**Minutes of the 33rd Meeting of the Executive Committee (EC) of Centre for High Technology (CHT) held through Video Conference on 18th May 2022**

Shri Sunil Kumar, Joint Secretary (Refineries), MoP&NG and Chairman of the Executive Committee of CHT chaired the Meeting.

The list of participants is enclosed as **Annexure**.

ED (CHT)welcomed the Chairman and other members of Executive Committee. Thereafter, CHT made a detailed presentation on the Agenda Items. The following are the salient point of discussions:

## 1. Presentations to EC

### 1.1 Report - Committee on Crude Selection and procurement

CHT invited IOCL on behalf of the committee to present their report on Crude Selection and procurement. IOCL has presented on behalf the committee, the changes in crude procurement and provided the following recommendations:

- To have a National event similar to Asia Pacific Petroleum Conference (APPEC)
- Dead freighting and demurrage make common shipping uneconomical
- Individual company has specific infrastructure & configuration and crude requirement is dependent on that and varies from one refinery to other and hence common consultant benchmarking may not be feasible

Chairman opined that oil companies should have one common channel of communication if such a situation arises. The objective is to optimize the purchases if required. The idea of decentralization is to make the companies more agile but of late it is observed that on a country wide scale collective crude procurement, it will give negotiating power. The idea is how to influence the market using the trading desk and that aspect should be seen and not remain a passive buyer and desires a sperate discussion is required on the subject.

**Action by: Refineries /CHT**

### 1.2 Solomon Benchmarking Studies -Q1D1 from Design stage at NRL Expansion

NRL presented that ensuring Quartile 1 from Day 1 from design of NREP units is the primary objective of the project. EII of each individual unit was calculated from the bid stage itself to ensure this objective. They engaged Mc Kinsey as Technical and Management consultant during configuration finalization and experts were ensured to be present during finalization of Design basis. All the possible optimization was incorporated during process design itself. Specific Energy for each upcoming unit was calculated as per Solomon by Targeting Q1 Q2 breaking point. Apart from VDU and GDS all individual units are upcoming units are in Q1 while the complex comes under Q1 as a whole. NRL informed that they are ready to provide the inputs from their experience to other PSU refineries.

Chairman, EC advised all the Director Refineries of individual companies to check the Quartile positioning of the units in the upcoming projects.

EC noted the above and advised refineries to work towards calculating the EII of the upcoming units

**Action by: Refineries**

**Mission Q1 – Action areas**

CHT presented the key findings from the Solomon Refinery Bench Marking Study 2020 that Indian PSU refineries need to improve in the areas of Operational Availability, Energy Efficiency and Process Utilization. Also, opportunities to the tune of 2.25 USD per bbl exist for Indian PSU refineries primarily in the areas of Energy, Fractionation and Utilization.

EC deliberated on various measures being undertaken to further improve the refinery performance quartile ranking with respect to various KPI's. Refineries informed the various measures taken up by refineries to improve the Energy efficiency in the upcoming projects. Chairman opined that an action plan has to be prepared to achieve Q1 for all PSU refineries by 2030 for refineries with a capacity more than 3 MMTPA. A committee is suggested to be formed under Director CHT to look into the various aspects to achieve this target in coordination with refineries.

**Action by: Refineries /CHT**

## 2. Items for information and consideration of EC

### 2.1 Refinery Performance Improvement Programme (RPIP) for PSU Refineries

**RPIP Phase I**

CHT presented the progress of the ongoing phase-1 study for 7 refineries. HPCL assured that outside the refinery expansion, some ideas are implemented and assured that the program will be on track in the next 6 months.

While BPCL MR has resolved the issues with BCG, payment issues from BPCL-KR continue to exist. CHT informed that BCG has escalated the issue related to delayed implementation and fees to CMD BPCL, and requested CHT for E com. CHT is discussing the same with both the parties for resolving the issue.

**Phase II**:

CHT mentioned that the phase-2 study for balance 8 PSU refineries (BR, JR, HR, BGR, GR, DR, CPCL & NRL) is being taken up.CHT has applied for approval for floating GTE. Tender for the same shall be floated once GTE approval is received.

