

NEED OF AN HOUR - POLICY FOR RENOVATION, MODERNISATION, UPRATING AND LIFE EXTENSION (RMU&LE) OF HYDROELECTRIC PROJECTS IN THE STATE THROUGH PRIVATE SECTOR PARTICIPATION ON LEASE, RENOVATE, OPERATE AND TRANSFER BASIS (LROT)

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1. INTRODUCTION

Hydro-Electric Power, generation has many well recognised advantages. It is environmentally clean and renewable energy source with high degree of flexibility and reliability. In the overall economic interests of the State and the country, hydro potential has to be optimally harnessed and operated efficiently by constant maintenance, renovation and modernisation.

2. NEED FOR THE POLICY

Renovation, Modernisation, Up-rating & Life Extension (RMU & LE) of old hydro-electric plants has been accorded high priority by the Government of India as it is considered as a faster and cheaper option of capacity addition in comparison to installing new units, as the later involves various statutory clearances and critical issues like land acquisition, forest clearance or R & R, geological surprises, new evacuation arrangements. Also risk of time overrun is very limited & it improves the operational reliability and efficiency. It also extends the plant life by 20 to 25 years.

Since the enactment of Electricity Act, 2003, (EA, 2003) there is an increasing trend of private sector investments in power sector. Further it is believed that Public Private Participation (PPP's) has some inherent strength such as easy access to the state of art technology, better managerial skill and comparatively faster decision making which can benefit for timely completion of RMU & LE activities. The financial burden on the consumers can be reduced by avoiding time and cost overrun and limiting the overhead cost, administrative charges and establishment charges to the minimum. RMU & LE of over lived hydro-electric projects, through Private Sector Participation can be made on Lease, Renovate, Operate & Transfer basis (LROT).

The Act (EA, 2003) has enabled substantial participation of private sector, particularly in power generation. Having recognised, the distinct advantages of implementation of RMU&LE works through PPP, which have already been mentioned in above paragraph, RMU&LE works pertaining to over lived hydro electricity generating stations, in which power generation is incidental to irrigation and/or water supply releases would be carried out through Lease, Renovate, Operate & Transfer (LROT) basis.

The performance and economics of operation of the hydroelectric projects which are constructed and presently being operated by State Water Resources Department (WRD) or State generation companies needs to be assessed, evaluated and can be taken up for RMU & LE on priority through LROT basis.

3. OBJECTIVES OF THE POLICY

Following objectives are intended to be achieved -

- (a) Life Extension (LE) of over lived hydroelectric power plants, beyond its' normative life.
- (b) Along with the life extension, improving the performance of over lived hydroelectric power plants in terms of efficiency, output, availability & reliability by resorting to modernisation with state of art technology.

- (c) Upgrading the station capacity, wherever feasible, from techno-economic and hydrological point of view.
- (d) Converting existing base load stations to peaking stations, for the benefit of the electricity grid, wherever feasible, without adversely affecting the other planned consumptive water usages.
- (e) Reducing the maintenance requirements and ensuring ease of operation and safety.
- (f) Optimum utilisation of land available with Water Resources Department (WRD) at hydroelectric plants and existing evacuation infrastructure by promotion of co-located hydro-solar hybrid power plant.
- (g) Accelerating the RMU&LE activities of the existing hydro-power plants through private sector participation in a time bound manner.
- (h) Protection of overall consumers' interests by timely completion of the RMU&LE works without cost over-run and minimum loss of the plant generation.
- (i) Generation of reasonable revenue for State for sustenance of the infrastructure created for harnessing the natural resources.

4. RELEVANT LEGAL PROVISIONS

- (a) EA, 2003 has delicensed the generation of electricity. As per the provisions in Section 7 of the EA, 2003, provides that any generating company may establish, operate and maintain a generating station without obtaining a license under this Act, if it complies with the technical standards relating to connectivity with the grid referred to in clause (b) of the Section 73 of the Act.
- (b) Notwithstanding the provisions in section 7 of the EA, 2003, the provisions in Section 8(1) of the EA, 2003, read with the Central Government Notification No. SO 490(E) dated 28.01.2014, the hydroelectric schemes costing more than Rs. 1,000 Crores are required to be submitted to the Central Electricity Authority (CEA), for its concurrence. The Authority, before concurring such schemes, is expected to scrutinise the scheme, with respect to the guidelines stipulated in Section 8(2) of the EA, 2003.

Thus, the State, by virtue of statutory provisions, being the owner of the hydroelectric projects in their jurisdiction, have right of harnessing, the natural resources at these sites, for generation of hydro-electro activity and earn revenue from it. Also, the State can carry out RMU & LE works and operate these hydropower plants.

