Azadi Ka Amrit Mahotsav

ANNUAL REPORT
2023-24

SSS NIBE

Sardar Swaran Singh National Institute of Bio-Energy, Kapurthala

(An Autonomous Institution of Ministry of New and Renewable Energy)

Annual Report
2023-24

SARDAR SWARAN SINGH

NATIONAL INSTITUTE OF BIO-ENERGY

An Autonomous Institution of
Ministry of New and Renewable Energy
Kapurthala – 144603, India

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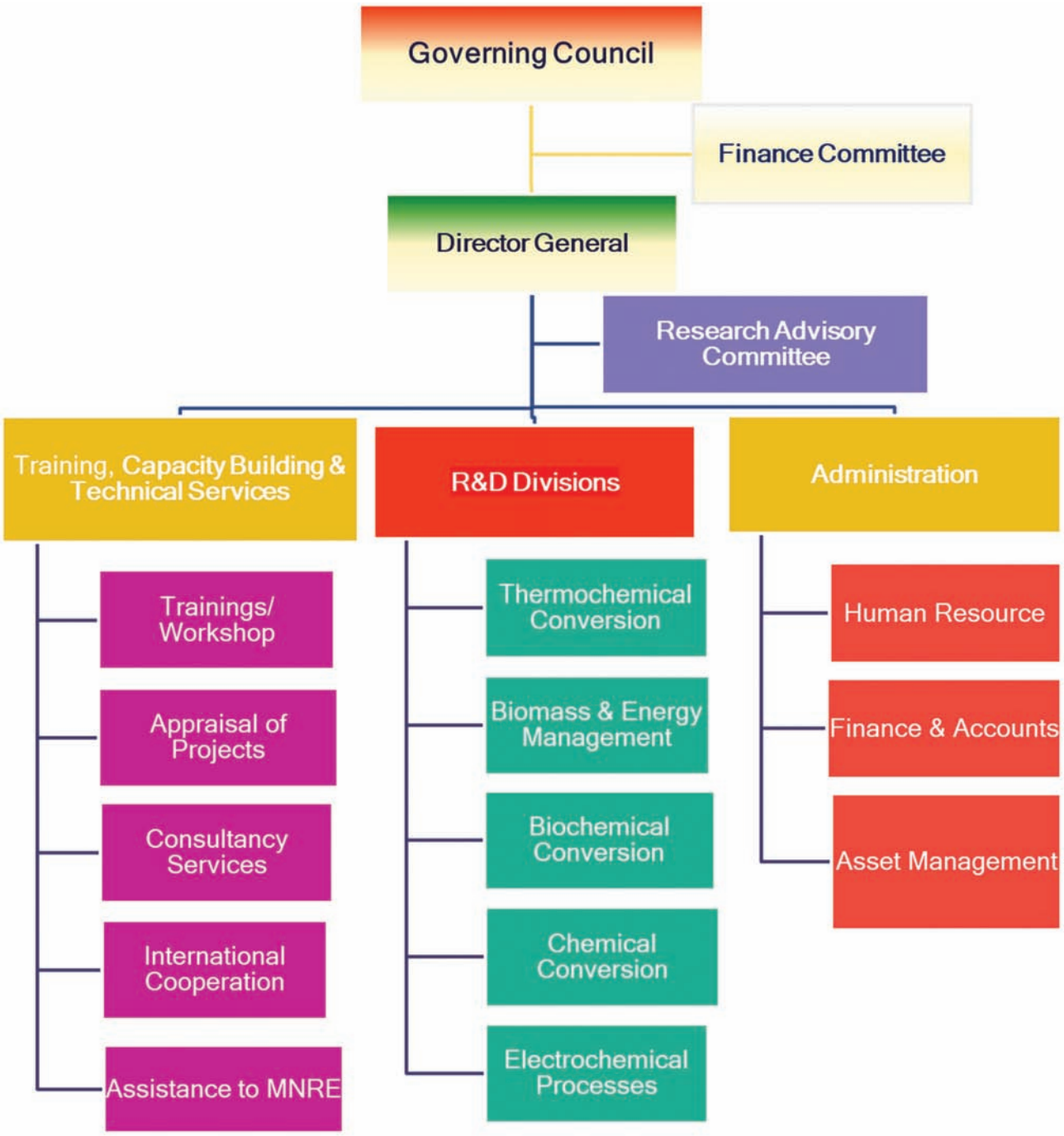
"Green Future, Net Zero aren't just fancy words but reflect India's need and commitment, making it the best destination for investment and innovation in renewable energy"

- Hon'ble PM Shri Narendra Modi

FUNCTIONAL STRUCTURE



Message from Secretary's Desk

भूपिन्दर सिंह भल्ला, भा.प्रा.से.
सचिव
Bhupinder S. Bhalla, IAS
Secretary

भारत सरकार
नवीन और नवीकरणीय ऊर्जा मंत्रालय
GOVERNMENT OF INDIA
MINISTRY OF NEW AND RENEWABLE ENERGY

It is my pleasure to present the Annual Report for 2023-24, as Chairman of the Governing Council of the Sardar Swaran Singh National Institute of Bio-Energy (SSS NIBE), Kapurthala. I take this opportunity to commend SSS NIBE's efforts and commitment to research, innovation, and the dissemination of knowledge for advancing bioenergy across the nation.

Bioenergy plays a crucial role to achieve energy security and sustainability. India, with its vast agricultural and biomass resources, has tremendous potential to lead the global transition toward renewable energy. SSS NIBE is working on pressing scientific challenges being faced in the sector to facilitate harnessing the potential of bioenergy for a clean and green future. I am happy to see that over the past year, the institute has further strengthened its research portfolio across a broad spectrum of bioenergy pathway, such as biogas, biohydrogen, biomass pellets, biomass resource management among others. To strengthen and accelerate R&D, I understand the institute has also signed strategic MoU with institutes of international repute. These efforts are necessary for faster realization of technologies and ensuring that bioenergy can meet the energy demands of the future while fostering sustainability.

In addition to its research endeavours, SSS NIBE has continued to serve as a hub for academic excellence through its joint M. Tech program in Renewable Energy with NIT Jalandhar. SSS NIBE is also actively contributing to skill development and knowledge enhancement in the sector with its training programs / workshops on pertinent themes. It was privilege to launch the **Bioenergy Anthem** of MNRE at the 4th International Conference on Recent Advances in Bio-energy Research in October 2023 organized by NIBE.

Looking ahead, I feel confident that SSS NIBE, with its state-of-the-art infrastructure, dedicated staff, and committed leadership, will play an instrumental role in India's bioenergy revolution and contribute to our goal of achieving a sustainable, self-reliant, and low-carbon economy.

I extend my heartfelt appreciation to the entire team at SSS NIBE for their tireless efforts and commitment as I release the annual report for 2023-24, highlighting the accomplishments and activities undertaken by SSS NIBE throughout the year.

(Bhupinder S. Bhalla)
Chairman,
Governing Council SSS NIBE &
Secretary MNRE

अटल अक्षय ऊर्जा भवन, गेट नं २ के सामने, सी.जी.ओ. काम्प्लैक्स, लोदी रोड, नई दिल्ली–110003
Atal Akshay Urja Bhawan, Opp. Gate No. 2, CGO Complex, Lodhi Road, New Delhi-110003
Tel. : 011-20849010, 20849011 • E-mail : secy-mnre@nic.in

Message from the Director General

सरदार स्वर्ण सिंह राष्ट्रीय जैव-ऊर्जा संस्थान
(नवीन और नवीकरणीय ऊर्जा मंत्रालय, भारत सरकार)
12 किमी. पत्थर, जालंधर-कपूरथला रोड, वडाला कलां, कपूरथला (पंजाब)144603
फोन नं० 01822-507401, ईमेल:dg.nibe@nibe.res.in, वेबसाईट: https://nibe.res.in
Sardar Swaran Singh National Institute of Bio-Energy
(An Autonomous Institute of Ministry of New and Renewable Energy, Government of India)
12 Km. Stone, Jalandhar-Kapurthala Road, Wadala Kalan, Kapurthala (Punjab)-144603.
Ph.: 01822-507401, e-mail: dg.nibe@nibe.res.in, website https://nibe.res.in
डॉ. जी. श्रीधर
महानिदेशक
Dr. G. Sridhar
Director General

Biomass can play a critical role in reducing atmospheric carbon dioxide levels and mitigating climate change. Biomass is poised to become a major stakeholder in meeting our country's energy needs in the future. Biomass is a versatile fuel that can be used to produce electricity, heat, and transportation fuels, offering a flexible solution to various energy needs. Biomass can be an effective tool for mitigating climate change by promoting the use of biochar for carbon sequestration and also enhance soil fertility. However, there are also challenges, such as ensuring sustainable biomass supply, avoiding competition with food production, and managing the environmental impacts of biomass harvesting. Addressing these challenges through innovation and policy support can help Bioenergy play a pivotal role in achieving a sustainable energy future.

With a boost being received for the bioenergy sector from the Government, Sardar Swaran Singh National Institute of Bio-Energy (SSS NIBE), Kapurthala with its dedicated focus on the bioenergy sector is certain to play a major role in times to come. On the R&D front, both Applied research and Pilot Technology validation received fillip. On the Applied research front, there has been progress on Bio H2 – biochemical pathway, biochar and finding the biomarker for paddy straw in unknown biomass pellet. On the pilot / technology validation, NDA has been signed with over six SMEs including start-up for setting up of biogas plant based on in-house thermophilic technology using a range of feedstocks including Napier grass, paddy straw and organic waste from MSW. A few of these plants are expected to become operational by end of 2024. The institute has made modest contribution to publications, which includes over 35 journal or conference papers including book chapters that have been published, along with 2 patents.

This year also saw launch of new bilingual website of the institute, a user-friendly site which hosts a) National Biomass Atlas-a graphical database of state-level surplus biomass resource in the country and b) National Livestock Biomass Atlas – a graphical database of state-level waste from livestock in the country. These Atlas will be periodically updated along with interactive features in times to come.

One of the biggest achievements of the institute is successful conducting of 4th International Conference on Recent Advances in Bio-energy Research-2023 (ICRABR-2023). The diverse participation received from over 300 National / International participants from all these stakeholders fructified the aim of the conference. This event has provided better visibility of the institute at the National and International levels.

On the academic front, I am glad to share that third batch of M. Tech (Renewable Energy) students have graduated and successfully placed in industry / academics, similarly there has been increase in enrolment of students for the fourth batch that commenced in 2024. On the capacity building and outreach front, the institute has successfully conducted hands-on training program / workshop on biogas technology and Biomass-based Clean Cooking Solutions.

With institute's high end instrumentation lab facilities improving year-on-year, a no. of industries / agencies have been availing the facility for biomass composition analysis and biogas potential etc. As a further step, these labs are soon expected to be accorded with NABL accreditation, for quality and reliable results. The academic, training, testing, evaluation activities have generated modest revenue to the institute and this is expected to grow in future.

To strengthen and accelerate R&D, our institute signed strategic MoU with institutes of International repute such as IIT Roorkee, NAL Bengaluru and Indian Biogas Association. This will MoU will further both on academic and R&D fronts.

The institute also actively participated in contributing to technical programmes and meetings relating to bio-energy entrusted by MNRE including acting as the Central Nodal Agency for biogas implementation program in the country. The prominent ones include my role as a sub-committee member under the SAMARTH mission of the Ministry of Power.

In the coming years, the institute aims to focus on building our core research strength in developing technologies and solutions that have societal relevance and uphold the spirit of innovation, collaboration and excellence and thereby enhance the contribution of bio-energy to India's attainment of the net zero target by 2070.

I appreciate the efforts of all the staff and students at the institute for successfully completing their tasks and am delighted to release the annual report for 2023-24.

Dr. G. Sridhar
Director General

THE CHARTER

The Sardar Swaran Singh National Institute of Bio-Energy (SSS NIBE), Kapurthala was established in 1998 as an autonomous R&D institute under MNRE, Government of India. SSS NIBE is managed by a Governing Council headed by Secretary, MNRE and the Director General is the head of the institute. The Institute is situated in a campus of 75 acres with a unique solar passive structure office building at the 12th km Milestone, Jalandhar-Kapurthala national highway.

SSS NIBE was established to serve as a focal point of excellence for carrying out R&D, testing, evaluation, and training in bio-energy. The Institute has five research divisions, which are Biomass and Energy Management, Thermochemical, Biochemical, Chemical, and Electrochemical Processes, and all the divisions are working on approaches to enhance the usage of biomass, creating the right awareness and technology demonstrations. The institute is well equipped with the research infrastructure and an eco-friendly research environment. The broad spectrum of these divisions includes biomass resource assessment & management, biomass characterization, gasification, combustion, pyrolysis, solid waste / solid-state bio-methanation, biohydrogen production, compressed biogas, municipal solid waste (MSW) to power generation, hybrid biomass systems, testing & standardization, and training for skill development in the bio-energy sector.

MISSION

SSS NIBE, a knowledge-based R&D institution of high quality and dedication, offers services and seeks to find optimum solutions for the major stakeholders across the entire spectrum of the bio-energy sector. It will support bio-energy sector in developing the knowledge for promoting new technologies. It will develop Human Resources for the bio-energy sector at all levels by imparting the training and allied activities to professionals of bio-energy sector

OBJECTIVES

To establish "Sardar Swaran Singh National Institute of Bio-Energy" as an apex R&D institution responsible for conducting state-of-the-art research and development activities in all the areas relating to renewable / bio-energy sources, including human resource development at all levels, post-doctoral research and research leading to commercialization of bio-energy technologies and the activities entailing:

1. Technology assessment, resource surveys and potential assessment.
2. In-house R&D in all emerging bio-energy areas.
3. Sub-contracting of R&D activities.
4. Joint technical programmes with other national institutions and testing centres.
5. Setting up of specialized centres at SSS NIBE and in different parts of the country for specific bio-energy areas.
6. Testing and certification of devices and systems.

7. Techno-economic evaluation of bio-energy equipment and systems.
8. Creating database for bio-energy including information on patents.
9. Compiling and dissemination of information on resources, technologies, products and applications.
10. Providing technical support to industry on new product design and development, and upgradation of product and manufacturing process.
11. Organizing training programmes, seminars and workshops.
12. Cooperation with scientific and technical institutions abroad under bilateral and multilateral agreements.
13. Economic studies on bio-energy technologies and their environmental impact.
14. Assistance in curriculum development in bio-energy and undertaking concrete programmes for human resource development.
15. Consultancy services in the renewable energy sector with specialization in Bio-energy.
16. Providing technical support to MNRE in policy, planning and implementation.

To promote and develop requisite expertise and capabilities in regard to such technologies and applications, as may be deemed appropriate, to improve applied R&D skills and provide, organize, manage scientific, technical, engineering, management and other related assistance in promotion, development, demonstration, dissemination, and adoption of appropriate environment friendly technologies.

To provide various services including:

1. Planning, formulation, appraisal and monitoring.
2. Assessment, evaluation, implementation and management.
3. Development of projects, products, technology, management, reliability, maintenance, testing, design and other scientific technical and engineering inputs.
4. Management service, training, information, market development, etc.
5. Organizing training, study tours, seminars, workshops, etc.
6. Applied research & development.
7. Technical, scientific, managerial and engineering consultancy services.

SSS NIBE's Committees

Governing Council

PRESIDENT OF THE SOCIETY & CHAIRMAN

Secretary
Ministry of New and Renewable Energy, New Delhi

MEMBERS

Joint Secretary/Advisor, Bio-Energy
Ministry of New and Renewable Energy, New Delhi

Joint Secretary& Finance Advisor
Ministry of New and Renewable Energy, New Delhi

Secretary
Department of Biotechnology, New Delhi

Secretary
Department of Science & Technology

Principal Secretary
Department of Science, Technology & Environment, Govt. of Punjab

Chief Executive Officer
Punjab Energy Development Agency, Chandigarh

Scientist-in-Charge
Centre of Excellence for Farm Machinery, CSIR-CMERI, Ludhiana

Chief Executive Officer
Skill Council for Green Jobs, New Delhi

Director
Dr. B. R. Ambedkar National Institute of Technology, Jalandhar

Prof (Dr.) S. Dasappa
Center for Sustainable Technologies, IISc Bangalore

Chairman
Indian Biogas Association, Gurugram

MEMBER SECRETARY

Director General
Sardar Swaran Singh National Institute of Bio-Energy, Kapurthala

SSS NIBE's Committees

Finance Committee

CHAIRMAN

Joint Secretary & Finance Advisor
Ministry of New and Renewable Energy, New Delhi

MEMBERS

Chief Controller of Accounts
Ministry of New and Renewable Energy, New Delhi

Joint Secretary/Advisor, Bio-Energy
Ministry of New and Renewable Energy, New Delhi

Director General
Sardar Swaran Singh National Institute of Bio-Energy

Director, PEDA
Punjab Energy Development Agency, Chandigarh

Director (Bio-Energy)
Ministry of New and Renewable Energy, New Delhi

Deputy Secretary, IFD
Ministry of New and Renewable Energy, New Delhi

Head of Department
Center for Energy and Environment
Dr. B R Ambedkar National Institute of Technology, Jalandhar

MEMBER SECRETARY

Scientist
Sardar Swaran Singh National Institute of Bio-Energy, Kapurthala

SSS NIBE's Committees

Building & Works Committee

CHAIRMAN

Director General
Sardar Swaran Singh National Institute of Bio-Energy

MEMBERS

Director, (Bio-Energy)
Ministry of New and Renewable Energy, New Delhi

Executive Engineer (Civil)
CPWD, Jalandhar Circle

Assistant Engineer (Electrical)
CPWD, Jalandhar Circle

MEMBER SECRETARY

Assistant Engineer (Civil)
Sardar Swaran Singh National Institute of Bio-Energy

SSS NIBE's Committees

Research Advisory Committee

CHAIRMAN

Director General
Sardar Swaran Singh National Institute of Bio-Energy, Kapurthala

MEMBERS

Joint Secretary/ Advisor, Bio-Energy
Ministry of New and Renewable Energy, New Delhi

Prof. Ashok Gadgil
Lawrence Berkeley National Laboratory, USA

Prof. Ajay K Dalai
University of Saskatchewan, Canada

Prof Rajesh K Sani
South Dakota School of Mines, USA

Prof. K. A. Subramanian
HoD ESE, IIT Delhi

Director (Technical)
NISE, Gurugram

Director (Technical)
NIWE, Chennai

Industry Representatives, Nominated by DG, SSS NIBE

Representative from DBT

Representative from Science & Technology Dept.
Govt. of Punjab

MEMBER SECRETARY

Scientist
Sardar Swaran Singh National Institute of Bio-Energy, Kapurthala

TECHNOLOGICAL HIGHLIGHTS

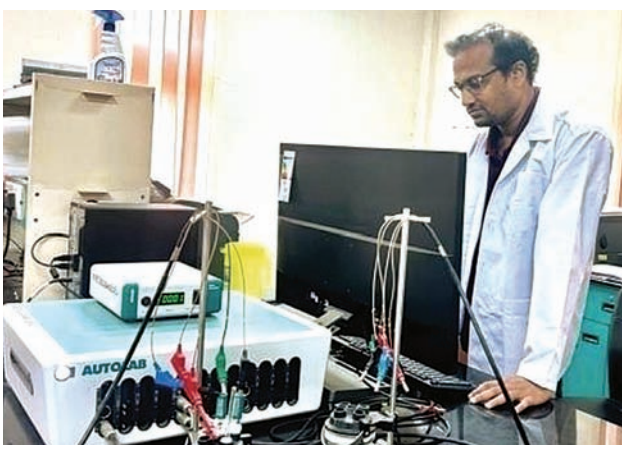
- **Laboratory Facilities**
- **Division Wise R&D Progress**
- **Sponsored or External Funded Projects**
- **Academic Program**

LABORATORY FACILITIES

A. Facilities available in Chemical Conversion Division & Electrochemical Division (R&D-I)

The equipment facilities available in Chemical Conversion& Electrochemical Divisions are:

Gas Chromatograph	Electrochemical Work Station
Automatic Density Meter	Infrared Lamp
True Boiling Point Distillation Apparatus	pH & Conductivity Meter
Rams bottom Carbon Residue	Flashpoint apparatus (automatic open cup)
Oxidation Stability Apparatus	Rotary Vacuum Evaporator
Radleys Reactor	Computerized Diesel Engine Test Rig
FTIR Spectrometer	Exhaust gas analyzer
High-Pressure High-Temperature Reactor	Fuel analyser for diesel index/Cetane No.

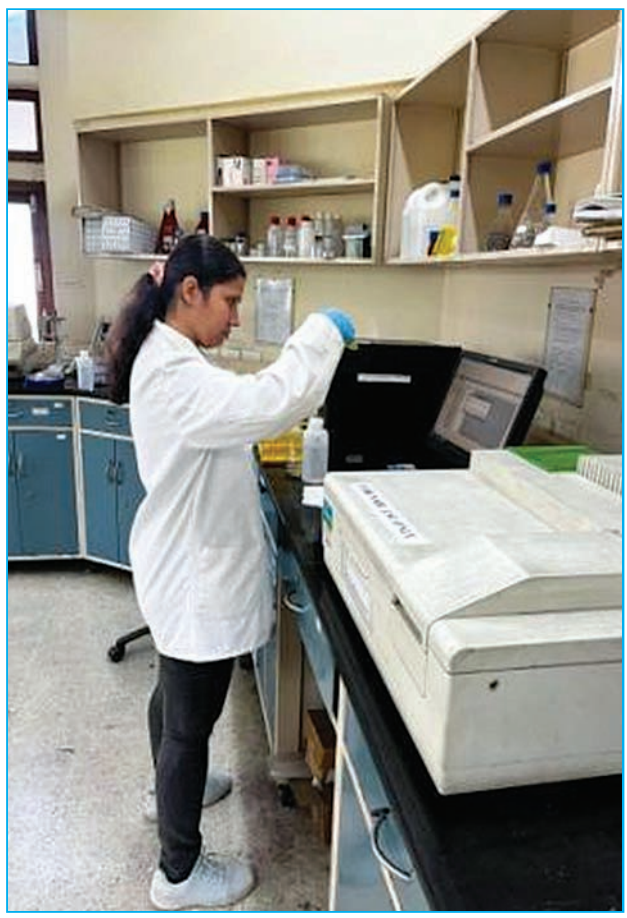




Researchers working in R&D-I Division

B. Facilities available in Biochemical Conversion Division (R&D-II)

The Biochemical Conversion Division has been established in R&D-II with the facilities of Analytical, Bioprocess, Microbiology, and Molecular Biology Laboratories. The equipment facilities available in Biochemical Conversion division include:

High Pressure Liquid Chromatography	Microscope with a camera
Gas Chromatography	Incubator
UV-vis spectrophotometer	CO_2 Incubator-cum-shaker
Fibertech	BOD Incubator
Bioreactor (3.0 & 7.5 L)	Hot Air Oven
Refrigerated Centrifuge	Horizontal Laminar Flow
Water Purification System	Automatic Colony Counter
Lyopholizer	Deep Freezer
Micro-disintegrator	Refrigerators
Water Bath	Gradient PCR
Autoclaves	Real-Time PCR
Environmental Shaker	Horizontal Gel Electrophoresis
Bio photometer	Gel Documentation
SDS-PAGE	Electroporation Unit

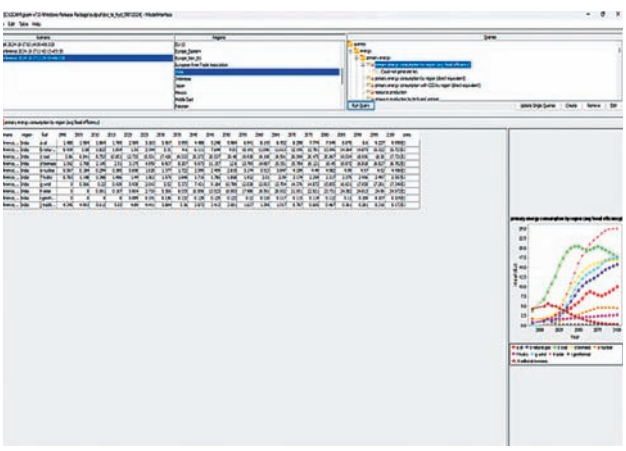


Researchers working in R&D-II Division

C. Facilities available in Thermo-chemical Conversion Division (R&D-III)

The Thermochemical Conversion Division has been established in R&D-III with the facilities for biomass characterization, biomass gasification, and Cookstove testing, etc. The available equipment facilities:

CHNS analyzer	TG-DTA
Online Gas Analyzer	Bomb Calorimeter
Stack Monitoring System (for SPM measurement)	Muffle Furnace
Testing Hood for biomass Cookstove	Multi Gas Analyser
Solar Concentrator Training System (Parabolic Trough Collector Based)	Solar PV Emulator
Solar PV Grid-Tied Training System	Solar PV Training & Research System (Stand Alone System)
Solar Thermal Training System (Flat Plate Collector Based System)	Wind Turbine Emulator
Differential Scanning Calorimeter	Wind Energy Training System
High Pressure Reactor	Fume Hood



Researchers working in R&D-III Division

DIVISION WISE R&D PROGRESS

A. Biomass and Energy Management Division

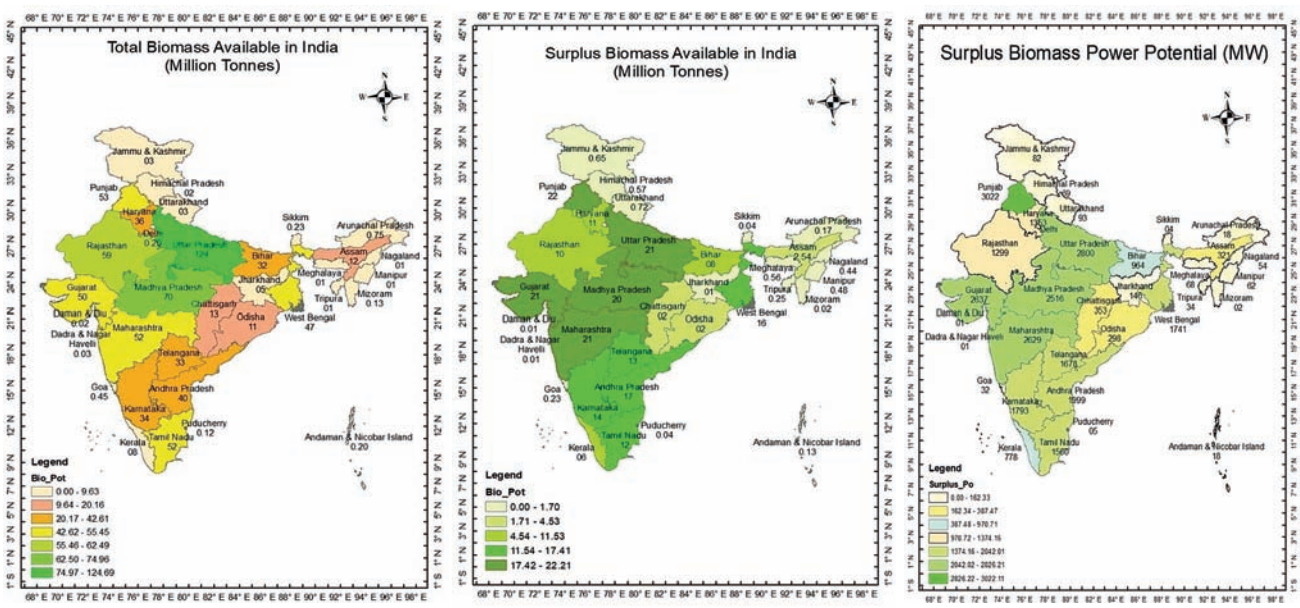
Biomass and Energy Management Division has started several initiatives in the past year. A reliable biomass supply is critical to the success of any commercial bio-energy project. Recognizing the importance of biomass resource management, the division has focused on assessing surplus biomass from agricultural activities using an evaluation study completed by Administrative Staff College of India (ASCI) for the Ministry of New and Renewable Energy (MNRE), Government of India. The Division has developed an open access digitized National Biomass Atlas for easier understanding of the biomass availability scenario in the country (URL: https://www.nibe.res.in/biomass-atlas.php).Utilising this research as a foundation, more studies are being conducted to estimate the availability of biomass in the country and evaluate the energy potential of surplus biomass.

1. National Biomass Atlas of India

The salient features of the National Biomass Atlas are:

- Graphically presents the state-wise total and surplus biomass availability in the country.
- State-wise and Crop-wise surplus biomass availability for the different important crops.
- State-wise and crop-wise fractions of the different residues available per crop for the various important crops.
- Images of the different crops considered with their crop residue ratios.

The atlas will provide useful information to all the concerned stakeholders in the biomass and bio-energy sector including academics, government officials, industry representatives, entrepreneurs, policymakers, and the general public.

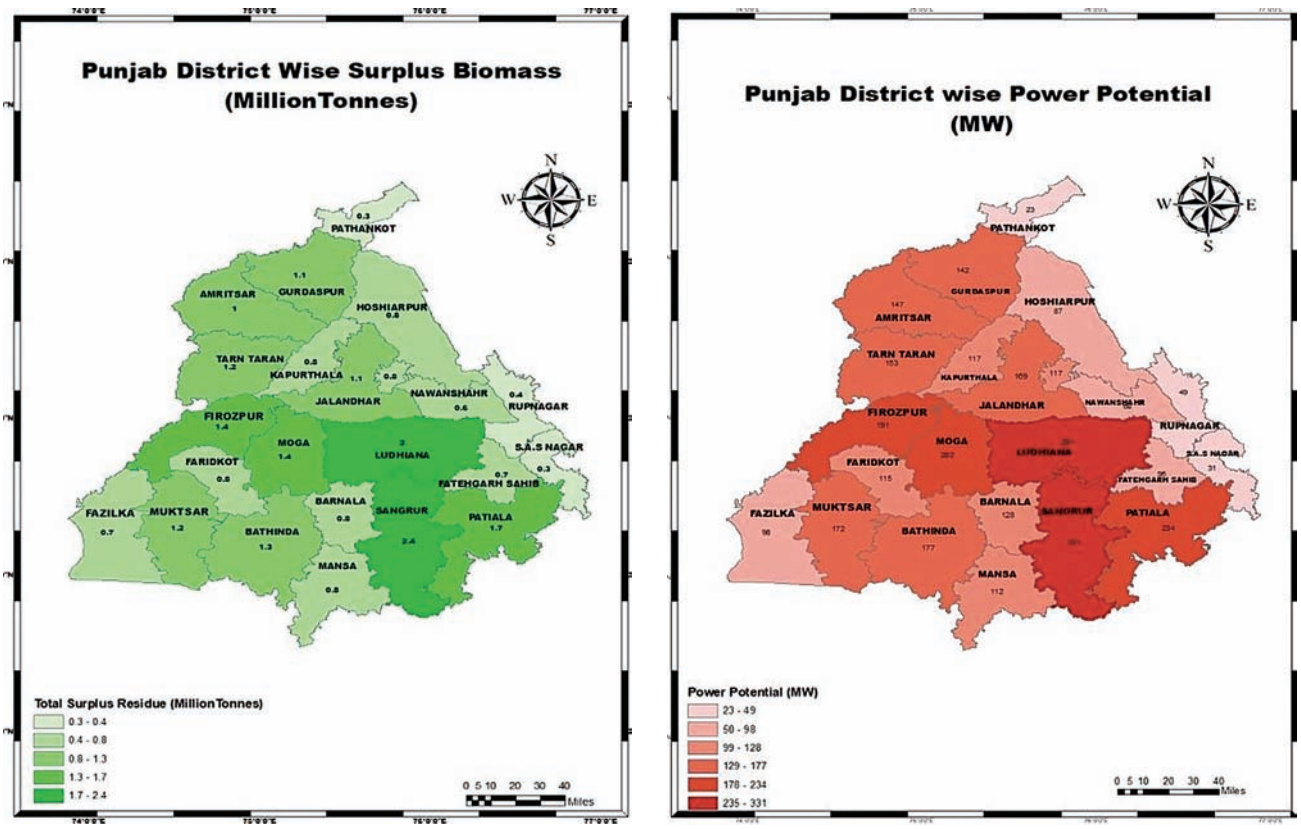


Total Biomass availability, Surplus Biomass Availability and Biomass Power Potential in India

a) District-level updating of the National Biomass Atlas of India

The scope of the atlas is being extended to provide district level information on biomass availability and its bioenergy potential.

