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From the Desk of Executive Director



Like every year, the New Year - 2016 started off with the Oil & Gas Conservation Fortnight (OGCF) celebrations throughout the country, from January 16-31, with the purpose of creating awareness amongst various target groups for promoting oil conservation and emission reduction. As in previous years, Centre for High Technology (CHT) associated in this noble cause, organized surveys in the areas of 'Furnace/Boller Efficiency' and 'Furnace Insulation

Effectiveness' in Indian refineries including private refineries (RIL and Essar Oil) and JV refineries (HMEL and BOPIL). The committee constituted by the Ministry of Petroleum & Natural Gas (MoP&NG) will evaluate the performance results obtained during this survey. I would like to convey my gratitude to the management of all the refineries for extending their co-operation and support in conducting of the surveys during OGCF.

With the co-operation of various host refineries, CHT regularly organizes Activity Committee Meetings (ACMs) on critical and important areas of refinery and pipelines operations. ACMs provide common knowledge sharing platform to the industry for exchanging their experience and best practices. CHT organized 8 nos. ACMs between October 2015 to June 2016 and topics covered were Fuel & Loss and Energy Optimization, Fluidized Catalytic Cracking, Environment Management, Power & Utilities, CCR & ISOM, Pipelines Operations, Hydro-processing & Hydrogen Generation and Delayed Coker & Visbreaker.

CHT played a key role in helping the Bureau of Energy Efficiency (BEE) in arriving at refinery-wise targets for specific energy consumption which was notified by BEE on March 31, 2016. For this purpose, CHT revamped its specific energy consumption metric, commonly referred to as MBN, with revised energy factors for a number of processing units. The New MBN methodology has been implemented at all refineries along with accounting procedure to bring them at common platform for inter-refinery

comparisons. The methodology would also be used for awarding refineries for performance in specific energy consumption from the year 2015-16. I would like to thank all refineries, including Private and JV refineries in extending fullest cooperation in implementation of new MBN.

CHT engaged M/s Salomon Associates, USA to benchmark the performance of the Indian PSU refineries based on the operating data for the year 2014. The results of the 2014 benchmarking cycle were made available in January 2016. The significant findings indicated that all refineries have made improvements to their performance from the previous benchmarking cycle of 2012. As against a world reduction of specific energy consumption of 1 EIU unit per year, Indian PSU refineries have averaged a reduction of 3 EIU units per year. However, the energy costs of Indian refineries continue to be high - as much as 82% of the total operating cost. Indian refineries need to reduce their energy consumption for which CHT continues to assist Indian refineries in achieving these goals. Utility suppliers like NTPC and PTC are already assisting refiners to identify sources of electric energy to replace the internal generation by the refineries. A second exercise is to engage consultants to assist refineries in identifying specific energy reduction initiatives that can be undertaken by them. With the efforts of the refineries, aided by the inputs from CHT's initiatives, the results of the next benchmarking cycle should show further improvement in performance and assist Indian refineries to achieve world scale performance.

My best wishes to all for meeting the future challenges.

(Brijesh Kumar)
Executive Director

20th Refinery Technology Meet (RTM)

**20th RTM organised by CHT in association with Indian Oil Corporation Ltd.
will be held from September 7-8, 2016 at Mahatma Mandir Convention cum Exhibition Centre,
Bambhajangar, Gujarat**

34th Meeting of the Governing Council (GC) of CHT

The 34th Meeting of the Governing Council (GC) of Centre for High Technology (CHT) was held on December 10, 2015 under the chairmanship of Shri K.D. Tripathi, Secretary, P&NG. The GC had a detailed review on the progress and status of major activities of CHT including:

- ◆ Integrated Refinery Business Improvement Program (IRBIP) under Phase-II
- ◆ Energy Efficiency Improvement Study at Numaligarh Refinery and HPCL Visakh
- ◆ Institution of Awards for Innovation for Refineries and R&D
- ◆ Finalisation of Methodology for GHG (CO₂ equivalent) Inventory Performance of Refineries
- ◆ Technical Services Agreement (TSA)
- ◆ Performance Benchmarking of PSU refineries
- ◆ Performance Improvement of PSU refineries through Gap Identification, Analysis and Recommendations
- ◆ Modification of Methodology and Energy factors for

- Evaluation of Specific Energy Consumption;
- ◆ Performance Audit of PSU Refineries
- ◆ Activity Committee Meetings organised by CHT during the year
- ◆ Organising 20th Refinery Technology Meet (RTM)
- ◆ The status of the R&D projects approved by Scientific Advisory Committee (SAC)

GC approved CHT's proposal for performance gap bridging for Specific Energy Consumption with additional scope of covering Performance Audit by including experienced operating experts along with the consultant.

GC also accorded approval for Implementation of New Energy Factors for Specific Energy Consumption i.e. New MBN (MBTU/bbl/NRGF) from the year 2015-16 and use of the same for target setting for PAT (Perform Achieve and Trade) Scheme of BEE.

19th Meeting of Executive Committee of Centre for High Technology

The 19th Meeting of Executive Committee of Centre for High Technology was organized on May 24, 2016 at SCOPE Complex, New Delhi under the chairmanship of Shri Sandeep Poudarik, IAS, Joint Secretary (Refineries), MoP&NG. The Meeting was attended by Directors (Refineries) of IOCL, HPCL, BPCL, Director (T)-EIL apart from senior officials from CPCL, NRL, MRPL and OIDB. EC took a detailed review of the progress and major activities of CHT including Performance Benchmarking study carried out for 15 PSU refineries through Solomon Associates for the calendar year 2014 and the subsequent

plan for the cycle of 2016, initiation of the modalities for carrying out Performance Gap Reduction and Margin Improvement programme for the refineries and floating of global tender for Performance Improvement of PSU refineries. Besides this, deliberations also took place with regards to Implementation status for the ongoing Refinery Performance Improvement Programme (RPIP), review of the status of commercialization of indigenously developed technologies & identification of gaps to improve the commercialization success rate and new R&D Proposals.



Shri Sandeep Poudarik, IAS, Joint Secretary (Refineries), MoP&NG, (right) being welcomed by Shri Brijesh Kumar, ED-CHT



Shri Sandeep Poudarik, IAS, Joint Secretary (Refineries), MoP&NG, (extreme right) chairing the Executive Committee Meeting of CHT



Executive Committee Meeting of CHT (in progress) ; Seated (L-R): Shri Ajit Kumar, Dy. Secretary, MoP&NG, Shri B.K. Datta, Director (R), BPCL and Shri Sanjay Singh, Director (R), IOCL



Executive Committee Meeting of CHT (in progress): Seated (L-R): Shri N. Boraharaj, GM (T), NRL, Shri Gaidam Roy, MD, CPCL and Shri B.K. Namdeo, Director (R), HPCL

77th Meeting of Scientific Advisory Committee (SAC) on Hydrocarbons

The 77th Meeting of the Scientific Advisory Committee (SAC) was held on 15th December 2016 at Bhabha Chamber, SCOPE Complex, New Delhi. Dr Anil Kakodkar, Chairman, SAC chaired the meeting which was attended by all the SAC members including executives from Indian PSU oil & gas companies, their R&D divisions and members from academia.