**Action by: Refineries /CHT**

### 2.2 Reduction of Water Footprint in PSU refineries

CHT presented the short-term achievement (2019-22) and long-term targets for the refineries.

| Refinery | Base Year: 2018-19 | Target as per roadmap wrt base year | | Achieved | | Target as per roadmap wrt base year | |
|---|---|---|---|---|---|---|---|
| | Consumption ($M^3$/Hr) | 2019-22 (Short Term) | | 2019-22 | | Beyond Mar'22 (Long Term) | |
| | | $M^3$/Hr | % over base | $M^3$/Hr | % over base | $M^3$/Hr | % over base |
| IOCL-JR | 1540 | 516 | 33.5 | 512 | 33.2 | 525 | 34.1 |
| IOCL-GR | 165 | 53 | 32.3 | 53 | 32.1 | 84 | 50.9 |

| Refinery | Base Year: 2018-19 | Target as per roadmap wrt base year | | Achieved | | Target as per roadmap wrt base year | |
|---|---|---|---|---|---|---|---|
| | Consumption ($M^3$/Hr) | 2019-22 (Short Term) | | 2019-22 | | Beyond Mar'22 (Long Term) | |
| | | $M^3$/Hr | % over base | $M^3$/Hr | % over base | $M^3$/Hr | % over base |
| IOCL-DR | 109 | 27 | 24.5 | 51 | 46.8 | 23 | 21.1 |
| IOCL-BGR | 248 | 25 | 10.1 | 15 | 6.0 | 90 | 36.3 |
| IOCL-BR | 686 | 59 | 8.6 | 43 | 6.3 | 50 | 7.3 |
| IOCL-MR | 655 | 40 | 6.1 | 40 | 6.1 | 121 | 18.5 |
| IOCL-PR | 1558 | 410 | 26.3 | 180 | 11.6 | 145 | 9.3 |
| IOCL-HR | 626 | 35 | 5.6 | 35 | 5.6 | 88 | 14.1 |
| IOCL-PDR | 1781 | 457 | 25.7 | 457 | 25.7 | 1200 | 67.4 |
| CPCL | 1135 | 197 | 17.4 | 153 | 13.5 | 44 | 3.9 |
| **IOC-T+CPCL** | **8503** | **1819** | **21.4** | **1539** | **18.1** | **2370** | **27.9** |
| HPCL-V | 722 | 184 | 25.5 | 120 | 16.6 | 197 | 27.3 |
| HPCL -M | 348 | 6 | 1.7 | 10 | 2.9 | 25 | 7.2 |
| **HPC-T** | **1070** | **190** | **17.8** | **130** | **12.1** | **222** | **20.7** |
| BPCL-K | 1989 | 603 | **30.3** | 581 | **29.2** | 271 | 13.6 |
| **Total*** | **11562** | **2612** | **22.6** | **2250** | **19.5** | **2863** | **24.8** |
| BPCL-M | 596 | 12 | 2.0 | 78 | 13.1 | 23 | 3.9 |
| MRPL | 1803 | 200 | 11.1 | 280 | 15.5 | 100 | 5.5 |
| NRL | 402 | 8 | 1.9 | 44 | 10.9 | 15 | 3.6 |
| BORL | 827 | 7 | 0.8 | 8 | 1.0 | 10 | 1.2 |
| **Total** | **15190** | **2838** | **18.7** | **2660** | **17.5** | **3011** | **19.8** |

*Part of EIL study

After deliberations, Refineries are advised to indicate the year wise targets for the next three years and formulate the plan to achieve the targeted total water savings of 3011**$M^3$/Hr**.

**Action by: Refineries/CHT**

## 2.3 Refineries MBN performance for 2021-22 Vs PAT cycle targets

The objective of PAT is to meet the Intended Nationally Determined Contribution (INDC) objectives of reduction in emission intensity by 33-35% of GDP by 2030 from the base year of 2005. While 18 refineries were included in PAT-II, 20 refineries are included in PAT-VI targeting a net MBN reduction of ~5.9%.