- Activities have been initiated with the state of Punjab. Crop statistics data, like crop production, crop area, and crop yield was collected for 22 districts of Punjab.
- The collected data was further assessed for crop wise Gross biomass and the surplus biomass availability produced in all the districts and the surplus biomass based bio-energy potential was determined.



District wise Surplus Biomass Availability and Power Potential for Punjab

- The district wise atlas of Punjab indicates the Surplus Biomass availability and District-wise Power Potential. It has been estimated that Punjab has around **22.8 Million Tonnes** of Surplus biomass with **3100.7 MW** of Power Potential. The district-wise atlas for Punjab will be hosted on the SSS NIBE website soon.
- In future, total and surplus biomass availability and bio-energy potential for each district from all the states in India will be assessed.

2. Progress on Livestock-waste energy Atlas of India

Livestock manure is another important biomass resource in the country having significant bioenergy generation potential. Recognizing its importance the division has initiated work on the estimation of Livestock biomass availability and its bioenergy potential in the country. For this the livestock (Cattle, Piggery, Poultry) population based on the 19th and 20th livestock census for the years 2012 and 2019,

respectively, has been collected from Department of Fisheries, Animal Husbandry and Dairying, Government of India. The work on the livestock atlas is ongoing.

The salient features of the Atlas will be:

- Graphically present the state-wise annual biogas / CBG generation potential and power generation potential based on the considered Livestock Census.
- Considers three major livestock categories: (a) Cattle (b) Poultry (c) Piggery.
- The assessment for each livestock category will include:
  - ✓ Biogas generation potential
  - ✓ Annual CBG generation potential
  - ✓ Annual Power generation potential
  - ✓ Annual LPG replacement potential

Preliminary assessments indicate that national livestock manure based annual biogas generation potential is **20357 million m^3** and power generation potential is **4303 MW.**

The other activities carried out in the division include studies on biomass supply chain management and experimental trials on smart hybrid anaerobic digestor. These are explained in some detail below:

3. Global Change Analysis Model (GCAM) training for biomass supply chain (BSC) assessment by PNNL, USA under the US SAGE 2.0.

The South Asia Group for Energy (SAGE) is a consortium consisting of USAID, the US Department of Energy (DOE) and their National Laboratories (PNNL and NREL). Under the US SAGE program, SSS NIBE and PNNL are working together on the training and use of Global Change Analysis Model (GCAM), a global model that represents the behavior of and interactions between five systems: the energy system, water, agriculture and land use, economy, and climate. It was developed by PNNL in the year 1980 and has evolved since, in response to the need to address an expanding set of science and assessment questions. Under this program, the following activity was carried out:

- Scientist and students fromthe division are undergoing atraining by PNNL, USA on Distribution, Availability and Supply Chain aspects for future biomass scenarios in GCAM software.
- An industrial survey questionnaire has been prepared for collection of relevant data for different bioenergy technologies fromindustries.
- The outputs therefrom will be used in GCAM and the supply curves will be studied accordingly.

4. Smart Hybrid Anaerobic Digester

Thermal energy is required to maintain temperature in anaerobic digesters to produce biogas and bio-manure through the decomposition of organic waste. Controlled higher temperatures in the digesters may lead to higher gas yield and reduced retention times. The research at SSS NIBE under

the division addresses these challenges in two phases. The first phase involves the development of a thermal analysis system that optimizes the energy requirements of anaerobic digesters. A range of sensors, coils, and flow meters are strategically placed in this system to ensure precise thermal control. The system design was refined based on insights gained from ANSYS simulations. It provides real-time data on thermal energy demand, assisting in optimizing plant design and predicting fuel requirements by maintaining constant temperatures within 0.5°C.

Phase 2 will involve developing a thermal energy system forpilot-scale anaerobic digester (1000L), including solar, biomass, and waste heat sources. Integrated waste heat recovery and storage systems will emphasize reliability, scalability, and flexibility. Based on the availability of heating sources, this smart hybrid biogas system will automatically select the most economical heating source.

The work on phase 2 is ongoing and the study will result in improved biogas production efficiency, improved energy management, cost savings, improved waste management, and environmental sustainability.

Mr Rakesh Godara's (SRF, SSS NIBE) project under the guidance of Dr. Nikhil Gakkhar and Dr. Vandit Vijay on "Design and Development of Smart Hybrid Biogas Digester," has won the prestigious GBEP Youth Award, held during Global Bioenergy Week in Bangkok, Thailand, from 24-27 October 2023. GBEP is an international initiative formed to support the cost-effective deployment of bioenergy and biofuels, especially in developing countries.GBEP comprises of 56 national governments and 38 international organizations, including G8+5 nations, major like the USA, Europe, Russian Federation, China, Japan, UK, IEA, UNEP, UNIDO and UNDP, with G8 and G20 mandate.

Global Bio-energy Partnership (GBEP) Youth Award

B. Biochemical Conversion Division

During FY 2023-24, several externally funded and in-house R&D projects were taken up by the research team in the division. Major focus areas include biogas production from different feedstocks, biogas upgradation via microbial electromethanogenesis, development of enzyme cocktail for enhanced sugar recovery through enzymatic saccharification of various lignocellulosic biomass, 2G ethanol from different feedstocks, biohydrogen production from organic waste, lignocellulosic biorefinery, wastewater treatment using microalgae and algal biorefinery, etc. The details of these projects are discussed as follows.

1. Exploration of Lignocellulolytic enzymes producing thermophiles from hot springs of Western Himalayan region for biorefinery applications

The project 'Exploration of Lignocellulolytic enzymes producing thermophiles from hot springs of Western Himalayan region for biorefinery applications' is funded by DST under KIRAN scheme. A thermophiliclignocellulolytic gram positive bacterium *Bacillus licheniformis* (NIBE - 23) has been isolated from Western Himalayan Region. Different parameters like temperature, pH, incubation time and nutrient sources were optimized for growth. The cellulase enzyme has been purified by FPLC. Hi-Trap Q FF (5 ml) affinity chromatography column has been used for purification and further optimization is ongoing.

2. Optimizing Biogas Production from Napier Grass using a Thermophilic Anaerobic Digestion Consortium

Napier grass has a huge biogas potential as compared to other lignocellulosic substrates, which could be achieved through Thermophilic Anaerobic Digestion (TAD). The potential of Napier grass via a TAD process with an in-house developed thermophilic consortium was analyzed, and good biogas / biomethane yield with low hydraulic retention time (HRT) were obtained. Consequently, the thermophilic consortium developed in the Biochemical Conversion Division, SSS NIBE, Kapurthala, THERMI-NIBE V.1 has been adapted to further develop a pioneering consortium tailored to produce biogas from Napier grass. Through a series of experiments and careful optimization, a specialized consortium aimed at maximizing biogas production from Napier grass has been developed.

3. Upgradation of Biogas via Microbial Electromethanogenesis

A jacketed double-chambered bioreactor (H-type cell) for the upgradation of biogas via microbial

Microbial Electromethanogenesis technique has been selected for the Upgradation of biogas on the basis of the advantages of the technique over the others. In Microbial Electromethanogenesis, methane is produced by reducing carbon dioxide by the biocatalysts in the presence of imposed potential. A jacketed double chambered bioreactor (H-type cell) has been designed and fabricated for the upgradation of biogas via microbial electromethanogenesis. The bioreactor / H-type cell is made up of glass with a capacity of 2L (1L each chamber). The reactor set-up consists of an anodic and cathodic chamber typically divided by a proton exchange membrane (PEM) for the transport of ions i.e., protons. The protons are generated in the anodic chamber and are carried to the cathodic chamber through PEM where the CO_2 is reduced (by reduction reaction) leading to the production of methane. In this way, CO_2 present in the raw biogas can be utilized along with the Upgradation of the biogas. An in-house developed thermophilic consortium, i.e., THERMI-NIBE V.1 is being used in the study.

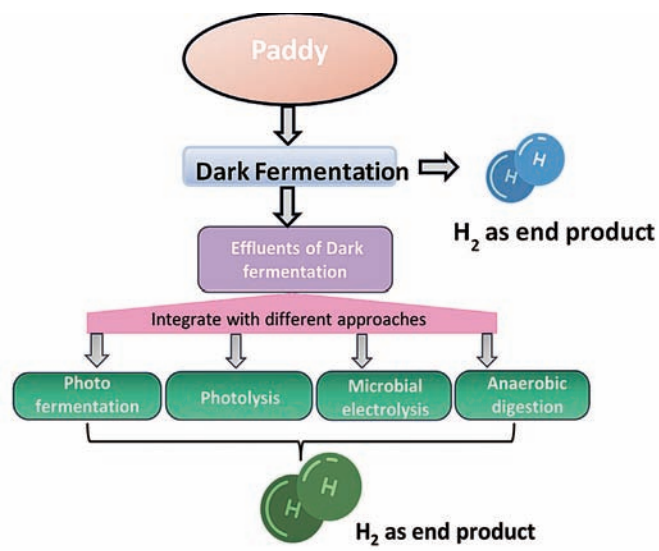
4. Optimizing Ammonia Pretreatment of Lignocellulosic Biomass for Enhanced Bioethanol Production

Ammonia pretreatment process has been adopted for bioethanol production at Biochemical Conversion Division, SSS NIBE. Pretreatment of sugarcane bagasse (SCB) and paddy straw were being performed using different concentrations of ammonia. 5%, 10% and 15% ammonia concentrations were taken for pretreatment of SCB and paddy straw at 85°C by 10% solid loading for 24 h. This approach aims to enhance the breakdown of lignocellulosic biomass into fermentable sugars, thereby increasing the efficiency of bioethanol production. In the subsequent stages, in-house adapted strains of *Kluveromycesmarxianus* K3.2 and FKS.A1, capable of utilizing both hexose and pentose sugars, were used for simultaneous saccharification and co-fermentation (SSCoF). The approach not only optimizes the conversion of biomass to bioethanol but also leverages the unique metabolic capabilities of the yeast strains to maximize yield and process efficiency. Preliminary results have shown promising improvements in sugar release and ethanol productivity, indicating the potential for scaling up this optimized pretreatment process in industrial applications. Further research is ongoing to refine the process parameters and evaluate the economic feasibility of large-scale implementation.

5. Development of low cost halotolerantmicroalgalbiorefinery

Seawater is a rich source of minerals, and when supplemented with iron and nitrate becomes a suitable low-cost microalgal growth medium. The current research uses seawater-based medium to cultivate a microalgal isolate (adapted to saline conditions) to explore the production of biofuels and other industrial applications. Microalgal isolate was first cultivated in lab-scale conditions and further, large scale microalgal cultivation (500L) was carried out in outdoor conditions. Growth study and biochemical component analysis were conducted on microalgal isolate grown in both conditions and compared. Microalgal harvesting is generally a cost consuming step, however the microalgal isolate was harvested using low-cost biopolymer chitosan through flocculation, thus ensuring economic feasibility. The microalgal isolate was assessed for biogas production, through bottle displacement method and it was found to produce a considerable amount of biogas.

6. Bio-Hydrogen: Integrated Dark & Photo Fermentation/Anerobic process



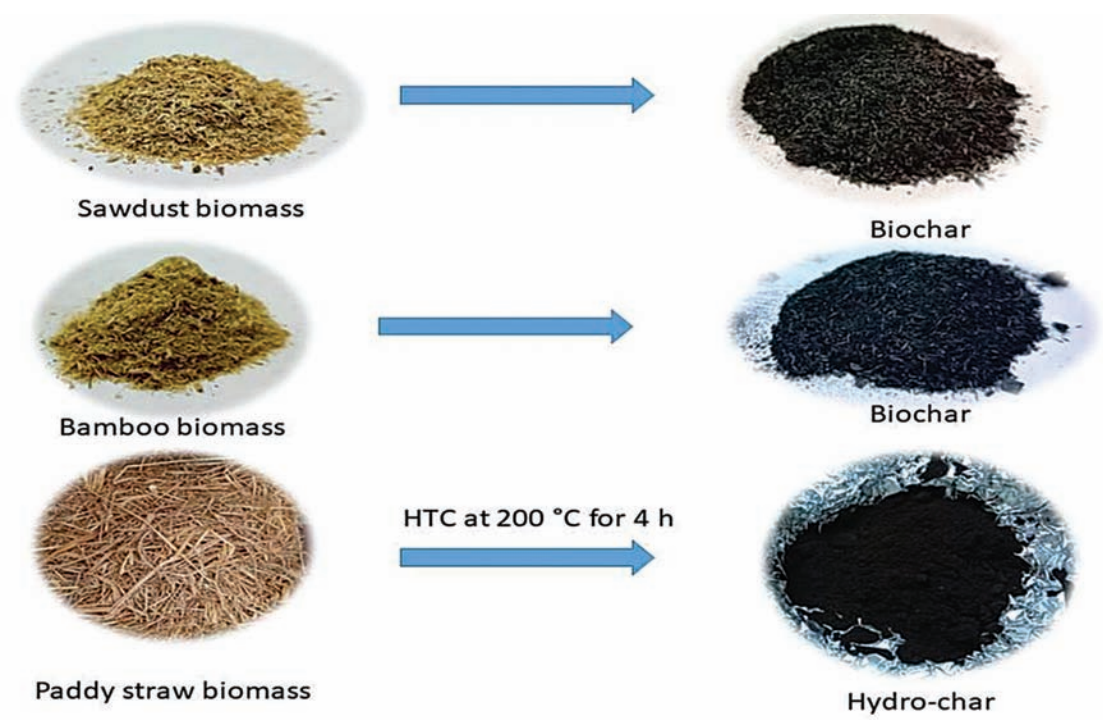
A laboratory-scale biohydrogen plant set up has been designed and fabricated. Different experiments to assess the biohydrogen potential of paddy straw using different conditions including type of pretreatments, enzyme concentrations, solid loading, and types of fermenting bacteria including dark and photo fermentations and different inoculum size have been carried out. Further work of optimization is going on to obtain maximized biohydrogen yield from paddy straw.

Solid loading (%)	Seed (%)	Temperature (°C)	HRT (days)	Biogas Yield (L/Kg of DM)	Hydrogen (%)	Methane (%)
8	10	52	25	250 & 550	35	65

C. Chemical Conversion Division

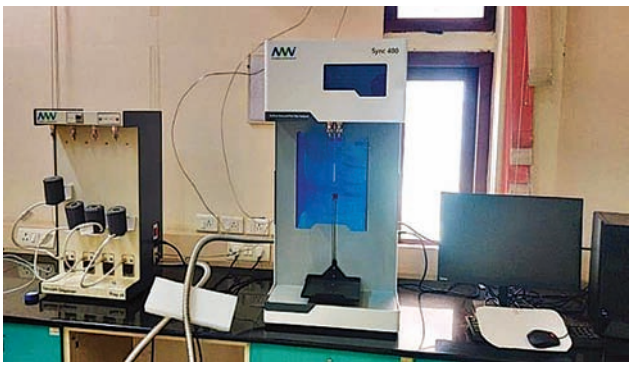
The Chemical Conversion Division at SSS NIBE aims to transform waste lignocellulosic biomass into valuable chemicals through various processes. These include Slow Pyrolysis to produce biochar, Hydrothermal carbonization (HTC) / Hydrothermal Liquefaction (HTL) for biomass conversion to biochar and Biochar activation for diverse applications, Bio-oil production and its conversion into high-value chemicals. Additionally, the division conducts catalytic transformations of different lignocellulosic biomass components (Cellulose, Hemicellulose, Lignin) into high-value chemicals. Feasibility studies are also underway for upgrading Biogas to Hydrogen via catalytic steam or dry methane reforming. In the FY 2023-24 Chemical Conversion Division has initiated the following research activities:

- Development of carbon-rich biochar from agriculture waste biomass, focus on optimizing the process to enhancebiochar yield and quality. By exploring the carbonization of agriculture biomass, the study aims to contribute to sustainable waste management practices and explore renewable energy applications.



Production of Biochar from different biomass at 200°C for 4 hours

- Comprehensive utilization of lignocellulosic biomass for the production of platform chemicals and materials. This initiative seeks to create an innovative hybrid biorefinery system that can efficiently convert abundant agri-waste feedstock into valuable chemicals and materials.



BET and pore size analyzer

High pressure and temperature Reactor

D. Electrochemical Division

1. Biomass based Carbon for Electrochemical applications:

The Electrochemical Process Division at SSS NIBE is actively engaged in research activities focused on utilizing both conventional and unexplored biomass sources to synthesize carbon materials for various electrochemical applications, such as the Hydrogen Evolution Reaction (HER) and Oxygen Evolution Reaction (OER).

Beyond the use of conventional biomass, the division is exploring the potential of unexplored biomass sources, such as the fruit of *Terminalia Arjuna* (Arjuna) and the pods of *Leucaenaleucocephala* (River Tamarind), to produce these carbon materials. The synthesis process involves using a two-zone tubular furnace, which allows for the controlled carbonization and activation of the biomass precursors.

The resulting biomass-derived carbon materials exhibit unique properties, such as high surface area, porosity, and heteroatom doping, which can enhance their performance in electrochemical applications. By leveraging these unexplored biomass sources and advanced synthesis techniques, the Electrochemical Process Division aims to develop cost-effective and sustainable carbon materials for the efficient working of energy devices such as water electrolyzer and supercapacitors.

Terminalia Arjuna *fruit*

Leucaenaleucocephala *pods*

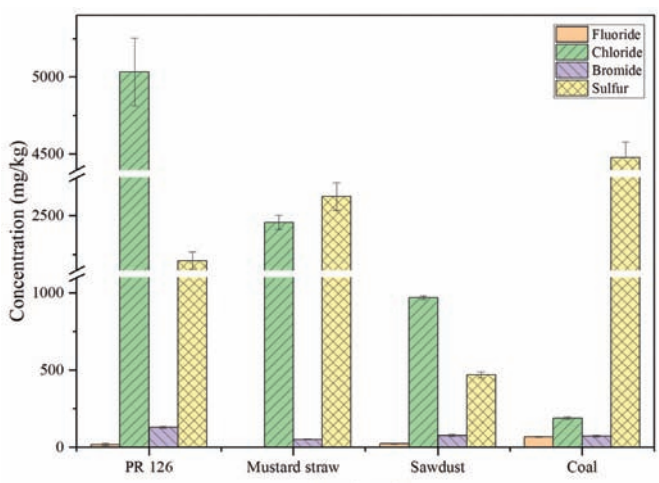
Synthesis of Biomass-derived carbon material through a two-zone tube furnace

Terminalia Arjuna fruit-derived Activated Carbon at varying temperatures with different activators ($ZnCl_2$,KOH)

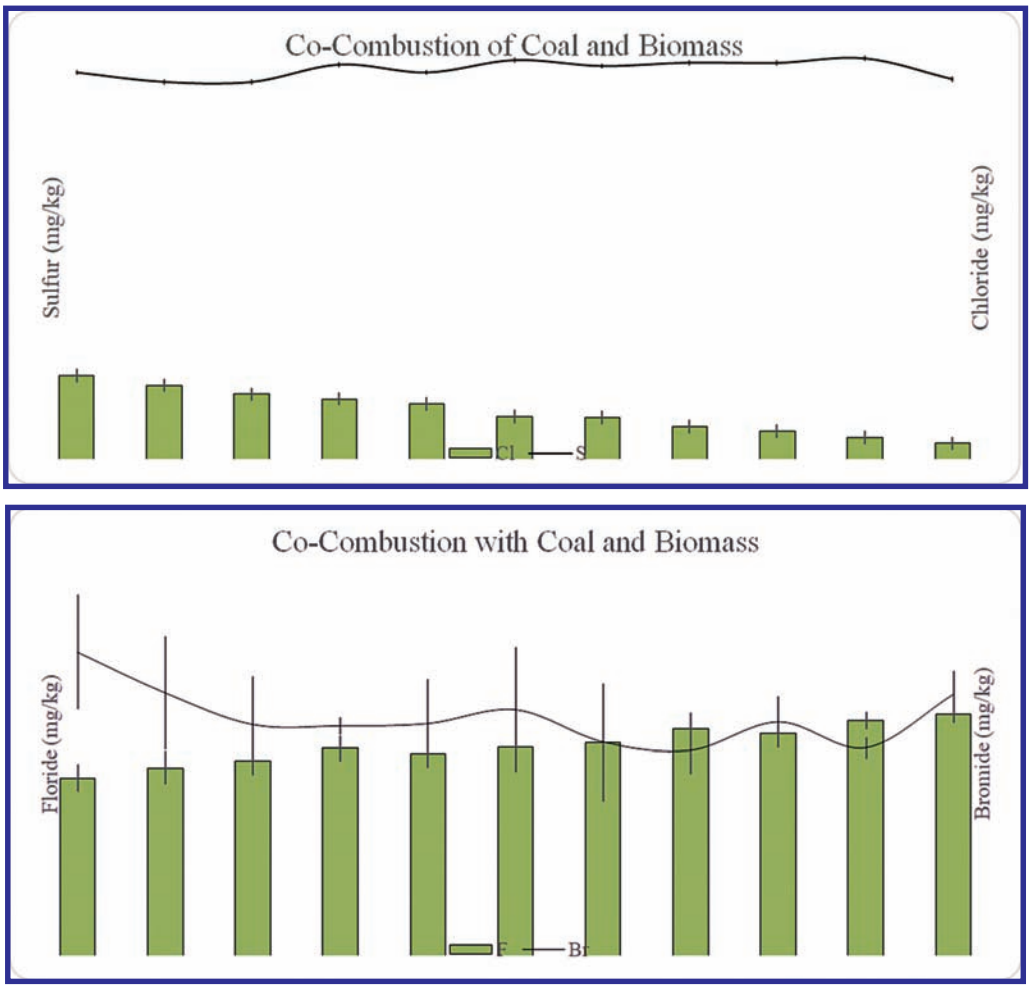
2. Comprehensive profiling of biomass and Biomass-coal blends

The agricultural landscape of the state of Punjabis marked by vast amounts of agro-residues, especially rice straw, which are often left unused. The PR 126 variety, developed by Punjab Agricultural University, is notable for its high yield and substantial biomass production, making it a valuable resource for energy generation. These residues present a significant opportunity for their utilization in thermal power plants. The surplus biomass from rice cultivation, such as the PR 126 variety and other agro-based residues, can be effectively blended with coal to enhance energy production and reduce waste. However, integrating agro-residues into thermal power plants faces several challenges. These include logistical issues in collecting and transporting biomass, variations in fuel quality, and the need for modifications in existing power plant infrastructure to handle biomass feedstock. Additionally, the presence of silica and other impurities in rice straw can lead to operational difficulties, such as slagging and fouling in boilers.

Our research focuses on the comprehensive profiling of biomass, particularly the PR 126 rice straw, mustard straw, and sawdust from Punjab, and their blendswith coal. The study includes detailed characterization through proximate and ultimate analysis, bomb calorimeter tests, and the assessment of anions, cations, heavy metals, and silica content with the help of Combustion Ion Chromatography.



Anion Analysis of Pure Samples Using Combustion Ion Chromatography



Effect of Blending Biomass and Coal (Varies from 0 to 20% of Biomass by wt. %) on Anion of Using Combustion Ion Chromatography

3. Progress of Works on bamboo based activated carbon for Hydrogen Storage:

Activated Carbon (AC) is highly regarded for its large surface area and superior adsorption properties, which make it an excellent choice for hydrogen storage. AC derived from bamboo has shown positive results as per few studies. Different varieties (23 types) of bamboo were obtained and processed through thermal routes to obtain AC, which were intended to have hydrogen storage applications. A proposal for the same has been put forward to Ministry of New and Renewable Energy (MNRE).

Solid Oxide Fuel Cells (SOFCs) are known for their high efficiency and ability to operate at high temperatures. Since they offer a wide range of applications, gaining an in-depth idea regarding their working process and further optimization seem viable. Plans to setup a SOFC test apparatus are underway which will promote proper understanding and initiate further explorations.

Our projects include integrating microbial electrosynthesis with Haematococcus cultivation to enhance bio-productivity, collaborating with IISER Mohali. We also work with NIT Rourkela on developing bioplastics from Spirulina residual biomass, showcasing a sustainable approach to material innovation. Additionally, we are optimizing biogas and bioethanol production from residual Dunaliella and other waste biomass, aiming for a biorefinery model. Furthermore, we are developing animal feed from algae and waste biomass, contributing to agricultural sustainability through

waste recycling. Our division's work is characterized by significant collaborations, mentorship, and a commitment to resource efficiency and agricultural sustainability.

E. Thermo-Chemical Division

1. Design verification and safety guidelines of gasifier operation for thermal calcination application

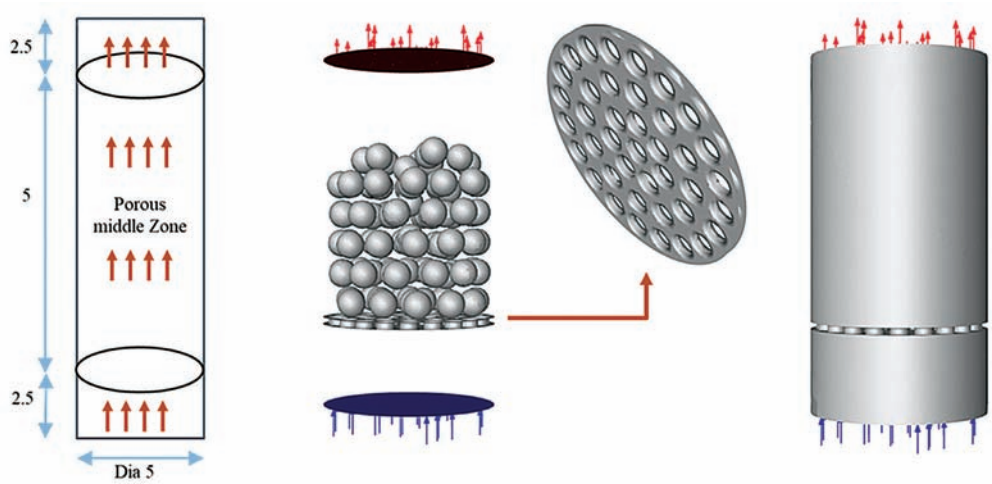
During the year 2023-24, a consultancy project was undertaken for the verification of existing design and dimensions of gasifier for desired syngas output. Also, to verify safety systems of the gasifier and suggest changes, if any. During the tenure of this project, an operation manual was preparedwith SOP and safety concerns for the operation of the existing gasifier as per the client requirements. Additionally, with the preparation of the operational manual desired optimum parameters were calculated mentioning the fuel consumption rate, rated gas flow, required air flow rate, temperature, theoretical gas generation etc.

2. Design and development of a continuous biomass torrefaction reactor

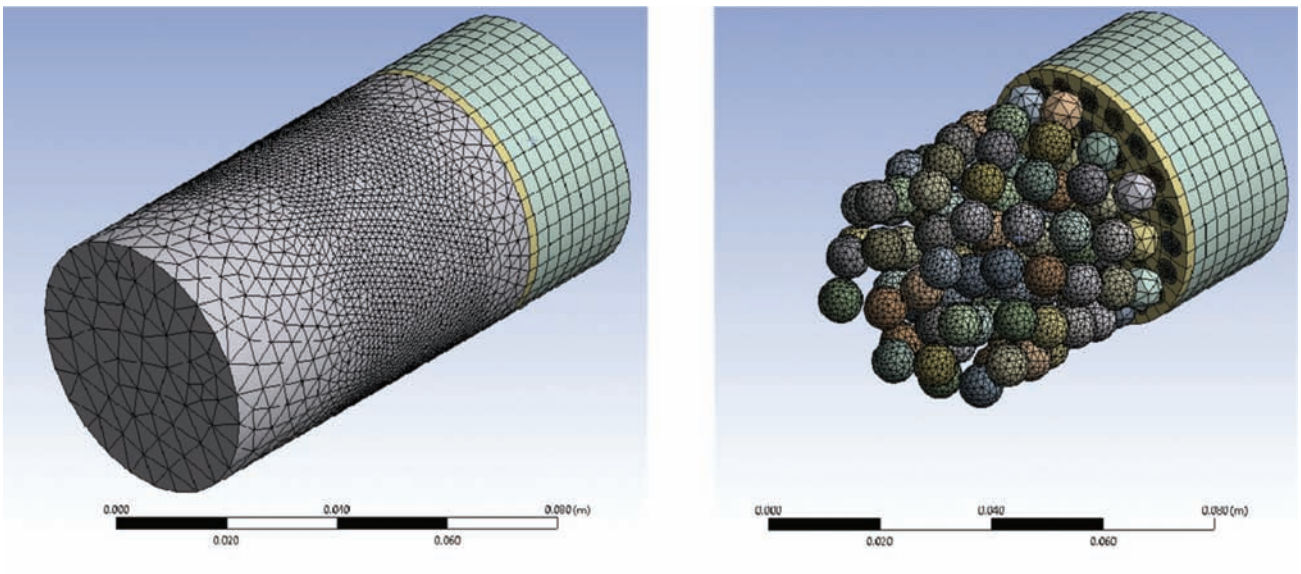
During the year 2023-24, an in-house project was undertaken for 'Design and development of a continuous biomass torrefaction reactor'. The objectives of this project include: -

- Understanding various torrefaction technologies
- CFD modeling studies for reactor design
- Development of prototype reactor
- Fabrication and installation of torrefaction reactor
- Experimental studies using various biomass feedstock
- Optimization of process parameters

Under this project thermal upgradation of sustainable biomass via torrefaction numerical approach was up taken. A model was created for a fixed bed torrefied reactor in ANSYS Fluent using air as flue gas in computational model.

