



ईडी-सीएचटी/2937

दिनांक: 01 अक्टूबर, 2021

श्री राजेश सैनी,  
उप मुख्य वित्त एवं लेखा अधिकारी,  
तेल उद्योग विकास बोर्ड,  
प्लॉट नंबर-2, सेक्टर-73,  
नोएडा (एपी) - 201 301

**विषय : वर्ष 2020-21 के लिए ओआईडीबी की वार्षिक रिपोर्ट के लिए सीएचटी से संबंधित जानकारी**

महोदय,

कृपया अपने पत्र संख्या 5/11/2021-ओआईडीबी दिनांक 27 जुलाई 2021 का अवलोकन करें। जैसा कि वांछित है, उच्च प्रौद्योगिकी केन्द्र (सीएचटी) से संबंधित वर्ष 2020-21 के लिए ओआईडीबी की वार्षिक रिपोर्ट में शामिल करने के लिए जानकारी संलग्न है।

इस रिपोर्ट की सॉफ्ट कॉपी dcfae.admn.oidb@nic.in पर ईमेल के माध्यम से भेजी गई है। तेल उद्योग विकास बोर्ड द्वारा प्रदान की गई वित्तीय सहायता से शुरू की गई परियोजना से संबंधित कुछ तस्वीरों की सॉफ्ट प्रतियां भी आपके आवश्यक कृपया के लिए भेज दी गई हैं।

धन्यवाद सहित,

भवदीय,  
पी. शम्भू  
(पी. रमन)

कार्यकारी निदेशक (कार्यवाहक प्रभारी)

संलग्न: उपरोक्त अनुसार

**Material for inclusion in the OI DB's Annual Report for the year 2020-2021**

**1.0 Introduction**

Centre for High Technology (CHT) was established in 1987, to act as the Technical Wing of MoP&NG for implementation of scientific and technological programmes of Govt. of India. Major functions of CHT include:

- Performance Benchmarking of Refineries and Pipelines
- Performance Improvement in Refineries through Best Practices, Special Studies, Operational Improvement and Process Technology
- Energy Efficiency Improvement in Downstream Hydrocarbon Sector
- Petroleum Product Quality Improvement
- Sharing of Best Practices and Information & Knowledge Dissemination
- Integration with Alternative Energies and New Initiatives in Downstream Sector for Future Sustainability
- Promoting Innovations and R&D in Downstream Hydrocarbon Sector. Co-ordination of activities of Scientific Advisory Committee (SAC) on Hydrocarbons of MoP&NG
- Reduction of Water foot print
- Development of import substitute fuels, chemicals and catalysts

During the year 2020-21, an amount of Rs 15.25 crore was received by CHT as grant-in-aid from OI DB. Out of this fund, Rs 1.47 and Rs 2.65 crore were released by CHT for R&D projects and special studies respectively during the year.

**2.0 Major activities undertaken during 2020-21 are as under:**

**1. Performance Benchmarking of PSU refineries and pipelines**

**(a) Performance Benchmarking of PSU refineries**

Performance benchmarking of PSU refineries is being conducted regularly since 2010 by CHT through M/s Solomon Associates (SA), USA. A long-Term Agreement upto 2028 has been made with SA for undertaking benchmarking of the PSU refineries. The study for PSU Refineries for 2020 cycle is in progress.

## **(b) Performance Benchmarking of PSU Pipelines**

Performance Benchmarking Study for Pipelines (Liquid, Gas, LPG) and SPMs for 2018 cycle was initiated for the first time through M/s Solomon Associates (SA), USA. The contract agreement for the second i.e. 2020 cycle was signed on 10<sup>th</sup> November 2021 and the study is in progress.

## **2. Energy Efficiency improvement**

### **1. PAT (Perform, Achieve and Trade)**

PAT is a market based regulatory instrument to reduce specific energy consumption in the energy intensive sector of the economy. PAT is one of the initiatives under The National Mission for Enhanced Energy Efficiency (NMEEE), which is one of the eight missions under the National Action Plan on Climate Change for enhancing energy efficiency, to enhance the cost effectiveness through tradable energy saving certificates.

Refinery sector was included in PAT cycle-2 (2016-17 to 2018-19) along with Discoms & Railways to the eight energy intensive sectors, already covered in PAT cycle-1. Under the scheme, each refinery, including PSU and Private Sector, is mandated to meet the Specific Energy Consumption Targets. The targets are set higher for refineries which have higher specific energy consumption and hence higher potential for energy saving. The energy saving targets were assigned by BEE (Bureau of Energy Efficiency) in consultation with CHT, an associated office under MoP&NG.

The energy reduction Target for refining sector in PAT cycle -2 was set at 5.49% equivalent to 1.01 Million TOE. Against this, the actual energy reduction of 8.05%, equivalent to 1.48 Million TOE was achieved.

For the current PAT cycle-6 (2020-21 to 2022-23), the sectoral energy reduction Target of 5.49% has been retained, which is equivalent to energy saving target of 1.17 Million TOE.

### **2. Long term energy saving Target till 2030 in PSU refineries**

A Roadmap on specific energy consumption for PSU Refineries, aligned with India's NDC of 33-35% reduction in Specific Energy Consumption by 2030 over the base year of 2005, have been prepared. The roadmap has prepared based on various studies conducted both in-house as well as through consultants. The targets are also assigned for midterm (2023-24) based on already identified energy saving scheme as well as long-term (2030) for each PSU refinery.

### **3. Annual audit on furnace efficiency and steam leaks**

In order to improve energy efficiency and reduce energy consumption, CHT in association with the refineries organize surveys every year in the areas of 1) Furnace/Boiler efficiency and 2) Steam leak. These two areas are taken up every alternate year. Survey in area of Furnace/Boiler efficiency was carried out in Jan 2020.

### **3. Refinery Performance Improvement Programme (RPIP)**

CHT in coordination with the refineries finalized refinery-wise global consultants for carrying out refinery performance improvement programme for 15 PSU refineries which aims at yield and energy improvement. RPIP Phase -I has already commenced in seven refineries (HPC-Mumbai and Visakh, BPC-Mumbai and Kochi, IOC-Panipat, Paradip and Mathura) and the programme is under various stages of implementation

In the second phase, EOI was floated again on 30<sup>th</sup> July 2020, to identify new consultants over and above the existing ones who are already carrying out RPIP Phase I. Consultant shortlisting through EOI is complete and refinery specific tender shall be floated once clearance is received from the refineries (IOC-Barauni, Gujarat, Haldia, Bongaigaon, Guwahati, Digboi, CPCL-Manali and NRL).

### **4. Special studies for the PSU refineries**

#### **Development of Water Consumption Norms and Reduction of Water Footprint for Refineries**

CHT in association with refineries carried out a study through EIL for Development of Water Consumption Norms and prepared a roadmap for Reduction of Water Footprint in refineries with short term (<2 years) and long term (>2 years) targets.

