आज़ादी का अमृत महोत्सव

ISO 9001:2015

उच्च प्रौद्योगिकी केन्द्र

पैट्रोलियम एवं प्राकृतिक गैस मंत्रालय, भारत सरकार

Centre for High Technology

Ministry of Petroleum & Natural Gas, Govt. of India

सीएचटी/एसएसी-97/
CHT/SAC-97/ 3574

10 जुलाई 2023
10th July 2023

सेवा में/ To,

पेट्रोलियम और प्राकृतिक गैस मंत्रालय की हाइड्रोकार्बन पर वैज्ञानिक सलाहकार समिति के अध्यक्ष, सदस्यगण, स्थायी व विशेष आमंत्रित अतिथिगण।
(संलग्न सूची के अनुसार)
Chairman, Members, Permanent & Special Invitees of Scientific Advisory Committee (SAC) on Hydrocarbons of MoP&NG
(as per list attached)

विषय: पेट्रोलियम और प्राकृतिक गैस मंत्रालय की हाइड्रोकार्बन पर वैज्ञानिक सलाहकार समिति (SAC) की 97वीं बैठक का कार्यवृत्त

Sub: Minutes of 97th Meeting of the Scientific Advisory Committee (SAC) on Hydrocarbons of Ministry of Petroleum & Natural Gas

प्रिय महोदय/महोदया / Dear Sir/Madam,

दिनांक 3 जुलाई, 2023 को वीडियो कॉन्फ्रेंसिंग मोड द्वारा सम्पन्न, पेट्रोलियम और प्राकृतिक गैस मंत्रालय की हाइड्रोकार्बन पर वैज्ञानिक सलाहकार समिति की 97वीं बैठक के कार्यवृत्त की प्रतिलिपि आपकी सूचना एवं आवश्यक कार्यवाही हेतु संलग्न की जा रही है।

Enclosed please find a copy of the Minutes of 97th Meeting of the SAC on Hydrocarbons of Ministry of Petroleum & Natural Gas held on 3th July, 2023 through video conferencing mode, for your kind information and necessary action.

सादर,
With kind regards,

भवदीय,
Yours sincerely,

आलोक शर्मा

(आलोक शर्मा)
कार्यकारी निदेशक
(Alok Sharma)
Executive Director

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10th July, 2023

Minutes of 97th Meeting of Scientific Advisory Committee (SAC) on Hydrocarbons of MoPNG

The 97th meeting of SAC was held on 03rd Jul 2023 through VC mode. The meeting was chaired by Dr Anil Kakodkar, Chairman, SAC. The list of participants is enclosed as **Annexure-I**.

ED-CHT welcomed the Chair, other esteemed Members of SAC and Special Invitees. ED-CHT briefed the SAC about the agenda. The agenda points of the meeting included the Select Committee Recommendation on proposals received under RFS-IV of PM JI-VAN Yojana and New R&D Projects received at CHT.

Chairman, SAC in his opening remarks expressed that implementation of Biofuels & PM JI-VAN Yojana is important and well organised logistics for biomass collection, processing and supply has the potential to improve rural economy and enquired about the progress of various approved/ recommended projects under RFS-I & RFS-III.

CHT updated SAC on the implementation status as under;

- PM JI-VAN Yojana announced by GOI in Feb 2019 provides for financial support to 12 Commercial scale 2G Ethanol Projects and 10 Demonstration scale projects based on lignocellulosic biomass.
- Phasing
    - Phase-I (2018-19 to 2022-23): 6 Commercial & 5 demonstration projects
    - Phase-II (2020-21 to 2023-24): 6 commercial & 5 demonstration projects
- **Commercial Projects**

    So far out of the 12 commercial projects as envisaged for financial assistance under PM JI-VAN Yojana, 1 project by IOCL under RFS-I has been commissioned and the other 3 projects are under implementation. Besides these 2 more projects have been approved under RFS-III and their status is as under;
    - The commercial projects by MRPL and Shell have been delayed mainly on account of difficulty in working out finance due to non-availability of clarity on 2G Ethanol price.

