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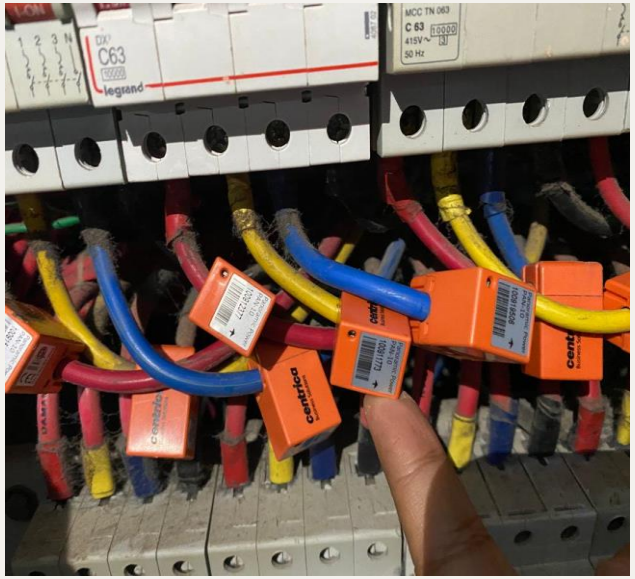
Business Solutions

Improve Operating Margins and drive Sustainability with Centrica's IoT 4.0 Wireless, Real-time, Circuit-level Solution

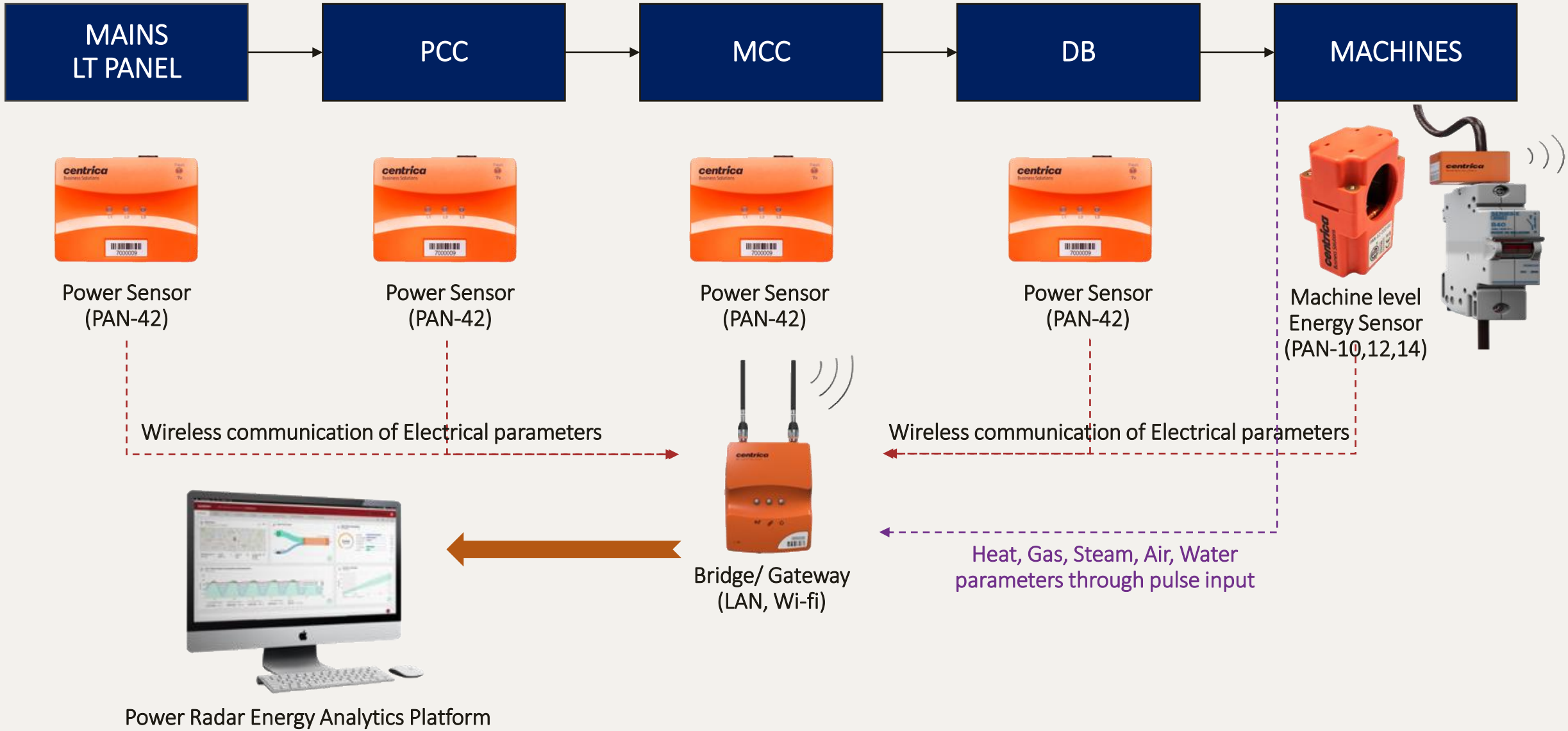

Energy insights
technology
from Centrica
Business Solutions

Centrica's **patented technology** driven by **wireless** sensors & advanced analytics from Power radar software enables **"Circuit level"** actionable **intelligence**



- Wireless Sensors - no wiring cost
- Maintenance free
- Self-powered
- Granular "Machine level" Intelligence
- Non-invasive & Quick installation in seconds
- Real time data transmitted every 10 seconds
- Stores data during power failure
- Temperature & Fire safe (Flammability rating UL94 V-0)
- Humidity safe Humidity range (5% – 95% non-condensing)
- International certifications (USA, Europe, AUS, RUS, JAPAN
- No Disruption in Production
- Real-time alerts for equipment failure
- Cost-effective
- Patented Technology with no Competition

End to End coverage of Carbon footprint by Centrica's Wireless sensors across Energy sources



Centrica's **scalable** solution **consists of hardware, software and advisory services,** to enable you to leverage your energy usage as a strategic business asset

