



GOVERNMENT OF ARUNACHAL PRADESH
OFFICE OF THE EXECUTIVE ENGINEER (E), DIRANG ELECTRICAL DIVISION
DEPARTMENT OF POWER, DIRANG.

COST BENEFIT ANALYSIS FOR FOREST LAND DIVERSION

(Ref: MoEF guideline No. 7-69/2011-FC (Pt.) dated. 01" Aug, 2017)

Project: - Diversion of 77.04 Ha of forest land for construction of 132 kV D/C Bomdila-Kalaktang transmission line under Comprehensive Scheme project of Arunachal Pradesh.

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

No	Nature of Proposal	Applicable/Not applicable	Remarks
1	All categories of proposal involving forest land upto 20 hectares in plains and upto 5 hectares in hills.	Not applicable	
2	Proposal for defence installation purpose and oil prospecting(Prospecting only)	Not applicable	
3	Habitation, establishment of industrial units, tourist lodge complex and other building construction.	Not applicable	
4	All other proposals involving forest land more than 20 hectares in plains and more than 5 hectares in hills including roads, Distribution lines, minor, medium and major irrigation projects, hydro projects, mining activity, railway lines, location specific installations like micro-wave stations, auto-repeater centres, TV Towers etc.	Applicable	These are case where a cost benefit analysis is necessary to determine when diverting the forest land to non- forest use in the overall Public interest.

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Table-B: Estimation of cost of forest diversion

SN	Parameter	Remarks	Monetary equivalent
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). <i>Note:</i> 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	NPV for the diverted forest area considered as Rs. 9.39 Lakhs/Ha. Total value of NPV in Rs. =(9.39 Lakhs x 77.04 ha) = 723.4056 Lakhs
2	Loss of animal husbandry productivity; including loss of fodder	To be quantified and expressed in monetary terms or 10% of NPV applicable whichever is maximum	NIL. As the proposed project is an overhead Distribution line, there will be no loss animal husbandry Productivity including loss of fodder. After completion tower erection and stringing, nature vegetation/plantation of dwarf specie, will cover up the areas which were Temporarily damaged during construction.
3	Cost of human resettlement	To be quantified and expressed in monetary terms as per approved R&R plan	NIL. There is no human resettlement issue this project. Hence no cost involved for any R & R scheme.
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 the project.	To be quantified and expressed in monetary terms on actual cost basis at the time of diversion	NIL There is no requirement of any diversion of public facilities any Administrative infrastructure (Road building, schools, dispensaries, electric lines, railways, etc.) under the Distribution line project.

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5	Possession value of forest land diverted	30% of environmental costs (NPV) due to loss of forests or circle rate of adjoining area in the district should be added as a cost component as possession value of forest land whichever is maximum	The possession value of forest land diverted is calculated as Rs. 217.021 Lakhs. (30% of NPV) However, in case of Distribution line projects, possession of diverted forest land is not completely required by the User Agency after completion of the project & during operation and maintenance (O&M) stage. As per existing MoEF guideline, dwarf species plantation will be undertaken below the Distribution line corridor (RoW) Forest Department. Only looping pruning of tree branches near the electric conductor will be required during the maintenance period of the Project
6	Cost of suffering to oustees	The social cost of rehabilitation of oustees (in addition to the cost likely to be incurred in providing residence, occupation and social services as per R&R plan) be worked out as 1.5 times of what oustees should have earned in two years had he not been shifted.	Not applicable for this project since there is no resettlement involved.
7	Habitat Fragmentation Cost	While the relationship between fragmentation and forest goods and services is complex, for the sake of simplicity the cost due to fragmentation has been pegged at 50% of NPV applicable as a thumb rule	Considered as 50% of NPV i.e. Rs. 361.702 Lakhs
8	Compensatory afforestation and soil and moisture conservation cost	The actual cost of compensatory afforestation and soil & moisture conservation and its maintenance in future at present discounted value	Cost of CA is considered as= 3.5 Lakh per ha. Total CA Cost (in double degraded land) = (3.5 x 77.04 ha x 2) = 539.28 Lakhs.
TOTAL cost of forest diversion			(723.4056 + 217.021 + 361.702 + 539.28) = 1841.4086 Lakhs


