UK Government

Bureau of Energy Efficiency
Ministry of Power, Government of India

Knowledge Exchange Platform
Transmitting Knowledge through Best Practices

ASPiRE Programme

Accelerating Smart Power & Renewable Energy in India

SECTORAL WORKSHOP & STUDY TOUR ON

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

WORKSHOP: **08 December 2022**
(09:30 – 18:30 IST / 04:00 – 13:00 GMT)

STUDY TOUR: **09 December 2022**
(09:00 – 13:00 IST / 03:30 – 07:30 GMT)

Hosted by:

Raymond Ltd.,

Chhindwara, Madhya Pradesh

Raymond

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1. Background on ASPiRE Programme

During COP26, India had pledged to achieve net-zero emissions target by 2070; to get 50% of its energy from renewable resources and by the same year to attain 500GW non-fossil electricity capacity. These targets shall help India reduce its total projected carbon emissions by 1 billion tonnes and lower its emissions intensity by 45% by 2020 (over 2005 levels).

The UK and India share a key strategic partnership and as part of the '*3rd India – UK Energy for Growth Partnership*', an inter-ministerial energy dialogue was held on 8th October 2021 to strengthen collaboration on accelerating the move to global clean energy in the decade ahead. During this, the minsters endorsed '*Roadmap 2030 for India-UK Forward Action Plan*' on clean energy, improving energy efficiency measures, enabling use of green hydrogen, and increasing the switch to electric mobility. One of the actions under the *Forward Action Plan* was to launch the India-UK joint partnership technical assistance programme on Smart Power and Renewable Energy, titled '*Accelerating Smart Power and Renewable Energy in India" programme* ***(ASPiRE)****'*. One of the thematic areas of ASPiRE is **industrial energy efficiency and decarbonisation (IEED).**

The objective of ASPiRE is to catalyse increased investment in IEED, renewable energy, storage deployment and electricity distribution in India. The programme aims to catalyse increased investment that supports sustained & inclusive economic growth, low carbon and leads to poverty reduction including through the promotion and empowerment of women and other socially weaker groups.

A consortium led by KPMG has been selected by the Foreign, Commonwealth and Development Office (FCDO), UK as the implementing agency for ASPiRE programme in collaboration with Idam Infra and Carbon Trust.

2. Rejuvenation of Knowledge Exchange Platform (KEP)

Under the ASPiRE programme, a rejuvenated Knowledge Exchange Platform **(KEP)** is being developed in collaboration with the Bureau of Energy Efficiency (BEE) to promote and share best practices & energy-efficient technologies among large-scale industries. The rejuvenated KEP web portal would be a one-stop shop for all energy efficiency needs of large industries covered under BEE's PAT Scheme. The rejuvenated KEP would include new features and would facilitate Designated Consumers (DCs) in adopting new and emerging IEED technologies offered by Indian and global technology suppliers.

The rejuvenated KEP would comprise of database of proven and emerging technologies available in India and globally. Further, the database would also provide details of technology suppliers and financial institutions, updated at regularly intervals.

The rejuvenated KEP would thus facilitate:

- Exchange of knowledge and information to enhance peer to peer learning
- Exchange of energy management best practices across sectors
- Access to IEED tools, technologies & technology providers available in India and globally
- Access to data sources and knowledge repositories to support knowledge translation
- Organise sector/ industry specific workshops/ seminars to enhance EE measures
- Enable knowledge and commercial partnerships

3. Textile Sector in India[1]

Indian textile and apparel industry contributes ~2% to the national GDP and 7% of industry output in value terms. India accounts for ~4% of the global trade in textiles and apparel. In 2020-21, textile, apparel & handicrafts together accounted for ~11.5% of India's total exports. Domestic textiles & apparel industry stood at GBP 130 bn in 2021. Indian textiles and apparel industry employs 45 million people directly and 100 mn people in allied industries, making it the 2nd largest industry by manpower. Textile industry in India includes a wide range of segments – from traditional handloom & handicrafts to cotton, wool & silk, and the 'organised textile industry'. The organised textile industry is marked by its use of capital-intensive technology for mass production and includes apparel manufacturing, spinning, weaving, processing, etc

Cotton production in India is projected to reach 7.2 million tonnes (~43 million bales of 170 kg each) by 2030[2] driven by increasing demand from consumers. The handicraft exports from India too is expected to rise YoY due to increased participation from industry players to boost handicraft products in the global market.

