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CHT BULLETIN
(MARCH 2018 - FEBRUARY 2019)

CHHT

BULLETIN

Centre for High Technology
Ministry of Petroleum & Natural Gas, Govt. of India

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March 2018 - February 2019

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Editorial Team

Brijesh Kumar
Satya Prakash
Renu Raina

From the desk of Executive Director



The 23rd Refining and Petrochemicals Technology Meet (RPTM) with the theme "Aligning Refineries for Sustainable Future" was organised by CHT in association with Bharat Petroleum Corporation Ltd. (BPCL) during 12 – 14 January, 2019 at Mumbai.

The Meet was inaugurated by Dr. M.M. Kutty, Secretary, PNG, Govt. of India in the gracious presence of Dr. Anil Kakodkar, eminent Scientist and Chairman, Scientific Advisory Committee on Hydrocarbons of MoP&NG, Senior officials from MoP&NG and Captains of the hydrocarbon industry from India and abroad. A series of pertinent issues like integration & advancement in petrochemicals and biofuels, gasification, Innovations, quality improvement, energy reduction, digital revolution, best practices, benchmarking, operation risk management, etc. were thoroughly deliberated by professionals.

I would like to thank the patronage and guidance received from MoP&NG and Indian refining sector, Process licensors, dignitaries, speakers and delegates for their valued contribution leading to yet another successful organization of RPTM, the biggest event on CHT's annual calendar. The event got an overwhelming response with record participation of 1200 delegates signifying growing importance and utility of the event.

The last one year has been very eventful for Centre for High Technology. CHT has undertaken a number of studies and new initiatives for Improvements in the refinery sector, some of these are;

1. M/s Solomon Associates, USA has been engaged for Performance Benchmarking Study of 16 PSU refineries and 4 lube refineries for 2018 Cycle. The study results shall be available by December, 2019. CHT has been carrying out benchmarking of PSU refineries since 2010.

2. Based on Benchmarking study carried out by Solomon for 2016 cycle, the following areas have been identified for improvement in PSU refineries;
 - a. Energy Efficiency
 - b. Operational Availability
 - c. Stream Sharing
 - d. Reducing Steam System Size
 - e. Reduction of water footprint

Accordingly, the following studies have been completed / undertaken;

- a. Energy efficiency improvement in process unit areas by EIL: completed
 - b. Energy Audit of utilities by PCRA: completed.
 - c. Best practices on Steam reduction through KBC. The Study will be completed by April, 2019
 - d. Development of norms for water consumption through EIL: The Study will be completed by Jan, 2020
 - e. Performance Improvement through global consultants: initiated
 - f. Parameter on Operation Availability has been included in MoU signed by the Govt. with PSUs
 - g. Issue of dual tax regime affecting stream sharing by refineries has been taken up with MoF through MoP&NG.
 - h. Roadmap for specific energy consumption up to 2030 aligning with India's NDC
3. CHT has for the first time, undertaken Performance Benchmarking Study for Pipelines on centralised basis covering 32 (crude, product & LPG) pipelines, 4 SPM systems and 6 gas pipelines for the 2018 cycle and has engaged M/s Solomon Associates, USA for carrying out the study. The study results shall be available by October, 2019.
 4. Refinery Performance Improvement Programme (RPIP) has been initiated through Global Consultants for PSU refineries. The selection of the refinery-wise H-1 consultant, including pre-bid meeting was carried out by CHT on behalf of the refineries. Seven Refineries under phase-1 have commenced the study based on 2017-18 data. Remaining refineries shall undertake the study based on 2018-19 data.

5. A group comprising representatives from Refineries and Marketing of OMCs has been constituted by CHT for regular review till completion of roll-over to BS-VI. CHT has conducted several meetings with the industry. Based on the discussions, shut-down schedule and staggering of shutdowns as agreed in meetings, refineries have submitted month wise production numbers up to March, 2020. OMCs have also furnished month wise demand numbers, ethanol blending and projected product sales growth rate based on which supply / demand position has been prepared zone wise as well as OMC wise. Sample SOP, for tank wise planning, which can be modified for each depot depending upon t'put has been suggested.

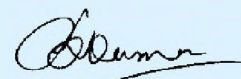
For Quality assurance, Activity Committee Meet on QC Lab Practices was conducted for the first time at Mangalore with objective to gear-up, sensitize and set SOPs to ensure roll-over to BS VI fuel and to prevent BS VI product quality failure in supply chain. Lab Co-relation Programme has been initiated in 2 phases for better coordination of product quality at industry level. MS, HSD and ATF would be covered under the Programme. The First Level of the Programme comprising one refinery from each zone & R&D labs was completed in Oct, 2018. The Second level of the Programme comprising intra zone refineries and major PPL/ Mktg. installations and one R&D lab was launched in a meeting held at CHT on 11 Dec, 2018.

6. CHT has proposed to engage M/s LanzaTech for the Feasibility Study for Production of Ethanol from Off-gases in PSU refineries. It is proposed to take-up the study in phases.
7. For sharing of experience and dissemination of information on latest developments and best practices, CHT has organised 11 nos. Activity Committee Meetings on major areas of refinery operations & pipelines. CHT also prepared Compendium on Experience Sharing and updated it in July' 2018. CHT has launched a Discussion Forum on its portal (cht.gov.in) in 10 separate areas concerning the downstream hydrocarbon sector. A brief Write-up in the form of Slides on the Procedure / Instructions has been sent to all the refineries for propagation and making use of the Forum.

8. A study has been initiated for import substitution of Reference Fuels as well DMDS under "Make in India" initiative.
 9. A Workshop on Project Execution Strategies was held along with EIL, at Gurgaon on 8th Dec, 2018. Various Issues requiring further discussions and interventions at policy level have been compiled.
 10. For the year 2019, steam leak survey was conducted through industry teams as part of Oil & Gas Conservation Fortnight during 17th - 24th January' 2019.
 11. 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.
 12. CHT prepared a paper highlighting the various issues and the support sought by the refining industry, including bringing electricity under the ambit of GST, to unify the tax and tariff structure. MoP&NG has taken up the issue with MoP.

As per MoP&NG directive, approval of projects under HCF follow the same route as for CHT / OI DB funded projects and are being recommended / monitored by SAC.
 13. All work related to Biofuels has been transferred from MNRE to MoP&NG and are being monitored by CHT / SAC.

As per MoP&NG directive, approval of projects under HCF follow the same route as for CHT / OI DB funded projects and are being recommended / monitored by SAC.
 14. Refinery Sector has been included in the PAT scheme from the cycle-II, which has commenced from 01.04.2016. The refinery Specific Energy target, based on sector target of 5.97% reduction over 2014-15, are mandated to be achieved by 2018-19. Measurement & Verification (M&V) Audit and normalisation to be undertaken this year.
 15. MoU was signed with American Chamber of Commerce (AMCHAM) in April, 2018. The MoU touches upon major areas of cooperation and also brings out specific studies identified at present that could be undertaken by US companies for pursuing through AMCHAM.
 16. As recommended by the Working group on Lube oil recycling, OMCs issued EOI and shortlisted consultants to prepare business model for setting up Collection Centre. The report is expected by Sept, 2019.
 17. CHT has subscribed to report of M/s Penwell, USA with a view to rectify Nelson Complexity Index of PSU refineries in their worldwide refinery database.
 18. Inspection of CHT was carried out by Parliamentary Subcommittee on Official Language on 5th Oct, 2018. The Hon'ble Chairman and the other Committee members expressed satisfaction over use of Hindi language in CHT.
 19. CHT coordinated Meetings of Working Group on Refineries (WGM) chaired by JS(R), MoP&NG wherein the data on Physical, Financial and Project Parameters for all the PSU Refineries is reviewed. CHT also co-ordinated the activities of Scientific Advisory Committee (SAC) on Hydrocarbons of MoP&NG in identifying and funding of research projects for downstream hydrocarbon sector.
- I am grateful to all the agencies, organisations which are working with CHT in achieving the goals set by MoP&NG. We together will continue our endeavour to improve the performance of refineries and encourage innovative methods and technologies to achieve excellence.



(Brijesh Kumar)
Executive Director

PM lays foundation stone of Barauni Refinery Expansion Project



Hon'ble Prime Minister Shri Narendra Modi laid the foundation stone of Barauni Refinery Expansion (from 6 to 9 MMTPA) project, ATF hydro-treating unit (INDJet), Augmentation of Paradip-Haldia-Durgapur LPG Pipeline & it's extension up to Patna and Muzaffarpur and revival of Barauni Fertiliser plant. He stressed that setting up of the polypropylene unit will spur the era of petrochemicals industry in Bihar

PETROTECH-2019

Hon'ble Prime Minister Shri Narendra Modi inaugurated PETROTECH-2019, the 13th International Oil & Gas Conference & Exhibition, organised under the aegis of the Ministry of Petroleum & Natural Gas, Government of India, at India Expo Centre, Greater Noida in Uttar Pradesh on 11th February 2019.



Hon'ble Prime Minister Shri Narendra Modi addressing the delegates during Inaugural function of PETROTECH 2019 held at India Expo Centre, Greater Noida on 11th February 2019.



PM inaugurating the Ministry of Petroleum & Natural Gas & Skill Development and Entrepreneurship under the aegis of the Ministry of Petroleum & Natural Gas at PETROTECH 2019.

23rd Refining & Petrochemicals Technology Meet (RPTM)

The 23rd Refining & Petrochemicals Technology Meet (RPTM), under the aegis of MoP&NG, was successfully organised by CHT in association with BPCL during 12-14 January, 2019 at Mumbai. The Theme of the Meet was "Aligning Refineries towards Sustainable Future"

The Meet was inaugurated by Dr. M.M. Kutty, Secretary, PNG, Govt. of India in the gracious presence of Dr. Anil Kakodkar, eminent Scientist and Chairman, Scientific Advisory Committee on Hydrocarbons of MoP&NG, senior officials from MoP&NG and Captains of the hydrocarbon industry from India and abroad. A series of pertinent issues like integration & advancement in petrochemicals and biofuels, gasification, Innovations, quality improvement, energy reduction, digital revolution, best practices, benchmarking, risk management, etc. were thoroughly deliberated by professionals.



Dr. M.M. Kutty, Secretary, PNG lighting the ceremonial lamp at 23rd RPTM. Others seen in the picture are Shri Sanjiv Singh, Chairman, Indian Oil Corporation Ltd.; Shri M.K. Surana, Chairman & Managing Director, Hindustan Petroleum Corporation Ltd.; Shri Vijay Sharma, Director (Refineries), P&NG; Dr. Anil Kakodkar, Chairman, SAC on Hydrocarbons of MoP&NG; Shri D. Rajkumar, Chairman & Managing Director, Bharat Petroleum Corporation Ltd. and Shri Brijesh Kumar, Executive Director, CHT

The Refinery Performance Improvement Awards for 2017-18, OGCF Award 2018 and Innovation Awards for 2017-18 were given to the Award Winners by the Chief Guest during the Inaugural Session on 12th January, 2019.

A total of 82 technical papers (including 59 by foreign companies) spread over 15 Technical Session were presented during the Meet. Another 60 technical papers were covered in 3 Poster Sessions. 16 Exhibition Stalls were put up by reputed vendors/ service providers showcasing their technology/products/services.

A record number of more than 1200 delegates including 175 foreign delegates) participated in the Meet. There were representatives from 66 foreign companies. For the first time there were delegates / speakers from Israel, Germany, France, Holland, China, Singapore, Kuwait, and Malaysia.

Dr. M.M. Kutty, in his inaugural address, stressed that India is at critical juncture faced with rapidly transforming energy landscape bringing in irreversible changes. Such a situation demands a holistic assessment of impact on disruptive technologies, innovations, change in trade in investment pattern, geopolitics and climate issues. Energy is the most important catalyst for sustaining economic growth. Govt. of India is therefore fully committed to improve access to energy in a time bound manner to its population. The requirement of refining capacity in India is projected as 670 MMTPA by 2040 including 25% surplus for export. Petrochemical consumption in India is very low at 10 kg per person compared to world average of 32 kg per person. The demand of petrochemicals has a strong linkage with GDP. Petrochemical industry is therefore poised for a quantum jump in growth. Though the Petrochemical integration with refineries has already begun in India, the future refineries have to be built fully integrated with petrochemicals. This will also provide long term business sustainability for refineries in case of shift from petroleum fuels in future. The world is at a crucial stage of climate crisis, today we are largely dependent on non-renewable fossil fuels, and the solution is to wean off from fossil fuels. Increasing the gas usage is another way to fight the crisis; India has a plan to increase the gas in energy mix from current less than 6.5% to 15% by 2030. Govt. is according great push towards harnessing bio fuels with launch of national biofuel policy of 2018. Series of policy decisions have been taken to promote ethanol blending programs to target 20% of ethanol blending in petrol and 5% biodiesel blending in diesel by 2030. Govt. is giving impetus to advanced biofuels such as 2G ethanol, bio CNG, bio methanol, drop in fuel, etc. India has decided to leapfrog from BS-IV fuel to BS-VI fuel in 2020 ahead of earlier plan of 2024. He said that Sustainability starts with reducing the adverse environmental impact because of our operations. It also entails supplying products that benefits society with lesser Impact on environment, therefore the theme of the meet, "Aligning Refineries for Sustainable Future" is extremely relevant in today's contest. He wished all the best and success for the meet.