#### **Feasibility study for production of ethanol using waste gases through M/s LanzaTech, USA**

The study for BPCL-Mumbai Refinery has been completed. The study for Numaligarh Refinery (NRL) is in progress.

#### **Feasibility & Business Model for Reference Fuel by EIL & IOC R&D:**

Reference Fuels are used by OEMs for testing their vehicles. These fuels are imported mainly from Germany. The study has been planned in three phases. The study for Phase-1 (Paper Blend using LP Model) has been completed and Phase-2 (lab blending) is in progress. It is possible to make Reference Gasoline from IOC-PR

streams based on the Laboratory study. Quality issue of Reference Diesel being addressed using different grades of Bio-diesels and additives.

#### **5. Refining & Petrochemicals Technology Meet (RPTM)**

With a view to keep abreast with the technological developments and disseminate information, CHT organises RPTM every year in association with one of the PSU oil company on different theme of relevance. The event is attended by large number of process licensors, catalyst suppliers and delegates from India and abroad. The last 24<sup>th</sup> RPTM was organised along with MRPL in Bengaluru during 19<sup>th</sup> to 21<sup>st</sup> January, 2020. The event had presentation of 80 oral papers spread over 15 Technical Sessions and 78 papers in Poster Sessions along with 16 Exhibition Stalls and was attended by around 1500 delegates/invitees from India and abroad. The 25<sup>th</sup> RPTM was planned in Mumbai in association with HPCL but could not be held due to COVID-19 pandemic.

#### **6. Implementation of PM JI VAN Yojna**

Pradhan Mantri JI-VAN Yojana was announced in March, 2019 for promotion of 2G ethanol by providing Viability Gap Fund (VGF) for setting up of 12 commercial units (combined capacity of ~40 crore litre per annum) and 10 demonstration units at semi commercial level. CHT has been nominated as nodal agency for implementation of PM JI VAN Yojana. Request for Selection (RFS) for shortlisting of eligible Project Developers (PD) was issued on 26<sup>th</sup> August, 2019. The project proposals were evaluated by SAC and based on its technical recommendation, Steering Committee of CHT for PM JI-VAN Yojana, approved VGF / Financial assistance for 4 commercial projects and 1 demonstration project.

As advised by SAC, it is proposed to incorporate few amendments in the scheme to enlarge the scope and solicit broader participation. Subsequently, RFS shall be issued for remaining 8 Commercial and 9 Demonstration projects after the amendments.

#### **7. Indigenous Technology Development**

CHT co-ordinates the activities of Scientific Advisory Committee (SAC) on Hydrocarbons of MOP&NG in identifying and funding of research projects for downstream hydrocarbon sector. SAC approves and steers projects of national importance and refining operations. SAC is headed by Dr. Anil Kakodkar, an eminent Scientist and DAE Chair Professor, BARC.

During 2020-21, SAC had three meetings till December 2020. SAC had detailed review of the on-going projects and new project proposals.

During the year, M/s EIL along with BPC Kochi has developed indigenous Desalter Technology under the project funded by CHT.

ED CHT has been nominated as Technology officer to represent MoP&NG. CHT provided input for the development of Science, Technology and Innovation Policy (STIP) of Govt. of India.

#### **8. Hydrogen Research**

SAC has identified hydrogen research and its promotion of as one of the major focus areas. CHT has funded various projects for carrying out research and demonstration of technologies including production of hydrogen from different pathways (including electrolysis of water and biomass gasification), development of fuel cell buses in tie-up with vehicle manufacturer as well as transport operators, storage and dispensing of hydrogen, production of HCNG and demonstration of HCNG fuelled buses in Delhi.

#### **9. Development of Catalyst Manufacturing Plant In India :**

The Refining Industry employs many catalytic processes where catalysts play major role in operation and profitability improvement. However, there is no major catalyst manufacturing facility in India and the country is mostly dependent on catalyst import leading to vulnerability of this sector. It is with this intent that MoP&NG constituted a Committee for Setting up of Catalyst Manufacturing Unit in India vide F. No. R-11029/34/2020-OR-II/E-34716 dated 6<sup>th</sup> August,2020. Catalyst suppliers from across the world were invited for the deliberations with the committee to understand their capabilities & intent. Out of eight potential catalyst suppliers, the Committee shortlisted five potential ones for detailed specific interaction. The committee suggested the path forward to materialise the intended purpose and concluded that in the coming years, the burgeoning refinery and petrochemical industry would require a secure supply of huge quantity of different types of catalysts, hence, it is imperative to invest in the indigenous production of catalyst and associated research and development. Committee recommends formation of Joint Venture/s among interested partners wherever there is synergy in the catalyst manufacturing value chain. The details of the JV can be formulated based on the mutual agreement among the prospective partners. Catalyst manufacturing units demand huge investment and a suitable government policy to bolster the initiative. The committee is of the view that policy intervention by the government is required to promote indigenous catalyst manufacturing. A report including above activities submitted to MoP&NG in month of Feb 2021. Further discussions with the prospective partners is led by HPCL.

#### **10. Integrated Monitoring and Advisory Council (IMAC)**

During 2<sup>nd</sup> meeting of IMAC chaired by Hon'ble Minister, P&NG, it emerged that holistic and coordinated strategy in close coordination with all IMAC Member Ministries is imperative towards the exercise of Reassessment of the Roadmap to implement the Hon'ble Prime Minister's vision of reducing oil import dependency. Accordingly, 6 Working Groups have been constituted for monitoring the progress on various initiatives, schemes, projects and strategies taken under respective Member Ministries domain with a view to augment Supply of energy, Savings in energy as a means to achieving oil import reduction.

Meetings of the Working Group on R&D and Innovation as well as of Working Group on Biofuels, constituted under IMAC were held. The baseline as well as final report has been submitted to MoP&NG.

#### **11. Report on enhancing Production of Petrochemicals in Refineries**

A Committee was constituted by MoP&NG to undertake detailed study on Business Opportunity for Petrochemicals in India. The Committee identified major petrochemicals based on consumption, value, import, growth and capacity in India including projected capacity addition for identified petrochemicals. The detailed report was submitted to MoP&NG.

#### **12. Stream Sharing among Refineries**

A summary has been submitted to MoP&NG regarding losses incurred by refineries due to not sharing of intermediate streams on account of dual tax regime.

#### **13. Study on Additional Strategic/Operational Crude Oil Storage**

Creation of petroleum reserves is one of the several contingency measures to meet the energy security. A Committee was constituted by MoP&NG to carry out detailed study on all aspects of common crude oil storage in the country. The report has been submitted to MoP&NG.