Shri Brijesh Kumar, Executive Director, GHT, welcomed Dr Anil Kakodkar, Chairman, SAC and members of SAC, academia and scientists to the 77th Meeting.

Dr Anil Kakodkar, Chairman, SAC, in his opening remarks, advocated for bringing in greater efficiency in every domain of work owing to the increasingly competitive world. He advised for gradual shifting from hydrocarbon sector to non-fossil sources to avoid crisis at later stage. He pointed out that technologies available from elsewhere may benefit us, but they themselves are unlikely to provide the necessary full solution to meet the local challenges. Since developments take time, there is an urgent need to progressively plan appropriate actions, leverage the R&D strength we already have and augment this strength so that we have India specific solutions in place. He also remarked that while making progress on the process side, capability building in terms of manufacturing equipment locally through creating new design needs to be developed. He also expressed satisfaction over the considerable work done during the intervening period by the Apex Group.

Shri A.S. Pathak, Director, GHT, presented the ATR of the 76th meeting along with the current status of various on-going/ approved R&D projects, commercialization status of



Dr Anil Kakodkar, Chairman, SAC, (right) delivering his speech. Seated (left): Shri Brijesh Kumar, Executive Director, GHT

the funded projects, status of the R&D Projects having potential for commercialization particularly in the area of technology and catalysts. Chairman, SAC, suggested to undertake a separate exercise for scrutinizing the potential areas/projects which are yet to be commercialized.

The 'Position Paper' prepared by EIL, to look at emerging scenario and identifying new research areas / R&D initiatives that need to be taken up for the Hydrocarbon Sector, was deliberated. SAC advised EIL to finalise the paper incorporating the recommendations of the members.



77th Meeting of Scientific Advisory Committee in progress. Seated (L-R): Dr R.K. Malhotra, DG, PetroFad, Shri Ajay.N. Deshpande, Director (T), EIL, Shri Sanjiv Singh, Director (R), IOCL



77th Meeting of Scientific Advisory Committee in progress. Seated (L-R): Shri B.K. Namdeo, Director (R), HPCL, Shri B.K. Datta, Director (R), BPCL and Dr M.O. Garg, Director, CSIR-IGIP

Working Group Meeting to review Refinery performance

The meetings of Working Group to review Refinery Performance were organized twice during the first half of 2016 under the chairmanship of Shri Sandeep Poundrik, IAS, Joint Secretary (Refineries), MoP&NG. The first meeting was held on February 16, 2016 at Vadodara Refinery of IOCL and the second meeting on May 24, 2016 at SCOPE Complex, New Delhi. The deliberations of the Working Group covered the following important issues affecting operational efficiency of the refineries and their profitability.

a) **Upgradation of Kerosene:** During the meeting held at Vadodara, it was decided that a task force consisting of refinery and marketing wings of major PSU oil companies and CHT shall submit a concept paper on desulphurization of kerosene consisting of demand projection, present level of sulphur in kerosene and projected in future, technological options and investment required. In the subsequent meeting, a



Shri Sandeep Poundrik, IAS, Joint Secretary (Refineries), MoP&NG being welcomed by Shri Sanjiv Singh, Director (Refineries), IOCL, at Gujarat Refinery

concept paper was presented by CHT in consultation with the industry. The paper will be finalized by CHT.

b) **Grid Power:** Variations in the cost of power from captive generation in respect of various refineries was deliberated. It was decided to review Fixed and Variable cost of power from CPP as well as Grid Power under various options like Open Access and Group



Dignitaries at Working Group meeting in IOCL, Gujarat Refinery.

Captive mode and strategies for utilization of Grid Power. A Taskforce comprising members from Industry partners, EIL and CHT has been working out a common methodology for calculating the cost of own power for realistically assessing the economics of use of Grid Power. Refineries shared their plans and status of various actions for taking grid power.

c) **Auto-fuel policy 2025-Implementation of BS-IV and BS-VI fuels:** Industry was advised to complete all projects related to BS-IV and BS-VI by December 2016 and September 2019 for country-wide smooth roll-out by 1st April 2017 & 1st April 2020 respectively. The schedule and the preparedness for the same was reviewed refinery-wise. Concerns from refineries were discussed for achieving the targeted project completion schedule.

d) **Performance Parameters:** The methodology for calculation of performance parameters was reviewed and it was decided that performance parameters such as crude throughput, new MBN, distillate yield (Incl. LOBS & Wax) to be adopted for performance monitoring on monthly basis. It was also decided that while presenting GRM, data on complexity, cracks and crude cost is to be included besides inventory losses on crude, finished products and intermediate stocks. CHT also presented the Refinery performance for the completed year 2015-16 and April 2016.

e) **Strategic development of refineries:** MoP&NG suggested that Approach Paper be prepared for development of refining sector during next 25 years to meet the growing needs of petroleum products with the help of Industry working group or any other suitable consultant. CHT presented interplaying issues which are important for arriving at futuristic crude processing capacity by 2040 and requested that a Working Group be constituted for finalization of paper.

f) **Review of refinery projects:** The status of projects costing ₹ 100 crore and above at refineries were deliberated. Majority of the projects were going as per the project schedule. The reasons for delay and the problems faced were reviewed.



Working Group meeting in progress at SCOPE Complex, New Delhi

Implementation of PAT (Perform, Achieve and Trade) scheme in Refinery sector

Bureau of Energy Efficiency (BEE) under Ministry of Power is entrusted with the implementation of the PAT scheme for achieving Energy saving in Energy Intensive Industries. It is one of the initiatives undertaken under NMEEE (National Mission for Enhanced Energy Efficiency). In the first PAT cycle, eight Industrial sectors were covered. In PAT cycle-II, three more sectors are getting covered including Refinery sector. PAT cycle-II has commenced on 1st April 2016 and would end on 31st March 2019, with 18 Refineries, each with Energy consumption of more than 90,000 TOE getting covered under PAT cycle. A Technical committee has been formed with representation from all the Oil companies, BEE and PCRA. New MBN methodology of CHT has been taken as the metric for calculation of Specific Energy Consumption in Refinery Sector. CHT organized a series of meetings with Refineries and BEE to clear all the doubts regarding calculation of New MBN, Targets, Implementation and regulatory aspects of PAT. Data was also sought from Refineries to know the ENCON schemes / projects in hand, those envisaged till 2018-19 and the likely reduction in Energy during PAT cycle. Based on the New

MBN calculations for the Baseline year, targets were calculated by BEE and were notified through Gazette on 31st March 2016. The Target reduction in Energy for the Refinery sector is 5.97%. Further, CHT along with BEE and PCRA has verified the data and documents submitted by Refineries for the Baseline year. CHT is also in the process of lining up consultant to undertake comprehensive study for Energy reduction in PSU Refineries which should help to take care of any gap over the energy reduction achievable with envisaged schemes as on date. The Refineries have to appoint certified Energy Manager in each Refinery who will file Annual energy return. Each Refinery has to undergo mandatory Energy audit by an accredited Energy auditor in the beginning of the PAT cycle. The Target MBN figures will have to be achieved in the assessment year namely 2018-19. The Refineries who achieve better than the target will be provided with 'Escerts' which can be traded through power exchange. If the achievement falls short of the target, then the concerned Refinery has to buy 'Escerts' from the market or pay to the Government, the cost of shortfall in TOE saving, apart from Penalty upto ₹ 10 lakh.