Dr. M.M. Kutty, Secretary PNG, Govt. of India delivering the Inaugural speech during 23rd RPTM at Mumbai



Dr. Anil Kakodkar, Chairman, Scientific Advisory Committee on Hydrocarbons of MoP&NG delivering keynote address during 23rd RPTM at Mumbai



Shri Vijay Sharma, Director (R), MoP&NG delivering the Theme address during 23rd RPTM at Mumbai

Dr. Anil Kakodkar, in his key note address, indicated that there are three main challenges for Hydrocarbon sector; 1) Reduction of Import bill 2) Ensure Energy Security in both short and long term 3) Issue of Climate Change-doing our activities in environmentally responsible manner. Indian refining industry is a success story as it can compete globally. This strength can be leveraged, capitalised. We have done lot of progress in terms of technologies related to refineries in terms of processes; we need to focus more particularly in context of domestic capability in equipment. As far as petrochemicals business is concerned, thrust should be laid on reducing import content. We need to align policies in a manner that we keep on increasing the domestic content in energy business. In the context of policies, if energy basket is left to market forces, it may not move in the direction that is consistent with the national security objective, we need to adjust our policies to be consistent with the three primary objectives as stated. He stressed that utilisation of Gas, utilisation of Biomass for production of Ethanol, Fuel cells, production of Hydrogen by non-fossil source and electrolysis need to be pursued.

Shri Vijay Sharma, Director (R), MOP&NG, in his theme address put forth that Electrical vehicles will play a key role in future. Taking the average of projections given by the various agencies, electric vehicle may register a share of 25% by 2025 and 40% by 2030. Electrical Vehicle is expected to come in a big way in near future. This will reduce import bill and also address the environmental challenges. However, this will not affect the requirement of fossil fuels in the near future. He presented the future requirement of oil demand considering different scenarios based on the projections given by various agencies. Already long term expansion plan of the Indian refineries have been drawn up to meet the demand.



Shri D. Raj Kumar, Chairman & Managing Director, BPCL, delivering the Welcome address during 23rd RPTM at Mumbai

Shri Brijesh Kumar, Executive Director, Centre for High Technology, in his Vote of Thanks, thanked all the dignitaries, speakers and participants for their august presence & active participation and making the event a grand success.



Shri Brijesh Kumar, Executive Director, CHT presenting Vote of Thanks during 23rd RPTM at Mumbai

Key Technical Sessions

On the first day of the Meet, industry experts made the presentations on the topics "Moving Towards Sustainable Future" and 'Aligning Refineries for Sustainable Future".

Session on "Aligning Refineries for Sustainable Future" was chaired by Shri Sanjiv Singh, Chairman, IOCL and the two sessions on "Moving Towards Sustainable Future" were chaired by Shri M.K. Surana, C&MD, HPCL and Dr. Anil Kakodkar, Chairman, Scientific Advisory Committee on Hydrocarbon of MoP&NG. Subsequent technical sessions were chaired by Dr. Anjan Ray, Director, CSIR-IIP, Shri Vinod S. Shenoy, Director(R), HPCL, Shri M. Venkatesh, Managing Director, MRPL, Shri B.V. Rama Gopal, Director(R), IOCL, Shri S.S.V. Ramakumar, Director (R&D), IOCL, Shri S.N. Pandey, Managing Director, CPCL and other dignitaries from Downstream.

Reputed industry experts presented papers on the following topics:

- Global Energy and Chemical Industry Outlook
- A process for Drop in Renewable Aviation Fuel
- Competitive path ways for Crude to Chemicals
- Catalytic Conversion of Waste Plastics into High Quality Fuels
- Converting Municipal Solid waste to Drop in Hydrocarbon fuels
- Carbon Recycling : Clean Fuel and Clean Air
- Opportunities for Biomass as a main stream Energy source
- Catalytic processes for Converting CO₂ and Bio mass to Liquid fuels and chemicals
- Initiatives and steps towards Industrial Revolution 4.0
- Improving Project Performance through Bench marking
- Improving Business Success through Operational Risk Management



Shri Sanjiv Singh, Chairman, Indian Oil Corporation Ltd, chairing Technical Session during 23rd RPTM



Shri M.K. Surana , C&MD, Hindustan Petroleum Corporation Ltd, chairing Technical Session during 23rd RPTM



Dr. Anil Kakodkar, Chairman, Scientific Advisory Committee, on Hydrocarbon of MoP&NG chairing Technical Session during 23rd RPTM

Glimpses of 23rd RPTM



Shri B.V. Rama Gopal, Director (Refineries), IOCL chairing Technical session during 23rd RPTM.



Shri K.K. Jain, Executive Director, Barauni Refinery, IOCL chairing Technical session during 23rd RPTM.



Discussions on the sidelines during 23rd RPTM.



Shri Vinod Shenoy, Director (Refineries), HPCL chairing Technical session during 23rd RPTM.

Exhibition Stalls & Poster Gallery of 23rd RPTM

Dr. M.M. Kutty, Secretary, PNG, Govt. of India also inaugurated the Poster and Exhibition gallery. Shri D. Rajkumar, Chairman & Managing Director, Bharat Petroleum Corporation Ltd., Shri Sanjiv Singh, Chairman, Indian Oil Corporation Ltd., Shri M.K. Surana, Chairman & Managing Director, Hindustan Petroleum Corporation Ltd. and Shri Vijay Kumar Sharma, Director (Refineries), MoP&NG and Shri Brijesh Kumar, Executive Director, CHT were present on the occasion.

An exhibition showcasing a wide range of innovative technologies, products and services by reputed vendors, and service providers like Haldor Topsoe, DuPont, Aspentech and others was also organised. The BPCL –R&D and DBT-ICT emphasised on Bio fuel technologies, EIL-IOCL and HPCL R&D showcased their technologies including those taken up for commercialization. Dr. Kutty

showed keen interest both in posters gallery and the stalls and held interaction with presenters and exhibitors.



Inauguration of Poster & Exhibition Gallery of 23rd RPTM by Dr. M.M. Kutty, Secretary, PNG, Govt. of India

Glimpses of Exhibition / Poster Gallery



Chief Guest Dr. M.M. Kutty, Secretary, PNG, Govt. of India, discussing with Exhibitors & Technical Poster Presenters during 23rd RPTM at Mumbai

Awards

In order to encourage competition amongst the refineries and recognise overall performance improvement, Ministry of Petroleum & Natural Gas, Government of India has instituted the following annual awards:

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

Refinery Performance Improvement Award

The awards were finalised by the Award Selection Committee constituted by MoP&NG. Dr. M.M. Kutty, Secretary, PNG, Govt. of India, presented the awards to the winners during the inaugural function of the 23rd Refining & Petrochemicals Technology Meet (RPTM) on 12th January, 2019 at Mumbai.

The Refinery Performance Improvement Award is based on the performance of refineries against various critical parameters like Crude T'put, Specific Energy Consumption, Specific Steam Consumption, Carbon Emission Intensity, Operating Cost and Specific Water Consumption.

The Award winning refineries for the category 'Refinery Performance Improvement' for the year 2017-18 are as under:

First Prize	Indian Oil Corporation Limited–Mathura Refinery
Second Prize	Numaligarh Refinery Limited

Oil & Gas Conservation (OGCF) Awards for the year 2018

Oil & Gas Conservation Fortnight (OGCF) is celebrated throughout the country during January every year with the purpose of creating awareness amongst various target groups to appreciate and inculcate the habit of conserving petroleum products. CHT, in association with refineries organizes surveys during OGCF in the areas of:

- Furnace/ Boiler Efficiency
- Steam leak

These two areas are taken-up every alternate year and surveys are conducted simultaneously at all the refineries including private refineries by teams constituted by CHT. CHT evaluates the performance and the Awards are finalized by the Award Selection Committee constituted by MoP&NG. The award for 2018 is based on the OGCF Survey conducted during January, 2018 in the area of Furnace Efficiency.

The Award winning refinery for the category 'Best Improvement in Furnace efficiency for 2018 is as under:

Best Improvement in Furnace Efficiency	Bharat Petroleum Corporation Limited–Mumbai Refinery
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Innovation Awards for the year 2017-18

MoP&NG has instituted R&D / Innovations Awards for "Best indigenously Developed Technology / Process" to incentivise and encourage R&D / Innovation efforts in the Oil Industry. The objective of this Award is to promote innovative scientific endeavour in the country by encouraging and rewarding excellence in original invention / innovation and channelizing national and international knowledge and expertise with the mission of giving impetus to innovation activity in the country.

The Innovation Awards are conferred in the following categories:

- Best indigenous developed technology
- Best innovation in Refinery
- Best Innovation in R&D institute

Innovation Awards for the year 2017-18 were given in the various categories as follows:

Sl. No.	Category	Innovation related to	Winner
1	Best Indigenous Developed Technology	Octamax: An indigenous technology for conversion of cracked C4 stream to High Octane Gasoline	IOCL(R&D)
2	Best Innovation in Refinery	Production of De-aromatized Solvent (D-80) in LOBS (Lube Oil Base Stock) unit using narrow cut Kerosene as feed from Hydrocracker unit	BPCL, Mumbai (Commendation Certificate)
3	Best Innovation in R&D Institute	Development and Commercial trial of indigenous dewaxing catalyst: BHARAT: HiCAT	BPCL(R&D)
		HPCORRMIT - A novel cost effective corrosion inhibitor for LPG pipelines : Make in India Initiative	HPCL (R&D) (Commendation Certificate)
		A Lubricity Improving Additive Formulation for Ultralow Sulphur Diesel	HPCL (R&D) (Commendation Certificate)

Glimpses of the Award Function



Team IOCL-Mathura Refinery receiving First Prize in Category 'Refinery Performance Improvement Award 2017-18'



Team Numaligarh Refinery Ltd., receiving Second Prize in Category 'Refinery Performance Improvement Award 2017-18'



Team BPCL-Mumbai Refinery receiving OGCF Award 2018 'Best Improvement in Furnace Efficiency'



Team IOCL-R&D receiving Innovation Award in Category 'Best Indigenous Developed Technology'—for conversion of cracked C4 stream to High Octane Gasoline "Octamax" for 2017-18



Team BPCL-R&D receiving Innovation Award in Category 'Best Innovation in Refineries' – Production of De-aromatized Solvent in LOBS unit using narrow cut Kero as feed from Hydrocracker unit for 2017-18



Team BPCL-R&D receiving Innovation Award in Category 'Best Innovation in R&D' Development and Commercial trial of indigenous dewaxing catalyst: BHARAT:HICAT



Team HPCL-R&D receiving Innovation Award in Category 'Best Innovation in R&D' – HPCORRMIT - A novel cost effective corrosion inhibitor for LPG pipelines a Make in India Initiative



Team HPCL-R&D receiving Innovation Award in Category 'Best Innovation in R&D' A Lubricity Improving Additive Formulation for Ultralow Sulphur Diesel

“Science must meet rising aspiration of the people”.

**- Narendra Modi
Hon'ble Prime Minister of India**

Takeaways from the 23rd RPTM

- 1. The energy transition is underway**, timing is unclear but a major dislocation lies ahead. Most vehicles will be powered by internal combustion engines for the next two decades (Shell) and by 2040, only 7.5% of cars on the road be electric (IEA)

Therefore, the world will continue to need gasoline, diesel and jet fuel for some time. Trends to watch are Mobility changes, refinery/petrochemical integration, COTC and plastics recycling. Lubes for transport are projected to decline as EVs have Minimal moving parts.

Projects that may help to enhance competitiveness are Refinery specialities i.e. high-value niche products, hydrogen production, Petrochemicals and Residue conversion.

- 2. In order to reduce dependence on crude oil**, refinery need to look at alternative feedstocks in future, like Bio-feedstocks, Wastes, Captured CO₂, Algae-to-oil and Renewable electricity used across the site and gasification. Reduction of water and carbon footprint would be the guiding philosophy. For Water, refineries can look at Multiple Effect Distillation (MED) as it consumes low level steam or waste heat as against Reverse osmosis (RO) which consumes power.

Transform refining from fuels to chemicals

Crude to chemicals	%
Average	5 – 6
Complex	10 – 20
Maximum	25 – 30
Future	>50

- 3. The quality of Gasoline, including RON**, need to improve to address emission reduction targets and to align with future vehicle fleet.

Carbon offset and reduction scheme for international aviation (CORSIA), stipulates voluntary period 2021-26, after which it will become mandatory. Aircraft operators will be required to purchase offsets or “emission units” against CO₂ emissions.

Some of the options available to refineries for RON boosting are;

- “Octamax®: An Indigenous Technology for Conversion of Cracked C4 Stream to High-Octane Gasoline” has been developed by IndianOil R&D Centre and a unit with a production capacity of 55 kTA has been commissioned in Mathura Refinery in January, 2018. Since commissioning, Octamax® product, having blending RON exceeding 120, is being routed directly to MS pool.

- “Etherification – route to high RON gasoline”: Indirect incorporation of ethanol via ethyl tertiary butyl ether (ETBE) or tertiary amyl ethyl ether (TAEE) is an interesting option for sustainable gasoline production. ETBE also mitigates some of the issues associated with MTBE.
- Solid alkylation catalyst processes are available from KBR (K-SAAT) and Lummus (AlkyClean®) which eliminates corrosion and safety concerns associated with liquid acid catalyst.
- INVISTA is offering technology to minimize octane loss using a proprietary solvent extraction technology. The technology segregates the thiophene-rich middle cut of the gasoline, which can bypass hydro-treating freeing up ~30% capacity in the hydro-treater and reducing the Octane loss by 60+%.