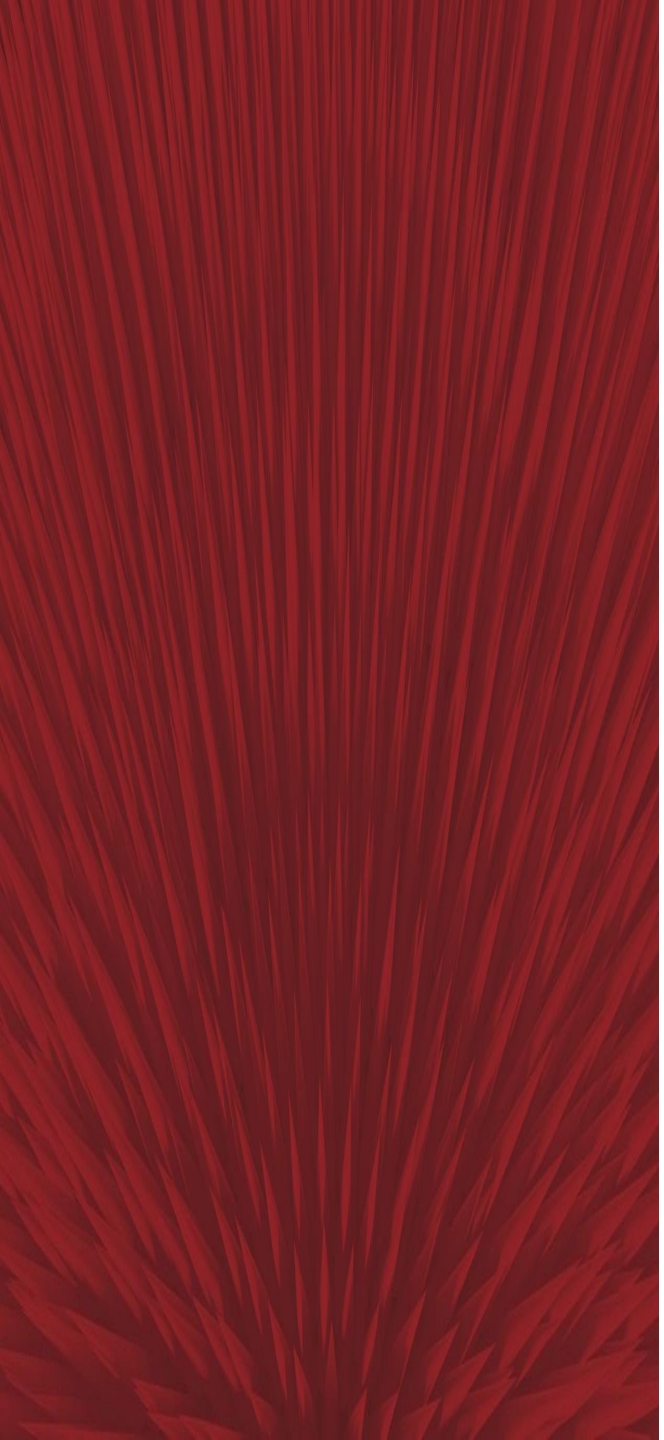
CAPTURE UNPARALLELED
ENERGY DATA

Wireless Sensors → Bridge → Energy Analytics software → Energy Advisory for Energy Management

- Data aggregation through self powered, wireless sensors
- Granular intelligence to reduce invisible power wastage
- Complete visibility into energy consumption & cost
- One time investment – Capex recovery through depreciation - No cost from "2nd Year"

- Robust and intuitive Enterprise level advanced energy analytics platform
- All Energy generation sources (electrical, solar, DG etc.) can be monitored
- Real time data monitoring & tracking of assets
- Real-time Equipment failure alerts & energy reports

- Actionable Recommendations for Implementation leading to significant annual savings
- Handholding to enable your firm to meet sustainability & net zero targets
- Customized quarterly reports for Management review meetings
- Detailed analysis of anomalies at a granular level



USE CASE

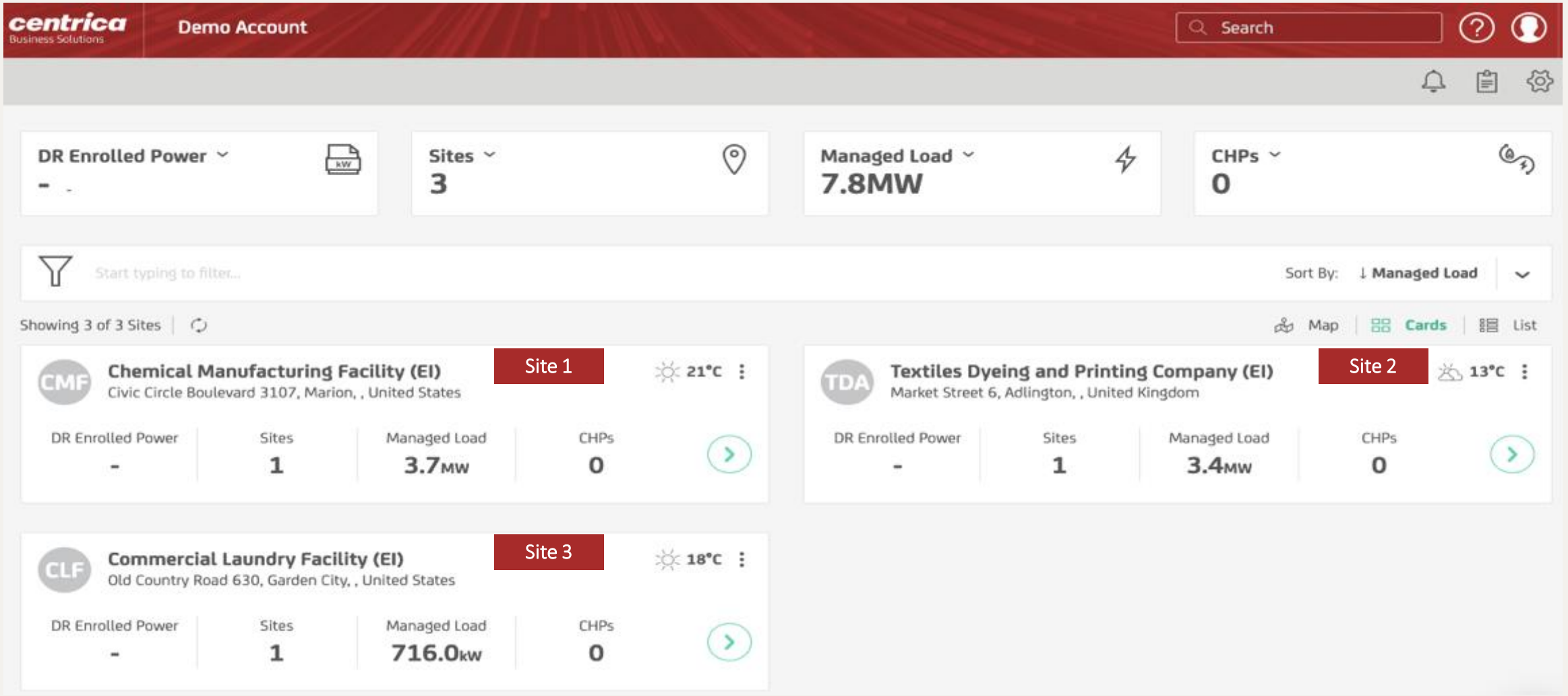
Centrica provides a **comprehensive** IoT 4.0 solution to **drive Net Zero & Energy productivity across your organization**