- **Demonstration Projects**

    So far out of the 10 demonstration projects as envisaged for financial assistance under PM JI-VAN Yojana, 2 projects one each by IOCL under RFS-I (approved in 2020) and HPCL under RFS-III have been approved. Their implementation status is as under;

    - Demo plant by IOC is yet to be commissioned. It was scheduled to be commissioned before commercial 2G ethanol plant (original commissioning schedule 1st April 2022).
    - The implementation of Demo plant by HPCL is delayed mainly due to change in location of the plant from Bihar to Andhra Pradesh and presently front-end engineering is in progress.
    - Chempolis has withdrawn its proposal after approval by the Steering Committee.

Chairman proposed that members of SAC may visit the 2G plant by Praj industries, 3G plant by LanzaTech and Demo plant by IOCL R&D at Panipat Refinery of IOCL.

Following points were discussed in the meeting:

1. RFS-IV proposals: Recommended by Select Committee under PM JI-VAN Yojana

RFS-IV was issued for 6 Commercial Scale and 7 Demonstration Scale 2G Integrated Bioethanol Projects on 15th Dec 2022, which was extended to 15th May 2023.

Under RFS-IV, 8 Commercial & 3 Demo plant proposals were received by CHT.

The following Select Committee was constituted by Chairman SAC for evaluation of proposals:

(i.) Shri Rajiv Aggarwal, Director (T), EIL – Chairman (SC)
(ii.) Dr. D.K. Tuli, Independent consultant, Bio-energy Chair
(iii.) Dr Sangeeta Kasture, Scientist F, DBT
(iv.) Mr Harsh Kumar, GM (F), IOCL RHQ
(v.) Shri Alok Sharma, ED (CHT) -Convener

Accordingly, meeting of the Select Committee of SAC was held on 29th May'23 at CHT, Noida. The meeting was attended by all the members of the committee.

1.1 <u>Commercial Scale Proposals</u>

1.1.1 Rice Cellulose Pvt. Ltd. (RCPL): The commercial plant of capacity 100 KLPD is proposed at Kurnool District in Andhra Pradesh with Rice straw & Corn Cob as feedstock. The total project cost is approximately Rs 1000 Cr. The Financial assistance sought is Rs 150 Cr.

PD has tied up with M/s Praj as technology provider for the commercial 2G ethanol plant. **This would be 4th plant based on Praj's Technology**. PD has indicated that financing of the project depends on 2G ethanol price, therefore a clarity is required on the same.

The project considers increase in the capacity of milling unit based on experience of IOC PR project, as the moisture content of the biomass is more than design level of 15%. The project also envisages downstream CBG production.

SAC deliberated on the proposal and the improvements in milling capacity & CBG plants being proposed that are improvements over the existing Praj Technology. Committee indicated that variation in moisture content of the biomass has significant effect on biomass transportation prices and suggested that Natural drying or solar drying solutions can be explored to control the moisture at storage depot.

Chairman SAC suggested that control of Moisture content may be explored in aggregator's framework.

SAC recommended the proposal for approval of Steering Committee.

Action By: CHT/RCPL

1.1.2 Khaitan Bio Energy Pvt Ltd (KBEL):

PD has submitted 4 proposals as per following details:

S.No.	Plant Location	Feedstock/ Capacity (KLPD)	Technology	Capex / FA sought (Cr. INR)
1	Rajpura Phase-1 Punjab	Rice straw / 100	In-House	1035/150
2	Rajpura Phase-2 Punjab	Rice straw / 100	In-House	991/150
3	Saharanpur, Uttar Pradesh	Rice straw / 100	In-House	1019/150
4	Lucknow, Uttar Pradesh	Rice straw / 100	In-House	1019/150

PD has worked on the demo plant funded by BIRAC and owns in-house patented technology for 2G Ethanol plant. As per the Annual Report of DBT for FY 21-22, the technology was mentioned to be at TRL-8 level.

PD indicated that their technology is slightly different from existing technologies in a way that Simultaneous Saccharification and Fermentation (SSF) is not done. Additionally, production of two by-products, Precipitated silica and Gypsum is proposed as part of the proposed project. PD also mentioned that they would prefer 2 plants each at two different locations (Panjab and U.P) to garner funding as well as derive cost benefit. PD further mentioned that clarity on pricing of 2G ethanol is also required for working out commercial viability of the plants.

SAC deliberated on the proposal and discussed the key advantages of the technology, economics and quality of the by-products being produced (Gypsum & Silica) and their effect on production cost of 2G ethanol. SAC also discussed regarding experience and financials of PD regarding eligibility criteria.