4. Petrochemicals

- Dow Global Technologies LLC, METEOR™ EO-RETRO 2000 Catalyst for Ethylene Oxide Production can be easily retrofitted into existing plants and provides high activity and high selectivity to maximize production of EO based on available ethylene.
- Adding toluene methylation (EMTAMSM) process to an existing aromatic complex results in substantial paraxylene production boost at no additional feed costs
- Propane Dehydrogenation (PDH) technology is emerging as major source on purpose propylene and H₂ a bonus co-product. Methanol can also be converted to propylene by the MTPTM process. Propylene can be used to produce acrylic acid and its derivatives.
- Propylene oxide, an important derivative of propylene and attractive intermediate for Polyurethanes, will grow outpaced GDP.

5. Potential of Fertilizer from Sour water Stripper gases (SWSG)

Ammonia, being a valuable chemical, is typically produced from costly naphtha or natural gas route. As per Solomon study 2016, PSU refineries had potential of recovering about 42000 MT/ year of anhydrous ammonia (liquid/ gas) from SWSG. Presently this is burnt in claus burner. SWSG in a SRU requires 3 times the operating capacity as amine acid gas and it does not contribute towards Sulfur production. This ammonia can be converted to produce 0.36 MMTPA of ATS (Ammonium thio Sulphate- (NH₄)₂S₂O₃) using simple SWAATS

Process licensed by GTC. ATS is the most commonly used S-containing fluid fertilizer and is considered safer, more environmentally friendly fertilizer, better than ammonium sulphate as it improves plant utilization of N and reduces loss of N as nitrate to ground water. The process can also be used to Capture SO₂ (from oxidized Claus Tail Gas, sulfuric acid plants, etc.) and also to desulphurise fuel gases to produce ATS using NH₃ and sulphur.

6. Bio Refining

In future, refineries will have to integrate with bio-refining to increase feed diversity and address the problem of global warming. Bio-oil can be produced from various thermo-chemical methods of conversion like fast pyrolysis and hydrothermal treatment. Thermal pyrolysis route has many undesirable attributes as the product is highly unstable with high total acid number (TAN ~200), low heating value (~6560 BTU/lb), high oxygen content (~40%), high water content (20%) & incompatibility with petroleum fractions. The process may be used at small scale for distributed production which will eliminate the high costs involved with the transportation of low density biomass. The pyrolysis oil can be upgraded at a centralized facility.

- In Hydropyrolysis of Biomass, in the presence of hydrogen, liquid with similar to refinery products are formed with no undesirable polynuclear aromatics, olefins, or reactive free radicals. The hydrogen can be sourced from existing hydrogen utilities or produced through renewal power. The hydrogen required for the process can also be obtained from the reforming of the off gas making it a self-sustainable process.

Bio-Crude can be co-processed into Refinery's existing FCC unit to produce Renewable Gasoline and Renewable Diesel.

- Natural lipids contained in feedstocks such as vegetable oils, and fats residues -UCO, fatty acids- can be transformed via hydro-processing technology to Jet fuel and HSD. HVO permits LCO incorporation after low severity desulphurization.
- LanzaTech's Gas Fermentation process has been proven at commercial scale with the conversion of industrial off gases to sustainably produced fuel grade ethanol now a reality. This process is being commercially launched in India by IOC at its Panipat refinery with commissioning slated for early 2020.

7. Gasification

- Shell's economic analysis demonstrates that the integration on SDA-hydrocracking - residue gasification can provide lower capital costs, higher liquid yields and better efficiency in conversion to hydrogen. This option outscores other residue conversion technology and can process virtually all heavy residues and even handle the difficult pitch stream from EB or SHC. The scheme provides Enhanced margin at lower capex compared to DCU plus petcoke gasification
- RIL has developed a low capex catalytic gasification process for gasification of high ash content Indian coal. The process operates at low Temp below 750°C but can still gasify difficult feedstock e.g. petcoke, high ash coal and agri-biomass producing high quality syn gas without char and with significantly lower Capex and Opex. The process has been tested in continuous circulating fluid bed pilot plant needing demonstration. Reliance R&D has developed a simple continuous catalytic pyrolysis process which is capable to produce high quality liquid from as received waste plastic samples.
- Plasma Gasification looks a viable alternative to deal with Refinery hazardous / Non-Hazardous waste. The environmental footprint of Plasma is minimal in comparison to Landfills or Incineration. Plasma gasification of refinery Waste like Refinery Sludge, Waste White Oil from Poly Propylene Unit (PPU), FCC Catalyst and Insulation was carried by MRPL on a pilot plant using electrodes that create Plasma gasification Zone. The Process products like vitrified slag potential to be converted to value added Vitrified tiles was also studied.

8. Hydrogen and Hydro-processing

Haldor Topsoe A/S presented on new developments on Electricity Integration (generate electricity from renewable sources) by

- First stage approach would be substitution of steam driven utilities with power driven
- Hybrid Hydrogen Scheme ATR (Auto thermal reforming) + Electrolysis
 - o Efficiency of water electrolysis doubled
 - o Natural gas consumption decreased by 22%
- Traditionally the yield slate of a hydrocracking unit is optimized by focusing on the selection of the hydrocracking catalyst. Recently Albemarle has explored the region of ultra-low nitrogen

(ULN, <10 ppm Nitrogen slip) operation in the pre-treatment section of hydrocracking units. Haldor Topsoe has recently developed and commercialized novel scale catcher technology High Efficiency Liquid Phase Scale Catcher HELPSc™) and further TK-6001 HySwell™ catalyst which possesses ultra-high HDN activity, leading to higher volume swell, increased endpoint reduction and improved cetane index of product diesel on treating diesel & VGO feeds.

- Linde is Working on Dry reforming of CO₂ (CH₄+CO₂ = 2 CO + 2H₂) and improved efficiency with low steam demand at high pressure

9. Benchmarking

- Solomon Associates presented "Insights into Reducing Steam System Size and Fresh Water Usage".
 - o The most energy efficient refineries in the world have small steam systems
 - o Energy efficient refineries avoid use of condensing steam turbines
 - o Strong relationships exist between steam and fresh water usage. Almost 15% of water consumption is associated with condensing turbines.
- Independent Project Analysis (IPA) presented on "Improving performance through Benchmarking: A Refining and Petrochemical Perspective". Benchmarking gives companies an objective and quantitative assessment of a project's cost and schedule competitiveness against like projects, and provides a measure of project development readiness. IPAs can provide risk analysis and benchmarking services for capital projects and capital project systems based on analysis of industry data collected directly from owner organisations. IPA has developed a set of evaluation and analysis tools specific to the unique nature of the refining and petrochemical projects. As a result, companies receive unmatched insights into the definition and development of their projects. With cost, schedule, and other performance measures from thousands of refining and petrochemical projects (currently more than 6,000) for companies who require quantitative project performance data to determine how best to move forward with capital project investments.

10. Innovations in refineries

- Next generation Hige based Amine Process developed by HPCL R&D employs use of rotating packed bed helps to get rid of the increased

Sulphur processing capacity requirement. The integration of rotating packed bed with existing conventional column reduces the CAPEX and OPEX significantly for new configuration.

- BPCL, Corporate R&D Centre has developed cost effective dewaxing catalyst viz. BHARAT-HiCAT at 1/5th the cost of commercial catalyst. The commercial trial was initiated in May 2017 at LOBS unit in Mumbai Refinery by replacing first bed of dewaxing reactor with a quantity of 10 MT.
- D-80 solvent (flash point more than 800°C), primarily an imported product in our country, is a specialized low odour solvent having ultra-low aromatic content (< 0.2 wt%) and very narrow boiling range 195-250°C). The solvent finds numerous and ever growing uses in various applications such as metal working fluid, printing Ink, household mosquito/insecticide repellents, aerosols, etc. BPCL Mumbai Refinery has successfully produced D-80 in LOBS plant using narrow cut Kerosene as a feed from Hydrocracker unit.
- The presence of carbon dioxide (CO₂), hydrogen sulphide (H₂S) and free water can cause corrosion problems in oil and gas pipelines. To mitigate the problem, the Corrosion Inhibitor (CI) is injected into pipelines at ppm level dosage. HPCL has developed HPCORRMIT - A Novel Cost Effective Inhibitor for LPG Pipelines at approximately 50% of imported product price.
- Fanless Jet type cooling tower is a new approach, where air current is produced by Jet Effect. Jet nozzles are placed at the top of the tower. When water comes out of nozzles, it pushes surrounding air downwards by Jet effect. This air is drawn out of tower from the bottom, through side eliminators (louvers).

11. Robotics and Advanced Controls

- Online Robotic Sludge removal from API Forebays where shutdown could not be taken: Sludge is processed via Centrifuge, to minimize Oil content (2-4%) and Sludge handling volume by >90%. Dry cake thus generated is sent for bio-remediation in time span of 5-6 months.
- Electrical Control System by Emerson in Kochi Refinery Captive power plant has been designed and built with the feature to maintain the grid PF and Grid MW automatically at the operator set value. This module in ECS can be effectively used to avoid penalties by maintaining good power factor and to maintain the grid import at the desired values

- BPCL MR has developed and deployed the business process which is a Simulation based Process Control (RTO) for Performance Monitoring and Emission Control in SRU system.
- Advances in Digital Technologies such as Artificial Intelligence, Machine learning and the ability to manage large data sets in the cloud provide a unique opportunity to transform the refining and petrochemical industry. This digital transformation can facilitate operational excellence to dramatically increase safety, reliability and profitability and help them tackle critical problems such as unplanned downtime, underperforming assets and human capital challenges for example knowledge gaps and operational excellence. Such a transformation

requires changes to the people and organisation, the work process and practices, the physical assets themselves as well as the technology, tools and systems. These solutions are providing industrial users with round the clock monitoring of plant data and rigorous simulations, and on-going operational health checks and recommendations to close performance gaps and enabling users to improve operational excellence.

- IIoT based wireless sensors can be deployed for non-critical process loops. This enables infrastructure for adding wireless instruments, Reliability related initiatives using web based monitoring, advanced analytics and machine learning.

CHT INKS MoU WITH AMCHAM INDIA

An MoU was signed between Centre for High Technology and American Chamber of Commerce in India (AMCHAM) on May 8, 2018 for cooperation in areas of technology, operations and access. The MoU would facilitate enhanced cooperation and specific studies for promoting technical exchange and absorption of technology. The MoU entail working across the entire range of downstream hydrocarbons, biofuels, petrochemicals, as well as digital control, internet of things and Artificial Intelligence (AI) in the petroleum sector. The MoU also bring out specific studies identified at present that could be pursued.



The event took place in the presence of Mr. Sandeep Poundrik, Joint Secretary (Refineries), Ministry of Petroleum and Natural Gas, Govt. of India; Mr. Robert Garverick, Minister Counsellor for Economic, Environmental, Science and Technology affairs, U.S. Embassy; Mr. Thomas Hardy, Director, Congressional Affairs and Public Relations, USTDA; Ms. Verinda Fike, Regional Director, South and Southeast Asia, USTDA; Mr. Todd Abrajano, Senior Advisor to the Director, USTDA; Ms. Aileen Nandi, Deputy Minister Counsellor for Commercial Affairs, U.S. Embassy; Ms. Mehnaz Ansari, Representative, India, South and Southeast Asia, USTDA; Mr. Ray Sudweeks, First Secretary for Energy Affairs, U.S. Embassy; Mr. Pawan Kumar, Under Secretary (Refineries), Ministry of Petroleum and Natural Gas; Mr. B.V. Rama Gopal, Director (Refineries), Indian Oil Corporation Ltd.; Ms. Madhvi Kataria, Deputy Director General, AMCHAM and Mr. Debasish Roy, Program Director, AMCHAM.

The MoU was signed by Mr. Brijesh Kumar, Executive Director, CHT and Ms. Ranjana Khanna, Director General CEO, AMCHAM

36th Meeting of the Governing Council of CHT

The 36th Meeting of the Governing Council (GC) of CHT was held under the Chairmanship of Dr. M.M. Kutty, Secretary, MoP&NG on 30th July, 2018 in the Conference Hall, MoP&NG, Shastri Bhawan, New Delhi.

The meeting was attended by GC members from MoP&NG, viz., Principal Advisor, AS & FA, JS (R), JS (M) and Secretary (I/c), OADB; CMD, HPCL; Director (Refineries) of IOCL, BPCL, HPCL; CMD, EIL; MD, MRPL; Director(T), NRL; CGM(T), CPCL; Director (BD), GAIL; CEO, HMEL and Chief Scientist, CSIR-IIP.

Shri Brijesh Kumar, ED, CHT made a detailed presentation on the progress and status of various activities / initiatives taken-up by CHT since the last GC meeting. The presentation covered the Refinery Performance

Improvement Programme of PSU refineries; Results of the Performance Benchmarking Study of PSU refineries carried out through Solomon Associates for 2016 cycle; Performance Gap bridging for Specific Energy Consumption and Performance Audit of refineries; Supply of Power from the Grid to PSU Refineries; Activities of Scientific Advisory Committee on Hydrocarbons of MoP&NG; Status of on-going R&D projects funded by CHT; New R&D projects to be funded by CHT, etc. ED, CHT also highlighted the new initiatives taken-up by CHT.

