

**KERALA STATE ELECTRICITY BOARD Ltd**

(Incorporated under the Companies Act, 1956)

Registered Office: Vidyuthi Bhavanam, Pattom, Thiruvananthapuram – 695 004

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**ABSTRACT**

Chinnar Small Hydro Electric Project (24MW/76.45Mu) - Phase II - Construction of Powerhouse, Valve House, Tail race, Switch yard, Hydro Mechanical and Electro Mechanical works - Adopting VPI technology generators and acceptance of tender deviations - Sanctioned - Orders issued.

**Corporate Office (SBU-GE)**

B.O. (FTD) No. 24/2024 (DGE/G2/AEE3/Chinnar-II/2023) Thiruvananthapuram.

Dated:16-01-2024

- Read :
1. Agreement No. 04/CE (C-I&CC)/2022-23 dated 22.07.2022.
  2. Minutes of meeting held on 18.05.2023.
  3. Letter No. P2223-02-PM-GM-OG-CWC-342 dated 01.06.2023
  4. Letter No. CEICC/07/Chinnar-PH /2023/580 dated 26.06.2023.
  5. Letter No. P2223-02-PM-GM-OG-CWC-599 dated 08.07.2023
  6. Letter No. P2223-02-PM-GM-OG-CWC-619 dated 11.07.2023
  7. Letter No. CEPED/PH Layout/23-24/98 dated 15.07.2023.
  8. Letter No. DGC/AEEIII/Chinnar/2014/23/180 dated 01.08.2023 of Director (G-C).
  9. Note No. CEPED/PH Layout/22-23 (17) dated 21.08.2023 of Dy. Chief Engineer (PED) with FPO Chief Engineer.
  10. Note No. DIRGE/G2/CHINNAR SHEP-II/2023 (1) dated 27.09.2023 submitted to Chairman and Managing Director.
  11. Note No. DIRGE/G2/CHINNAR SHEP-II/2023 (2) dated 06.10.2023 to Full Time Directors.
  12. Note No. DB1/CCM/Chinnar/2023-24/928 dated 14.12.2023 of Deputy Chief Engineer & PM, PES with FPO Chief Engineer
  13. Decision of the Full Time Directors on the Note No DGE/G2/AEE3/Chinnar-II/2023 dated 28.12.2023 of the Director (Gen-Elec) (Agenda No. 19-1/2024).

**ORDER**

The construction works of Chinnar SHEP Phase II was awarded to M/s. Paulose George Construction Company Pvt Ltd - Aryacon Engineers and Contractors - M/s. Flovel Energy Private Limited Consortium on 09.06.2022 and agreement was executed on 22.07.2022 at their quoted price of Rs.116,65,30,340/- excluding GST. The official date of commencement & completion are 08.07.2022 & 08.07.2024 respectively.

During the bid evaluation time, the E&M contractor M/s. Flovel Energy Private Limited had put forward a proposal to change the type of generator i.e to adopt Vacuum Pressure Impregnation (VPI) technology generators instead of conventional generator. VPI generators are a small rating generator of 12 MW and rated speed of 750 rpm. They had also informed that it is not technically possible to handle the rotor poles and stator coils without removing the complete rotor and upper bracket, as specified in the Tender. But KSEBL was not willing to accept the tender deviation. In the tender document the dimension of the power house was 39.7 x 15.75m. M/s. FLOVEL thereafter agreed to supply the generators with resin rich coils and withdraw all deviations as per letter dated 05.01.2022 and furnished an undertaking on 10.01.2022 that they have not proposed any deviation from tender documents other those specifically admitted by KSEBL. Accordingly, the work was awarded on 09.06.2022 to the consortium as per the original tender conditions.

The construction activities of Phase II works commenced on 8.07.2022. But the work could not be preceded due to non-finalization of Powerhouse layout. The actual dimensions of generator are known only during detailed engineering which is done during execution stage. At this stage, the lesser dimensions for Power House was proposed (35.5 x 12.5 m) which is not sufficient to accommodate the conventional generator with barrel. Meanwhile the contractor M/s Flovel has again proposed on to adopt VPI generators instead of conventional, as it is better than conventional type and is readily available with the Generator manufacturer and the space required is less. To resolve the issues related to the finalization of layout of the power house, a meeting was conducted on 10.5.2023 by the Director (G-E), Director (G-C) with the concerned Civil & Electrical officials and Higher officials of M/s Flovel Energy Pvt Limited. In the meeting M/s Flovel informed that all the data/dimensions and levels in power house layout shall be finalized after conducting site visit.

Accordingly, after site visit, another meeting was conducted on 18.5.2023 by the Director (G-E), Director (G-C) with M/s Flovel Energy Pvt Limited for taking a decision on type of generator. During the meeting convened by the Director (Generation-Electrical) and Director (Generation-Civil) on 18.05.2023, M/s Flovel introduced M/s.WEG as the generator manufacturer of the project. M/s. WEG then presented their technology of "Vacuum Pressure Impregnation System". The important merits of the said system includes homogenous insulation system, good sealing property so that moisture entry is restricted, greater mechanical stability in end windings, higher kW/kg, reduced failure risk etc. When enquired about the demerits of the VPI technology, it was informed that when stator becomes faulty, it can be repaired by M/s WEG or competent skilled personnel only.

