Renovation, Modernization, Uprating & Life Extension of Hydro Power Plants– Case Study

Presented by:
1. Md. Eyasin – Chief Engineer(OS&U), DVC, Kolkata
2. Shri P Sikdar- Chief Engineer(PHPS), DVC, Panchet
3. Shri N K Singh- Dy. Chief Engineer(MHPS), DVC, Maithon
<table>
<thead>
<tr>
<th></th>
<th>Jharkhand</th>
<th>West Bengal</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Present Capacity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydel</td>
<td>Panchet = 80 MW</td>
<td>Maithon- 63.2 MW</td>
<td>147.2 MW</td>
</tr>
<tr>
<td></td>
<td>Tilaiya - 4 MW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal</td>
<td>Bokaro-630 MW</td>
<td>Durgapur- 210 MW</td>
<td>7270 MW</td>
</tr>
<tr>
<td></td>
<td>Chandrapura- 890 MW</td>
<td>Durgapur Steel- 1000 MW</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Koderma- 1000 MW</td>
<td>Mejia - 2340 MW</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Raghunathpur-1200 MW</td>
<td></td>
</tr>
<tr>
<td><strong>Total Installed Capacity</strong></td>
<td>2604 MW</td>
<td>4813.2 MW</td>
<td>7417.2 MW</td>
</tr>
<tr>
<td><strong>Under Commissioning (COD)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal</td>
<td><strong>Bokaro A- 500 MW</strong></td>
<td></td>
<td>500 MW</td>
</tr>
</tbody>
</table>

1. Jharkhand: 2604 MW
2. West Bengal: 4813.2 MW
3. Total: 7417.2 MW
4. Under Commissioning (COD): 500 MW
DVC EXPERIENCE IN RMU & LE(HYDRO)

DVC undertook RMU of Maithon Hydel Power Station (MHS) in the past. For Panchet Hydel Power Station (PHS), RLA study & DPR reports were prepared in 2007 for undertaking R&M of PHS Unit 1 of 40MW capacity in the 10th Plan.

<table>
<thead>
<tr>
<th>Hydel Unit</th>
<th>Manufacturer</th>
<th>Original Capacity(MW)</th>
<th>Present Capacity(MW)</th>
<th>Commissioning Year</th>
<th>Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TG</td>
<td>GEN</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MHS U2</td>
<td>NEYPRIC</td>
<td>SIEMENS</td>
<td>20</td>
<td>23.2</td>
<td>Mar’ 58</td>
</tr>
<tr>
<td>PHS U1</td>
<td>NOHAB</td>
<td>AEG</td>
<td>40</td>
<td>40</td>
<td>Dec’ 59</td>
</tr>
</tbody>
</table>
MAITHON HYDEL POWER STATION (MHS)

MHS Unit 2(1958) was taken up for RMU in year 2003-2006 period, on OEM basis by engaging M/s Alstom. The unit capacity was uprated to 23.2 MW from installed capacity of 20MW.

Total cost involved: INR 182712909 + EURO 2943588

SCOPE OF WORK

- Refurbishment and uprating of Generator: Uprated from 20MW to 23.2MW. Replacement of stator winding with class F insulation.
- Turbine runner replaced with modified one.
- Replacement of Generator Transformer: Transformer uprated from 25MVA to 33.35MVA.
- Replacement of generator Air coolers.
- Replacement of excitation system by static excitation system.
- Replacement of Governing system by Digital (Neyrpic ADT1000)
- Gate Refurbishment: Intake Emergency / Intake Service Gate / Tailrace Gates
- Replacement 11KV Bus duct, Line Side cubicles and Neutral Earthing cubicle
- Replacement of protection system with Microprocessor relays.
- Replacement of Auxiliary Panels and Switchgears.
- Replacement of UAT: Class of insulation changed to class H, glass fiber reinforced epoxy resin.
- Refurbishment of 2X57.5 T EOT Crane In Under Ground Power House.
MAITHON HYDELM POWER STATION (MHS)

EXPERIENTIAL LEARNING

The RMU was taken up due to increased forced outages, completion of 50 years and non-availability of OEMs/spares. Cracks were observed in turbine runner, which was replaced.