GC was also briefed about the other activities of CHT in the areas of Activity Committee Meetings, Refinery Performance Improvement, OGCF & Innovation Awards, Swachhata Ranking for PSU Refineries, Technical Support given by CHT to MoP&NG, etc.

Scientific Advisory Committee Meeting

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: 82nd meeting on 11 September 2018 and 83rd meeting on 17 November,

2018. SAC had detailed review of the on-going projects and new project proposals.

All work related to Biofuels has been transferred from MNRE to MoP&NG and are being monitored by CHT/ SAC.

As per MoP&NG directive, approval of projects under HCF follow the same route as for CHT / OADB funded projects and are being recommended / monitored by SAC.

Executive Committee (EC) Meetings of CHT

The 25th Meeting of the Executive Committee of CHT was held under the Chairmanship of Shri Sandeep Poundrik, Joint Secretary (R), MoP&NG on 12th June 2018 at SCOPE Convention Centre, New Delhi. The meeting was attended by Director (Refineries) of IOCL, BPCL, HPCL; MDs of CPCL, MRPL & NRL; Director (T), EIL; ED (R&D), GAIL; Director-CSIR-IIP; FA&CAO, OADB. During the meeting, detailed review was held on the progress and status of major activities of CHT including Energy Efficiency Improvement Study, Performance Improvement Programme of PSU refineries, New Studies / Initiatives taken by CHT, New & on-going R&D projects etc.

The 26th Meeting of the Executive Committee (EC) of CHT was held under the chairmanship of Shri Sandeep Poundrik, Joint Secretary (R), MoP&NG on 3rd January, 2019 at MoP&NG. The meeting was attended by Director (Refineries) of IOCL, BPCL, HPCL, MD of CPCL,

MRPL, NRL, Dy. Chief F&AO of OADB and senior officials from EIL and GAIL. During the meeting, detailed review was held on the progress and status of major activities of CHT including Energy Efficiency Improvement Study and Performance Audit of 15 PSU Refineries, Performance Improvement Programme of 9 PSU Refineries, Development of Water Consumption Norms and Reduction of Water Footprint for 13 PSU Refineries, Refinery Performance Improvement Programme through Shell at MRPL, Performance Benchmarking Study of PSU refineries through Solomon Associates for 2018 Cycle, Performance Benchmarking Study for Pipelines - 2018 Cycle, Study on Reduction of Steam Network at Refineries, Feasibility Study for Production of Ethanol from Off-gases, Reference Fuel: Make in India and Lab Correlation Programme. EC also reviewed the R&D Projects funded by CHT and RBE-2018-19 and BE 2019-20.

Performance Review of Refineries by Working Group on Refineries (WGM)

The data on Physical, Financial and Project parameters for all the PSU Refineries is collected every month and the consolidated information covering Actual performance vis-à-vis Targets along with reasons for deviation is presented during the review meeting chaired by JS R, MoP&NG to enable refineries to take corrective actions, if any.

The 18th Working Group Meeting was held under the Chairmanship of Shri Sandeep Poundrik, Joint Secretary (R), MoP&NG on 12th June 2018 at SCOPE Convention Centre, New Delhi. The meeting was attended by Director (Refineries) of IOCL, BPCL, HPCL; MDs of CPCL, MRPL & NRL; Director (T), EIL; ED (R&D), GAIL, Manager PTC. The issues pertaining to maximisation of grid power intake at PSU refineries, Reduction of sulphur in Kerosene, feasibility study for ethanol production from PSA off gases, reference fuel Review of refinery performance,

catalyst manufacturing unit in India, substitute of DMDS, taxation issues in sharing of intermediate products, shutdown schedule of refineries for 2018-19 and 2019-20 were deliberated.

19th Working Group Meeting to review performance of refineries was held under the Chairmanship of Shri Sandeep Poundrik, Joint Secretary (R), MoP&NG on 20th August 2018 at MoP&NG, New Delhi. The meeting was attended by Director (Refineries) of IOCL, BPCL, HPCL; MDs of CPCL, MRPL & NRL; Director (T), EIL and Executives from PTC. During the proceedings, grid power intake, reduction of sulphur in kerosene, energy roadmap (MBN) in PSU refineries, strategy for implementation of BS-VI fuel supply, promotion of indigenous technologies, losses due to dual tax regime, feasibility study for ethanol production from refinery off gases were discussed.

All India Customer Meet BHEL GE Gas Turbine Services Private Limited, Hyderabad



A customer conference was arranged by CHT along with BGGTS on 12-13 July 2018 at Hyderabad where Refineries presented their best practices and discussed saving opportunities. Salient take aways of this meet are as follows wherein BGGTS offered help:

1. Remote Service Centre & Reliability improvement

The global benchmark of fleet reliability for the Gas Turbine is close to 98-99% globally. In order to further improve the reliability close to 100%, BGGTS is establishing a Remote Service center to provide customer support on 24x7 hours basis

and developing a Customer Service Portal for customer issue management. This is targeted at troubleshooting, trip recovery, Reliability & Availability improvement, continuous performance monitoring and advisory to optimize performance including inventory management.

2. Gas Turbine Performance enhancement:

Continuous enhancements are taking place to improve capacity, heat rate and steam generation in GT Units for Frame 5, Frame, 6B, Frame 9E GT's. A benefit up to 14% in Output and 5% in Heat Rate can be achieved. In addition, steam generation can also be increased.

3. Fuel Flexibility in Gas Turbine:

The Gas Turbine has capability to burn more than 50+ fuels including ash bearing fuels, refinery gases, propane, syngas, residues and also ethane. Some refineries have taken actions to convert the gas turbine to alternate cheaper fuels.

4. Auxiliary system improvement and best practices:

Refineries have implemented several improvement measures in auxiliaries, such as IGV actuator relocation, bleed valve relocation, introduction of IMO pump, synthetic filter etc.

Activity Committee Meetings

1. Inspection Practices of Refineries, Oil & Gas Pipelines

Venue : IOCL-Mathura Refinery.
Duration : 15-16 March, 2018
Participants : 65 nos. from IOCL, BPCL, HPCL, CPCL, HMEL, IOCL Pipelines, NRL, EOL, BORL, OMPL, IOCL-R&D / IOCL-M&I, OISD, EIL & Vendors
Chief Guest : Shri Utpal Deka, Director, CHT
Convener : Shri A.T Mandal, GM (ES&IP), Mathura Refinery

Best Practices and Takeaways

1. Inspection of Small Bore Piping by adopting profile Radiography technique.
2. Breakthrough solution for Inspection of Flare, Stacks, Chimneys & tall structures by Drone Inspection.
3. Adopting RBI (Risk based Inspection) program
4. CUPS technology for Inspection of Corrosion Under Pipe support
5. Inspection of Tube to Sub Header weld joint along with pigtail in Reformer Furnace for carburization.
6. Improvement in Reliability of Waste Heat Boilers in SRU by adopting Square design ferrules.
7. ARTIS (Automated Reformer Tube Inspection System) for measurement of Ultrasonic Attenuation, Diametric Growth & Remaining life Assessment of reformer Tubes.
8. Use of sealant around Tank periphery to mitigate corrosion of annular plate.
9. SRUT (Short range Ultrasonic Testing) - new Technology for Inspection of Annular Plate of Tanks.
10. Methods & techniques to ensure moisture barrier between metal surface & LRB insulation
11. Innovative solution of providing L Angle around tank periphery on extended portion of annular plate to prevent water ingress & soil side corrosion.
12. PHONON Technology-Advanced NDT for inspection of cross country pipelines including buried pipelines)
13. PREDICT CRUDE software for evaluation of corrosion rates for high acid crude processing.
14. DETECT Technology - Advanced NDT for pipeline corrosion Monitoring.
15. Automated Ultrasonic Scanning of mounded bullets.

Points to Ponder/ Problem Areas

1. Corrosion of piping at culverts, road crossings
2. Leak identification of underground piping without excavation
3. Corrosion under Insulation
4. Inspection of studded tubes at furnace convection zone



Shri L.W. Khongwir, Executive Director, IOCL-Mathura Refinery inaugurating the two day Activity Committee Meeting on Inspection Practices of Refineries, Oil & Gas Pipelines at Mathura Refinery on 15th March 2018.

2. Delayed Coker unit

Venue : CPCL Chennai
Duration : 27-28 March 2018
Participants : 51 nos. from 13 Refineries, R&D Centres & CSIR along with domain experts like EIL, CB&I, M/s Daily Thermetrics and HTRI
Chief Guest : Sh. S.N. Pandey, Managing Director, CPCL, Chennai
Convener : Shri Ratan Newar, Vice President, BORL, Bina

Best Practices and Takeaways

1. Cleaning of maze sump with slurry pump to avoid manual cleaning.
2. Provision of LCGO flushing in coke drum Overhead line to avoid frequent stuck up problem.
3. Main fractionator top wash zone, water washing.
4. Ultrasonic flowmeter in heater pass flow.

5. Provision of BFW in Heater Cross Over to reduce coke deposit in Heater Coils.
6. Purging of Fractionator MOV's with blocking steam after diversion
7. Routing of Blowdown gas to fractionator condenser to eliminate flare loss during switch over.
8. Provision of Shed trays in fractionator to restrict entrainment of coke fines.
9. Increasing steam line size of feed lines Velan Valves for better flushing
10. PM Schedule of free fall arrestor for failure elimination.

Points to Ponder

1. High temperature difference between furnace outlet to coke drum inlet due to long transfer line.
2. Optimization of column top temperature to prevent dew point corrosion at MF top Vs Coker naphtha generation.
3. Oil carry over in sour water in blow down vessel.
4. HCGO MCR variation with same HCGO wash rate.



Shri S.N. Pandey, CMD, CPCL addressing during Activity Committee Meeting on Delayed Coking Unit

3. 12th ACM on Hydro-Processing Hydrogen Generation

Venue : HPCL, Visakhapatnam

Duration : 16-18 April, 2018

Participants : 104 participants from various refineries, EIL, R&D wings, CSIR-IIP and Private Companies viz., Shell, Axens, HaldorTopsoe, Albemarle, Sud-chemie, ART and Johnson Matthey

Chief Guest : Shri Nandakumar, CGM & Convener Petrochemicals and R&D), MRPL

Best Practices and Takeaways

1. Utilization of specialized catalyst loading and unloading technologies to reduce the time of turn around.
2. Advanced reactor internals for enhancing the mixing & Catalyst wetting rate, enabling increase in the volume availability for additional catalyst loading.
3. Parallel reforming such as HTER, utilizing the heat energy at the reformer outlet stream to provide the heat to parallel feed stream in HTER reactor to increase the capacity of Hydrogen Generation Unit with energy saving.
4. Advances in Hydrogen plant zinc oxide catalyst like Cu promoted Zinc oxide catalyst to reduce the sulphur levels of hydrogen unit feed to minimum, thereby increasing the life of reforming catalyst.
5. Laser Eddy current Outside LEO) scanning to assess the remaining life of Reformer tubes.
6. APC implementation for hydrogen header pressure management

Best Operational Practices

1. Chemical Injection in feed to reduce the reactor first bed pressure drop to prolong the operation of plant.
2. Liquid nitrogen injection at reactor inlet, to cool the catalyst bed during turn around to reduce the time of final cooling. (DHDT, HMEL)
3. Installation of Thermal sleeve in quench nozzles to reduce the effect of sudden temperature drop due to quench (BORL).
4. Using specialized technology like carbo dump technology) to unload catalyst in a safer mode in reduced time period.
5. Merging of 2 reactor beds to increase the hydro treating catalyst volume (BPCL-KR).
6. APH cleaning with dry ice.

Points to Ponder / Issues frequently faced

1. CFE leak across breech lock exchangers
2. Overhead corrosion in DHDS/DHDT strippers due to presence of chloride.
3. Fouling of combined feed exchangers. Frequent backwash in auto backwash filters of DHDT/HCU.
4. Frequent backwash in auto backwash filters of DHDT/HCU.
5. Thinning of amine absorber and inlet lines to amine absorber.
6. Reactor thermocouple leak and failures.
7. Fouling, scaling and choking of naphtha fired reformer burners.



Shri Nandakumar, CGM (Petrochemicals and R&D), MRPL addressing the participants of the 12th ACM on Hydro-processing & Hydrogen Generation at HPCL Visakh

4. Power Generation, Distribution and Maintenance of electrical System

Venue : Numaligarh Refinery Limited, Golaghat

Duration : 11 – 12 June, 2018

Participants : 61 nos. from different Refineries and Petrochemicals along with domain experts and renowned vendors – M/s Schneider Electric, M/s Rockwell Automation, M/s Schweitzer Engineering Laboratories Pvt. Ltd. Also BEE & EIL experts shared their views on the topic

Convener : Shri Gopal Sarma, Chief Technical General Manager (Operations), NRL

Best Practices and Takeaways

1. Use of RCM (Reliability Centered Maintenance) software and asset integration management system to improve reliability.
2. Usages of online thermal imaging for switchgear.
3. Steam header pressure control & Oxygen optimization with the help of APC.
4. Dry ice blasting of HRSG tubes.
5. Wireless Fire siren system.
6. Use of QR coding for electrical asset management.
7. E-LOTO system implementation.
8. ECS based load shedding at motor level.
9. Provision for humidity sensor in Generator air cooler air path for identification of Generator cooler leak.
10. Earth pit continuous watering system

11. Arc resistant switchgear.

Points to Ponder

1. GT tripping on liquid fuel during auto change over from gas to liquid due to flow divider frequent jamming issue.
2. Lightning protection for floating roof tanks needs some more focus to find out the best solution
3. To locate underground charged cable when they are in bunch
4. Induction voltage issue in central circuit especially in long length control cables.