During the meeting, it was understood that the VPI technology is readily available with the generator manufacturer, as it is a latest technology and space required is less. Regarding the cost of VPI generators, M/s Flovel intimated that the VPI technology is readily available with them and can be supplied at their quoted rate although the rate is more. The major concern was the replacement of faulty stator coils if required at site. M/s Flovel confirmed that M/s WEG can do the replacement work at site with VPI stator coils. It was directed to submit the comparison statements of both conventional and VPI generators. Also, to submit a note regarding rotor pole replacement without lifting the rotor from the position. The meeting decided to recommend putting up the matter of adopting VPI generator instead of conventional type generator before the Board for approval on receipt of comparison statements.

M/s Flovel has submitted the comparison statements as per the letter read as 3<sup>rd</sup> and 6<sup>th</sup> above. The relevant points in the comparison statements are as follows:

M/s Flovel has intimated that the cost of VPI generators is 12% to 15% higher than Resin rich coil Generators and regarding rotor pole replacement without lifting the rotor, M/s Flovel has informed that rotor pole can be removed only after removal of bearing end shield for this construction of generators. Regarding KSEBL's query M/s Flovel has intimated that there will be no change in technical agreement conditions because of implementing VPI technology generators. During the meeting on 18.05.23, M/s Flovel intimated that for VPI generators, generator barrel is not required. All benefits of barrel will be sufficed in the VPI generators and hence the meeting decided to recommend deleting the barrel with slight savings in civil works also.

Regarding KSEBL query that "deleting provision for barrel, whether all the technical specifications related to barrel will be provided by M/s. Flovel, the firm has replied vide comparison statements that all technical specifications related to barrel will be provided by them. As per the letter read as 4<sup>th</sup> above the Chief Engineer (CI &CC) has informed that the width across the bay cannot be altered and is to be limited to 12.5m owing to space constraints. M/s. Flovel as per the letter read as 5<sup>th</sup> above has intimated that it is not possible to accommodate the barrel along with bus duct by limiting Powerhouse dimensions up to 35.5m X 12.5m.

Regarding the requirement of Pressure Relief Valve, M/s Flovel informed during the meeting on 18.05.2023 that on detailed study, it was understood that the system does not require PRV with pressure rise and speed rise within IS limits of 30% and 50% respectively. After discussion, it was mutually agreed that pressure rise shall be limited to 30% and speed rise shall be limited to 45% instead of 50%. M/s Flovel agreed to the same and agreed to provide

the supporting documents in support of their claim. The meeting further decided that the scope of PRV can be deleted as the penstock is safely designed to meet the 30% pressure rise and water hammer requirements subject to the above. The meeting decided that M/s Flovel shall sign an undertaking to ensure the speed rise and pressure rise are within agreed limits specifying in terms of financial liability. Deputy Chief Engineer (PED) with FPO Chief Engineer has proposed the financial liability as 10% of contract price as per the letter read as 7<sup>th</sup> above if the contractor fails to achieve the above agreed values of speed rise and pressure rise at the time of commissioning.

Regarding time extension and approval of construction schedule, Chief Engineer (PED) vide letter No. CE (PED)/Chinnar/2010-11/310 dated 06.09.2022 has granted 7 months additional time to the Contractor M/s. Flovel for conducting fresh model test of turbine based on the direction from the Director (Generation-Electrical). In the meeting held on 18.05.2023, the agreement Authority (CECI&CC) was directed to accord sanction to the construction schedule with 31 months and time extension of 7 months shall be regularized when the original period of completion of 24 months elapses. The Deputy Chief Engineer (PED) with FPO Chief Engineer as per the note read as 9<sup>th</sup> above has requested sanction on the following:

1. To accord sanction to provide VPI technology Generators without barrel instead of conventional type generators in Chinnar SHEP Phase II works, provided M/s. Flovel ensures to implement all technical specifications specified in the agreement conditions except VPI Generators.
2. To approve the agreement deviation on "The construction of generators shall be such that rotor poles and stator coils can be handled out or in without removal of rotors and without disturbing the upper bracket".
3. To instruct M/s Flovel to sign an undertaking to ensure the pressure rise and speed rise are within agreed limits of 30% and 45% respectively at the time of commissioning failing which Board will be at liberty to recover up to 10% of contract price.
4. To approve the construction schedule with 31 months including 7 months additional time (as approved by the Director (Gen-Ele)) for conducting model test of the turbine of the Chinnar SHEP Phase - II work be approved.