#### **14. Awards**

CHT is actively associated with the following Annual Awards instituted by Ministry of Petroleum & Natural Gas, Government of India:

- Refinery Performance Improvement Award
- Saksham Awards based on Steam Leak and Furnace Efficiency Surveys
- Innovation Award

The Awardees for the first two categories are selected by the selection committee set up by MoP&NG. For Innovation Awards, nominations for the following three

categories were invited from the Industry and the Awardees are selected by the committee constituted by Chairman, SAC, based on guidelines of Governing Council of CHT:

- i) Best Indigenously Developed Technology
- ii) Best Innovation in Refinery (refinery/ group/ individual)
- iii) Best Innovation in R&D Institute (institute/ group/ individual)

These awards are presented during the Inaugural function of the Refining & Petrochemicals Technology Meet (RPTM).

#### **15. Activity Committee Meetings**

With the aim of sharing of best operational practices & improvements and dissemination of information on latest developments, CHT organised various two nos. online Activity Committee Meetings in critical areas/ technologies in refining sector and pipelines operations. Activity Committee Meet on "Strategies for Turnaround Management" was organized by CHT for the first time virtually in collaboration with HPCL-Visakh Refinery. The Activity Committee Meet on Digitalization in Refining Business Process was also held online in association with BPCL-Kochi Refinery.

#### **16. Swachhata Ranking for Oil & Gas PSUs & attached offices**

MoP&NG, its attached offices and Oil & Gas CPSEs under the administrative control of MoP&NG celebrated Swachhata Pakhwada fortnight from 1<sup>st</sup> to 15<sup>th</sup> July, 2020. During Swachhata Pakhwada, Oil & Gas CPSEs and attached offices of MoP&NG were ranked based on the Swachhata Index developed by Centre for High Technology. The awards were presented to the winners by Hon'ble Minister of Petroleum & Natural Gas and Steel on 14<sup>th</sup> December, 2020.





# उच्च प्रौद्योगिकी केन्द्र

(पेट्रोलियम एवं प्राकृतिक गैस मंत्रालय), भारत सरकार

**Centre for High Technology**

(Ministry of Petroleum & Natural Gas), Govt. of India

Dated: 4<sup>th</sup> June, 2020

No. ED-CHT/2386

Shri Rajesh Saini,  
Deputy Chief Finance and Accounts Officer,  
Oil Industry Development Board,  
Plot No. 2, Sector-73,  
Noida (UP) - 201 301

**Sub: Material for OIBD's Annual Report for the year 2019-20**

Dear Sir,

Please refer to your letter no. 5/1/2020-OIBD dated 26<sup>th</sup> May 2020 for the subject matter. As desired, material for inclusion in the OIBD's Annual Report for the year 2019-20 pertaining to Centre for High Technology (CHT) is enclosed.

As desired, Soft Copy of this report has been sent through email at [dcfao.admn.oibd@nic.in](mailto:dcfao.admn.oibd@nic.in). Soft copies of few photographs relating to the project undertaken with the financial assistance provided by the Oil Industry Development Board are also forwarded for your useful please.

Thanking You,

Yours faithfully,

(K.K. Jain)

Executive Director

Encl.: As above

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Tel.: ..... Fax: 91-120-2593780/2593782, Email: .....@cht.gov.in, Website : www.cht.gov.in

Liaison Office: C/o OIBD, 301, World Trade Centre, 3<sup>rd</sup> Floor, Babar Road, New Delhi-110 001

**Material for inclusion in the OIDB's Annual Report for the year 2019-20****1.0 Introduction**

Centre for High Technology (CHT) was established in 1987, to act as the Technical Wing of MOP&NG for implementation of scientific and technological programmes of Govt. of India.

Major functions of CHT include:

- Performance Benchmarking of Refineries and Pipelines
- Performance Improvement in Refineries through Best Practices, Special Studies, Operational Improvement and Process Technology
- Energy Efficiency Improvement in Downstream Hydrocarbon Sector
- Petroleum Product Quality Improvement
- Sharing of Best Practices and Information & Knowledge Dissemination
- Integration with Alternative Energies and New Initiatives in Downstream Sector for Future Sustainability
- Promoting Innovations and R&D in Downstream Hydrocarbon Sector. Co-ordination of activities of Scientific Advisory Committee (SAC) on Hydrocarbons of MoP&NG

During the year 2019-20, an amount of Rs 18.10 crore was received by CHT as grant-in-aid from OIDB. Out of this fund, Rs 2.37 and Rs 6.81 crore were released by CHT for R&D projects and special studies respectively during the year.

**2.0 Major activities undertaken during 2019-20 are as under:****1. Performance Benchmarking of PSU refineries and pipelines****(a) Performance Benchmarking of PSU refineries**

Performance Benchmarking 2018 cycle of PSU refineries is carried out by CHT regularly since 2012 cycle through M/s Solomon Associates (SA), U.S.A. The study for 2018 cycle was for 16 PSU refineries and 4 lube refineries was completed and final benchmarking study report was submitted in mid of Oct 2019. A workshop on "How to use data" was conducted by M/s Solomon Associates on 19<sup>th</sup>/20<sup>th</sup> November 2019. The participants comprised of a multidisciplinary team from all the participating PSU refineries. In the workshop, Solomon Associates deliberated on various KPI's used in benchmarking along with its significance and methodology of calculation. Solomon Associates made a final consolidated presentation on the performance of PSU refineries at MoP&NG on 18<sup>th</sup> November 2019.

## **(b) Performance Benchmarking of PSU Pipelines**

Performance Benchmarking Study for Pipelines (Liquid, Gas, LPG and SPMs) for 2018 cycle was initiated for the first time and completed through M/S Solomon Associates (SA), USA in January, 2019. The Data Coordinators' Seminar was conducted by SA with participants from Pipelines (IOCL, BPCL, HPCL, OIL, GAIL) on 22<sup>nd</sup>/23<sup>rd</sup> February, 2019 at CHT. The Study results were shared in October, 2019. Executive presentation of Study results was done by M/s Solomon Associates on 21.10.2019. Two Workshops at Delhi & Mumbai were also carried out on 22.10.2019 & 25.10.2019 as per contractual agreement. Study results have been shared with all the participating companies. Presentation of study results was held at MoP&NG on 10<sup>th</sup> February 2020. Secretary, P&NG chaired the meeting. ASFA, MoP&NG, representatives of M/s Solomon Associates along with CMD/Directors of Oil PSUs and ED CHT were the major participants in the meeting.

## **2. Energy Efficiency Improvement**

Refineries are included in PAT (Performance Achieve and Trade), under which each refineries is mandated to meet the Specific Energy Consumption Targets. CHT was actively associated with BEE for baseline Audit of Refineries, target setting, for development of calculation formats and has been monitoring the progress. CHT has also checked the final M&V reports submitted by Accredited Energy Auditors and assisted BEE in finalising the achievements of Energy Reduction Targets for Refineries.

Under PAT cycle-II, which ended in 2018-19, the refinery sector achieved savings of 1.482 MTOE against target of 1.08 MTOE over the base line year of 2014-15. The refinery wise energy savings targets for 2023-24 under new PAT cycle have also been mandated based on specific energy reduction of 4.49% the refining sector.