CHT Presented performance of Oil PSUs MBN achievement for 2021-22 and targets for PAT- VI. (2022-23 is assessment for PAT-VI Cycle). The details are as below

| Refinery | Best Achieved MBN | Year of achievement | Achieved MBN | | PAT Target |
|---|---|---|---|---|---|
| | | | 2020-21 (Target) | 2021-22* | 2022-23 |
| **DR** | 101.7 | 2019-20 | 98.1 | 99.6 | NA |
| **GR** | 108 | 2017-18 | 123.7 | 122.6 | 104.3 |
| **BGR** | 88.6 | 2018-19 | 108.5 | 111.5 | 81.8 |
| **HR** | 76.6 | 2018-19 | 89.3 | 88.5 | 70.9 |
| **BR** | 75.9 | 2019-20 | 78.1 | 76.7 | 72.7 |
| **MR** | 63.5 | 2020-21 | 63.1 | 62.2 | 60.7 |
| **PR** | 63.2 | 2017-18 | 68.0 | 63.9 | 60.3 |
| **PDR** | 64.1 | 2019-20 | 69.0 | 68.3 | 62.4 |
| **JR** | 72.4 | 2017-18 | 82.6 | 79.5 | 69.7 |
| **BPC-M** | 63 | 2019-20 | 64.4 | 64.4 | 61.8 |
| **BPC-K** | 68.2 | 2019-20 | 71.7 | 66.9 | 67.5 |
| **HPC-V** | 77.3 | 2018-19 | 81.2 | 85.0 | 72.3 |
| **HPC-M** | 82.8 | 2018-19 | 98.2 | 106.7 | 78.9 |
| **MRPL** | 74.2 | 2018-19 | 81.4 | 73.5 | 69.1 |
| **CPCL** | 81.5 | 2019-20 | 86.7 | 82.6 | 76.9 |
| **NRL** | 64.4 | 2020-21 | 64.4 | 63.5 | 61.9 |
| **BORL** | 64.8 | 2019-20 | 74.1 | 70.4 | 64.7 |

*Provisional

It was deliberated by EC members

- HPCL informed that VR will achieve the target as soon as after completion of VRMP which was delayed due to Covid -19 and MR upon stabilization of the expansion will achieve the target.
- IOCL informed that they are implementing Energy saving schemes and are hopeful of achieving the PAT target.
- MRPL informed that they are confident of achieving the PAT target

**Action by: Refineries**

## 2.4 Catalyst Manufacturing Unit

A committee was constituted by MoP&NG on 6th August 2020 for setting up a catalyst Manufacturing Unit in India

The committed discussed with five shortlisted prospective partners in January' 2021.The discussions ranged from Type of catalyst, investment, area and utilities required, marketing /sales aspects, scale up of catalyst recipes developed by Indian PSUs and toll manufacturing, Policy issues, Structure of JV, etc. The detailed study report has been submitted to MoP&NG on 9.2.2021.

IOCL already setting Catalyst manufacturing unit at Panipat

HPCL informed that PFR is complete with M/s Evonik (M/s Porocel taken over by M/s Evonik) and a team is formed to discuss the JV modalities.

PFR is also completed with ART Ms/ Grace and by June'22 discussions are expected to start w.r.t. JV modalities.

Chairman informed that to form a JV, Niti Aayog approval is required and advised HPCL to approach Ministry accordingly.

**Action by: HPCL/IOCL**

## 2.5 Status of Reference Fuel Plant by EIL and IOC(R&D)

CHT informed that Study was conducted and PFR and good attractive IRR is also available for the project and the same was discussed in GC and IOC was asked to go ahead. SIAM has now revised the demand. Demand for MS has reduced but Demand from Diesel has drastically come down.

Explaining the revised demand, SIAM informed that for (first fill-export), Reference fuel was being imported but in 2020 when India switched to BS-VI, fuel standards was set at par with rest of world. Now companies export for First fill is replaced with normal commercial domestic fuel and hence imports of reference fuel has come down. Also, in case of Diesel, customer preference has changed and they are moving towards Petrol. SIAM expressed that India can export Reference fuel to the world by putting up manufacturing facilities in India.

Chairman added that external market condition was not considered in the study and many of refineries in Europe is shutting down. Since 2019, many refineries were demanding for indigenous reference fuel and also discussed in recently held GC in March 2022. Chairmen further stated that Refining activity will shift this part of world and passenger vehicles based on IC engines will there for at least next two decades. Hence, project should be taken forward.

**Action by: IOCL**

## 2.6 Petrochemical Benchmarking

In line with refinery benchmarking studies, PSU's have requested to carry out benchmarking of major petrochemical units of PSU's.

