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Performance Evaluation Of 405 Mw Ranganadi Hydro-Electricity Project (Rhep) Phase-I, Neepco Ltd.,Yazali, Arunachal Pradesh, India

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Abstract:

If not best, good Performance is always sought after undertaking any developmental activities irrespective of economic, political, social, cultural, physical and mental etc., 405 MW RHEP, Yazali was commissioned in the year 2001 with a promising role to improve not only the profitability of NEEPCO ltd but also to harness the hydro-electricity power of Arunachal Pradesh and thereby to improve the socio-economic status of the local inhabitants of project site as well as to provide revenues to the state government and supply of electricity etc.

Since Arunachal Pradesh is consider as the power house of India and RHEP, Yazali being the first mega hydro-electricity project in the state, RHEP need to set example by setting standard in terms of performance. Therefore to what extent to what RHEP has performed well; needs to be enquired upon. On this backdrop at attempt has been made in this paper to evaluate the performance of RHEP, Yazali, NEEPCO ltd. in terms power generation, profitability, CSR, Spill over benefits etc.

Keywords: *Corporate Social Responsibility, Power generation, profitability, spill over benefits, RHEP, Yazali, NEEPCO ltd., Arunachal Pradesh.*

1.Introduction

Development is the common catch phrase in modern world, no one denies development. Everyone is need of quality of life; access to education and health care; employment opportunities; availability of clean air and safe drinking water and so on. The individual person aim of development is the economic security, while these individuals aim of the person in collective became the goal for the nation to increase wealth of the country or in other term 'the economic development' of the country. The economic development can be achieved through industrialization and commercialization. The growth of industrialization, economy and its global competitiveness hinges on the availability of reliable and quality of power at low price or competitive price. Human being is fond of using electric gadgets; therefore, power is an essential requirement for all facets of our life and has been recognized as a basic need.

The electricity is generated from thermal, hydro, nuclear, wind and solar energy. Among all the sources of energy, thermal and nuclear energy is non-renewable sources of energy and also pollutes environment. Thermal and nuclear energy uses the fossil fuels as source of energy, which is scarcity in nature. Therefore, we need to reduce dependence on fossil fuels and minimize the amount of carbon emission in the atmosphere as possible as it can be. Hence, we need to produce more energy from renewable sources of energy. Hydropower is a renewable source of economic, non-polluting and environmentally benign source of energy. Hydro power stations have inherent ability for instantaneous starting, stopping, load variations etc. and help in improving reliability of power system. Hydro stations are the best choice for meeting the peak demand. The generation cost is not only inflation free but reduces with time, because once the dam is installed it extract the energy from free flowing water. Hydroelectric projects have long useful life extending over 50 years and help in conserving scarce fossil fuels.

Arunachal Pradesh is the land of mountainous, forests and rivers inhabited by tribal people and the mountainous topography of the state presents an ideal condition for the development of hydro-electric projects. There are five major river basins in the state namely Kameng, Subansiri, Siang, Dibang and Lohit river basin, which provide conducive potential for hydro power projects. Arunachal Pradesh is blessed with a huge hydropower potential, as per Central Electricity Authority (CEA), it has 50328 Mega Watt (MW) estimated potential and north eastern states at 63,257 MW. However, with these powers potential, Arunachal Pradesh has tapped 405 MW only.

Against this backdrop of power potential in the north-eastern region, the North Eastern Electric Power Corporation Limited (NEEPCO Ltd) was incorporated in April 1976 as a wholly owned government of India enterprise to exploit, utilize and develop the inherent power generation capability of the region. NEEPCO Ltd, being the premier power development organization of the north-eastern region, has been entrusted by the planners and decision makers in the power sector of the nation with the task of developing a significant quantum of total hydro power potential of the north eastern region. It will minimize the peak demand of power in north eastern region and India as a whole.