A Roadmap for Energy Reduction in PSU refineries till 2030, aligning with India's NDC of 33-35 % reduction in Specific Energy Consumption over base year of 2005, has been prepared. The roadmap has also assigned a midterm (2023-24) and long term target (2030) for each PSU refineries.

## **3. Refinery Performance Improvement Programme (RPIP)**

CHT coordinated finalisation of refinery-wise global consultants for carrying out comprehensive Refinery Performance Improvement Programme of 7 PSU refineries (HPCL - Mumbai and Visakh, BPCL - Mumbai and Kochi, IOCL - Panipat, Paradip and Mathura) in the first phase based on baseline year 2017-18. Refineries have received their assessment report and implementation phase is under progress.

Based on experience of Phase-1 refinery post assessment, the Study for balance refineries (IOCL-Barauni, Gujarat, Haldia, Bongaigaon, Guwahati, Digboi, CPCL-Manali and NRL shall be taken up in 2<sup>nd</sup> Phase and the activities of EOI finalization has begun.

#### 4. Special studies for the PSU refineries

##### **Development of Water Consumption Norms and Reduction of Water Footprint for Refineries**

CHT initiated Development of Water Consumption Norms and Reduction of Water Footprint for Refineries through EIL as approved during 25<sup>th</sup> meeting of EC of CHT. The final report was discussed among PSU refineries at CHT on 26/27<sup>th</sup> February, 2020 and an execution roadmap with a short term (<2 years) and a long term (>2 years) target, was developed for submission to MoP&NG. While the short term measures had a target date of completion by March 2022, the long term measures involved ideas / projects which shall be completed beyond March 2022.

##### **Approach Paper on demand side steam management**

M/s KBC, Singapore was awarded to prepare an approach Paper on demand side steam management based on the best practices and Indian realities. The final report along with a detailed matrix of identified best practices as well as RPIP findings have been circulated to refineries.

##### **Feasibility study for production of ethanol using waste gases through M/S LanzaTech, USA: The study for 1<sup>st</sup> phase of refineries is in progress.**

CHT in coordination with M/s LanzaTech carried out Techno-economic Assessment for 13 PSU refineries covering Refinery-wise Ethanol potential, Capex and estimated Cash Cost of Production (CCOP). CCOP was projected below Rs 40 per litre for all refineries except IOC-GR & DR, indicating feasibility of adopting LanzaTech technology. Joint site visit by M/s LanzaTech and respective refinery were done to access site limitations, if any. Out of 6 refineries identified for carrying out feasibility studies initially, two refineries (IOC-Haldia & IOC-Gujarat) were dropped out due to space constraints. BPCL-Mumbai refinery and MRPL awarded the job, BPCL-Kochi and Bina refinery are interacting with M/s LanzaTech to resolve technical issues. In view of lower potential of Ethanol at MRPL, the feasibility study will be independently done by MRPL without CHT funding.

##### **Feasibility & Business Model for Reference Fuel by EIL & IOC R&D:**

Reference Fuels are used by OEMs for testing their vehicles. These fuels are imported mainly from Germany. A study, comprising of three phases has been planned to assess the feasibility for production in India. Work Order was awarded to M/s Engineers India Ltd., along with IOC-R&D for "Development of Process Scheme for Reference Fuel". Identification of Refinery streams for manufacture of Reference fuel was carried out. Kick off meeting was held on 27<sup>th</sup> January 2020 at CHT with EIL & IOCL-R&D for the First phase of "Development of Process Scheme for production of Reference Fuel". EIL submitted updated Final report for Stage-1 study on 26<sup>th</sup> May 2020.

#### 5. Furnace efficiency and Steam leak surveys

In order to improve energy efficiency and reduce energy consumption, CHT, in association with refineries, organizes Surveys every year in the areas of i) Furnace/ Boiler Efficiency and ii) Steam leak. These two areas are taken-up every alternate year. Survey in the area of Steam Leak was conducted during January, 2019 and survey for Furnace/ Boiler Efficiency was conducted during January-February, 2020.

#### 6. Refining & Petrochemicals Technology Meet (RPTM)

With a view to keep abreast with the technological developments and disseminate information, CHT organises RPTM every year in association with one of the PSU oil company on different theme of relevance. The event is attended by large number of process licensors, catalyst suppliers and delegates from India and abroad. The last 24<sup>th</sup> RPTM, was organised by CHT in association with MRPL, during 19<sup>th</sup> to 21<sup>st</sup> January, 2020 in Bengaluru. The Theme of the Meet was "Driving Refineries and Petrochemicals towards Sustenance". Around 1500 delegates / invitees from India and abroad participated in the Meet. The event had presentation of 82 oral papers spread over 15 Technical Sessions, 77 papers in Poster Sessions and 17 Exhibition Stalls. The meet was attended by 1500 delegates/invitees from India and abroad.

#### 7. Implementation of PM JI VAN Yojna

Pradhan Mantri JI-VAN Yojna was announced in March, 2019 for promotion of 2G ethanol by providing financial assistance for setting up of 12 commercial units (combined capacity of ~40 crore litre per annum) and 10 demonstration units at semi commercial level. Government has targeted blending of 10 % Ethanol in Petrol by 2022 and 20% by 2030 & Blending of Biodiesel in Diesel of 5% by 2030

The scheme will be implemented in 2 phases as under:

Phase-I (2018-19 to 2022-23): 6 Commercial & 5 demonstration projects

Phase-II (2020-21 to 2023-24): 6 Commercial & 5 demonstration projects

For commercial projects, the maximum financial support per project has been capped at Rs 150 crore, which is linked to ethanol capacity and the project cost. For demonstration projects, the financial assistance will be limited to Rs. 15 crore per Technology.

CHT has been nominated as nodal agency for implementation PM JI VAN Yojna. Scientific Advisory Committee on Hydrocarbons of MoP&NG (SAC) has been nominated to appraise the project proposals. The projects recommended by SAC shall be considered and approved by Steering Committee of CHT.

3 sub committees were constituted by SAC for quick & effective implementation of the scheme. Draft RFS, separately for Commercial & Demonstration Projects, were prepared after taking inputs from 3 sub committees & subsequent discussion in SAC meeting. RFS documents were issued on 26<sup>th</sup> Aug'19 on CPP Portal as well as CHT Website for selection of

Project Developers (PDs) for demonstration scale & commercial scale 2G Bioethanol Projects.

Against the RFS, 6 commercial project proposals and one proposal (IOCL R&D) for demonstration project have been received. The recommendation of the SAC shall be now put up for consideration and approval by Steering Committee of CHT.

#### 8. Indigenous Technology Development

CHT co-ordinates the activities of Scientific Advisory Committee (SAC) on Hydrocarbons of MOP&NG in identifying and funding of research projects for downstream hydrocarbon sector. SAC approves and steers projects of national importance and refining operations. SAC is headed by Dr Anil Kakodkar, an eminent Scientist and DAE Chair Professor, BARC.