Shri Bhaskar Phukan, Director (T), NRL addressing the participants of the ACM on Power Generation, Distribution and Maintenance of Electrical System at NRL



Participants of the ACM on Power Generation, Distribution and Maintenance of Electrical System at NRL

5. 1st Activity Committee Meet on 'Quality Control Lab Practices'

Venue : Hotel Ocean Pearl, Mangalore.

Duration : 14-15 June, 2018

Participants : 67 nos. from Refineries of IOCL, BPCL, HPCL, MRPL, CPCL, HMEL, NRL, Nayara Energy (formerly EOL),

BORL and OMPL, from Marketing QC of IOCL, BPCL, HPCL, R&D Centers of IOCL, HPCL, BPCL, CSIR-IIP, EIL and also from BIS and SGS Lab

Chief Guest: Shri Brijesh Kumar, Executive Director, CHT

Convener : Shri P. D. Dusane, GM(QC), IOCL Mktg. HO

Best Practices and Takeaways

1. Certified Reference material (CRM) & Standard Reference Material (SRM)
 - Use of Make in India CRM developed as per ISO 17034 by PSU Labs and Performance verification of Instrument with CRM / SRM before testing of critical samples.
2. Maintenance of Lab Equipment
 - Centralized AMC for cost optimization and open tendering for proprietary CAMC services by exploring new vendors for instruments.
 - Procurement of auto instruments with 2 years comprehensive warranty plus 5 to 6 years CAMC including supply of CRMs.
 - Providing closed space/controlled environmental conditions for EDXRF & WDXRF for better measurement precision in Ultra low Sulphur detection.
3. System Improvement
 - Lab instruments integration with LIMS and maximum usage of LIMS with other refinery systems.
 - Periodic Operational Qualification (OQ) certification by OEM to ensure measurement performance and health of instruments.
4. Ultra-low Sulphur Testing
 - Use of 2 separate techniques / methods for testing & certification before release of product ex Refinery to avoid product quality failure.
5. Other best practices
 - Use of FTIR (Fourier Transform Infrared Spectros copy) against standard methods for rundown samples.
 - Correlation of engine RON & GC RON for better plant performance
 - Quick determination of HSD distillation using Micro Distillation test method D 7345.
 - Calibration and use of Supreme 8000 EDXRF (Latest technology instrument) in air mode, saving of costly helium gas.

Points to Ponder/ Problem Areas

1. Testing related Issues
 - Alternate test method for cetane number (CN) in BIS spec. for HSD.
 - Non - availability of right CRMs
 - Price escalation in spares & consumables also for AMC & services) due to lack of information & coordination between refineries.
 - MFA (Multi-Functional Additives): composition analysis and its impact on properties of MS
 - For BS VI UL "S" detection in addition to D 5453, one more suitable user friendly method needs to be finalized.
2. System Improvement
 - Electronic note book for data entry
 - Digitalization of certification to Regulatory bodies.
3. Other Issues
 - Closed loop liquid sample transfer for RON, density, GC analysis etc. in Labs
 - Exploring suitable plug material, its specification and parameter to track & cut Interface of product & plug material for Pipeline transportation in BS VI scenario



Shri Brijesh Kumar, Executive Director, CHT inaugurating the 1st Activity Committee Meet on "QC Lab Practices" at MRPL



Participants of the 1st Activity Committee Meet on "QC Lab Practices" at MRPL

6. 18th ACM on Advanced Process Control, Optimization & Blending

Venue : Golden Retreat, City Centre, Haldia

Duration : 23-24 July 2018

Participants : 87 nos. from IOCL, BPCL, HPCL, CPCL, MRPL, NRL, EIL, HMEL, BORL, Nayara Energy, leading vendors in APC field (Aspen Tech, Honeywell, Emerson, Aveva) and service providers (Helium Consulting, Equinox, HTRI) participated in the Meet.

Invited Experts: Shri Philip Bhaskar, Vice President Experts (TS), Nayara Energy, Shri V. Suresh, GM Advanced Control & Analytics, BPCL, Mumbai.

Convener : Shri P.N.K. Mohanty, Chief General Manager (TS), IOCL, Haldia Refinery

Best Practices & Takeaways

1. Base controllers tuning within one month of new process plant commissioning concept needs to be followed by refineries. Subsequently within the next one year APC project commissioning activity shall be completed.
2. Task force concept (Project Engineer/ APC Engineer/Process Engineer) is one of the success methods for APC project implementation successfully. This way, refineries should target to reduce the implementation time of the projects to between 4 – 6 months instead of present 9 – 11 months.
3. PID loop tuning software from DCS vendors / APC licensors are good for initial gain values but complicated loops needs manual intervention from the control engineer for tuning after the initial values.
4. Standardization of KPIs and benefit audit needs to be done. Presently, IOCL refineries are conducting internal audit once in 6 months by turning off the controllers to collect base data. BPCL is working on a method to arrive at the same on daily basis
5. Blending SOPs are to be standardized like frequency of NIR spectrum, check-list for improving on time of the analyzer etc. and even the start/stop of blenders especially for the similar vendor license like Honeywell, Schneider etc.
6. Continuous bias update of inferential is necessary for better prediction. Automatic bias updation using integration of LIMS with PPL may help it.
7. Use of Analytics is good for pooling of data to make model out of database to predict failure of some equipment (e.g. compressor)

or process (process yield or specs going down after particular time, Ex. BS&W in FCCU bottoms) after particular period. Analytics in process engineering will help in analysing data to know root cause of the disturbances

Points to ponder/Area of concern

1. Cyber security issues while keeping APC option on network for online support or modelling.
2. Reasons for controller getting off suddenly without any message or prior warning are to be known.
3. Difficulties in maintaining, LPG weathering, DCU bottom temperature control and Hydrogen off gas flow control.
4. APC software upgrade (for discontinuation of all old version support) by the vendor is a concern as there is an investment to be made for the same by the refinery.
5. If tendering of the upgrade (due to nil support by the vendor) is done then if a different licensor gets selected, then all the units are required to be re-implemented again. This involves time and cost.
6. Few refineries continue with old version and do not depend on the vendor. This involves huge specialized manpower identified for the APC team (similar to IS etc.)



Group photograph of the participants of the 18th ACM on Advanced Process Control, Optimization & Blending at Haldia



A view of the proceedings of the 18th ACM on Advanced Process Control, Optimization & Blending held at Haldia

7. Environment and Water Management

Venue : IOCL, Digboi Refinery
Duration : 4 - 5 October' 2018
Participants : 67 nos. from the refineries, R&D and domain experts like CSIR – IIP, EIL, XYLEM water Solutions, Grasim Industries Ltd, SUEZ water Technologies & Solutions and The Energy Resources Institute.
Convener : Shri C. Abhiram, Ex-General Manager (HSE), IOC-Refinery Headquarters

Best Practices and Takeaways

1. Online robotic cleaning of sludge removal from API separator
2. Ozone treatment for COD reduction & color improvement
3. Membrane Bio Reactor (MBR) for high degree of biomass/solids control for getting consistently high effluent quality
4. Technological opportunities for Carbon Di-oxide capturing and utilization
5. Bamboo-based bio-ethanol plant technology i.e. conversion of lingo-cellulosic bamboo bio-mass to ethanol. Objective is 10% ethanol blending in motor spirit to promote use of Green Fuel.
6. 100 KWp Floating Solar Power System on Fresh Water Reservoir at Panipat Naphtha Cracker which is FIRST OF IT'S KIND IN INDIAN OIL

Points to Ponder

- 1) Treatment of excess ammonical nitrogen in waste water
- 2) Remote calibration of online air quality monitoring system implementation



Shri C. Abhiram, Ex-General Manager, HSE, IOCL, addressing the delegates during ACM on Environment & Water Management at IOCL, Digboi



Group photograph of the participants of ACM on Environment & Water Management at IOCL, Digboi

8. Activity Committee Meeting on 'Rotary Equipment'

Venue : BPCL-Kochi Refinery
Duration : 30-31 October, 2018
Participants : 50 nos. of delegates from IOCL, BPCL- KR, BPCL-MR, HPCL-MR, HPCL-VR, GAIL, CPCL, HMEL, NRL, NEL, OMPL, IOCL-R&D/IOCL-M&I, EIL & Vendors
Chief Guest : Shri Prasad K. Panicker, ED(I/C), BPCL-KR
Convener : Shri Babu Joseph, CGM Maint.), BPCL-KR

Best Practices and Takeaways

1. ODR, MCSA, MAT & RFID being commissioned as new reliability improvement initiatives for Rotary Equipment
2. Air coolers to replace Water coolers
3. Comprehensive Root Cause Failure Analysis using both mechanical and metallurgical analysis. Change of metallurgy reduces cavitation issues.
4. Conversion of single seal to double seal as per OISD requirement
5. Use of synthetic oil for barrier fluid in place of mineral oil which gets degraded at high temperature. Standardisation of lubricant to reduce inventory.
6. Providing temperature strip on critical bearing housing to monitor temperature of lube oil on regular basis.
7. Daily walk through Inspection (WTI) by plant maintenance engineer for reporting abnormalities related to deviation to critical reliability variables (CRVs) & equipment operating envelope.
8. "Not Ok" state of vibration probes taken into tripping logic to reduce the damage level.

- Interchangeability exercised for seal spares, coupling, pump spares, etc. & indents of new spares are made considering this to reduce cost.

Points to Ponder/ Problem Areas

- Repetitive Dry Gas Failure in CCR Net Gas Compressor supplied by BHEL due to Machining quality issue
- Frequent valve failure along with cylinder liner & piston failure in CCR H₂ rich gas compressor due to green oil formation
- Fractionator bottom pump of DCU (Ebara make) cavitates on running after little time, not able to run continuously
- Reliability of oil mist lubrication
- Identification of Critical pumps where mechanical seal vapor pressure range is low for seal plan modification to API plan 53-B to reduce the premature failure of seal
- Poor quality of cooling water leading to cooler chokage
- Frequent liquid ingress in the suction of reciprocating compressors in lube units
- Frequent seal & bearings failures in column bottom



Shri Prasad K. Panicker, ED I/C, BPCL, Kochi addressing the participants of the ACM on Rotary equipment held at BPCL, Kochi Refinery



Participants of the ACM on Rotary Equipment held at BPCL, Kochi Refinery

9. 45th ACM on Fuel & Loss and Energy Optimisation

- Venue** : Acres Club, Chembur, Mumbai
- Duration** : 15-16 November 2018
- Delegates** : A total of 85 delegates from Refineries as well as from 16 reputed consultants and vendors like KBC, BGGTS, Siemens, International Copper Association, Xicon, GTC, Alfa Laval, Armec, Thermax, Armstrong, Forbes Marshal, Mechwell, EIL, CII, BEE and Green Wave attended the meet.
- Chief Guest** : Shri C.J. Iyer, ED (I/C), BPCL, Mumbai
- Convenor** : Shri Chacko M. Jose, General Manager (TS), BPCL, Mumbai Refinery

Best Practices and Takeaways:

- In India, IE2 class of motors as minimum standard have become mandatory from 1.1.2018. High efficiency motors (IE3 & IE4) have lower slip and tend to run at slightly higher rpm and hence may consume more power unless the pump impeller is trimmed to restore flow and head.
- Plate type heat exchangers have very low Hot end approach temperatures (down to 3 deg C) and have higher overall heat transfer coefficient and have very compact design. Cleaning can be done either chemically or after dismantling the panels on all the four sides. The time required for cleaning is also lower (1-3 days). It can be used for fouling service and also in Hydroprocessing units upto moderate pressures (42 bar) as replacement for CFE exchangers.
- Jet cooling Towers have no fans to force the Air flow and hence save huge amount of electricity. There are no fills for creating the contact film for mass transfer between water and air. The Towers are of modular design and can be easily resited. The maintenance is very easy as one out of two spray headers can be isolated and taken for cleaning / maintenance without interrupting the cooling tower operation.
- Divided wall column can reduce the number of columns for successive distillation. Three cut separation is possible in one column unlike two columns in conventional design thereby eliminating one condenser and one reboiler. The purity of middle cut is very high in DWC design
- Monitoring and optimisation software by BGGTS can be customised to the power plant for getting best energy performance in CPP.
- KBC's optimiser (Visual Mesa) can be used for optimising the utilities energy consumption in the Refinery.