North Eastern Electric Power Corporation Limited (NEEPCO Ltd.) was incorporated under the schedule "A" of Government of India Enterprise under the Ministry of Power was set up on the 2nd of April, 1976. NEEPCO have completed 5 (five) project with installed capacity of 1130 MW till date namely (i) 275 MW, Kopili Hydro Electric Project (ii) 291 MW, Assam Gas based Power Project (iii) 84 MW, Agartala Gas Turbine Project (iv) 75 MW, Doyang Hydro Electric Project and (v) 405 MW, Ranganadi Hydro Electric Project. It have also 4 projects under construction with installed capacity of 871 MW, these are (i) 60 MW Tuirial Hydro Electric Project (ii) 600 MW Kameng Hydro Electric Project (iii) 110 MW Pare Hydro Electric Project and (iv) 101 MW Tripura Gas Based Project. NEEPCO Ltd has the authorized share capital of ` 5000 Crore as on 31st march 2010 and net worth as on 31st march 2009 is ` 4182.31 Crore. NEEPCO's headquarter is located at Shillong, the capital of Meghalaya.

The Ranganadi Hydro Electric Project (RHEP) Phase-I with a capacity of 405 Mega Watt (MW) has been developed and commissioned by NEEPCO Ltd during the year 2001-02. RHEP is located in 27^o20', 93^o45' E of Lower Subansiri District of Arunachal Pradesh, which is 80 km away from Ziro the district headquarter of Lower Subansiri District of Arunachal Pradesh. This project is established in river basin of Panyor (Ranganadi) and tail discharge at Pare (Dikrong) river basin of Papum Pare district of Arunachal Pradesh.

2.Literature Review

A large volume of literature on general studies and a research has been conducted in the field of hydroelectric project across the globe and in India. A number of reports, articles, survey and studies have been published on performance evaluation methodologies with respect to hydroelectricity project. Some of the literatures bearing importance for the present study have been reviewed.

The power is important sources that are requires for industrial, commercial and economic development to the nation M.K. Khera, B.D. Sharma, Majid Hussain (1991) besides, hydro power station leads to rapid development of socio-economic development of the nation and state as a whole and a region or area in particular Moonis Raza (1980), G. Baidya (2006). It provide spill over benefit to project affected area. They also help in minimizing carbon emission in atmosphere Ghanshyam N Singh, T Valuthi Varagunasingh, N Manonmoney, Kanti Singh (1991). The other uses of reservoir provides for water sport, tourist attraction, aquaculture and irrigational support to agriculture. Large dam can controls the flood, which would otherwise affected to people living downstream. Hydropower dam have inherent benefit yet it is equally associated with demerit Mohinder Kumar Slariya (2009), John R. Wood (2007) this includes ecological damage and loss of land, relocation of project affected people Moonis Raza (1980), G. Baidya (2006), G. Thukral (1992) dam failure hazard Vinod Raina, Aditi Chowdhury, Sumit Chowdhury (1999) due to submerge of large number of trees and decaying in an aerobic environment produces methane emission which is a potent of greenhouse gas. The increase in global temperature reduces the flow of river which affects the production of power from dam. Siltation reduces the flood control mechanism as well as power generation of the dam. In view of such consequences, World Commission on Dams under United Nation Development Programme (UNDP) issues guidelines from time to time in ensuring proper implementation of hydropower projects all over the world. India too needs to regulate its hydropower policy with world leader Ramaswamy R. Iyer (2003). Further, due to increase in the awareness among the masses; there are large number of anti-dam activist and movement around the globe. Considering such consequences it is therefore very much important to evaluate the performance of dam in terms of financial, economic and social appraisal of projects George Irwin (1978), Robin Boadway (2006) before as well as after the commissioning of the hydropower projects.

3.Objectives Of Study

To study and evaluate the performance of RHEP on selected variables.

To address the problem associated with the performance.

4.Methodology

The present study is based on both primary as well as secondary data. The data regarding socio-economic facilities and amenities after the commissioning of RHEP have been collected from the published and unpublished sources comprises of state government and RHEP officials etc covering the period of nine years i.e. 2001-02 to 2009-10. The profit figures of RHEP have been obtained from NEEPCO authority through Right to Information (RTI).The interpretations and analysis of the data collected from primary and secondary sources have been supplemented by the information obtained through formal and informal discussions with project affected families and RHEP officials using tables and graphs.

