs. 22.38 lakhs.
8	Compensatory afforestation and soil & moisture conservation cost	The actual cost of compensatory afforestation and soil & moisture conservation and its maintenance in future at present discounted value.



Cost Benefit Analysis Guidelines for forest land diversion-2017

Table-C: Existing guidelines for estimating benefits of forest-diversion in CBA

No.	Parameters	Remarks
1	Increase in productively attribute to the specific project	The project for exploratory drilling of GOAN is prognoses with reserve of 589.89 MMCM. The project is of high risk with probability of discovery 33%. In case of success, the recoverable reserve (considering 60%) in monetary terms amounts to Rs.337.5 crores (considering gas @ rate of Rs.9535/1000m ³) in the project life of 15 years.
2	Benefits to economy due to the specific project	<p>The project will yield significant economic benefit to the state through royalty @10% of the gas sale after deducting OPEX. The royalty would amount to the tune of Rs. 9.9 crores approximately.</p> <p>More cess to the govt. through the gas sale tax @33.99% which would amount to the tune of Rs. 114 crores approximately in the project life of 15 years.</p> <p>Construction of road will lead to much better connectivity, which will play significant role in improving the socio-economic condition of the people of the locality in any folds.</p>
3	No. of population benefited due to specific project	<p>Approximately 3500 man days of temporary employment will be generated during exploration phase.</p> <p>Further benefits will depend on the success of exploration.</p>
4.	Economic benefits due to direct and indirect employment due to the Specific project.	<p>A good number of people will be benefited directly and indirect employment will be generated during construction and drilling activities and much more out of its further operational activities in case of success.</p> <p>CSR activities will be carried out in the operational areas as per need of the locality in consultation SDM/DM</p>
5	Economic benefits due to compensatory afforestation	<p>The compensatory afforestation amount will be deposited to forest department as per the plan and estimates of the forest department.</p> <p>There will be various employment generated for execution as well as maintenance of the CA work.</p>



Note-1: Net Present value (NPV) of environment and ecosystem services loss:

The concept of Net Present value of the forest land diverted is a scientific method of calculating the environmental cost and other losses caused due to diversion of forest land for non-forestry purposes. The NPV represents the net value of various ecosystem services and other environmental services in monetary terms which the forest would have provided if the forest would not have been diverted.

Note-2: Possession value of forest land diverted:

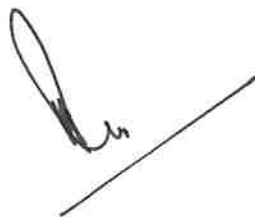
The forest land diverted for the project such as irrigation, hydropower, railways, roads, wind, and transmission lines and mining etc are unlikely to be returned and remains in possession of the user agencies. Therefore 30% of the net present value (NPV) of forest land diverted or market rate of adjoining area in the district should be added as a cost component as "possession value of forest land" in addition to the environmental costs due to loss of forests.

COST ESTIMATES AND FINANCIAL ANALYSIS

The basis for cost estimation is as follows:

- 1) It is assumed that all the expenditures are in foreign currency U.S Dollar with exchange rate @ Rs.60.
- 2) Drilling cost has been considered Rs.150000/m for exploration well and Rs.140000/m for development well.
- 3) Transportation of gas is being considered through pipeline of length 90 km. Cost of pipeline is considered as Rs.35 lakhs per km.
- 4) The average sale price of the gas, is considered at Rs.9535/1000m³ (4.50\$/MCF).
- 5) Techno-economic analysis has been carried out considering royalty @10% and tax @33.99%
- 6) Financial analysis
 - i. Life cycle cost (Operating, Exploration & Development): Rs.238.28 crores (34.04 \$MM)
 - ii. Project life: 15 years

The detail of cost estimation calculation is given below:



Technical Assumptions

COUNTRY	INDIA
BASIN	A&AA Basin
BLOCK	AAFB
PEL/PML	Gojalia
PROSPECT	GOAN
PLAY	Middle Bhuban
HC TYPE	Gas
AREA (Sq.Km.)	4.00
PLAY TOP (m)	1600
INPLACE VOLUMES (MMCM)	983.3
PRODUCTION PROFILE	
PEAK WELL FLOW (MMCF/d)	4.5
PLATEAU RATE (FIELD) (MMCF/d)	6.3
YEARS TO PLATEAU	1
PLATEAU DURATION (Years)	6
FIELD PRODUCING LIFE (Years)	14
EXPLRN. / APPRAISAL / ENGINEERING	
NO. OF EXPL+APP WELLS	1
TOTAL NO. OF PRODUCERS	2
EXPORT OPTION (PL / TANKER)	PL
PIPELINE LENGTH (km)	11
DEVELOPMENT CONCEPT	Well-pad connected to main producing facility
PIPELINE TARIFF(\$/bbl)	NA
COST ASSUMPTIONS	Exploratory well: Rs. 1,50,000/m Development well: Rs. 1,40,000/m Pipeline cost: Rs. 3500000/km



Economic Indicators

Prospect		GOAN
Reserves	MMCM	589.89
	BCF	20.85
Estimated Expenditures		
Operating Expenses	\$MM	13.69
Exploration Capital	\$MM	7.25
Development Capital	\$MM	13.10
Life cycle cost	\$MM	34.04
Average Price	\$/Mcf	4.54
Unit Operating Expenses	\$/Mcf	0.66
Unit Exploration Capital	\$/Mcf	0.35
Unit Development Capital	\$/Mcf	0.63
Unit Life cycle cost	\$/Mcf	1.63
Producing Life	Years	14.00
Project Life	Years	15.00
Economic Indicators		
IRR	%	25.08
NPV @ 0%	\$MM	33.99
NPV @ 5%	\$MM	20.80
NPV @ 8%	\$MM	15.28
NPV @ 10%	\$MM	12.30
NPV @ 12%	\$MM	9.77
NPV @ 14%	\$MM	7.60
Risk Analysis		
Risk Money	\$MM	7.26
Discovery Probability	%	33
EMV @ 0%	\$MM	6.36
EMV @5%	\$MM	2.24
TE VIABILITY	VIABLE	


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