UK Government

iDeeksha

Bureau of Energy Efficiency
Ministry of Power, Government of India

ASPIRE Programme

Accelerating Smart Power & Renewable Energy in India

Sectoral Workshop & Study Trip

BEST PRACTICES IN ENERGY EFFICIENCY IN SUGAR SECTOR: A PATH FOR DECARBONISATION

WORKSHOP:

Date: *21st March 2024*
Time: *09:00 – 17:30 IST / 03:30 – 12:00 GMT*
Venue: *Renaissance Hotel, Lucknow*

STUDY TRIP:

Date: *22nd March 2024*
Time: *10:00 – 13:00 IST / 04:30 – 07:30 GMT*
Venue: *Balrampur Chini Mills, Haidergarh*

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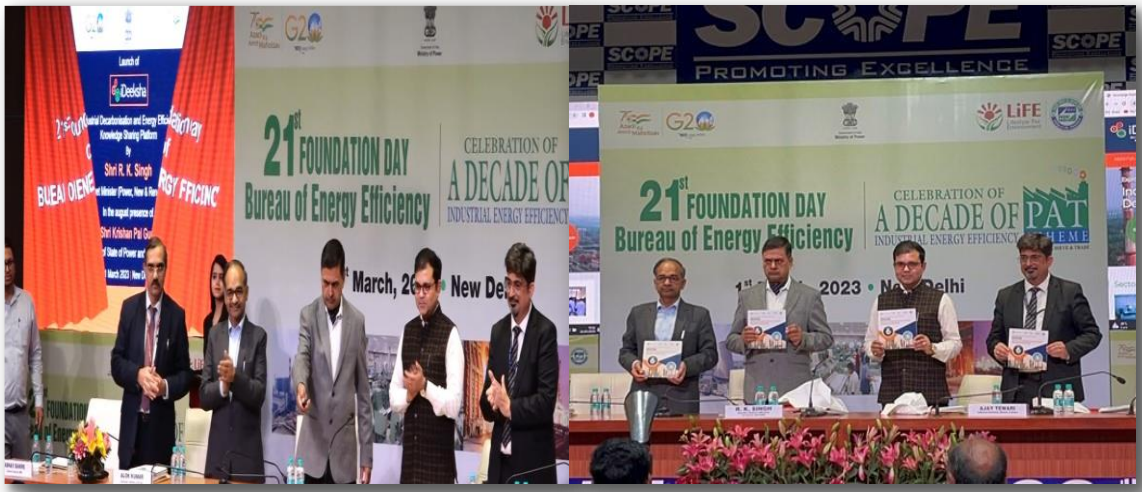
1. About ASPIRE Programme

Accelerating Smart Power and Renewable Energy (ASPIRE) is a bilateral programme being implemented by the Foreign Commonwealth and Development Office (FCDO), Government of UK in association with the Ministry of Power and Ministry of New and Renewable Energy (MNRE), Government of India (GoI). Key objective of the ASPIRE Programme is to facilitate India's transition towards a sustainable, low carbon energy ecosystem to fulfill its net-zero commitments. KPMG is the implementation advisor to FCDO in relation to the ASPIRE programme and Idam Infrastructure Advisory Private Limited (India) is a key consortium member.

Industrial Energy Efficiency and Decarbonisation (IEED) is a key thematic area of support under the ASPIRE programme which is being implemented in association with Bureau of Energy Efficiency (BEE), GoI.

2. About IDEEKSHA Platform

The Industrial Decarbonisation and Energy Efficiency Knowledge Sharing (IDEEKSHA) Platform has been developed under the ASPIRE Programme in collaboration with the BEE to promote and share best practices and energy-efficient technologies among large-scale industries. The IDEEKSHA platform was launched by Mr. R.K. Singh, Hon'ble Cabinet Minister for Power and New and Renewable Energy, Government of India during the 21st Foundation Day Event of BEE on 1st March 2023, in Delhi.