As regards, declaration of ethanol price by Government, SAC observed that recommendation to the Govt has already been given and the matter is with the Govt to decide.

As regards experience and financial criteria, it was noted by SAC that the proposal has been submitted by Khaitan Bio Energy Limited in which M/S Kapedome Enterprises Limited is having shareholding of 20.69% and rest is by the Khaitan family. PD has submitted credentials of its associate company M/s Kuantum paper Ltd, in which M/s Kapedome Enterprise is having major shareholding of 66.51%. PD requested for relaxation in the financial criteria.

PD through M/s Kuantum Paper Ltd meets the technical criteria, being having experience of handling biomass; but not the financial criteria as lead partner. SAC opined that the

relaxation can be given on criteria of financial capability based on the credential of the associate company.

SAC observed that one of the primary objective of PM JI-VAN yojana is to promote New Technologies and supporting 4 plants with the same technology and feed at one go, may not fulfil the purpose of the scheme.

After deliberations, SAC recommended that 2 plants on 2 different feedstocks (1 plant on Rice straw & another plant on Bagasse as a feedstock) is recommended to differentiate the plant performance on different feedstock, either at one location or two different locations. PD shall however, decide the locations of the recommended two plants. As biomass availability is seasonal, mixed feed i.e. 6 Month operation on Bagasse & 6 Month on Rice Straw can also be considered.

Action By: CHT/KEBL

1.1.3 Jindal Steel & Power Ltd (JSPL): The commercial plant of capacity 175 KLPD is proposed in the existing steel plant of JSPL Angul, Odisha based on industrial off gases as feedstock, which are currently being flared. The proposed technology partner in the proposal is M/s Lanzatech.

The total project cost is approx. Rs 1568 Cr. The Financial assistance sought is Rs 150 Cr.

SAC deliberated on the proposal. IOCL mentioned that a plant based on Lanzatech Technology for Fermentation of off gases at steel plants in China, which has been visited by IOCL-team. Further a bigger plant of Lanzatech technology has been put up at steel plant in Belgium which is also in operation.

It was noted that Industrial wastes as feedstock has been amended in National Biofuel Policy in 2022, but the same has not been incorporated in the current PM JI-VAN Yojana. However, it has been proposed in EFC document of PM JI-VAN Yojana.

It was deliberated that Steel production capacity in the country is expanding very fast and this could become an important source of 2G ethanol.

SAC recommended the proposal for approval of Steering Committee.

Action By: CHT/JSPL

1.2 <u>Demonstration Scale Proposals</u>

1.2.1 Lignopura Agrotech Pvt. Ltd. (LAPL): The demo plant of capacity 1.59 KLPD is proposed at Sangli in Maharashtra with Bagasse as feedstock. PD has developed in-house technology particularly in the pre-treatment section using oxygenated organic solvent producing ethanol yield of up to 31.8%.

The total project cost is approx Rs 26.6 Cr. The Financial assistance sought is Rs 15 Cr.

SAC opined that although the technology is primarily similar to that of Praj technology, more demo plants should be supported for innovations and growth of the technology in the country and there is enough space in the scheme.

SAC recommended the proposal for approval of Steering Committee for financial assistance of Rs 15 Cr. However, the Demo plant should be ready for testing of indigenous enzymes produced in the country.

Action By: CHT/LAPL

1.2.2 Godavari biorefineries ltd. (GBL): The demo plant of capacity 3 KLPD is proposed at Sameerwadi in Karnataka with Bagasse as feedstock. The total project cost is approximately Rs 36 Cr (excluding land cost). The Financial assistance sought is Rs 15 Cr.

SAC noted the novelty in pre-treatment of biomass (steam blasting) and that PD has in-house engineering capability available through their 1G venture and also in-house availability of bagasse.

SAC suggested PD to include xylose fermentation for better yield. Further, the Demo plant should be ready for testing of indigenous enzymes produced in the country.

SAC recommended the proposal for approval of Steering Committee for financial assistance of Rs 15 Cr.