5.Performance And Evaluation

Hydro Electricity project, in spite of bearing huge social cost; is a cheap, renewable and sustainable resource to generate revenue. Exploitation of water resources is directly linked to socio economic development. Though Arunachal Pradesh have the potential of 50328 MW and one of the top hydropower potential among the state of India, the state could not able to tap the benefits due to various reasons ranging from proper policy, geographical isolation to protest from locals. RHEP is the only commissioned mega dam in state, which started its commercial operation from the year 2001-02. Hence, it is very much important to evaluate the performance of RHEP. Not only for the RHEP itself but also for making comparison and projection for upcoming Hydro Electricity projected in the state.

Thus, in this paper an attempt has been made to evaluate the performance of RHEP. The performance measurement has been made in terms of the following variables.

Power generation

Profitability

Corporate Social Responsibility

Spillover benefit and

Survey report, which is discussed as under:-

5.1.Power Generation

Energy (power) generation is one of the important functions of power developer. Ranganadi hydro electric plant is generating the power since its inception in year 2001-02. The designed energy of RHEP is to achieve 1510.00 MU. However, the actual power

generated by RHEP varies from year to year due to many reasons like sudden machine failure, tunnel rectification work, transmission fault, annual plant maintenance etc. the energy generated and variation is shown in table 1 and 2 respectively.

Year	Energy Generated (MU)
2001-02	21.711
2002-03	189.487
2003-04	956.737
2004-05	1641.108
2005-06	1411.861
2006-07	957.715
2007-08	1540.013
2008-09	1567.888
2009-10	1025.260

*Table 1: Energy Generated By RHEP Since Inception
Source: RHEP, NEEPCO, Yazali.*

These year wise pattern of power generation as per Table 1 have been shown in figure 1 below.

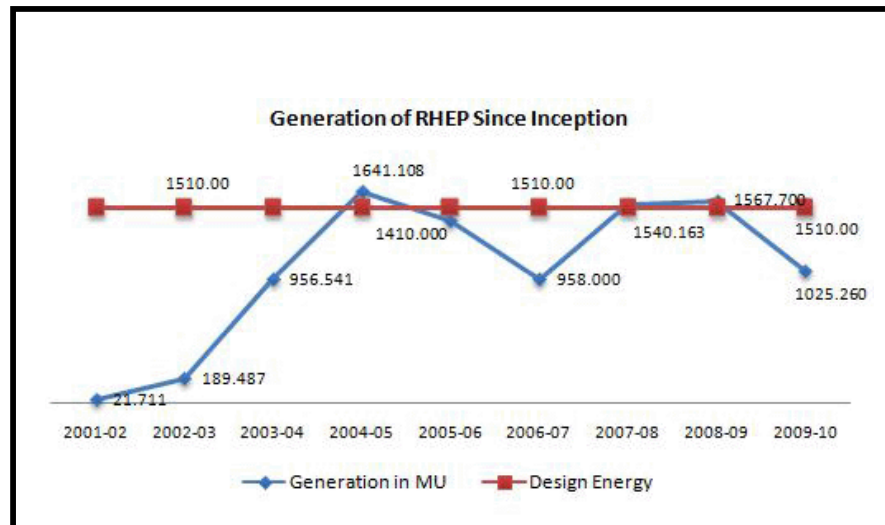


Figure 1

Source: RHEP, NEEPCO, Yazali

From the above figure 1, it can be observed that the highest energy generation is in the year 2004-05 is 1641.108 MU and lowest energy generation is in the year 2001-2002 is 21.711MU. The average energy generation till 2009-10 is 1034.642 MU. However, during the year 2004-05, 2007-08, 2008-09 the energy generated by RHEP is more than

targeted designed energy. Energy generation of RHEP also shows great variation from targeted energy designed. These are shown in table 2