Snapshots from IDEEKSHA Platform and Newsletter launch during BEE's Foundation Day Event

The IDEEKSHA platform is a one-stop shop for all energy efficiency/ decarbonisation needs of large industries covered/ expected to be covered under BEE's PAT Scheme. The IDEEKSHA platform would thus facilitate:

- Exchange of knowledge and information to enhance peer to peer learning.
- Designated Consumers (DCs) in adoption of new and emerging IEED tools & technologies by facilitating access to Indian and global (including from the UK) technology suppliers.
- Access to a database of financial institutions.
- Access to IEED tools, technologies & technology providers available in India and globally.
- Access to data sources and knowledge repositories to support knowledge translation.
- Sector/ industry specific workshops/ seminars to enhance EE measures.
- Knowledge and commercial partnerships.

The IDEEKSHA platform facilitates knowledge exchange and partnerships among industry and technology suppliers for 8 hard-to-abate industrial sectors (Cement, Aluminium, Iron & Steel and Textile, Fertiliser, Chlor-Alkali, Pulp & Paper, and Refinery) which are also covered under BEE's Perform

Achieve and Trade (PAT) scheme. Under the IDEEKSHA Platform, support was extended to four (4) energy-intensive industrial sectors (Cement, Aluminium, Iron & Steel and Textile) in terms of providing access to database of global industrial energy efficiency & decarbonisation (IEED) technologies, organising capacity building workshops and study trips, etc. Four sectoral workshops and study trips were organised in 2022 and 2023, each focusing on key industries: Aluminium, Textile, Cement, and Iron & Steel. These events are aimed at understanding industry-specific challenges, opportunities, and identifying strategies for sustainable development. The details of the events, including background notes, presentations, event summary reports, etc., can be accessed through the IDEEKSHA Platform (https://www.ideeksha.in/) under 'Past Events' tab. Below are the direct links to access the resources:

S.No.	Past Events	Sector	Reference Links
1	Sectoral Workshop on Best Practices in Energy Efficiency in Aluminium Sector: A Path for Decarbonisation	Aluminium	https://www.ideeksha.in/pages/Sectoral Workshop on Best Practices in Energy Efficiency in Aluminium Sector
2	Study Tour/ Visit of Aditya Aluminium Plant, Lapanga, Odisha		https://www.ideeksha.in/pages/A Study Tour Visit of Aditya Aluminium Plant
3	Sectoral Workshop on Best Practices in Energy Efficiency in Textile Sector: A Path for Decarbonization	Textile	https://www.ideeksha.in/pages/Sectoral Workshop on Best Practices in Energy Efficiency in Textile Sector
4	Study Tour/ Visit of Raymond Textile Plant, Chhindwara, Madhya Pradesh		https://www.ideeksha.in/pages/A Study Tour Visit of Raymond Textile Plant
5	Sectoral Workshop on Best Practices in Energy Efficiency in Cement Sector: A Path for Decarbonisation	Cement	https://www.ideeksha.in/pages/Sectoral Workshop on Best Practices in Energy Efficiency in Cement Sector: A Path for Decarbonisation
6	Study Tour/ Visit of Udaipur Cement Works Limited (UCWL)		https://www.ideeksha.in/pages/A Domestic Study Tour-Visit of Cement Plant
7	Sectoral Workshop on Best Practices in Energy Efficiency in Iron & Steel Sector: A Path for Decarbonisation	Iron & Steel	https://www.ideeksha.in/pages/Sectoral Workshop on Best Practices in Energy Efficiency in Iron & Steel Sector: A Path for Decarbonisation
8	Study Tour/ Visit of Godawari Power & Ispat Limited (GPIL)		https://www.ideeksha.in/pages/A Domestic Study Tour-Visit of Iron & Steel Plant
9	Sectoral Workshop on Best Practices in Energy Efficiency in Pulp & Paper Sector: A Path for Decarbonisation	Pulp and Paper	The report is under development and would be soon uploaded on IDEEKSHA platform.
10	Study Trip/ Visit of Khanna Paper Mills, Amritsar		The report is under development and would be soon uploaded on IDEEKSHA platform.
11	Sectoral Workshop on Best Practices in Energy Efficiency in Chlor-Alkali Sector: A Path for Decarbonisation	Chlor - Alkali	The report is under development and would be soon uploaded on IDEEKSHA platform.