During the year, M/s EIL along with BPC Kochi has developed indigenous Desalter Technology under the project funded by CHT.

#### 9. Hydrogen Research

Till the very recent past, the role of hydrogen was not seen so clearly. As a result there was not so much interest in Hydrogen research. Driven by concern of global warming, deteriorating emission levels and falling cost of renewable power, it is now being recognized that the different energy systems, including fossil fuels (coal, crude, gas), will co-exist in the foreseeable future. As energy systems are capital intensive and take time to develop, increasing role for renewables, with possible transition to electricity and hydrogen economy is foreseen in long term. While there appears to be renewed interest in hydrogen research, the energy transition still remains unclear and developments in the different energy forms shall determine the path forward. Considering the above, Scientific Advisory Committee on Hydrocarbons of MoP&NG has identified hydrogen research and its promotion of as one of the major focus areas.

Currently, transition to Hydrogen economy has several challenges, like cost effective production, storage, development of Fuel cell & deployment of different applications, etc. This requires concerted efforts for R&D in these areas and creation of infrastructure for dispensing of hydrogen to different applications for demonstration.

Following projects are currently in progress/ under consideration;

Sl. No.	Project Detail	Total project Cost Rs. crore	Funding by CHT Rs. Crore	Status of approval
1	Scale-up studies and process development for Hydrogen Production by Catalytic Decomposition of Natural Gas: HPCL-R&D, CeNS and IIT, Delhi	29.46	16.73	ongoing
2	Solar H <sub>2</sub> production & dispensing station: IOCL R&D	65.16	25.00	ongoing

Sl. No.	Project Detail	Total project Cost Rs. crore	Funding by CHT Rs. Crore	Status of approval
3	Demonstration unit for H-CNG production and trials at Rajghat Bus Depot at Delhi: IOC R&D	33.39	9.2	ongoing
4	Fuel Cell buses based on H <sub>2</sub> produced from Multiple Pathways: IOCL/ KPIT / IISc	296.66	138.32	Under consideration

**10. Development of Catalyst Manufacturing Plant in India :**

With a view to set up world class Catalyst Manufacturing Unit in India-under Make in India, Expression of Interest (EOI) have been issued from bidders having global reach for marketing of catalysts and catalyst manufacturing capability. The proposed catalyst plant is envisaged to be set up as a Joint Venture between an established Catalyst Manufacturer/Supplier and one or more PSUs under MoP&NG.

**11. Awards**

CHT is actively associated with the following Annual Awards instituted by Ministry of Petroleum & Natural Gas, Government of India:

- Refinery Performance Improvement Award
- Saksham Awards based on Steam Leak and Furnace Efficiency Surveys
- Innovation Award

The Awardees for the first two categories are selected by the selection committee set up by MoP&NG. For Innovation Awards, nominations for the following three categories were invited from the Industry and the Awardees are selected by the committee constituted by Chairman, SAC, based on guidelines of Governing Council of CHT:

- i) Best Indigenously Developed Technology
- ii) Best Innovation in Refinery (refinery/ group/ individual)
- iii) Best Innovation in R&D Institute (institute/ group/ individual)

Refinery Performance Improvement Awards for 2018-19, Saksham Award for 2019 and Innovation Awards for 2018-19 were presented to the winners by the Chief Guest during the Inaugural function of the 24<sup>th</sup> Refining & Petrochemicals Technology Meet (RPTM) on 19<sup>th</sup> January, 2020 in Bengaluru.

**12. Swachhata Ranking for PSU/JV Refineries**

Swachhata Ranking of PSU/JV Refineries is a new initiative of the Ministry of Petroleum & Natural Gas, started in 2017. Refineries are ranked based on the Swachhata Index developed by Centre for High Technology. Swachhata Ranking for 2018-19 for PSU/JV Refineries was finalised and was presented to the winners by Hon'ble Minister of Petroleum & Natural Gas and Steel, Govt. of India, on 16<sup>th</sup> September 2019.

**13. Activity Committee Meetings**

With the aim of sharing of best operational practices & improvements and dissemination of information on latest developments, CHT organised various Activity Committee Meetings in critical areas/ technologies in refining sector and pipelines operations. Currently 14 Activity Committees are in place and 7 ACMs were held during the year 2019-20.

**14. Knowledge Dissemination and Experience Sharing**

- A Compendium on Best Practices, including Takeaways from Activity Committee Meetings and Innovations in refining sector was prepared and shared with all refineries.
- Discussion Forums on 10 major areas concerning the downstream hydrocarbon has been created on CHT portal. Specific queries can be posted by the authorised co-ordinators from PSU companies for seeking answers from an Expert Panel.

**15. Implementation of BS-VI Auto fuels and Lab Co-relation Programme**

Readiness for supply of BS-VI fuels were discussed during various review meeting with JS(R) and representatives from PSU refineries. A detailed review of BS-VI projects at PSU refineries along with readiness to supply BS-VI Gasoline and Diesel was done during 21<sup>st</sup> meeting of Working Group on 22<sup>nd</sup> November 2019. Refineries had planned up gradation of supply network from refinery up to marketing locations and filling stations before the rollout date 1<sup>st</sup> April 2020.

CHT initiated "Inter Laboratory Correlation Programme" for better coordination of product quality at industry level. MS, HSD and ATF have been covered under this programme.

**16. Supply of Grade A (1000 ppm S) Kerosene: MoP&NG vide letter dated 16<sup>th</sup> October 2018 communicated to Industry that all refineries will supply Grade-A Kerosene (1000 ppm Sulphur) w.e.f. 01.04.2020. Industry is ready for production from refineries w.e.f. 01.04.2020. Considering the low allocation and limited tankage, further 3 months to be required for dilution.**



Project: Biomass Hydrolysis for the production of Fuel grade Hydrocarbons: CSIR-IIP/HPCL

