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

Domestic Study Tour of

RAYMOND LIMITED

CHHINDWARA, MADHYA PRADESH

9th December 2022

Hosted by:

Raymond Limited, Chhindwara

SUMMARY REPORT

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About ASPIRE Program

Accelerating Smart Power and Renewable Energy in India (ASPIRE) is a bilateral program implemented by Foreign Commonwealth and Development Office, Government of UK in association with Ministry of Power and Ministry of New and Renewable Energy, Government of India. KPMG is the lead delivery partner for the ASPIRE programme. Idam Infrastructure Advisory Private Limited (India) and Carbon Trust (UK) are the key consortium members.

ABBREVIATIONS

Abbreviations	Acronyms
ASPIRE	Accelerating Smart Power and Renewable Energy in India
AHF	Active Harmonic Filter
BEE	Bureau of Energy Efficiency
DC	Designated Consumers
FCDO	Foreign Commonwealth and Development Office
GESI	Gender Equality and Social Inclusion
IEED	Industrial Energy Efficiency and Decarbonisation
PAT	Perform Achieve Trade
P/V	Polyester Viscose
TFH	Thermic Fluid Heater

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BACKGROUND

Indian textile 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 2021, the domestic textiles & apparel industry stood at ~**INR 13,000 billion** (**GBP 130 billion**). The industry employs over **45 million** people directly and **100 million** 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 and silk across both organised and unorganised 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. A total of **163** large textile units are covered under the Bureau of Energy Efficiency's (BEE) Perform Achieve and Trade (PAT) scheme, cumulatively accounting for ~**2.88 MTOE** of energy consumption, ~**9.27 MTCO2e** of emissions, offering **energy-saving potential** of **0.234 MTOE**. Leading textile industries in India have announced several initiatives as part of their decarbonisation commitments.

In view of this, a **domestic study tour** of **Raymond Ltd.'s** unit in Chhindwara, Madhya Pradesh was organised on 9th December 2022 under **Accelerating Smart Power and Renewable Energy in India (ASPIRE)'** programme. The purpose of the study tour was to demonstrate and disseminate the various **best practices and innovative IEED technologies** adopted by the above-mentioned Raymond Unit to enhance it **energy efficiency** and efforts to **decarbonise** its operations. The study tour was jointly organised by FCDO and Bureau of Energy Efficiency (BEE) with the support of Raymond Limited. The study tour was preceded by a sectoral workshop on "**Best Practices in Energy Efficiency & Decarbonisation in Textile Sector**" on 8th December 2022 at the above Raymond Unit.

Objective of the Study Tour

- To disseminate and demonstrate new and innovative IEED technologies and best practices adopted by Aditya Aluminium
- To enable other industries in the aluminium sector, reduce their overall specific energy consumption and adhere to the compliance requirements under BEE's PAT scheme
- To foster an ambitious, mutually beneficial, and outcome focused relationship between industry stakeholders

Highlights

50+ Participants

Visit to key areas of the plant to understand various IEED measures implemented including:

- Waste heat recovery projects in stenters, dyeing and compressor room
- IoT and digitalisation initiatives to monitor critical machine level parameters
- IEED measures in boiler and thermic fluid heater and air compressor system

Active participation from various leading textile industries and technology providers in India and the UK textile (including senior officials and executives)

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OVERVIEW OF RAYMOND TEXTILE PLANT

Raymond Plant, Chhindwara, Madhya Pradesh

Raymond is a diversified group with majority business interests in **Textile & Apparel** sectors and a presence across varying segments such as Consumer Care, Realty and Engineering in national and international markets. Raymond is one of the **largest vertically** and **horizontally integrated** manufacturers of worsted suiting fabric in the world and is a market leader in the domestic worsted suiting industry in India.

Raymond's Chhindwara unit is a **cutting-edge integrated** manufacturing facility situated 65 kilometres from Chhindwara, Madhya Pradesh. It is also identified as a **Designated Consumer** (DC) as per the norms laid down by the Bureau of Energy Efficiency (BEE), Ministry of Power under the Perform, Achieve and Trade (PAT) scheme. The unit has implemented several measures to enhance its **energy efficiency** and **decarbonise its operations**. These measures helped in reducing their specific energy consumption and to meet the compliance requirement under the PAT scheme.

The unit creates high-end pure wool, wool blend, and polyester viscose suits and is situated on a 100-acre site with a built-up area of **140,000** square metres consisting of **65%** of the area as a green belt. The Raymond Chhindwara unit has **128 looms** and **33,528 spindles**, employing over **2,700** people.