S.No.	Past Events	Sector	Reference Links
12	Study Trip/ Visit of Gujarat Alkalies and Chemical Limited (GACL)		The report is under development and would be soon uploaded on IDEEKSHA platform.

Now, the ASPIRE Programme in consultation with the Bureau of Energy Efficiency is extending the technical assistance support through IDEEKSHA platform to four (4) new industrial sectors namely, **Pulp & Paper**, **Chlor-Alkali**, **Tyre manufacturers** and **Sugar**. As part of the support, ASPIRE Programme team is organising workshops and plant study trips for the above 4 new focus sectors to enhance energy efficiency measures and enable decarbonisation in the industrial sectors. So far, the ASPIRE programme team has organised workshops and study trips for 2 focus sectors i.e., pulp & paper and chlor-alkali on 13th February 2024 and 27th February 2024, respectively.

Further, the platform would also host a technology compendium encompassing IEED technologies available in India and globally (including from the UK and newsletters showcasing case studies on leading IEED best practises practices adopted by the Indian and International players (including from the UK), along with innovative low – carbon technologies/ solutions and their suppliers tailored for the above sectors.

3. Overview of Sugar Sector in India

India is the largest producer of sugar in the world, with an output of ~**40** million metric tons in 2022-23[1]. The sugarcane and sugar sector are the country's second-largest agro-based industry, following cotton. Of the approximately **756** installed sugar mills, **522** were operational during the 2021-22 season[2], with **60%** of the mills located in Uttar Pradesh (highest share in national production) and Bihar.

The sugar industry not only supplies raw materials to the alcohol and beverage sectors but also contributes to fuel blending, aiding in green fuel production and reducing crude oil imports. India surpassed its target of **10%** ethanol blending with petrol ahead of its schedule in 2022 and now aims to achieve **20%** blending by 2025.

The industry is witnessing significant expansion, with sugar mill capacities ranging from **2,500** tons of cane per day (TCD) to over **10,000** TCD[3]. The industry also includes two standalone refineries in Gujarat and West Bengal producing refined sugar from both imported and domestically produced raw sugar.

By-products of Sugar Industry

(i) Cogeneration: ~**300** kg of bagasse (a residue from sugar extraction process) is produced from per tonne of sugar which can be converted to ~**130** kilo Watt hour (kWh) of power. India's sugar industry has a total installed co-generation capacity of **~4,200** MW. The power generated by an integrated sugar mill is partially consumed captively and **~75%** of the total co-generation power is sold to grid.

(ii) Ethanol: a key by-product for integrated sugar mills is Ethanol, which is primarily derived from molasses, a by-product of the sugar industry. Ethanol plays a crucial role, particularly during years of surplus sugarcane production.

Energy Efficiency and Decarbonisation Potential

As per a study by IIT Bombay, it was found that the production of one tonne of sugar releases GHG emissions equivalent to **324** to **834 kg** of carbon dioxide. Sugarcane cultivation accounts for significant greenhouse gas emissions in the entire life cycle of sugar production. Coal-based electricity consumption for irrigation and application of chemical fertiliser and cattle manure lead to this high level of emissions. Sugarcane milling accounts for **6-7%** and cogeneration of electricity from bagasse accounts for **2-3%** of emissions.[4]

The sugar sector is now expected to be covered under Bureau of Energy Efficiency (BEE's) flagship Perform Achieve and Trade (PAT) scheme. As per Ministry of Power's (MoP) notification dated 6th June 2023, units of sugar plants[5], having energy consumption of **10,000** metric tonne of oil equivalent (ToE) per year or above will qualify as a Designated Consumer in Sugar Sector. As per a recent study, the overall energy consumption of this sector is estimated to be **4.45** Mn TOE and **~100** sugar plants are expected to be included as Designated Consumers (DC) under the PAT scheme.