7. CFD modelling studies in Combustion Air duct and also the Flue gas duct to reduce pressure drop help achieve reduction in Power load of the Fans. Also CFD modelling can help in designing combustion air header to achieve even distribution of air to burners.
8. Thermodynamic steam traps present in large numbers in the Refineries malfunction because of dirt / scale in the line (upstream) and also because of high superheat or cooling by Rain water. For saturated service, the ideal selection would be inverted bucket trap which does not let any steam to pass, allows removal of non-condensable in the system, gives zero leak for extended period of time. Advantages of IB traps (compact) was presented by Armstrong
9. Greenwave made a presentation on HVAC additive which would keep the internal heat transfer area clean and thereby help in reducing the energy consumed by HVAC. Benefit to the tune of 17% in electricity consumption have been reported.
10. Some case studies etc. Some of the key take aways from Refinery presentations is as under:
 1. Use of chilled water for decreasing the size of the vacuum pump and for increasing the Vacuum Pump (LRVP) Capacity in VDU. Chilled water is to be supplied through VAM with recovered heat from HSD rundown using plate type heat exchanger
 2. Use of online chemical cleaning to reduce Arch Temperature and to boost up through Put in CDU, VDU
 3. Use of Thermo-compressors to reduce LP steam venting.
 4. APC utilisation for energy optimisation
 5. Graphics page for monitoring heater efficiency and also specific steam consumption (HPC-V)
 6. Use of telescopic insulation
 7. Utilisation of Oxygen rich Air in Boilers
 8. Incorporation of energy efficiency in Refineries at Design stage itself.
 9. Real time MBN calculation for corrective action
 10. Setting Specific energy Targets for individual units and monitoring on daily basis.
 11. Dry ice blasting of HRSG & Boiler tubes
 12. Energy champion initiative at BPCL-Mumbai & Idea Mela at HPC-M

Points to Ponder :

1. Unaccounted losses quantification
2. Replacement of compressor drive in a short shutdown
3. Flare monitoring efficiency
4. Petcoke quantification
5. Reduction of EII
6. Poor condensate recovery



Shri C.J.Iyer, ED (I/C), BPCL, Mumbai Refinery addressing the Activity Committee meeting on Fuel & Loss and Energy Optimization



Participants of the ACM on Fuel & Loss and Energy Optimization held at Acres Club, Chembur, Mumbai

10. 36th ACM on Oil & Gas Pipelines and SBM

- Venue** : HPCL, Hyderabad
- Duration** : 23-24 January, 2019
- Participants** : 80 nos. of delegates from IOCL, BPCL-KR, BPCL-MR, HPCL-MR, HPCL-VR, ONGC, OIL, GAIL, CPCL, HMEL, NRL, NEL, MRPL, IOCL-R&D, EIL, OISD & Vendors
- Chief Guest** : Shri S.M. Kulkarni, Deputy Chief Controller of Explosives, Secunderabad
- Convener** : Shri K. Subramanian, GM-Pipeline Projects, HPCL-Mumbai

Best Practices and Takeaways

1. Use of geospatial satellite data in Pipeline Industry and Space based asset integrity management. National Remote Sensing Centre-ISRO, can play a vital role in identification of better route (reconnaissance survey) of new pipelines, evaluation of crop compensation, maintaining authentic route data for legal aspects, soil investigation etc.
2. Pipeline Operations & Optimisation - Installation of transmix separator plant at terminal point of cross-country multiproduct pipeline with goal to eliminate requirement of PCK as plug between MS & HSD, lesser batch length & better interface management.
3. Adopting a broad approach for issues pertaining to ROU/ close interaction with villagers for land compensation
4. Use of foam pigs for transportation of multiple products in cross-country product pipeline
5. Skin effect heat tracing system for transportation of Heavy Liquids
6. GIS based monitoring and controlling of ROW related issue
7. Solar Based SV stations
8. Standardisation of PLC programming
9. HVDC Mitigation studies by Computer simulation methods
10. Predictive maintenance practices/ identifying early warning signals through ultrasound techniques, thereby improving reliability in operation
11. Stopkit: Use as a sealing agent in case of an emergency
12. Coating /CP Survey real time using XLI
13. Intelligent pigging of 48" offshore pipeline connecting one SPM to shore tank farm carried out by bidirectional method
14. CI Injection at offshore line from Tanker to avoid corrosion
15. Integrity Management - Installation of PIDWs (Pipeline Intrusion Detection & Warning system) along ROW to capture signals in case of intrusion.
16. Magnetic ball running for detection of pipeline integrity to determine internal corrosion
17. Close monitoring of CP parameters along the pipeline and immediate attention of the deviation in PSP value

18. Introduction of AP 1173 safety management system for P/L
19. Installation of SSD (Solid State Decouples) under the HT line to avoid AC interference.

Ponts to Ponder/Problem Areas

1. No Apex Level Coordination between power transmission / pipelines / railway / telecom for e.g. pipeline representation in "Power, Telecom Coordination Committee" under CEA
2. Higher Transmix generation (Interface) in Multi-product pipelines
3. Wax handling at Pig receiving barrel, almost solidifies during removal of received pig, especially in upper Assam region where crude oil is high wax content and heavy in Nature
4. Power supply categorisation/ open access power trading - as to how the state discoms treat pipeline industry is highly varied and no consistency. Work is needed in coordinated manner with MOP/CEA/CERA
5. Hydrotesting of non piggable pipelines using sea water and subsequent handling of oil water mixture to drain water & treat in ETPs etc.
6. Problem in repairing concrete insulation damage of offshore line as it enters onshore (at beach).
7. UHF signal dark zones across distant tanks
8. ROW farmer developmental & Encroachment issues
9. Integrity management of very old cross-country crude as well as product pipelines, especially in areas of rapid urbanisation



Shri S.M. Kulkarni, Deputy Chief Controller of Explosives lighting the ceremonial lamp to inaugurate 36th ACM on Oil & Gas pipelines and SBM at Hyderabad



Participants of the 36th ACM on Oil & Gas pipelines and SBM at Hyderabad

- 3) Production of Ammonium Thiosulfate from SWS Gas
- 4) Oxygen-enrichment in SRU with waste nitrogen stream

Points to Ponder

- 1) RCSV/SCSV erosion issue
- 2) Bottom circuit exchanger (MF column) fouling issue
- 3) HC carryover in Acid Gas & Sour Water Gas from upstream units
- 4) Heat Stable salts (HSS) removal system implementation in Amine Regeneration Unit

11. Fluidised Catalytic Cracking & Sulphur Recovery Units

Venue : IOCL, Gujarat Refinery
Duration : 28 - 29 January' 2019
Participants : 98 nos. delegates from Refineries, R&D Centers of IOC, BPC & HPC, EIL, IIP, Technology Providers / Catalyst Suppliers e.g. Grace, Honeywell UOP, Technip FMC, BASF, KBR, Johnson Matthey, GTC, DOW, SudChemie, Axens, Worly Parsons, Albemarle, CIRCOR
Convener : Shri Debasish Chakraborty, CGM(HSE), IOCL Gujarat Refinery

Best Practices and Takeaways

Fluidised Catalytic Cracking Unit

1. Stripper packing technology (structural packing) for better catalyst flux rates.
2. Special customized isolation valve between reactor & main fractionator for safety and reduction in shutdown time.
3. MAXOFIN - Optimized Technical Solution for Maximizing Olefins Production of Refineries

Sulphur Recovery Unit

1. Production of Sulphuric acid from Sour Gas ex ARU/SWS
2. Capacity enhancement by producing / recovering NH₃ for commercial purpose



Shri Sudhir umar, D, Gujarat Refinery addressing the Activity Committee meeting on FCC & SRU at Gujarat refinery



Participants of the ACM on FCC and SRU held at Gujarat Refinery

Steam Leak Survey during Jan 2019

CHT conducts steam leak survey and Furnace Efficiency Survey at all the Refineries in alternate years during Saksham month. This year's survey was on Steam leaks. The teams for conducting survey was formed by CHT, getting 3-4 Engineers from all the Refineries including Private and JV Refineries. Each team had a team leader cum coordinator from the same Refinery being surveyed. The result were calculated on the last day of the survey

itself using the detailed procedure and the calculation in soft form developed by CHT. The highlight of this year is the introduction of detailed calculation of steam trap losses by UNFCCC method, covering all types of malfunction.

The results of the survey in comparison to previous surveys is as under:

Sl.No.	Refinery	STEAM LEAK KG/HR				Steam leak (KG/MT) of steam produced			
		2013	2015	2017	2019	2013	2015	2017	2019
1	IOC-Guwahati	70	49	15	*	0.64	0.44	0.15	*
2	IOC-Barauni	90	298	1006	93	0.13	0.46	1.56	0.21
3	IOC-Gujarat	337	289	152	493	0.32	0.28	0.15	0.45
4	IOC-Haldia	72	759	781	742	0.10	1.08	1.44	1.43
5	IOC-Mathura	92	60	54	15	0.17	0.11	0.09	0.05
6	IOC-Digboi	66	312	118	94	0.94	4.29	1.68	1.43
7	IOC-Panipat	345	177	183	892	0.15	0.13	0.13	0.64
8	IOC-Bongaigaon	17	14	2	3	0.07	0.10	0.02	0.02
9	IOC-Paradip				1927				1.71
10	BPC-Mumbai	2140	856	569	217	4.14	1.77	1.12	0.44
11	BPC-Kochi	691	497	318	1472	1.13	0.87	0.56	1.23
12	HPC-Mumbai	527	169	415	150	1.45	0.40	0.96	0.37
13	HPC-Visakh	549	146	59	978	1.41	0.35	0.14	2.21
14	CPCL-Manali	404	161	226	383	0.50	0.21	0.28	0.48
15	NRL	121	48	17	32	0.51	0.18	0.06	0.19
16	MRPL	1304	4901	1333	1340	1.41	3.01	0.82	0.86
17	HMEL	0	63	58	57		0.07	0.05	0.05
18	BORL	0	70	42	24		0.11	0.07	0.03
19	Nayara Energy	165	24	14	58	0.09	0.01	0.01	0.03
20	RIL-DTA	208	55	388	350	0.08	0.02	0.13	0.13
21	RIL-SEZ	349	128	393	110	0.10	0.04	0.11	0.04
		7544	9077	6142	9429	0.43	0.48	0.31	0.49
	PSU	6823	8737	5247	8831	0.71	0.96	0.57	0.87
	PVT+JV	722	340	895	598	0.09	0.03	0.09	0.07
	*Survey at IOC-Guwahati has been postponed due to Refinery shutdown.								

IOC-Bongaigaon has reached steam leak quantity of very low level in single digit (3 kg/hr). (

'Make in India' Initiative

- by Brijesh kumar, ED(CHT)

India is on the cusp of a transition and is moving to the centre stage of global economic activity. India is presently the fastest growing major economy in the world however, Manufacturing contributes just over 15% of GDP. This is low in comparison to South Korea of 28% and China 29%. The aim of 'Make in India' campaign is to increase it to 25%, as seen with other developing nations of Asia.

'Make In India' is a campaign to encourage industrialists and investors (both multinational companies as well as domestic companies at national and international level worldwide) to set up their manufacturing units in India: So, 'Make in India' leads to 'Made in India'.

Make in India focuses on the priority 25 sectors of the economy. The government issued the Public Procurement (Preference to Make in India), Order 2017, as part of a policy to promote 'Make in India'. Purchase preference is given to local suppliers. As per the order the minimum local content shall ordinarily be 50%. However, the Nodal Ministry may prescribe a higher or lower percentage in respect of any particular item and may also prescribe the manner of calculation of local content. The margin of purchase preference shall be 20%. In order to ensure compliance of the Order, bidders would have to mandatorily provide details of 'local content' or elements of domestic manufacturing in the offer form on the e-procurement website for all types of tenders, before quoting rates.

The purpose of launching this campaign is to make India a destination of global manufacturing hub by improving ecosystem to help manufacturing sector. The present Govt. wants itself to be seen as a partner in the economic development of the country alongside the corporate sector. India has made rapid strides in this direction by improving its ranking in the world Banks' Ease of Doing Business Index in recent past. India jumped to 77th place out of 190 countries in 2018 from 100th place in 2017 and 130th in 2016.

"Modern science is a catalyst agent to fulfil the needs of humankind. We must ensure that it reaches poorest of the poor".

- Narendra Modi
Hon'ble Prime Minister of India

New Initiatives by CHT

1. Refinery Performance Improvement Programme (RPIP) of PSU Refineries

Centre for High Technology (CHT), takes up various programmes for performance evaluation, improvement, capability building, and operational performance, etc. for Indian PSU Refineries on a centralized basis. CHT has initiated RPIP by engaging experienced global consultants for 15 Indian PSU Refineries in two phases as under:

Phase-I: Commencing year 2017-18 for 7 refineries

IOCL : Mathura, Panipat & Paradip Refineries

BPCL : Mumbai & Kochi Refineries

HPCL : Mumbai & Visakh Refineries

Phase-II: Commencing year 2018-19 for 6 refineries

IOCL : Barauni, Gujarat, Haldia & Bongaigaon Refineries

CPCL : Manali Refinery

NRL : Numaligarh Refinery

The exercise of selecting the refinery-wise H-1 consultant, including pre-bid meeting & refinery visits by consultants, for the Phase-1, comprising 9 refineries, was completed by CHT

The entire programme, including implementation, is planned to be completed in 3 years and the Initial Assessment by the consultant shall be completed in 24 weeks.

IOC-GR & DR may be considered along with balance 6 refineries under Phase-II (with 18-19 as baseline year)

2. Roadmap for Energy Reduction upto 2030

After extensive discussions and consultation with refineries, a roadmap for PSU refineries has been proposed. The targets for 2023-24 are based on the Solomon suggested EII targets from peer group performance to achieve Q1 and long term targets for 2030 are aligned to India's NDC (Reduction of Specific Energy Consumption by 33-35% by 2030 over base year of 2005).

3. Performance Benchmarking Study of PSU refineries through Solomon Associates for 2018 Cycle

M/s Solomon Associates (SA), USA has been engaged for Performance Benchmarking Study of 16 PSU refineries (including the new IOCL-Paradip refinery) and 4 lube refineries for 2018 Cycle.