Year	Energy Generated	Variation from targeted (1510.00 MU)
2001-02	21.711	(-) 1488.289
2002-03	189.487	(-) 1320.513
2003-04	956.737	(-) 553.263
2004-05	1641.108	(+) 131.108
2005-06	1411.861	(-) 98.139
2006-07	957.715	(-) 552.285
2007-08	1540.013	(+) 30.013
2008-09	1567.888	(+) 57.888
2009-10	1025.260	(-) 484.74

*Table 2: Variation In Energy Generation Of RHEP, Yazali
Source RHEP, NEEPCO, Yazali.*

The data of table 2 depicts that the three years where the generation of power is more than targeted are (i) year 2004-05 the energy generation is 1641.108MU which is 131.108 MU more than targeted energy (1510.00); (ii) 2007-08 the energy generation is 1540.013 MU which is 30.013 MU more than targeted and in the year 2008-09, the energy generation is 1567.888 MU which is 57.888 MU more than targeted. Hence, the total energy that has been generated more than the designed energy is 219.009 MU. From the table 2, it can also be observed that there are less generation of energy (power) than its designed energy. These less generation of energy is in year, 2001-02, 2002-03, 2003-04, 2005-06, 2006-07, 2009-10 and energy of 1488.289 MU, 1320.513 MU, 553.263 MU, 98.131 MU, 552.285 MU and 484.74 MU respectively. The total energy that has been less generated till 2009-10 is 4497.221 MU. This implies that the performance of RHEP in terms of energy generation is not satisfactory. During the course of study it has been found that low energy generation of RHEP is basically due to various problems like; siltation, less rainfall in the catchment, technical problems, etc.,

5.2. Profitability

One of the best parameter to measure the performance of a project is profitability. It is implied that less performed project will yield low return whereas, best performed project

will yield high return. In this respect the researcher has collected data in terms of Gross Profit and Net Profit under Right to Information Act which is shown in table 3.

Year	Gross-profit (in `)	Net profit (in `)
2001-02	910.73	278.97
2002-03	11346.04	4346.12
2003-04	9543.97	2565.29
2004-05	15520.83	9517.43
2005-06	12648.5	5253.08
2006-07	15233.52	10378.22
2007-08	35232.35	27906.92
2008-09	15173.79	10977.46
2009-10	17071.82	12887.50
Total	132681.55	84110.99
Average	14742.40	9345.67

Table 3: Statement Of Year-Wise Gross Profit & Net Profit Of RHEP, Yazali
(Rupees In Lakhs)

Source: NEEPCO Ltd Shillong, Via RTI

It can be seen from the above table that the simple average gross profit and net profit of RHEP for the year 2001-02 to 2001-10 are Rs. 14742.40 and Rs. 9345.67 lakhs respectively. In other words, RHEP is generating an average net profit of Rs. 93.4567 crore and average of gross profit is Rs. 147.424 crore per year.

Assuming average profit as the margin or desired profit or target profit to achieve, the trend analysis of gross profit and net profit can be seen in figure 2 and 3 respectively.

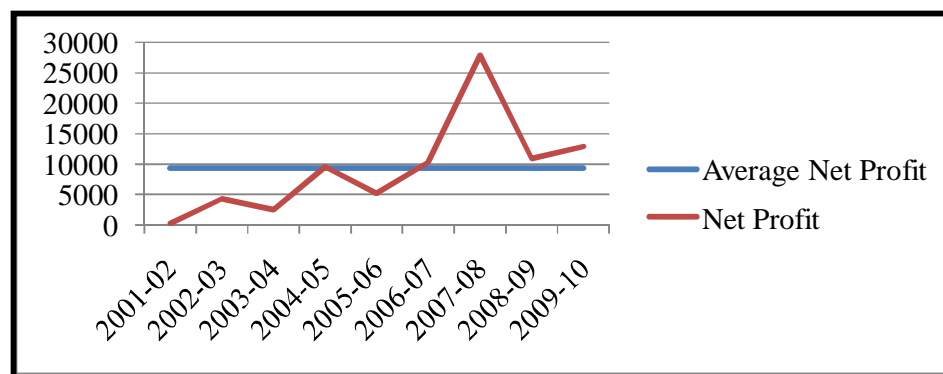


Figure 2: Trend Analysis Of Net Profit Of RHEP (Year 2001-02 To 2009-10)