- Not able to raise full load to uprated level with all the three units running simultaneously
  - Probable cause: raised tailrace level.
- Problem facing just after ten years due to no guaranteed technical support for expected R&MU life of 25 years. Guaranteed performance could not be exhibited after R&M.
- Black start not possible after RMU: Not exhibited/ intimated by Vendor
  - Absence of facility of synchronizing in dead bus as breaker closure not possible.
PANCHET HYDEL POWER STATION (PHS)

HIGHLIGHTS
- The Unit 1 was taken up for RLA study by engaging MECON & NHPC prepared DPR in the year 2007 for the R&M without Uprating.
- The work could not materialize as the tendering job for the same was not undertaken.
- The same will be undertaken by after getting the DPR & RLA vetted by CEA.

EXPERIENTIAL LEARNING
- Indian market lacks expertise for Scope determination for undertaking RMU.
- Inspite of best efforts on part of DVC & CEA also pitching in, NHPC did not undertake part 2 of Consultancy work which included tendering work for R&M.
- It is not possible to engage any manufacturer for undertaking RLA & LE studies & report preparation, since it would debar him from participation in tender for execution.
- No standard benchmarks.
- No standard Tender Document formats for calculation/ imposition of Guarantee & Penalty conditions. Different Utilities have different clauses for the same.
- Dearth of experience in Consultants undertaking RLA & LE studies.
- Issues related to copyright of OEMs & Change of ownership at OEMs.
- Non availability of initial project documents.
- No standard norms & procedure availability for following during implementation of RMU.
- No standard Arbitration clauses & procedure in place, should a need arise.
- No specific cost standard per MW for undertaking RMU.

Conti...
PANCHET HYDEL POWER STATION (PHS)

- Non-Level playing field with Solar & Wind: Benefits for solar such as Renewal Purchase Obligation (RPO), Sales tax exemption, Concessional custom duty exemption, 100% Excise Duty exemption, Priority sector lending Low interest loan should be passed to Hydel R&M expenditure also irrespective of capacity.
- Cumbersome process of clearances for R&M tariff benefit from CERC.
- Stringent Hydropower Purchase Obligation (HPO):- Introduction of HPO and linking of the same to any kind of subsidiary being given to fossil fuel generation.
- Absence of qualifying of more than 25MW Hydropower as Renewable Energy thereby extending of benefits at par with Solar/wind by making Hydropower into Renewable Purchase Obligation irrespective of capacity (presently Hydro of capacity upto 25 MW qualify RPO).
- Policies for Hydro projects R&M financing: Creation of National Hydro Fund for R&M/ special hydropower financing schemes through soft loan. Suitable regularity framework for use of long term financial instruments.
- Hydro Tariff: Flexibility w.r.t. Long Term PPA/Extension of PPA. Time-of-Day (TOD) Tariff (Differential tariff and off peak hours). Preferential TOD tariff for hydro plants with uprating after R&M.
- Packaging for R&M w.r.t Hydro Mechanical (HM), Turbo-Generator (TG), Balance of Plant (BOP) etc. vis-a-vis. technical spec. standardization for R&M, JV formation & technical issues.
- Financial & technical reasons for time & cost run over.
- To ensure for complete scope of work as per RLA recommendation with essential SCADA/ Data loggers and to avoid for need base SOW only.
- Water cess & Green cess by states.
- R&M Specific skill development and technology driven regular training & brain-storming sessions.
धन्यवाद

Thank You

DVC
(An Autonomous body under MoP)

Produce & Flourish

www.dvcindia.org
A. Maithon & Panchet Hydel Station

- **Civil Package** - Includes Illumination works also for Maithon at an estimated cost of Rs1.47 Crs (Price Bid is yet to be opened)


  2. R&I of 22 Ton, 40 Ton & 75 Ton Gantry Cranes, Intake Emergency Gate Under Sluice Emergency Gate, Draft Tube Hoisting Arrangement.

  3. R&I of Illumination system.

  4. 300 KVA DG Set.

- Draft QR for each HM pkg of hydel prepared & submitted to civil