### 1. Continuous Hydrolysis Plant



## 2. High Performance Liquid Chromatograph (HPLC)



### 3. BET Surface Area/Pore Size Distribution

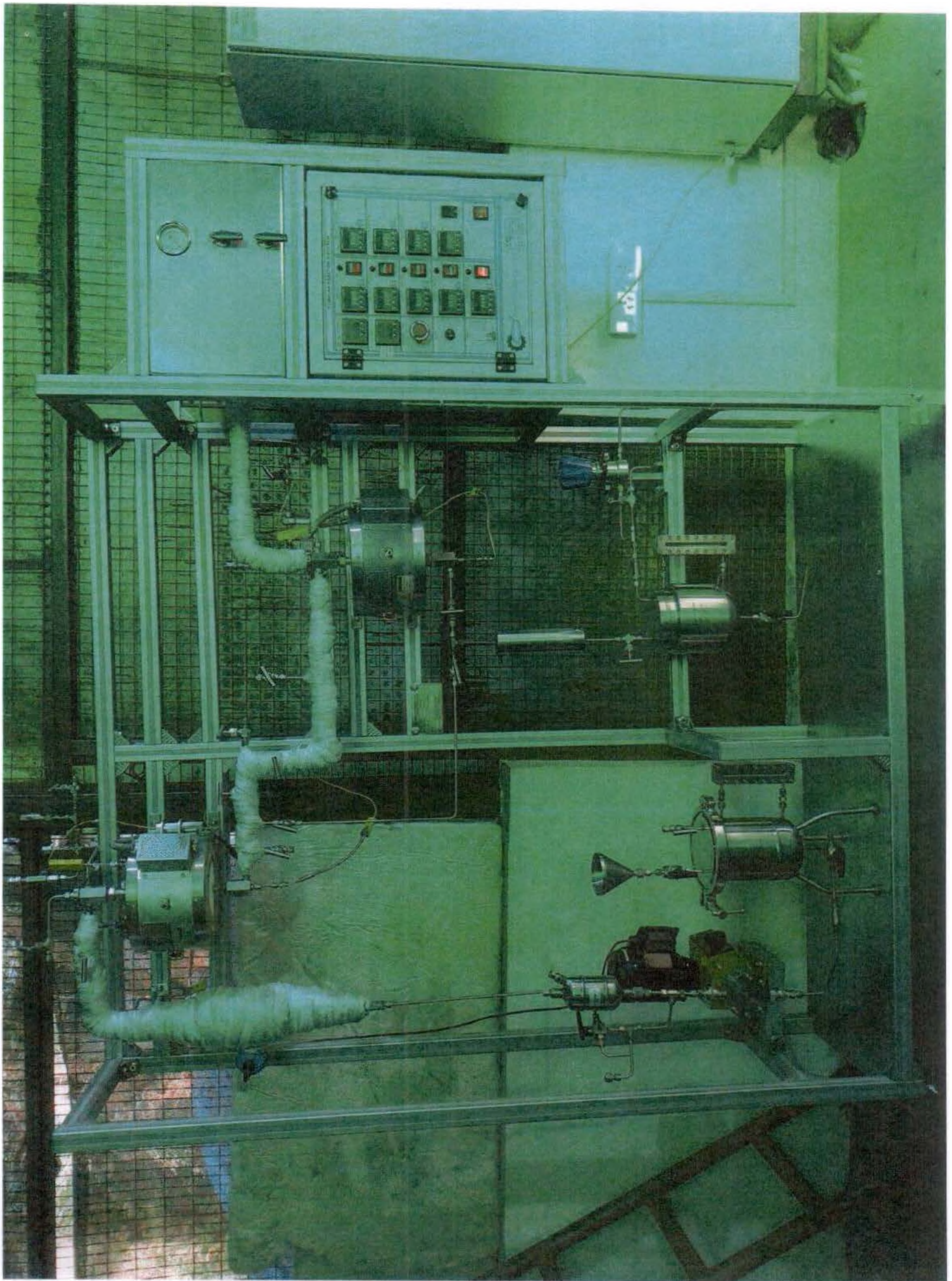


#### 4. Chemisorption (TPR/TPD/TPO)



Project: stabilization and upgradation of Biomass derived bio-oils in a 3 stage Catalytic process to produce liquid hydro carbon fuels: TE





**Project: Coal to Liquid (CTL) Fuels Technology Development: EIL/ BPCL**



Gasifier at EIL R&D, Gurugram

**Project: Parametric Study and Technology Development for Desalter Design: EIL/ BPCL**



**Proto-type Desalter at BPCL-Kochi Refinery**



**Project: Development of Catalyst and Process for Slurry Phase Residue Hydroprocessing: CSIR-IIP/ HPCL/ EIL/ BPCL**



**Slurry Hydrocracker pilot facility at CSIR-IIP**

**Project:** Development of Catalyst and Process for Slurry Phase Residue Hydroprocessing: CSIR-IIP/ HPCL/ EIL/ BPCL





Julabo Recirculating Chiller -2



SHC HTHP BATCH Reactor 1 litre -2



HTSIMDIST & DHA Combi



Julabo Recirculating Chiller -1



SHC HTHP BATCH REACTOR 1 litre -1



# उच्च प्रौद्योगिकी केन्द्र

(पेट्रोलियम एवं प्राकृतिक गैस मंत्रालय, भारत सरकार)

**Centre for High Technology**

(Ministry of Petroleum & Natural Gas, Govt. of India)

No. CHT/MOP&NG/1403

21<sup>st</sup> December 2018

Ministry of Petroleum & Natural Gas,  
Govt. of India  
Shastri Bhavan  
New Delhi-110 001

**Attn.: Shri Noas Kindo, Under Secretary**

**Sub: Annual Report 2018-19 of the Ministry of Petroleum & Natural Gas**

Dear Sir,

This has reference to your letter No. R-12042/17/2018-OR-II/P-27803 dated 19<sup>th</sup> December, 2018 on the above subject.

As desired, the information pertaining to Centre for High Technology for the Annual Report 2018-19 of the Ministry of Petroleum & Natural Gas (as on 31<sup>st</sup> December 2018) is enclosed for your kind perusal.

Yours faithfully,

(Brijesh Kumar)

Executive Director

**Encl. : As above**

ओ.आई.डी.बी. भवन, 9वाँ तल, प्लॉट नंबर 2, सेक्टर 73, नोएडा 201307 (उ. प्र.)

OIDB Bhawan, Tower "A", 9th Floor, Plot No. 2, Sector-73, Noida - 201307 (U. P.)

Tel. : ..... Fax: 91-120-2593780/2593782, Email: .....@cht.gov.in Website: www.cht.gov.in

Liaison Office: C/o. OIDB, 301, World Trade Centre, 3rd Floor, Babar Road, New Delhi-110 001



## **Annual Report 2018-19 of the Ministry of Petroleum & Natural Gas**

### **Material pertaining to Centre for High Technology (as on 31<sup>st</sup> December 2018)**

#### **1.0 Introduction**

Established in 1987, Centre for High Technology (CHT) acts as the Technical Wing of MOP&NG for implementation of scientific and technological programmes of Govt. of India. Major functions of CHT include:

- Performance Benchmarking of Refineries and Pipelines
- Performance Improvement in Refineries through Best Practices, Special Studies, Operational Improvement and Process Technology
- Energy Efficiency Improvement in Downstream Hydrocarbon Sector
- Petroleum Product Quality Improvement
- Sharing of Best Practices and Information & Knowledge Dissemination
- Integration with Alternative Energies and New Initiatives in Downstream Sector for Future Sustainability
- Promoting Innovations and R&D in Downstream Hydrocarbon Sector. Co-ordination of activities of Scientific Advisory Committee (SAC) on Hydrocarbons of MoP&NG

#### **2.0 Major activities undertaken by CHT during 2018-19**

##### **2.1 Performance Benchmarking**

Performance Benchmarking of PSU refineries for the Study Cycle 2018 has been initiated through M/s Solomon Associates (SA), USA. The Data Coordinators' Seminar was conducted by SA with participants from all refineries on 29<sup>th</sup>/30<sup>th</sup> November, 2018 at CHT. The Study Results will be available by November, 2019.