The specific power consumption of sugar mills is also evaluated based on power consumption and tonnes of cane. The typical specific energy consumption will be in the range of ~**26-32** kWh/ tonne of cane[6]. The break-up of section wise specific power consumption is as follows:

- Milling tandem including cane handling – 10 to 12 kWh/ tonne of cane
- Clarification, Boiling, curing & sugar handling – 7 to 8 kWh/ tonne of cane
- Power plant including ESP – 7 to 8 kWh/ tonne of cane
- Factory lighting & other utilities – 2 kWh/ tonne of cane

[1] https://www.indiansugar.com/PDFS/PPt_to_Hon_ble_Minister-SUGAR.pdf
[2] https://www.ideeksha.in/pages/Sugar-Basic%20info%20on%20Sectors
[3] https://dfpd.gov.in/Home/DirectorateOfSugar?language=1
[4] Simultaneous production of sugar, power generation from bagasse is environment-friendly, says IIT-Bombay study | Latest News India - Hindustan Times
[5] or establishment those are under production of sugar and its variants such as white sugar, brown sugar, and liquid sugar
[6] https://www.teriin.org/sites/default/files/2021-08/Sugar_Report.pdf

With the implementation of the latest energy efficient technologies, specific power consumption of the mills can be brought down to 22kWh/ tonne of cane[7].

The sugar sector in India can adopt best available techniques (BATs) and technologies to enhance energy efficiency and enable decarbonisation.

4. Decarbonisation of Indian Sugar Industry

India's ambitious target of achieving net-zero emissions by 2070 reflects a significant commitment to addressing the climate crisis. Sugar industries have committed to enhance energy efficiency through systematic planning, and many of these entities have shown significant progress. Some of the energy efficient measures adopted by the sugar mills are mentioned below:

- **Shree Renuka Sugars:** Shree Renuka Sugars, one of the leading sugar manufacturers, operates seven sugar mills in India with a total crushing capacity of **35,000** TCD along with two port-based sugar[1] refineries of **1.7** million tonnes per annum (MTPA) capacity. It has undertaken several energy efficiency initiatives including utilisation of renewable energy, water management technologies, implementation of circular economy principles such as for captive consumption, they utilise a large proportion of energy generated by their cogeneration units. ~**83%** of their cogeneration process is renewable energy based, resulting in a significant reduction in GHG emissions[8].
- **Bannari Amman Sugars:** Bannari Amman Sugars has adopted several energy efficiency and sustainability measures including circular economy principles such as development of a co-generation plant, distillery division, utilising the by-products of sugar manufacturing in other industries. Further, they have installed seven wind mills which not only power its group of industries but also export power to the state electricity grid[9].
- **Dalmia Bharat Sugar and Industries Limited:** Dalmia Bharat Sugar embarked on several sustainable and low- carbon initiatives to moderate water consumption, which has helped them to achieve “Zero Water Discharge” status at their effluent treatment, utilising all treated water in irrigation. At the plants, condensate water is reused in process and cooling application, green belt development and for irrigation purpose. The hot condensate water is used for imbibition, and it reuses non-contaminated water for process application, etc.[10]
- **Cooperative sugar mills in Maharashtra:** Some cooperative sugar mills in Maharashtra have been working on modern energy efficiency and renewable energy solutions to improve overall operational efficiency and reduce their carbon footprint.
- **Shri Someshwar Sahakari Sakhar Karkhana (SSSSK):** SSSSK has made significant investment in the following - a distillery unit producing ethanol using molasses; a biogas unit generating biogas using spent wash from the distillery; a cogeneration facility generating combined heat and power using bagasse and biogas and bio-fertiliser using press mud from biogas plant.[11]

The government of India issued a scheme to promote **Biomass based co-generation in Sugar Mills** in 2018 to further enhance sustainability in the sugar industries.[12]

In addition to the above, Sugar industries in India have adopted the following key operational best practices and technologies as part of their IEED measures:

- Production of bioethanol, bio-compressed natural gas (CNG)
- Production of bioelectricity through cogeneration
- Production of sugarcane-based methanol

[7] All India seminar on latest energy efficient technologies in Indian sugar industry – organised by STAI
[8] https://renukasugars.com/pdf/events/annualreport22srslse.pdf
[9] Sugar - Bannari Amman Group
[10] DBSIL-Sustainability-Report-FY1920 .pdf (dalmiasugar.com)
[11] https://www.iwmi.cgiar.org/Publications/Books/PDF/resource_recovery_from_waste-257-267.pdf
[12] pib.gov.in/PressReleaseIframePage.aspx?PRID=1742794#:~:text=The Ministry has been implementing a scheme to,notified on 11.05.2018 and was valid till 31.03.2021.