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

Sr. No.	Parameters	Remarks	Monetary equivalent
1	Increase in productively attribute to the specific project	To be quantified & expressed in monetary terms avoiding double counting	Socio economy development & industrial growth, power for irrigation, telecommunication facility and distribution of grid power to rural households will have major to the socio-economy of the state. The lump sum monetary equivalent of the above benefit is considered as Rs.2459.808 crore per year. Details attached in Annexure-A
2	Benefits to economy due to the specific project	The incremental economic benefit in monetary terms due to the activities attributed to the specific project	The monetary value of the incremental economic value of the specific Transmission project may be considered equivalent to the value of the asset to be created i.e. Rs. 24.38 crore
3	No. of population benefited due to specific project	As per the Detailed project report	Entire population of Bomdila- Kalaktang and also the surrounding areas will be benefited by the said 132 kV D/C Bomdila-Kalaktang Transmission Line. The said line connectivity will help the rapidly developing Bomdila and Kalaktang area by providing uninterrupted power supply for small and large scale business establishments which will improve the socio economy development of the area. The monetary equivalent of the benefits due to excess to electricity is difficult to quantified.


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4	Economic benefits due to direct and indirect employment due to the project	As per the Detailed project report	Temporary labour engagement (appx 60 no's per day) during execution of the project along with various firms/suppliers/manufacturers will be engaged for a period of four (4) years. Permanent employment for 15(fifteen) nos. will be also be generated. The lump sum monetary equivalent of the direct and indirect employment generation is calculated as 1.515 crores
5	Economic benefits due to Compensatory afforestation	Benefits from such compensatory forestation accruing over next 50 years monetized and discounted to the present value should be included as benefits of compensatory afforestation. *For benefits of CA the guideline of the Ministry for NPV estimation may be consulted	Benefits from compensatory forestation accruing over next 50 years is huge and monetary equivalent is considered as Rs. 379.08 lakhs.
Total benefit of the project (monetary equivalent)			= (2459.808 + 24.38 + 1.515 + 3.79) = 2489.493 crores

BENEFIT


Cost Benefit Ratio (CBA Ratio) = COST

= 2489.493

18.414 crores *

CBA RATIO= 135.1956

This Undertaking is being signed with reference to the MoU signed between Power Grid Corporation of India, Limited and Department of Power, Govt. of Arunachal Pradesh, vide Sl. No:2.2 of Clause No. 2.0 without any liability in the part of the Department it is mandatory part of Comprehensive Scheme for Strengthening of Transmission & Distribution in Arunachal Pradesh.


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EVALUATION OF BENEFITS:**1. Increase in productivity attributable to the specific project:**

- Power Flow = 80 MW
- Load Factor = 60%
- Losses = 2.5%
- Average value added = Rs. 6.00 per kwh
- Energy sent out per year = $80 \times 10^6 \times 0.6 \times 8.76 \times 0.975$
= 409.968 x 10⁶ kwh
- Value added = $409.968 \times 10^6 \times 6.00$
= Rs. 2459.808 crore / year

2. Benefits to economy:**3. No. of population benefitted:**

Assuming average 10 units consumption per day per household, total 1.1232 million households can be provided electricity per year.

4. Employment potential

The project will employ an average of 75 labors with an average of 150 days of work in a year for 02 years.


Therefore, total man/days generated = $75 \times 200 \times 2 = 30000$.

Value of man/days generated assuming the labor cost of Rs. /man/day =
 $120000 \times 505 = 1.515$ crores

5. Benefits due to compensatory Afforestation

The value of a fully stocked forest due to CA after 50 years will be $121.111 \times 2 \times 9.39 = 2274.465$ lakhs.

The NPV of the amount of 2274.465 lakhs shall be 379.08 lakhs discounted @ 10% every year.


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