The largest integrated worsted suiting unit in the world, this facility holds a production capacity record of **14.65 million metres**. Modern machinery at the plant ensures excellent production and efficiency. The labour force is well-trained and skilled.

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STUDY TOUR/ VISIT OF TEXTILE PROCESSING COMPLEX

The Raymond Ltd.'s Chhindwara unit is well equipped with a combing section, polyester conversion section, dyeing process, re-combing section, spinning section, auto winding section, weaving, and finishing department.

An overview of the process followed at Raymond textile unit is represented in the diagram below:

Figure: Typical Process Flow Diagram Raymond Chhindwara Plant

As part of the study tour, participants visited the following key areas/ departments of the plant:

- **Grey Combing** – to straighten and parallelise the fibre and eliminate shorter fibres from noils (raw material) to make even slivers
- **Dyeing** – to colour the fibres using dyes to give it a particular shade, which is then provided to the recombing department
- **Recombing** – to blend fibres such as wool, viscose, polyester, etc. and to remove entanglement (during dying), short fibres and undesirable components (like slubs, neps).
- **Spinning** – to increase yarn quality and subsequently decrease yarn breakage, undesirable yarn flaws like thick, thin areas and neps
- **Weaving** – two distinct sets of yarns or threads are interlaced at right angles resulting in a fabric or a cloth
- **Finishing** – This department is divided into three sections: (i) grey area, (ii) wet area, and (iii) dry area. Final treatment of the fabric is done in the Finishing department wherein actions such as mending, batching, singeing, pre-scouring, drying, heat set, rope scouring, softening, pressing, decatising, etc. are performed

Recombing Section

Spinning Department

Weaving Department

Mending Section

KEY TAKE AWAYS

The key energies efficiency and decarbonisation measures implemented, and the savings realised through the same are presented below:

1. **Waste Heat Recovery projects**

   Implemented **waste heat recovery systems** in following key processes:

   - 'Stenters' - to recover heat from flue gases
   - 'Dyeing' - to recover heat from effluents
   - 'Compressor room' - to recover heat from hot oil

   IMPACT -

   Achieved reduction in **energy and CO_2 emission**, as summarised in the table below:

Machine	Location	WH Media	Hot Water Recovered in KL/day	Heat Recovered in Kcal	Annual Fuel Saving in MT	Cost Saving in Lakh Rs	CO_2 Reduction in MT
Dyg WHR	Top Dyg	Dyg Effluent	76.50	2295000	695	25.43	1551
Stenter	Finishing	Waste Flue Gas	80.00	2000000	606	27.00	1418
Compressor	Compressor Room	Hot Oil	81.60	2448000	742	27.13	1654

WHR-Dyeing

WHR-Stenter

WHR-Compressor

WHR-Dyeing

WHR-Stenter

2. IoT and Digitalisation:

Implemented an **IoT and Digitalisation** based solution for:

- Effective monitoring of various machine level parameters
- **Energy monitoring & analytics**
- **Auto WhatsApp reports** sent to concerned officials for **deviation monitoring** of critical parameters