1 PLAN	2 CUT WASTAGES & EMISSIONS	3 MEASURE & TRACK IMPACT	4 DRIVE ENERGY PRODUCTIVITY	5 DIGITAL REPORTING
Draw data-driven Carbon & Energy Baseline & build science-based carbon reduction roadmap with granular view of existing Energy usage & Carbon emissions	Reduce Scope 1 & 2 emissions – Targeted & focused reduction of wastages & improve energy efficiency through Smart Energy Management with machine-level energy insights	Measure & track impact of Energy efficiency initiatives & projects as well as validate capex investments	Reduce Machine breakdown through predictive maintenance Optimize preventive maintenance Validate the quality of maintenance with before and after data	Digital Reporting: ISO 14001, ISO 50001, PAT, BRSR
Enterprise level solution enables to build Enterprise wide plan up to machine level through Real-time Energy monitoring & accounting Lower the Capex - Reduce & right-size the need for RE	Ensure transparent monitoring and reduction of upstream Scope 3 emissions	Enterprise level solution enables benchmarking sites as well as machines within sites	Drive better production planning & m/c sequencing through machine-level SEC analysis Real-time peak load demand -Open access bidding Drive Manpower productivity & behavioural change	Digitally track & report CO2e footprint & Energy consumption

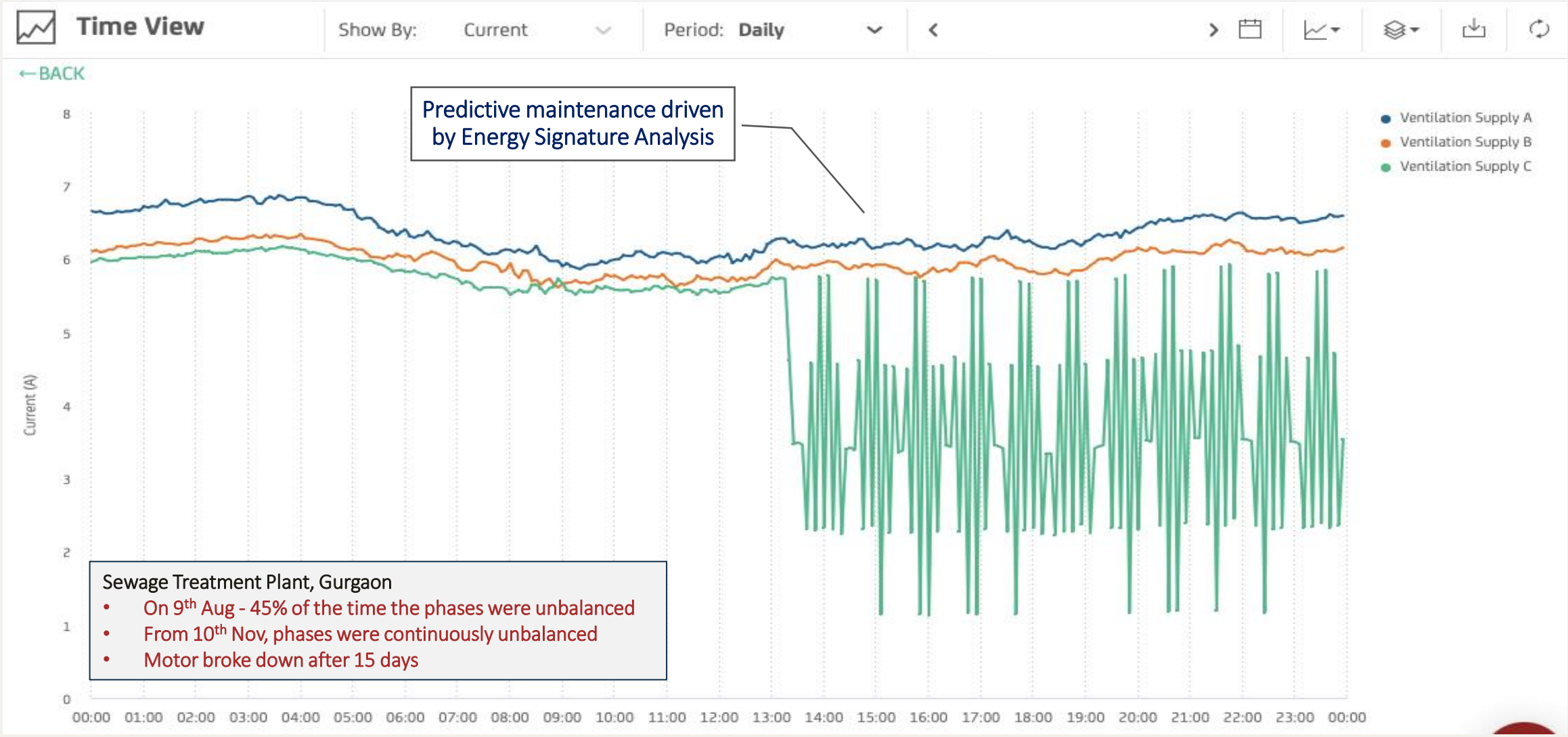
NET ZERO SOLUTION JOURNEY

Centrica's IoT solution **empowers enterprise-level** real time energy management of all the **sites and assets, 24*7, from a single dashboard**

Centrica's solution empowers the management with Real time data by giving comprehensive view – both at Macro and Micro level



Centrica's **predictive maintenance** helps to minimize machine breakdown through early failure detection as well as helps to **optimize preventive maintenance**