The study was launched at CHT with Data Co-ordination Seminar conducted by Solomon on 29-30 Nov 2018. The study results shall be presented by Solomon by Dec., 2019.

4. Performance Benchmarking Study for Pipelines - 2018 Cycle

CHT has engaged M/s Solomon for carrying out Performance Benchmarking Study for 32 crude, product & LPG pipelines, 4 SPM systems and 6 gas pipelines for the 2018 cycle.

The Study would cover 6 crude pipelines (8,412 out of total 10,292 km), 22 product pipelines (11,844 out of total 13,767 km) & 4 LPG pipelines (2,416 out of 2,859 km), 6 gas pipelines (9,145 out of 12,634 km) and 4 SPM systems.

The study was launched at CHT with Data Co-ordination Seminar conducted by Solomon on 21 & 22 Feb 2019. The study results shall be presented by Solomon by Oct., 2019.

5. Study on Reduction of Steam Network at Refineries

Solomon Associates, in their benchmarking studies of PSU refineries, have pointed out large steam network and over reliance on steam consumption as one of the major areas leading to higher specific energy consumption in PSU refineries.

So far, refineries have worked with the approach of managing supply of steam, which lacked demand side management.

CHT has engaged M/s KBC for preparing an "Approach Paper on Reduction of Steam System at Refineries" by demand side steam management based on the best practices and Indian realities.

The Study will be completed by April' 2019 (order placed on 28th January' 2019)

6. Compendium on Experience Sharing

A need has been felt, to make a ledger of experiences on the best practices and share major success stories for mutual benefit and also prepare an action plan for further improvement. CHT launched a compendium on Experience Sharing in March'18 in order to share ledger of experiences on the best practices and major success stories for mutual benefit and generation of more ideas based on cross learning amongst PSU refineries.

The compendium consists of the takeaways from the following:

- Refinery-wise schemes under implementation/ planned
- Best practices
- Findings of Walk-through Audits
- Innovations in refining sector
- Activity Committee Meetings conducted by CHT
- Feedback from refineries from cross sharing

The compendium has been circulated to all the PSU refineries in July' 2018. The compendium shall be updated in July' 2019

7. Development of Water Consumption Norms and Reduction of Water Footprint

CHT has engaged EIL for carrying out a study for Development of Water Consumption Norms and Reduction of Water Footprint for 13 PSU Refineries. MRPL, BPCL-M and NRL have already taken up the study separately.

Job has been awarded to EIL with a Completion Schedule of 9 months from Kick-off Meeting (KoM). KoMs held for 13 refineries and the study is in progress.

8. Activity Committee on Quality Control

In line with the demand expressed by the industry, a New Activity Committee on "Quality Control" has been initiated to keep abreast with the latest developments and sharing of best practices. The 1st Activity Committee Meeting was conducted at MRPL in June' 2018 which was very well received.

9. Discussion Forum

CHT has launched "Discussion Forum" on 16th November' 2018 in its Portal (cht.gov.in) for sharing of Best Practices & knowledge dissemination; the forum will cover areas pertaining to refinery process troubleshooting, energy efficiency improvement, fuel quality, petrochemicals, water management, power generation distribution and reliability, project management, pipelines, hydrogen as fuel and Bio-fuels.

For each of the above areas, an Expert Panel consisting of Domain Experts has been constituted. Specific queries can be posted by the authorised co-ordinators from PSU companies for seeking answers from the Expert Panel of the respective area as well as by coordinators across the industry.

As discussed in the 26th meeting of EC on 3rd Jan 2019 CHT has redesigned the Discussion Forum to widen the participants' access. EC also suggested that companies may also propagate this new initiative amongst their officers for fruitful utilisation.

A brief Write-up in the form of Slides on the Procedure/Instructions has been sent to all the refineries for propagation and making use of the Forum.

10. Workshop on Project Execution Strategies

EIL organised a workshop on Improvement in Project Execution Strategies at Gurugram Office complex on the 8th Dec 2018. This workshop was conducted under the aegis of CHT (Centre of High Technology, MoPNG)



Shri Brijesh Kumar, ED, CHT addressing the workshop on Project Execution Strategy



Shri L.K Vijh, Director (Technical), EIL addressing the workshop on Project Execution Strategy

The workshop was attended by senior management of IOCL, BPCL, NRL, BORL, HPCL and HRRL. Shri Brijesh Kumar, ED(CHT) welcomed all the delegates to the workshop and shared his thoughts on issues plaguing the Indian hydrocarbon sector especially from the Project implementation perspective. Shri LK Vijh, Director (Technical), EIL delivered the key note address and shared his views on the issues impacting the execution of mega projects in India.



As part of the workshop presentations were made by Shri RK Sabharwal, D(C), Shri AK Kundu, ED (Const) and Shri Deepak Gupta CGM (Projects), EIL on contracting ecosystem, construction best practices and Mega project execution respectively, the presentations brought to fore key issues that are hampering timely execution of projects.



BORL, BPCL, IOCL and HRRL made their presentations highlighting the areas of improvement in Project execution strategies' Open sessions were conducted to deliberate on the major challenges. The initiative was very well received by all the participants especially Client officials, who desired such workshops to be conducted regularly.

11. Reference Fuel: Make in India

During the meeting of Working Group on Refineries held on 12 June, 2018, EIL was advised to submit a proposal to CHT for preparing a business model along with IOC R&D.

Subsequently, EIL submitted a proposal for carrying out the study in 3 phases;

- Phase-1: Preliminary feasibility (Identification of suitable streams and Study based on stream wise data).
- Phase-2: Technical Feasibility (Study based on lab blending/ splitting of streams with blending of biodiesel/ alcohol)
- Phase-3: Feasibility and Business Model

Present Study will be for Feasibility and Order-of-magnitude cost. Further study will be required for +/- 10 % cost and BDEP. The study shall be completed within 6 months after approval

12. Feasibility Study for Production of Ethanol from Off-gases

LanzaTech, USA has developed technology for production of ethanol from off-gases containing CO, CO₂ and H₂ through fermentation route.

CHT has proposed to engage M/S LanzaTech for the Feasibility Study for Production of Ethanol from Off-gases. It is proposed to take-up the study in phases based on ethanol production potential.

13. Swachhata Ranking 2018-19 for PSU 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.

The Refineries comprising of 16 PSU Refineries and 2 JVs has been split into three groups and each group comprising of mixed pool of 6 numbers of refineries from inter-OMCs

2 refineries from each group have been shortlisted after detailed discussions and site audit by the nominated committees.

The Shortlisted refineries have also been visited by a Committee comprising of representative from each group, CHT and MoP&NG. The report is under finalisation for selection of first, second and third winner.

14. Industry Lab Correlation programme (ILC)

As advised by SAC, CHT has initiated an inter laboratory correlation programme for better coordination of product quality at industrial level.

The programme shall be undertaken for 3 major fuel products (MS, HSD and ATF) at 2 levels.

For the first level, ILC has been conducted with one refinery from each zone and participating/ independent labs as under;

North Zone: IOCL-Mathura, Central & Western Zone: BPCL-Mumbai

East Southern Zone : HPCL-Vizag,

North Eastern Zone : IOCL-Guwahati

Independent labs: IOC R&D, BPC-R&D, HPC R&D, CSIR-IIP, SFPL

The second level programme would be intra zone,

involving all refineries in the Zone, one R&D lab and major PPL/ Mktg installations of the zone. The second level programme has been launched in CHT and shall be completed by May, 2019.

For each product, a coordinating refinery lab has been identified for sending the samples and compiling results.

15. Launching of Blended lubricants with Re-refined oil

Reduce, reuse and recycle (R3) are the three essential components of environmentally responsible consumer behaviour that can reduce carbon footprint for creating a sustainable life.

India is currently importing about 2.0 MMT per year of base oil for meeting the domestic demand of 2.8 MMT of lube oil, out of which, about 1.6 MMT is for automotive & industrial lubricant and rest process oils, transformer oils and white oils.

Lubricating oil does not easily wear out, it just gets dirty so reusing and recycling is the most effective ways to save valuable natural resources protect the environment and save money. All of these is dependent on the type of contamination in the used oil. If the used oil has been severely degraded and cannot be reclaimed or recycled, then only it should be processed for use as fuel. Therefore used oil must be managed properly for local waste management authorities or automotive repair shops to prevent contaminating the environment

Against this background, MoP&NG constituted a Working Group to look into various strategies for making a detailed plan for collection of used lubricants and their recycling process to restrict the outflow of used oil for burning or other inferior purposes leading to wastage of valuable base oil.

As recommended by the Working group on Lube oil recycling, OMCs issued EOI and shortlisted consultants to prepare business model for setting up Collection Centre. The report is expected by Sept, 2019

16. Issue arising due to dual tax regime post GST implementation in Petroleum Refining Sector

Presently, 3 major products from refineries viz., MS, HSD and ATF, which constitute 85% of total refinery products, are kept outside the ambit of GST. While on these products, Excise and VAT provisions are applicable, the various feedstocks, capital goods and other input services are subjected to GST. Due to dual tax regime, refineries are not able to avail benefit of set off for the tax paid on inputs.

Refineries are also not able to take advantage of spare assets at other refineries by exchange of intermediate streams for value addition. Solomon Associates in their global benchmarking studies have highlighted importance of exchange of intermediate streams for value addition, practised by refineries world over. As a result, not only the refineries are incurring huge losses, the utilisation of capital intensive spare assets and infrastructure for sharing of these streams have become unviable resulting in huge national loss. In some refineries products are exported/ imported at unfavourable prices instead of sharing with other refinery for value addition.

Some of the major best practices, employed by global refineries to boost productivity and profitability, which are getting affected due to the dual tax regime, are as under;

1. Stock Transfer of intermediate streams for value addition
2. Built-Own-Operate model for outsourcing utilities
3. Sharing of streams for blending with final products
4. Production of Special products

Major products of refineries attract VAT, while stream sharing attracts GST. Refineries are therefore, not able to take advantage of spare assets at other refineries by exchange of intermediate streams for value addition due to non-availability of ITC. This results in national loss due to suboptimal utilisation of infrastructure/ assets. To address this issue, a paper was prepared by CHT in consultation with refineries, which proposed that stream sharing among refineries may be brought under Zero tax slab of GST. MoP&NG has taken up the issue with MoF.

17. Issues with Grid Power Intake at Refineries

Refinery Sector is a major consumer of power and consumes almost 2400 MW of power (~ 1400 MW by PSU refineries and ~ 1000 MW by private refineries), much of it is generated in captive power plants. The industry has so far relied on captive generation due to issues of reliability, which is of paramount consideration for the industry due to operational issues.

As an initiative towards utilizing the excess installed generation capacity in the country and also to maximize use of renewable power, refineries are progressively moving from captive generation to sourcing their power requirements from the Grid. PSU refineries are planning to increase Grid Intake from the current ~ 7.6 % to 34 % in the next 3-4 years.

The Electricity Act 2003 and the "Tariff Policy" from Ministry of Power (MoP) have encouraged utilization of Open Access power to bring equilibrium between source of power generation and power demand.

However, during procurement of Grid power through Open Access, a number of challenges are being faced like, unrealistic hike in electricity charges by DISCOMs and tax structure making it unviable option, frequent interruptions, hurdles in procurement of Green power from remote developers, etc. Many a times, the role of DISCOM is not supportive due to conflict of interest and there is no effective grievance redressal agency at the moment. CHT prepared a paper highlighting the various issues and the support sought by the refining industry including bringing electricity under the ambit of GST to unify the tax and tariff structure. MoP&NG has taken up the issue with MoP.

"India accords topmost importance to the oil and gas sector. We are implementing pioneering reforms in the sector aimed at fulfilling our needs and at the same time working towards creating a sustainable planet."