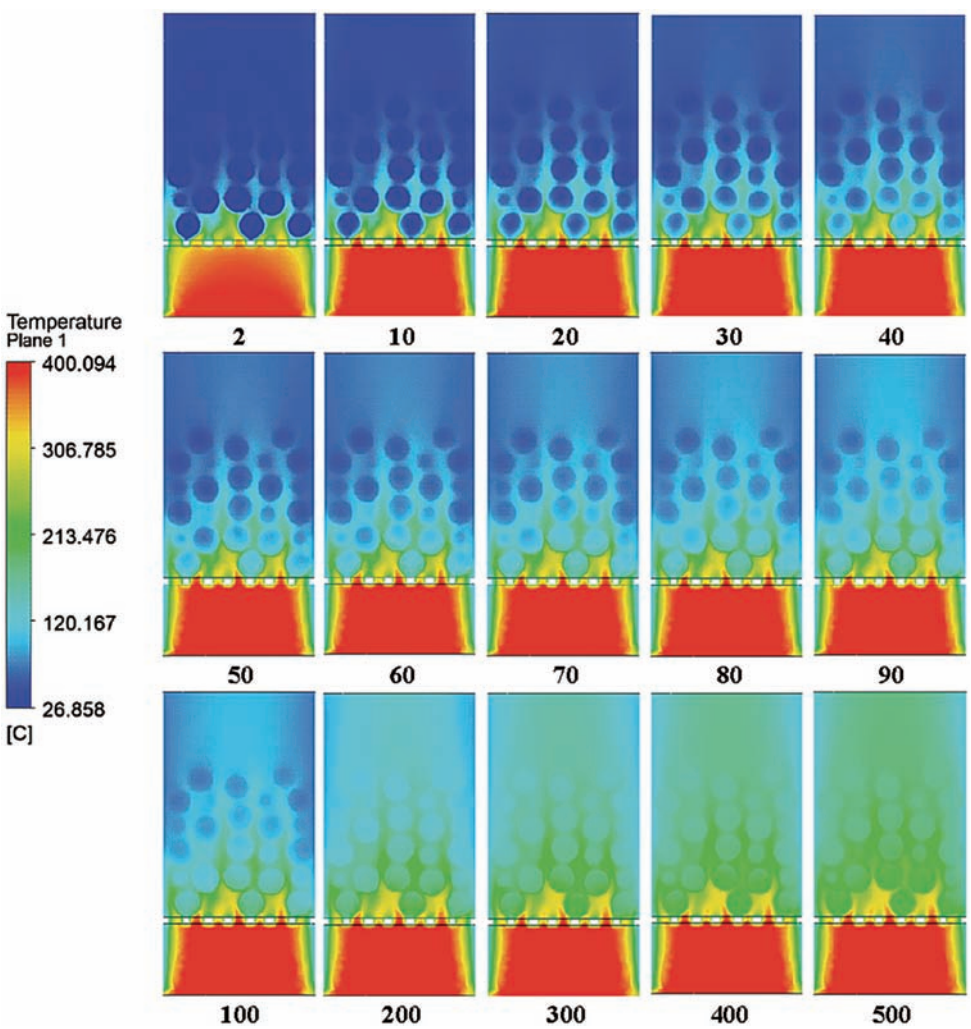


3D geometry of simulated torrefaction reactor unit (All dimensions are in cm)

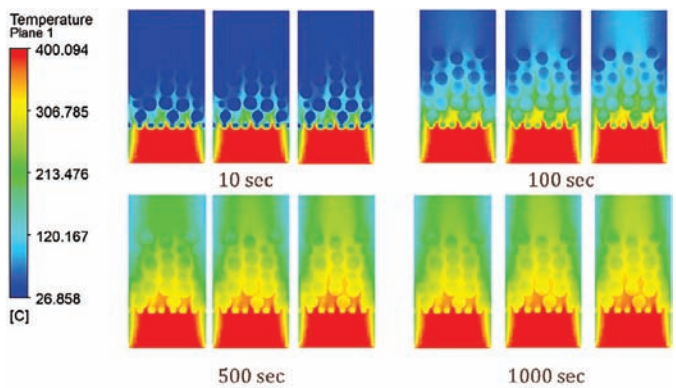


Meshed reactor geometry

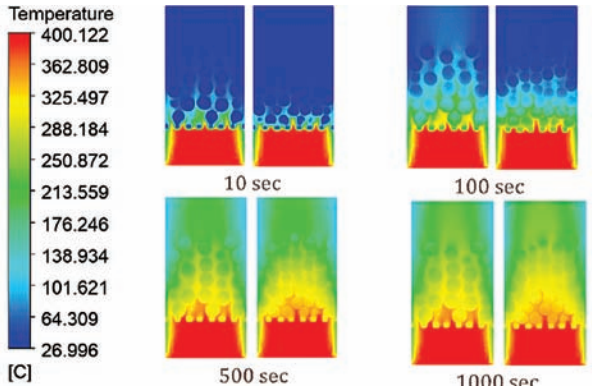
The CFD model was established for a torrefied reactor. The present work deliberated the effect of flow rate and temperature inside the reactor. Furthermore, it also predicted the relative distribution of temperature inside the reactor.



Temperature contours at different time interval (V= 0.6192, T= 400°C)



Temperature contour at different Flow rate (a) 0.375 (b) 0.438 (c) 0.5 m3/hr;



Temperature contour at different particle diameter size (a) 10 mm (b) 7.5 mm

a) Temperature contour at different inlet temperature 400, 500 and 600 °C

Numerical investigations have been conducted to determine the temperature distribution at different flow rates and temperatures. Based on the present study, following details have been drawn:

- High energy density torrefied char can be produced, which promotes the biomass economy.
- This study can serve as a successful model for biomass as a raw material for torrefied char production.

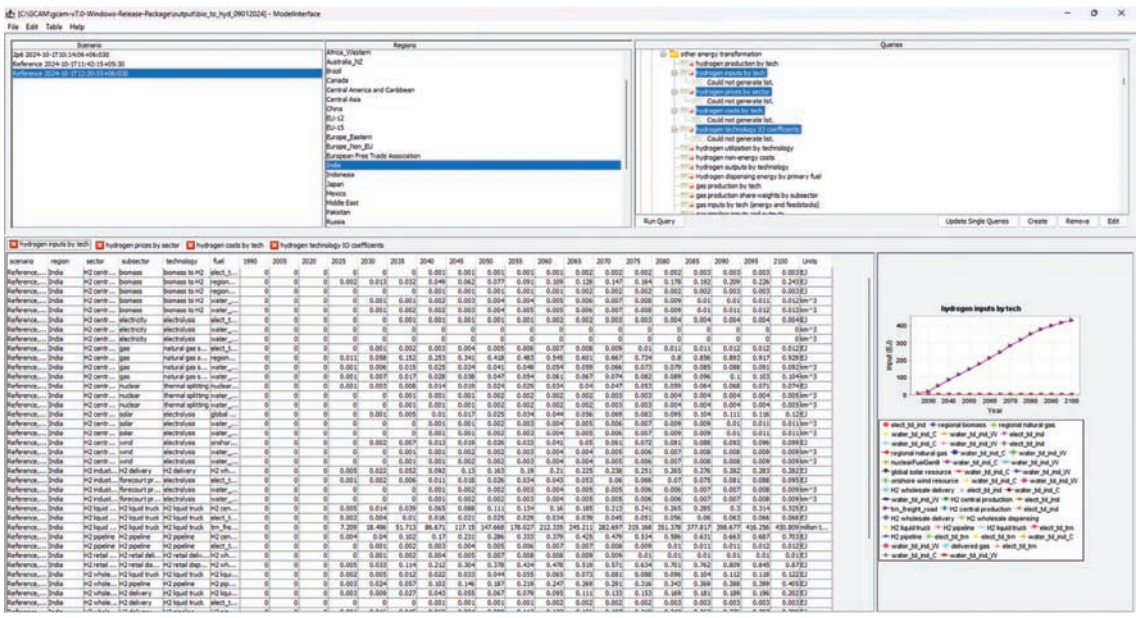
Further after the robust and thorough investigation with the computational model prototype development will be carried out in the coming year.

3. Prediction of biomass to Hydrogen production potential in India using GCAM modeling

During 2023-24 under SAGE 2.0 a project is being undertaken with PNNL, USA for 'Prediction of biomass to Hydrogen production potential in India using Global Change Analysis Model (GCAM) modeling'. Under the project basic GCAM training has been given to the concerned individuals with the project. The objectives of the project include:

- Collection of data of various biomass to hydrogen pathways in India.
- Analysis of data based on the technology readiness level of the technology.
- Identification of various end application of green hydrogen.
- Prediction and analysis of predicted values for biomass to hydrogen route in India using GCAM.

GCAM modeling is being done using the collected data. Relevant data collection is being carried out by SSS NIBE and GCAM analysis on integration of biohydrogen in industrial and transport sectors is being up taken jointly by SSS NIBE & PNNL. On completion of the objectives of the project a research paper will be published in a reputed SCI journal as per the results of analysis of the GCAM predictions. Beside the research article a manuscript for review article on 'Global biomass to hydrogen energy technology, potential & techno-economics' is also being done to be published in a reputed SCI journal.



GCAM interface with a hydrogen production scenario

4. Improved biomass cookstove testing and certification

Institute has a well-equipped improved biomass cookstove test center for cookstove manufacturers in the Northern region of India and specially for the states of Punjab, Haryana, Himachal Pradesh, Jammu & Kashmir and Uttarakhand region.

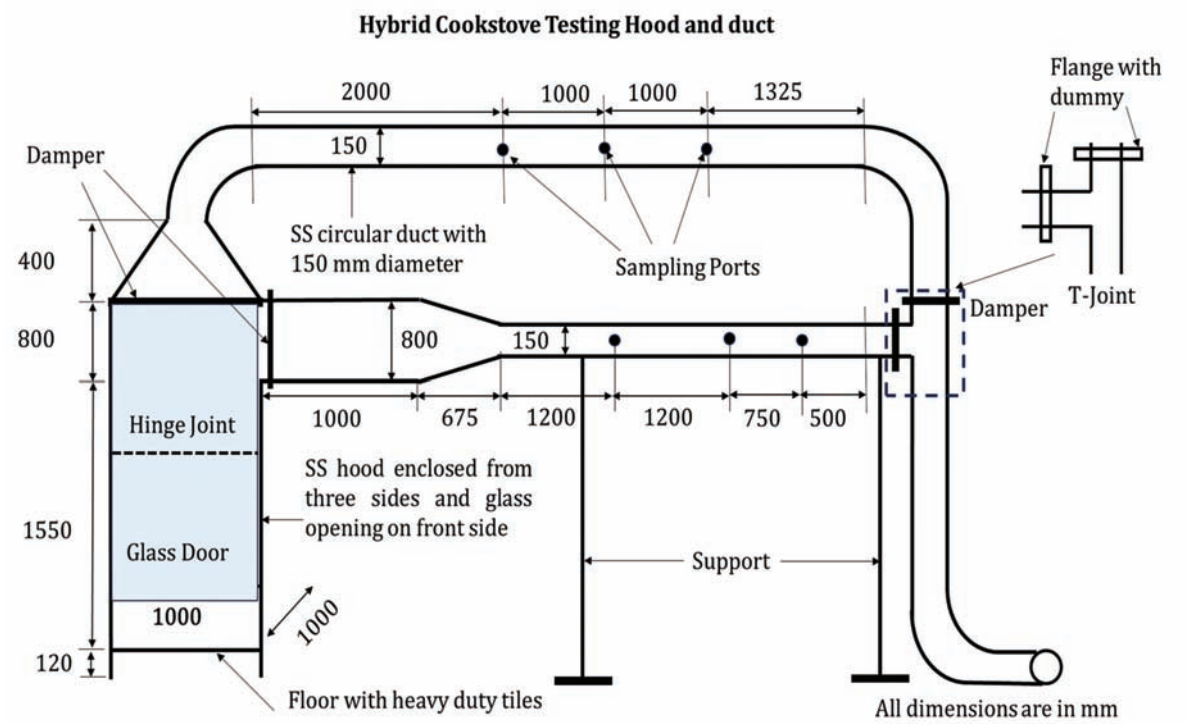
Biomass cookstove testing facility at SSS NIBE

The upgradation of cookstove testing facility has been initiated at the Institute and various equipment's such as particulate matter analyzer for gravimetric measurement of $PM_{2.5}$, hot air oven and muffle furnace for biomass characterization are under procurement. The hybrid design of cookstove testing hood as shown in the will be fabricated to facilitate cookstove testing as per both BIS and ISO standards. Various cookstove models are regularly received for testing and certification purpose at the laboratory.

The testing has been carried out following BIS 2013 protocols. The detail of the cookstove models tested and their performance can be found in the Table below.

Biomass cookstove models received and tested at SSS NIBE cookstove Test Center

S. No.	Name and address of manufacturer & cookstove specifications / type	Tested in Month/Year
1.	**SRC Natura Product Ltd.** Address: Karol Bagh, New Delhi-110005	
	i) Natural Draft, Two pot, Domestic size Biomass Cookstove (Material of Construction: Mud/clay, Side feeding)	June / Aug., 2023
2.	**Fire and Combustion Research Center (FCRC), Jain (deemed to be) University Bengaluru** Address: JAIN Global Campus, NH 209, Jakkasandra Post, Bengaluru - Kanakapura Main Road, Ramanagar District - 562 112	
	i) Advance Biomass Cookstove Device (ABCD) – 3.5 kg/hr (Vertical forced draft)	April, 2023
	ii) Advance Biomass Cookstove Device (ABCD) – 1.5 kg/hr (Vertical forced draft)	May, 2023
	iii) Advance Biomass Cookstove Device (ABCD) – 3.5 kg/hr (Horizontal forced draft)	July - Aug., 2023
3.	**Sai Gramin Udyog** Address: Faridabad, Haryana	
	i) Natural Draft Cookstove, Metal Body, Single Pot: 0.9 kg/h	Jan., 2024



Proposed hybrid design of cookstove testing hood

5 Advanced biomass cookstove demonstration and dissemination in collaboration with Fire and Combustion Research Center (FCRC), Jain University Bengaluru

An MoU between SSS NIBE and Jain University has been signed in Sept, 2022. Under this MoU SSS NIBE, five nos. of improved biomass cookstoves (as in figure below) of different ratings (1.5 kg/hr, 3.5 kg/hr and 15 kg/hr) and types (Horizontal and vertical) have been received from FCRC. The laboratory testing of these cookstove has been carried out at SSS NIBE using BIS protocols. Based on the satisfactory performance report of laboratory testing, three cookstoves have been disseminated to investigate their field performance. An advanced biomass cookstove device (forced draft vertical type) having burning rate of 3.5 – 6 kg/h has been disseminated at Primary School Ibban, Kapurthala for preparation of mid-day meal for 90 students. Apart from this, two forced draft improved cookstoves having burning rate of 3.5 – 6 kg/h and 15 kg/h have been disseminated at ITITI Doon Sanskriti School Jhajra, Dehradun. It is a residential school for students from tribal areas of the country, especially North-East region having strength of around 150 students. Training has been provided to the concerned operator for proper operation and maintenance of improved cookstoves being disseminated.

(a)

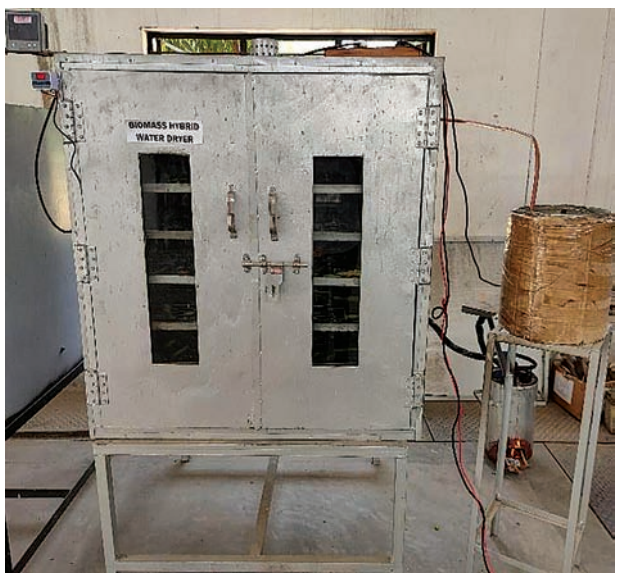
(b)

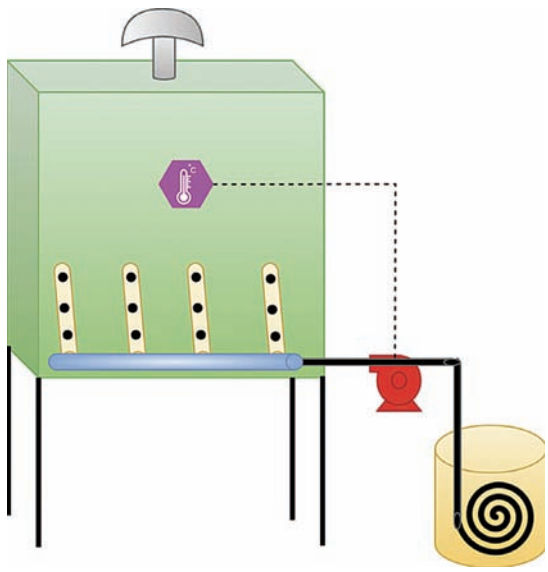
Advanced biomass cookstoves dissemination at
a) Primary School, Ibban and b) ITITI Doon Sanskriti School Dehradun

6. Advanced Drying Technologies: Water-Based and Air-Based Dryers

Significant progress has been achieved in the development of air-based dryers, expanding upon the success of water-based dryer designed for agricultural applications. This advancement underscores the commitment in enhancing drying technology. During the successful testing of water-based dryers, their superior performance was demonstrated, which can be credited to the careful regulation of temperature and humidity. Testing was conducted on three individual agro products: onions, spinach, and curry leaves. These samples had an initial moisture content of 87.38%, 88.60%, and 65.13%, respectively (wet basis). For Onion, Spinach, and Curry leaves, the percentage of weight reduction was 89.04%, 89.03%, and 74.88%, respectively. The tests performed during drying process revealed that a reduction in moisture of under 10% is achievable for onion,

spinach, and curry leaves after 26.5 hours, 11.5 hours, and 8.5 hours, respectively. In addition, the moisture content of bitter Gourd decreased from 91.78% to 56.23% within six hours. Progressing forward, the focus of the study is on advancing air-based drying systems. The basic air-based drying system has been developed and is currently in the fabrication stage. Additionally, an advanced air-based drying system is being designed, with plans for implementation in the near future. Air-based dryers are believed to be more efficient and energy-friendly. These dryers utilize the properties of air to achieve faster drying times and lower energy consumption, making them more sustainable. By continuing to develop and implement air-based drying systems, we aim to contribute to efficient drying solutions that reduce energy consumption and enhance product quality.





(a) The water-based dryer model *(b) The air-based dryer Model*

Various dryer models developed at SSS NIBE

7. Biochar production from agricultural wastes as a soil amendment for improving soil fertility, nutrient retention and overall soil health.

To curb stubble burning and manage waste generated from farming, such feedstockcan be effectively used to produce biochar. Given its many potential advantages, biochar technology is regarded as sustainable. Following soil application, reduces the impact of climate change by sequestering carbon in the soil for hundreds or even thousands of years. It raises agricultural output and soil fertility. Because of its high surface area, it collects toxins from the environment. In this regard a Biochar kiln has been constructed at the Thermo-Chemical Division of SSS NIBE. The purpose of the kiln is to produce Biochar from agricultural wastes for soil amendment. It is a rectangular kiln made of bricks raised to a height of 3 feet 11 inches, a chimney outlet is given to allow the combustion products to escape. An inlet fan is also provided to initiate burning during the process and improve control of the rate of airflow. A port has been given for igniting the feedstock also the same port can be used for removing the product obtained. The ignition port has a shutter that can be shut down during the combustion process and removed when not in use. Kiln has a height of 1.19 m, a length of 0.68 m, and a width of 0.838 m. The below image shows the kiln and its dimensions.

Biochar production Kiln

To start combustion, the straw is ignited from the top of the kin, covered with an iron lid, and then immediately sealed with mud Experiments have been carried out with Rice straw as the feedstock to produce biochar (as shown below). It can easily accommodate approximately 45 kg of rice straw in the form of a bale. The complete process from combustion to cooling it down take around 2-3 hours. Till now we have been able to achieve biochar with a calorific value of 4821.84 Cal/gm and a Fixed carbon of 57.56 %.

(a) Rice Straw ***(b) Biochar***

Raw biomass and product bio-char produced from kiln.

It can easily accommodate approximately 45 kg of rice straw. The complete process from combustion to cooling it down take around 2-3 hours. Till now we have been able to achieve biochar with a calorific value of 4821.84 Cal/gm and a Fixed carbon of 57.56 %. For reference, the quality of the kiln-produced biochar was also compared with that of laboratory produced biochar. A series of experiments were conducted in the muffle furnace at 250^0, 350^0, 400^0, 450^0, 500^0, and 550^0. The best yield of Biochar was obtained at 350^0 and 400^0 with the calorific value of 5533 Cal/g and 4634 Cal/g respectively. The fixed carbon at 350^0 was 45.29 % while that at 400^0 was 44.678%.

SPONSORED OR EXTERNAL FUNDED PROJECTS

A. Central Power Research Institute, Bangalore Funded Project

1. Project No. CPRI/NPP/21-26/TH/1: Composition analysis of different types of pellets/ briquettes received from unknown sources

The investigation was conducted in the CPRI-funded project titled "Composition analysis of different types of pellets / briquettes received from unknown sources" with the explicit objective of discerning the paddy content within an unidentified sample of composite biomass pellets. The outcomes of this study hold significant ramifications for advancing the use of biomass pellets alongside coal in thermal power plants, thereby contributing to electricity generation. This multifaceted strategy addresses the persistent issue of agricultural fires in northern India by harnessing crop residues in thermal power plants, consequently abating pollution, fostering carbon neutrality, and augmenting energy production. Simultaneously, it serves to lower the pressure on coal imports by substituting a portion of coal in thermal power plants, thereby enhancing India's energy security.

The research commenced with an exhaustive characterization of pure biomass residues. Proximate, ultimate, and calorific values of biomass residues sourced from the Punjab Haryana regions were systematically determined. Furthermore, advanced analytical techniques such as ion chromatography and combustion ion chromatography were deployed. Subsequent to the characterization of pure biomass samples to identify a suitable biomarker, mixed biomass samples underwent rigorous testing with the aim of constructing a model for the determination of paddy concentration in unknown biomass samples.

108 experiments were performed utilizing mixed biomass samples, yielding substantive data on proximate and ultimate values for diverse mixtures. Among these, 17 experiments pertained to mixtures of PR 126, mustard, and sawdust, with concurrent determinations of proximate and ultimate values. Similarly, 24 experiments were executed with mixtures of PR 126, wheat, mustard, maize, and sweet sorghum, while 67 experiments concentrated on mixtures of PR 126, mustard, and press mud. Additionally, 17 experiments were conducted with a composite of PR 126, mustard, and sawdust, with anion concentrations determined through combustion ion chromatography. Moreover, 126 experiments were conducted using ion chromatography to ascertain concentrations of bromide, fluoride, sulfate, phosphate, nitrate, and chloride in specific mixtures, thereby enriching the nuanced understanding of their compositional characteristics.

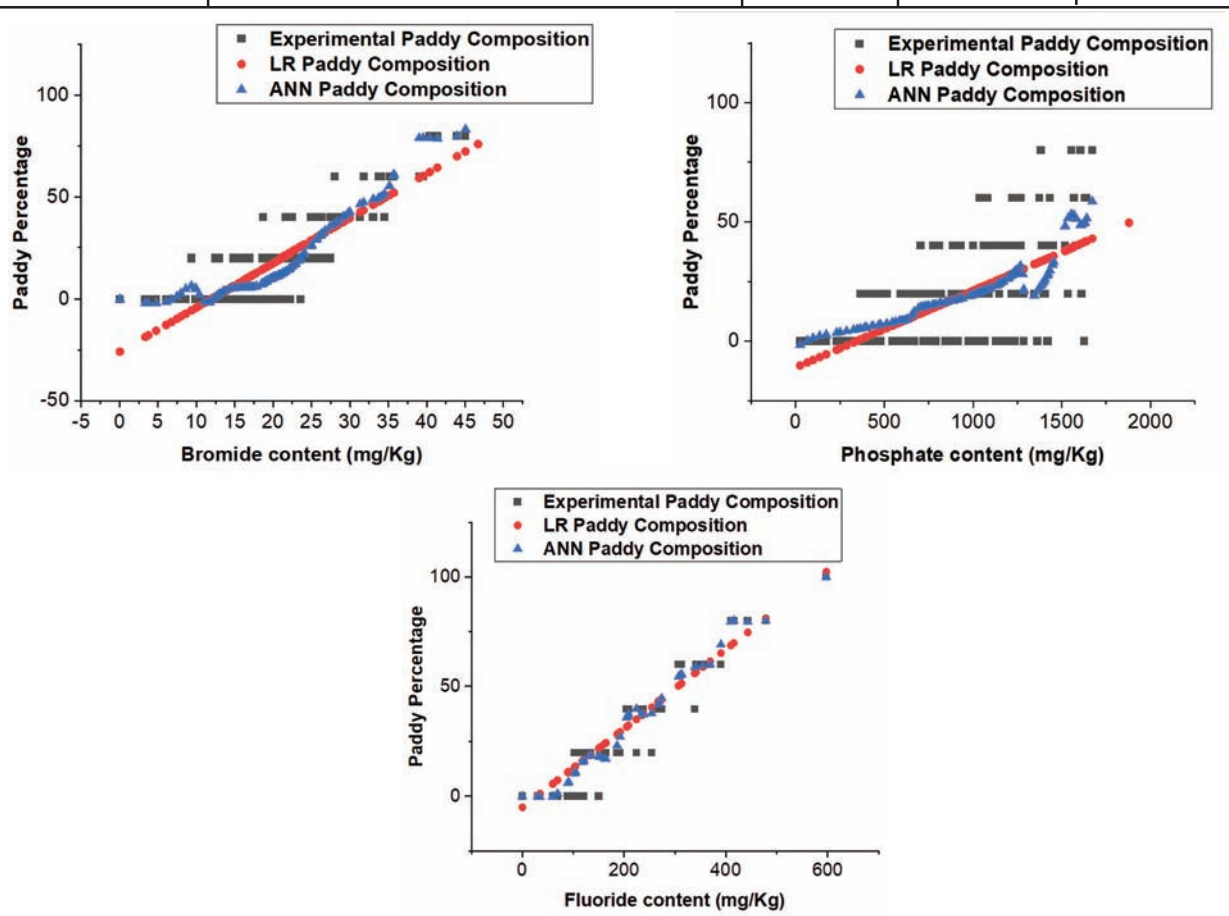
Ash content surfaced as a reliable biomarker for most agro-residue mixtures, except in instances involving pressmud. Particularly noteworthy were fluoride, bromide, and phosphate concentrations identified as effective biomarkers for mixtures incorporating PR 126, wheat, maize, mustard, and pressmud. Fluoride concentration, as determined by ion chromatography, exhibited the highest R-value. Both linear regression and artificial neural networks (ANN) were judiciously employed to determine the paddy percentage in unknown samples accurately.

The study's results recommend the use of a composite metric encompassing ash content, calorific. value, and fluoride concentration for the effective determination of paddy concentration in unknown biomass sample comprising PR 126, wheat, maize, mustard, and pressmud. Paddy ash content typically resides within the range of 15-20% among agro-residues, emphasizing that in a composite agro-

residue mixture, the ash content should not exceed 20%. Additionally, given that the heating value of paddy straw approximates 3200-3500 kCal/kg, an unknown agro-residue sample should exhibit a calorific value surpassing 3500 MJ/kg, while concurrently maintaining ash content below 20%, Additionally, the calculation of fluoride, bromide, and phosphate concentrations in the unknown mixture facilitates an estimation of the range of paddy composition in the biomass mixture with a quantifiable degree of certainty (see Table and Figure below).

Linear regression and artificial neural network parameters for the mixed biomass samples (PR126 straw, mustard straw, pressmud, wheat straw, and maize stalk)

Parameters		Fluoride (mg/Kg)	Bromide (mg/Kg)	Phosphate (mg/Kg)
Linear regression	F-ValueLinear Regression	1184.06	360.19	61.26
	R^2 Linear regression	0.91	0.74	0.33
	Intercept	-5.1	-25.96	-11.01
	Coefficient	0.18	2.18	0.03
Artificial Neural Network	No. of neurons in ANN Model	10	10	10
	Training data fraction in ANN Model	0.90	0.90	0.90
	Validation data fraction in ANN Model	0.05	0.05	0.05
	Test data fraction in ANN model	0.05	0.05	0.05



Comparison between paddy fraction in a mixture of PR126, Mustard, Pressmud, Wheat, and Maize for a) Fluoride, b) Bromide, c) Phosphate content (from top left, clockwise)

In conclusion, it can be stated that although paddy straw percentage in an unknown pellet is not easy to predict so accurately without knowing the actual ingredients / biomass used during the pelletization, it can surely be predicted with known ingredients using biomarkers like ash content, fluoride, chloride and bromide concentration up to an accuracy of 90%. Another attribute of this work is that a high percentage of halogen concentration in the paddy straw is detrimental to the environment and their control / precipitation before releasing the same in the environment from the thermal power plants must be ensured.

2. Project No. CPRI/NPP/21-26/TH/3: Complete ash analysis of biomass pellets and co-combusted fuels

The agricultural state of Punjab, India, faces a severe environmental challenge each year due to the widespread practice of stubble burning. This method of clearing agricultural residue, particularly paddy straw, has led to significant air pollution, causing smog and respiratory health issues in Punjab and neighboring regions, including the national capital, Delhi. Addressing this issue requires innovative solutions for effective waste management. One promising approach is the utilization of agro-residues as biomass fuel in thermal power plants, transforming agricultural waste into a valuable energy resource. However, using biomass in thermal power plants poses technical challenges such as a reduction in boiler and reactor efficiency due to slagging and fouling issues, and other emissions which are detrimental to the environment.

