# COMMERCIAL ASPECTS OF RENOVATION & MODERNIZATION OF HYDRO POWER PLANTS

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# Need for R&M of old Hydro Plants

- Construction of a Hydro electric power plant requires huge capital investment which includes **civil assets** that comprise about **75-80% of the project cost**.
- The **civil assets** are normally designed for a life of **100 years** whereas **electrical /mechanical assets** are designed for **30 to 35 years**.
- Due to prolonged operation of generating unit for around 35 years, generic defects such as **wear and tear**, **ageing, obsolescence of equipments, reduction in efficiency, derating, increased forced outages** etc. may cause problems in smooth and efficient working of the generating station (especially E&M components).
- Due to technical improvements in design and new technologies coming in, old power stations are not comparable to newer and advanced stations.

# Advantages - R&M of old Power Plants

- Comparatively easier than constructing a new project.
- Much lower construction/renovation period of **2 to 3 years** against the construction period of new hydro electric projects (6 to 7 years or more).
- Life of the power station can be extended to another **20-25 years** by undertaking timely R&M Program.
- Cost effective measure to **mitigate power shortages** – Cost of R&M is **much lesser** as compared to construction of a new project of same capacity.
- The efficiency & reliability can be improved by usage of '**State of the Art technologies**' by replacing old & damaged components.
- R&M increases plant load factor/ efficiency of the project which is equivalent to capacity addition.

# Govt. policies on R&M

'National Electricity Policy, 2005'

- National Electricity Policy envisages the need for accelerated implementation of R&M Schemes. The relevant extracts are reproduced below:

*"**Renovation and Modernization (R&M)***

*5.2.21 One of the major achievements of the power sector has been a significant increase in availability and plant load factor of thermal power stations specially over the last few years.* ***Renovation and modernization for achieving higher efficiency levels needs to be pursued vigorously and all existing generation capacity should be brought to minimum acceptable standards.*** *The Govt. of India is providing financial support for this purpose.*

*5.2.22 For projects performing below acceptable standards,* ***R&M should be undertaken as per well-defined plans featuring necessary cost-benefit analysis****. If economic operation does not appear feasible through R&M, then there may be no alternative to closure of such plants as the last resort.*

*5.2.23 In cases of plants with poor O&M record and persisting operational problems, alternative strategies including change of management may need to be considered so as to improve the efficiency to acceptable levels of these power stations."*

# Govt. policies on R&M

- ‘Tariff Policy, 2016’
- Tariff policy provides the basic framework for inclusion capital investment on R&M as part of multi year tariff framework.
- **Section 5.11(g) of Tariff policy 2016 provides as under:**

*“**Renovation and Modernisation***

*Renovation and modernization of generation plants (including repowering of wind generating plants) need to be **encouraged for higher efficiency levels even though they may have not completed their useful life**. This shall not include periodic overhauls. A Multi-Year Tariff (MYT) framework may be prescribed which should also cover capital investments necessary for renovation and modernization and an incentive framework to share the benefits of efficiency improvement between the utilities and the beneficiaries with reference to revised and specific performance norms to be fixed by the Appropriate Commission. Appropriate capital costs required for predetermined efficiency gains and/or for sustenance of high level performance would need to be assessed by the Appropriate Commission.”*

# Provisions of CERC (Terms & Conditions of Tariff) Regulations, 2014

- **Regulation 15 (*Renovation & Modernization*)**

  *"(1) The generating company or the transmission licensee, as the case may be, for meeting the expenditure on renovation and modernization (R&M)* ***for the purpose of extension of life beyond the originally recognised useful life for the purpose of tariff of the generating station*** *or a unit thereof or the transmission system or an element thereof, shall* ***make an application before the Commission for approval of the proposal with a Detailed Project Report giving complete scope, justification, cost-benefit analysis, estimated life extension from a reference date, financial package, phasing of expenditure, schedule of completion, reference price level, estimated completion cost including foreign exchange component, if any, and any other information considered to be relevant by the generating company*** *or the transmission licensee.*

# Provisions of CERC (Terms & Conditions of Tariff) Regulations, 2014

- **Regulation 15 (*Renovation & Modernization*)**

*(2) Where the generating company or the transmission licensee, as the case may be, makes an application for approval of its proposal for renovation and modernisation,* ***the approval shall be granted after due consideration of reasonableness of the cost estimates, financing plan, schedule of completion, interest during construction, use of efficient technology, cost-benefit analysis, and such other factors as may be considered relevant by the Commission****.*

*(3) --------*

*(4) Any expenditure incurred or projected to be incurred and admitted by the Commission after prudence check based on the estimates of renovation and modernization expenditure and life extension, and* ***after deducting the accumulated depreciation already recovered from the original project cost****, shall form the basis for determination of tariff."*

# R&M of Bairasiul Power Station – Brief Overview

- Installed Capacity: 180 MW
- Design Energy: 779MU, post R&M – 708.59MU
- COD: 1st April 1982
- Stipulated Technical useful Life: 35 years from COD (upto 31.03.2017)
- Residual Cost Considered: Rs 37.81 Crores
- R&M Cost: Rs. 341.41 Crores (excluding residual cost)
- Expected Life Extension: 25 years after completion of R&M
- Proposed R&M Period: 3 years
- Present composite tariff - **₹ 1.97/unit** (FY 2016-17)
- Post R&M first Year Tariff of **₹ 3.11/unit** considering ROE on 30% + residual value and O&M expenses applicable for existing projects.
- Petition submitted in CERC as per Regulation 15 of CERC Tariff Regulations, 2014 and 'in principle' approval of the proposal has been given by CERC in June'2016.