Action By: CHT/GBL

CHT informed SAC that the following proposals were not recommended by Select Committee;

Project Developer	Plant Location	Feedstock / Capacity (KLPD)	Technology	Capex / FA (Cr. INR)	Remarks
Chhattisgarh Bio Fuels Authority (Demo)	Chhattisgarh	Rice Straw / 1.2	DBT-ICT	20/15	• **Tubular reactor design had limitations** • **Submitted Trial data of IGL Kashipur plant Not sufficient. (4 days data @5TPD provided)** • **TLA & FTO pending**
Spray Engineering Devices (Comm)	Bihar	Corn cob / 65	LanzaTech	980/100	• **Tech. PQ criteria not meeting RFS criteria** • **Turnover not meeting RFS criteria (<Rs. 250 Cr)** ○ **FY 2022-23: Rs. 392 Cr** ○ F.Y. 2021-22: Rs. 214 Cr ○ F.Y. 2020-21: Rs. 110 Cr ○ F.Y. 2019-20: Rs. 72 Cr • **DFR** (by 12th Jul'23)**, TLA and FTO awaited** • **Demo plant data not sufficient** • **Sourcing of biomass status is invalid**
ZGPL (Comm)	Bairabi, Mizoram	Bamboo / 100	LanzaTech	1000/150	•**Tech. PQ & Turnover Criteria not meeting** •**DFR, TLA, Land availability documents not submitted.**

SAC took note of the above.

General observation of SAC on PM JI-VAN Yojana:

(i.) It was observed that the PD applying under PM JI-VAN yojana are putting conditions for clarity on the price of 2G ethanol to work out their finance. The projects approved under RFS-III (Shell and MRPL) are also getting delayed on account of their inability to work out financial closure in absence of 2G ethanol price. SAC suggested that Government may declare the 2G ethanol price and also explore option to give separate mandate for blending of 2G ethanol with gasoline by OMCs on priority basis.

(ii.) CHT indicated that report has been submitted for 2G ethanol pricing based on framework followed by US and EU which considers carbon reduction. An incentive for technological developments has been further suggested by CHT till 2G technology maturing.

(iii.) Efforts should be made to publicise the scheme with state Govt. as well so as to seek their support in biomass aggregation as well as their financial assistance, as per PM JI-VAN Yojana.

Action By: CHT

2. Second milestone payment for 2G Ethanol commercial plant of IOCL at Panipat

IOCL, vide letter dated 6th Mar'23 (received by CHT on 13th Mar'23) has requested for the release of Rs 37.50 crore (2nd instalment of 25% of financial assistance of Rs 150 Crore) on completion of mechanical erection of the project.

Further, IOCL vide letter dated 18.04.2023 has requested to waive off the requirement of submission of three-year agreement for supply of Biomass along with 2nd instalment due to change in philosophy of Biomass aggregation for the plant.

During 96th SAC, CHT proposed for modification of payment clause for IOC 2G ethanol commercial plant for release of 2nd Instalment of Financial Assistance. SAC advised CHT to form a committee with approval of SAC chairman for due diligence of the case and get their recommendations.

Accordingly, following committee was constituted by Chairman SAC to carry out due diligence and submit its report;

(i.) Mr Rajiv Aggarwal, Director (T), EIL
(ii.) Dr D K Tuli, Independent consultant, Bio-energy Chair
(iii.) Dr Ravikumar, BPCL
(iv.) Mr S. Kulkarni, CHT

The committee has recommended the following:

IOC has submitted a letter from government of Haryana confirming, dedicated cluster for supply of biomass and also letter from government of Haryana to constitute a committee to make arrangements for a regular supply of paddy straw. Considering the same, the Committee has recommended that "it may be considered that IOCL has met the requirement for second milestone payment". In view of the above, it is proposed to waive

off the clause no. 5 (viii) of MoA as a special case to release 2nd milestone payment to IOCL. Further, in view of the problems experienced by IOCL, SAC may review requirement against second milestone payment for future RFS.

SAC deliberated and approved 2nd milestone payment disbursal of IOCL 2G plant

SAC suggested that most of the agriculture activities are the state subjects and a pragmatic view is required to be taken keeping a balanced view on protecting interest of marginalized farmers as well as interest of the industry with overall view of promoting availability and financial viability of these plants.