- Utilisation of industry 4.0 technologies for an improved infrastructure for decarbonisation
- Utilisation of film forming polyamines to enhance reliability and economics of steam & power generating systems
- Sugarcane waste conversion into char
- Utilisation of quintuple 3rd effect vapour for sugar melting
- Utilisation of film type sulphur burner
- Utilisation of bagasse drier
- Utilisation of planetary gearbox for crystalliser
- Utilisation of advanced bagasse-based co-generation
- Utilisation of mechanical Vapour Compression (MVR) technology to recover low-pressure waste steam
- Utilisation of AC Mill Drives
- Utilisation of vertical continuous vacuum pan for massecuite boiling
- Utilisation of low-pressure extraction (LPE) system
- Utilisation of membrane filtration for sugar manufacturing
- Utilisation of high-pressure co-generation system

5. Potential Technology Interventions for Enhancing IEED in Indian Sugar Sector

Some of the potential areas for technology intervention in the Indian Sugar sector to reduce carbon intensity & facilitate a rapid transition to net-zero have been identified below:

- Bioethanol sugarcane-bio refineries
- Post-combustion CO_2 capture (PCC) in the power-cogeneration
- CO_2 capture during fermentation
- Carbon capture technology benchmarking
- Chemical absorption with aqueous methyl-diethanolamine (MDEA)
- Digital technologies for process optimisation for increased efficiencies and yields
- Energy integration - waste heat recovery from hot flue gas, bagasse drying and heating combustion air
- Reduce energy usage, through steam reduction
- Capacity enhancement
- Development of co-generation facilities to meet both steam and power demand
- Installation of electrical mill drive based sugar extraction in place of steam mill drives
- Changing the evaporator configuration to (DEVC + Quad to Quintuple/ quadruple mode)
- Modification in vapour bleeding arrangement system (for plants utilising quintuple effect system)
- Hot condensate management: utilising hot condensate from 2nd body of multiple effect evaporators for superheated wash water heating instead of exhaust steam or vapour bled from multiple effect evaporator bodies
- Utilisation of low-grade vapour for pan boiling by employing mechanical circulators
- Stepwise recovery of flash heat steam from the condensate from evaporators, juice heater and pans
- Selective incorporation of direct contact heaters for juice heating, syrup, filtrate, and molasses conditioning
- Use of low temperature vapours for pan washing
- Heating the air by hot condensate at sugar dryer/hopper
- Chilled water generation using hot vapour condensate in vapour absorption system
- Integrating renewable energy sources (fuel switch)

Sugar Industry in the UK

In the United Kingdom, sugar is derived exclusively from sugar beets and sugar cane due to their sufficient sucrose content for industrial sugar production. In 2022, the UK harvested over **six million tons** of sugar beets, contributing to the broader sugar manufacturing industry with revenue amounting to **£830 million** (INR 8,730 crores). Wholesalers specialising in sugar, sugar confectionery, and chocolate in the UK reported sales exceeding **£8.5 billion** (INR 89,406 crores).

The sugar beets cultivated in the UK held a value of **£223 million** (INR 2,346 crores) in 2022 and were processed into about **one million metric tons** of sugar in the preceding year. Sugar primarily serves as an ingredient in various food products, primarily as a sweetener.

Some of the energy efficiency measure adopted by the UK sugar manufacturing units such as British Sugar, Tate & Lyle, Ragus sugars etc. include the following:

- Reusing waste condensate water (adopted by Cantley factory of British Sugar) to reduce overall water consumption

- Leveraging artificial intelligence and automation (such as drones, robotics, manufacturing operations management (MOM) software, etc.) to enable process optimisation, inventory management, etc.
- Utilising air-blast oil cooler (adopted by Bury St. Edmunds factory of British Sugar), in place of conventional borehole water cooling systems helps to conserve local water resources, improves cooling efficiency, reduces maintenance costs, and improves plant safety.
- Utilising heat exchangers to recover heat from furnaces, incinerators, static diesel or gas engines, gas turbines and other sources of waste heat generated by systems' exhaust gases.
- Utilising falling film evaporators & multi-film evaporators for producing high-quality sugar syrups or molasses with specific sugar concentrations for further processing into refined sugar or other sugar-based products
- Developing co-generation plants to enable circular economy
- Using ultrafiltration techniques to remove impurities from sugarcane juice