Perform, Achieve, and Trade (PAT) Scheme for Textile Sector

Textile sector is one of the designated sectors covered under Bureau of Energy Efficiency's (BEE) flagship Perform, Achieve, Trade (PAT) scheme for large energy-intensive industrial sectors.

Textile industry in India can be classified into organized and decentralized/ rural sectors. The organized sector comprises of mills which include both spinning mill and composite mill. The decentralized power-loom/ hosiery and knitting sector forms the largest section of the textile industry.

A textile industry with an annual consumption of over 3,000 tonnes of oil equivalent (toe) is notified as a Designated Consumer (DC) under the Energy Conservation Act, 2001. Majority of the DCs from Rajasthan, Punjab, Maharashtra and Gujarat have already been notified under PAT.

The energy efficiency and decarbonisation potential of Textile sector under PAT scheme is presented in Table 1 below.

Table 1: Energy efficiency & decarbonisation potential of Textile sector under PAT Scheme (Cycle 1 to VI)

Total Number of notified DCs	Energy Efficiency Potential (MTOE)	Decarbonization Potential ($MTCO_2$)
168	0.234	0.799

[1] Source for all figures unless stated otherwise: Invest India (Textiles & apparel sector)
[2] https://www.livemint.com/economy/india-a-1-trillion-manufacturing-export-market-by-2030-11669800286004.html

4. Decarbonisation of Indian Textile Industry

One hundred and sixty-eight industries from textile sector, covered under the PAT scheme, cumulatively **consume ~2.71 MTOE** and **emit ~9.27 MTCO$_2$e** annually. These industries offer an **energy saving potential** of ~**0.234 MTOE** and **decarbonisation potential** of 0.265 MTCO$_2$e. The textile industry is in the process of preparing a roadmap for reducing its emission intensity and carbon dioxide emissions by 2030, as per the directives of the Government of India. Some of the initiatives/ commitments adopted by leading textile industries in India to achieve decarbonisation of the textile industry are discussed below:

- Raymond UCO Denim[3] - targeting minimum 60 per cent GHG emission reduction by 2025 compared to 2016 baseline
- Arvind Limited[4] - have a target of 15% reduction in specific GHG emission by 2022 in comparison to 2017 and 20% of the energy portfolio shifted to renewable sources by 2022
- Welspun India Limited[5] - has recently committed to the Science Based Targets initiative (SBTi) of Net-Zero Standard & Business Ambition for 1.5 °C to mitigate its GHG emissions

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

- **Waste heat recovery** from PV motex stenter
- Installation of **Low-pressure Air compressor** with Heat Recovery unit
- Installation of **Flash jet recovery** system
- Installation of **VFD** in Weaving chiller Cooling tower Fan
- **High pressure mist spray** system at AWT
- Use of Removable **reusable insulation**

[3] https://www.businesstoday.in/industry/story/exclusive-raymond-uco-denim-targeting-60-ghg-emission-reduction-by-2025-says-ceo-arvind-mathur-341247-2022-07-12
[4] https://www.arvindfashions.com/combat-climate-change/
[5] https://www.welspunindia.com/uploads/investor_data/Reg30_25012022_ClimateAction.pdf

5. Potential technology interventions for enhancing energy efficiency/ decarbonisation in Indian Textile Sector

Some of the potential areas for technology intervention in Indian textile sector to facilitate rapid transition to net-zero have been identified below:

- **Various Dyeing processes** such as Pulser Dyeing Technique, Airflow Dyeing Technology, Digital Dyeing, and Supercritical CO_2 Dyeing Technique
- **Technological processes** such as Ultrasonic Assisted Wet Processing, and Closed condensate recovery pump
- **Wind recovery turbine** from humidification exhaust Microbial fuel cells technology to generate electricity from Textile wastewater treatment
- **Energy Recovery** from H-Plant exhaust air by providing a special turbine which generates grid-connected electricity to be used for lighting purposes
- Clean-tech digital textile manufacturing solutions
- **Eco-friendly technology** which benefited in:
    - Recycled raw material
    - Reduced water usage by DOPE-DYE techniques
    - Reduced Carbon footprint
    - Virtually no scrap - "no cut, no waste

Leverage UK Textile Sector's strengths and capabilities

The textile sector in the UK produces ~**£5.8bn** of materials annually, with over **4,200** businesses in the sector. UK's textile sector offers some key technologies, solutions, and best practices in the following areas:

- Circular economy,
- New fibre technologies
- Waterless and low energy dying
- Tools to measure and monitor sustainable performance
- IoT and AI based solutions to improve material and energy efficiency.
- Digital dyeing and finishing technology that delivers significant reduction in energy consumption and eliminates contaminated wastewater emissions

Strengths and capabilities of UK's textile sector can be leveraged to facilitate rapid transition of Indian textile sectors' journey to net-zero through adoption of best practices, technologies, and solutions. To facilitate access to leading best practices and technologies of UK textile sector, some key UK organisations namely, **Alchemie Technology, Centrica, Pilio, MRI eSight, Smartia** etc. are participating in the textile sectoral workshop scheduled on **8th December 2022**.

6. Textile Sectoral Workshop

A one-day workshop on **"*Best Practices in Energy Efficiency in Textile Sector: A path for decarbonisation*"** is being organised on **8th December 2022** at **Raymond Limited, Chhindwara, Madhya Pradesh**. The workshop will cover various aspects of latest national and international technologies and presentation by leading textile industries. The workshop is designed to provide national and international organisations a platform to present their best practices and technologies for IEED in the textile sector. The workshop would thus enable in capacity building of textile 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 detailed workshop agenda has been provided in Annexure.

7. Study Tour of Raymond Ltd., Madhya Pradesh

A study tour/ visit of Raymond Limited, Chhindwara, has been organised on **09th December 2022** (09:00 – 13:00 IST). The plant is a state-of-the-art integrated manufacturing facility located 65 km away from Chhindwara, Madhya Pradesh. The plant produces premium pure wool, wool blend, and polyester viscose suiting. The Raymond Chhindwara unit comprises of **128 looms and 33,528 spindles**. The plant has a workforce of more than **2,700 employees**. The plant is equipped with modern machinery, ensuring high efficiency and productivity. The workforce is adequately skilled, well-trained, and competent. This plant has achieved a record **production capacity** of **14.65 million meters**, giving it the distinction of being the **single largest integrated** worsted suiting unit in the world.

The study tour/ visit of the plant is crucial for fostering dialogue and knowledge exchange among diverse industry players. The field visit would provide an opportunity to understand the best available IEED technologies and processes adopted at Raymond Limited. This study tour/ plant visit would enable in sharing of best practices and technologies between industries and ensure an ambitious, mutually beneficial and outcome-focused relationship.

