07 September 2022

UNIDO CLARIFICATION Note No. 5

Request for Proposal (RFP) No.: 1100177111

PROVISION OF ONE BRAND NEW MOBILE INSULATING OIL REGENERATION PLANT (Lot 1) AND TWO BRAND NEW MOBILE INSULATING OIL FILTRATION/DEHYDRATION PLANTS (Lot 2) FOR TRANSFORMERS AND WITCHGEARS FOR USE BY CEYLON ELECTRICITY BOARD IN SRI LANKA

Questions	Answers
1. With regard to ToR, 5.1.1 General *If a filter cartridge is used in the system, it must be non-migratory.* Please clarify if non-migratory stays for not to be replaced (meaning cleanable and reusable – not to be disposed of) and if it is referred to the filters able to trap water.	1 Non-migratory means that the sorbent material cannot flow with the oil. For example, if a filter cartridge contains granular adsorbent, the granular material has to be contained in porous enclosure that allows the oil to pass through, but retains the granular adsorbent. Furthermore, the filter can be cleanable and reusable or disposable and replaceable. The filters referred to are the ones used to remove water and other impurities in the oil.
2. With regard to ToR, 5.1.2 Design Please confirm if the hinged, lockable door is a compulsory requirement or if other coverage systems such as tarpaulins are acceptable	2 The enclosure to be used in the mobile transformer oil dehydration/filtration plant must be solid structure and lockable. Tarpaulins or similar coverage are not acceptable.
3. With regard to ToR, 5.1.2 Design Please clarify the statement : *The system shall not use external heat or vacuum to complete the dehydration process* It seems the vacuum and heating of the oil standard technology for removing gases and water is not accepted. Please clarify the meaning.	3 Vacuum and external heaters to complete dehydration process are acceptable
4. With regard to ToR, 5.1.2 Design and 5.1.6 Adsorbent Clay Column *The large-capacity adsorbent filters shall be automatically regenerated (re-dried) by the system through an internal process at regular intervals.* *The adsorbent clay column shall be designed and built in such a manner that allows the in-situ cleaning and regeneration of the solid adsorbent.* From what above, it seems oil reclamation with adsorbent is required (also for DBDS removal), using reactivatable clay.	4 The clay-adsorbent based regeneration process is a standard process in the electrical industry. The TOR are directed to such systems, however if there are other technical alternatives that render a regenerated transformer oil that meet the performance standards and operational cost similar to those clay-adsorbent process, they will be acceptable. Regarding the volume to be treated on a yearly basis, it should be estimated in the hourly capacity of 1500 litres per hour and usable time based on Vendors' experience.

We drive your attention to what is reported by the Cigre Technical Brochure 625, on the Removal of corrosive sulphur from oil in service [paragraph 4.3] Please, note that the Cigre Technical Brochure 625, on the Removal of corrosive sulphur from oil in service [paragraph 4.3] declares as follows: *Several oil reclamation or regeneration processes applied on-site have been found to be successful in removal of corrosive sulphur from the oil. […] There were experiences with oils becoming more corrosive after reclamation, but mostly to silver. […] Reactive sulphur compounds,i.e. elemental sulphur may be formed from various sulphur compounds at temperatures above 200°C and even from "cleaned/treated" oil, free of DBDS at temperatures above 300°C, during reactivation of adsorbent or at any stage of the process where high temperatures are evolved . At temperatures above 250-300°C catalytic cracking of the oil on hot metal oxides surfaces can take place, followed by formation of unsaturated hydrocarbons, ethylene, propylene, butane, elemental sulphur and other reactive sulphur compounds. There is even the possibility of gaseous combustion and pyrolysis products reacting to form free sulphur, in particular from SO2 and H2S according to the Claus reaction (which is catalyzed by the activated bauxite which is used in most equipment). The oil may be non-corrosive prior reclamation, but is usually rich in sulphur and may contain a substantial total amount of disulphides. Therefore, where clay is reactivated prior to reuse, the reactivation step will result in temperatures in the range 600°C to 900°C being reached and any liquid products from this will be very high in elemental sulphur and it may be possible for this to be introduced back into the reclamation process, unless steps are taken to prevent it.* Technologies not based on clay and thermal reactivation of them are not affected by these possible side effects and risks (to make the oil more corrosive after reclamation), also due to the low treatment temperature (90-110° C). Again, as reported by the Cigre Brochure 625, other removal techniques are available as 4.*3.2 Chemical treatment of the oil*. These processes are based on the mixture of chemicals and clays to be replaced daily. These Chemical treatments were founded on the experiences learned in the removal of PCB from contaminated oils. These processes have the vantage to be effective, depending on the amount of materials and duration, on all types of contaminants, such as Acidity, DBDS, corrosion compounds, and even on PCB. In this sense, this solution can be multipurpose and not subjected to the mentioned side effects, being also	

capable to allow long terms warranty and enhancing oil quality. Finally, the possibility to decontaminate the oil also from PCB, if present, allow significant operational flexibility of the solution. Please confirm if a proposal based on chemicals and clay to be replaced and disposed of is acceptable for this tender. If positive, in order to formulate a technical and economical proposal for the tender, please provide an expectation of the oil quantity to be treated per year (with the regeneration plant) to estimate the provision of reagent and clays for the first year of the project.	

Please be reminded that the submission deadline has been extended until 04 October 2022, 16:00 hours, Vienna CET.

To improve efficiency, kindly try to send ALL your clarification questions in one single communication.

Please also be reminded that request for clarifications, if any, shall be received two weeks prior to the offer submission deadline.