Performance Benchmarking Study for Pipelines (Liquid, Gas, LPG and SPMs) for 2018 cycle has also been initiated for the first time.

##### **2.2 Refinery Performance Improvement**

- **Energy Efficiency Improvement Study of PSU Refineries:** Refineries are included in PAT (Performance Achieve and Trade), under which each refineries is mandated to meet the Specific Energy Consumption Targets set for 2018-19. CHT was actively associated with BEE for target setting and has been monitoring the progress. CHT also initiated Energy Efficiency improvement studies for PSU refineries for Process Side through EIL and for Utilities Side through PCRA which were completed.

A Roadmap for Energy Reduction in PSU refineries till 2030, aligning with India's NDC of 33-35 % reduction in Specific Energy Consumption over base year of 2005, has been prepared.

- **Development of Water Consumption Norms and Reduction of Water Footprint for Refineries** through EIL has been initiated and currently in progress.
- **Approach Paper on demand side steam management** based on the best practices and Indian realities is planned through M/s KBC, Singapore and is expected to be completed by March, 2019.
- **Performance Improvement Programme of PSU Refineries:** CHT, along with industry, finalised refinery-wise consultants for undertaking comprehensive Performance Improvement Programme of 9 PSU refineries in the First Phase. The Study for balance refineries will be taken up in 2<sup>nd</sup> phase.
- In order to improve energy efficiency and reduce energy consumption, CHT, in association with refineries, organizes **Surveys** every year in the areas of i) **Furnace/ Boiler Efficiency** and ii) **Steam leak**. These two areas are taken-up every alternate year. Survey in the area of Furnace/ Boiler Efficiency was conducted during January, 2018. Survey in the area of Steam Leak will be conducted during January, 2019.

### **2.3 23<sup>rd</sup> Refining & Petrochemicals Technology Meet (RPTM)**

23<sup>rd</sup> RPTM, organised by CHT in association with BPCL, will be held during 12-14 January, 2019 in Mumbai. The Theme of the Meet is "Aligning Refineries towards Sustainable Future". Around 1000 delegates/invitees from India and abroad are expected to participate in the Meet.

23<sup>rd</sup> RPTM will have presentation of around 80 papers spread over 15 Technical Sessions and about 60 papers in Poster Sessions along with 16 Exhibition Stalls.

### **2.4 Indigenous Technology Development**

CHT co-ordinates the activities of Scientific Advisory Committee (SAC) on Hydrocarbons of MOP&NG in identifying and funding of research projects for downstream hydrocarbon sector. SAC approves and steers projects of national importance and refining operations. SAC is headed by Dr Anil Kakodkar, an eminent Scientist and DAE Chair Professor, BARC.

During 2018-19, SAC had two meetings till December 2018: 82<sup>nd</sup> meeting on 11<sup>th</sup> September 2018 and 83<sup>rd</sup> meeting on 17<sup>th</sup> November, 2018. SAC had detailed review of the on-going projects and new project proposals.

## 2.5 Performance Awards

CHT is actively associated with the following Annual Awards instituted by Ministry of Petroleum & Natural Gas, Government of India:

- Refinery Performance Improvement Award
- Oil & Gas Conservation Fortnight (OGCF) Award
- Innovation Award

The Awardees for the first two categories are selected by the selection committee set up by MoP&NG. For the Innovation Award, the Awardees are selected by the committee constituted by Chairman, SAC, based on guidelines of Governing Council of CHT.

Refinery Performance Improvement Awards for 2017-18, OGCF Award for 2018 and Innovation Awards for 2017-18 have been finalised by the Committee and will be presented to the winners during the Inaugural function of the 23<sup>rd</sup> Refining & Petrochemicals Technology (RPTM) on 12<sup>th</sup> January, 2019 in Mumbai.

## 2.6 Knowledge Dissemination and Experience Sharing

- **Activity Committee Meetings:** With the aim of sharing of best operational practices & improvements and dissemination of information on latest developments, CHT organised various Activity Committee Meetings in critical areas/ technologies in refining sector and pipelines operations. A new Activity Committee Meeting on "Quality Control" was started. Currently, 15 Activity Committees are in place.
- A Compendium on Best Practices, including Takeaways from Activity Committee Meetings and Innovations in refining sector was prepared and shared with all refineries.
- Discussion Forums on 10 major areas concerning the downstream hydrocarbon has been created on CHT portal. Specific queries can be posted by the authorised coordinators from PSU companies for seeking answers from an Expert Panel.
- A Workshop on "Improvement in Project Execution Strategies" was organised by CHT & EIL on 8<sup>th</sup> December, 2018 at EIL, Gurgaon.

## 2.7 Lab Co-relation Programme

CHT initiated "Inter Laboratory Correlation Programme" for better coordination of product quality at industry level. MS, HSD and ATF have been covered under this programme. The First Level of the Programme comprising one refinery from each zone

& labs was completed in Oct 2018. The Second Level, covering intra-zone, involving all refineries and major PPL/ Mktg. installations of the zone and one R&D lab was launched on 11<sup>th</sup> December, 2018 and is expected to be completed by May 2019.

#### **2.8 Swachhata Ranking for PSU/JV Refineries**

Started in 2017, Swachhata Ranking of PSU/JV Refineries is a new initiative of the Ministry of Petroleum & Natural Gas. Refineries are ranked based on the Swachhata Index developed by Centre for High Technology.

Swachhata Ranking for 2018 for PSU/JV Refineries is currently in progress.

No. CHT/MOP&NG/

28<sup>th</sup> November 2017

**Ministry of Petroleum & Natural Gas,  
Govt. of India  
Shastri Bhavan  
New Delhi-110 001**

**Attn: Shri Pawan Kumar, Under Secretary**

**Sub : Annual Report 2017-18 of the Ministry of Petroleum & Natural Gas**

Dear Sir,

This has reference to your letter No. R-12042(11)/301/2017-OR.II/E-16866 dated 6<sup>th</sup> October 2017 on the above subject.

As desired, the information pertaining to Centre for High Technology for the Annual Report 2017-18 of the Ministry of Petroleum & Natural Gas (as on 31<sup>st</sup> December 2017) is enclosed for your kind perusal.

Yours faithfully,

**(Brijesh Kumar)  
Executive Director**

**Encl. : As above**

## Annual Report 2017-18 of the Ministry of Petroleum & Natural Gas

### Material pertaining to Centre for High Technology (as on 31<sup>st</sup> December 2017)

#### **1.0 Introduction**

Established in 1987, Centre for High Technology (CHT) acts as the Technical Wing of MOP&NG for implementation of scientific and technological programmes of Govt. of India. Major functions of CHT include assessment of technology requirement, operational performance evaluation and improvement of the refineries. CHT acts as a focal point of oil industry for centralised technical assistance, knowledge dissemination, performance data base, exchange of information and experience sharing. CHT also coordinates funding of research work in downstream hydrocarbon sector and pursue the programmes of "Scientific Advisory Committee on Hydrocarbons" of MOP&NG.