Performance Benchmarking

Over the past two decades, refining capacity in India has grown beyond its own petroleum product requirements. Indian refineries are now regularly exporting product. In order to assess their competitiveness, benchmarking is an extremely useful exercise that helps refineries in comparing their performance with global peers and identification of gaps and potential areas of improvements. Centre for High Technology (CHT), engaged M/s Solomon Associates USA to benchmark the performance of the Indian PSU refineries in respect of the operating data for the calendar year 2014. Bharat Oman Refineries Ltd (BORL) was included in the consolidated exercise.

The results of the 2014 benchmarking cycle were made available by Solomon Associates in January 2016. CHT drew up a presentation schedule, in consultation with the participating refineries, in the first and second week of February 2016. On the request of some refineries for corrections in the data submission, Solomon Associates recomputed the final results, which were released in March 2016.



'How-to-use-Data' seminar in progress

The results indicate that energy continues to be the highest component of operating cost of the Indian PSU Refineries. On a positive note, Indian PSU Refineries have managed to reduce their specific energy consumption by an average of 3 EIU units per annum as against the global reduction of about 1 EIU unit per annum.

Oil & Gas Conservation Fortnight 2016

During January 18-22, 2016, CHT organized surveys to assess "Furnace/Boller Efficiency" and "Furnace Insulation Effectiveness" in all Indian PSU, Private & JV Refineries in India, as a part of the Oil & Gas Fortnight (OGCF) 2016. Because of its planned shutdown, the survey for IOCL Guwahati refinery was carried out in the first week of January 2016. For each refinery, an audit team was constituted which comprised of a Coordinator-cum-Team Leader and 3 external members. A total of 79 nos. engineers from CHT and other refineries were involved in the exercise to carry out the survey during the 5 day period.

CHT provided the formats for data collection and the procedure for measurement and calculation of Furnace/Boller Efficiency and Furnace Insulation Effectiveness.

The surveys were carried out by the audit teams as per the laid out procedures of CHT and reports were submitted to CHT. The computations made by the individual teams have been reviewed by CHT. These will be placed before the Award Committee constituted by the Ministry of Petroleum & Natural Gas for recommending the Refineries for Awards for the best performance.

Workshop on sharing of indigenously developed technologies

As a follow up of decision during meeting on Commercialisation of Indigenous Technologies chaired by Director (R), IOCL, a two-day workshop was conducted on June 20-21, 2016 for sharing of Information regarding Indigenously developed technologies. The senior officials from Refineries and R&D Institutions of IOCL, BPCL, HPCL, EIL and CSIR-IIP participated in the workshop. The objective of the workshop was to highlight the technologies available with respective Oil Industry & R&D Institutes.

The participating organisations interacted with each other to adapt the Indigenously developed technologies in their respective fields.

Some of the Indigenous technologies deliberated are IOCL's "IndeDiesel" DHDT Hydrotreatment for Euro-IV & V diesel, "IndeHex" Food Grade Hexane Hydrotreatment of hexane for benzene removal, "IndJet" ATF Hydrotreating



Workshop on sharing of indigenous technologies in progress

Selective Removal of Mercaptan Sulfur, "IndSelectG", Cracked Gasoline Desulphurization, "IndDieselREN" Coprocessing of Non-edible Vegetable Oil and Delayed Coking & INDMAX Technologies; BPCL's Bharat ecochem - corrosion inhibitor for ethanol blended gasoline, Cost effective Gasoline Sulphur Reduction Catalyst and Innovative methodology for prediction of Refining Characteristics of Oil; EIL's Sulphur Recovery and Gas Processing technologies; HPCL's HIGee, PSA and visbreaker and technologies developed by CSIR-IIP such as Dearomatization of Naphtha for Pure BTX production, VSA technology for high purity CO₂ recovery from Power plant flue gas, Pressure/Vacuum Swing Adsorption (PVSA) Technology for Biogas Up gradation, PSA/ (VSA) Process for Recovery/ Purification of Helium from Low Helium Bearing Natural Gas and technology for Bio-Jet Fuel.



Workshop on sharing of indigenous technologies in progress

Life is like riding a bicycle. To keep your balance, you must keep moving.
- Albert Einstein

The greatest threat to Our Planet is the belief that someone else will save it.
- Robert Swan

Hydrogen as a Clean & Sustainable Energy Carrier

- Brijesh Kumar

Executive Director, Centre for High Technology

Hydrogen, found in plentiful in the Earth and water systems and in other compounds, is projected as fuel of future and potentially the ultimate renewable energy source for humankind. Hydrogen as a clean and sustainable energy carrier and its use in fuel cells holds great potential to help meet concerns over climate change, provided we can produce enough hydrogen through low carbon emission technologies. Most of the hydrogen is currently produced by steam reforming of natural gas or Naphtha. For the near term, this production method will continue to dominate. However, to overcome our dependence on imported energy, and for making a full hydrogen economy a reality, there is need to work around cluster of technologies for economical and sustainable production of Hydrogen from renewable sources. This will enable developing countries like India to leapfrog the carbon intensive development path of the 21st century and go straight to sustainable energy system of future.

The applications for hydrogen as a fuel are numerous ranging from laptop computers to transportation. Hydrogen fuel cells have been used to energize Cell Phone Towers, forklift trucks, and space shuttles and in future, Clean-running hydrogen fuel cells could potentially power trucks, trains, could be used as an industrial feedstock and injection into the natural gas line.

Hydrogen and fuel cell research needs to focus on developing, integrating, and demonstrating hydrogen production and delivery, hydrogen storage and fuel cell technologies for transportation, stationary and portable applications. Projects ranging from fundamental research to overcome technical barriers, manufacturing process improvement to enable high-volume fuel cell production, systems analysis to identify the most promising commercialization pathways and market transformation to support early market deployments are required.

Storing hydrogen for renewable energy technologies can be challenging, especially for intermittent resources such as solar and wind. Partnership of industry, academia, and other research organizations would be needed to advance the science behind emerging hydrogen and fuel cell technologies and to validate new technologies and systems in real-world operation. We also need to work with national and international standards development organizations to ensure the safe operation, handling and use of hydrogen via the development of codes and standards.