# Inconsistency in Regulation 15(4) – (Bairasiul Power Station)

**Computation of carry forward cost / Residual value as per existing regulatory provisions:-**

- The original project cost has been defined at Regulation 3(43) as '**the cost within the original scope up to the cut-off date as admitted by the Commission**'.
- Original project cost / COD cost of Bairasiul is **Rs. 143.21 Crs.**
- The **accumulated depreciation as on 31.03.2017** as per tariff order of Bairasiul dated 17.06.2015 is **Rs. 170.32 Crs.**
- As per Regulation 15(4), the carry forward cost works out to be **negative Rs. 27.11 Crs (Rs. 143.21 Crs – Rs. 170.32 Crs)** which is not logical.
- CERC has **ignored the fact that additional capitalization also forms part of the capital cost & depreciation is allowed on total project cost** (i.e. Admitted cost as on COD + Admitted additional capitalization for succeeding years).

# Inconsistency in Regulation 15(4) – Case Study (Bairasiul Power Station)

**Submission of NHPC – Regulation 15(4) be modified as:-**

- *"Any expenditure incurred or projected to be incurred and admitted by the Commission after prudence check based on the estimates of renovation and modernization expenditure and life extension, and* ***after deducting the accumulated depreciation already recovered from the admitted project cost****, shall form the basis for determination of tariff."*
- The **admitted capital cost & cumulative depreciation** as on 31.03.2017 allowed by CERC are **Rs. 208.13 Crs & Rs. 170.32 Crs**.
- Carry forward cost = Rs. 208.13 Crs – Rs. 170.32 Crs

  **= Rs. 37.81 Crs**
- The matter already considered by CERC in the R&M Petition. Suitable amendment in the regulation is awaited.

# Mechanism for fixation of O&M Expenses during post R&M period

- CERC has already notified the Normative O&M Expenses for existing NHPC Power Stations for 2014-19 based on actual O&M Expenses incurred in the last 5 years.
- For new Generating Stations, O&M Expenses specified by CERC for Ist year of COD are:
  - 4% of Project cost for capacity **less** than 200 MW
  - 2.5% of Project cost for capacity **more** than 200 MW
  - Annual escalation of 6.64%
- After completion of R&M works, **the cost base will be changed** and it is not clear whether the station shall be treated as **new generating station or existing generating station for the purpose of computation of post O&M Expenses during post R&M period.**

# Mechanism for fixation of O&M Expenses during post R&M period

- If the generating station after R&M is treated as 'New generating Station', it will result in **considerable reduction of O&M expenses and will not be sufficient to run the power station.**
- Though after completion of R&M, reduction in consumption of stores & spares, repair & maintenance expenses etc. is expected but the man power cost & administrative expenses (which are 70-80% of total O&M Expenses) are essentially to be serviced.
- **NHPC's suggestion:** The methodology followed by CERC in case of old Power Stations i.e, **fixation of O&M expenses on the basis of previous years' actual data with applicable annual escalation may be followed in the post R&M period also to cover up the actual O&M Expenses.**

# Mechanism for Recovery of Annual Fixed Charges (AFC) during execution of R&M works

- CERC Tariff Regulations, 2014 is silent on the mechanism for recovery of Annual Fixed Cost (AFC) during complete / partial shutdown of a **Hydro Generating Station for R&M works**.
- Power Station has to service the establishment & administrative expenses etc. during shutdown period also. Accordingly hydro generating stations are left with **two options**:
- **Option 1: The generator may be allowed to recover the CERC notified O&M expenses limited to actual establishment expenses directly from beneficiaries during complete /partial shutdown period**.
- **Option 2: In case option 1 is not agreed, then capitalization of actual O&M / Establishment expenses incurred during shutdown period in the R&M cost be allowed.**
- If **Option 1** is exercised, such establishment expenses need not to be capitalized in the R&M cost **reducing burden on beneficiaries by way of reduced tariff in the post R&M period**.

# Mechanism for Recovery of Annual Fixed Charges (AFC) during execution of R&M works

- However, CERC has specified methodology for recovery of AFC during complete/partial shutdown in case of Thermal generating Stations for R&M.
- **Regulation 30(2)** of CERC Tariff Regulations, 2014 applicable for **Thermal generating Stations** reads as under:

  *"..... Provided that in case of **generating station or unit thereof** or transmission system or an element thereof, as the case may be, **under shutdown due to Renovation and Modernisation, the generating company** or the transmission licensee **shall be allowed to recover part of AFC which shall include O&M expenses and interest on loan only**."*
- While conveying approval of R&M for BSPS, CERC has considered the request of NHPC and **extended the same provisions in this case**. However, amendment in Regulation is required.

# Treatment of Residual value in R&M Cost base

- Depreciation is allowed upto 90% of capital cost by CERC during its useful life of 35 years.
- The entire debt portion (70%) of capital cost along with 20% of equity portion is returned to the developer in the form of depreciation at the end of useful life of Power Station.
- Remaining 10% which is **part of equity** is treated as residual value.
- The residual value is added to the cost of R&M works to finalize the cost base for post R&M scenario as per regulation 15(4) of CERC Tariff Regulations, 2014.
- Existing regulation is silent on treatment of residual value in total post R&M cost of the project.
- It is proposed that 30% equity of "Total cost after R&M" should include this residual value and generating company may put in additional equity as required. Alternatively, CERC may allow ROE on Residual value plus 30% of R&M Cost.
- Necessary clarifications / amendments are required to be incorporated in the regulations.

Thank You