5. IMPLEMENTATION FRAMEWORK :

5.1 Identification of Projects / Units Needing RMU & LE :

RMU&LE program needs to be taken up timely to prevent further deterioration in operation of generating units which may lead to their premature retiring. Identification of plants requiring renovation and modernisation need to be done well in advance as there are several essentialities to be fulfilled which may take considerable time before commencement of the actual execution of works. The projects requiring RMU&LE needs to be primarily identified not only on the basis of its operating hours but on the basis of its' performance record and parameters such as -

- Reduction in generation due to frequent breakdowns and reduction in efficiency;
- Reduction in plant availability due to frequent unplanned breakdowns;
- Temperature rise, vibrations etc;
- Uneconomical operations due to increase in O & M Cost;
- Obsolescence of equipment and non-availability of spares;

The performance of all the projects should be reviewed initially after every 10 years and after 20 years of operations, every 5 years. The performance data should be documented in the standard format prescribed in Annexure -1 and Annexure -2 of the "Guidelines for Renovation & Modernisation of Hydro Power Stations" issued by the CEA (hereinafter referred to as "CEA R & M Guidelines"). The projects based on the past performance data and the criteria listed above should be considered for Residual Life Assessment (RLA) study.

5.2 Residual Life Assessment (RLA) Studies

Systematic RLA study of the primarily identified projects should be conducted as a mandatory technical requirement to assess the health and residual life of every component of the hydroelectric unit and to firm up the scope of RMU & LE plan.

RLA studies, in order to avoid conflict of interests should be conducted through an independent institute or competent consultant who will not be involved subsequently in the execution of RMU & LE works, directly or indirectly. The specific clause, should be provided in the bid documents.

RLA studies, and the RLA Report should be on the basis of inspections, diagnostic tests and checks specified in the CEA R & M Guidelines. RLA studies should identify and address the problems due to generic defects, design deficiency if any, ageing, obsolescence of equipment/components, non-availability of spares, low efficiency of generating units and safety requirements.

In RLA studies the hydrology should be reviewed and the hydropower potential should be reaffirmed, taking due cognisance of any change in hydrology over a period. Any scope for upgrading based on the availability of additional water if any should also be confirmed.

RLA studies, in addition to electromechanical components, must also give due attention to hydromechanical and civil components. Erosion damages of civil works especially in intake structures, water conductor system and tail race channels require special attention. Water leakages from the gates and intake structure should also be given due consideration.

RLA Report should specify the envisaged RMU&LE plan, considering the life extension period and Techno-economic feasibility of upgrading. The possibility of converting existing baseload station to peaking station should also be considered.

Considering the fact that the control protection system, comprising of electronic components and software, become obsolete in a period of 10 to 12 years, provision for two cycles of modernisation of electronic control system will be made for achieving reliability and higher yield. The scope of the RMU&LE work should be clearly defined, to avoid cropping up of the extra works beyond the envisaged scope, at later stage, resulting into cost and time overrun.

Provision for, discharge and net head measurement facility, along with its synchronisation with electronic (SCADA) system and data logging system should be provided. Further, the RLA Report should clearly indicate which components / equipment are to be refurbished and which need complete replacement. Report should also cover the prioritization of R&M activities. The works, having shorter gestation period but having immediate benefits in terms of improvement of availability, increase in generation, etc. Needs to be assigned higher priority.

5.3 Preparation of the Draft Project Report (DPR):

Due attention must be given while preparing DPR to avoid further complications at bidding stage and in tariff determination process. The DPR should be bankable and should include following essential provisions.

- (a) Complete scope of the envisaged RMU&LE works consistent with the approved RLA Report;
- (b) Hydrology details duly considering the change in hydrology or water release pattern, if any;
- (c) History of station wise /unit wise past performance, trajectory of operation of the generating plant and project specific operating criteria / conditions i.e. whether the power station is expected to be operated as per the irrigation use or as per the instructions of the State Load Despatch Centre.
- (d) Working table for 75% dependable year and design energy (DE);
- (e) Detailed cost estimates, on the basis of AHEC-IITR, “1.5 General – Project Cost Estimation”, standard/manual/guideline Nov. 2012 or as amended, issued by Alternate Hydro Energy Centre, Indian Institute of Technology Roorkee, duly considering the aspect of private sector participation. The cost estimates should be realistic to the extent possible and should be based on current market rates / budgetary offers of the supplying agencies. Capital cost should cover all the costs of all civil, electro-mechanical and hydro-mechanical works, cost of RLA study including testing, predevelopment charges, financial charges, interest during construction, all applicable taxes, expenses towards foreign exchange component if any, freights, insurance, erection, testing and commission, project management, contingencies, overheads etc. It should also account for mandatory payments to be made to the WRD including all applicable taxes.
- (f) Cost benefit analysis, computation of the cost of generation and likely levelized tariff as per prevailing tariff Regulations notified by the Commission.
- (g) Implementation schedule of RMU&LE works will be planned with minimum generation loss. In projects having more than one unit, generation will be planned concurrently with the works, to the extent possible.
- (h) As the RMU&LE activities are proposed to be taken up through PPP, the administrative approval of the State Government to the DPR will not be required. However, the cost estimate should be verified / scrutinized by appropriate state central