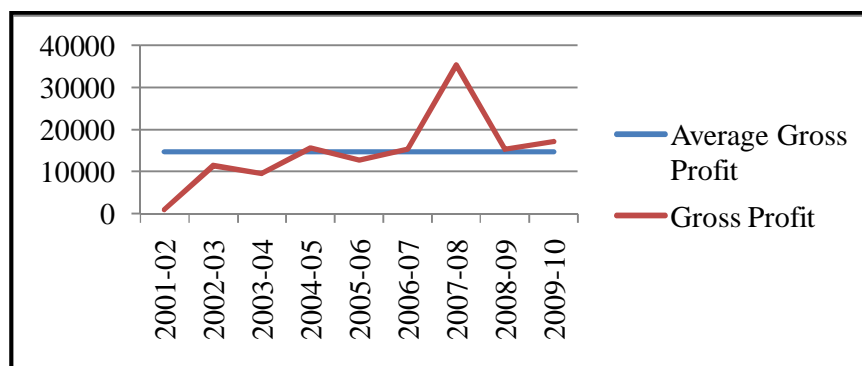


Figure 3: Trend Analysis Of Gross Profit Of RHEP (Year 2001-02 To 2009-10)

It can be observed from the figure 2 and 3 that, both the Net Profit and Gross Profit is in increasing trend. It can also be noted that during the initial years both gross profit and net profit were below the average; however RHEP could able to magnify its profitability from the year 2006-07 with highest gross profit of Rs. 35232.35 lakh and net profit of Rs. 27906.92 lakh during the year 2007-08. Thus, it suggests that performance of RHEP is satisfactory and profitable to its investors. Considering the trend analysis as well as the prosperous future it is expected that performance of RHEP in terms of profitability will definitely improve in the future.

5.3. Corporate Social Responsibility

At present days Corporate Social Responsibility (CSR) is one of the legal obligations on the part of corporate bodies to take measures for the society to ensure the fulfillment of objective under triple bottom line i.e. profit, nation and society. In this regard NEEPCO Ltd has also enshrined the following measures under CSR. The NEEPCO CSR is as follow:-

NEEPCO ltd. (RHEP authority) has performed numbers of programs under corporate social responsibilities in catchment areas during the year 2008-09, which is discussed as under:

Construction of water supply intake and providing of water supply line to rehabilitated village of Potin.

- Construction of Public toilet 3 (three) numbers at Possa village.
- Water supply with Portland Cement Concrete (PCC) platform at Possa village.
- Water storage tank at Hoz, near Power House of RHEP.
- Construction of Cement Concrete (CC) foot path.

- Repairing of the administrative building of Government Higher Secondary School, Yazali.
- Besides above, during the year 2009-10 NEEPCO ltd has also performed the following activities as a part of its CSR.
- Construction of boundary wall for Government Secondary School, Pitapool.
- Leveling of football ground at rehabilitated village Potin.
- Construction of bus waiting shed at Possa village.
- Providing computers to 2 (two) numbers of school namely Govt. Higher Secondary School, Yazali and Govt. Middle School, Hoz.
- Conduct 3 (three) medical camps.
- Award to merit scholarships for Arunachal Pradesh Schedule Tribe students of Lower Subansiri District.
- Construction of Cement Concrete foot path at new Pitapool village.
- Construction 1(one) number with 4 (four) roomed public toilet with septic tank for pre-primary school at new Pitapool village.
- Construction of 2(two) numbers with 2(two) roomed public toilet with septic tank at Pitapool and Chod villages.

The total expenditure incurred on corporate social responsibility of RHEP in year 2009-10 is Rs. 2,11,75,163 (rupees two crore eleven lakhs seventy five thousand one hundred sixty three) but the target budget was only Rs. 2.10 crore.