Action By: CHT/IOCL

3. New R&D Project Proposals

3.1 Pilot Scale Process Development for Generation of Pyrolysis oil from Multi-feed (Biomass, Tyre, Plastic) and its Co-processing in Refinery & Valorization of Biochar with LCA & Techno-economic Assessment: TERI/IOCL

Objective:

- The proposal is intended to establish a process for pilot scale pyrolysis of biomass / co-pyrolysis of biomass with used tyre, plastic etc. and upgradation of generated pyrolysis oil to reduce CCR, TAN oxygen and moisture. It further intends to valorize the bio-char to high porosity activated carbon This proposal also aims to co-process the pyrolysis oil/ upgraded pyrolysis oil in Delayed coking process. It further aims to explore the co-processing of pyrolysis oil/ upgraded pyrolysis oil in FCC at lab scale.
- Techno-economic analysis and LCA of pyrolysis product upgradation for Indian context

Project Deliverables:

- **Process/ Technology**: Biomass pyrolysis/ co-pyrolysis process and process for upgrading pyrolysis oil; Process for co-processing pyrolysis oil in Delayed Coker.
- **Product**: Pyrolysis / Co-pyrolysis products from 6 agri- crop residues (Mustard Husk, Paddy straw, Wood sawdust, Bagasse, Cotton stalk & Cashew nut shell) and quality char/activated carbon.
- **Data & Report**: Characterizations data of pyrolysis, co-pyrolysis and upgraded pyrolysis products;
- **Design / Software:** Design of future plants and sizing with economic models, recovery of chemicals from bio-oil; technical feasibility report for commercial demonstration.

Project Schedule for each Milestone:

S. No.	Activity	Timeframe (Months)
1	Detailed characterization of biomass and feedstock	0-12
2	Pyrolysis of feedstock for making bio oil and biochar	0-12
3	Upgradation of biomass pyrolysis products at pilot scale	6-24
4	Upgradation of co-pyrolysis products at pilot scale	12-36
5	Co-processing experiments	18-36
6	Biochar upgradation at Pilot scale as per leads obtained in lab scale	12-36
7	Techno-economic assessment (TEA) for refinery integration	30-36
8	Chemical recovery from pyrolysis oil (TERI) & Final report submission	12-36

Project Funding:

Total Project Cost (₹ lakh)	1179.62
Fund required CHT/ OIDB (₹ lakh)	548.29
Project Duration (Months)	36
PSU Partner	IOCL

SAC suggested IOCL for active participation in the project from the beginning and critically look into the bio-mass pyrolysis process with a view to take it to commercial level.

SAC recommended the proposal subjected to scope revision as per IOCL.

Action By: CHT/TERI/IOCL

3.2 Carbon Capture and Utilisation using Photosynthetic Bacteria: Caliche/BPCL

Objective:

- To develop a working pilot system for CO2 capture using purple non-sulphur bacterial system and production of important industrial chemicals/ fuels through photosynthetic bacteria route.

Project Deliverables:

- **Technology**: Technology to capture CO2 from flue gas and production of value-added products.
- **Product**: Bacterial Biomass and high value products such as Polyhydroxyalkanoates (PHA).
- **Data & Report**: Project report.

Project Schedule for each Milestone:

S. No.	Activity	Timeline (Months)
1	Feasibility study & prototype design at pilot scale	3
2	Optimization of scale of Carbon Capture	3
3	PNSB plant stage implementation	3
4	Feasibility study of power plant	2
5	Analysis for utilisation of H2 in FC	2
6	CO recycling option to boiler using short flame burner design	2
7	CFD modelling of Solvent flow & stripping tower	3

Project Funding:

Total Project Cost (₹ lakh)	96.41
Fund required CHT/ OIDB (₹ lakh)	47.01
Project Duration (Months)	18
PSU Partner	BPCL

SAC deliberated that there should be some clarity in the scope of the project that biomass /cell mass produced in the process can be used to produce valuable chemicals. Yield coefficient of biomass should be included in the proposal. Further scalability of the process at commercial scale may be examined.

SAC recommended the proposal subject to revision of scope and inclusion of information.

Action By: CHT/Caliche/BPCL

3.3 Real-time Corrosion Visibility and Forecast in Overhead Distillation Columns using Artificial Intelligence Tools: Corrosion Intel/BPCL

Objective:

- Use material structure, material properties, and combine with the operational parameters as well as fluid parameters for modelling corrosion progression on the overhead columns
- Usage of model to provide real time visibility into health of the o/h columns with AI.