The matter was submitted to Chairman and Managing Director as per the note read as 10<sup>th</sup> above for necessary sanction. The Chairman and Managing Director has directed to get specific remarks of all Directors and put up. Accordingly, the matter was placed before the Full Time Directors as per note read as 11<sup>th</sup> above for a decision.

The Director (Finance & HRM) remarked as follows: “Any introduction of new technology should follow a thorough examination of all aspects, including financial considerations. When a new technology offers both financial and technical advantages, after its adoption, it is crucial to promote fair competition among bidders to obtain the most competitive offers. In the current case

1. Altering design parameters in the middle of a project execution based on a contractor's proposal is not a sound practice.
2. The project report and its financial aspects were evaluated based on the existing technology, and the approval was granted accordingly.
3. Detailed examination of potential financial impacts, long-term benefits, and challenges are not provided.
4. The technology proposed by bidders during the pre-bid meeting was mentioned as rejected, but it remains unclear whether a comprehensive analysis was conducted before rejection, and no reason for the rejection is documented.
5. If the proposed technology offers advanced features and financial benefits, it should have been adopted at an earlier stage to ensure fair competition. Hence, I do not support the proposal put forth vide document DIRGE/G2/CHINNAR SHEP-II/2023 (2) dated 06.10.2023.”

However, the other Technical Directors have recommended for the changes. Chairman and Managing Director has remarked that it was brought to notice that civil work is standstill because the generator design approval is not given and that if the design of generator is kept as it is, it will increase the cost of Powerhouse as it will be a large structure. It was brought to notice that right at the time of pre bid this aspect was discussed and brought into notice of the concerned officers, however they did not agree to the suggestions. The Project officers at the time of field visit informed to CMD that the site condition are such that there is no possibility to construct a big Power House to accommodate the conventional generator. CMD noted another fact that VPI technology generator have been used in other projects of KSEBL.

Chairman and Managing Director therefore directed that the concerned officers to put up the details of costs and based on these details appropriate decisions to be taken by circulating the details to all Directors. During the review meeting held on 26.9.2023 by the CMD, the representative of M/s Flovel was asked about the reason for changing the generator type. Flovel representative explained that there are some issues in the basic engineering design of the Generator barrel. He added that the barrel type is absolutely not necessary for the rating of the machine and rotational speed as planned in Chinnar. He specified that they had mentioned this fact in their offer letter itself and quoted for without barrel generator.

The Deputy Chief Engineer & Project Manager, PES with FPO Chief Engineer, as per the note read as 12<sup>th</sup> above has reported as the additional cost implication for the civil part for construction of barrel, if VPI technology is not used and corresponding increase in Powerhouse (about 6%) is tentatively calculated as Rs.550 lakhs. The space constraint in the site is also mentioned, if ordinary generator is used.

As directed by the Chairman and Managing Director the matter was once again placed before the Full Time Directors for a decision as per note read as 13<sup>th</sup> above.

It is noted that the project execution is affected due to the issue regarding technology to be used for generator, which could have been appropriately decided right at the first instance at the time of bidding / pre bid meeting stage. As it was not done in time by the respective officers, after going ahead with civil works other components, upon reaching the stage of Power House construction, later on the rectification in technology request was proposed by the concerned division.

Having considered the sequence of actions taken in detail leading to delays and only option of changing the technology of Generator based on the site conditions and cost savings the Full Time Directors has resolved to accord sanction

1. To provide VPI technology Generators without barrel instead of conventional type generators in Chinnar SHEP Phase II works, provided M/s. Flovel Energy Private Limited ensures to implement all technical specifications specified in the agreement conditions except VPI Generators.
2. To delete the clause of the agreement namely "The construction of generators shall be such that rotor poles and stator coils can be handled out or in without removal of rotors and without disturbing the upper bracket".
3. To instruct M/s Flovel Energy Private Limited to sign an undertaking to ensure the pressure rise and speed rise are within agreed limits of 30% and 45% respectively at the time of commissioning failing which KSEBL will be at liberty to recover up to 10% of contract price.
4. To approve the construction schedule with 31 months including 7 months additional time (as approved by the Director (Gen-Ele)) for conducting model test of the turbine of the Chinnar SHEP Phase - II work.

Orders are issued accordingly.

By Order of the  
Full Time Directors

Sd/-

LEHKA G  
Company Secretary

To:

The Deputy Chief Engineer (PED) with full powers of Chief Engineer.

Copy to:

The Company Secretary/ Chief Engineer (IT,CR&CAPS)/ Financial Advisor/ LA&DEO/ Chief Internal Auditor

The TA to the Chairman & Managing Director / Director (Generation-Civil) / Director (Distribution, Safety, SCM & IT) / Director (Transmission, SO & Planning)/ Director (Generation - Electrical, REES, SOURA, Sports & Welfare)

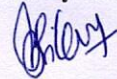
The PA to the Director (Finance & HRM)

The Sr.CA to the Secretary (Administration)

The RCAO/ RAO

Stock File.

Forwarded / By Order



Assistant Executive Engineer