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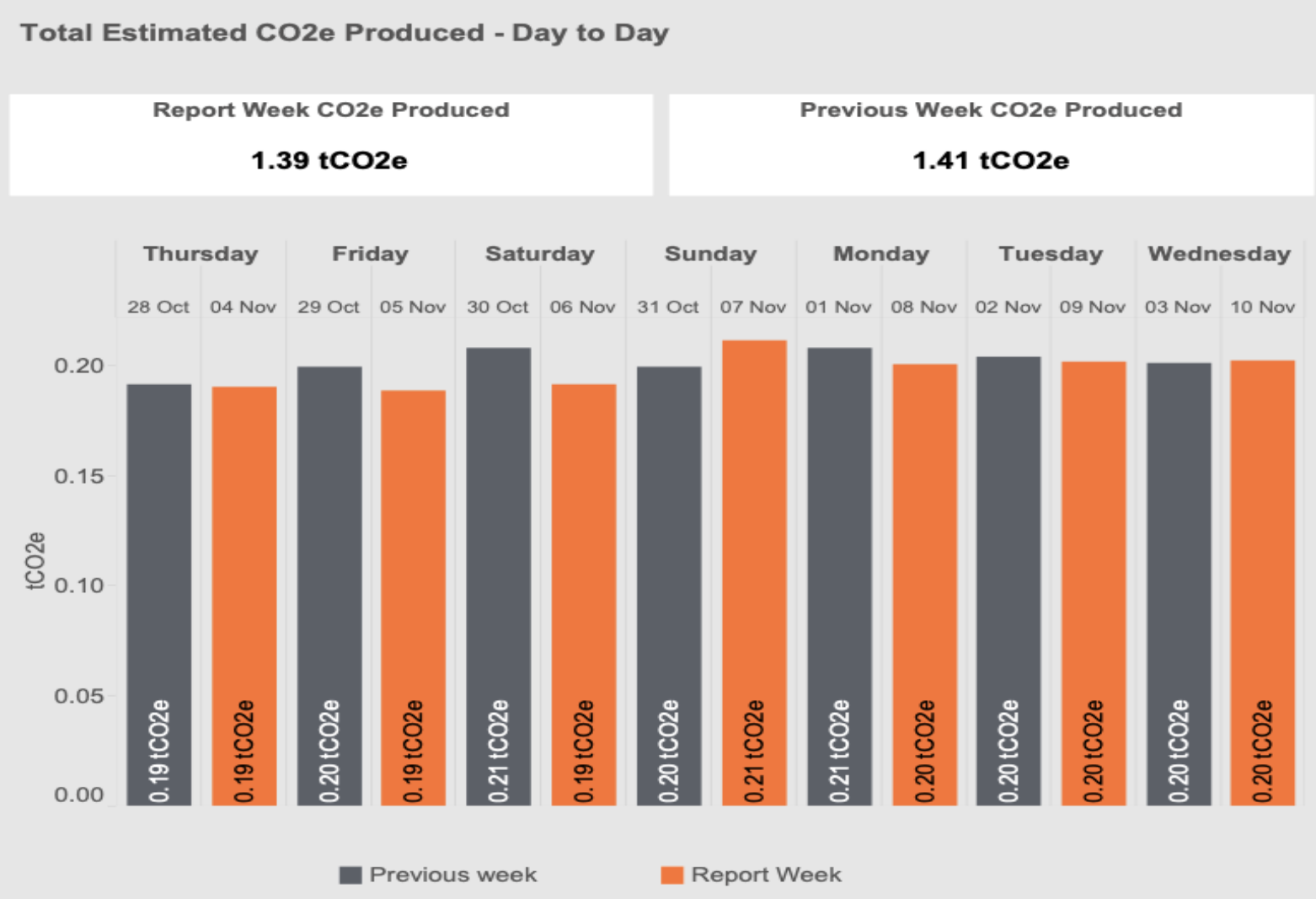
Carbon emissions tracking helps in managing the **Carbon footprint** of your facility to achieve your **Net Zero Target**

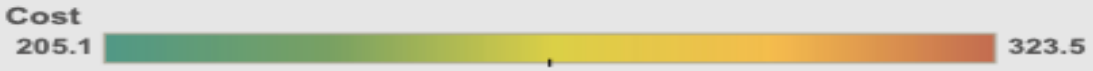


- India has introduced new Carbon reporting requirements for the top 1,000 listed companies in the country by market capitalization
- SEBI stipulates that the disclosure must be made through a new format, namely the Business Responsibility and Sustainability Report (BRSR). BRSR reporting will be mandatory from FY 2022-23
- Investors increasingly expect organisations to report on sustainability. To raise funds and meeting the changing requirements of shareholders & investors, it is vital consideration for businesses.
- ESG reports will detail an organisation's commitment to sustainability and reducing its environmental impact with hard facts than mere words

Centrica helps in **granular level identification** of **energy wastage and anomalies** through 24 Hr power consumption **Heat map**