Indian sugar mills can leverage strengths and capabilities of UK sugar sector to accelerate their journey towards achieving net-zero emissions. Some of the best practices, technologies, and solutions offered by the UK technology providers that can be adopted by Indian sugar mills include:

- Efficient effluent treatment technologies
- Process control and automation solutions
- IoT based Industry 4.0 energy management solutions
- Carbon capture, utillisation and storage
- Low-emission bulk drying technology
- Artificial intelligence/ machine learning based solutions to drive emission reduction
- Fuel switching (including in coking plant) - biomass, hydrogen, and electrification[13]

In order to facilitate access to leading best practices and technologies of UK sugar sector, some key UK organisations such as Shell Technologies, Carbon Clean, Centrica, etc. are participating in the below mentioned sectoral workshop on 21st March 2024. Overview of the technologies offered by these companies are provided below:

- **Shell Technologies:** offers sustainable technologies for production of first- and second-generation **biofuels** (including **bioethanol**) such as **fibre conversion technology**. This technology enables ethanol producers to shift their product portfolio and increase profitability. It utilises powerful, low-temperature recyclable acid to open lignocellulosic biomass, or plant dry matter, to unlock plant sugars. This allows for high yield conversion without downstream fouling. Shell's Renewable Refining Process (SRRP) is a hydrotreated vegetable oil (HVO) technology that converts 100% biofeeds into renewable diesel and jet fuel.[14]
- **Carbon Clean:** offers patented **carbon capture** technology using CDRMax™ process allows capturing more carbon at the lowest cost, all while meeting strict environmental criteria. The CDRMax™ process captures carbon dioxide from the industrial flue gases or off-gases emitted from power plants, boilers, kilns, and chemical facilities. CDRMax™ can be used with source gases that contain CO_2 concentration between **3%** to **25%** by volume. The process produces carbon dioxide with purities ranging from **95%** to **99%**, which can then be sold, reused, or sequestered.[15]
- **Centrica PLC:** offers patented technology driven by **wireless sensors** & **advanced analytics** from power radar software enables machine-level energy management systems for enhancing operating margins and driving sustainability across the organisation.[16]

[13] https://www.themanufacturer.com/articles/the-sweet-smell-of-decarbonisation/

[14] https://www.shell.com/business-customers/catalysts-technologies/resources-library/raizen-second-generation-biofuels.html

[15] https://www.carbonclean.com/

[16] Sustainable Business Energy Services | Centrica Business Solutions

6. IDEEKSHA Sectoral Workshop for Sugar Sector

ASPIRE Programme in collaboration with the BEE is organising a one-day workshop on ***"Best Practices in Energy Efficiency in Sugar Sector: A Path for Decarbonisation"*** on **21st March 2024** at Renaissance Hotel, Lucknow**.** The workshop will cover various aspects of the sugar sector such as the PAT scheme, best practices and technologies adopted by Indian industries and new-age low-carbon technologies available globally to enhance energy efficiency/ enable decarbonisation. The workshop is designed to provide national and international organisations with a platform to present their best practices and technologies in the above areas. The workshop would provide an opportunity for stakeholders to understand the Sugar sector in India and connect with key stakeholders for potential partnerships. The workshop would thus enable capacity building of Sugar sector stakeholders.

ASPIRE programme promotes gender equality, and the sectoral workshop is expected to deliver GESI (Gender Equality and Social Inclusion) through the participation of women and stakeholders from marginalised groups from large energy-intensive industries. The workshop will also include a presentation on importance of Gender Equality and Social Inclusion (GESI) measures in Indian industries.

The detailed agenda for the Sugar sectoral workshop has been provided in Annexure.

7. Study Trip of Balrampur Chini Mills, Haidergarh, Uttar Pradesh

In 2003-04, Balrampur Chini Mills Limited (BCML) established an integrated sugar complex in Haidergarh, boasting a crushing capacity of **4,000** tonnes of cane per day alongside a **20.25** MW cogeneration power plant fuelled by bagasse. Over time, the crushing capacity of the Haidergarh facility was ramped up to **5,000** tonnes of cane per day, owing to the addition of a **3 MW** turbine generator dedicated to export power.