Areas of research

- ❖ Fuel cells for transportation (stationary and portable applications)
- ❖ Hydrogen production and delivery
- ❖ Hydrogen storage
- ❖ Manufacturing
- ❖ Market transformation
- ❖ Safety, codes and standards
- ❖ Systems analysis
- ❖ Technology validation

Hydrogen production from renewable sources

- ❖ Biological Water Splitting
- ❖ Fermentation
- ❖ Conversion of Biomass and Wastes
- ❖ Photo-electro-chemical Water Splitting
- ❖ Solar Thermal Water Splitting
- ❖ Renewable Electrolysis

Biological Water Splitting

In the photo-biological water splitting process, hydrogen is produced from water using sunlight and specialized microorganisms, such as green algae and cyanobacteria. Certain photosynthetic microbes use light energy to produce hydrogen from water as part of their metabolic processes. Because oxygen is produced along with the hydrogen, photo-biological hydrogen production technology must overcome the inherent oxygen sensitivity of hydrogen-evolving enzyme systems. There is need to address this issue by screening for naturally occurring organisms that are more tolerant of oxygen and by creating new genetic forms of the organisms that can sustain hydrogen production in the presence of oxygen. Researchers are also developing a new system that uses a metabolic switch (sulfur deprivation) to cycle algal cells between the photosynthetic growth phase and the hydrogen production phase.

Fermentation

In the fermentation process, hydrogen is produced from the fermentation of renewable biomass materials. Scientists are developing pretreatment technologies to convert lignocellulosic biomass into sugar-rich feedstock that can be directly fermented to produce hydrogen, ethanol and high-value chemicals. Researchers are also working to

identify a consortium of *Clostridium* that can directly ferment hemicellulose to hydrogen. Other research areas involve bio-prospecting efficient cellulolytic microbes that can ferment crystalline cellulose directly to hydrogen to lower feedstock costs. Once a model cellulolytic bacterium is identified, its potential for genetic manipulations, including sensitivity to antibiotics and ease of genetic transformation, will be determined. Future fermentation projects will focus on developing strategies to generate mutants that are blocked selectively from producing waste acids and solvents to maximize hydrogen yield

Conversion of Biomass and Wastes

Hydrogen can be produced via pyrolysis or gasification of biomass resources such as agricultural residues like peanut shells, consumer wastes including plastics and waste grease or biomass specifically grown for energy uses. Biomass pyrolysis produces a liquid product (bio-oil) that contains a wide spectrum of components that can be separated into valuable chemicals and fuels, including hydrogen. Researchers are currently focusing on hydrogen production by catalytic reforming of biomass pyrolysis products. Specific research areas include reforming of pyrolysis streams and development & testing of fluidizable catalysts.

Photo-electro-chemical (PEC) Water Splitting

The cleanest way to produce hydrogen is by using sunlight to directly split water into hydrogen and oxygen. In the PEC water splitting process, hydrogen is produced from water using sunlight and specialized semiconductors.

Multi-junction cell technology developed by the photovoltaic industry is being used for PEC light harvesting systems that generate sufficient voltage to split water and is stable in a water/electrolyte environment. The NREL-developed PEC system produces hydrogen from sunlight without the expense and complication of electrolyzers, at a solar-to-hydrogen conversion efficiency of 12.4% lower heating value using captured light. Research is underway to identify more efficient, low cost materials and systems that are durable and stable against corrosion in an aqueous environment.

Solar Thermal Water Splitting

The High-Flux Solar Furnace concentrates solar energy generating ultra-high temperatures that enables hydrogen production via thermochemical reaction cycles. Researchers use the High-Flux Solar Furnace reactor to concentrate solar energy and generate temperatures between 1,000 and 2,000 °C. Ultra-high temperatures are required for thermochemical reaction cycles to produce hydrogen. Such high-temperature, high-flux, solar-driven thermochemical processes offer a novel approach for the environmentally benign production of hydrogen. Very high reaction rates at these elevated temperatures give rise to very fast reaction rates, which significantly enhance production rates and more than compensate for the intermittent nature of the solar resource.

Hydrogen Storage

Whether for stationary or portable transportation applications, cost-effective, high-density energy storage is necessary for enabling the technologies that can change our energy future and reduce greenhouse gas emissions. Hydrogen can play an important role in transforming our energy future if hydrogen storage technologies are improved.

Market Transformation

Market transformation activities address technical and non-technical barriers to the commercialization of hydrogen and fuel cell technologies to ensure that laboratory advances can be realized in the marketplace. Projects focus on deploying hydrogen and fuel cells in key early markets—specialty vehicles, backup and remote power, portable power and primary power for critical applications such as hospitals or data centers and renewable hydrogen production technologies.

Early Market Deployments

Strategic early market deployments can accelerate the market penetration of hydrogen and fuel cells. A modest number of new orders can significantly reduce costs through economies of scale.

Early market sales stimulate further market activity by:

- ❖ Supporting the growth of a domestic industry
- ❖ Overcoming logistical and other non-technical challenges associated with the adoption of a new technology
- ❖ Establishing key infrastructure elements essential for future market growth
- ❖ Providing real-world operation and performance data and lessons learned that can be used to validate the benefits of the technology.

Petroleum Refineries could also introduce hydrogen in their product slate, taking advantage of surplus hydrogen generation capacity, to promote and accelerate development of these applications till sustainable production technologies are fully developed.

Safety, Codes and Standards

Hydrogen safety, codes and standards focus on ensuring safe operation, handling and use of hydrogen and hydrogen systems through safety sensors and codes and standards for buildings and equipment.

Safety Sensors

To facilitate hydrogen safety, NREL, USA is testing hydrogen sensors that detect leaks and monitor gas purity at the Safety Sensor Testing Laboratory. Because hydrogen is colorless and odorless, sensors are important for safe hydrogen fueling stations, equipment and facilities.

ISO – 9001:2008 Re-Certification Audit of CHT

Centre for High Technology obtained ISO 9001:2008 Certification in June 2013 and as per the system requirement, Re-Certification Audit was carried out by M/s DNV GL on June 28, 2016. On the satisfactory completion of the audit, CHT has been recertified with ISO 9001:2008 by M/s DNV GL.

This certification is as per the international standard related to quality management system. This certification raises an organization on customer focus, approach sustained customer satisfaction by producing & delivering services and providing support functions that meet customer's needs and expectations.

Prior to the audit, one-day ISO awareness training program was organized on June 23, 2016 at CHT Office as per the system requirement.



Activity Committee Meets

'Fluidised Catalytic Cracking'

The 43rd FCC Activity Committee Meeting was held in HPCL-Mittal Energy Limited (HMEL), Bhatinda on 5th & 6th October, 2015. The two day event was attended by about 60 delegates from various Indian Refineries.