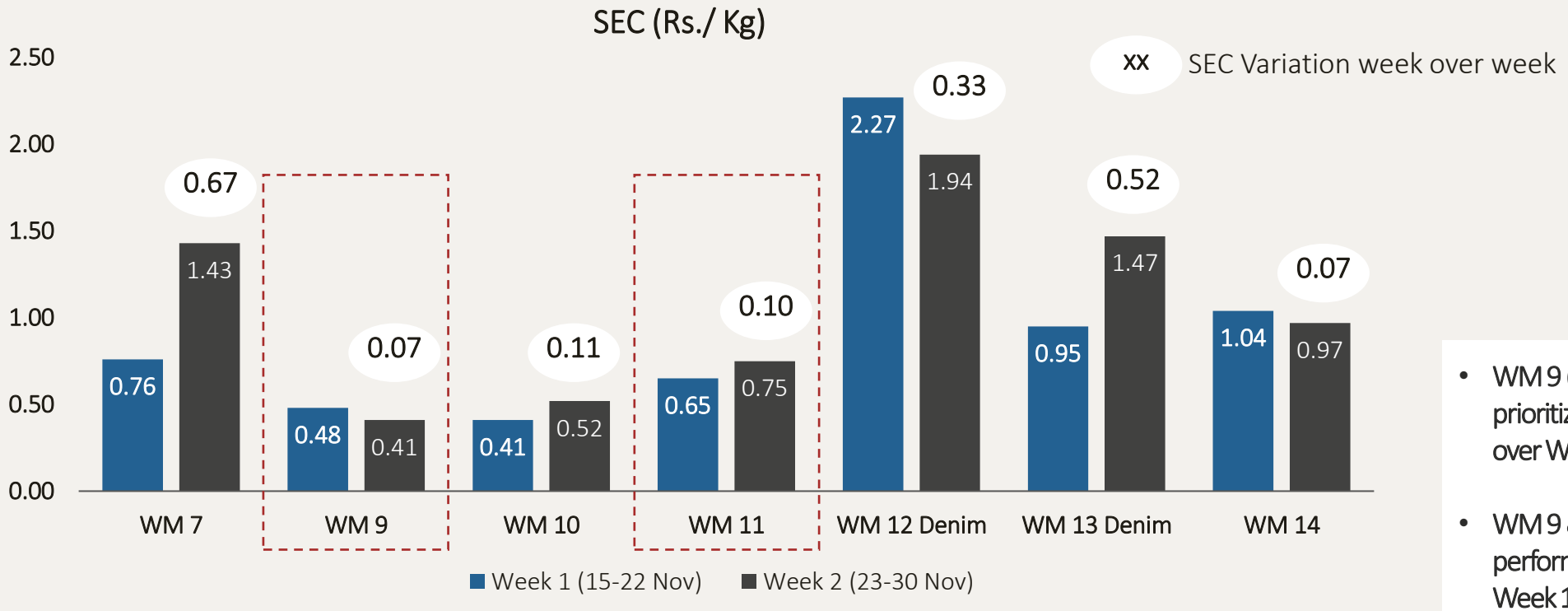
What led to high energy consumption on Sunday and Tuesday?

Hours	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0	₹275.74	₹259.52	₹262.01	₹272.46	₹252.04	₹264.11	₹242.05
1	₹275.12	₹250.50	₹262.77	₹267.84	₹261.34	₹245.34	₹223.91
2	₹272.52	₹261.68	₹266.73	₹275.27	₹243.68	₹243.48	₹218.03
3	₹262.71	₹259.65	₹255.84	₹273.75	₹246.41	₹233.45	₹226.09
4	₹273.39	₹245.23	₹263.55	₹277.52	₹239.09	₹208.57	₹233.86
5	₹263.43	₹262.36	₹265.05	₹276.64	₹246.60	₹226.22	₹256.71
6	₹266.64	₹266.69	₹243.35	₹266.14	₹248.90	₹206.38	₹241.12
7	₹251.95	₹256.25	₹250.73	₹264.16	₹261.11	₹205.07	₹242.61
8	₹265.78	₹265.94	₹263.59	₹262.33	₹248.05	₹249.84	₹239.65
9	₹264.80	₹266.15	₹257.60	₹268.17	₹250.12	₹261.37	₹242.21
10	₹316.45	₹266.67	₹253.25	₹265.47	₹237.24	₹252.17	₹261.20
11	₹320.51	₹262.30	₹258.07	₹268.41	₹217.48	₹258.75	₹265.73
12	₹311.87	₹274.86	₹257.01	₹267.72	₹231.83	₹285.24	₹249.77
13	₹270.62	₹265.69	₹247.28	₹263.54	₹255.74	₹266.07	₹264.44
14	₹289.73	₹261.16	₹260.84	₹265.21	₹261.57	₹236.89	₹258.62
15	₹319.23	₹261.88	₹323.52	₹269.48	₹257.88	₹238.19	₹275.01
16	₹302.56	₹272.33	₹313.33	₹254.53	₹268.84	₹270.15	₹280.27
17	₹269.65	₹262.72	₹265.82	₹269.97	₹248.22	₹252.85	₹260.78
18	₹261.20	₹259.89	₹258.02	₹268.30	₹260.54	₹263.70	₹266.22
19	₹268.79	₹265.75	₹259.34	₹248.21	₹256.73	₹263.04	₹245.07
20	₹274.97	₹272.59	₹275.98	₹261.26	₹262.25	₹255.76	₹260.26
21	₹266.99	₹268.73	₹265.91	₹264.27	₹245.68	₹264.53	₹271.97
22	₹273.27	₹278.78	₹276.47	₹265.00	₹270.02	₹262.12	₹272.36
23	₹281.25	₹274.06	₹273.99	₹264.39	₹259.23	₹252.96	₹257.56



Drive higher Energy productivity through **Machine-level energy mapping & SEC analysis** with Centrica's solution

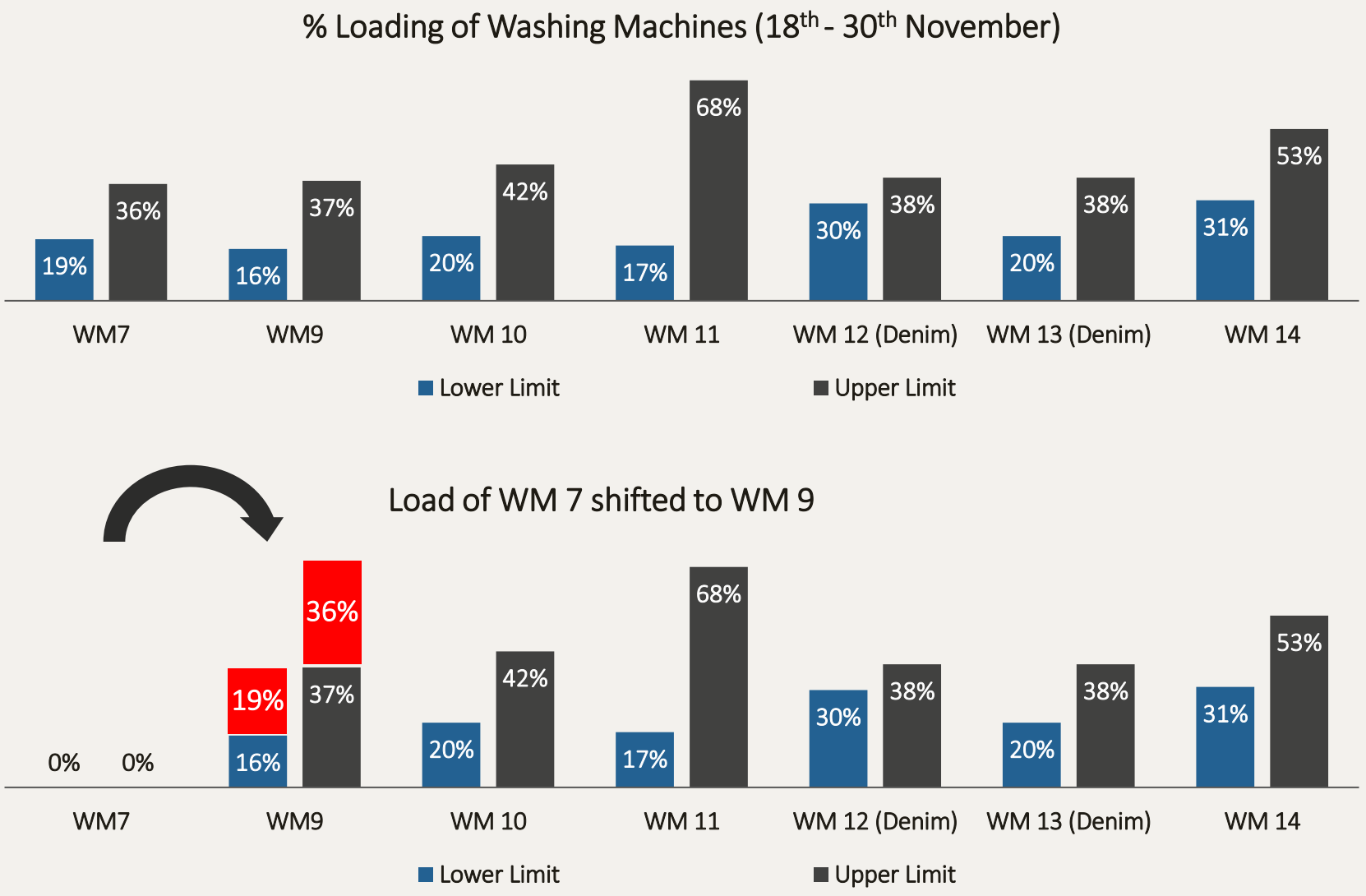
Identify low SEC machines, Sequencing - Low SEC machines (WM 9 & WM 10) to be prioritized over WM 11