#### **2.0 Major activities undertaken by CHT during 2017-18**

##### **2.1 Performance Benchmarking of PSU Refineries**

Performance Benchmarking of 15 PSU refineries, 4 lube units and 1 JV Refinery (BORL) for the Study Cycle 2016 through M/s Solomon Associates (SA), USA was completed in September 2017. The findings of the Study were presented by SA to all the participating refineries as well as MOP&NG.

The major findings of the Study are as under:

- Energy Cost continues to be a major component of Opex.: 74 % in 2016
- 17.5 % reduction in EII from 120 in 2010 to 99 in 2016
- PSU refineries have consistently achieved better than World's Best EII Peer Group performance in the Process Fired Furnace Efficiency category
- Reducing the Steam System Size is a large opportunity area for EII improvement
- Large reduction in Steam System Size since benchmarking : > 9.5 MMT per year reduction in steam usage

##### **2.2 21<sup>st</sup> Refinery Technology Meet (RTM)**

21<sup>st</sup> RTM organised by CHT in association with HPCL during 20-22 April, 2017 at Visakhapatnam was a grand success with participation of around 800 delegates/invitees from India and abroad. The Theme of the Meet was "Refining to Petrochemicals – The Way Ahead".

The Meet was inaugurated by Hon'ble Minister, Petroleum & Natural Gas, Government of India Shri Dharmendra Pradhan, in the presence of Secretary, P&NG; Joint Secretary(R), MoP&NG; CMD, HPCL and Heads/Senior Executives from oil industry. A

total of 74 oral papers spread over 16 Technical Sessions and 82 posters were presented during the 3 day Meet. 12 Exhibition Stalls were put up by leading technology/service providers showcasing their services. Apart from Indian oil companies, leading global consultants/technology providers like Shell, UOP, Chevron, ExxonMobil, Haldor Topsoe, Axens, KBR, DuPont, Solomon, Lyondell Basell, Grace, Univation, Mitsui Chemicals etc. participated in the Meet.

### **2.3 Indigenous Technology Development**

CHT co-ordinates the activities of Scientific Advisory Committee (SAC) on Hydrocarbons of MOP&NG in identifying and funding of research projects for hydrocarbon sector. SAC approves and steers projects of national importance and refining operations. SAC is headed by Dr Anil Kakodkar, an eminent Scientist and DAE Chair Professor, BARC. SAC had its 80<sup>th</sup> meeting on 6<sup>th</sup> September, 2017 and reviewed the completed and 11 on-going R&D projects. The project on "Development and durability Testing of Ethanol-Diesel Blend Engine" of ARAI, Pune recommended by SAC was approved by the Executive Committee of CHT in its 22<sup>nd</sup> meeting held on 20<sup>th</sup> June, 2017.

In order to attract more participation from Academia and exploit the research expertise /capabilities available in Indian universities/Institutions and also to strengthen the interface between R&D establishments & Industry, CHT has been inviting research proposals through EOI.

EOI has been issued 3 times since July 2016. In all 31 projects, including 4 projects in hydrogen research area have been received. The proposals are screened and modifications are advised by Steering Committee nominated by Chairman SAC. The last 3<sup>rd</sup> meeting of the Steering Committee was held on 3<sup>rd</sup> October 2017.

### **2.4 Energy Efficiency Improvement Study and Performance Audit of PSU Refineries**

The Energy Efficiency Improvement Study and Performance Audit of 15 PSU Refineries by EIL is in progress and will be completed by March 2018. An Umbrella Agreement with EIL for TSA has been finalised in consultation with refineries for detailing of energy saving schemes at  $\pm$  30% cost for obtaining in-principle approval. The Agreement enables simplified and quick work order from refinery on single page format with only scheme specific details like objective, deliverable, time lines, etc. The Agreement was signed jointly by CHT & EIL on 15<sup>th</sup> September, 2017.

## **2.5 Mandatory Energy Audit (MEA)**

CHT, on behalf of industry, had engaged PCRA for carrying out MEA of 12 PSU refineries (excluding IOCL-Guwahati, Digboi and Paradip, who are not part of PAT, and BPCL-Kochi who have already completed MEA) The Audit was completed in June 2017.

## **2.6 Performance Improvement of Refineries**

The EOI and the Tender Document for Performance Improvement Programme for PSU refineries have been finalised along with refineries. It is planned to cover 9 refineries under the 2017-18 study cycle. Refinery-wise consultant shall be finalised by the Committee of CHT and Refineries by the first week of April 2018.

## **2.7 Performance Awards**

CHT is actively associated with the following Annual Awards instituted by Ministry of Petroleum & Natural Gas, Government of India:

- Refinery Performance Improvement Award
- Oil & Gas Conservation Fortnight (OGCF) Award
- Innovation Award

The Awardees for the first two categories are selected by the selection committee set up by MoP&NG. For the Innovation Award, the Awardees are selected by the committee constituted by Chairman, SAC, based on guidelines of Governing Council of CHT.

CHT was involved in co-ordination, data validation/compilation and providing necessary technical support to the Committees for finalising the awards.

Refinery Performance Improvement Awards for 2016-17, OGCF Award for 2017 and Innovation Awards for 2016-17 have been finalised by the Committee and will be presented to the winners during the Inaugural function of the 22<sup>nd</sup> Refining & Petrochemicals Technology (RPTM) on 13<sup>th</sup> January, 2018 at Bhubaneswar.

## **2.8 Activity Committee Meetings**

With the aim of sharing of best operational practices & improvements and dissemination of information on latest developments, CHT organised various Activity Committee Meetings in critical areas/ technologies in refining sector and pipelines operations.



## **2.9 Perform, Achieve and Trade (PAT) Scheme implementation in refineries**

BEE has already notified refinery-wise target for Specific Energy Consumption for achievement by 2018-19. The Technical Committee headed by CHT, has worked out the normalisation methodology and factors to be applied over the actuals for performance assessment for the year 2018-19.

## **2.10 Swachhata Ranking 2017 for PSU Refineries**

Swachhata Ranking of PSU Refineries is a new initiative of the Ministry of Petroleum & Natural Gas. The inter-refinery survey of 17 Public and 2 Joint Sector Refineries has been conducted and these refineries have been ranked based on the **Swachhata Index** developed by Centre for High Technology. The **Swachhata Index** is based on infrastructure available at Refineries not only for its own Employees but also for its Contract Laborers, Cleanliness, Systems and Processes including waste generation and disposals, initiatives taken for Swachhata awareness and its campaign, waste paper recycle and reuse, processing municipal waste in Refineries, etc.