Shri Ruchir Kacker, AGM-TS, HPCL-Mittal Refinery, welcomed all the participants. Shri Rajan Kapoor, Director, CHT delivered the key note address. He re-iterated that FCC being the highest profit generating unit in a refinery, this meeting is one of the most important Activity Committee Meet. He emphasized the need to maximize the FCCU utilization and improve the Energy Intensity Index (EII) and Volumetric Expansion Index (VEI) of FCCUs of Indian refineries.

Convener of the Activity Committee Meeting, Shri S. Ramanathan, Chief Manager (Petrochem), BPCL Kochi Refinery, spoke at length about various aspects of FCC such as its position in Refinery configuration, economy and challenges. He presented a detailed comparison of Catalytic Cracking vs Hydrocracking with respect to value



Shri A.S. Basu, Head, HMEL Refinery, addressing the participants of Activity Committee Meet on 'Fluidized Catalytic Cracking'



43rd Activity Committee Meet on 'Fluidized Catalytic Cracking'. Seated (L-R): Shri S. Halder, Additional Director, CHT; Shri Rajan Kapoor, Director, CHT; Shri A.S. Basu, Head, HMEL Bhatinda Refinery; Shri S. Ramanathan, Chief Manager (Petrochem), BPCL Kochi Refinery and Shri N. Suresh Kumar, Joint Director, CHT

addition. He emphasized the need for building higher conversion FCCs in view of the proposed Euro VI equivalent specifications for M/S, expected to be implemented by April 2020.

Shri A.S. Basu, Head of HMEL Refinery, also shared his thoughts on the occasion. He dwelled upon the technology evolution that FCC operation has undergone over the years starting from distillate mode to the recent petrochemical mode. He opined that conversion and selectivity of catalyst are two areas which need further improvement.

Presentations were made by the representatives from the refineries highlighting the performance of the respective FCC units during the period April 2014 to June 2015. Shri S. Halder, Additional Director, CHT, presented the comparison of the EII and VEI data of all FCCUs, drawn from the 2012 benchmarking study.

'Fuel & Loss and Energy optimization'

42nd Activity Committee meet on 'Fuel & Loss and Energy optimization' was organized by CHT with EOL as hosts at Vadinar during 26-27th November 2015. The meeting was inaugurated by Shri C. Manoharan, Director (Refinery) in the presence of Shri L.H. Shivaraya, Director, CHT. The meeting was attended by 45 participants from Refineries,

EIL (R&D), CSIR-IIP and vendors viz., Forbes Marshall, GTC and Emerson. Each Refinery made a presentation on the Energy & Loss data, schemes implemented in the previous year & planned in current year; Energy saving achieved/projected to be achieved and a case study by each refinery on energy conservation.



Shri C. Manoharan, Director (Refineries), Essar Oil, addressing the participants of Activity Committee Meet on 'Fuel & Loss and Energy optimization'



Lighting of ceremonial lamp by Shri L.H. Shivaraya, Director, CHT. Standing: Shri K.C. Swain (extreme left) and Shri C. Manoharan, Director (Refineries), Essar Oil (in the centre)



Participants of the Activity Committee Meet on 'Fuel & Loss and Energy Optimization'

'Power & Utilities'

The 29th Activity Committee Meet was organised jointly by CHT & BPCL- Mumbai Refinery on October 29-30, 2015 at Mumbai. The meeting was attended by 50 delegates from 17 Refineries, EIL and reputed vendors (M/s PTC India Ltd & M/s GE Power). During the Meet, a total of 22 presentations were made. Refineries made 16 presentations on action taken for arranging Grid Power at high voltage for refinery operation, CPP performance during the previous year, major Interruptions/failures and its Root Cause Analysis.

Shri Brijesh Kumar, ED-CHT, in his key-note address, briefed about various activities pursued by CHT for improvement of refinery performance and emphasised the need for cheaper and reliable Grid Power for refinery operation since cheaper crude prices prevailing presently are not sustainable. In his inaugural address, Shri S.S. Sunderajan, ED, BPCL, Mumbai Refinery, talked about challenges faced by P&U departments of the refineries for providing reliable & cheaper power to refinery. Earlier, Shri C.J. Iyer, GM (Ops), BPCL, Mumbai Refinery, welcomed the delegates.

At the outset, Shri Vijay Mohan, Advisor (Tech), CHT made a presentation on Refinery Power requirement vs Grid Power



Participants of 29th Activity Committee Meet on "Power & Utilities"

based on various factors like availability, reliability and cost comparison. EIL presented on Steam & Power system optimisation in Cogen Plants. M/s PTC discussed various options presently available for cheaper & reliable Grid Power for refinery operation. M/s GE Power made presentation on Fuel flexibility in Gas Turbine for cheaper power, Plant operation optimisation and Software solutions to various problems faced in operation and maintenance of GT's. This was followed with question & answer session where delegates discussed major operation & maintenance issues faced in their refineries.



Shri Brijesh Kumar, ED, CHT, lighting the ceremonial lamp during 29th Activity Committee Meet on "Power & Utilities". From (L-R): Shri S.S. Sunderajan, GM, Engg. & Adv. Services, BPCL Mumbai Refinery, Shri S.S. Sunderajan, ED, BPCL Mumbai Refinery and Shri C.J. Iyer, GM (Ops), BPCL Mumbai Refinery

'Environmental Management'

The 26th Activity Committee Meet on "Environmental Management" was held at Mumbai on October 8-9, 2015. The meet was jointly organized by Centre for High Technology (CHT) and Hindustan Petroleum Corporation Limited, Mumbai Refinery. The meeting was attended by 52 participants from 17 Refineries across the country, R&D centres and Representative from EIL and reputed vendors.

Shri A.R. Tamhankar, GM, HPCL, Mumbai Refinery welcomed all delegates to the 26th ACM on Environmental Management.

Shri Brijesh Kumar, ED, CHT, in his key-note address, emphasized the importance of the ACM. He upheld the importance of such meetings as they provide a platform for sharing rich experience on the critical issues and best



Lighting of ceremonial lamp by Shri S. Bharathan DGM (Technical) HPCL, Mumbai Refinery and Convener of the Meet

Shri S. Bharathan, DGM (Technical), HPCL, Mumbai Refinery, chaired the meeting as Convener.

The meeting was formally inaugurated by lighting of the ceremonial lamp. All the participating refineries presented their best practices, innovative ideas and last one year performance on Environment. At the end of each presentation, queries sought by the participants were clarified. HPCL (R&D), IOCL (R&D) and EIL also presented the developmental activities carried out in the field of environment.

There were a total of 22 presentations with good interaction between the participants and presenters. All the pertinent questions were discussed after each individual presentation in an interactive manner.

M/s JVI Marketing displayed their various products along with schemes for collecting floating oil. M/s Carbon Clean Solutions presented their developmental activities on CO₂ capturing & efficient re-use.

At the end of the two-days' meeting, a separate Q&A session was also held to discuss the problems faced by the refineries for effective solutions. All refineries showed their concern about the storage time of hazardous waste, i.e., max. 90 days from the date of generation of Hazardous waste.