Strategically positioned along the road connecting Haidergarh Town and Pokhra village in Barabanki district, the plant operates a boiler with a nominal capacity of **120** tons per hour (TPH). The super heater outlet steam parameters are set at **87** kg/cm sq. and **515**℃, facilitating optimal performance. Furthermore, the plant features a high-efficiency extraction cum condensing type turbogenerator set, clocking in at **20.25** MW nominal capacity and operating with steam inlet parameters of **84** kg/cm sq. and **510**℃.

The boiler incorporates a traveling grate with electric drive, specifically designed for burning bagasse. Feed water, heated in high-pressure feed water heaters, enters the system at **170**℃. Meanwhile, the deaerator outlet water temperature is maintained at an optimal level. During the cane crushing season, the **20.25** MW turbogenerator set consumes a maximum of **102** TPH of steam to fuel its operations. Simultaneously, the **3** MW turbogenerator set generates an average of **2** MW of power through pressure reduction processes.

Mill House

Boiling House

The study trip to BCML aims to facilitate dialogue
and knowledge exchange among industry stakeholders, fostering a deeper understanding of latest IEED technologies adopted by the plant. This study trip is designed to encourage the sharing of best practices and technologies between industries, promoting an ambitious, mutually beneficial, and outcome-focused relationship.

8. Annexure – Agenda for IDEEKSHA Sectoral Workshop - Sugar Sector

Theme: Best Practices in Energy Efficiency in Sugar Sector: A Path for Decarbonisation

Date: 21st March 2024

Time: 09:00 – 17:30 IST / 03:30 – 12:00 GMT

Venue: Hotel Renaissance, Lucknow

Time (IST)	Name of Session	Presenter
Inaugural Session		
09:00 – 09:30	Registration	
09:30 – 09:35	Lighting of Lamp	
09:35 – 09:45	Welcome Address	Mr. Ramit Malhotra, Director, KPMG, Lead-Smart Power, ASPIRE Programme
09:45 – 09:55	Introduction of ASPIRE Programme*	Ms. Sanyukta Das Gupta, Senior Advisor, Smart Power, Climate and Energy Team, British High Commission (BHC)
09:55 – 10:05	Brief overview of industrial energy efficiency (IEE) theme of ASPIRE Programme	Mr. Balawant Joshi, Managing Director, Idam Infra, ASPIRE Programme Team
10:05 – 10:15	Keynote Address by Bureau of Energy Efficiency (BEE)	Mr. Sunil K. Khandare, Director, BEE
10:15 – 10:25	Inaugural Address by Uttar Pradesh New and Renewable Department Agency (UPNEDA)	Mr. Anupam Shukla (IAS), Director, UPNEDA
10:25 – 10:35	Special Address by Balrampur Chini Mills Limited (BCML)	Mr. Sandeep Agrawal, Chief General Manager, BCML
10:35 – 10:40	Vote of Thanks	Mr. K. K. Chakarvarti, Senior Advisor, IDEEKSHA Platform (ASPIRE Programme Team)
10:40 – 10:45	Group Photograph	
10:45 – 11:00	Tea Break and Networking	
Technical Session I: Perform Achieve and Trade (PAT) Scheme for Sugar Sector		
11:00 – 11:05	Moderator	Mr. Sunil K. Khandare, Director, BEE
11:05 – 11:25	PAT Scheme for the Sugar Sector under the Energy Conservation Act	Mr. Ashish Ranjan Srivastava, Senior Sector Expert-Sugar, BEE
11:25 – 11:40	Achievements of Uttar Pradesh State Designated Agency (UPSDA) in Implementation of PAT Scheme in UP	Mr. Girish Kumar, Senior Energy Consultant, UPSDA
11:40 – 12:00	Latest Development in Indian Sugar Industries for Energy Efficiency/ Conservation	Mr. Anoop Kumar Kanaujia, Assistant Professor, Sugar Engineering, National Sugar Institute (NSI), Kanpur
12:00 – 12:15	Q&A	
Technical Session II: Sharing of best practices by Indian Sugar Sector / Association		
12:15 – 12:20	Moderator	Mr. K. K. Chakarvarti, Senior Advisor, IDEEKSHA Platform (ASPIRE Programme Team)
12:20 – 12:35	Supporting the Indian Sugar Industry's journey to Energy Efficiency	Mr. Sankalp Suman, Sr. Manager – Sustainability & Climate Change, Indian Sugar Mills Association (ISMA)
12:35 – 12:50	Best Practices in Energy Efficiency & Carbon Emissions Reduction in Sugar Industries	Mr. Chintan Shah, Assistant Vice President, MITCON India