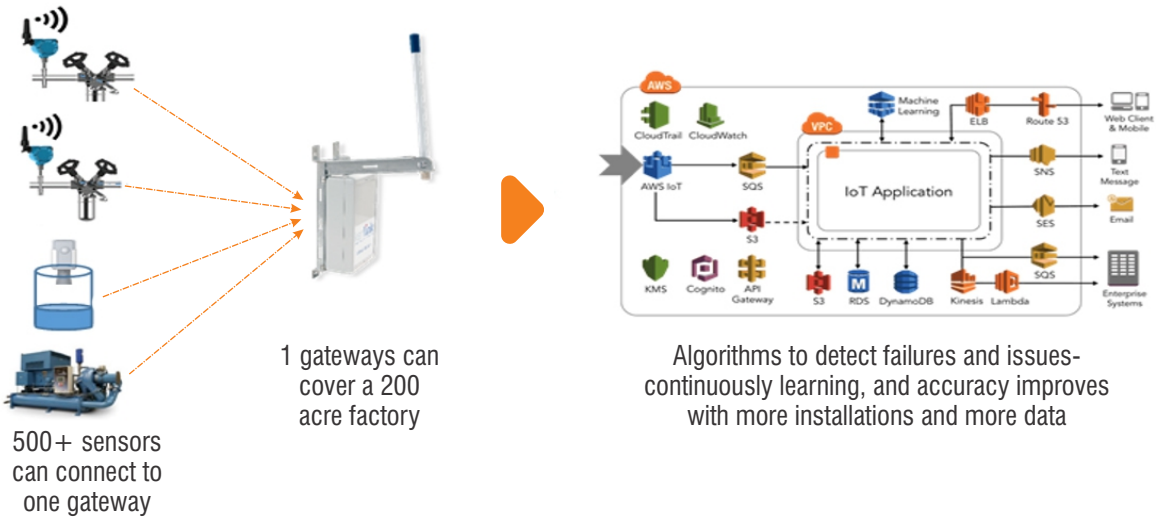

Figure: Architecture for IoT set Up at Raymond Chhindwara Plant

Figure: Utility Monitoring IoT System deployed at Raymond Chhindwara Plant

Figure: IoT Based Steam Trap Monitoring System at Raymond Chhindwara Plant

3. **IEED measures in Boiler and Thermic Fluid Heater:**
   - Use of **rice husk** (biomass) in boiler and thermic fluid Heater (TFH)
   - Upgradation to **Auto Fuel Draft System** from old TFH
   - Use of **treated effluent through reverse osmosis (RO), pre-heating of feed water** by waste heat, recovery of steam condensate and **automatic blow down**

IMPACT -

Implementation of these measures resulted in annual savings of **1785 MT** in fuel and **3404 MT** CO_2 emissions

4. **IEE measures in Air Compressor system:**

Implementation of advanced compressed air systems with feature of **air pressure band separation** (low, medium and high) along with deployment of **energy efficient compressors**.

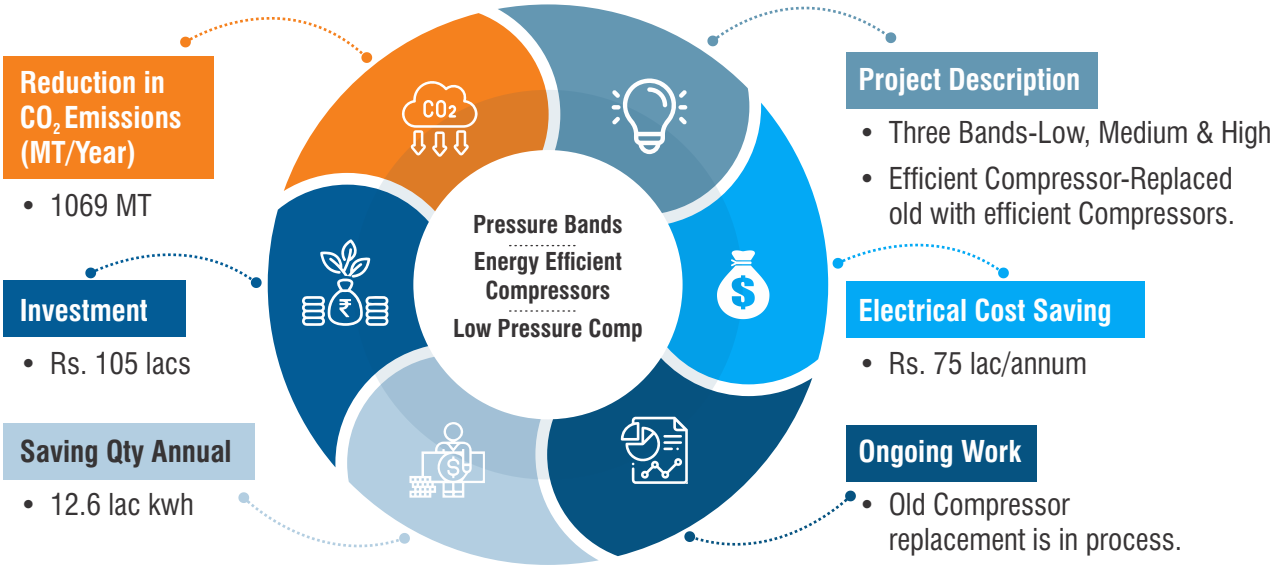

Figure: Compressed Air System

5. **Other measures:**

- Use of **efficient aerodynamic fans** and installation of **Active Harmonic Filter** (AHF)
- Installation of **photocells for speed frames**
- Optimisation of suction pressure of Pneumofil in open and ring frame
- Installation of energy efficient motors
- Efficient lighting system, Harmonic Control and PF Correction System

IMPACT -

Summary of savings in cost and reduction in carbon emissions achieved in last 5 years through implementation of above-mentioned measures is presented below:

FY	Power Saving in KWH	Coal Saving in MT	Coast Saving in Lakh INR	CO2 Reduction in MT
2018-19	368970	1285.34	70.832	3424
2019-20	1452044	264.31	92.058	1874
2020-21	642628	650.31	57.783	2120
2021-22	317397	673.00	60.577	1898
2022-23 YTD OCT	29833	2842.32	105.261	5740

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FEEDBACK FROM THE PARTICIPANTS

- Around **93%** of the participants responded that they were **more than satisfied** with the outcomes of the study tour/ visit (*provided a 7+ rating on a scale of 10*).
- About 93% of the participants rated the **quality** and **content** of the delivery as more than satisfactory (*provided a 7+ rating on a scale of 10*).
- Many participants recommended similar study tours/ visits to be organised in future for textile sector
- The participants suggested following subjects for future study tours/ plant visits:
  - **Co-generation** and **Trigeneration**
  - **Net zero roadmap** for industries
  - **Automation** for improvement of energy efficiency
  - **Compressed** air energy-saving opportunities

> *"The study tour provided a good opportunity for sharing learnings about compressed air applications in textile sector"*
>
> ***Mr. Prasanna Amberkar***
> *Assistant Manager, Godrej & Boyce MFG. Co. Ltd.*

> *"The study tour helped in disseminating best practices and initiatives for cross-sectoral applications"*
>
> ***Mr. Vishvendra Singh***
> *Lead Solar & Renewable Energy, Trident Limited*

> *"Insightful study tour that helped in gaining knowledge about latest and innovative energy saving projects"*
>
> ***Mr. Ravindra B. Rade***
> *Dy. Manager (Electrical), Raymond Uco Denim Pvt. Ltd., Yavatmal*

> *"The workshop offered the opportunity to witness the energy saving initiatives undertaken by Raymond Chhindwara"*
>
> ***Mr. Nishant***
> *Manager PAT compliances, Trident Limited*

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CONCLUSION

The response to the study your/ visit has been positive with participation of key stakeholders including senior officials from leading Indian textile industries, technology providers from India and the UK. The study tour appears to have served its purpose of providing an opportunity to industry and technology firms to share best practices and technologies for enhancing adoption of IEED measures across the Indian textile sector. The study tour promoted **gender equality and social inclusion (GESI)** measures undertaken at Raymond Chhindwara including visit to the 'Mending' section which is **entirely managed by women** staff. It is expected that this study tour would have a demonstrable and long-lasting on-field impact in due course of time. Further, to keep up the momentum, the following activities are envisaged under ASPIRE to enable wider adoption of IEED measures and technologies by Indian textile industries to achieve their net-zero targets:

- Organise a national level workshop and launch the rejuvenated KEP portal with database of proven/ emerging global technologies, technology providers and financial institutions
- Provide handholding support including B2B interactions/ webinars to large energy-intensive industries (incl. textile sector) to support in identifying technologies & solutions, and technology suppliers to enhance IEED measures
- Organise cross-sectoral workshops, national-level-policy roundtable on similar lines for key industrial sectors including textile sector in collaboration with global technology suppliers including from the UK
- Create more **discussion forums** to facilitate exchange of knowledge and information that will aid in the formulation of policies

For more information please contact:

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ANNEXURE
ATTENDANCE SHEET

S.No.	Name	Designation	Organisation
1	Mr. Nishant	Section In charge- Solar	Trident Ltd
2	Mr. Vishvendra Singh	Section In charge- Utilities	Trident Ltd
3	Mr. Johnson Daniel	(NMEEE & DSM) Division	Energy Management Centre -Kerala
4	Mr. Subhash Babu B. V	Registrar	Energy Management Centre - Kerala (SDA)
5	Mr. G Srinivas	Energy Manager	Suryalakshmi Cotton Mills Ltd
6	Mr. Abhinash Saikia	Assistant Manager Mechanical	Raymond Limited Vapi
7	Mr. Suresh Babu B. V	Founder	OTTOTRACTIONS
8	Mr. Mahendra P. Khante	Sr. Vice President (E & I)	VARDHMAN FABRICS
9	Mr. Santosh Maloniya	Manager (E & I)	VARDHMAN FABRICS
10	Mr. Akhil Jain	Manager	Raymond Luxury Cottons Limited, Kolhapur
11	Mr. Nilesh Chougale	Executive	Raymond Luxury Cottons Limited, Kolhapur
12	Mr. A. MURUGAKANI	AGM-Electrical	LOYAL TEXTILE MILLS LTD
13	Mr. Prasanna Amberkar	Mechanical Maintenance Engineer	Godrej Electricals & Electronics
14	Mr. Aleem Shamasti	Plant Incharge	Raymond Ltd., Jalgaon
15	Mr. Pramod Narkhede	Chief Engineer	Raymond Ltd., Jalgaon
16	Mr. Bhupendra Rajput	Manager – Electrical Engg	Raymond Ltd., Jalgaon
17	Mr. Milan Rana	Manager – Mechanical Engg	Raymond Ltd., Jalgaon
18	Mr. Srinivasa Raju Namburi	Director	Bridgethings
19	Mr. Mohd Areeb	Area Sales Manager - North India	Xero Energy
20	Mr. Gajraj Singh Narde	Manager-Engg	Raymond Luxury Cottons Limited, Amravati
21	Mr. Sumeet Banerjee	Asst. Manager- Engg	Raymond Luxury Cottons limited, Amravati
22	Mr. Kumar Jadhav	Associate Manager	Godrej Electricals & Electronics