In his valedictory address, Shri C. Abhiram, GM (HSE), IOC-RHQ, summarized all the relevant issues which were discussed during 2 days' meeting.



Participants of 26th CHT Activity Committee Meet on "Environmental Management"

practices. In his address, he talked on the carbon footprint and water footprint of the refineries. In this context, he announced that Ministry has approved the award for lowest CO₂ emission amongst Indian Refineries.

In his inaugural address, Shri N.S.J. Rao, ED, HPCL, Mumbai Refinery, expressed his concern for rapid technological growth which is compounded with increased environment awareness. He emphasized that as statutory bodies are more vigilant at present, one cannot relax on the Environmental issues. He concluded his address with "Environment First, Production next" and gave good wishes to the meeting.

'Catalytic Reforming and Isomerization'

The 38th Activity Committee Meet on "Catalytic Reforming and Isomerization" was held on October 13-14, 2015 at Visakhapatnam in association with Visakh Refinery of Hindustan Petroleum Corporation Ltd. The Meet was attended by 60 participants. The meet got excellent response with participation from all the refineries, R&D centres of EIL, HPCL and IIP. Additionally, representatives from process licensors, M/s Axens and M/s UOP attended the two-day meet. Refinery personnel shared their operational highlights, best practices, troubleshooting carried out and benefits achieved.

The Meet was inaugurated by Shri G. Sriganesh, ED, HPCL Visakh refinery. Shri Sriganesh detailed the evolution of the OCR technology by quoting various references. Earlier

Shri G.S. Prasad Sarma, GM, Operations, HPCL, Visakh refinery, welcomed the participants. Shri I.H. Shivaraya, Director, CHT, also addressed the participants.

Apart from the presentations by the individual refineries, HPCL, R&D presented on the Metal Catalyzed Coking while EIL R&D Centre presented on Catalytic Reformer Simulation & Optimization software developed by EIL & IIP. CSIR-IIP presented on the recent trends in Catalyst Development. The process licensors M/s Axens presented the advancements in catalytic reforming technology and development of new catalyst for ISOM having longer life and better conversion ability. M/s UOP presented on challenges and opportunities for refineries while producing BS-IV & V Grade Gasoline.



Inaugural address by Shri G. Sriganesh, ED, HPCL Visakh Refinery



Shri I.H. Shivaraya, Director, CHT, delivering key-note address. Seated (L-R): Shri M.R. Sudarshan Iyer, Convener & DGM, BPCL Koochi refinery; Shri G. Sriganesh, ED, HPCL Visakh Refinery; Shri G.S. Prasad Sarma, GM, Operations, HPCL Visakh Refinery

'Pipeline Operations'

Centre for High Technology in association with Indian Oil Corporation Limited-Pipelines Division, organised the 34th Activity Committee Meeting (ACM) on 'Cross-Country Oil & Gas Pipelines' at OADB Bhawan, Noida on December, 22-23, 2015. A total of 50 Pipeline engineers from ONGC, IOCL, BPCL, HPCL, GAIL, OIL, EIL & OISD participated.

At the outset, Shri Brijesh Kumar, ED, CHT welcomed the participants and various dignitaries present. He briefed them about various activities of CHT along with the need for organising such Activity Committee Meetings which help in building up the Industry Interface and Information sharing of the best practices. During his welcome address, ED, CHT emphasized about the significant role of Pipelines as carriers of crude oil, petroleum products and natural gas

which provides environment friendly and low cost transportation thereby aiding in the overall economic growth of the country. He also stressed on the need to maintain safe and un-interrupted Pipeline operations.

The meet was inaugurated by Shri R.K. Samtani, Executive Director, IOCL, Northern Region Pipelines, Panipat. During his key-note address, he opined that in the emerging global Oil & Gas scenario, such platforms for knowledge sharing are of great importance as pipe liners are faced with common challenges of pilferages, ROU acquisition, corrosion, safety of the pipelines stretching through densely populated areas and carrying highly inflammable products, etc. He stressed the need for compliance to design codes and prescribed safety standards in order to



Shri V.S. Sehgal, DGM (Ops), BPCL & Convener for the ACM lighting the ceremonial lamp. Standing (L-R): Shri A.S. Pathak, Director, CHT; Shri R.K. Samant, Executive Director, IOCL, Northern Region Pipelines, Panipat and Shri Brijesh Kumar, Executive Director, CHT

mitigate the occurrence of accidents. He informed that the need of the hour is not only to evaluate our practices based on lessons learnt from various incidents but to upgrade our systems with latest technological advancements, innovative solutions and mutually acceptable solutions and recommended practices in order to function effectively retaining focus on safety and integrity of pipelines.

During the two day programme, a total of 18 presentations were made on various topics related to Pipeline Design & Construction, Operation & Maintenance, Integrity

Management and case studies which were followed by brief interaction between the presenters & the delegates. Q&A session was held at the end of two day programme wherein the delegates put forth various issues dealt in areas of Pipeline design, operation, maintenance and safety. An Expert panel chaired by Dr. B.D. Yadav, Executive Director (Operation & Project), IOCL, Pipelines Head Office, Noida and General Managers from ONGC, BPCL and EIL, shared their expertise in pipeline operations while addressing the queries of the participants thereby providing effective solutions.



Q&A session of the 34th Activity Committee Meet on "Cross Country Oil & Gas Pipelines". Seated (L-R): Shri V.S. Sehgal, DGM (Ops), BPCL, Mumbai & Convener for ACM; Shri S.R. Jaiswal, GGM & Head Pipelines, ONGC, Mumbai; Shri R.P. Pandey, GM (C&M), ONGC, New Delhi; Shri B.D. Yadav, ED(O&P), IOCL Pipeline Division, Noida; Shri S.N. Jaiswal, GM (Maint.), BPCL, Mumbai; Shri Rakesh Virost, GM(Mtg.), EIL, New Delhi and Shri Vinay Mittal, GM (Pipeline Engineering Deptt.), EIL, New Delhi



Participants of 34th CHT Activity Committee Meet on "Cross country Oil & Gas Pipelines"

'Hydroprocessing & Hydrogen Generation'

11th Activity Committee Meeting on Hydro-processing & Hydrogen Generation was organised at Hyderabad during February 16-18, 2018 by GHT with sponsorship of Chennai Petroleum Corporation Ltd (CPCL). The meeting was attended by 101 participants from 17 Refineries, R&D Centres of IOC, HPC & BPC, EIL, IIP, experts from process licensing companies, viz., Axens & UOP and Catalyst Vendors, viz., Haldor Topsoe and Sud-Chemie. The meeting was inaugurated by Shri I.H. Shivaraya, Director,

GHT in the presence of Shri Madhusudan Sau, DGM, IOCL-R&D and Shri S. Sadagopan, Chief Manager (TS) CPCL. In total, 45 presentations were made followed by intensive interaction by the participants with presenters during the three-day Meet. Shri Madhusudan Sau, DGM-R&D, IOCL was the convener for the meet covering Hydroprocessing Units and Shri Bimlesh Gupta, Chief Manager (TS), NRL was the convener for the meet covering Hydrogen Units.