	WM 7	WM 9	WM 10	WM 11	WM 12	WM 13	WM 14
Week 1 Production (Kgs)	4164	6896	9821	12028	2088	3974	4340
Week 2 Production (Kgs)	2835	10542	11941	11408	2326	2802	5456

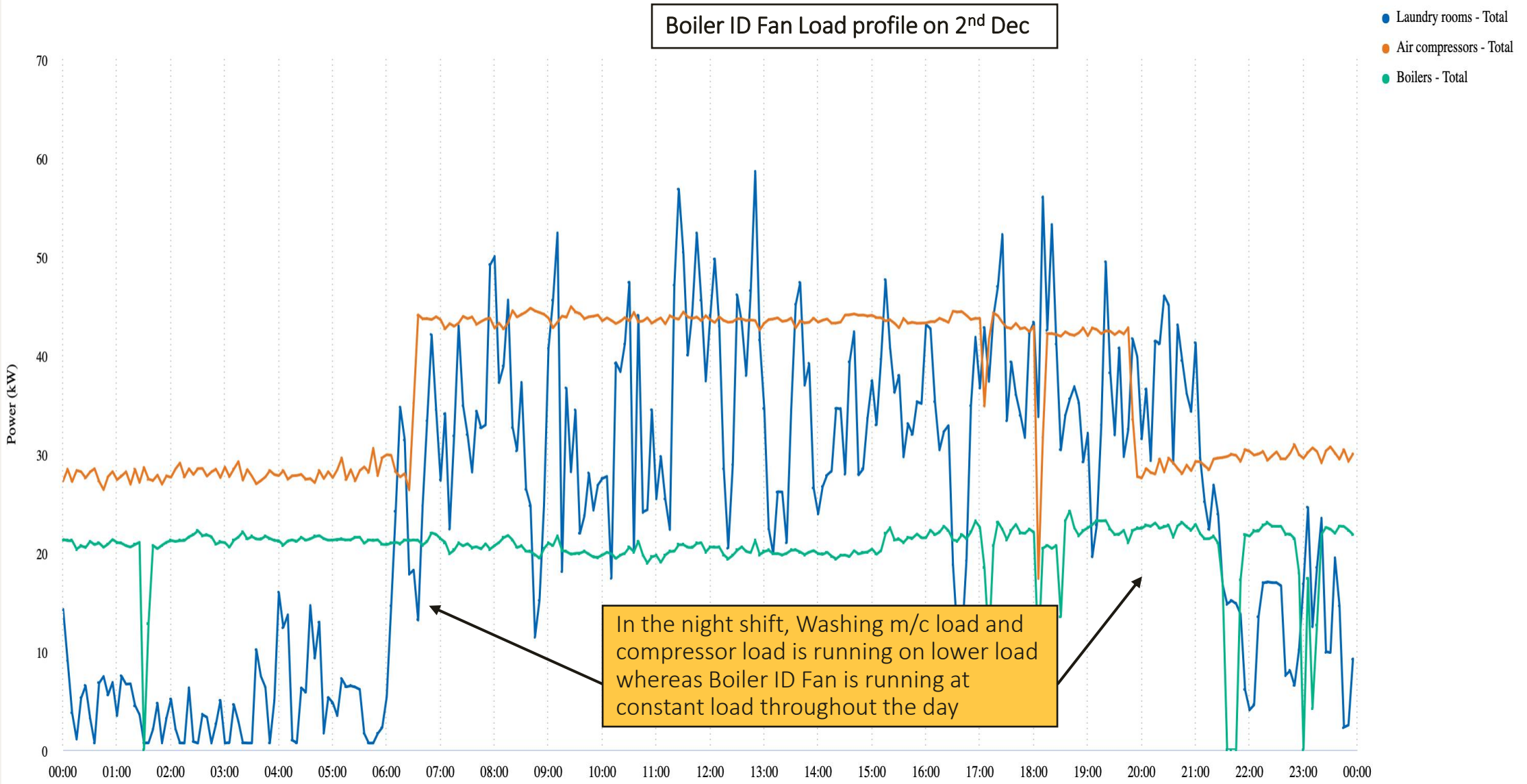
- WM 9 (6896 kgs) to be prioritized due to better SEC over WM 11 (12028 kgs)
- WM 9 & 10 are the best performing machines in Week 1 & 2
- WM 12 & 13 - Denim Machines are the most energy intensive