The evaluation of the programs covered under unit level CSR-CD as framed in NEEPCO Ltd shows that, out of four objectives in Education, only two objectives have been performed. As for peripheral development objective, all the three has been performed. From the others objective no 1 out of 15 objectives has been undertaken by RHEP. Under health upliftment objective out of three objectives only one has been performed. Further, it is also found that out of 26 objectives of unit level CSR-CD only 6 and 9 objectives have been performed in year 2008-09 and 2009-10 respectively. It may be mention that information regarding implementation of CSR-CD of NEEPCO ltd. was available only for the year 2008-09 and 2009-10 during the course of study.

Thus, it is observed from the above discussion that performance of NEEPCO ltd (RHEP) in terms of achieving the objectives under CSR is not satisfactory. However, it is expected that that NEEPCO ltd will definitely look out for more activities under CSR in

future. It may also be mention that the activities undertaken by NEEPCO ltd (RHEP) have not been made available to the researcher.

5.4.Spillover Benefit From Rhep, Yazali

The spillover benefits of RHEP, Yazali have been discussed under the following identified parameter.

- Infrastructure (this includes roads, medical, School, recreational and telecommunication)
- Market Facility
- Employment and
- Revenue from RHEP.

5.4.1.Infrastructure

5.4.1.1.Road

The road is the one of the most important infrastructure of socio-economic development project, though the road in and around is not fully constructed by NEEPCO authority, yet it can be termed as spillover benefits from RHEP, since road has been finance by NEEPCO ltd to construct the road. The NEEPCO authority have constructed two road i.e. Pitapool to Rub village, where dam is constructed. Another one is road from NEEPCO complex Yazali to Hoj, where power house is constructed. The State Government's Public Work Department (PWD), have constructed two road i.e. diversion road of RHEP from Lichi village (7 camp, Kimin) via Potin to NEEPCO complex, another one is from Midpu to Hoj connecting the Papum Pare District to Lower Subansiri District, which is the lifeline of three district namely Lower Subansiri, Kurung Kumey and Upper Subansiri Districts. Since this road in not touching Assam, proper maintenance and renovation of the road it will play significant role in developing the three districts in near future.

5.4.1.2.Medical

The Yachuli Circle posses one Public Health Centre (PHC) at Yazali, which is run and managed by Government of Arunachal Pradesh, in addition to it, NEEPCO authority have provided one medical facility at NEEPCO complex for its employee and project affected families. Where no doctor charge is taken from persons or kith and kin of

project affected family, only medicine cost have to bear by them. This facility can be termed as life saving schemes for the citizen of NEEPCO complex as well as for nearby areas of NEEPCO complex. Otherwise, the local dwellers of that area have to travel 20 Km approximately to access the facility of PHC at Yazali.

5.4.1.3.School

There is one higher secondary school at NEEPCO complex, Yazali, run under the banner of Vivekanada Kendra Vidyalaya School but supervised and look after by NEEPCO authority, especially for the children of NEEPCO employee, yet the student from nearby areas or Project Affected Family do take great advantage from it. So in a gross term it helps in education system of local inhabitant children too.

5.4.1.4.Recreational

The reservoir of RHEP dam can attract recreational activity like adventurous boating, which can attract tourist. For this reason, Department of Tourism Government of Arunachal Pradesh has built a tourist lodge at Potin, (which is yet to start) and a guest house at Peni where tourist can stay.

5.4.1.5.Telecommunication

Before the project there was no any telecommunication system prevails there, now there is connection of telecommunication both mobile and landline. This makes easy communication for the local dwellers. Thus the development of telecommunication in the project affected areas can be attributed to RHEP, NEEPCO ltd.

5.4.1.6.Others

Besides the above specific infrastructure benefits, it was observed that all the villages in the project are getting electricity supply from RHEP. The RHEP authority are also conducting environment and health awareness program due to which local inhabitants are benefitted

.