The textile division of Raymond Chhindwara (Madhya Pradesh) has successfully implemented an Energy Management System (EnMS) that meets all requirements of ISO 50001. The achievements of the plant post implementation of EnMS are presented in Table 2 below[16]

Table 2: Achievements of Raymond Ltd., Chhindwara plant post implementation of EnMS

Description	Unit	2020
Energy Performance Improvements		11% reduction during PAT Cycle-II
Total Energy Cost Savings	INR Cr.	2.34
Cost to implement EnMS	INR Cr.	2.02
Total Energy Savings	GJ	61,710.41
Total CO_2 Emission Reduction	Metric tons	4,788.69

The plant has also implemented the following key energy-saving projects in the past:

- Use of variable speed drives
- Installation of photocells for speed frames
- Optimization of suction pressure of Pneumofil in open and ring frame
- Replacement of old inefficient boiler with efficient boiler
- Maximum reuse of steam condensate and recovering heat from the hot water/hot effluent water
- Waste heat recovery in AC centrifugal comp.
- Implementation of waste heat recovery system at the dyeing section
- Reduction in boiler blow-down water by using RO water
- Installed waste heat recovery system of air compressor & stenter

The plant has achieved reduction of ~**2700 tonnes of CO_2** of **Scope 1** emissions primarily through fuel switchover and ~**350 tonnes of CO_2** in **Scope 2** emissions through savings in imported electricity in 2021-22.

[6] Raymond Limited- Energy Management System Case Study (https://www.cleanenergyministerial.org/content/uploads/2022/03/cem-em-casestudy-chhindwara-india.pdf)

Annexure – Agenda for Textile Sectoral Workshop

Theme: Best Practices in Energy Efficiency in Textile Sector: A path for decarbonisation

Date: Thursday, 08 December 2022

Time: 09:30 – 18:00 IST / 04:00 – 12:30 GMT

Venue: Factory Guest House, Raymond Limited, Chhindwara, Madhya Pradesh

Time (IST)	Name of Session	Presenter
Inaugural Session		
09:30 – 09:35	Lighting of Lamp	
09:35 – 09:40	Welcome address	Representative of Raymond Chhindwara
09:40 – 09:45	Introduction of ASPiRE Programme	Ms. Sanyukta Das Gupta, Smart Power Advisory, British High Commission
09:45 – 09:50	Special Address by ASPiRE team	Mr. Ramit Malhotra, Director, KPMG India, ASPiRE Team
09:50 – 09:55	Special Address by Raymond Chhindwara	Mr. Surendra R Tiwari, Plant Head, Raymond Chhindwara
09:55 – 10:00	Special Address by Raymond Uco Denim	Mr. Nitin Shrivastava, Director Manufacturing, Raymond Uco Denim Pvt.
10:00 – 10:10	Special Address by BEE	Dr. Ashok Kumar, Deputy Director General, BEE
10:10 – 10:20	Inaugural Address by the Chief Guest	Mr. Harish Chatterjee, Vice President - Textile Manufacturing, Raymond Ltd
10:20 – 10:25	Vote of Thanks	Mr. Balawant Joshi, MD, Idam Infra, ASPiRE Team
10:25 – 10:30	Group Photograph	
10:30 – 10:45	Tea Break and Net Working	
Technical Session I- Perform Achieve and Trade Scheme for Textile Sector		
10:45 – 10:50	Moderator	Dr. Ashok Kumar, Deputy Director General, BEE
10:50 – 11:10	Perform Achieve and Trade Scheme for Textile Sector: Impact of the PAT Scheme on energy use and environment on the Textile Industry (Virtual presentation)	Mr. Ajitesh Upadhya, Textile Sector Expert, BEE
11:10 – 11:15	Discussions	
Technical Session II – Sharing of Best Practices by Textile Plants		
11:15 – 11:20	Moderator	Mr. K. K. Chakarvarti, Sr. Advisor, KEP
11:20 – 11:35	Raymond Chhindwada Journey towards Energy Efficient Plant	Mr. Sumant Kundu, Raymond Limited, Chhindwara
11:35 – 11:50	Best Practices implemented & Learning experience under PAT scheme implementation	Vardhman Fabrics, Budhi - • Mr. Santosh Maloniya
11:50 – 12:05	Reduction in carbon footprint of Vapi textile plant	Mr. Avinash, Raymond Khadki (Gujarat)
12:05 – 12:20	Decarbonization initiatives by Raymond Kolhapur	Mr. Akhil Jain, Manager - Mechanical
12:20 – 12:35	Reducing carbon footprint by adopting new technologies and best practices	Mr. Bhupendara Rajput, Raymond Jalgaon