The ongoing CPRI project titled "Complete ash analysis of biomass pellets and co-combusted fuels" aims to explore the potential of agro-residues for power generation by analyzing their chemical and physical properties and evaluating their co-combustion with coal. The primary objectives include determining the chloride and sulfate contents of various biomass types, identifying the metallic oxides and silica contents in pellets and coal, assessing the ash fusion temperature of different pellets, and evaluating these parameters for co-combusted fuel blends. Additionally, the project seeks to generate a comprehensive database and provide recommendations for the optimal blending proportions of biomass pellets with coal to ensure economic and environmental benefits.

Experimental results have revealed important insights into the elemental compositions of different biomass species. For instance, the analysis of anion concentrations showed that cotton and maize have high chloride levels, which can lead to severe corrosion in boiler tubes. Wheat straw, PR 126 straw, and groundnut stalk exhibited moderate chloride levels, while sawdust and PR 126 husk had the lowest, indicating they might be more suitable for combustion processes with minimal corrosion issues. Sulfur content was highest in mustard straw and PR 126 straw, raising concerns about SOx emissions, which necessitate flue gas desulfurization systems. Sawdust and PR 126 husk contained the lowest sulfur levels, presenting fewer challenges in terms of sulfur dioxide emissions.

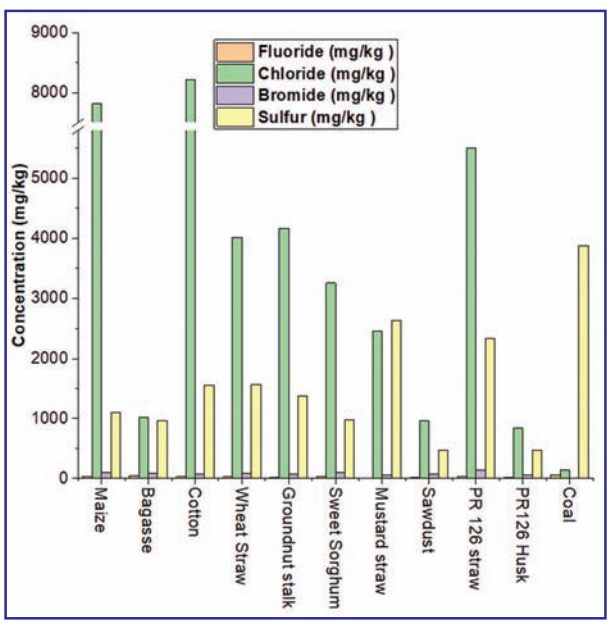
The analysis of bromide and fluoride content provided further insights into the environmental and operational impacts of using different biomasses. High bromide levels in PR 126 straw and sweet sorghum can impact ozone depletion and lead to material degradation in plant infrastructure. On the other hand, mustard straw and groundnut stalk, with low bromide levels, posed fewer environmental hazards. Similarly, sugarcane bagasse and sweet sorghum exhibited high fluoride levels, affecting ash melting behavior and potentially leading to slagging issues, whereas mustard straw and groundnut

stalk showed the lowest fluoride content, making them more favorable for thermal power plant use.

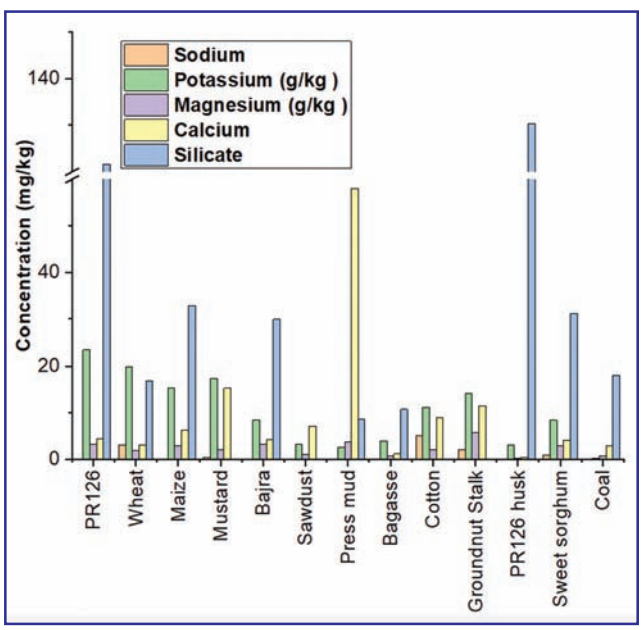
Cation and silicate concentrations also play a crucial role in determining the suitability of biomass for combustion. High potassium levels in PR 126 and wheat influence slagging and fouling tendencies in boilers, while sawdust and coal, with the lowest potassium content, pose less risk for potassium-induced issues. Sodium content was highest in cotton and wheat, exacerbating fouling and corrosion, while bajra and PR 126 husk had the lowest sodium content, suggesting they are less likely to cause sodium-related problems. Silicate content, which affects ash fusion characteristics and slagging behavior, was highest in PR 126 husk and straw, while groundnut stalk and press mud had the lowest silicate content, indicating better performance in terms of slagging potential.

In the upcoming fiscal year, the project will focus on determining the chloride and sulfate contents, metallic oxides, and silica in co-combusted fuel. Additionally, the ash fusion temperature for both pure biomass and co-combusted fuel will be assessed. These analyses will provide further insights into the feasibility of biomass as a supplementary fuel in coal-fired power plants, aiming to improve combustion efficiency, reduce maintenance costs, and comply with environmental regulations.

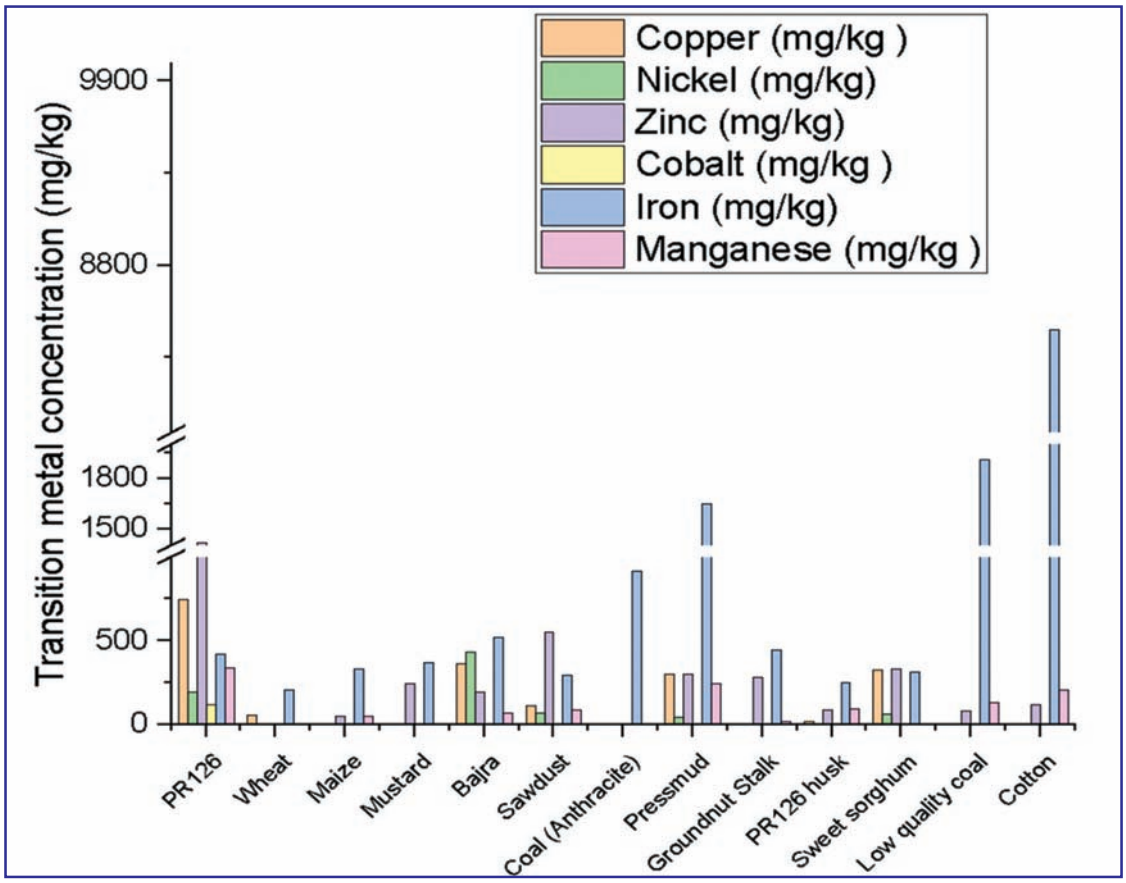
This project addresses the critical need to mitigate the adverse effects of stubble burning in Punjab by exploring the potential of biomass as a sustainable energy source. By conducting comprehensive chemical and physical analyses, the research aims to optimize the use of biomass in thermal power plants, contributing to cleaner energy production and improved air quality. The progress made so far and the future plans indicate a robust approach to achieving these goals, paving the way for sustainable agricultural waste management and energy generation.



Anion concentration in various biomass and coal



Cation and silicate concentration in various biomass and coal



Transition metal concentration in various biomass and coal

3. Project No. CPRI/NPP/21-26/TH/2: Complete heating and emission analysis of raw biomass and pellets during combustion

During the year 2023-24, significant progress was made in achieving the objectives of the CPRI funded project titled "Complete heating and emission analysis of raw biomass and pellets during combustion." The project's goals included:

- To collect and analyze raw agro-residue from northern India for composition analysis.
- To investigate the burning rate, thermal efficiency, and emission analysis of pellets during combustion.
- To identify the heating values of the pellets using a bomb calorimeter and from ultimate analysis.
- To generate a database and recommendations for appropriate thermal and environmental analysis to meet desired standards.

Various biomass feedstock samples (wheat, paddy, maize, mustard, bajra, bagasse, pine etc.) were procured from the Northern states of Punjab, Haryana, Uttarakhand, Himachal Pradesh, and Jammu & Kashmir. These samples were then characterized for calorific value, proximate value (moisture content, volatile matter, ash content, and fixed carbon), and ultimate value (carbon, nitrogen, hydrogen, sulfur, and oxygen).

(A) Samples from State of Haryana

(B) Samples from State of Punjab

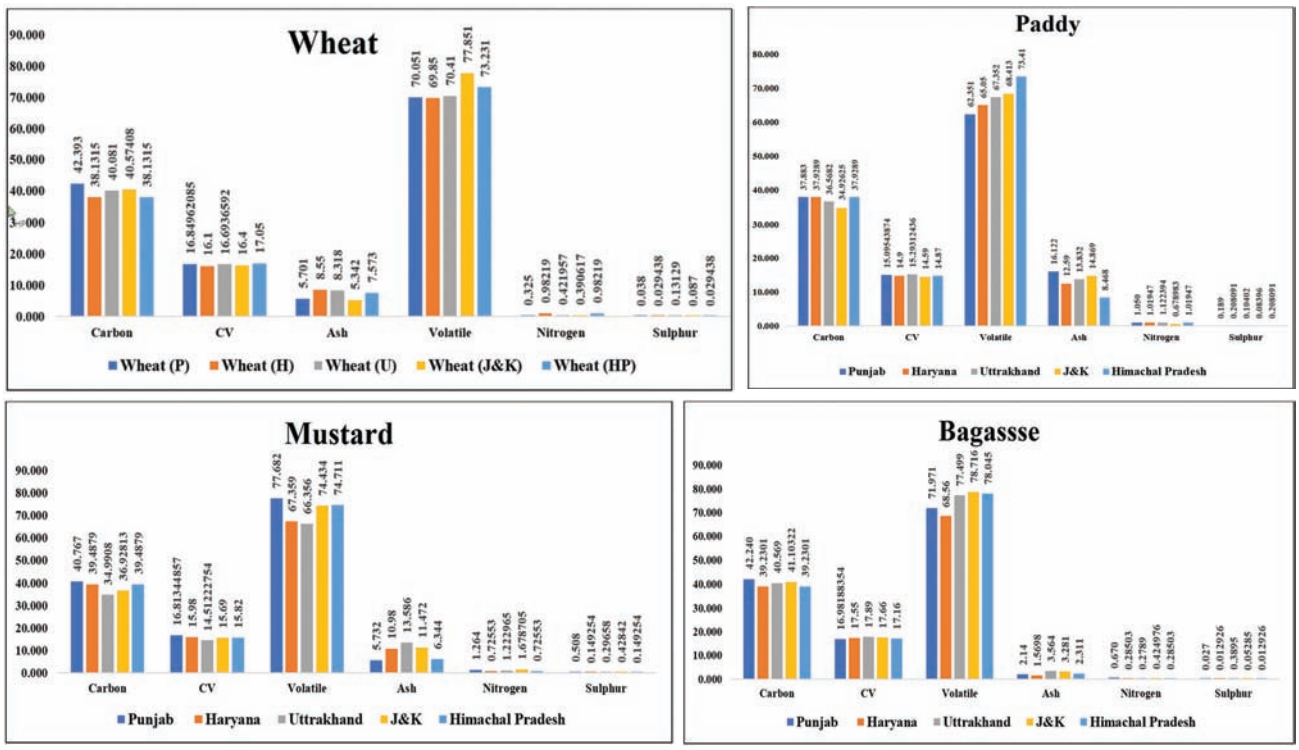
(C) Samples from State of Himachal Pradesh

(D) Samples from State of Jammu & Kashmir

(E) Samples from State of Uttrakhand

Biomass samples from different states

Understanding the composition of various biomass sources is essential for optimizing energy conversion processes. A comprehensive comparative analysis of biomass composition across different states for specific crops was conducted based on key components, such as calorific value (CV), ash content, volatile matter, nitrogen, and sulfur, for crops like wheat, mustard, bagasse, paddy, and mustard straw. This analysis revealed significant variations in the composition of these crops across North Indian states.



Comparison analysis of different crops of different states

For wheat, the energy potential (calorific value) remained steady among all five states, but the ash content varied considerably. Haryana's wheat had higher ash content, likely due to soil and farming practices, while Jammu & Kashmir's wheat had lower ash content, possibly due to different soil types. The levels of volatile matter, nitrogen, and sulfur also varied regionally, influenced by climate and agricultural practices. Similar trends were observed in other crops like paddy, mustard, and bagasse. For instance, paddy from Punjab had higher ash content, likely influenced by the local soil and climate, while paddy from Himachal Pradesh had lower ash content. The differences in volatile matter, nitrogen, and sulfur content across regions reflected the varied environmental and agricultural conditions. While the energy potential of these biomass sources remained consistent, factors like ash content varied significantly. This suggests that regional differences in soil, climate, and farming methods have a substantial impact on biomass composition. By understanding these variations, we can better optimize the use of biomass resources for energy production.

To fulfill this objective of thermal efficiency and emission analysis, various samples of coal were collected from different thermal power plants. These samples were characterized for calorific value, proximate value, and ultimate value. The collected coal samples revealed that none met the desired calorific value (CV) and ash content targets (3400-3500 cal/gm and 35-40%, respectively). Employing a coal blending approach, different proportions of high-quality and normal-quality coals were theoretically mixed to achieve the desired values. Theoretical calculations identified an optimal blend composition of 10% high-quality coal and 90% normal coal, yielding a CV of 3611.23 and ash content of 35.408. Experimental data showed that the blend of 15% high-quality coal and 85% normal coal provided the best results, with a higher calorific value (3498.67±1.5 MJ/kg) and relatively lower ash content (40.280%±2). This blend also maintains a reasonable balance of volatile matter and fixed carbon, contributing to better combustion properties and efficiency.

A series of experiments were carried out utilizing a forced draft Cookstove to assess its burning rate and thermal efficiency. The burning rate of coal and paddy pellets was measured in kilograms per hour (kg/hr). The results showed that coal had the slowest burning rate at 0.83 kg/hr, while paddy pellets burned faster at 1.32 kg/hr, indicating that fuel composition significantly influences fuel consumption during cooking. Thermal efficiency tests conducted through six experimental trials revealed consistent performance of the Cookstove. On average, it had a thermal efficiency of 36.96% with a standard deviation of 0.31%, and power output ranged from 2.43 kW to 2.50 kW. Further experiments with different biomass-coal blends are ongoing.

During 2023-24, the CPRI funded project made significant strides in analyzing raw biomass and pellets for combustion. Biomass samples from northern India were characterized for thermal properties. Co-combustion with coal revealed optimal blends for calorific value and ash content. Forced draft Cookstove experiments demonstrated different burning rates, with paddy pellets burning faster than coal. The Cookstove's thermal efficiency averaged 36.96%. Regional analysis of biomass composition showed significant variations due to soil and climate, impacting energy conversion. Further experiments with biomass-coal blends are ongoing to enhance energy production.

B. Ministry of New and Renewable Energy, New Delhi Funded Project

1. Project No. 223/2/2019-Waste to Energy-Part (2): Densification of agro-waste and assessment for its application in the gasifier

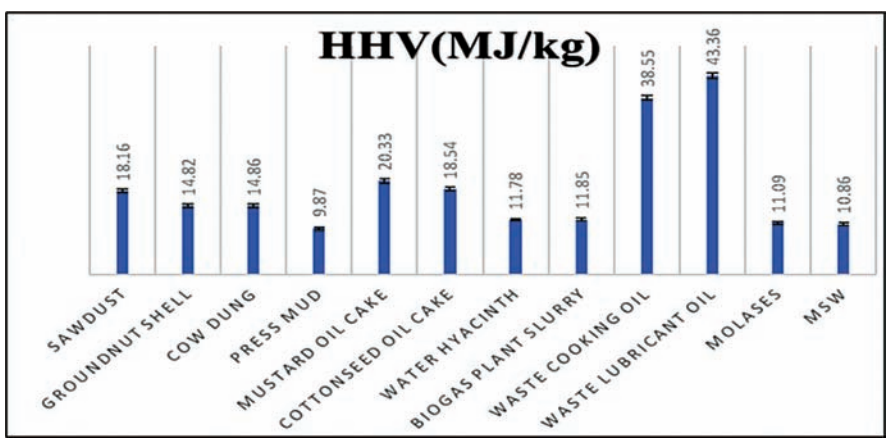
During 2023-24 significant work has been done for completion of the objectives of the project entitled 'Densification of agro-waste and assessment for its application in gasifier'. During this period objectives of the project were revised as per the meeting of the project monitoring committee. The revised objectives of the project include: -

- To characterize different agro-wastes like paddy straw, corn stover, sweet sorghum, millet, cotton stick, and mustard crop residue for briquetting machine.
- To investigate the size of milled biomass and binders on pellets characteristics.
- To investigate fuel efficiency of pellets for its potential use in gasifier.
- Techno-economic study of pellets for its application in gasifier.

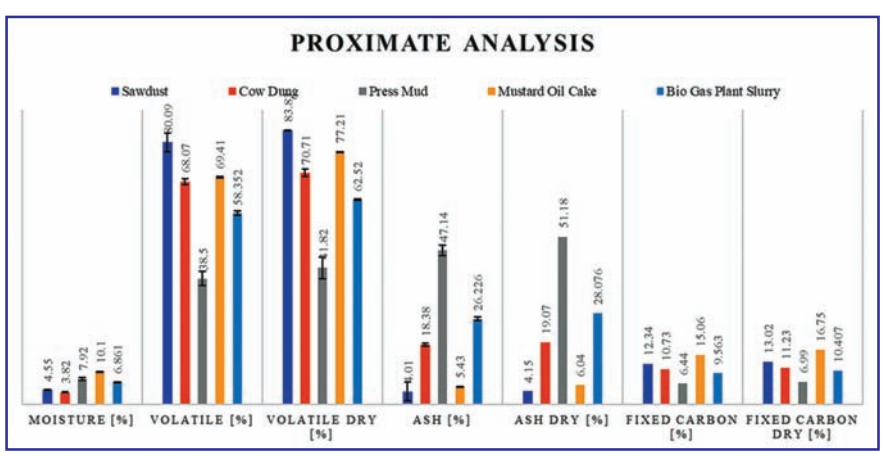
During this year besides the characterization of the biomass which are included in the project (paddy straw, corn stover, sweet sorghum, millet, cotton stick, and mustard crop residue) tested in the previous year of the project. Different organic binders and different milled size biomass were tested for physiochemical characteristics as shown below.

Different organic binders used for preliminary testing

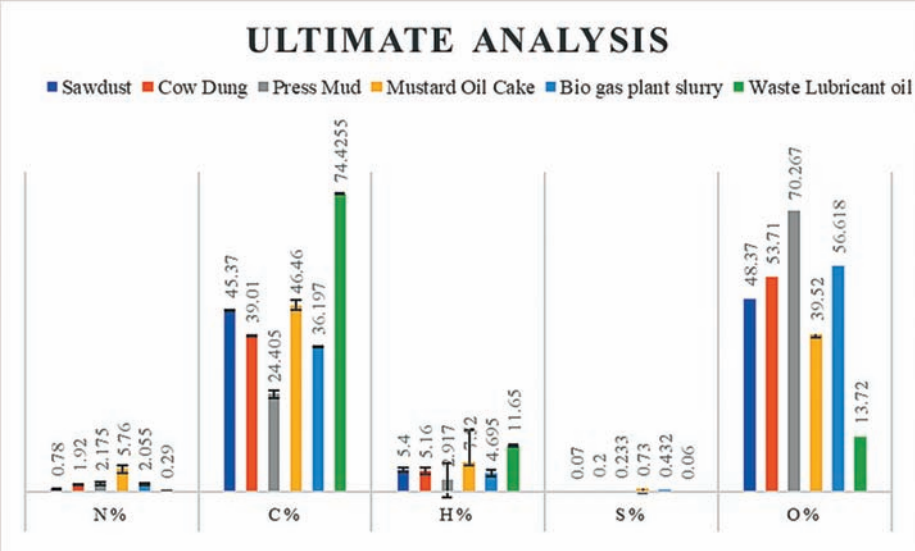
The Higher Heating Value (HHV), ultimate analysis (C, H, N, S, O) and proximate analysis (moisture, volatile matter, fixed carbon and ash) of the tested samples have been provided in Figures below respectively.



Higher Heating Value of different binders



Proximate analysis of different binders



Ultimate analysis of different binders

Ultimate analysis and proximate analysis values of different size milled biomass are given in Tables below respectively.

Proximate analysis values of different sizes milled biomass

Biomass Name with size in mm	Moisture [%]	Volatile [%]	Volatile Dry[%]	Ash[%]	Ash Dry [%]	Fixed Carbon [%]	Fixed Carbon Dr[%]
Cotton Stalk<2	11.26±0.13	68.27±0.31	76.93±0.24	3.18±0.28	3.58±0.32	17.28±0.27	19.47±0.31
Cotton Stalk2-5	11.15±0.03	69.896±0.77	78.66±0.84	1.78±0.10	2.01±0.11	17.16±0.84	19.31±0.95
Cotton Stalk>5	11.37±0.07	71.31±0.40	80.46±0.44	1.56±0.17	1.77±0.19	15.73±0.26	17.76±0.3
Millet<2	10.65±0.06	67.17±0.91	75.18±1.04	6.47±0.17	7.24±0.18	15.69±0.86	17.56±0.96
Millet2-5	10.67±0.10	68.67±1.54	76.88±1.64	3.85±0.10	4.31±0.12	16.79±1.33	18.80±1.51
Millet>5	10.60±0.10	69.92±0.59	78.22±0.62	3.47±0.17	3.88±0.19	15.99±0.41	17.89±0.47
Corn Stover <2	10.89±0.05	68.43±0.53	76.80±0.61	6.12±0.42	6.87±0.48	14.53±0.96	16.31±1.08
Corn Stover 2-5	10.71±0.05	68.84±1.25	77.10±1.43	3.69±0.13	4.14±0.15	16.74±1.29	18.75±1.44
Corn Stover >5	10.74±0.01	70.14±1.02	78.58±1.14	3.36±0.11	3.76±0.12	15.74±0.92	17.64±1.03
Mustard<2	11.12±0.08	68.54±0.97	77.12±1.10	7.70±0.23	8.67±0.26	12.62±1.21	14.2±1.36
Mustard2-5	10.73±0.04	69.33±0.87	77.67±0.98	5.62±0.12	6.3±0.14	14.30±1.00	16.02±1.12
Mustard>5	10.68±0.09	69.81±1.16	78.16±1.24	5.28±0.01	5.92±0.01	14.21±1.09	15.91±1.24
Paddy Straw<2	10.04±0.01	62.86±0.79	69.88±0.88	14.63±0.13	16.26±0.15	12.45±0.70	13.84±0.77
Paddy Straw2-5	10.51±0.01	64.92±1.12	72.55±1.27	12.86±0.01	14.38±0.01	11.69±1.15	13.06±1.28
Paddy Straw>5	10.48±0.11	63.99±1.14	71.37±1.19	13.39±0.13	14.68±0.35	12.53±1.197	14.05±1.37

Ultimate analysis values of different sizes milled biomass (in %)

Biomass	N	C	H	S	O
Cotton Stalk<2	0.815±0.126	39.207±0.36	5.258±0.01	0.09±0.013	54.627±0.232
Cotton Stalk2-5	0.657±0.098	40.317±2.352	5.252±0.253	0.051±0.018	53.721±2.577
Millet<2	0.998±0.262	39.297±1.052	5.572±0.224	0.133±0.034	53.998±1.073
Millet2-5	0.61±0.051	40.595±0.706	5.532±0.05	0.099±0.011	53.161±0.795
Corn Stover <2	0.815±0.126	39.207±0.36	5.258±0.01	0.09±0.013	54.627±0.232
Corn Stover 2-5	0.657±0.098	40.317±2.352	5.252±0.253	0.051±0.018	53.721±2.577
Mustard<2	1.106±1.137	38.044±38.203	5.307±5.392	0.629±0.616	54.911±45.348
Mustard2-5	0.537±0.276	37.127±2.848	4.927±0.244	0.414±0.236	56.991±2.613
Paddy Straw<2	0.787±0.053	34.22±0.438	4.738±0.108	0.196±0.03	60.056±0.542
Paddy Straw2-5	0.479±0.104	34.704±1.378	4.743±0.134	0.176±0.048	59.895±1.621

Also, during 2023-24 the procurement process of the biomass densification machine for pellet production and Syn gas analyzer for biomass gasifier have been up taken. The bidding and tender process and release of PO of the same has been completed. The further work is focused on the production of pellets with the help of different biomass and binders and their characterization. The work for the other objective is under progress aligned with the timeline of the project.

With the relevance of the project, during this period the JRF involved in the project presented our work 'A Comparative Study of Cow Dung and Water Hyacinth Feedstock Biomass Gasification: Optimization for Enhanced Producer gas production' at ICRABR-2023 at SSS National Institute of Bio-Energy, Kapurthala from 9th to 12th October 2023. The work from this conference will be published in Springer's proceedings in Energy. Furthermore, the JRF involved in the project presented our work 'Insights into Biomass Gasification: A Statistical Analysis' at ChemEEE 2024 at IIPE Visakhapatnam from 19-21 February 2024. The work from this conference will be published in SCI journal proceedings.

C. NMHS Funded Project

Advanced microalgal biorefinery approach for recycling of domestic sewage wastewater for cleaner and greener Himalayan region

SSS NIBE had received an externally funded project entitled "Advanced microalgal biorefinery approach for recycling of domestic sewage / wastewater for cleaner and greener Himalayan region" from the National Mission on Himalayan Studies, MoEF&CC, Govt. of India. The collaborative project cost INR 96.75 Lakhs for a duration of three years (July 2023 to July 2026) and the members are Dr. Sachin Kumar (PI, SSS NIBE), Dr. Sanjeev Mishra (Co-PI, SSS NIBE), and Dr. Mamta Awasthi (Co-PI, NIT Hamirpur). In addition, the Jal Shakti Vibhag, Hamirpur has collaborated in the project as the implementing partner to install the technology in one of its Sewage Treatment Plant (STP), Hamirpur.

The project aims to develop a sustainable process to treat domestic sewage wastewater using algal and conversion of harvested algal biomass into biogas, biocrude, biochar, and high-value products. The agal cultivation process and the optimization study will be done in a 2000 L open raceway pond at SSS NIBE. Further, the optimized process will be scaled-up in a 5000 L open raceway pond at STP, Hamirpur. The harvested biomass will be converted into biofuels using existing pilot-plant anaerobic digester installed at SSS NIBE. In addition, the project will help manpower and skill development and conduct technoeconomic analysis of the overall process for further scale-up under pilot plant and commercialization through technology transfer.

The wastewater samples were collected from different locationsand characterized for nitrate, phosphate, and cations, TDS, etc., as per the APHA 2023 protocols. Microalgal strains were isolated from the wastewater samples using serial dilution and microbial isolation techniques. The pure culture strains were subsequently grown in BG-11 Media. The pure cultures were initially identified by observing them under the microscope to have an idea about the putative microalgalgenus.Among the isolates, three microalgae strains were found to be from the class *Chlorophyceae*. Isolated microalgal strains were inoculated into growth media (BG-11).The culture condition was maintained at temperature (25°C ± 2°C), pH (7.00 – 8.00), and light intensity (7500 – 8000 Lux). The growth study of lab-scale

cultures was assessed by monitoring optical density (OD) at 680 nm followed by estimating the dry cell weight (DCW (g/L)). To enhance the growth the pH was maintained 7.0-8.0 by periodic supply of pure CO_2. Further research and optimization for wastewater treatment by microalgae strains is ongoing.

Algal culture rack set up in the Algal bio-refinery Lab

ACADEMIC PROGRAM

The institute commenced an academic program M. Tech (Renewable Energy), in collaboration with Dr. B. R. Ambedkar National Institute of Technology (NIT), Jalandhar in September, 2020. This program has provision for National Renewable Energy fellowship for the GATE qualified students, which is formally approved by Hon'ble Minister, MNRE. The course offered by Centre for Energy and Environment, NIT Jalandhar, has an intake capacity of 30 students, which includes 15 industry sponsored / self-sponsored candidates.