5.4.2.Market Facility

During the course of study it was found that four market centers were created after implementation of the project, which can be termed as the newly market created due to project. These markets are located at Potin, near entry gate of NEEPCO, complex, RHEP, near Circle Office of Yazali and new Pitapool respectively. This creation of

market helps the local inhabitant especially the project affected families to earn their livelihood and for economic development of that area.

5.4.3. Employment

Due to the project, local habitant of Arunachal Pradesh to the tune of 83 numbers could employed in RHEP out of which 53 numbers is holding the regular job, 29 are holding on basis of 89 days employee and 1 (one) deputation from state government. These employments could not have been generated without the project, which is also the spillover benefit that provided to the people of Arunachal Pradesh.

5.4.4. Power Supply

Power is the primary output of any power developers, that may be hydro, thermal, nuclear, wind and solar. As a host state of project and under the National Hydro Power Policy 1998 as well as under the para 9.7 of hydro power policy 2008, Arunachal Pradesh is entitled to receive 12 percent free power share from the RHEP. The power received from RHEP as furnished by the department of power, Government of Arunachal Pradesh. The available data is from 2004-05 to 2009-10, these are shown below in table 4.

12 percent free power received from RHEP (in MUs)					
2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
197.530	168.782	112.532	181.520	188.480	122.300

*Table 4: 12 Percent Free Power Receipt By Government Of Arunachal Pradesh
Source: Department Of Power, Government Of Arunachal Pradesh*

While an analysis with the total generation of power of RHEP with 12 percent free share of power entitled to State Government is presented in table 5

Year	Total generation of RHEP (in MU)	12% free share received by Arunachal Pradesh (in MU)	12% free share Actually entitled	Less/More from 12%
2001-02	21.711	Not available	2.605	-----
2002-03	189.487	Not available	22.738	-----
2003-04	956.737	Not available	114.808	-----
2004-05	1641.108	197.530	196.933	0.597
2005-06	1411.861	168.782	169.423	-0.641
2006-07	957.715	112.532	114.926	-2.394
2007-08	1540.013	181.520	184.802	-3.282
2008-09	1567.888	188.480	188.147	0.333
2009-10	1025.260	122.300	123.031	-0.731

Table 5: Variation From Actual Power Entitled To Arunachal Pradesh From Rhep, Yazali

Source: Department Of Power, Government Of Arunachal Pradesh

It is observed from the table 5, that the surplus received over 12 percent is received in year 2004-05 and 2008-09 in the form of 0.597 MU and 0.333 MU respectively. The total of surplus received is 0.93 MU. Whereas, the deficit received less than 12 percent is in year 2005-06, 2006-07, 2007-08 and 2009-10 of 0.641MU, 2.394 MU, 3.282 MU and 0.731 MU respectively. The total of deficit received is 7.048 MU.

Hence, it is expected that with the increase in power generation the revenue generation of Government of Arunachal Pradesh will also increase. However, during the course of study it was found that RHEP confronts numerous problems due to which performance of could not be achieved as desired.

6.Problems Associated With The Performance Of Rhep, Yazali

During the course of study the following problems were identified to be the main factors responsible for below the mark performance of RHEP. These problems have been be classified under two headings i.e. controllable and uncontrollable, which are discussed as under.

The controllable problems identified in respect of RHEP, Yazali are as follows:

6.1. Annual Plant Maintenance

Due to Annual Plant Maintenance of RHEP, its machines are turn off and there is no any power generation in this period. The duration of Annual Plant Maintenance depend upon the intensity of machine damage. It mostly ranges from week to month.

6.2. Sudden Machine Failure

This kind of problem arises in any time, which results into forced outage. Since, machine failure means shutting down of its generation.

6.3. Tunnel Rectification Work

Sometimes problem arises in tunnel, due to high pressure of water or debris stock in tunnel. This damage of tunnel creates a problem in generation of energy.

6.4. Evacuation/Line Constraints (Transmission Line Fault)

Due to fault in the transmission line, its energy generation could not able transmit to demand of power/energy.