S.No.	Name	Designation	Organisation
23	Mr. Ajit Patil	Sr. GM (BH, PH & inst.)	Grasim Industries Ltd. Unit Century Rayon
24	Mr. Keshav Rajegore	Designated Energy Manager	Grasim Industries Ltd. Unit Century Rayon
25	Mr. Yogesh Bondre	Manager (Mech.)	Raymond UCO Denim Pvt. Ltd
26	Mr. Ravindra Rade	Dy. Manager (Elect.)	Raymond UCO Denim Pvt. Ltd
27	Mr. Gajraj Singh Narde	Manager-Engg	Raymond Luxury Cottons Limited, Amravati
28	Mr. Ranjit Singh	Asst. Manager (Elect.)	Raymond Ltd., Textile Division - Chhindwara
29	Mr. Ketan Andankar	Asst. Manager (Elect.)	Raymond Ltd., Textile Division - Chhindwara
30	Mr. Rakesh Upadhyay	Dy. Manager (Mech.)	Raymond Ltd., Textile Division - Chhindwara
31	Mr. Abhilash Dubey	Executive (Mech.)	Raymond Ltd., Textile Division - Chhindwara
32	Mr. Sachin Ghatode	Dy. Manager (Mech.)	Raymond Ltd., Textile Division - Chhindwara
33	Mr. Sumant Kumar Kundu	Sr. Manager (Mech)	Raymond Ltd., Textile Division - Chhindwara
34	Mr. Chandrakant Chaudhary	Dy. Manager (Elect.)	Raymond Ltd., Textile Division - Chhindwara
35	Mr. Rakesh Upadhyay	Dy. Manager (Mech.)	Raymond Ltd., Textile Division - Chhindwara
36	Mr. Rintu S Das	DGM Engg	Raymond Ltd., Textile Division - Chhindwara
37	Mr. Khursheed Hussain	Sr. Manager Sales	ARMEC Group
38	Mr. Raju Yadav	Sr. Manager Sales	ARMEC Group
39	Mr. Anand Vijayakumar	Technical Sales Specialist	FluxGen Sustainable Technologies
40	Mr. Surendra Tiwari	Plant Head	Raymond Chhindwara
41	Mr. Balwant Joshi	Managing Director	Idam Infra
42	Mr. Rajiv Shukla	Executive Director	Idam Infra
43	Ms. Dhaarna Rawat	Analyst	Idam Infra

S.No.	Name	Designation	Organisation
44	Mr. Anurag Singh Sirola	Manager	KPMG
45	Mr. Anand Vijayakumar	Technical Sales Specialist	FluxGen Sustainable Technologies
46	Mr. Surendra Tiwari	Plant Head	Raymond Chhindwara
47	Mr. Balwant Joshi	Managing Director	Idam Infra
48	Mr. K.K. Chakarvarti	Sr. Advisor	Knowledge Exchange Platform
49	Mr. Amit Saini	Asst Manager, Electrical	Raymond Vapi
50	Mr. Nitin Shrivastava	Works Director	Raymond UCO P Ltd, Yevatmal
51	Mr. Ajay Baldua	Gen. Manager-Works	Raymond Ltd., Vapi
52	Mr. Ketan Patel	Asst Manager, Mechanical	Raymond Ltd., Vapi
53	Mr. Anand V	Director	Hi-tech facility
54	Mr. AC Verma	Executive Director	Hi-tech facility
55	Mr. Harsh Vardhan	Lead IoT	Hi-tech facility