Shri I.H. Shivaraya, Director, GHT, delivering keynote address during 11th Activity Committee Meeting on Hydro-processing & Hydrogen Generation



11th Activity Committee Meeting on Hydro-processing & Hydrogen Generation. Seated (L-R): Shri S. Sadagopan, Chief Manager (TS) CPCL, Dr Madhusudan Sau, DGM, IOCL-R&D and Shri Utpal Datta, Additional Director, GHT



Participants of 11th Activity Committee Meeting on Hydro-processing & Hydrogen Generation

'Delayed Coker & Visbreaker'

The 7th CHT Activity Committee Meet on "Delayed Coker and Visbreaker" was held at HICC, Hyderabad on March 21 - 22, 2016. The meet was organised by Centre for High Technology (CHT), Noida, which was sponsored by Bina Oman Refineries Ltd. (BORL), Bina. Delegates from various refineries across the country from Private & Public Sector Organisations, R&D Centres and representatives from EIL attended the meet and deliberated on the various aspects of delayed coking and visbreaking technologies.

The programme started on 21st March 2016 with Inaugural Session. The welcome address to all the participants was delivered by Shri U. Deka, Additional Director, CHT, in which he requested all the participants to make the maximum use of the opportunity of the meet to interact and share their valuable experience for the benefit of all.

In his address, the Convener of the meet, Shri D. Chakraborty, GM (TS&HSE), IOCL, Gujarat Refinery opined that although Visbreaker units will be phased out due to low demand of fuel oil, Delayed Coking will continue to be the preferred technology for bottom upgradation. He highlighted various challenges faced by Delayed Coker at present to reduce the coke make as well as different problems for DCU operations.

Shri Brijesh Kumar, Executive Director, CHT in his keynote address emphasised the utility of both Delayed Coking and visbreaking technologies in the present refining scenario, in spite of being very old technologies. He touched upon various activities of CHT with special emphasis on three key areas of concern for Indian refining industry, viz., PAT Scheme, Auto Fuel Policy and Margin Improvement. He highlighted the potential in Delayed Coker, considering the operational gaps identified in the Solomon Benchmarking Studies. He also stressed the utility of forums like Activity Committee Meetings for sharing the knowledge for creating a pool of experience for future references and overall development of Indian Petroleum Industry. As the mechanical features are of very high importance for DCU operation, Shri Brijesh Kumar advised to include M&I aspects in the future ACMs for Delayed Coker.

In his Inaugural address, Shri A.P. Raghav, Vice President, BORL stressed the importance of Activity Committee Meet, especially for the new refiners like BORL and HMEL. He requested all the participants to deliberate in key areas for DCU like reduction in coke make, sulphur reduction in



7th Activity Committee Meeting on Delayed Coker & Visbreaker. Seated (L-R): Shri D. Chakraborty, GM (TS&HSE), IOCL, Gujarat Refinery, Shri Brijesh Kumar, Executive Director, CHT, Shri A.P. Raghav, Vice President, BORL and Shri Utpal Deka, Additional Director, CHT

coke, drum vibration, additives, etc. He expressed hope that the Activity Committee Meet will achieve its desired objectives with proper sharing of operating experiences / practices and other technological issues.

The Technical Sessions were convened by Shri D. Chakraborty, GM (TS&HSE), IOCL, Gujarat Refinery. The technical sessions on both the days were highly interactive and all the participating refinery units shared their experiences with respect to operational highlights, best practices, trouble shooting, modifications, etc. R&D Centres of IOCL, HPCL and EIL presented the developmental activities carried out in the field of Delayed Coker & Visbreaker.



Participants at 7th Activity Committee Meeting on Delayed Coker & Visbreaker

उच्च प्रौद्योगिकी केन्द्र में सतर्कता जागरूकता सप्ताह का आयोजन



कार्यकारी निदेशक महोदय, श्री बृजेश कुमार अधिकारियों एवं कर्मचारियों को सतर्कता जागरूकता की महत्व दिखाने हुए

उच्च प्रौद्योगिकी केन्द्र में दिनांक 28 से 31 अक्टूबर 2016 तक सतर्कता जागरूकता सप्ताह मनाया गया। सार्वजनिक क्षेत्र के उपक्रमों में तथा विभिन्न केन्द्रीय सरकारी कार्यालयों में नैतिक मूल्यों को बढ़ावा देने के उद्देश्य से सतर्कता जागरूकता सप्ताह का आयोजन किया जाता है। इस अवसर पर 28 अक्टूबर 2016 को गाननीय कार्यकारी निदेशक महोदय,

श्री बृजेश कुमार द्वारा अधिकारियों एवं कर्मचारियों को सतर्कता जागरूकता की शपथ दिलाई गई। इस अवसर पर सुश्री रेगु रैना, संयुक्त निदेशक, उच्च प्रौद्योगिकी केन्द्र, ने निविदा प्रक्रिया में सतर्कता के विषय पर एक प्रस्तुतिकरण भी दिया।

अंतर्राष्ट्रीय योग दिवस

भारत के प्रधानमंत्री, गाननीय श्री नरेन्द्र मोदी ने 27 सितंबर 2014 के संयुक्त राष्ट्र में दिए गए अपने भाषण के द्वारा 21 जून को अंतर्राष्ट्रीय योग दिवस के रूप में मनाने का प्रस्ताव रखा था। उनकी इस पहल के फलस्वरूप 21 जून 2015 को प्रथम अंतर्राष्ट्रीय योग दिवस के रूप में मनाया गया।

योग का प्रयोग शारीरिक, मानसिक और आध्यात्मिक लोगों के लिए हमेशा से होता रहा है। आज के विकसित लोगों ने ये स्थापित कर दिया है की योग शारीरिक और मानसिक रूप से मानवजाति के लिए हददान है। योग भारत की प्राचीन संस्कृति का गौरवस्पी हिस्सा है जिसकी वजह से भारत सदियों



अंतर्राष्ट्रीय योग दिवस कार्यक्रम में उच्च प्रौद्योगिकी केन्द्र के अधिकारी गण



एक विश्व गुरु रहा है। योग एक ऐसी सुलभ एवं प्राकृतिक फसदी है जिससे स्वास्थ्य मन एवं शरीर के साथ अनेक आध्यात्मिक लाभ प्राप्त किये जा सकते हैं।