Time (IST)	Name of Session	Presenter
12:35 – 12:50	Energy Conservation at Century Rayon, Grasim Industries Ltd. Unit	Mr. Ajit Patil Mr. Keshav Rajegore
12:50 – 13:00	Discussions	
13:00 – 14:00	Lunch Break	
Technical Session III – Sharing of Best Practices by Industries and Technology Suppliers		
14:00 – 14:05	Moderator	ASPiRE Team
14:05 – 14:20	Opportunities in textile units - Thermal Energy Optimization	Mr. Ashwin K.P., Promethean Energy
14:20 – 14:35	Energy saving opportunities in compressed air system	Mr. Kumar Jadhav, Godrej Electricals & Electronics
14:35 –14:50	Energy efficient axial fans for AHU & ventilation systems	Mr. Mohd Areeb, Xero Energy Engineering Solutions Pvt Ltd
14:50 –15:00	Discussions	
15:00 –15:15	Brief overview of UK Textile Sector *(virtual presentation)*	Mr. Paul Alger, UK Fashion and Textile (UKFT) Association, UK
15:15 – 15:30	Improve operating margins & drive sustainability with Centrica's IoT 4.0 real-time machine-level energy management solution	Mr. Anand and Mr. Harsh, Centrica (UK)
15:30 – 15:40	AI based solutions for industrial energy optimisation/ efficiency *(virtual presentation)*	Mr. Asim Majid, Smartia (UK)
15:40 – 15:50	MRI eSight Energy Management Software	Mr. Kyle Rossi, MRI eSight (UK)
15:50 – 16:05	Alchemie Technology, waterless dyeing and finishing processes' *(virtual presentation)*	Ms. Dee Roche, Alchemie Technology (UK)
16:05 – 16:20	'Net zero in textile manufacturing: measuring, reducing and reporting' *(virtual presentation)*	Ms. Catherine Bottrill, Pilio (UK)
16:20 – 16:30	Discussions	
16:30 – 16:45	Tea Break and Networking	
16:45 – 17:00	A novel and highly scalable wireless monitoring & control solution	Mr. Raju Namburi, Bridgethings
17:00 – 17:15	How green, cool & energy efficient is your cooling system?	Mr. Khursheed Hussain, ARMEC Group
17:15 – 17:30	De-Risking Industries and Commercial Facilities from Water Crisis	Mr. Anand Vijayakumar, FluxGen, Sustainable Technologies
17:30 – 17:45	Achieving Energy Optimisation in Compressed Air Systems with Smart Monitoring	Mr. Hidhay. K - Managing Director, Systel Energy Solutions (India) Pvt Ltd.
17:45 – 18:00	Best Practices and Initiatives taken by Trident Group (Discussions)	Mr. Nishant, Trident Group
Discussions, Feedback and Concluding Remarks		
18:00 – 18:30	1. Mr. Harish Chatterjee, Vice President Manufacturing, Raymond Ltd. 2. Dr. Ashok Kumar, Deputy Director General, BEE 3. Mr. Surendra R Tiwari, Plant Head, Raymond Chhindwara 4. Ms. Sanyukta Das Gupta, Smart Power Advisory, British High Commission 5. Mr. Ramit Malhotra, Director, KPMG India, ASPiRE Team 6. Mr. Balawant Joshi, MD, Idam Infra, ASPiRE Team 7. Mr. K. K. Chakarvarti, Senior Advisor, Idam Infra, ASPiRE Team 8. Mr. Anurag Singh Sirola, Manager, KPMG India, ASPiRE Team 9. Mr. Rajiv Shukla, Executive Director, Idam Infra, ASPiRE Team	