Project Deliverables:

- **Product:** AI based Realtime Corrosion Visibility for Crude Overhead units
- **Software:** Cyber Security Z4

Project Schedule for each Milestone:

S. No.	Activity	Timeline (Months)
1	Planning & Requirement Analysis	0-2
2	Defining Requirements	1-3
3	Building & developing technology	3-12
4	Testing, validation & customisation	12-18

Project Funding:

Total Project Cost (₹ lakh)	91.88
Fund required CHT/ OIDB (₹ lakh)	45.48
Project Duration (Months)	18
PSU Partner	BPCL

SAC deliberated and suggested that time period for data collection by Caliche can be increased to minimum 1 year and historical data of Plant/ Lab of BPCL of about 3 years. This could be the starting point before inviting other Oil PSUs to share their plant data with IPR sharing.

SAC recommended the proposal subject to submission of revised proposal incorporating above suggestions.

Action By: CHT/Corrosion Intel/BPCL

3.4 Integrated systematic biological methanation: A complete solution to meet the energy demands under Carbon Neutrality (Integration of coal bio-transformation and CO2 bio-utilization): TERI/OEC

Objective:

- To develop an integrated process for enhancing biological methane generation by Coal Bioconversion and CO2 Bio-utilization from the coal bed methane (CBM) wells. It aims to demonstrate the process in suitable selected CBM wells (Jharia/ Bokaro/ Raniganj) at pilot-scale after detailed laboratory investigations. It further aims for Techno-economical assessment of developed bioprocess to establish the commercial feasibility.

Project Deliverables:

- **Technology**: Development and Demonstration of Integrated biological process for enhanced methane production under subsurface condition of coal seams for high calorific biomethane.
- **Product**: Bacterial-archeal consortia for enhanced methane generation by integrated bioconversion of coal to methane and bio-utilization of carbon dioxide to methane. Installation and operation of online monitoring equipment's at CBM field site of ONGC

- **Design / Software**: Response Surface Modelling for integrated process for enhanced biological methane production under subsurface conditions
- **Data & Report**: Project report on techno-economic assessment of developed process

Project Schedule for each Milestone:

S. No.	Activity	Timeline (Months)
1	Develop an integrated process for biological methane generation through Coal bioconversion and CO2 Bio-utilization	0-6
2	Evaluate the detailed mechanism of developed bioprocess to larger geographical and geological contexts	0-12
3	Core flood investigations and field demonstrations would be carried out in order to comprehend the potential of the developed process	12-18
4	Techno-economical assessment of developed bioprocess to establish the commercial feasibility	18-30
5	Academic, industrial, and social awareness towards the sustainability and circular methane economy	30-36

Project Funding:

Total Project Cost (₹ lakh)	506.06
Fund required CHT/ OIDB (₹ lakh)	227.26
Project Duration (Months)	36
PSU Partner	OEC

SAC deliberated and recommended the proposal.

Action By: CHT/TERI/OEC

3.5 Low pressure hydrogen storage tanks for two and three wheelers: IITB/BPCL

Objective:

- To make compact, easily scalable and standard canister with 1 kg capacity which can be easily stacked together to get in multiples of 1 kg, will be developed targeting vehicular applications like for three wheelers and 660 gm of hydrogen for two wheelers.

Project Schedule for each Milestone:

S. No.	Activity	Timeline (Months)
1	Synthesis and characterization of metal hydrides	0-6
2	Integration of metal hydride-based tanks developed with the vehicles	0-12
3	Performance evaluation and testing of the vehicle and standards development	9-24

4	Refuelling infrastructure requirements and techno economics	12-24
5	Techno economics for commercialization	12-24

Project Funding:

Total Project Cost (₹ lakh)	385.82
Fund required CHT/ OIDB (₹ lakh)	192.98
Project Duration (Months)	24
PSU Partner	BPCL

SAC deliberated and recommended the proposal

Action By: CHT/IITB/BPCL

4. R&D Project Proposals (Already deliberated by SAC)

4.1 Carbon capture by adsorption process from refinery flue gases at low temperature using novel porous organic polymeric (POP) adsorbents: IICT/BPCL

Objective:

- To develop one-pot multicomponent synthetic approaches to synthesis new family of POP based adsorbents with the integration of heteroatom functionalities (N, O, or S) at the molecular level and characterization for their structure and morphology.
- To study adsorption/desorption isotherms and sorption kinetics to assess their adsorption potential

SAC in its 95th meeting had deliberated on the proposal and advised for considering integrated approach for CO2 adsorption, transportation & valorization. SAC advised PI to discuss with BPCL and resubmit the proposal adhering to OIDB funding guidelines of 50 % max of total project cost.