तेल उद्योग विकास निगम के नोएडा स्थित भवन में अंतर्राष्ट्रीय योग दिवस 21 जून 2016 को मनाया गया। इस में उच्च प्रौद्योगिकी केन्द्र के अलावा तेल उद्योग सुरक्षा निदेशालय (OASD), ISPTL, राजीव गांधी पेट्रोलेियम प्रौद्योगिकी संस्थान (RIGIPET) ने भी हिस्सा लिया। कार्यक्रम की शुरुआत योग सत्र से हुई। अंतर्राष्ट्रीय शिवानंदा योग वेदांग केन्द्र के योग-गुरु एवं सहस्र द्वारा अधिकारियों को योगासन तथा प्राणायाम कराया गया। सत्परशात योगाचार्य द्वारा योग की उपयुक्तता तथा लोगों पर एक प्रस्तुतिकरण किया गया।

सुख्यामृतम्

श्री सत्यवीर सिंह ने, उच्च प्रौद्योगिकी केन्द्र में अक्टूबर 2016 से कार्यकारी सचिव के पद पर कार्यभार ग्रहण कर लिया है। श्री सिंह ने M.A. तथा L.L.B. की उपाधि C.C.S. विश्वविद्यालय मेरठ से हासिल की, तत्पश्चात उन्होंने IGNOU, दिल्ली से MBA (HR) तथा कार्मिक व्यवस्थापन में PGDPM उपाधि हासिल की है।

श्री सिंह ने अपने व्यावसायिक जीवन की शुरुआत इंडियन ऑयल कॉर्पोरेशन से की और रिफाइनरी मुख्यालय, मधुरा रिफाइनरी, पानीपत रिफाइनरी में विभिन्न पदों पर कार्य करते हुए 28 वर्षों का नैतिक अनुभव हासिल किया है।

श्री सिंह को मार्च 2016 में पदोन्नती मिली और वह कार्यकारी सचिव (ग्रैंड सी) के पद पर कार्यरत हैं।

उच्च प्रौद्योगिकी केन्द्र श्री सिंह का हार्दिक स्वागत करता है एवं उनके पदोन्नति पर बधाई देता है।



श्री सत्यवीर सिंह



श्री शशी कुमार शर्मा

श्री सतोष कुमार शर्मा ने उच्च प्रौद्योगिकी केन्द्र में अक्टूबर 2016 से संयुक्त निदेशक के पद पर कार्यभार ग्रहण किया है। श्री शर्मा ने अपने व्यावसायिक जीवन की शुरुआत भारत पेट्रोलेियम कॉर्पोरेशन से की और मुंबई रिफाइनरी में विभिन्न विभागों में कार्य करते हुए 14 वर्षों का अनुभव हासिल किया है।

श्री शर्मा ने सन 2002 में IT - रुइकी से रासायनिक अभियांत्रिकी में B. Tech. की उपाधि ग्रहण की तथा सन 2014 में S.P. Jain Institute of Management & Research, मुंबई से Executive MBA की उपाधि हासिल की है। उन्होंने Process Improvement Programms के अंतर्गत Six Sigma में ब्लैक बेल्ट भी हासिल किया है।

उच्च प्रौद्योगिकी केन्द्र ने श्री शर्मा का हार्दिक स्वागत है।



श्री नरेन्द्र प्रताप सिंह

श्री नरेन्द्र प्रताप सिंह ने उच्च प्रौद्योगिकी केन्द्र में मार्च 2016 से संयुक्त निदेशक के रूप में काम करना प्रारम्भ किया है। श्री सिंह ने अपनी बी. टेक. (संगणक प्रणाली और अभियांत्रिकी) की उपाधि, राष्ट्रीय प्रौद्योगिकी संस्थान अलाहाबाद से ग्रहण की है।

श्री सिंह ने अपने व्यावसायिक जीवन की शुरुआत 1988 में इंडियन ऑयल कॉर्पोरेशन की मधुरा रिफाइनरी से की। तत्पश्चात उन्होंने कॉर्पोरेट कार्यालय गुरुगांव तथा इंडियन ऑयल कॉर्पोरेशन के नई दिल्ली स्थित रिफाइनरी मुख्यालय में भी अपनी सेवाएं दीं। श्री सिंह को Software Development, Networking, Finance, SAP&R/3, Procurement, Data center management & Data analysis तथा Cyber crime में अत्याधिक अनुभव हासिल है।

उच्च प्रौद्योगिकी केन्द्र में उनका हार्दिक स्वागत है।

पदोन्नतियाँ



श्री आनंद शर्मा, उप निदेशक (विप), उच्च प्रौद्योगिकी केन्द्र, को इनके वैकल्पिक कार्यालय, इंडियन ऑयल कॉर्पोरेशन लिमिटेड में उप प्रबंधक के पद से प्रबन्धक के रूप में पदोन्नत किया गया। उनकी पदोन्नती पर उच्च प्रौद्योगिकी केन्द्र परिवार की ओर से उन्हें हार्दिक बधाई।



श्री अनांद कुमार बघत, सहायक निदेशक (निगम संसाधन), उच्च प्रौद्योगिकी केन्द्र, को इनके वैकल्पिक कार्यालय, इंडियन ऑयल कॉर्पोरेशन लिमिटेड में ग्रेड ए से ग्रेड बी में पदोन्नत किया गया। उनकी पदोन्नती पर उच्च प्रौद्योगिकी केन्द्र परिवार की ओर से उन्हें हार्दिक बधाई।

भावभीनी विदाई

किन्दुस्तान पेट्रोलेियम कॉर्पोरेशन लिमिटेड से प्रतिनियुक्ति अन्तार पर कार्यरत श्री विक्रम चड्ढा और श्री अंशुल अरोड़ा (सहायक निदेशक), भारत पेट्रोलेियम कॉर्पोरेशन लिमिटेड से श्री सुनील चौबरी (संयुक्त निदेशक), श्री स्नेहमय इलदर (अतिरिक्त निदेशक), श्री भस्म पाल (वैरिष्ठ सहायक) और इंडियन ऑयल कॉर्पोरेशन लिमिटेड से श्री सुभाष कुमार (निजी सचिव) को स्थानान्तरण होने के कारण उनके अपने वैकल्पिक कार्यालय भेजा गया।

उच्च प्रौद्योगिकी केन्द्र परिवार की ओर से इन सभी को भावभीनी विदाई देने के लिए एक समारोह का आयोजन किया गया। इस अवसर पर श्री बृजेश कुमार, कार्यकारी निदेशक, ने उच्च प्रौद्योगिकी केन्द्र को छोड़ कर जाने वाले सभी अधिकारियों की प्रशंसा की तथा उनके द्वारा दिए गए महत्वपूर्ण योगदान की सराहना करते हुए उनके उज्ज्वल भविष्य की कामना की। अधिकारियों ने इस कार्यलय में अर्पित अपने अनुभवों की जानकारी देते हुए सहयोग के लिए सभी का आभार प्रकट किया। इस अवसर पर उच्च प्रौद्योगिकी केन्द्र परिवार की ओर से कार्यकारी निदेशक द्वारा सभी अधिकारियों को स्मृति चिन्ह प्रदान किया गया।