6.5. Low Price Offered By Grid Corporation

Transmission is carried by the Grid Corporation of India, sometime they offered low price for the energy. This is beyond the NEEPCO expectation or less than its cost of generation, so the transmission is stop till the negotiation for the price is mutually accepted the both parties.

6.6. Less Technical Knowhow Of Field Staff/Generator Operator

Less technical knowhow of field staff/generator operator sometimes for their fault there is sudden machine failure or forced outage. Till technical problem is solved, there is no any generation of power. This problem mainly arises due to inexperience of handling the generator by the staff/generator operator or transfer of employee or casual handling. These above problems are basically technical problem which create hindrance in energy generation. Therefore, if detected early the above problems can be rectified and can be controlled by taking appropriate measures like; training of operator, constant monitoring and inspection, setting quality control standard etc.

Besides controllable problems, there are non-technical problems which is uncontrollable or beyond the reach of human being of RHEP authority. These are as follow:

6.6.1. Siltation Problem

This is the major problem that hindrance in energy generation, siltation the terms denote for the reservation of sand in reservoir of dam. The deposits of sand create less stock of water in the reservoir, which result into less water for energy generation.

6.6.2. Less Rainfall In Catchment Area

The rainfall is not equal in all the years since from inception, the year with less rainfall means less water in river resulting into decline in ground water table, since ground water table is feed by the surface water, any decline in surface water declines ground water and vice-versa. Hence, less rainfall resulted into less availability of water for energy generation. Thus, it is observed that due to the presence of above cited problems the energy generated by RHEP is not as per designed energy.

7. Suggestions

Considering the above discussions, the following suggestions are recommended to improve the performance of RHEP, Yazali.

The proper and constant monitoring and training to the generator operator can be fruitful in achieving the desired energy generation. This will magnify the profit position of NEEPCO ltd.

Implantation of environmental safeguard plan for the downstream area of reservoir, so that the loss of life and property of downstream area can be minimized.

On the matter of degradation of agricultural and horticulture production of downstream area, it is advice to provide fund for the canal based irrigation facility and renovation of the same for at least once in a year. These will easy the claimant of downstream community as well as in building good rapport.

Implementation of in Toto of para 14 of Hydro Power Policy, 2008, of Government of Arunachal Pradesh is very much sought for overall socio economic development of the Project Affected Family.

More and more activities should be undertaken by NEEPCO ltd under CSR as a part of its obligation as well as to improve better relationship between NEEPCO ltd and local inhabitants.

NEEPCO should develop measures for dissemination of information about RHEP reflecting not only the benefits but also its probable impact on society and environment

so that beneficiaries can take precautionary measures to protect themselves from the probable losses.

NEEPCO Ltd should collaborate with educational and technical institute like Rajiv Gandhi University and NERIST (North Eastern Regional Institute of Science and technology) etc., in the development of better policy by way of conducting workshops and seminars regarding the improvement of RHEP performance as well as dam issues in the state.

8. Conclusion

“No pain no gain” the quotation clearly signifies that for improving the overall performance of RHEP, many challenges need to be cross. Though profitability of RHEP shows good result, the overall performance of RHEP is not satisfactory. Therefore, NEEPCO authority should give more focus on how to improve the performance. For this matter, equal focus should be given to profit, people and planet as per Triple Bottom Line concept. Thus considering the above discussions and suggestions, NEEPCO need to seek cooperation from state government, local inhabitants, subject experts, technical persons/institutes etc., and perform 360 degree evaluation through workshops/seminars/conferences etc., at least once in ten years to arrive at strategic decision. These will not only improve the overall performance of RHEP but most importantly it will be an example for others to follow. Last but not the least; Arunachal Pradesh possess the hydro-power capacity of more than 50,000 MW and the state hydro power policy 2005 state that, “if the available potential (hydropower) can be harnessed, the state will be floating ‘hydro dollars’ like petro dollars in Arab countries”,. Therefore, NEEPCO ltd need to set example to draw more attention from local community, state government and power developers to enable them to make a decision and to think twice before starting hydro-power projects in the state.

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