agency. The successful bidder may prepare its own DPR consistent with its envisaged RMU&LE plan and costing.

5.4 Standard Bidding Documents and Model Lease Agreement :

In order to have uniformity along the various States there should be a standard bidding document and lease agreement. Bidding document should provide history of operation of the generating units and project specific operating criteria / conditions i.e. whether the power station is expected to be operated as per the irrigation schedule or as per grid requirement.

5.5 Selection of the Generating Company

Project shall be allotted to a Generating Company, following a transparent two stage bidding process. Respective State generation companies may also participate in this bidding process. In the first stage, the bidders will be shortlisted, on the basis of assessment of their financial and technical strengths. In the second stage, the financial bids shall be called from the pre-qualified bidders. The bidder, who offers the highest Upfront Premium (UP), over and above the Threshold Premium (TP), fixed for the bidding, will be selected as a Successful Bidder.

The TP shall be a particular amount per MW of installed capacity of hydroelectric project. The TP so fixed shall be the part of the capital cost.

5.6 Sequence of Implementation Schedule

The implementation schedule under this policy for various tasks shall be as follows -

- (a) Letter of Award (LOA) will be issued to the successful bidder within, say 10 (ten) calendar days from the opening of the financial bids.
- (b) The Performance Security (PS) of value of say 5 % of the estimated cost of RMU&LE work, in the form of irrevocable Bank Guarantee (BG) shall be submitted within, say 15 (fifteen) days from the date of LOA by the successful bidder or the Special Purpose Vehicle (SPV) proposed by the successful bidder, as per the provisions in the bidding document. If the successful bidder fails to submit it, within stipulated period, LOA issued shall stand cancelled and EMD deposited along with the bid shall be forfeited. Under such circumstances LOA shall be issued to bidder who has offered next higher UP.
- (c) The Generating Company shall further make the payments of the TP & UP within one month from the date of LOA. In no case, the time limit prescribed for the payment of the TP & UP shall be extended. If the successful bidder fails to make the payment of TP & UP, within stipulated period, LOA issued shall stand cancelled and EMD as well as PS shall be forfeited. Under such circumstances LOA shall be issued to bidder who has offered next highest UP.
- (d) After above process is completed by the Successful Bidder, the EMD submitted by other bidders shall be released within, say 15 (Fifteen) calendar days.
- (e) The Generating Company or the SPV, who shall also be recognised as Generating Company shall execute the Lease Agreement with State, on the Non-Judicial Stamp Paper, of requisite value within, say 30 (thirty) days from the date of issue of LOA. Lease Agreement shall be registered within, say next 10 days.
- (f) After completion of the above said activities State shall hand over the project site 'AS IS WHERE IS BASIS' along with all the spares, tools and plants, package sheds, drawings etc. to the Generating Company. (The cost of disposal of such scrap shall be borne by the Generating Company at the same time scrap and replaced components/equipment shall be the property of Generating Company).
- (g) The Generating Company shall simultaneously arrange for any other required formalities such as preparation of its own DPR, obtaining necessary clearances, financial closure, tariff determination by the Commission, signing of the Energy Purchase Agreement (EPA) etc.
- (h) The project shall be recommissioned after carrying out necessary RMU&LE works, within the stipulated time. Time limit for the execution of the RMU&LE works shall be fixed on the basis of nature and the extent of work. However, many a times, during the execution, after dismantling of the machines, additional works, which were not considered in RLA study, may crop up, requiring reverse engineering. Under such circumstances suitable time extension will be given without any cost implications. State will be the competent authority for granting such extensions.
- (i) During execution, the progress of the work shall be reviewed with respect to the milestones set in the lease Agreement. In case, the Generating Company fails to achieve expected progress, it will be entitled to pay the Liquidated Damages, as prescribed in Lease agreement.