Time (IST)	Name of Session	Presenter
12:50 – 13:10	Best Practices Presentation from Indian Sugar Industry	Mr. Bipin Patel, Senior Engineer, Balrampur Chini Mill, Haidargarh
13:10 – 13:20	Q&A	
13:20 – 14:00	Lunch Break and Networking	
Technical Session III: Case Studies and Low Carbon & Digital Technologies for Sugar Sector– by Indian Experts		
14:00 – 14:05	Moderator	ASPIRE Team/ Sector Expert (BEE)
14:05 – 14:25	Decarbonisation through Bagasse Dryer in Captive Power Plants of Sugar Mills	Mr. Rajesh Verma, CEO, Environpol Engineers Pvt. Ltd.
14:25 – 14:45	Performance optimisation through predictive modelling	Mr. Rohan Kadamb (Analyst), Development Environergy Services Ltd
14:45 – 15:05	Energy Conservation Opportunity in Sugar Industry	Mr. Kamalesh K Jha, Accredited Energy Auditor, Padmashtdal Energy
15:05 – 15:20	Q&A	
Technical Session IV: Standards & Decarbonisation Technologies for Sugar Sector – by International & UK Technology & Solutions Providers		
15:20 – 15:25	Moderator	Ms. Ismini Pnevmatikaki, KPMG
15:25 – 15:40	Presentation by KPMG* *"Overview of sustainability in sugar sector in the UK", covering:* • *Decarbonisation commitments* • *Policy landscape* • *Leading IEED technologies/ best practises adopted by the UK sugar industries*	Ms. Ismini Pnevmatikaki, KPMG
15:40 – 16:05	Presentation by Shell Technologies* *"Decarbonisation pathways in the sugar industry - A snapshot from the UK perspective"*	Mr. Ulf Ch. Nahrath, Vice President, UK Energy Transition & Infrastructure, Shell International Ltd.
16:05 – 16:10	Q&A	
16:10 – 16:25	Presentation by Centrica PLC, UK* *'Improve Operational Energy Efficiency Predict Breakdowns with Centrica's Wireless, Real-time Technology'*	Mr. Anand, Director, HTFE (India Partner of Centrica PLC, UK)
16:25 – 16:30	Q&A	
16:30 – 16:45	Presentation by Carbon Clean, UK* *'Carbon Capture, Utilisation and Storage technology to help achieve net-zero'*	Mr. Niraj Singh, Senior Project Development Manager, Carbon Clean, UK
16:45 – 16:50	Q&A	
Session on Importance of Gender Equality and Social Inclusion (GESI) measures in Indian Industries		
16:50 – 17:00	Importance of GESI measures in Indian Industries	Mr. Anurag Singh Sirola, Manager, KPMG, ASPIRE Programme Team
Discussions, Feedback and Concluding Remarks		
17:00 – 17:30	Mr. Sunil K. Khandare, Director, Bureau of Energy Efficiency (BEE) Ms. Sanyukta Das Gupta, Senior Advisor, Smart Power, Climate and Energy Team, BHC* Mr. Ramit Malhotra, Director, KPMG, Lead-Smart Power, ASPIRE Programme Mr. Anurag Singh Sirola, Manager, KPMG, ASPIRE Programme Team Mr. Balawant Joshi, MD, Idam Infra, ASPIRE Programme Team Mr. K. K. Chakarvarti, Senior Advisor, Idam Infra, ASPIRE Programme Team	
17:30 onwards	Tea and Networking	

**Virtual presentation*