The proposed units are as underneath:

| Unit | PSU |
|---|---|
| Naphtha Cracker | IOC PR, Gail Pata, BCPL-Lepatkata |
| PP | IOC-PR, PDR,MRPL, BCPL-Lepatkata |
| PE | IOC-PR, GAIL PATA, BCPL-Lepatkata |

EOI was prepared by CHT along with a committee comprising PSU representatives from IOCL, MRPL and GAIL. EOI was floated on 20th Apr'22 and is extended by 10 days upto 23rd May'22 as requested by M/s EIL. Till 18th May'22, three offers received and are under evaluation.

CHT informed that EIL has informed CHT that the requirements sought from EOI was found to be restrictive.

Committee members expressed that Benchmarking studies to be opened up and needs to be global so that a comparison can be made with the best Technologies and best practices available globally to benefit out of them.

BPCL expressed that they have undertaken a Energy Benchmarking study was done for their Rasaayan project with KBR.

EC advised to take inputs from BPCL-MR and expressed that Benchmarking requires data from the global companies and hence require companies with global data. EIL can have a separate discussion with Secretary PNG on the issue.

**Action by: CHT/IOCL/GAIL/MRPL/EIL**

**2.7 Status on PM JI-VAN Yojana**

IOC, ABRPL, HPCL first milestone payment done and BPCL payment is being processed. Chairman expressed hope this year spending of ₹310 Crore on the scheme will be achieved and requested payments to be expedited. CHT informed that for RFS issued one proposal has been received and 4 more are expected. Chairman asked CHT to be flexible in receipt of proposals and not to prolong the process further.

**Action by: CHT**

**3. Items for Approval of EC**

**3.1 Integration of parabolic trough solar collectors with multi effect evaporator for reducing the dependency of energy-intensive industries over fossil fuels: IIT Roorkee/ IOCL**

CHT informed IOC has confirmed participation. Project Cost is 42.24 Lakhs and CHT contribution will be 21.12 lakh.

Elaborating further CHT explained that its Optimising solar connection, improving solar efficiency &using it for thermal fluid circulation. JSR expressed if project is unique in its approach then we can go ahead.

SAC (30$^{th}$Mar'22)advised that PSU collaboration for CHT consideration and subsequently IOC showed interest.

**EC considered and approved the above proposal at a cost of Rs 42.24 Lakh with contribution of Rs 21.12 Lakh (i.e. 50% of total project cost) by CHT/OIDB.**

**Action by: CHT/IOCL**

**3.2 Lightweight Novel Multicomponent High Entropy Alloy for Hydrogen Storage Application: CSIR-IIP/ IIT-T/ IIT-D/ Midhani, Hyderabad/ 3Wi Technologies, Vadodara**

CHT explained that Novel HEAs with a hydrogen storage capacity of 2-3 wt% at ambient temperature and pressure less than10 bar. HEA with Cyclic stability of more than 10000

cycles. 25 kg of HEA H2 Canister generates 0.5 kg of Hydrogen can be stored. Many scientific communities are associated with this project along with IOC. IOC commented that it complements their work in Hydrogen storage.

SAC (30th Mar'22) recommended the project once IOCL formally confirms participation as industrial partner. Subsequently IOCL confirmed their participation.

**EC considered and approved the above proposal at a cost of Rs 167.29 Lakh with contribution of Rs 83.65 Lakh (i.e. 50% of total project cost) under HCF (Hydrogen Corpus Fund).**

**Action by: CHT/IOCL**

**3.3 Design, Development & Demonstration of 1kW PEM Fuel Cell Technology: High Energy Batteries (HEB) (Project Cost: ₹ 1065.92 lakhs; CHT contribution: ₹532 lakhs)**

CHT informed that IOCL and GAIL have shown interest. SAC (30th Mar'22) recommended the proposal subject to IOCL/GAIL confirms participation as industrial partner.

Now both GAIL and IOC have confirmed as industrial partners.

**EC considered and approved the above proposal at a cost of Rs 1065.92 Lakh with contribution of Rs 532.96 Lakh (i.e. 50% of total project cost) under HCF (Hydrogen Corpus Fund).**

**Action by: CHT/IOCL/GAIL**

**3.4 Effective hydrogen production through Membrane less Electrolysers and storage: High Energy Batteries (Project Cost: ₹ 608.5 lakhs; CHT contribution: ₹304.25 lakhs)**

CHT informed the objective is to design and develop indigenous electrolysers for hydrogen production at an affordable cost. Proposal was recommended by SAC (30th Mar'22) subject to confirmation from parties.