- Shri Narendra Modi
Hon'ble Prime Minister of India

संसदीय राजभाषा समिति द्वारा निरीक्षण

दिनांक 05 अक्टूबर 2018 को संसदीय राजभाषा समिति की प्रथम उपसमिति द्वारा हमारे केंद्र की राजभाषा हिंदी में प्रगति का निरीक्षण किया गया। निरीक्षण बैठक का संयोजन श्री सत्यनारायण जटिया, माननीय संसद सदस्य (लोकसभा) के सभापतित्व में हुआ। समिति के अन्य सदस्यों में श्री टैनी मिश्रा, श्री अंगारणा बार ने व श्रीमती कान्ता कर्दम शामिल थे। संसदीय समिति के अधिकारियों में श्रीमती प्रतिभा मलिक, श्री एम.एस.रावत और संजीव कुमार रिपोर्टर ने भाग लिया। पेट्रोलियम मंत्रालय से श्रीमती ऊषा बिजोला, संयुक्त निदेशक व श्री एस.आर. मीना, संयुक्त सचिव(राजभाषा) बैठक में उपस्थित थे। समिति सचिवालय की श्रीमती प्रतिभा मलिक, अवर सचिव ने संसदीय समिति के गठन की पृष्ठभूमि, समिति की उपसमितियों का गठन तथा उन समितियों के दायित्वों और कार्य क्षेत्रों की जानकारी दी। हमारे कार्यकारी निदेशक महोदय श्री बृजेश कुमार द्वारा समिति का स्वागत व अभिनन्दन किया गया।

माननीय संयोजक श्री सत्यनारायण जटिया जी ने अपने संक्षिप्त संबोधन में राजभाषा हिंदी के प्रयोग की अनिवार्यता पर प्रकाश डाला तथा महा महिम राष्ट्रपति महोदय के आदेशों का संदर्भ लेते हुए कहा कि स्वतंत्रता प्राप्ति और हिंदी के राजभाषा घोषित होने के इतने लम्बे अरसे के बाद भी हिंदी का प्रयोग भली प्रकार से नहीं हो रहा है। शब्दावली पर ध्यान आकर्षित करते हुए उन्होंने पत्राचार के शत-प्रतिशत होने पर विशेष ध्यान दिलाया। पृष्ठ 12 पर हमने 'क' क्षेत्र में 84% पत्राचार प्रदर्शित किया था जबकि राजभाषा विभाग के वार्षिक कार्यक्रम में निर्धारित लक्ष्य के अनुसार यह 100% होना चाहिए था।

कार्यकारी निदेशक महोदय ने सहजता से उत्तर देते हुए स्पष्ट किया कि हमारे दो विभाग अधिकांशतः हिंदी में कार्य करते हैं वर्तमान समय में ई-मेल का प्रयोग भी हिन्दी में किया जाता है इसलिए इस माध्यम से पत्राचार में फर्क तो पड़ा है परंतु 100% कार्य करने का लक्ष्य पूरा नहीं हो सका। कार्यकारी निदेशक महोदय ने कहा कि वे स्वयं इस और व्यक्तिगत रूप से और अधिक ध्यान देंगे तथा आश्वासन दिया कि वे अपेक्षा के अनुरूप हिंदी के प्रयोग को बढ़ाएंगे।

समिति के माननीय सदस्यगण कार्यकारी निदेशक महोदय के यथार्थ पूर्ण स्पष्टीकरण से पूर्णतः सहमत और संतुष्ट हुए। माननीय संयोजक श्री सत्यनारायण जटिया जी ने कार्यकारी निदेशक श्री बृजेश कुमार जी को संसदीय राजभाषा समिति द्वारा प्रकाशित एक संकलन (जिसमें समिति के प्रतिवेदन के पहले नौ खंडों पर किये गये राष्ट्रपति के आदेशों का संकलन किया गया है) भेंट किया।

बैठक के समापन अवसर पर माननीय कार्यकारी निदेशक की ओर से संसदीय समिति के माननीय सदस्यों एवं समिति कार्यालयों के संबद्ध अधिकारियों, पेट्रोलियम और प्राकृतिक गैस मंत्रालय से आए अधिकारियों तथा अन्य सहयोगियों का धन्यवाद किया।



श्री बृजेश कुमार, कार्यकारी निदेशक, राजभाषा उपसमिति का अभिनंदन करते हुये।



राजभाषा उपसमिति द्वारा निरीक्षण के दौरान विचार विमर्श करते हुए



माननीय संयोजक श्री सत्यनारायण जटियाजी राष्ट्रपति के आदेशों का संकलन कार्यकारी निदेशक को भेंट करते हुए।



राजभाषा उपसमिति द्वारा प्रगति का निरीक्षण किया गया

स्वच्छता पखवाड़ा 01-15 जुलाई 2018

भारत सरकार के तेल एवं प्राकृतिक गैस मंत्रालय के दिशा-निर्देशों को ध्यान में रखते हुए संयुक्त रूप से उच्च प्रौद्योगिकी केन्द्र एवं भवन में स्थित अन्य कार्यालयों जैसे कि ओ.आई.डी.बी, ओ.आई.एस.डी, आई.एस.पी.आर.एल तथा आर.जी.आई.पी.टी में स्वच्छता पखवाड़ा 01-15 जुलाई 2018, तक मनाया गया। उच्च प्रौद्योगिकी केंद्र में स्वच्छता पखवाड़ा को सफल बनाने के लिए 01-15 जुलाई 2018, तक रोजाना स्वच्छता से संबंधित कार्यक्रम आयोजित किए गए। विभिन्न प्रकार के कार्यक्रमों का आयोजन किया गया जैसे कि नुक्कड़ नाटक, चित्र प्रतियोगिता, परिसर में वृक्षा रोपण, वाक प्रतियोगिता इत्यादि।

इस पखवाड़े के दौरान ओ.आई.डी.बी परिसर एवं ईएसआई अस्पताल के आस पास की जगह की सफाई कराई गयी। श्री बृजेश कुमार, कार्यकारी निदेशक, सीएचटी ने गाँव सरफाबाद, नौएडा के सरकारी स्कूल में बच्चों को स्वच्छता के प्रति जागरूक करवाते हुए कहा कि कैसे हम खुदको, अपने आस-पड़ोस को, विद्यालय और अपने देश को स्वच्छ रख सकते हैं। इस अवसर पर स्कूल के बच्चों को स्वच्छता किट भी प्रदान की गई। स्वच्छता पखवाड़ा के दौरान अधिकारियों एवं कर्मचारियों ने स्वच्छता के प्रति जागरूकता प्रसार के लिए बैनर एवं हॉर्डिंग लेकर श्री बृजेश कुमार, कार्यकारी निदेशक के नेतृत्व में पदयात्रा का सफल आयोजन किया गया। उच्च प्रौद्योगिकी केन्द्र में स्वच्छता से संबंधित एक प्रश्नोत्तरी प्रतियोगिता का आयोजन भी किया गया जिसमें संविदा पर कार्यरत सभी कर्मचारियों ने भाग लिया। श्री बृजेश कुमार, कार्यकारी निदेशक द्वारा विजयी प्रतिभागियों को पुरस्कार वितरित किए गए।



श्री बृजेश कुमार, कार्यकारी निदेशक, सीएचटी अपनी टीम के साथ गाँव सरफाबाद, नौएडा के सरकारी स्कूल के बच्चों को स्वच्छता के प्रति जागरूक करते हुए

स्वच्छता पखवाड़े के दौरान "बेटी बचाओ, बेटी पढ़ाओ" को सार्थक करती श्री धर्मेन्द्र जी की यह रचना प्रेरणा श्रोत बनी

अपने पापा को याद रखना



—धर्मेन्द्र कुमार
हिन्दी टाईपिस्ट

इस जहां से मैं चला भी जाऊं, तब भी ये अहसास रखना,
दुनिया की इस भीड़ में बिटिया अपने पापा को याद रखना।

तेरी ऊंगली पकड़ कर मैं पग-पग चलूंगा साथ तेरे
नहीं लगेगी तुझको ठोकर, मेरे हाथों में बस अपना हाथ रखना,
दुनिया की इस भीड़ में बिटिया अपने पापा को याद रखना।

घबराना मत कभी भी तू हौसले से हमेशा काम लेना
बेझिझक और बुलंद आवाज़ में, सबके सामने अपनी बात रखना,
दुनिया की इस भीड़ में बिटिया अपने पापा को याद रखना।

मैं तेरे प्यार की कैद से कभी, आज़ाद न होना चाहूंगा
मेरे गले में हमेशा तू अपनी बाहों का हार रखना,
दुनिया की इस भीड़ में बिटिया अपने पापा को याद रखना।
व्यवहार हो ऐसा तेरा, कि सबके दिल को छू जाए
बड़ों की करना हमेशा इज्जत, छोटों से सदा प्यार रखना,
दुनिया की इस भीड़ में बिटिया अपने पापा को याद रखना।

संसार की सबसे बड़ी खुशी है, तेरे चेहरे पर मुस्कान बेटी
जब भी मिले तू मुझसे, तोहफे में यही मुस्कान रखना,
दुनिया की इस भीड़ में बिटिया अपने पापा को याद रखना।

आखिरी ख्वाहिश बस एक मेरी, तेरे दिल में ज़िंदा रहने की
मेरी ये ज़िंदगी चार दिन की, इसे संभाल-ए मेरी जान रखना,
दुनिया की इस भीड़ में बिटिया अपने पापा को याद रखना।

इस जहां से मैं चला भी जाऊं, तब भी ये अहसास रखना
दुनिया की इस भीड़ में बिटिया अपने पापा को याद रखना
दुनिया की इस भीड़ में बिटिया अपने पापा को याद रखना।

योग दिवस - 21 जून 2018

भारत सरकार के तेल एवं प्राकृतिक गैस मंत्रालय के दिशा-निर्देशों के अनुरूप उच्चप्रौद्योगिकी केन्द्र में दिनांक 21 जून 2018 को चतुर्थ योग दिवस मनाया गया। इस अवसर पर ओआईडीबी भवन के सभागार में योगाचार्य तथा उन के शिक्षकों की देख-रेख में कार्यालय के सभी अधिकारियों एवं कर्मचारियों ने योगाभ्यास किया। इस अवसर पर योगाचार्य ने सभी को योग के बारे में विस्तार पूर्वक

बताया तथा अनुरोध किया कि अपने जीवन को स्वस्थ रखने के लिए प्रतिदिन योग अवश्य करें। योगाचार्य का कहना था कि जरूरी नहीं कि घर में ही नहीं बल्कि कार्यालय समय में भी कुछ योग क्रियाओं जैसे अनुलोम-विलोम, आँखों के व्यायाम आदि किए जा सकते हैं। इस अवसर पर कुछ झलकियाँ प्रस्तुत हैं।

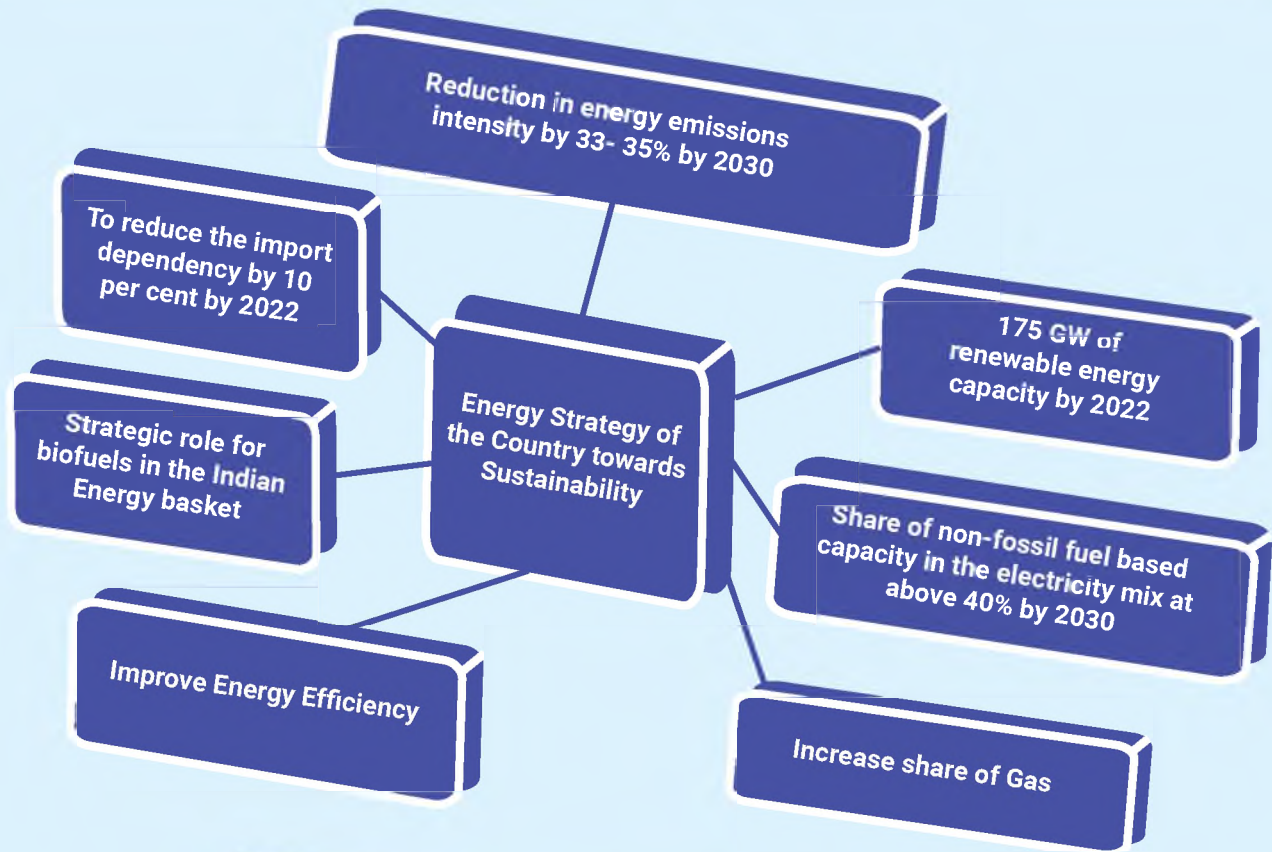


योगाचार्य अधिकारियों तथा अन्य कर्मचारियों के साथ चतुर्थ योग दिवस पर द्वीप प्रज्वलित कर कार्यक्रम का शुभआरंभ करते हुये।



योग दिवस पर योगाभ्यास करते हुये ओआईडीबी भवन में कार्यरत कर्मचारियों का एक दृश्य

Aligning Towards Sustainable Future



Sustainable Development

"Development that meets the needs of the present without compromising the ability of future generations to meet their own need" World Commission on Environment and Development

March towards Fuels of future

- Bio Fuels
- Fuels from CO₂ and renewable Hydrogen
- Hydrogen Economy

उच्च प्रौद्योगिकी केन्द्र

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