Capacity Utilization Analysis – Opportunity to aggregate the loads above 50% and reduce the # of machines running – potential to save **at least** Rs. 3.5 lakh/ year

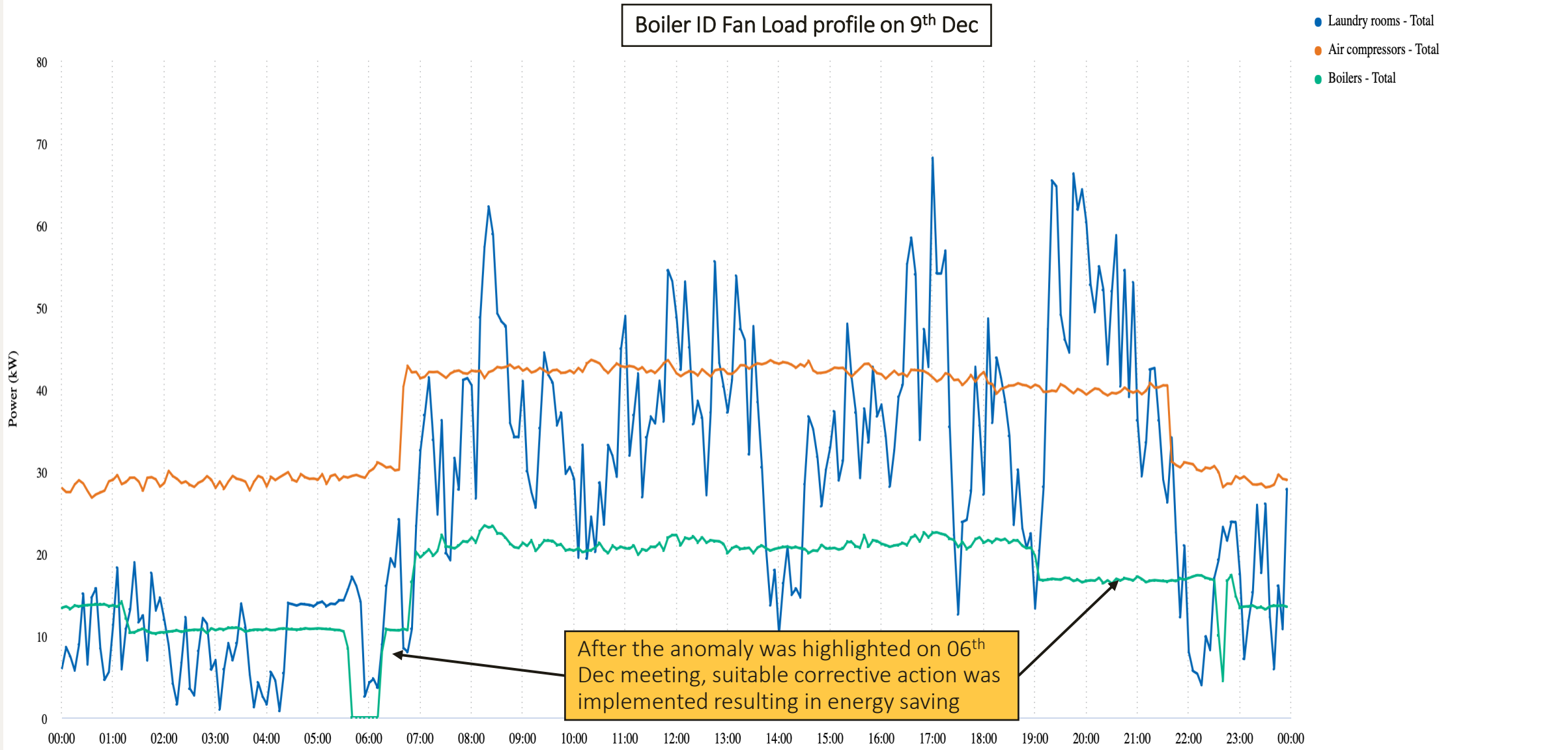


- Most of the WM are operating below 50% loading – leads to reduced efficiency & power factor.
- Opportunity to aggregate the loads above 50% and reduce the # of machines running.
- Taking the conservative scenario, even if operation of 1 machine is reduced it would lead to Rs. 3.5 lacs of saving per year (Savings = 8 KW *16 Hr* Rs. 9.11*300 days)
- Avg. benefit by reducing operation of 1 machine from a set of 7 washing machines = 3.5 lakh/ year
- Extrapolating, Benefit to the set of 14 washing machines = 7 lakh/ year