5.7 Term of Lease

The term of lease can be of say 25 years, from handing over of the project, excluding the period stipulated for completion of RM&U activities, including extensions granted, if any. At the end of the LROT period, absolute possession of the project, along with the land, switchyard and allied equipment and spares automatically stand transferred to State, free of cost.

6. GENERATION & SALE OF ENERGY

6.1 Generation

As per the provisions in EA, 2003, the Generating Company, during the Term of the Lease shall be entitled to operate and maintain the power plant without obtaining any licence, provided the technical standards related to connectivity with the grid referred to in sub-Section (b) of Section 73, provisions in Section 10, other relevant provisions in the EA, 2003 and prevalent regulations / orders of the Commission are followed.

6.2 Scheduling & Despatch Principles for Electricity

As per the provisions in the Section 33 of the EA, 2003, Generating Company shall comply with the directions of the State Load Despatch Centre (SLDC).

6.3 Grid Interconnection and Evacuation Arrangements

Grid Interconnection and Evacuation Arrangement shall be governed by the prevailing Grid Code, Regulations and the Orders of the Commission and the relevant provisions in the Energy Purchase Agreements to be signed by the Generating Company with the distribution licensee / Purchaser.

6.4 Wheeling and Transmission

Applicability of Wheeling and Transmission Charges and losses shall be governed by the prevailing Regulations and Orders of the Commission.

6.5 Sale of Power

The sale of electricity shall also be guided by the provisions in the prevalent RE Policy and Energy policy of the State. The tariff for sale of power to distribution licensee shall be determined by the Commission. The Generating Company, therefore, will be required to approach the Commission, for determination of the tariff with necessary Petition under Section 62 of the Electricity Act, 2003, and Tariff Regulations notified by the Commission.

7. MANDATORY PAYMENTS TO STATE BY GENERATING COMPANY :

In addition to the payment of the Threshold Premium and the Upfront Premium the Generating Company will have to make the following mandatory payments annually to the respective State -

- (a) Lease Charges : The lease charges for the transferred asset of the hydroelectric project can be at some pre decided rate* of, per annum, per MW of installed capacity of the hydroelectric project.
- (b) Royalty Charges : In case of hydroelectric projects in which the power generation is incidental to irrigation and or drinking water supply the applicable water royalty charges can be at some pre decided rate** of per kWh on the net energy exclusively exported from the hydroelectric project to the grid.
- (c) Intake Maintenance Charges: The Generating Company should pay the intake maintenance charges at some pre decided rate*** of per kWh, for the net energy exclusively exported from the hydroelectric project to the grid. Provided further that if the intake structure is handed over to the Generating Company for the maintenance, the Generating Company need not pay any intake maintenance charges, but it should maintain the intake structure at its' own cost.

Note –

* At the rate of Rs.4.5 Lacs, per annum, per MW of installed capacity of the hydroelectric project.

(Assuming capital cost of project for more than 5 MW as Rs. 600 Lacs/MW. With Residual cost @ 10% is Rs. 60 Lacs & interest on this Residual cost @7.5% is Rs. 4.5 Lacs)

** At the rate of Rs. 0.10 per kWh, for the net energy exclusively exported from the hydroelectric project.

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8. CO-LOCATED HYDRO-SOLAR HYBRID PROJECTS

The Generating Company can opt to develop hydro-solar hybrid project to tap the solar potential of the land, handed over to it. Any additional land required for solar component, if available, on lease basis can be made available. After ascertaining

technical feasibility, on case-to-case basis, State may permit the solar installation on downstream slope of the dam, Roof top of project or use of the submergence of the dam for installation of floating solar panels with additional lease charges. Generating Company can be required to sign Supplementary Agreement with State for the solar project. Generation meters needs to be provided to each source of Renewable Energy as per CEA specifications.

9 CONCLUSION

In this paper, it has been discussed that by undertaking timely RM&U & LE works, the existing generating plants can continue to operate for extended period of 20 to 25 years, with improved reliability and availability through PPP model on LORT basis. However, in the absence any policy guidelines for involving Private sector through PPP, the RMU&LE works have not been streamlined in the State yet. Attempt has been made through this paper to involve Private sector in RMU & LE work.

REFERENCES

1. Electricity Act, 2003.
2. Central Government Notification No.SO490(E), Date 28/01/2014
3. Guidelines published by Hydro Engineering and R&M Division, CEA, Ministry of Power on Renovation and Modernization and Uprating of Hydro Power Stations.
4. Alternate Hydro Energy Centre, Indian Institute of Technology Roorkee, AHEC-IITR, "1.5 General- Project Cost Estimation" ,Standard/manual/guidelines November-2012, Ministry of New and Renewable Energy, Govt. Of India.