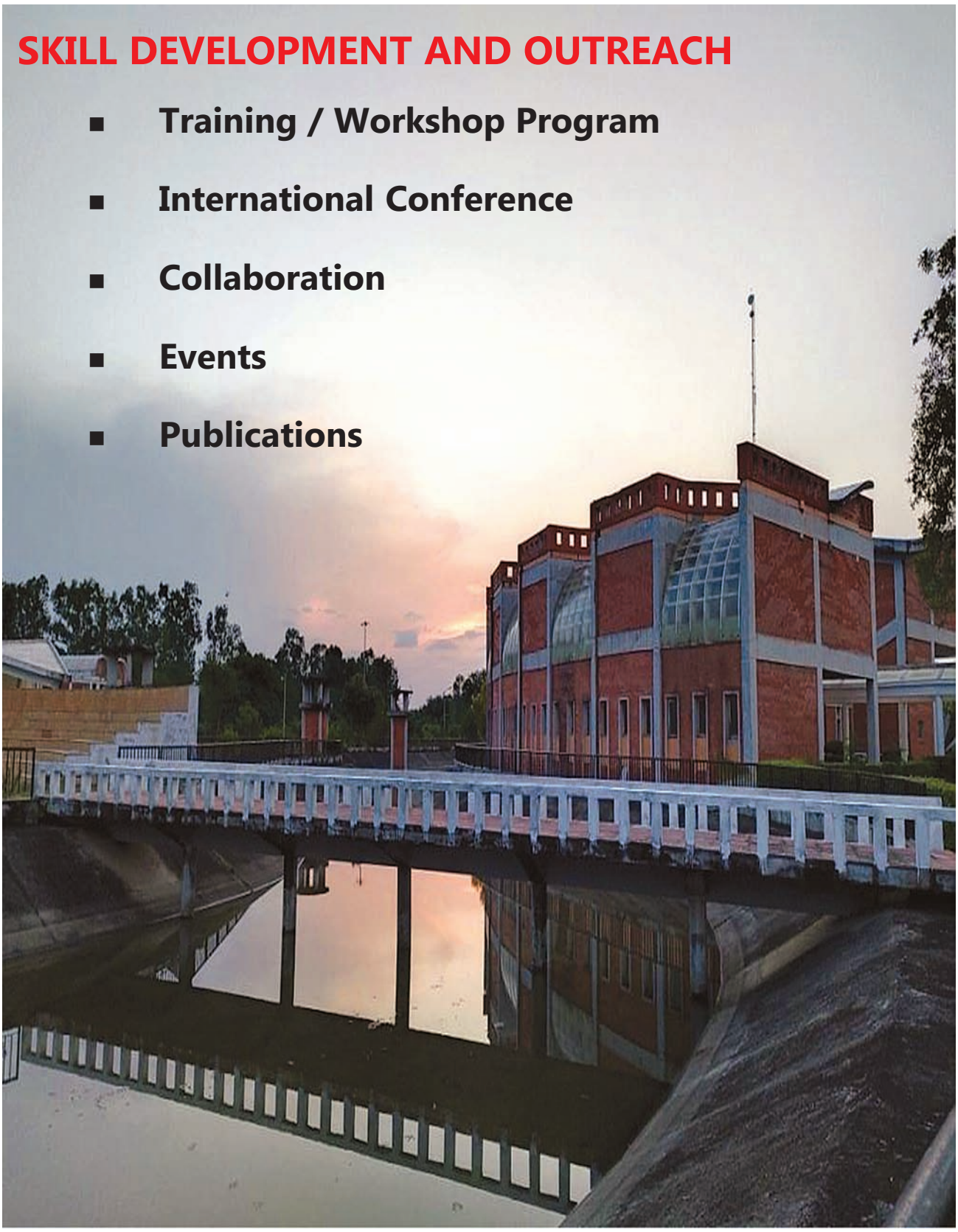
The first batch of students graduated in May 2022 and got successfully placed in academia and industry. Broad features of the program are as follows:

- Course work is jointly taught by Scientists from SSS NIBE and Faculty of NIT, Jalandhar.
- The program covers the important aspects of renewable energy, bioenergy, biofuels, waste to energy, solar thermal, solar PV, wind, hydro sectors with relevant electives offering.
- The students have a choice to work on final semester project at NIBE / NISE / NIWE or Industry.
- Opportunities for internships in industry

There is also opportunity for students to pursue Doctoral Research degree, which is offered jointly with NITJ, Indian Institute of Technology (IIT), Roorkee and other universities in the country. The Institute also offers limited Post-Doctoral Fellowship for researchers holding a PhD who wish to carry out their research activities in the field of Bio-Energy, acquire new skills and develop their careers.

SKILL DEVELOPMENT AND OUTREACH

- Training / Workshop Program
- International Conference
- Collaboration
- Events
- Publications



TRAINING / WORKSHOP PROGRAM

SSS NIBE is devoted to the promotion of bio-energy. With this aim, the institution organises outreach programmes and events on many facets of bio-energy. In 2023-24, the institution organised a national training programme and a workshop.

1. "National Hands-on training program on Bio-Gas Technology and its implementations"

2. "National Workshop on Biomass-based Clean Cooking Solutions"

SSS NIBE and Indian Biogas Association (IBA) jointly organized a five-day National hands-on training program on 'Biogas Technology and its Implementation' in hybrid mode between 19 and 23 Feb 2024. The event was inaugurated on 19th Feb 2024 by Dr. G. Sridhar, Director General, SSS NIBE, with Dr. AR Shukla, President, IBA as the Chief Guest and Sh. Gaurav Kedia, Chairman, IBA as the Guest of Honor.

The coordinator of the program, Dr. Sachin Kumar, Deputy Director, SSS NIBE, introduced the event's scope on biogas technology and elaborated on the objectives of the event. Sh. Gaurav Kedia, Chairman, IBA, in his opening remarks, highlighted the importance of training for the biogas sector.

Similarly, a two days National Workshop on, Biomass-based Clean Cooking Solutions was organized from 29th Feb. to 1st March, 2024. The event was inaugurated on 29th Feb by Dr. G. Sridhar - Director General, SSS NIBE, Chief Guest - Dr. Jatinder Kaur Arora, Executive Director, PSCST, Guest of Honour - Dr. Sangita M Kasture, Advisor & Scientist G, MNRE, with the prayer of Maa Saraswati. Dr. Sridhar spoke about the relevance and importance of biomass-based cooking in the country particularly in the rural areas. He highlighted that apart from cooking biomass resource could be utilized for meeting the thermal needs of rural enterprises, more importantly the micro and the small enterprises. Dr. G. Sridhar also brought out the need for support to the sector from MNRE.

Dr. Sangita Kasture in her address acknowledged the current challenges being faced in the clean cooking sector and indicated that stakeholders can collectively come up with the technological and business driven solutions for the problems to drive a clean transition. She also informed about the governmental support to the sector through biogas-based cooking. Chief guest Dr. Jatinder Kaur Arora with well laid out statistics highlighted the magnitude of the problem. She also highlighted the role of women entrepreneurship in solving this challenge and the ways through which PSCST is promoting women entrepreneurship across different sectors in the state. The vote of thanks was delivered by Dr. Kunwar Pal, Scientists-C, SSS NIBE.


National Workshop
on
Biomass Based Clean Cooking Solutions
29 February - 01 March, 2024
Organized by
Sardar Swaran Singh National Institute of Bio-Energy, Kapurthala

INTERNATIONAL CONFERENCE

4th International Conference on Recent Advances in Bio-energy Research-2023 (ICRABR 2023)

The 4th International Conference on Recent Advances in Bio-energy Research-2023 (ICRABR-2023) was organised by the Institute from 9-12th October 2023.

ICRABR 2023 was envisioned to serve as a holistic learning event and congregation of all the stakeholders in the bio-energy sector including the policymakers, government, industry, UN agencies, academia, and research. The diverse participation received from over 300 National / International participants from all these stakeholders fructified the aim of the conference.

During the conference, Mr. Bhupinder Singh Bhalla (IAS), Secretary, Ministry of New and Renewable Energy, highlighted the importance of bio-energy to meet rapidly increasing energy demand in future and also informed about the vital support that the MNRE is providing for the sector to grow quickly in India. He also called to scale up the existing solutions and innovate to accelerate energy transition. Mr. Bhagwanth Khuba, Hon'ble Minister of State (Chemicals and Fertilizers and MNRE) delivered his message for the conference with a pre-recorded video highlighting the relevance of bio-energy in Indian context and opportunities. Prof. K. K. Pant, Director IIT Roorkee, addressed the gathering and apprised them about the role of research and innovations for developing a sustainable bio-based economy. Director General NIBE, Dr. G. Sridhar highlighted the role of bio-energy in achieving an energy-self-reliant and carbon-neutral India and NIBE's efforts towards these goals.

Secretary, MNRE launched the communication kit for better outreach of the National Bio-energy Programme and an anthem on the theme of JaivUrjai.e. Bio-energy indicating its importance in day to day life of citizens. He also flagged off mobile vans to spread awareness about the ill effects of stubble burning of biomass majorly paddy straw and instead use it for various Bio-energy Projects under National Bio-energy Programme. The delegates also got a glimpse of some of the advances in bio-energy from the stall exhibition at ICRABR wherein several prominent industries / organizations showcased their bio-energy-related technology solutions and projects to the participants. Over the course of three days in the conference, there were multiple Plenary and Technical Sessions on the different themes of the conference from distinguished scientists, faculty and scholars, from USA, Europe, Canada and other Asian countries. Broad themes of the conference included but were not limited to Biomass Resource Management; Biomass / waste conversion to energy; Biomass Valorisation / Waste to value added materials/ Products; Modelling of Bio-energy system; and Biorefinery and Biohydrogen. Sessions during the conference covered the latest research developments in bio-energy including case studies, state-of-the-art practices, supply chain management, financing, sustainability, carbon neutrality, and policy aspects. The conference discussions explored the research activities in the areas of bio-energy including biogas, bio-hydrogen, biorefinery, biodiesel, bioethanol, fuel cell, biomass-derived electrodes for energy generation, biomass gasification and biomass cookstoves, and carbonaceous materials.

Besides the scientific focus, the conference also provided a wholesome knowledge exchange by featuring dedicated Industry Sessions on Technology Advances, Implementation, and Financing opportunities in the bio-energy sector, Success Stories from the Field, and Poster Sessions. The session on field stories generated great interest in the participants as they got to hear from people who have

successfully implemented bio-energy projects on the ground, overcoming the real-time challenges faced when a technology gets translated from lab to land. The session had presentations on Ensuring Food / Energy Security with Carbon Sequestration which presented biochar as a key solution, Livelihood Opportunities in the bio-energy sector with the focus on skilling needs for feedstock supply chain, fabrication / installation, operation and maintenance of bio-energy plant, Uptake of Biomass-Based Interventions through agriculture waste management for farmers income and energy access enhancement, Community Biogas Plants for decentralized energy generation and organic fertilizer production in rural areas etc. The fourth day of the conference (12.10.2023) witnessed an exciting Bio-energy Industry Exposure Visit of participants to Sukhbir Agro Energy Ltd. Biomass Power Plant in Ferozepur Dist., Punjab. It is an 18 MW capacity power plant that consumes around 600 tonnes of paddy straw in a day. The participants got a real-time feel of a live commercial bio-energy plant and understood the functioning and the scale of operations, including the storage, handling and transport of paddy straw required for running a large-scale bio-energy plant.

Discussions held during the conference also illustrated that collaboration remains the need of the hour for progress. They reinforced that partnerships among government, industries, societal organisations, farmers and research institutions can shape a future where sustainable energy solutions will drive the global progress.

Particularly now, after the launch of the Global Biofuels Alliance during G20 by Hon'ble PM Narendra Modi with the highlighted need to quickly achieve the SDGs, the knowledge exchange between researchers across disciplines and regions is needed to enhance the dissemination of concepts and ideas.

Glimpses of the 4th ICRABR-2023


ICRABR-2023

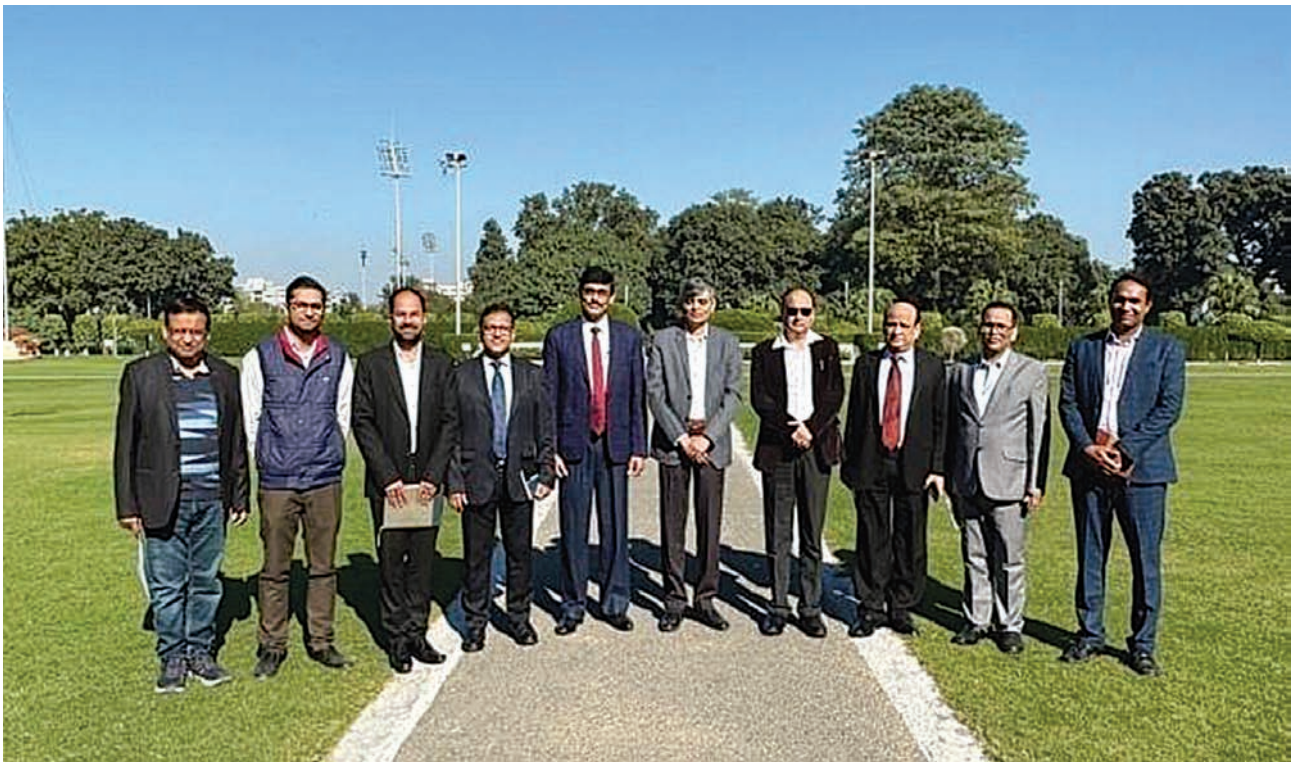
COLLABORATION

During the year 2023-24, SSS NIBE signed MoU's with various institutions to facilitate collaborative research and exchange of students for academic work. The MoU's signed are:

1. MoU between **SSS NIBE and National Aerospace Laboratories (NAL)** was signed with Surface Engineering Division of NAL, Bangalore for Joint R&D activities in the areas of application of biofuel in gaseous forms for power generation in high temperature fuel cell and work on Solid Oxide Fuel Cell (SoFC) for advancing its development in the country.

2. MoU between **SSS NIBE and IBA, Gurugram** was signed on 09.01.2024.

3. A strategic MoU was signed between **SSS NIBE and Indian Institute of Technology, Roorkee (IITR)** on 09.02.2024. This MoU will explore several avenues for collaboration in the field of bioenergy and bioproducts, starting with research scholars enrolling for PhD programs at IITR, commencement of jointly new academic programs – integrated PhD, exchange of faculty as visiting scientists, jointly submission of R&D proposals, training etc.

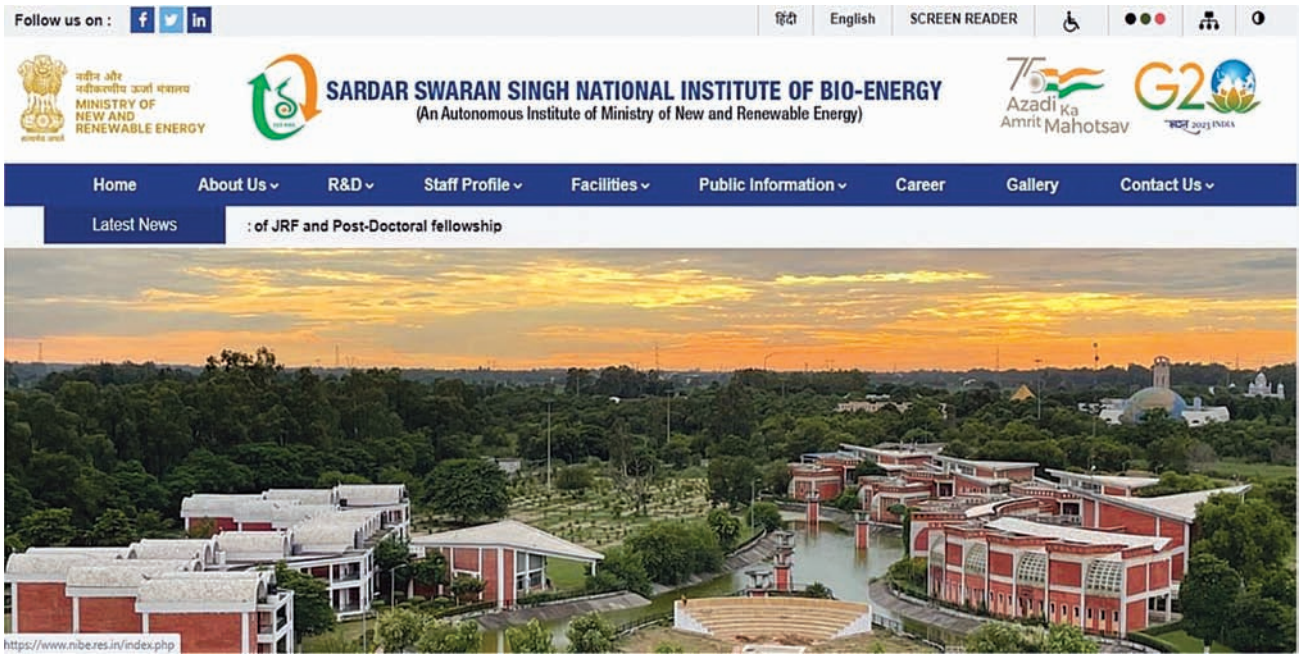



Signing Ceremony of MoU Between SSS-NIBE and IIT Roorkee (Moderated unmute mode)
Meeting Info
12:34
Layout
Meeting Room SSS.NIBE
KKPANT
Unverified
Jahnavi
Unverified
Prakash Biswas
Mute
Stop video

EVENTS

1. Launch of New Institute Website

The institute new bilingual website (http://nibe.res.in/) was formally launched by DG NIBE on 13th April 2023 in the meeting room of the Institute. The new website has a user-friendly design which makes it easier than ever to access information about institute's programs, Scientists, and upcoming events. One can explore the ongoing institute's innovative projects, access valuable resources, virtual campus and discover all the amazing opportunities which institute has to offer.



2. National Technology Day

National Technology Day was celebrated on 11th May 2023 to commemorate the successful conduct of India's nuclear tests in Pokhran on May 11, 1998, a significant milestone in the country's history. It was also an occasion to honour the spirit of the technological developments and innovations of India's scientific / industrial community.

In this regard, institute celebrated the National Technology Day on 11th May, 2023. During the event, a Guest Lecture was organized and delivered by Cdr. Gurkeerat Sekhon (Retd), Executive Vice President-North Zone, Punjab Renewable Energy Systems Pvt. Ltd.

3. International Year of Millets Celebration

Government of India had proposed to United Nations for declaring 2023 as International Year of Millets (IYOM). The proposal of India was supported by 72 countries and United Nations General Assembly (UNGA) declared 2023 as International Year of Millets on 5th March, 2021. In this regard, the institute celebrated IYOM, 2023 on 24th May 2023. During the event, a Guest Lecture was organized and delivered by Dr. Avneet Kaur, Assistant Professor, Krishi Vigyan Kendra, Kapurthala under Mission Life Celebrations.

Mission Life Celebrations

4. Exhibition on Bio-fuel Expo 2023

SSS NIBE exhibited a stall (complimentary) at the Bio-fuels Expo-2023 in Pragati Maidan, New Delhi from 5th – 7th June 2023. Bio-fuel Expo 2023-International Exhibition and Conference focused on Bio-fuel (Bio-diesel, Ethanol, Bio Gas, Hydrogen, Pellets) Manufacturers, Bio-fuel Plant Equipment & Machine Manufacturers, Bio-fuel Refineries and was a platform for the stakeholders of the sector to come together. A team from NIBE including Scientist, RA, and SRF were a part of the exhibition, and showcased the work / products / technologies developed at NIBE. The stall witnessed enthusiastic attendance from the expo visitors wherein they were also informed about the services offered by NIBE including testing, consultancy / DPR preparation, etc.

5. 77th Independence Day Celebration

The 77th Independence Day was celebrated on 15th August, 2023 with enthusiasm in the institute. On this occasion, the Director General of the Institute hoisted the National flag. The flag hoisting was followed by tree plantation from DG NIBE. A brief cultural program was organsed by researchers, staff and their families.

6. Orientation Program for M. Tech 2023 Batch

The joint orientation program for newly admitted M. Tech (R.E) students was held on August 28, 2023 at SSS NIBE. DG NIBE welcomed all new M. Tech students. All the new students introduced themselves followed by a short interaction with NITJ faculty members and Heads of all divisions of SSS NIBE.

7. Swachhata Shramdaan

Swachhata Shramdaan was organised by the institute under **"Swachhata Hi Sewa"** campaign.

8. Hindi Pakhwada

On the occasion of Hindi Pakhwada, various competitions and kavi sammelan were organized in the institute. Hindi essay competition, quiz competition and debate competition were some of the prominent competitions organized. Employees of the institute participated in large numbers in all these competitions. At the beginning of the Kavi Sammelan, the poet and the guests first lit the lamp

on the picture of Mother Saraswati. On this occasion, poets Mr. Rajesh Chetanji and Mrs. Baljeet Kaur ji, who have given their presentations on several national and international platforms, were invited. They tickled the audience with his humorous and satirical poems.

9. Vigilance Awareness Week

As per CVC's direction, SSS NIBE observed "Vigilance Awareness Week" (VAW) from 30.10.2023 to 05.11.2023. In this regard, the debate and quiz competition was organized on 02/11/2023 at Dr. A.P.J. Abdul Kalam Auditorium. All staff, research scholars, and students participated in the events. On this occasion, the integrity pledge was taken by all and also guest lecture was organized and delivered by Mr. Inder Raj Singh Bains (Retired P.C.S. Officer, Cooperative Department, Govt. of Punjab.) on "Vigilance Awareness & PIDPI" on 03.11.2023. The program concluded with tree plantation by the guest and DG NIBE.

10.Inauguration of Innovation and Computational facility

DG SSS NIBE inaugurated the Innovation and computational centre at Technical Block on 02.11.2023. This centre is expected to facilitate high end computational work of the institute and also serve as a facility for collaborative environment where staff, students and organizations can come together to exchange ideas, innovate, and develop their ideas / projects.

11. Constitution Day Celebration

The institute celebrated the Constitution Day on 26.11.2023 in the auditorium. During the event a pledge ceremony was organized.

12. Republic Day Celebration

The 75th Republic Day was celebrated on 26th January, 20234 with enthusiasm in the institute. On this occasion, the Director General of the Institute hoisted the flag. The flag hoisting was followed by tree plantation from DG NIBE. A brief cultural program was conducted by researchers, staff and their families.

13. Meetings

a. 8th Building Works Committee Meeting

The 8th building works committee meeting was held on 14.06.2023. During the meeting, various civil related matters were briefly discussed.

b. 23rd Finance Committee Meeting

The 23rd Finance Committee meeting of SSS NIBE was held on 09.08.2023 in hybrid mode at Ministry of New & Renewable Energy.

c. 37th Governing Council & 5th AGM Meeting

The 37th Governing Council Meeting and 5th Annual General Meeting were held on 25.10.2023 under the Chairmanship of Secretary, MNRE through hybrid mode.

d. 24th Finance Committee Meeting

The 24th Finance Committee Meeting was held on 15.02.2024 under the Chairmanship of Sh. Padam Lal Negi, Joint Secretary & Financial Advisor, MNRE via hybrid mode.

e. 38th Governing Council Meeting

The 38th Governing Council meeting was held on 26.03.2024 under the Chairmanship of Secretary, MNRE through hybrid mode.

14. Social Activities

Prize distribution of Hindi Pakhwada: Quarterly meeting on Hindi was organized at SSS NIBE on 15.03.24, where activities of Hindi were presented by Dr. Ashish Bohre, Hindi officer, SSS NIBE. This was followed by honoring of the winners of various competitions during the Hindi Pakhwada 2023, in the presence of Dr. V K Aggarwal, who is part of Hindi committee.

15. International Yoga Day

In September 2014, Hon'ble Prime Minister Narendra Modi, in his UN address, suggested an annual day of Yoga on 21 June, as it is the longest day of the year in the Northern Hemisphere and shares a special significance in many parts of the world. Our Institute actively celebrated the International Yoga Day on 21st June 2023, with the Institute's staff taking part and performing Asanas.

PUBLICATIONS

Patents

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2. Sachin Kumar, Richa Arora, Nilesh K Sharma and Shuvashish Behera, Simultaneous Saccharification and Co-Fermentation of Paddy Straw for Bioethanol Production; (Application No.: 202211001560; Dated: 11.01.2022; Country: India). Published in the Patent Office Journal, issue no. 28/2023 dated 14/07/2023., Page No. 49277.

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2. Hans M, Pellegrini VO, Filgueiras JG, de Azevedo ER, Guimaraes FE, Chandel AK, Polikarpov I, Chadha BS, Kumar S (2023) Optimization of Dilute Acid Pretreatment for Enhanced Release of Fermentable Sugars from Sugarcane Bagasse and Validation by Biophysical Characterization. BioEnergy Research 16 (1), 416-434.(IF: 3.6)
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4. Dhull P, Lohchab RK, Kumar S, Kumari M, Shaloo, Bhankhar AK (2023) Anaerobic Digestion: Advance Techniques for Enhanced Biomethane / Biogas Production as a Source of Renewable Energy. BioEnergy Research (In-press). https://doi.org/10.1007/s12155-023-10621-7(IF: 3.6)
5. Hans M, Lugani Y, Chandel AK, Rai R, Kumar S (2023) Production of first- and second-generation ethanol for use in alcohol-based hand sanitizers and disinfectants in India. Biomass Conversion and Biorefinery 13(9), 7423-7440. (IF: 4.987)
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7. Behera, S, Sharma NK and Kumar S (2023) Augmentation of Bio-butanol Production Through Isolation, Screening and Optimization of Growth and Fermentation Parameters Using Response Surface Methodology. Sugar Tech 25, 531-541. (IF: 1.872)
8. Garg S, Behera S, Ruiz HA and Kumar S (2023) A Review on Opportunities and Limitations of Membrane Bioreactor Configuration in Biofuel Production. Applied Biochemistry and Biotechnology 195, 5497–5540. (IF: 3.094)
9. Saranya, P., Jayanthi, S., & Nagappan, S. (2024). Production and characterization of extracellular laccase from Bacillus aerius SP3 and its application in dye decolorization. *Biologia*, 1-15.
10. Vandit Vijay, Santosh Saraswat (2023). From waste to wealth – biomass solutions (not only) for India's food loss challenge, Rural 21- The International Journal for Rural Development, 57 (4).

11. Vandit Vijay, Ram Chandra, Vivekanand, Anuj Kumar Chandel (2024). Editorial: The role of biochar in enhancing biogas productivity and bio-fertilizer quality, Frontiers in Energy Research, 12, 1357466.

12. https://doi.org/10.3389/fenrg.2024.13574

13. S K Saraswat, Vandit Vijay, G Sridhar (2023). National Biomass Atlas of India Brief (Biomass and Bioenergy Potential), OSF Preprints.

14. https://doi.org/10.31219/osf.io/dt68r

15. K Saraswat, Vandit Vijay (2023). Technical-Economic-Environmental (TE2) analysis of different site suitability classes in India, 5th International Conference on Energy, Power and Environment: Towards Flexible Green Energy Technologies (ICEPE), IEEE, 1-5.

16. Singh, G. N., Tyagi, U., Aslam, M., & Sarma, A. K. (2023). Expediency of Green Gasoline in Internal Combustion Engines. Green Gasoline: A Green Spark Transportation Fuel, 77, 218.

17. Singh, G. N., Sarma, A. K., Bharj, R. S., Vandit Vijay (2023). A study on emission analysis of automotive diesel engine fired with 2nd generation ethanol-blends for clean environment. 4th International Conference on Recent Advances in Bio-Energy Research (ICRABR-2023).

18. Deepanshu Awasthi, Bhautik Gajera, Rakesh Godara, Arghya Datta, Nikhil Gakkhar, Tapas Kumar Patra. 2024. "Process Design of Various Biomass Gasification Processes Using Aspen Plus and Its Effects on Syngas and Hydrogen Production." CRC Press, 260-278

19. Awasthi, Deepanshu, Sujit Kumar Guchhait, Suman, Anil K. Sarma, and Bharat Bajaj. "Synthesis and application of Quintinite-3T nano catalyst along with KOH for biodiesel production from Jatrophacurcas oil and used cooking oil." Chemical Engineering Communications 211, no. 2 (2024): 263-274.

20. Guchhait, Sujit Kumar, and Anil Kumar Sarma. "Application of nano emulsion in food and packaging industry." In Industrial Applications of Nano emulsion, pp. 49-75. Elsevier, 2024.

21. Gajera, Bhautik, Uplabdhi Tyagi, Anil Kumar Sarma, and Mithilesh Kumar Jha. "Pyrolysis of cattle manure: Kinetics and thermodynamic analysis using TGA and artificial neural network." Biomass Conversion and Biorefinery (2023): 1-17.

22. Guchhait, Sujit Kumar, Debanjan Sutradhar, Rajib Nandi, and Anil Kumar Sarma. "Biomass derived metal free hierarchical porous activated carbon for efficient oxygen evolution reaction." Energy Sources, Part A: Recovery, Utilization, and Environmental Effects 45, no. 2 (2023): 5957-5969.

23. Md Aslam, S Maktedar, A K Sarma, Green Gasoline: A Green Spark Transportation Fuel, Royal Society of Chemistry, 2023, ISBN 978-1-83916-788-1.

24. J Kaur, U Tyagi, MdAsam, A K Sarma, Green Gasoline as a Commercial Liquid Fuel Throughout Asia, Europe and the USA: A Technical Review, Green Chemistry, RSC, https://doi.org/10.1039/BK9781837670079-00272

25. G N Singh, U Tyagi, Md Aslam, A K Sarma, Expediency of Green Gasoline in Internal Combustion Engines, Green Chemistry, RSC, 218-237

26. U Tyagi, Md Aslam, A K Sarma Transportation Biofuels: Green Gasoline, Bioethanol, Biodiesel and Green Diesel A Comparison https://doi.org/10.1039/BK9781837670079-00196

27. U Tyagi, Md Aslam, A K Sarma Green Anti-knock Agents for Enhancement of Gasoline Performance Green Chemistry. https://doi.org/10.1039/BK9781837670079-00238

28. P. R. Chauhan, G. Raveesh, K. Pal, R. Goyal, S. K. Tyagi. Production of biomass derived highly porous activated carbon: A solution towards in-situ burning of crop residues in India, Bioresource Technology Reports 22 (2023), https://doi.org/10.1016/j.biteb.2023.101425.