PI has submitted the revised proposal in line with SAC recommendations.

- Project Duration: 36 months
- Total Cost: Rs 496.22 Lakhs
- Fund Sought from CHT: Rs 243.17 Lakhs

SAC deliberated and recommended the proposal.

Action By: CHT/IICT/BPCL

5. Re-appropriation of funds for "D&D of commercially viable fuel cell buses based on Hydrogen produced from multiple pathways": IOCL/IISc

IOCL via email on 19th June'23 has requested for Re-appropriation of the budget pertaining to biomass gasification project being pursued by IOCL & IISc:

Sl No	Item head	Approved budget as per MOA	Re-appropriation requested	Justification
A	**Non-recurring**			
1	Equipment and fabrication	9,98,00,000	7,67,44,250	Equipment and fabrication, & facility/infrastructure budget reduced after critical review of each component and negotiations with IISc
2	Facility/ infrastructure		1,47,50,000	
	Sub-total A	9,98,00,000	9,14,94,250	
B	**Recurring**			
3	Manpower	5,62,00,000	7,60,90,622	Manpower budget increased due to increased manpower requirement from IISc due to requirement of optimization both oxy-steam biomass gasification and vacuum pressure swing adsorption processes at both 1.5 kg/h and 5 kg/h hydrogen production scales meeting desired hydrogen yield as well as PEM fuel cell fuel quality requirements. This would ensure robust and optimal process & plant design. Further additional manpower is also required by IISC for installation and commissioning of scaled up 10 kg/h hydrogen production demonstration plant to be set up at IOC-R&D.
4	Operational expenditure/ Consumables	4,17,00,000	2,29,18,182	In the approved budget, overhead component was included under operational expenditure. Now overhead component is separately indicated.
5	IT Tools	1,40,00,000		
6	Travel	84,00,000	76,95,000	Manpower from IISc proposed to be involved during installation, commissioning and stabilization of 10 kg/h hydrogen generation plant at IOCL R&D. Accordingly expenditure towards travel, boarding etc. revised
7	Contingency		18,92,855	
	Sub-total B	12,03,00,000	10,85,96,659	
C	Overheads (@10% of non-recurring and recurring)	-	2,00,09,091	In the approved budget, overhead component was included under operational expenditure. Now overhead component is separately indicated.
D	Total (A+B+C)	22,01,00,000	22,01,00,000	

OIDB has however, mentioned that re-appropriation of funds from Capital to Revenue is not permissible as per GFR. The proposal needs approval of GC of CHT.

SAC took note of the comments provided by OIDB.

Action By: CHT/IOCL

Annexure-I

List of Attendees for 97th meeting of SAC

	Name	Designation	Organization
CHAIRMAN			
1	Dr. Anil Kakodkar	Former Chairman, AEC	BARC
MEMBERS			
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3	Prof. A. B. Pandit	Vice Chancellor	ICT, Mumbai
4	Prof. Lakshmi Kantam Mannepalli	Professor	ICT, Mumbai
5	Prof. Sanjay M. Mahajani	Professor	IIT, Mumbai
6	Prof. Vijayamohanan K. Pllai	Professor	Indian Institute of Science Education & Research, Tirupati
7	Dr. R. K. Malhotra	Former Director General	FIPI
8	Sh. R. Ramachandran	Former Director (Refineries)	BPCL
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11	Mr. Sanjay Khanna	Director (R)	BPCL
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13	Dr. S.S.V. Ramakumar	Director (R&D)	IOCL
14	Mr. Rajiv Agarwal	Director (T)	EIL
15	Ms. Varsha Sinha	Secretary (attended by Mr R K Saini)	OIDB
16	Ms. Sushma Rawat	Director (Exploration)	ONGC
17	Mr. Sanjay Verma	Director (R) (attended by Mr. Nandakumar, CGM)	MRPL
PERMANENT INVITEE			
18	Dr. Ravikumar V.	Head (R&D) (attended by Dr Jaya Rawat)	BPCL
19	Mr. V K Maheshwari	ED (R&D)	HPCL
20	Mr H Shankar	Head (R&D)	CPCL
21	Mr. R N Maiti	Head (R&D)	EIL
22	Mr. Sanjeev Kumar	Head (R&D)	GAIL