OEC has confirmed their participation as Industry Partner.

**EC considered and approved the above proposal at a cost of Rs 608.5 Lakh with contribution of Rs 304.25 Lakh (i.e. 50% of total project cost) under HCF (Hydrogen Corpus Fund).**

**Action by: CHT/OEC**

**4. Items for Recommendation of EC for Approval of GC**

**4.1 Development and Scale-up of Indigenous Next Generation Solid Oxide Fuel Cell Technology and Demonstration of Process Line (10 kW) for Prototype Production: HPCL/ARCI/CGCRI(Project Cost: ₹ 6951 lakhs; CHT contribution: ₹3472.96 lakhs)**

CHT informed that objective is to design and develop indigenous electrolysers for hydrogen production at affordable cost. The design seeks to remove the use of expensive membrane in the electrolysers and reduce the use of expensive materials like

titanium and noble metals. SAC while technically recommending the proposal advised that OIDB/CHT contribution should be kept at maximum of 50%.

CHT confirmed that there is sufficient HCF funds for the project. HPCL confirmed to JSR that CGCRI has good development on materials so 10 KW can be quickly done.

Chairman wanted to Know what will be cost of technology and whether the party is willing for technology transfer at this point in time. HPCL confirmed they will confirm these details.

**The cost of the project is Rs 6951 Lakh with contribution of Rs 3472.96 Lakh under HCF (Hydrogen Corpus Fund).EC recommended to put up to GC of CHT for approval of the proposal.**

**Action by: CHT/HPCL**

**5. Other Items with permission of Chair**

**5.1 Standard for Hydrogen (special Agenda)**

As per the recent meeting taken by Hon'bl minister on Green Hydrogen, it was stressed upon that there should be standardization for Hydrogen (Codes, safety and standards). Chairman suggested to form committee including Private Parties after due deliberation with parties involved.

CHT informed that presently there is no standards for hydrogen and would discuss with BIS on the same. Regarding Safety CHT feels committee can be formed by inclusion of OISD. Chairman advised to prepare a note on this agenda to be approved by Secretary.EIL expressed that they would like be included as member in the committee.

**Action by CHT**

**5.2 Decarbonisation of Indian oil and gas sector. (Project cost: 2.5 Crores)**

CHT indicated that this is a study initiated for decarbonisation of Indian oil and gas sector by taking in consultants like Mackinsey and two more parties. Chairman advised to wait till end of June when ETAC report will be ready so that parameters can be better defined. He meanwhile asked to work out parameters and the modalities.

**Action by CHT**

**5.3 Manpower at CHT**

CHT indicated man-power at CHT. M/s IOCL is looking in to the matter. CHT requested ONGC/GAIL/MRPL to nominate manpower .

Chairman complemented all refineries in meeting the demand of Petroleum products during these critical months without resorting to imports

The meeting ended with thanks to Chair

**Annexure**

**33rd Meeting of Executive Committee (EC) of Centre for High Technology (CHT) held through Video Conference on 18th May 2022**

## Participants

**MoP&NG**

1. Shri Sunil Kumar, JS(R) – Chair
2. Dr Navneet Mohan Kothari, JS (M)/OIDB
3. Shri Kapil Verma, Director (OR), MoPNG

**HPCL**

4. Shri V.S. Shenoy, Director (R)
5. Shri S. Bharathan, ED (R&D)

**BPCL**

6. Shri Rengarajan, EA to Dir (Refineries) BPCL

**IOCL**

7. Shri S Sarkar ED (OPS), RHQ

**GAIL**

8. Shri Sanjeev Kumar, Head (R&D)

**MRPL**

9. Shri M. Venkatesh, MD

**CPCL**

10. Shri Arvind Kumar, MD

**NRL**

11. Shri B J Phukan MD I/c NRL
12. Shri Bimlesh Gupta

**EIL**

13. Sh Rajeev Agrawal, ED (T)
14. Shri R.N Maiti, GGM

**CHT**

15. Shri Alok Sharma, ED-CHT
16. Shri P. Raman, Director
17. Dr N.S. Raman, Director