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Book Chapters

1. Kaur G, Umrao D, Dhull P, Kumar S (2024) The Role of Anaerobic Biorefinery in the Development of a Sustainable Economy. In: Chandel A (Ed.) Biorefinery and Industry 4.0: Empowering Sustainability. Springer, Cham, pp. 195-214.

2. Lugani Y, Brar SK, Kaur Y, Singh BP, Kumar D, Kumar S (2024) Sustainable production of advanced biofuel and platform chemicals from woody biomass. In: Deepak Kumar, Sachin Kumar, Karthik Rajendran (Eds.) Sustainable Biorefining of Woody Biomass to Biofuels and Biochemicals; Elsevier Woodhead Publishing, pp. 163-194.

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6. Deepanshu Awasthi, Bhautik Gajera, Rakesh Godara, Arghya Datta, Nikhil Gakkhar, Tapas Kumar Patra; Process Design of Various Biomass Gasification Processes Using Aspen Plus and Its Effects on Syngas and Hydrogen Production; Biomass Energy for Sustainable Development; CRC Press; pp260-278; dated – 2024

Books / Conference Proceedings

1. Kumar D, Kumar S, Rajendran K (Eds.) (2024). Sustainable Biorefining of Woody Biomass to Biofuels and Biochemicals. Elsevier Woodhead Publishing, Cambridge (ISBN978-0-323-91187-0).

2. Gakkhar N, Kumar S, Sarma AK, Graham NT (Eds.) (2023) Recent Advances in Bio-Energy Research: Select Proceedings of the 3rd International Conference, ICRABR 2022. Springer Proceedings in Energy. Springer Nature Singapore (eBook ISBN 978-981-99-5758-3; Hardcover ISBN 978-981-99-5757-6).

3. Dheeran P, Kumar S (Eds.) (2023) Extremophiles: Wastewater and Algal Biorefinery; CRC Press, Boca Raton (eBook ISBN 978-1-003-33522-1; Hardcover ISBN 978-1-032-37080-4).

SUPPORT SERVICES

- Finance & Administration
- Civil & Electrical
- Horticulture
- Rajbhasha Hindi

FINANCE AND ADMINISTRATION

Serving as the artery connecting the scientific divisions of the institute, the activities of Finance and Administrative divisions are briefed as under:

- Budget & revised estimates for grant-in-aid, allocation & re-appropriation of funds, expenditure management & budget control, project financial management.
- Statutory compliances on GST and income tax etc., dealing with audits, drawing up balance sheet, laying of audited accounts on the table of Parliament.
- Framing of rules, schemes and grievance redressal, management of outsourcing agency, legal issues, court cases & RTI, recruitment, hiring of research staff and promotions.
- Statutory compliances on EPF, societies registration, bills of establishment, facility management, activities related to the official language, maintenance of vehicle, security, horticulture activities, and housekeeping.
- Store & purchase, procurement of goods and services, GEM, contracts etc.
- Serving as the Central Nodal Agency for biogas implementation program of MNRE.

CIVIL & ELECTRICAL

The civil and electrical engineering division works on improving the infrastructure facilities at the institute, thus creating a conducive environment for students and staff for carrying out R&D and related activities. Some of the key activities undertaken in the 2023-24 include the following:

Renovation of Existing Structures: Renovation guest house, internal roads by incorporating modern technology and sustainable materials to improve functionality and energy efficiency.

2. Infrastructure Upgradation: Improvement in the campus infrastructure such as refurbishing of the meeting hall, improved road access, enhanced drainage systems, and the installation of new lighting to ensure safety and accessibility.

3. New Infrastructure: The establishment and furnishing of the new innovation and computational centre was taken up. This facility has been conceived to provide state-of-the-art computational facility for ongoing research initiatives at the institute. This facility also, provides an informal setup for scientist/ researchers for discussion, brainstorming etc.

The above works have been completed with due consideration to utility and quality. We believe these efforts will significantly contribute to the future growth and development of the Institute.

HORTICULTURE

The Horticulture section occupies a unique place in the SSS NIBE as campus looks green, clean and flawless with a well-maintained outdoor landscape. The large rectangular patch of land flanking both the sides of the main buildings provide an aesthetic face to the institution.

Mission of the horticulture section is to make a real and visible difference alongside delivering tangible results for SSS NIBE. All of this has been driven by our commitment to put bio-energy at the heart of everything we do.




Objectives of Horticulture:

- Supporting energy plantation to provide biomass for ongoing research activities in the field of bio-energy.
- Growing local tree varieties so as to create a sustainable and thriving environment for animal and bird species within research settings.
- Development of lawns in identified plots or belts and make such areas vibrant with seasonal flower beds.
- Coming to tree diversity, SSS NIBE campus is home to more than 1,000 mature trees of different species primarily including Arjun, Kachnaar, Eucalyptus, Tahli, Sagwan, Pipal, Banyan, Mango, Hared, Bahera, Plum, Pears, Guava, Kadipatta, Ashoka, Jamun, Amla, Alastonia, Indian Mahogany, Bottlebrush are few to mention here.

Rich flora of campus supports fauna and SSS NIBE is home to many local bird varieties like Peacocks, Parrots, Hoopies, Woodpeckers, Kingfishers, Egrets, Lapwings, Owls and animals like warthogs, Indian mongoose, Indian monitor lizards etc.

RAJBHASHA HINDI

All the works related to Official Language Hindi during the year 2023-2024 in SSS NIBE were successfully completed by the Hindi Division.The meeting of Official Language Implementation Committee and Hindi workshop were organized regularly during every quarter.

National Hindi Day is celebrated every year on September 14th in India. Based on the published rules of the Hindi Section of the Ministry of New and Renewable Energy, a Hindi Pakhwada was organized in the institution from 14th to 29th September 2023. During this period, a poetry symposium and various competitions such as quizzes, essay writing, and debates were organized to promote and raise awareness about Hindi as the official language. In which all the employees of the institute participated actively. The Kavi Sammelan was inaugurated by the honorable poet and special guest by lighting a lamp in front of the statue of Goddess Saraswati. The entire audience was enthralled with the humorous poems of nationally and internationally renowned Hindi poet Mr. Rajesh Chetan and Mrs. Baljeet Kaur. The audience present in the auditorium applauded, encouraging the honored poets with their claps.

A workshop on the topic "Technical Aspect of Hindi as Official Language" was organized on March 15, 2024, to promote Hindi as the official language. Dr. V.K. Agrawal, Hindi Advisory Committee, MNRE, was the keynote speaker at the event. During this program, the winners of various competitions held during Hindi Pakhwada 2023 were awarded prizes by the chief guest and the Director General of the institution.

FINANCIAL REPORT

- Balance Sheet
- Schedules / Annexures
- Notes to Accounts
- Independent Auditor's Report

BALANCE SHEET

The annual audited account of the Institute for the year 2023-24 has been prepared and duly audited by Anand Tarun & Co., Chartered Accountants, Jalandhar. The detailed independent Auditor's report, Balance Sheet, Income, Expenditure, Receipts & Payments Accounts schedules are attached herewith.

SARDAR SWARAN SINGH NATIONAL INSTITUTE OF BIO-ENERGY

(An Autonomous Institution of Ministry of New & Renewable Energy)
Kapurthala (Punjab) - 144601

BALANCE SHEET AS AT 31st MARCH, 2024

(Amount in Rs.)

FUND AND LIABILITIES	Schedule	31st March, 2024	31st March, 2023
CAPITAL ASSET FUND	1	41,76,55,081.99	37,42,72,365.78
RESERVES AND SURPLUS	2	18,56,71,397.37	19,09,31,375.72
CURRENT LIABILITIES AND PROVISIONS	3	1,08,61,142.53	42,20,564.76
TOTAL		**61,41,87,621.89**	**56,94,24,306.26**
ASSETS			
FIXED ASSETS			
(a) Created out of Central Governments Grants	4	17,75,19,914.58	17,51,52,385.58
(b) Out of Internal Generation Grants		0.00	0.00
INVESTMENTS		30,48,04,611.00	30,38,44,611.00
CURRENT ASSETS, LOANS AND ADVANCES	5	13,18,63,096.31	9,04,27,309.68
TOTAL		**61,41,87,621.89**	**56,94,24,306.26**
SIGNIFICANT ACCOUNTING POLICIES	13		
NOTES ON ACCOUNTS	14		

For Sardar Swaran Singh National Institute of Bio Energy

Finance & Accounts Officer

सरदार स्वर्ण सिंह राष्ट्रीय जैव ऊर्जा संस्थान
12 कि.मी पत्थर, जालंधर-कपूरथला रोड,
बडाला कलाँ, कपूरथला (पंजाब) 144601
Sardar Swaran Singh National Inst. of Bio-Energy
12 Km. Stone,Jalandhar-Kapurthala Road
Wadala Kalan,Kapurthala (Punjab) 144601

Director General

सरदार स्वर्ण सिंह राष्ट्रीय जैव ऊर्जा संस्थान
12 कि.मी पत्थर, जालंधर-कपूरथला रोड,
बडाला कलाँ, कपूरथला (पंजाब) 144601
Sardar Swaran Singh National Inst. of Bio-Energy
12 Km. Stone,Jalandhar-Kapurthala Road
Wadala Kalan,Kapurthala (Punjab) 144601

As per our Report attached
Anand Tarun & Co
Chartered Accountants

ANAND TARUN & CO. CHARTERED ACCOUNTANTS FRN : 017735N JALANDHAR

CA Anand M Chopra
Partner
M. No. 094257

Place: Kapurthala
Date : 03/08/2024

SARDAR SWARAN SINGH NATIONAL INSTITUTE OF BIO-ENERGY

(An Autonomous Institution of Ministry of New & Renewable Energy)
Kapurthala (Punjab) - 144601

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st MARCH 2024

(Amount in Rs.)

INCOME	Schedule	IE	31/03/2024	31/03/2023
Income from Services	6	28,00,813.19	28,00,813.19	7,86,217.00
Income from publication	7	-	-	-
Interest Earned	8	34,79,183.00	34,79,183.00	59,02,472.69
Other Income	9	94,25,605.21	94,25,605.21	64,76,374.81
Interest Earned & Other Income (Grant)	3.1	-	-	-
Grants from Government of India allocated for Revenue expenditure during the year		7,40,00,000.00	7,40,00,000.00	5,00,00,000.00
Grants - Adjustment previous year payment			-	-
Add:EMD,SD,PG Received			-	-
Closing stock			-	-
TOTAL (A)		**8,97,05,601.40**	**8,97,05,601.40**	**6,31,65,064.50**
EXPENDITURE			-	-
Opening stock			-	-
Establishment Expenses	10	2,76,42,747.00	2,76,42,747.00	1,99,29,418.00
Consultancy Project Expenses	11 (b)	-	-	-
Other Administrative Expenses	11 (a)	4,47,37,498.33	4,47,37,498.33	3,26,27,798.53
Expenditure from Grants			-	-
On Advances/Deposits/ Prepaid /EMD, SD, PG's etc.,			-	-
Refunded to Ministry/Bharat Kosh			-	-
Depreciation		2,22,87,827.21	2,22,87,827.21	2,23,49,440.43
In house project expenditure			-	-
Expenditure out of Previous Year Advance			-	-
TOTAL (B)		**9,46,68,072.54**	**9,46,68,072.54**	**7,49,06,656.96**

SARDAR SWARAN SINGH NATIONAL INSTITUTE OF BIO-ENERGY

(An Autonomous Institution of Ministry of New & Renewable Energy)
Kapurthala (Punjab) - 144601

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st MARCH 2024

(Amount in Rs.)

INCOME	Schedule	IE	31/03/2024	31/03/2023
Balance being excess of Income over Expenditure (A-B)		(49,62,471.14)	(49,62,471.14)	(1,17,41,592.46)
EMD,Performenc Guarnatee,Security Deposit Returned			-	-
Add: Opening Balance B/f (C)	3.1	-	-	-
Prior period adjustment	12	-	-	(66,42,471)
Transfer to Capital Asset Fund (D)	4	-	-	-
Transfer to Welfare Fund		-	-	
BALANCE BEING SURPLUS TRANSFERRED (1,83,84,063.46) TO GENERAL RESERVE FUND {A- (B+D) }		**(49,62,471.14)**	**(49,62,471.14)**	
UN-UTILIZED GRANTS OUT OF GOVT. GRANTS FOR REVENUE EXPENDITURE { (C+A)-B }		**-**	**-**	-
SIGNIFICANT ACCOUNTING POLICIES	13	-	-	-
NOTES ON ACCOUNTS	14	-	-	-

For Sardar Swaran Singh National Institute of Bio Energy

Finance & Accounts Officer

सरदार स्वर्ण सिंह राष्ट्रीय जैव ऊर्जा संस्थान
12 कि.मी पत्थर, जालंधर-कपूरथला रोड,
वडाला कलाँ, कपूरथला (पंजाब) 144601
Sardar Swaran Singh National Inst. of Bio-Energy
12 Km. Stone,Jalandhar-Kapurthala Road
Wadala Kalan,Kapurthala (Punjab) 144601

Director General

सरदार स्वर्ण सिंह राष्ट्रीय जैव ऊर्जा संस्थान
12 कि.मी पत्थर, जालंधर-कपूरथला रोड,
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Sardar Swaran Singh National Inst. of Bio-Energy
12 Km. Stone,Jalandhar-Kapurthala Road
Wadala Kalan,Kapurthala (Punjab) 144601

As per our Report attached
Anand Tarun & Co
Chartered Accountants

ANAND TARUN & CO
CHARTERED ACCOUNTANTS
FRN : 017735N
JALANDHAR

CA Anand M Chopra
Partner
M. No. 094257

Place: Kapurthala
Date : 03/08/2024

Place : Jalandhar
Date :
UDIN :

SARDAR SWARAN SINGH NATIONAL INSTITUTE OF BIO-ENERGY

(An Autonomous Institution of Ministry of New & Renewable Energy)
Kapurthala (Punjab) - 144601

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31st MAR'2024

(Amount in Rs.)

SCHEDULE 1 - CAPITAL ASSET FUND	31.03.2024	31.03.2023
Opening Balance	-	-
Balance as at the beginning of the year	37,42,72,365.78	33,23,53,752.31
ADD : Prior period adjustment	-	-
ADD : Addition from Capital Grant (Amount Spent for Purchase of Fixed Assets)	2,47,22,172.21	2,00,00,000.00
Add : Addtion from Internal Revenue Generation prior years	-	-
Add : Addtion from Interest on FDR (CORPUS)	2,29,94,240.00	1,02,70,771.31
Add: IREDA NIBE Award	-	1,35,22,400.00
Add: Interest on IREDA Fund	9,60,000.00	9,00,000.00
Less: Deletion from Capital Grants	-	-
Less: Deletion from Internal Revenue Generation	-	-
Less: Deletion from Capital Grants SRRA	-	-
Less: Depreciation on assets purchased out of Grants MNRE	52,93,696.00	27,74,558
Less: Depreciation on assets purchased out of Internal generation	-	-
Less: Depreciation on assets purchased out of Grants SRRA	-	-
TOTAL	**41,76,55,081.99**	**37,42,72,365.78**

As per our Report attached
Anand Tarun & Co
Chartered Accountants

CA Anand M Chopra
Partner
M. No. 094257

ANAND TARUN & CO. CHARTERED ACCOUNTANTS FRN : 017735N JALANDHAR

SARDAR SWARAN SINGH NATIONAL INSTITUTE OF BIO-ENERGY

(An Autonomous Institution of Ministry of New & Renewable Energy)

Kapurthala (Punjab) - 144601

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31st MARCH 2024

(Amount in Rs.)

SCHEDULE 2 - RESERVES AND SURPLUS	31st March, 2024	31st March, 2023
General Reserve Fund		
Balance at the beginning of the year	15,18,07,709.02	17,01,91,772.48
Less during the year being deficit	49,62,471.14	1,83,84,063.46
Less : Grant Refunded	-	-
Sub total (A)	**14,68,45,237.88**	**15,18,07,709.02**
RESERVE & SURPLUS- COMPLETED PROJECTS		
Bio Diesel Project	44,72,153.00	44,72,153.00
ICRISAT Project	13,929.00	13,929.00
Bio Crude Project	23,83,061.00	23,83,061.00
National Renewable Energy Program Project	50,415.00	50,415.00
Bio Ethenol Project	54,41,996.70	54,41,996.70
Bio Gas Project	59,929.00	59,929.00
Sub Total (B)	**1,24,21,483.70**	**1,24,21,483.70**
Biorefinery Approach for generation of platform chemicals and bioethanol		
Opening Balance	1,53,075.00	1,53,075.00
Add: Grant Received from MNRE during the year	-	-
Less: Expenses Biorefinery Approach for generation of platform chemicals and bioethanol	-	-
Sub Total (C)	**1,53,075.00**	**1,53,075.00**
Fellowship Grant Dr. Sachin Kumar	2,20,300.00	2,20,300.00
Less: Advance Given to Dr. Sachin Kumar	-	-
Sub Total (D)	**2,20,300.00**	**2,20,300.00**
Indo Brazil project		
Opening Balance	15,81,051.00	15,81,051.00
Add: Grant Received from MNRE during the year	0.00	0.00
Add: Advance Recovered from Meenu Hans	-	-
Less: Expenses for Project (Excluding Fixed Assets)	-	-
Less: Advance to GNDU	-	-
Add: Advance Recovered from GNDU	-	-
Sub Total (E)	**15,81,051.00**	**15,81,051.00**
RESERVE & SURPLUS - ON GOING PROJECTS		
Opening balance of Project MNRE(GIA)	23,568.00	-
Add: Grant Received from MNRE during the year	7,00,000.00	6,01,760.00
Less Expenditure	4,21,680.00	6,03,212.00
Less: Refunded back non utilised/interest	25,020.00	
Add: Interest Earned	-	25,020.00
Sub Total (F)	**2,76,868.00**	**23,568.00**
Opening balance of Project MNRE (Capital)	54,880.00	-
Add: Grant Received from MNRE during the year	-	12,63,400.00
Less: Refunded back non utilised/interest	54,880.00	12,63,400.00
Add : Interest earned	-	54,880.00
Sub Total (G)	**-**	**54,880.00**
Opening balance of Project WOS	6,25,875.00	9,58,519.00
Add: Grant Received from MNRE during the year	-	10,22,963.00
Less : Expenses of Project	3,98,239.00	14,15,096.00
Add: Interest Earned	-	59,489.00
Sub Total (H)	**2,27,636.00**	**6,25,875.00**

SARDAR SWARAN SINGH NATIONAL INSTITUTE OF BIO-ENERGY

(An Autonomous Institution of Ministry of New & Renewable Energy)

Kapurthala (Punjab) - 144601

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31st MARCH 2024

(Amount in Rs.)

SCHEDULE 2 - RESERVES AND SURPLUS	31st March, 2024	31st March, 2023
Cpri 270 L		
Opening balance	2,07,48,922.00	
Grant Received	20,36,000.00	2,29,07,000.00
Less : Expenditure	2,02,72,574.00	30,00,588.00
Add : Interest earned	4,10,000.00	8,42,510.00
Sub Total (I)	**29,22,348.00**	**2,07,48,922.00**
Cpri 37 L		
Opening balance	4,37,824.00	
Grant Received	-	37,00,000.00
Less : Expenditure	3,04,512.00	32,80,516.00
Add : Interest earned	20,000.00	18,340.00
Sub Total (J)	**1,53,312.00**	**4,37,824.00**
Cpri 66 L		
Opening balance	28,56,688.00	
Grant Received	22,43,000.00	**37,16,000.00**
Less : Expenditure	34,87,378.00	**9,74,462.00**
Add : Interest earned	70,000.00	**1,15,150.00**
Sub Total (K)	**16,82,310.00**	**28,56,688.00**
Advanced Microalgal Biorefinery Himalayan Project		
Opening balance	-	-
Grant Received	44,76,960.00	-
Less : Expenditure	6,27,956.00	-
Add : Interest earned	60,944.00	-
Sub Total (L)	**39,09,948.00**	-
Grant Received for Capital Asset		
Opening balance	-	
Grant Received	4,00,00,000.00	
Less : Fixed Assets Purchased	2,47,22,172.21	
Sub Total (M)	**1,52,77,827.79**	
Grand Total	**18,56,71,397.37**	**19,09,31,375.72**

As per our Report attached
Anand Tarun & Co
Chartered Accountants

ANAND TARUN & CO. CHARTERED ACCOUNTANTS FRN : 017735N JALANDHAR

CA Anand M Chopra
Partner
M. No. 094257

SARDAR SWARAN SINGH NATIONAL INSTITUTE OF BIO-ENERGY
(An Autonomous Institution of Ministry of New & Renewable Energy)
Kapurthala (Punjab) - 144601
SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31st MARCH 2024

(Amount in Rs.)

SCHEDULE 3 - CURRENT LIABILITIES AND PROVISIONS:	**31st March, 2024**	**31st March, 2023**
A. CURRENT LIABILITIES		
Sundry Creditors for expenses:	71,18,346.48	11,64,900.00
Expenses payable	4,75,820.00	1,36,864.00
Salary Payable	19,97,051.00	18,38,162.00
Security Deposit, EMD & PG	6,07,895.00	5,27,895.00
Advances Received on Projects	-	-
Statutory Liabilities	5,44,679.05	3,94,190.76
Other Current Liabilities	-	1,58,553.00
Other Payables	1,17,351.00	-
NIWE-IREDA Award Fund	-	-
Welfare Fund Payable	-	-
Branch Division Payables	-	-
TOTAL (A)	**1,08,61,142.53**	**42,20,564.76**
UN UTILISED GRANTS		
a) Central Finance Assistance MNRE (Grants-in-Aid)	-	-
Earmarked Projects SRRA USP	-	-
IREDA NIBE FUND	**-**	**-**
TOTAL (B)	**-**	**-**
TOTAL { (A)+(B) }	**1,08,61,142.53**	**42,20,564.76**
B. PROVISIONS		
Gratuity	-	-
Leave Encashment	-	-
Bonus & Ex-gratia	-	-
TOTAL (C)	**-**	**-**
GRAND TOTAL { (A)+(B)+(C) }	**1,08,61,142.53**	**42,20,564.76**

As per our Report attached
Anand Tarun & Co
Chartered Accountants

ANAND TARUN & CO CHARTERED ACCOUNTANTS FRN : 017735N JALANDHAR

CA Anand M Chopra
Partner
M. No. 094257

SARDAR SWARAN SINGH NATIONAL INSTITUTE OF BIO-ENERGY

(An Autonomous Institution of Ministry of New & Renewable Energy)
Kapurthala (Punjab) - 144601

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MAR'2024

(Amount in Rs.)

SCHEDULE 3.1 - UNUTILISED GRANT - CFA	As on 31.03.2024	As on 31.03.2023
Funds		
Balance as at the beginning of the year	-	-
Add : Grants received during the year(GIA Capital)	4,00,00,000.00	2,00,00,000.00
Add : Grants received during the year(GIA General)	4,70,00,000.00	3,40,00,000.00
Add : Grants received during the year(GIA Salary)	2,70,00,000.00	1,60,00,000.00
Add :Misc. Income on Grants	-	-
Add :Interest Earned on Grants	-	-
Add: Interest Accrued on Grants	-	-
Add: Profit on Sale of Assets	-	-
Add: Transferred from Earmarked Projects	-	-
Add: SNA Refund	-	-
Add:EMD,SD,PG Received	-	-
Total (A)	**11,40,00,000.00**	**7,00,00,000.00**
Less : Refunds		
Interest earned on Grants refunded to Ministry	**2,61,235.00**	**34,46,571.00**
Other Income Earned refunded to Ministry	-	-
Refund of Unutilized Grants	-	**17,28,772.00**
Total (B)	**2,61,235.00**	**51,75,343.00**
Total Fund Available (C= A-B)	**11,37,38,765.00**	**6,48,24,657.00**
Less: Expenditure		
Grants from Government of India allocated for Capital	-	-
Grants from Government of India allocated for Revenue expenditure	-	-
Grants from Government of India allocated for NER	-	-
Grants from Government of India allocated for SRRA	-	-
Expenditure relating to Grants from Government of India for the inhouse projects during the year	-	-
Transfer to capital asset fund	4,00,00,000.00	2,00,00,000.00
Transfer to Income & Expenditure	7,40,00,000.00	5,00,00,000.00
Excess of Expenditure out of Previous Year Advance	-	-
EMD,Performenc Guarnatee,Security Deposit Returned	-	-
Sub Total (i)	**11,40,00,000.00**	**7,00,00,000.00**

SARDAR SWARAN SINGH NATIONAL INSTITUTE OF BIO-ENERGY

(An Autonomous Institution of Ministry of New & Renewable Energy)

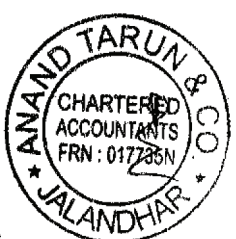
Kapurthala (Punjab) - 144601

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MAR'2024

(Amount in Rs.)

SCHEDULE 3.1 - UNUTILISED GRANT - CFA	**As on 31.03.2024**	**As on 31.03.2023**
Less: Payables		
Expenses Payable	-	-
Security Deposits & Performance Guarantee	-	-
Sundry Creditors	-	-
Other Current Liabilities	-	-
Advances received	-	-
Salary Payable / EPF Payable	-	-
Sub Total (ii)	-	-
Less: Advances & Deposits		
Less: Advances paid	-	-
Less: Deposits	-	-
Less: Prepaid Expenses	-	-
Sub Total (iii)	-	-
Total (D) [i+ii+iii]	**11,40,00,000.00**	**7,00,00,000.00**
UNUTILIZED GRANT (Refundable to Ministry)	-	-
UNUTILIZED GRANTS (Receivable from Ministry)	-	-
UNUTILIZED GRANTS / Funds (Others)	-	-

As per our Report attached
Anand Tarun & Co
Chartered Accountants



CA Anand M Chopra
Partner
M. No. 094257

SARDAR SWARAN SINGH NATIONAL INSTITUTE OF BIO-ENERGY

(An Autonomous Institution of Ministry of New & Renewable Energy)
Kapurthala (Punjab) - 144601

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31st MARCH 2024

(Amount in Rs.)

SCHEDULE 5 - CURRENT ASSETS, LOANS & ADVANCES	31st March, 2024	31st March, 2023
A. CURRENT ASSETS:		
Sundry Debtors	33,940.00	1,45,480.00
Inventories	-	-
Stock of Stationery	-	-
Closing Stock	-	-
Bank Balances:		
With Scheduled Banks:		
In Current Account	10,03,372.33	2,74,43,890.60
In Savings Bank Account	3,80,34,136.41	1,75,67,422.43
In Cash	17,922.00	19,437.00
In Deposit Account	7,68,16,843.00	3,24,46,824.00
Branch Division Receivables	-	-
TOTAL (A)	**11,59,06,213.74**	**7,76,23,054.03**
B. LOANS, ADVANCES AND OTHER ASSETS		
Advances and other amounts recoverable in cash or in kind or for value to be received:		
a) On Capital Account	-	-
b) Prepayments	3,50,858.00	3,71,430.00
c) Interest accrued on term deposits	13,80,918.38	12,77,108.38
d) Advances	41,14,584.49	31,08,111.49
e) Interest accrued on security deposit	4,29,016.00	3,92,403.00
f) Balance with Govt. Authority - TDS	96,81,505.70	76,55,202.78
TOTAL (B)	**1,59,56,882.57**	**1,28,04,255.65**
GRAND TOTAL { (A)+(B) }	**13,18,63,096.31**	**9,04,27,309.68**

As per our Report attached
Anand Tarun & Co
Chartered Accountants

ANAND TARUN & CO CHARTERED ACCOUNTANTS FRN : 017735N JALANDHAR

CA Anand M Chopra
Partner
M. No. 094257

SARDAR SWARAN SINGH NATIONAL INSTITUTE OF BIO-ENERGY

(An Autonomous Institution of Ministry of New & Renewable Energy)
Kapurthala (Punjab)- 144601
SCHEDULES FORMING PART OF INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2024

Amount in Rs.

SCHEDULE 6 - INCOME FROM SALES / SERVICES	31st March, 2024	31st March, 2023
Income from Services		
Testing Fee	4,19,160.00	1,00,140.00
Training Fee	0.00	8,352.00
NIT Course Fee	13,08,062.00	3,28,725.00
Registration Fee	10,73,591.19	3,49,000.00
TOTAL	**28,00,813.19**	**7,86,217.00**

SCHEDULE 7 - INCOME FROM PUBLICATION	31st March, 2024	31st March, 2023
Sale of Books & Reports	-	-
TOTAL	**-**	**-**

SCHEDULE 8 - INTEREST EARNED	31st March, 2024	31st March, 2023
On Term Deposits with Scheduled Banks (Corpus)	7,46,714.00	51,43,800.69
On Savings Bank account/MOD with Scheduled Banks	26,23,139.00	7,58,672.00
Interest from PSPCL	1,09,330.00	0.00
TOTAL	**34,79,183.00**	**59,02,472.69**

SCHEDULE 9 - OTHER INCOME	31st March, 2024	31st March, 2023
Rent Received	5,084.76	20,338.97
Sponsorship fee	32,02,969.53	0.00
Overhead Income	2,84,000.00	29,42,000.00
Hostel fee	65,452.00	50,346.00
Discount/Rebate	-	61,408.00
Other Misc Income	3,88,798.92	4,16,470.00
Licence fee	1,39,200.00	1,11,254
Evaluation Fee	0.00	100000.00
Profit on Sale of Tractor	38,684.00	-
Tender Fees	7,720.00	0.00
Grant Amortised/ Deferred income Related to Fixed Asset	52,93,696.00	2774557.84
TOTAL	**94,25,605.21**	**64,76,374.81**

SARDAR SWARAN SINGH NATIONAL INSTITUTE OF BIO-ENERGY

(An Autonomous Institution of Ministry of New & Renewable Energy)
Kapurthala (Punjab)- 144601
SCHEDULES FORMING PART OF INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2024

Amount in Rs.

SCHEDULE 10 - ESTABLISHMENT EXPENSES ADMINISTRATION AND R&D STAFF	31st March, 2024	31st March, 2023
Salaries and Allowances	2,37,09,353.00	1,75,01,166.00
Bonus & Ex-gratia	-	-
Contribution to Provident Fund (EPF)	26,39,575.00	19,33,752.00
Contribution to Pension	1,95,000.00	1,60,000.00
Leave travel concession	5,67,681.00	-
Children Education Allowance	3,55,780.00	2,97,000.00
Medical reimbursement	-	17,500.00
LTC Leave Encashment	1,55,358.00	-
Honorarium to staff	20,000.00	20,000.00
TOTAL	**2,76,42,747.00**	**1,99,29,418.00**

As per our Report attached
Anand Tarun & Co
Chartered Accountants

ANAND TARUN & CO CHARTERED ACCOUNTANTS FRN : 017735N JALANDHAR

CA Anand M Chopra
Partner
M. No. 094257

SARDAR SWARAN SINGH NATIONAL INSTITUTE OF BIO-ENERGY
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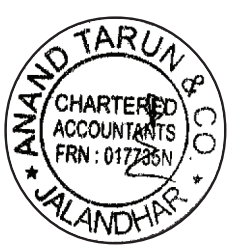
Kapurthala (Punjab)- 144601
SCHEDULES FORMING PART OF INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2024

Amount in Rs.

SCHEDULE 11 - OTHER ADMINISTRATIVE EXPENSES	31st March, 2024	31st March, 2023
Advertisement and Publicity	2,47,958.70	3,04,350.00
Audit & Legal fee	4,42,880.98	2,62,114.97
Consumable laboratory workshop exp	6,30,617.60	3,02,701.00
Electricity and Power	44,46,328.00	39,66,904.00
Stipend	73,89,305.00	46,65,068.00
Expenses on Seminar, Meetings, workshop & conference	44,08,023.70	12,00,638.00
Hospitality Expenses(other)	4,22,163.48	1,90,018.11
Computer software exp	1,16,046.00	2,00,227.00
Insurance Exp	3,757.00	7,469.00
Other Expenses	56,742.00	10,270.00
Computer hardware exp	2,91,623.00	2,00,730.00
Late Fee (CGST/SGST/TDS)	400.00	1,88,044.00
Printing and Stationery	86,294.00	2,11,562.00
Repair & maintenance	17,15,833.00	3,08,004.00
Newsletter/Newspaper exp	23,613.00	45,127.00
Refreshment	3,53,009.00	2,42,202.00
Machinery & Equipment Exp	16,84,994.54	18,01,456.27
Research & Development Exp	1,69,371.00	76,400.00
Contingency exp	1,39,799.40	7,103.78
Telephone and Communication Charges	20,97,582.00	17,18,026.00
Manpower & hiring of professional services	1,80,62,290.00	1,51,58,845.00
Reports exp	88,500.00	1,42,170.00
Travel & Conveyance and Taxi hire	14,26,684.93	9,39,547.00
Vehicles Running and Up Keeping	1,93,569.00	2,48,447.60
Horticulture exp	2,40,113.00	2,30,373.80
TOTAL (A)	**4,47,37,498.33**	**3,26,27,798.53**
CONSULTANCY PROJECT EXPENSES		
Expenses on In Consultancy Projects (B)	-	-
GRAND TOTAL { (A)+(B) }	**4,47,37,498.33**	**3,26,27,798.53**

As per our Report attached
Anand Tarun & Co
Chartered Accountants



CA Anand M Chopra
Partner
M. No. 094257

SARDAR SWARAN SINGH NATIONAL INSTITUTE OF BIO-ENERGY
(An Autonomous Institution of Ministry of New & Renewable Energy)
Kapurthala (Punjab)- 144601
SCHEDULES FORMING PART OF INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2024

Amount in Rs.

SCHEDULE 12 - PRIOR PERIOD ADJUSTMENT	**31st March, 2024**	**31st March, 2023**
Prior Period Expenses		
Internet Charges Railtel Corporation	-	14,67,128
Grant Refunded to Bharat Kosh of FY 2021-22	-	51,75,343
TOTAL	**-**	**66,42,471**

SARDAR SWARAN SINGH NATIONAL INSTITUTE OF BIO-ENERGY
(An Autonomous Institution of Ministry of New & Renewable Energy)
Kapurthala (Punjab)- 144601

PARTICULARS		**31st March, 2024**	**31st March, 2023**
VI.	**INVESTMENTS (Corpus Fund)**		
A	Fixed Deposits with Banks	28,94,22,211.00	28,94,22,211.00
B	IREDA- NIBE Award Sweep Account	1,44,22,400.00	1,35,22,400.00
	Interest under MOD of NIBE Award	9,60,000.00	9,00,000.00
	(Transferred from Deposit A/c)		
	TOTAL	**30,48,04,611.00**	**30,38,44,611.00**

As per our Report attached
Anand Tarun & Co
Chartered Accountants

ANAND TARUN & CO CHARTERED ACCOUNTANTS FRN : 017735N JALANDHAR

CA Anand M Chopra
Partner
M. No. 094257

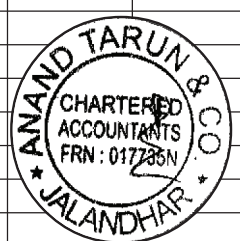
SARDAR SWARAN SINGH NATIONAL INSTITUTE OF BIO-ENERGY
(A Society Registered Under the Registration of the Societies Act, 1860)

IV: Fixed Assets and Depreciation Schedule as on 31.03.2024

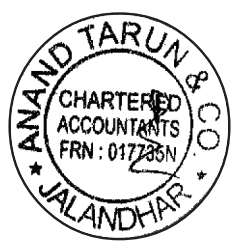
RATE OF DEP	PARTICULARS	WDV AS ON 31.03.2023	ADDITIONS MORE THAN 180 DAYS	LESS THAN 180 DAYS	DEDUCTIONS/ ADJUSTMENT	WDV AS ON 31.03.2024	Depreciation	W.D.V. AS ON 31.03.2024
-	Land	75,00,000.00	-	-	-	75,00,000.00	-	75,00,000.00
-	Land & Site Related Dev Works	12,85,066.00	-	-	-	12,85,066.00	-	12,85,066.00
0.15	Plant Mach & Equp Office-I	29,331.00	-	-	-	29,331.00	4,400.00	24,931.00
	FURNITURE, FIXTURE,OFFICE & HOSTEL EQUIPEMENTS							
0.40	Computer & Printer	4,15,503.33	4,54,590.21	13,39,114.58	0.00	22,09,208.12	6,15,860.00	15,93,348.12
0.10	Furniture & Fixtures	4,07,598.00	13,67,284.00	47,06,152.13	-	64,81,034.13	4,12,796.00	60,68,238.13
0.15	Office Equipments	6,42,715.00				6,42,715.00	96,407.00	5,46,308.00
0.15	Refrigerator	22,625.00				22,625.00	3,394.00	19,231.00
	Project Bio Crude Assets							
0.15	TBP Bio-Crude project	4,20,068.00			-	4,20,068.00	63,010.00	3,57,058.00
0.15	Gas Regulator	5,494.00			-	5,494.00	824.00	4,670.00
0.15	Hydrogen Gas Cylinder	4,328.00		-	-	4,328.00	649.00	3,679.00
	Project Bio Diesel Assets							
0.15	Diesel Engine Test Rig	2,72,799.00			-	2,72,799.00	40,920.00	2,31,879.00
0.15	Foundation Stone	15,548.00			-	15,548.00	2,332.00	13,216.00
0.15	Oxyen Gas Cylinder	1,457.00			-	1,457.00	219.00	1,238.00
0.15	Flash Point Apparatus	82,458.00			-	82,458.00	12,369.00	70,089.00
0.15	Kinematic Viscometer	61,691.00			-	61,691.00	9,254.00	52,437.00
0.15	Mechanical Stirrer	8,993.00			-	8,993.00	1,349.00	7,644.00
0.15	Petroleum Density Meter	1,65,656.00			-	1,65,656.00	24,848.00	1,40,808.00
0.15	Rotary Vaccume Evaporator	78,029.00			-	78,029.00	11,704.00	66,325.00
0.15	Soxhelt	12,937.00			-	12,937.00	1,941.00	10,996.00
	Project Bio Ethonal Assets							
0.15	Bio reactor	6,04,992.00			-	6,04,992.00	90,749.00	5,14,243.00
0.15	Gel Electrophoresis	46,085.00			-	46,085.00	6,913.00	39,172.00
0.15	Real Time PCR	2,62,237.00			-	2,62,237.00	39,336.00	2,22,901.00
0.15	SDS Page Electrophoresis	58,438.00			-	58,438.00	8,766.00	49,672.00
0.15	Gas Cylinder	2,699.00			-	2,699.00	405.00	2,294.00
0.15	Water Jacket Vessel	25,261.00				25,261.00	3,789.00	21,472.00
	Prroject Bio Gas Assets							
0.15	Infrared Thermometer	2,179.00	-		-	2,179.00	327.00	1,852.00
0.15	Equipments	14,600.00				14,600.00	2,190.00	12,410.00
	Project Bio Mass Cookstove Assets							
0.15	Gas Cylinder	21,282.00	-		-	21,282.00	3,192.00	18,090.00
0.40	Computer & Printrer	68.00				68.00	27.00	41.00
0.15	Office Equipments	21,565.00				21,565.00	3,235.00	18,330.00
	Project Indo Brazil Assets							
0.15	Equipments	6,82,465.00				6,82,465.00	1,02,370.00	5,80,095.00
	Scientific & Laboratory Equipments (12-13)							
0.15	Cook Stove	88.00			-	88.00	13.00	75.00
0.15	Fume Hood	16,181.00			-	16,181.00	2,427.00	13,754.00
0.15	Photo Bioreactor	2,548.00			-	2,548.00	382.00	2,166.00
0.15	Weight Scale 100 kg	1,332.00			-	1,332.00	200.00	1,132.00
0.15	Weight Scale 30 kg	951.00			-	951.00	143.00	808.00
	Plant & Machinery Equipments							
0.15	Air Compresser Machine	4,220.00			-	4,220.00	633.00	3,587.00
0.15	Fixed Drill Machine R/f 20mm	5,432.00			-	5,432.00	815.00	4,617.00
0.15	Gas cutting Set	6,025.00			-	6,025.00	904.00	5,121.00
0.15	Grinder Angle 100mm(Hand Grinder)	720.00			-	720.00	108.00	612.00

0.15	Hydrolic Power Hacksaw Machine	8,313.00			-	8,313.00	1,247.00	7,066.00
0.15	Lath Machine	57,046.00			-	57,046.00	8,557.00	48,489.00
0.15	Pana Machine(Arc Welding Set)	13,191.00			-	13,191.00	1,979.00	11,212.00
0.15	Pedestal Grinder 300mm	5,176.00			-	5,176.00	776.00	4,400.00
0.15	Tractor,Trolly & Equipments	9,19,597.00	-	-	66,816.00	8,52,781.00	1,32,151.00	7,20,630.00
0.15	Borewell with 2HP Submersible Pump	7,709.00		1,54,800.00	-	1,62,509.00	12,766.00	1,49,743.00
0.15	Drill Machine (GBM 10 MM Heavy)	630.00			-	630.00	95.00	535.00
0.15	Fire Extinguishar	21,321.00			-	21,321.00	3,198.00	18,123.00
0.15	Grass Moving Machine	270.00			-	270.00	41.00	229.00
0.15	Hmpv Fitting Lamp	10,096.00			-	10,096.00	1,514.00	8,582.00
0.15	Leveller	1,501.00			-	1,501.00	225.00	1,276.00
0.15	Projector	52,194.00			-	52,194.00	7,829.00	44,365.00
0.15	Tiller	2,090.00			-	2,090.00	314.00	1,776.00
0.15	Vehicle Car Ambessador (New)	81,905.00			-	81,905.00	12,286.00	69,619.00
0.15	Workshop Tools	75,353.00			-	75,353.00	11,303.00	64,050.00
0.15	Drill Hammer Rotary 26(hand Grinder)	2,497.00			-	2,497.00	375.00	2,122.00
0.15	Gas & Four Cylinders	1,754.00			-	1,754.00	263.00	1,491.00
0.15	Electrical Equipments	63,460.00			-	63,460.00	9,519.00	53,941.00
0.10	Guest Houes Assest/ Office Equipment	48,817.00			-	48,817.00	4,882.00	43,935.00
0.10	Leddger	9,575.00			-	9,575.00	958.00	8,617.00
0.10	Plant Mach & Equp Office-II	2,299.00			-	2,299.00	230.00	2,069.00
0.10	Fins Room Heater	1,65,376.00	-	-		1,65,376.00	16,537.60	1,48,838.40
0.15	Lab Scale Anaerobic Digester	11,66,189.80	-	-	-	11,66,189.80	1,74,928.47	9,91,261.33
0.15	Vehicle Staff Car	9,59,973.85	-	-	-	9,59,973.85	1,43,996.08	8,15,977.77
	Scientific & Laboratory Equipments							
0.15	Air Oven (250 degree)	6,721.00			-	6,721.00	1,008.00	5,713.00
0.15	Bomb Calorimeter	84,595.00			-	84,595.00	12,689.00	71,906.00
0.15	Circ,Refrig,6Lt,STD(Auto Clave)	18,382.00			-	18,382.00	2,757.00	15,625.00
0.15	Data Acquisition System	59,304.00			-	59,304.00	8,896.00	50,408.00
0.15	Digital Ph.Meter	8,281.00			-	8,281.00	1,242.00	7,039.00
0.15	Incubator Bacteriological	6,993.00			-	6,993.00	1,049.00	5,944.00
0.15	Kern Analytical Balance (220gm)	8,179.00			-	8,179.00	1,227.00	6,952.00
0.15	Laboratory Refrigerator	1,00,070.00			-	1,00,070.00	15,011.00	85,059.00
0.15	Laminar Airflow Horizontal	8,698.00			-	8,698.00	1,305.00	7,393.00
0.15	Megnetic Stirrer	5,425.00			-	5,425.00	814.00	4,611.00
0.15	Platorm Scale(Platform Balance)	2,560.00			-	2,560.00	384.00	2,176.00
0.15	Precision Laboratory Balance(610gm)	4,670.00			-	4,670.00	701.00	3,969.00
0.15	Water Bath	20,249.00			-	20,249.00	3,037.00	17,212.00
0.15	Automatic Sieve	49,974.00			-	49,974.00	7,496.00	42,478.00
0.15	Bio-Diesel Preparation Unit(England)	1,15,926.00			-	1,15,926.00	17,389.00	98,537.00
0.15	Biomass Gassifier	1,52,668.00			-	1,52,668.00	22,900.00	1,29,768.00
0.15	CHN Analyzer (Germany)	3,14,920.00			-	3,14,920.00	47,238.00	2,67,682.00
0.15	Fibretech Apparatur	36,341.00			-	36,341.00	5,451.00	30,890.00
0.15	Incubator Shaker(USA)	1,21,887.00			-	1,21,887.00	18,283.00	1,03,604.00
0.15	Micropipette	9,190.00			-	9,190.00	1,379.00	7,811.00
0.15	Portable Biogas plant	13,913.00				13,913.00	2,087.00	11,826.00
0.15	2 Gel Electrophrosis	1,73,354.00				1,73,354.00	26,003.00	1,47,351.00
0.15	Automatic Colony Counter	2,44,723.00				2,44,723.00	36,708.00	2,08,015.00
0.15	Bio Photometer	90,131.00				90,131.00	13,520.00	76,611.00
0.15	Co2 Incubator Shaker	2,12,996.00				2,12,996.00	31,949.00	1,81,047.00
0.15	Gas Flow Meter	1,83,117.00				1,83,117.00	27,468.00	1,55,649.00
0.15	Dry Bath	14,393.00				14,393.00	2,159.00	12,234.00
0.15	Electroporation Unit	43,061.00				43,061.00	6,459.00	36,602.00
0.15	Filter Paper Type SMP Sysytem	49,767.00				49,767.00	7,465.00	42,302.00
0.15	Flue Gas Analyser	4,16,637.00				4,16,637.00	62,496.00	3,54,141.00

0.15	FTIR Spectometer (FTIR 660)	3,93,884.00				3,93,884.00	59,083.00	3,34,801.00
0.15	Gradient PCR (Mastercycler Nexus GX2)	1,13,424.00				1,13,424.00	17,014.00	96,410.00
0.15	Hot Plate Cum Magnetic Stirrer	11,789.00				11,789.00	1,768.00	10,021.00
0.15	Precision Microbalance	35,245.00				35,245.00	5,287.00	29,958.00
0.15	Ultrasonic Cleaner	8,136.00				8,136.00	1,220.00	6,916.00
0.15	Refrigerated Centrifuge (Germany)	76,819.00		-		76,819.00	11,523.00	65,296.00
0.15	TG DTA (STA6000)Singapore	1,74,637.00				1,74,637.00	26,196.00	1,48,441.00
0.15	Ultra Low Freezer(Deep Freezer)(USA)	66,416.00				66,416.00	9,962.00	56,454.00
0.15	U V Vis Spectrophotometer(Singapore)	1,02,033.00				1,02,033.00	15,305.00	86,728.00
0.15	Autoclave	27,573.00				27,573.00	4,136.00	23,437.00
0.15	Auto Emission Analyzer	66,960.00				66,960.00	10,044.00	56,916.00
0.15	BOD Incubator	91,419.00				91,419.00	13,713.00	77,706.00
0.15	Carbon Monoxide Indicator	2,724.00				2,724.00	409.00	2,315.00
0.15	Circulatory Water Bath	33,204.00				33,204.00	4,981.00	28,223.00
0.15	Gas Chromatography	5,73,942.00				5,73,942.00	86,091.00	4,87,851.00
0.15	Microscope	30,818.00				30,818.00	4,623.00	26,195.00
0.15	Muffle Furnace 1200 (1400)	7,841.00				7,841.00	1,176.00	6,665.00
0.15	Muffle Furnance 1100 (1400)Degree	5,824.00				5,824.00	874.00	4,950.00
0.15	Vaccum Oven	29,534.00				29,534.00	4,430.00	25,104.00
0.15	Gas Regulator	1,504.00				1,504.00	226.00	1,278.00
0.15	Water Purificati0n System	1,57,280.00		10,971.00		1,68,251.00	24,415.00	1,43,836.00
0.15	Equipments (Scientific and Laboratory)	12,369.00				12,369.00	1,855.00	10,514.00
0.15	Automatic cell counter	1,17,439.00			-	1,17,439.00	17,616.00	99,823.00
0.15	Fluorescence Microscope	3,87,898.00				3,87,898.00	58,185.00	3,29,713.00
0.15	Hot air oven	1,44,188.00				1,44,188.00	21,628.00	1,22,560.00
0.15	Incubator 104	28,274.00				28,274.00	4,241.00	24,033.00
0.15	Irox diesel	6,27,444.00				6,27,444.00	94,117.00	5,33,327.00
0.15	Micro balance	5,04,908.00				5,04,908.00	75,736.00	4,29,172.00
0.15	Moisture analyzer	1,59,606.00				1,59,606.00	23,941.00	1,35,665.00
0.15	Muffle Furnance 1400	1,14,042.00				1,14,042.00	17,106.00	96,936.00
0.15	Phase contrastmicroscope	2,61,218.00				2,61,218.00	39,183.00	2,22,035.00
0.15	Shaking Water Bath	1,04,444.00				1,04,444.00	15,667.00	88,777.00
0.15	Staked Enviroment Shaker	6,83,371.00				6,83,371.00	1,02,506.00	5,80,865.00
	Scientific & Lab. Equipments (For Bio-Dieseal Project)							
0.15	Circular Saw Ma chine	4,553.00				4,553.00	683.00	3,870.00
0.15	Differntail Scanning Calormiter	6,07,032.00				6,07,032.00	91,055.00	5,15,977.00
0.15	Gel Documents	1,99,189.00				1,99,189.00	29,878.00	1,69,311.00
0.15	High Mast Light	8,05,831.00				8,05,831.00	1,20,875.00	6,84,956.00
0.15	Homogenizer	91,205.00				91,205.00	13,681.00	77,524.00
0.15	HPLC	3,53,478.00				3,53,478.00	53,022.00	3,00,456.00
0.15	Lyophilizer	1,61,100.00				1,61,100.00	24,165.00	1,36,935.00
0.15	Oxidation Stabilty Apparatus	2,04,329.00				2,04,329.00	30,649.00	1,73,680.00
0.15	Ramsbotton Carbon Residue Apparatus	1,77,844.00				1,77,844.00	26,677.00	1,51,167.00
0.15	Street Light	8,90,147.00				8,90,147.00	1,33,522.00	7,56,625.00
0.10	Furniture & Fixture	90,81,099.00	2,00,000.00			92,81,099.00	9,28,110.00	83,52,989.00
0.40	Computer/Peripherals	7,521.06				7,521.06	3,008.00	4,513.06
0.15	Library Books	7,43,349.00	-	-	-	7,43,349.00	1,11,502.00	6,31,847.00
0.15	Cycle	47.00				47.00	7.00	40.00
	Misc Eqiupments (Cellphone)					-		
0.10	Misc Fixed Assets	31,681.00				31,681.00	3,168.00	28,513.00
0.10	Guest House Misc Assets	15,205.00				15,205.00	1,521.00	13,684.00
0.15	Guest House Equip Mach-I	2,339.00				2,339.00	351.00	1,988.00
0.10	Guest House Equip Mach-II	44.00				44.00	4.00	40.00
0.15	Land Site Related Dev Tubewell	1,52,170.00				1,52,170.00	22,826.00	1,29,344.00
0.10	Civil Works Building & Built Up Space	11,25,37,717.00	5,23,200.00	1,89,910.00	0.00	11,32,50,827.00	1,13,15,587.00	10,19,35,240.00



0.15	Mobile	766.00				766.00	115.00	651.00
0.10	Inaugration of Gate	5,230.00				5,230.00	523.00	4,707.00
0.15	Air Conditions	8,76,015.00	-	22,40,337.98		31,16,352.98	2,99,428.00	28,16,924.98
0.15	Hair refrigerator 601 Ltr	12,796.00				12,796.00	1,919.00	10,877.00
0.15	Digital Electronic Balance ML 204	19,658.00				19,658.00	2,949.00	16,709.00
0.15	Helium Gas Cylinder with Regulator	5,977.00				5,977.00	897.00	5,080.00
0.15	Online UPS 15KVA	45,404.00				45,404.00	6,811.00	38,593.00
0.10	Development of Gate	9,11,319.00				9,11,319.00	91,132.00	8,20,187.00
0.15	Panasonic Fax	1,650.00				1,650.00	248.00	1,402.00
0.15	Washing Machine	5,271.00				5,271.00	791.00	4,480.00
0.15	Gas Purification	15,100.00				15,100.00	2,265.00	12,835.00
0.15	Liquid Nitrozen	15,833.00				15,833.00	2,375.00	13,458.00
0.15	Bike Passion	11,649.00				11,649.00	1,747.00	9,902.00
0.15	Machinery (Assets)	1,39,03,599.59	58,35,545.49	70,55,339.00	0.00	2,67,94,484.08	34,90,022.00	2,33,04,462.08
0.15	Process Equipment	70,010.00				70,010.00	10,502.00	59,508.00
0.15	LG refrigerator	**15,849.00**				15,849.00	2,377.00	**13,472.00**
0.10	Sign Board	3,84,076.43	-	-	-	3,84,076.43	38,408.00	3,45,668.43
0.15	Water Purifiers	30,437.00		29,980.00		60,417.00	6,814.00	53,603.00
0.10	Stainless steel Doors	1,08,073.00				1,08,073.00	10,807.00	97,266.00
0.15	Rear Disk Rod	1,690.00				1,690.00	254.00	1,436.00
0.15	Sheet Cutting Machine	9,567.00				9,567.00	1,435.00	8,132.00
0.10	Water tank	8,748.00	-	76,936.00		85,684.00	4,722.00	80,962.00
0.15	Sheet Rolling Machine	14,343.00				14,343.00	2,151.00	12,192.00
0.10	Construction	6,05,794.00				6,05,794.00	60,579.00	5,45,215.00
0.15	Audio Video Conferencing Sys	8,64,450.00	-			8,64,450.00	1,29,668.00	7,34,782.00
0.40	Scanner	71.00				71.00	28.00	43.00
0.10	Office Buildings (W	18,34,176.00				18,34,176.00	1,83,418.00	16,50,758.00
0.15	Plant Assets	6,572.00				6,572.00	986.00	5,586.00
0.15	CCTV Camera	990186.25	20440.00	0.00	0.00	10,10,626.25	1,51,593.94	8,59,032.31
0.40	Software	2978019.02	0.00	0.00	0.00	29,78,019.02	11,91,207.61	17,86,811.41
0.40	Computers/printers	666667.00	271899.82	0.00	0.00	9,38,566.82	3,75,426.73	5,63,140.09
0.25	Patent	40250.00	0.00	0.00	0.00	40,250.00	10,062.50	30,187.50
0.15	Telephone	5929.25	0.00	0.00	0.00	5,929.25	889.39	5,039.86
0.15	Forbes Vaccum Cleaner Wet & Dry	0.00		13145.00		13,145.00	985.88	12,159.13
0.15	Water Geyser	0.00	0.00	77170.00		77,170.00	5,787.75	71,382.25
0.15	Exhaust Fan	0.00		95700.00		95,700.00	7,177.50	88,522.50
0.15	Microwave Oven	0.00	0.00	12465.00		12,465.00	934.88	11,530.13
0.15	Crompton water heater geyser	0.00	7500.00	0.00		7,500.00	1,125.00	6,375.00
0.15	Projector Screen	0.00	0.00	14700.00		14,700.00	1,102.50	13,597.50
0.15	Video Conferencing Camera	0.00	0.00	24992.00		24,992.00	1,874.40	23,117.60
	Sub-Total	**17,51,52,385.58**	**86,80,459.52**	**1,60,41,712.69**	**66,816.00**	**19,98,07,741.79**	**2,22,87,827.21**	**17,75,19,914.58**



Schedule 3 Security Deposit, EMD, PG

Sr No	Particulars	Amount
1	Avon Corporation Ltd (EMD)	4,000.00
2	Eppendort India Ltd	50,000.00
3	ISS Hicare Pvt Ltd	5,000.00
4	Labmate Asia Pvt Ltd	20,000.00
5	M/s Bharat Instruments	6,000.00
6	M/s Hysel India Pvt Ltd	20,000.00
7	M/s Metrohm india Pvt Ltd	59,000.00
8	M/s Namco National Medicine Co	4,000.00
9	M/s Punjab Ex Servicemen Corporation	1,25,000.00
10	M/s Radical Scientific Equipment	30,000.00
11	M/s Saggu Tubewell Co	7,500.00
12	M/s Sandeep Builders	17,000.00
13	M/s Scientific Imporium	20,000.00
14	M/s TCI Chemicals Pvt Ltd	20,000.00
15	M/s Vinny Scientific Store	20,000.00
16	M/s Wipro GE Healthcare	40,000.00
17	Shankar Book Agency Pvt Ltd	7,500.00
18	EMD	82,000.00
19	M/s K Bhagat & Co.	1,545.00
20	Security Deposit Payable	69,350.00
	Total	**6,07,895.00**

Schedule 3 Salary Payable

Sr No	Particulars	Amount
1	Salary & Allowances Payable	17,68,677.00
2	EPF Payable	2,28,374.00
	Total	**19,97,051.00**

Schedule 5 Prepayments

Sr No	Particulars	Amount
1	Prepaid Expenses	3,50,858.00
	Total	**3,50,858.00**

Schedule 5 Sundry Debtors

Sr No	Particulars	Amount
1	Dr. Savita Vyas	900.00
2	M/s Ecosense Sustainable Solutions Pvt Ltd	29,500.00
3	Punjab Technical University	3,540.00
	Total	**33,940.00**

Schedule 5Advances

Sr No	Particulars	Amount
1	Gas Security	7,100.00
2	CASA New Delhi	3,00,000.00
3	KRITIKA JAIN	1,180.00
4	Deposit with CPWD	68,685.00
5	Jain University	3,37,040.00
6	M/s Deejay Corporation	63,279.00
7	NATIONAL INFORMATICS CENTRE SERVICES	25,897.00
8	UNITED NATIONS DEVELOPMENT PROGRAM	2,00,000.00
9	M/S OIL & NATURAL GAS CORP LTD	17,700.00
10	NIT HAMIRPUR	6,30,404.00
11	M/S BN CONSTRUCTION	5,00,000.00
12	DR ANAND PANDEY	3,540.00
13	PUNJAB STATE COUNCIL OF SCIENCE & TECH.	2,950.00
14	Security Deposit Recievable	800.00
15	SH RAM ANUJ SINGH	1,03,060.00
16	COMPTROLLER PAU LUDHIANA	59,000.00
17	EXECUTIVE ENGG. PWD	16,84,962.00
18	SRC NATURA	-29,500.00
19	Sundry Advance	41,055.49
20	INDIAN BIOGAS ASSOCIATION	270.00
21	BANSAL STEEL INDUSTRIES	84,842.00
22	M/S PUSHPA GUJRAL SCIENCE CITY	12,320.00
	Total	**41,14,584.49**

Schedule 3 SUNDRY CREDITORS

Sr No	Particulars	Amount
1	ABHI SALES HUF	64,106.00
2	ARORA VIKRAM & ASSOCIATES	18,880.00
3	AVP TRADING CO	1,04,310.00
4	GLOBAL SOURCING	12,000.00
5	HARSHA MADHUKAR	10,620.00
6	KLOROFIL SCIENTIFIC	3,02,980.00
7	MANMOHAN PURI	3,780.00
8	M/S ADROIT AUTOMATION & SERVICES	1,00,000.00
9	M/S ANALYTICAL LAB SOLUTIONS	4,956.00
10	M/S ANAND & ANAND	46,000.00
11	M/S ARIHANT INTERNATIONAL	43,140.00
12	M/S AV ENGINEERS	9,000.00
13	M/S BORRAMIE ELECTRIC & HARDWARE	1,050.00
14	M/S CAPTAIN A1 ENTERPRISE	21,528.00

Sr No	Particulars	Amount
15	M/S CHEMICOT SCIENTIFIC GASES	3,810.00
16	M/S CITIZEN INDUSTRIES	3,86,746.00
17	M/S CONSULTRAIN MANAGEMENT SERVICES	52,864.00
18	M/S DALMIA INDUSTRIES	16,882.00
19	M/S EPPENDORF INDIA LTD	14,953.00
20	M/s Gautam and Son's	4,180.00
21	M/s Kea Enterprises	68,600.00
22	M/s Kutch Enterprises	6,895.00
23	M/s Lab Technologies	26,84,500.00
24	M/s Modern Computers	4,47,000.00
25	M/s Neelgiri Technologies	24,992.00
26	M/s P.C Forms and Stationery	45,605.58
27	M/s PN Enterprises	1,620.00
28	M/s Pratyaksh Enterprises	2,980.00
29	M/s Puri and Gupta	59,000.00
30	M/s Rajasthan Research Lab Solutions	77,408.00
31	M/s Rbs Enterprise	16,107.00
32	M/s Real Tech System	1,95,770.00
33	M/S Samaritan Dental Co.	95,700.00
34	M/s Searock Office Automation	1,75,000.00
35	M/s Shivaya Sales	10,971.00
36	M/s Shiv Enterprises	3,491.00
37	M/s Shree Balaji Engineers	2,340.00
38	M/s Shri Ganesh Traders	59,000.00
39	M/s Shri Ram Sales Corporation	88,800.00
40	M/s Suma C	10,200.00
41	M/s Tarbo Solutions	35,000.00
42	M/s. The Bharat Instruments & Chemicals	69,518.00
43	M/s The Dream Mart	3,296.00
44	M/s Verder Scientific Pvt Ltd	11,22,000.00
45	N.K Enterprises	2,400.00
46	Sanjay Nandre	16,328.00
47	Satya Info Systems	2,789.90
48	Vishal Electronics	49,600.00
49	PUNJAB STATE COUNCIL FOR SCIENCE & TECH.	50,000.00
50	PUNJAB STATE POWER CORPORATION LTD	3,20,750.00
51	Macro scientific works pvt ltd	1,43,000.00
52	M/s Quadrent Televentures Ltd	5,900.00
	Total	**71,18,346.48**

Schedule 5 Balance with Govt Authorities

Sr No	Particulars	Amount
1	TDS RECOVERABLE	26,22,727.72
2	TDS RECOVERABLE OF PREV YEARS	44,14,027.00
3	ADVANCE TAX DEMAND	4,28,395.00
4	CGST CREDIT LEDGER	5,74,019.00
5	IGST CREDIT LEDGER	9,99,228.18
6	IGST RECOVERABLE	69,089.80
7	SGST CREDIT LEDGER	5,74,019.00
	Total	**96,81,505.70**

Schedule 3 STATUTORY LIABILITIES

Sr No	Particulars	Amount
1	TDS PAYABLE	3,31,375.00
2	CGST PAYABLE	49,854.91
3	IGST PAYABLE	1,11,178.01
4	SGST PAYABLE	49,854.91
5	TDS Payable	2,417.00
6	IGST INPUT	-0.78
	TOTAL	**5,44,679.05**

Schedule 3 OTHER PAYABLES

Sr No	Particulars	Amount
1	INTERNAL AUDIT FEES PAYABLE	1,03,191.00
2	STATUTORY AUDIT FEES PAYABLE	14,160.00
	TOTAL	**1,17,351.00**

Schedule 3 EXPENSES PAYABLES

Sr No	Particulars	Amount
1	CHEQUE ISSUED BUT NOT PRESENTED	4,69,920.00
2	EXPENSES PAYABLE FY 24-25	5,900.00
	TOTAL	**4,75,820.00**

NOTES TO ACCOUNTS

1. Accounting Convention

The Financial Statements are prepared on the basis of historical cost convention in accordance with the generally accepted accounting principles and on the accrual method of accounting.

2. Significant Accounting Policies

2.01 Basis of preparation and presentation

The financial statements of the institute have been prepared in accordance with generally accepted accounting principles in India (Indian GAAP). These financial statements have been prepared to comply in all material respects with the accounting standards issued by ICAI.

2.02 Use of estimate

The preparation of these financial statements in conformity with the recognition and measurement principles of AS requires the management of the Institute to make estimates and assumptions that affect the reported balances of assets and liabilities, disclosures relating to contingent liabilities as at the date of the financial statements and the reported amounts of income and expense for the periods presented. Estimates and underlying assumptions are reviewed on an ongoing basis. Revisions to accounting estimates are recognized in the period in which the estimates are revised and future periods are affected. The management believes that the estimates used in preparation of financial statements are prudent and reasonable. Future results could differ due to these estimates and differences between actual results and estimates are recognized in the periods in which the results are known/ materialize. Key source of estimation of uncertainty at the date of the financial statements, which may cause a material adjustment to the carrying amounts of assets and liabilities within the next financial year, is in respect of useful lives of property, plant and equipment, valuation of deferred tax liabilities and provisions and contingent liabilities.

3. Fixed Assets

Fixed Assets are valued at cost of acquisition inclusive of inward freight, duties and taxes, incidental & direct expenses related to acquisition.

4. Depreciation

Depreciation on Fixed Assets has been provided on written down value method as per rates specified in the IncomeTax Act 1961.

5. Revenue recognition

During the year, Provisions are recognized on accrual basis of accounting when the services provided under the contract are completed.Interest income received on account of government grants is passed through revenue account.

6. Government Grants

I. Government of india, Ministry of New & Renewable Energy has sanctioned the establishment of Sardar Swarn Singh National Institute of Renewable Energy (SSS-NIRE) as an autonomous Institute of Ministry under the Societies Registration Act 1860.. During the year 2023-24, Rs. 2,70,00,000/- has been received for Salary, Rs. 4,00,00,000/- has been received for creation of Capital Asset and Rs. 4,70,00,000/- has been received as a Grant for General Expenses. Total Grant Received during the year Rs. 11,40,00,000/-. This makes a total grant of Rs. 113,31,13,874/- received from ministry . Year wise Grants received along with Interest earned which had been converted from Capital Fund to Grant-In-Aid has been given in following table:

YEAR WISE DETAILS GRANT RELEASED FROM MNRE TO SSS-NIRE

Financial Year	Grant Received in Rs.	Cummulative Grant in Rs.
1998-99	7,50,00,000	7,50,00,000
1999-20	20,00,000	7,70,00,000
2000-01	-	7,70,00,000
2001-02	1,00,00,000	8,70,00,000
2002-03	2,00,00,000	10,70,00,000
2003-04	3,00,00,000	13,70,00,000
2004-05	2,83,00,000	16,53,00,000
2005-06	-	16,53,00,000
2006-07	-	16,53,00,000
2007-08	3,67,00,000	20,20,00,000
2008-09	3,50,00,000	23,70,00,000
2009-10	7,00,00,000	30,70,00,000
2010-11	4,00,00,000	34,70,00,000
2011-12	5,00,00,000	39,70,00,000
2011-12 (Intt. Utilized)	1,50,47,499	41,20,47,499
2012-13	15,00,00,000	56,20,47,499
2013-14 (Intt. Utilized)	74,66,375	56,95,13,874
2013-14	8,00,00,000	64,95,13,874
2014-15	12,00,00,000	76,95,13,874
2015-16	4,68,58,799	81,63,72,673
2016-17	91,41,201	82,55,13,874
2017-18	1,00,00,000	83,55,13,874
2018-19	1,00,00,000	84,55,13,874
2019-20	7,00,00,00	85,25,13,874
2020-21	4,70,00,000	89,95,13,874
2021-22	4,96,00,000	94,91,13,874
2022-23	7,00,00,000	101,91,13,874
2023-24	11,40,00,000	113,31,13,874

II. During the Year 2023-24 the Institute has received the grant of Rs. 20,36,000/- for the Project CPRI 270L, NIL grant for the Project CPRI 37L & Rs. 22,43,000/- for the Project 66L. Amount spent on these projects were Rs. 2,02,72,574/-, Rs. 3,04,512/- & Rs. 34,87,378/- for Project CPRI 270L, CPRI 37L & CPRI 66L respectively. Such amount was deducted from the Grant received using the Capital approach.

7. Balance Confirmation from Vendors

Balance confirmation from the various vendors is not available. To avoid the unnecessary incidences, it is essential to get the account statements of all the vendors at regular intervals. Submission of the accounts statements should be made mandatory for all the vendors in the future.

8. Employee Benefits

The Employees of the institute is entitled to certain benefits like Leave Encashment & Leave Travel Concession. They are also entitled to Gratuity to be received at the time of retirement of Employee. No provision is made by institute w.r.t Gratuity, Leave Encashment & Leave travel Concession. Institute claim expenditure of gratuity, leave Encashment, etc in its books of accounts when it is actually paid. However Institute should make provision of these expenditure every year in its books of accounts.

9. Contingent liabilities

There are no contingent liabilities as on 31-03-2024.

For Sardar Swaran Singh National Institute of Bio Energy

Finance & Accounts Officer

सरदार स्वर्ण सिंह राष्ट्रीय जैव ऊर्जा संस्थान
12 कि.मी पत्थर, जालंधर-कपूरथला रोड,
वडाला कलाँ, कपूरथला (पंजाब) 144601
Sardar Swaran Singh National Inst. of Bio-Energy
12 Km. Stone,Jalandhar-Kapurthala Road
Wadala Kalan,Kapurthala (Punjab) 144601

Place : Jalandhar
Date :
UDIN:

Director General

सरदार स्वर्ण सिंह राष्ट्रीय जैव ऊर्जा संस्थान
12 कि.मी पत्थर, जालंधर-कपूरथला रोड,
वडाला कलाँ, कपूरथला (पंजाब) 144601
Sardar Swaran Singh National Inst. of Bio-Energy
12 Km. Stone,Jalandhar-Kapurthala Road
Wadala Kalan,Kapurthala (Punjab) 144601

INDEPENDENT AUDITOR's REPORT

To
The Directors of
Sardar Swaran Singh Institute of Bio-Energy
Kapurthala

1. We have audited the attached Balance Sheet of Sardar Swaran Singh Institute of Bio-Energy, Kapurthala as at March 31, 2024 and also the Income and Expenditure Account for the year ended on that date annexed thereto. These financial statements are the responsibility of the management. Our responsibility is to express an opinion on these financial statements based on our audit.

2. We conducted our audit in accordance with auditing standards generally accepted in India. Those Standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audit provides are as on able basis for our opinion.

3. Further to our comments in the Annexure-A attached, we report that:

   i. We have obtained all the information and explanations, which to the best of our knowledge and belief were necessary for the purposes of our audit;

   ii. The balance sheet, income and expenditure account are in agreement with the books of account;

   iii. In our opinion, and to the best of our knowledge and according to the explanations given to us and subjects to our observations annexed here with we report that:

      a. The Balance Sheet, gives a true and correct view of the state and affairs of the Sardar Swaran Singh Institute as on 31.3.2024.

      b. The Income and Expenditure Account gives a true and correct view of excess of income over expenditure for the period ended 31.03.2024.

FOR ANAND TARUN & CO
CHARTERED ACCOUNTANT

CA ANAND MOHAN CHOPRA
PARTNER
M. No. 094257

ANAND TARUN & CO
CHARTERED ACCOUNTANTS
FRN : 017735N
JALANDHAR

Annexure –A

1. An amount of Rs. 4,00,00,000/- received as grant for purchase of capital asset during the year against which Rs. 2,47,22,172.21/- was spent on acquisition of capital asset. Grant received during the year had been credited to Grant Received for the capital asset under the major head of Reserves & Surplus. Amount which was spent for purchase of fixed assets of Rs. 2,47,22,172.21/-had been credited to capital fund account by debiting to Grant Received for capital asset account.An Amount of Rs. 52,93,696/- is charged as Depreciation on Capital Asset acquired out of the funds received for the purchase of fixed assets. Hence This amount is transferred from capital asset fund to Profit & Loss account being treated as income during the year.

2. Balance with the Government Authorities includes Advance Income Tax amounting to Rs. 4,28,395/- which belongs to some previous year. As explained to us, this amount had been claimed as refund in the Income Tax Return filled . However, Refund of this amount is yet not issued by Income tax authorities. Management is unable to provide the exact details as to which year this refund relates and why it is not being released by the Income Tax Department. In our opinion this amount is not recoverable at all and hence it should be written off in the books of accounts.

3. The Employees of the institute is entitled to certain benefits like Leave Encashment & Leave Travel Concession. They are also entitled to Gratuity to be received at the time of retirement of Employee. No provision is made by institute w.r.t Gratuity, Leave Encashment & Leave travel Concession. Institute claim expenditure of gratuity, leave Encashment , etc in its books of accounts when it is actually paid. Institute had not followed the provisions of AS 15 regarding the valuation of employees benefits and also had not made the provision for it. Therefore the profits are overstated by this amount.

4. Some of the purchases made in cash does not reflect in Inventory records . Hence the management should install proper system of inventory control so that each & every purchase should be properly recorded in stock register.

5. Expenditure from Imprest account should be minimized & it should be paid through PFMS mode. Institute is following the practice of incurring expenses through the imprest account of employee It is advisable that Adequate stock of consumables should be held by the concerned departments to avoid recurring purchases.

6. Advance paid to M/s Pushpa Gujral Science City of Rs. 12,320/- on 07/10/2023 for room booking but till date the invoices for these expenditure are not being received by the institute and hence had not been booked as expenditure.

7. Following is the List of Debtors / Loans & Advances / Securities where in advances have been given for more than a year and have not been given the proper adjustment in the books of accounts.

(in Rs)

Particulars	Date of Advance	Balance as on 31-03-2024
CASA, New Delhi	17/07/2003	3,00,000 /-
Sundry Advances	31/03/2015	41,055.49 /-
M/s Deejay Corporation	2012	63,279 /-
M/s B.N Construction	21/10/2014	5,00,000 /-
Dr. Savita Vyas	09/01/2022	900 /-
M/s Ecosense Sustainable Solutions	16/03/2022	29,500 /-
Security Deposit Recievable	02/09/2022	800 /-
Deposit with CPWD	25/03/2021	68685 /-
Gas Security	-	7100 /-
Punjab Technical University	23/08/2022	3540 /-
Comptroller, Punjab Agriculture University	29/08/2022	59000 /-

The above advances are long outstanding. As explained to us no legal proceedings had been initiated to recover these outstanding amounts. We recommend that proper action should be taken up for recovery from above parties and there should be regular review of all the advances to ensure that vendors are fulfilling their commitments as per the terms of work orders. If at all these advances are not recoverable then it should be written off in the books of accounts.

8. Following is the list of creditors which are not paid for more than a year

(In Rs)

Particulars	Detail	Bal as on 31-03-2024
Arora Vikram & Associates	16/12/2019	18,880 /-
CA Manmohan Puri	23/10/2021	3,780 /-
M/s Chemicot Scientific gases	31/03/2016	3,810 /-
M/s Puri & Gupta	31/03/2022	59,000 /-

The above liabilities are outstanding for more than a year, we recommend proper action should be taken to settle the liabilities. In case these amounts are not payable at all then these should be written off as income in the Books of Accounts.

9. Statutory liabilities:-

In view of there being no taxable income under Income Tax Act, 1961, provision for Income Tax has not been considered necessary. However, it is found from Income Tax Portal that the organization has pending outstanding liability of Income Tax is as under:

(in Rs.)

Sr No.	Assessment Year	Amount
1	2015-16	3,05,65,450/-
2	2016-17	5,47,460/-
3	2022-23	2,12,54,320/-

As explained to us Appeal for the AY 2015-16 has been filed before Commissioner of Income Tax (Appeals) Decision of Honorable CIT (A) is still pending. In connection to AY 2016-17 assessment has been made under Section 143(3) vide order 27.11.2018 with Nil demand but demand of Rs. 5,47,460/- has been still reflected in Income Tax Portal.

10. Physical verification of library books by the librarian should be done. Any books that are found to be damaged / missing, issued to students which is not possible to get back should be identified and if necessary should be written off from the stock as well as from the books of accounts.

FOR ANAND TARUN & CO
CHARTERED ACCOUNTANT

CA ANAND MOHAN CHOPRA
PARTNER
M. No. 094257

ANAND TARUN & CO
CHARTERED ACCOUNTANTS
FRN : 017735N
JALANDHAR

SSS NIBE TEAM

Director General Office

Dr. G. Sridhar	Director General
Mr. Hitesh Sharma	PA to Director General
Ms. Purnima	Multi-Tasking Staff

Chemical & Electro Chemical Conversion Division

Dr. Anil K Sarma	Scientist – E
Dr. Rawel Singh	Scientist – D
Dr. A. Senthil Nagappan	Scientist – D
Dr. Sandeep Kumar	Scientist – B
Mr. Vijay Bajala	Technical Assistant
Dr. ArghyaDatta	Research Associate
Dr. Amlan Das	Post-Doctoral Fellow
Dr. Kaustubh Chandrakant Khaire	Post-Doctoral Fellow
Dr. Kapil Mamtani	Post-Doctoral Fellow
Dr. Dig Vijay Singh	Post-Doctoral Fellow
Mr. Akash Deep Singh	Senior Research Fellow
Mr. Bhautik Gajera	Senior Research Fellow
Mr. Amit Dobal	Junior Research Fellow
MS. Shiloo Raj	Junior Research Fellow
Mr. Amrik Lal	Multi-Tasking Staff

Biochemical Conversion Division

Dr. Sachin Kumar	Scientist – C
Dr. Sanjeev Mishra	Scientist – D
Dr. Apurav Sharma	Post-Doctoral Fellow
Ms. Gaganpreet Kaur	Senior Research Fellow
Ms. Nisha Yadav	Senior Research Fellow
Mr. Subrata Maity	Junior Research Fellow
Ms. Swati Kumari	Junior Research Fellow
Ms. Divjot Kaur	Project Assistant
Smt. Shuchi Sahu	Technical Assistant
Mr. Ajay Kumar	Multi-Tasking Staff

Biomass & Energy Management Division

Dr. Ashish Bohre	Scientist – D
Dr. Vandit Vijay	Scientist – C
Dr. Gurkamal Nain Singh	Research Associate
Dr. Banafsha Ahmed	Post-Doctoral Fellow

Mr. Rakesh Godara	Senior Research Fellow
Mr. Avinash Bharti	Junior Research Fellow
Mr. Arshdeep Singh	Multi-Tasking Staff

Thermochemical Conversion Division

Dr. Tapas Kumar Patra	Scientist – C
Dr. Kunwar Pal	Scientist – C
Dr. Himanshu	Research Associate
Mr. Deepanshu Awasthi	Junior Research Fellow
Ms. Deepti Hooda	Junior Research Fellow
Ms. Anupama Saroj	Junior Research Fellow
Mr. Gopal Sharma	Technical Assistant
Mr. Manjeet Singh	Lab Technician
Ms. Rashpinder Kaur	Store Assistant
Mr. Arshdeep Singh	Multi-Tasking Staff

Civil and Maintenance Division

Mr. Ram Anuj Singh	Assistant Engineer (Civil)
Mr. Puneet Sharma	Electrician
Mr. Makhan Lal	Electrician
Mr. Manpreet Singh	Welder
Mr. Avtar Singh	Carpenter
Mr. Jaswinder Singh	Plumber
Mr. Amrik Singh	Multi-Tasking Staff
Mr. Amarjit Singh	Tractor Driver

Administrative Division

Mr. Anand Kumar	Consultant (Admin)
Dr. Abhishek Gupta	Deputy Director
Mr. Rupesh Kumar Verma	Junior Executive Assistant
Mr. Mukesh Banga	IT Assistant
Mr. Gurpreet Singh	Admin Assistant
Ms. Jatinderpreet Kaur	Librarian
Ms. Suambada Kumari	Junior Hindi Translator
Mr. Parminder Singh	Staff Car Driver
Mr. Sanju	Multi-Tasking Staff

Finance Division

Mr. Nanak Dev	Consultant (Accounts)
Mr. Sanjay Chauhan	Junior Executive Assistant
Mr. Aman Deep	Admin. Accounts Assistant

SOCIAL MEDIA / ONLINE PRESENCE

SSS National Institute of Bio Energy
@SssNibe

National Technology Day Celebration at @SssNibe
Invited lecture delivered by Cdr Gurkeerat Sekhon (Retd) Executive Vice President - North Zone Punjab Renewable Energy Systems Pvt. Ltd
@mnreindia
@PRESPLdesk
@Monish_Ahuja
@PSCST_GoP
@IndiaDST

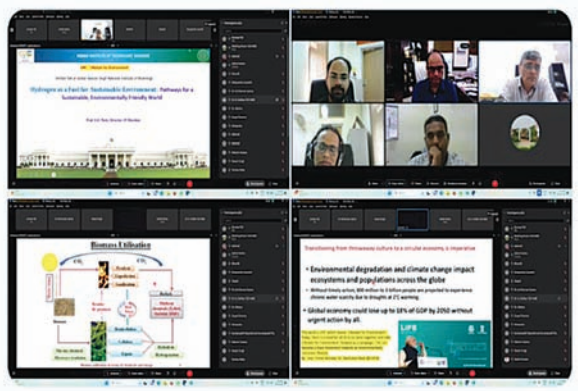
6:40 PM · May 11, 2023 · **229** Views

SSS National Institute of Bio Energy @SssNibe · May 14, 2023
संसदीय राजभाषा समिति ने अमृतसर में सरदार स्वर्ण सिंह राष्ट्रीय जेव ऊर्जा संस्थान @SssNibe एवं मंत्रालय @mnreindia के वरिष्ठ अधिकारियों के साथ निरीक्षण बैठक की। इस दौरान समिति ने मंत्रालय एवं संस्थान के अधिकारियों की उपस्थिति में हो रहे राजभाषा हिंदी के कार्यों का अवलोकन किया।

SSS National Institute of Bio Energy @SssNibe · Jun 9, 2023
Various LiFE Mission awareness campaigns & events were organized by the institute under the #MeriLife initiative.
@moefcc @mnreindia

#MissionLiFE
#ChooseLiFE
#MeriLiFE

SSS National Institute of Bio Energy @SssNibe · Jun 9, 2023
Delighted to host Prof. K. K. Pant, Director, @iitroorkee for the expert talk on "Hydrogen as a Fuel for Sustainable Environment: Role of Hydrogen Pathways for a Sustainable and Environmental Friendly World"
@mnreindia @IndiaDST
#MissionLiFE #ChooseLiFE #MeriLiFE



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SSS National Institute of Bio Energy @SssNibe · Jun 12, 2023
SSS NIBE exhibited a stall at the Biofuels Expo, Pragati Maidan, New Delhi from 5-7th June. The technologies/products developed at NIBE were showcased at the stall and generated a lot of interest in the expo visitors.
@mnreindia
@IndiaDST
@biofuelcircle

1 5 146

SSS National Institute of Bio Energy @SssNibe · Aug 15, 2023
स्वतंत्रता_दिवस की 77वीं वर्षगांठ के अवसर पर माननीय महानिदेशक द्वारा संस्थान में ध्वजारोहण कर राष्ट्रीय ध्वज को सलामी दी गयी।
Jay hind
#HappyIndependenceDay

2 67

SSS National Institute of Bio Energy @SssNibe · Aug 29, 2023
An orientation program for the newly admitted M.Tech. students for the 2023-24 session was organized on 28th Aug. It featured informative speeches to familiarize the students with @SssNibe and @NITJofficial functional bodies and facilities.

You reposted
Punjab State Council for Science and Techn @PSCST_C · Aug 30, 2023
To foster international collaborations for developing ex-situ applications of paddy straw in the State, @PSCST_GoP facilitated interaction of INER Taiwan & @SssNibe, Kapurthala for joint research projects
@meet_hayer
@trahul1976
@TWIndia2
@sstpdst
@JKAroraEDPSCST

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SSS National Institute of Bio Energy @SssNibe · Oct 1, 2023
Swachhata Shramdaan was organised by the institute under #SwachhataHiSewa campaign.
#SwachhtaPakhwada
#MNRE

3 125

Ministry of New and Renewable Energy (MI @mnreinc · Oct 9, 2023
Sardar Swaran Singh National Institute of Bio-Energy (SSS-NIBE), an autonomous Institute of @mnreindia is organising the "4th International Conference on Recent Advances in Bio-energy Research (ICRABR) 2023" from Oct 9 to Oct 12, 2023, at Kaputhala, Punjab.
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@SssNibe

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SSS National Institute of Bio Energy @SssNibe · Oct 9, 2023
The first day of ICRABR-2023 conference was covered by different electronic and printing media.

SSS National Institute of Bio Energy @SssNibe · Oct 10, 2023
Day 2 of the ICRABR-2023 finishes with the presentations of the young researchers.

#MNRE
#Bioenergy
#ICRABR2023

2 127

SSS National Institute of Bio Energy @SssNibe · Oct 11, 2023

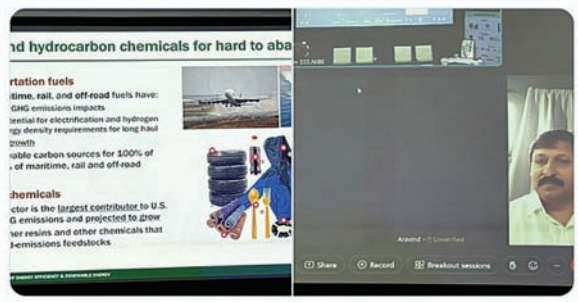
Day 3: The students from various schools of Kapurthala district have attended the lectures and visited the exhibition stalls.

#Bioenergy
#MNRE
#ICRABR2023

SSS National Institute of Bio Energy @SssNibe · Oct 11, 2023

We thank Prof. PV Aravind University of Groningen, Netherlands @univgroningen and Mr. Jim Spaeth Department of Energy, United States @ENERGY for the plenary talks.

#MNRE
#Bioenergy
#ICRABR2023
#Day3



SSS National Institute of Bio Energy @SssNibe · Oct 11, 2023

Day 3:
We are ready for the #postersession! Please visit us in the poster hall to share ideas, and dive into insightful conversations.
#MNRE
#Bioenergy
#ICRABR2023

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SSS National Institute of Bio Energy @SssNibe · Oct 11, 2023

Day 3 Ends with the prize distribution and vote of thanks.
#ICRABR2023
#MNRE
#Bioenergy

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SSS National Institute of Bio Energy @SssNibe · Oct 26, 2023

Mr. Rakesh Godara, Senior Research Fellow of @SssNibe won the prestigious Global Bioenergy Partnership Youth Award 2023 during the recently concluded Global Bioenergy Week in Thailand.
#Bioenergy
#GBEP
#MNRE

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SSS National Institute of Bio Energy @SssNibe · Nov 24, 2023

Celebrating Constitution Day with pride!
@SssNibe staff led by honourable Director General took a pledge to uphold the values that shape our democracy.

#ConstitutionDay
#mnre

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SSS National Institute of Bio Energy @SssNibe · Dec 6, 2023
Scientists from @SssNibe lead by Director General visited @iitroorkee to discuss collaborative opportunities in academic and research fields.

SSS National Institute of Bio Energy @SssNibe · Dec 8, 2023
@SssNibe signed an MoU with National Aerospace Laboratories (NAL) @CSIRNALOFFICIAL for work on Solid Oxide Fuel Cell (SoFC) for advancing its development in the country.

2 86

SSS National Institute of Bio Energy @SssNibe · Dec 8, 2023
@SssNibe informed the stakeholders about bioenergy solutions, schemes of @mnreindia during the Workshop on Exploring Market Solutions for Stubble Management by @ITCCorpCom

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SSS National Institute of Bio Energy @SssNibe · Jan 4
DG NIBE invited as a Guest Speaker on Energy Conservation Day on 14/12/2023 at Rail Coach Factory, Kapurthala. On this occasion, DG NIBE delivered the talk on Energy Conservation and also had a discussion with GM RCF.

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SSS National Institute of Bio Energy @SssNibe · Feb 9
A strategic MoU was signed between @SssNibe and @iitroorkee on 9th February 2024 through virtual mode.

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Prepared and Edited by :

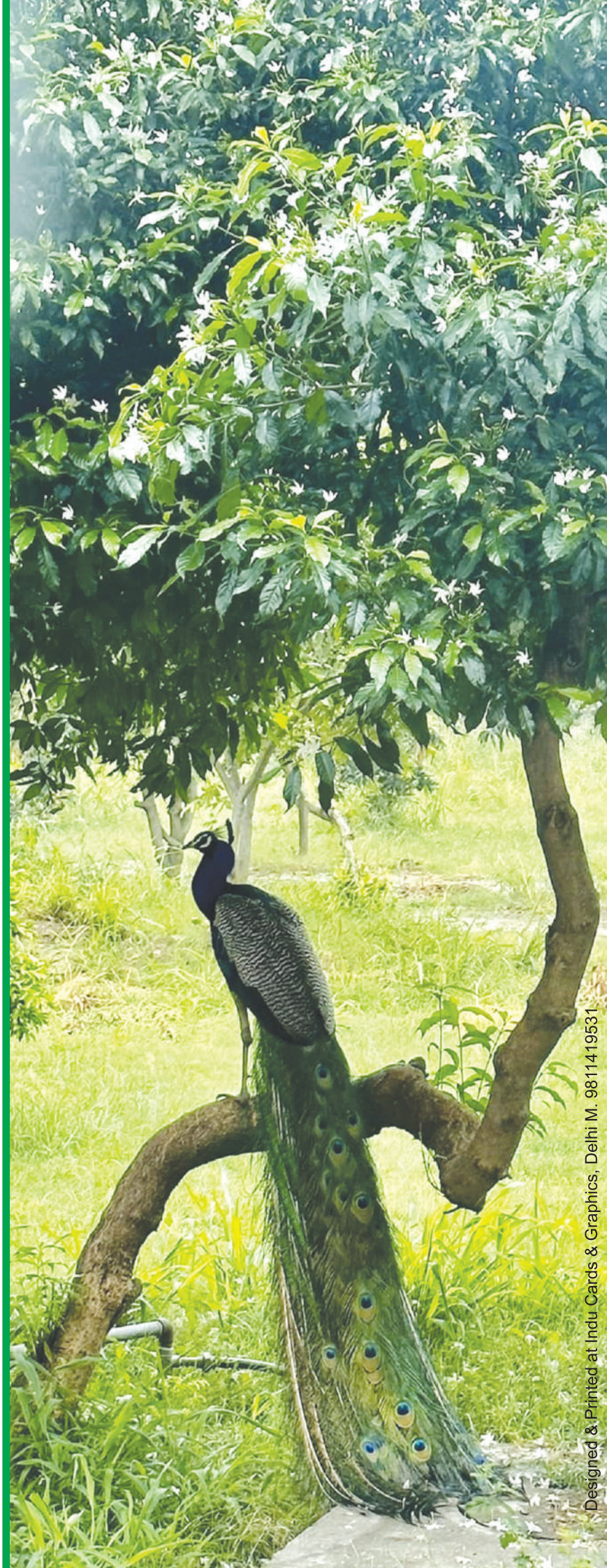
Dr. Ashish Bohre, Dr. Gurkamal Nain Singh, Sardar Gurpreet Singh and Shri Hitesh Sharma

Sardar Swaran Singh National Institute of Bio-Energy, Kapurthala

(An Autonomous Institution of
Ministry of New and Renewable Energy)

12 km Milestone, Wadala Kalan,
Jalandhar-Kapurthala Road
Kapurthala
Punjab 144603, India

Website: http://nibe.res.in
Email: sss.nibe@nibe.res.in
Telephone: (+91) 1822-507406
@NIBE
SSS NIBE



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