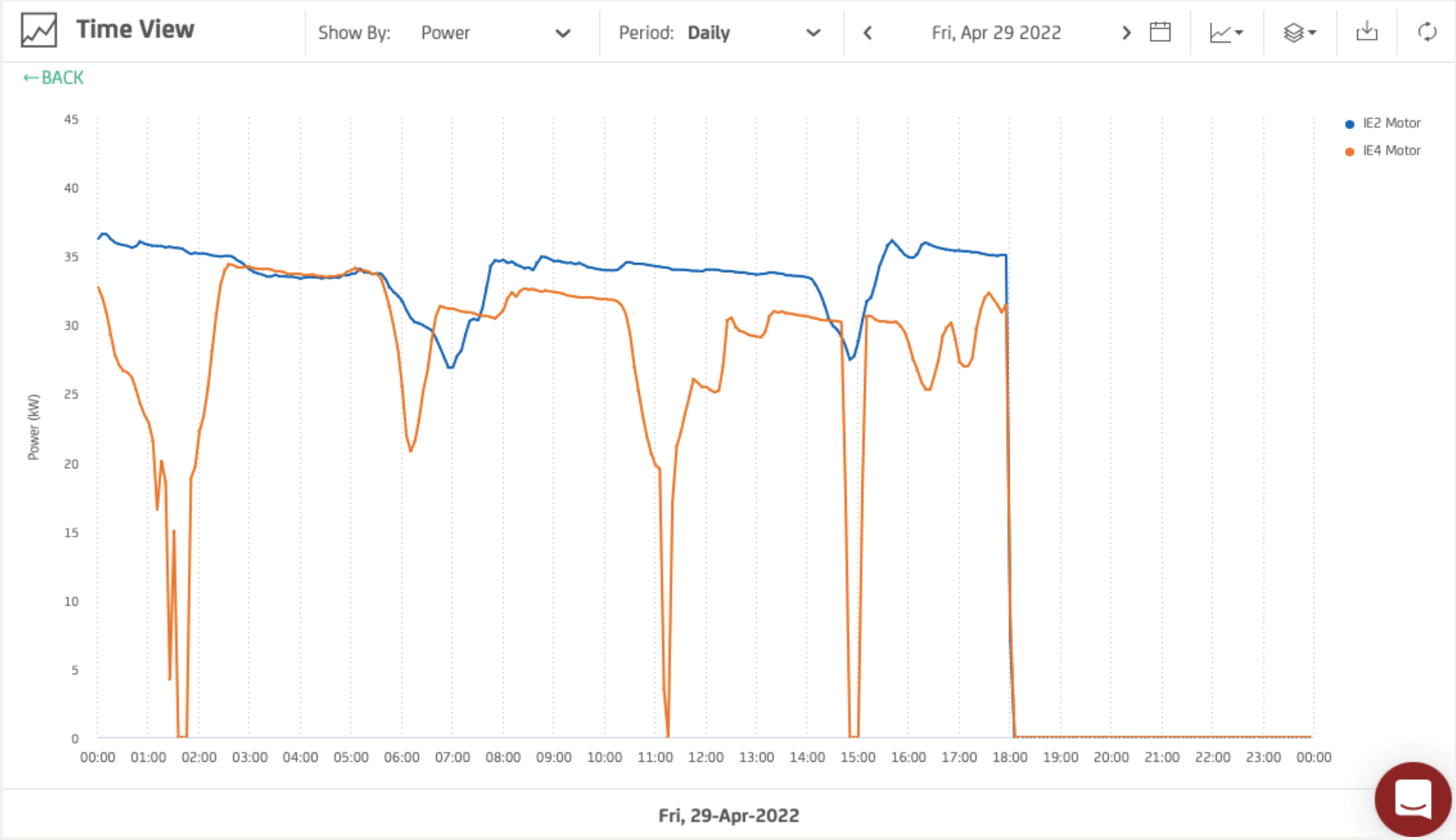
Boiler ID Fan is running at constant load throughout the day, leading to wasteful energy consumption



Based on the energy insights, corrective action was implemented to regulate ID fan operation as per washing machine's load - resulted in drop in power demand of ID fan during night shift



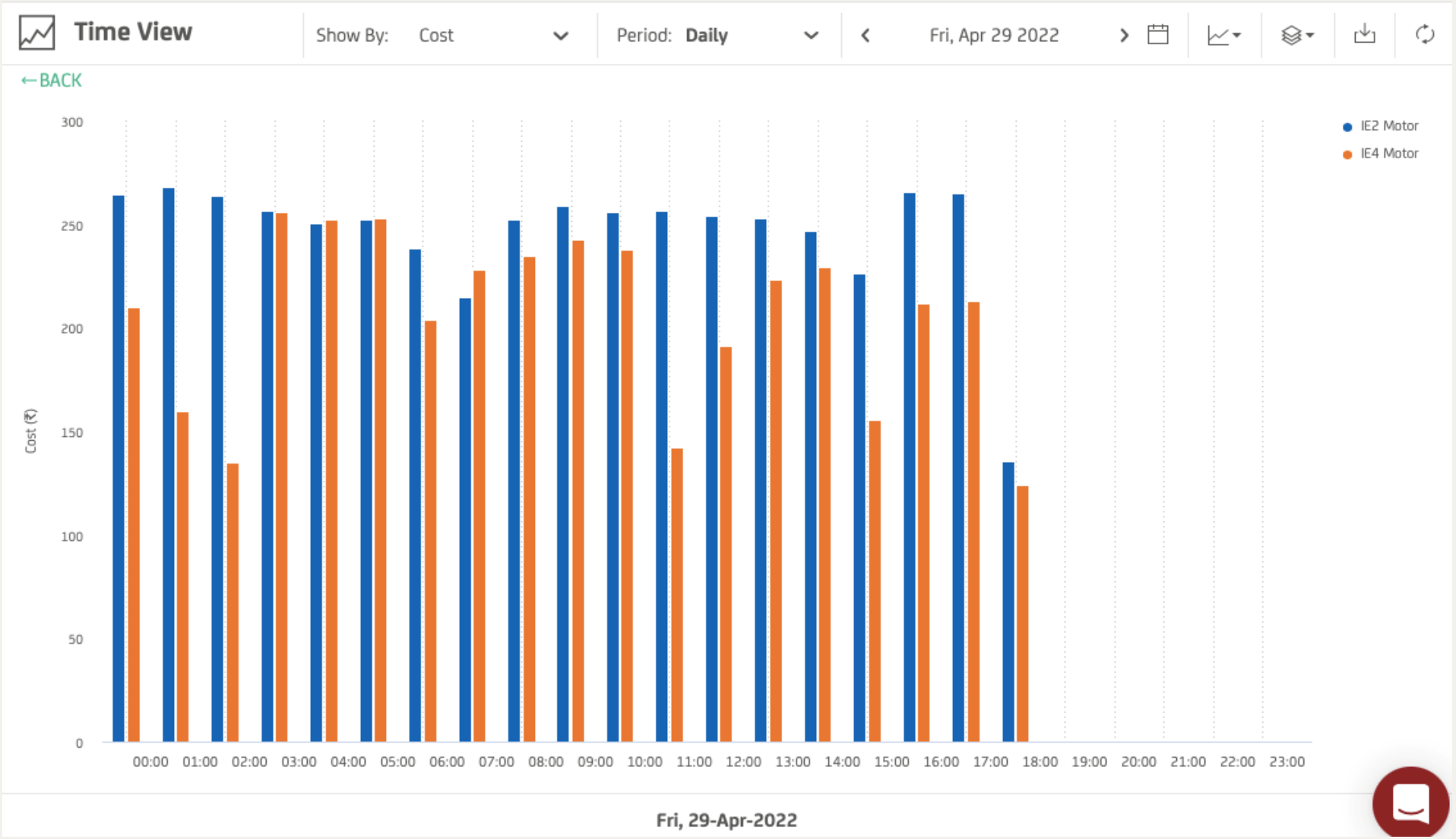
Centrica helps to identify production & manpower inefficiencies - M/c with IE2 motor found running continuously for 18 hrs; not stopped for knotting process



In Towel plant, Centrica sensors were applied on 2 TFO machines – one with IE4 motor and other with IE2 motor. After observing the trends on the two machines, following observations were made:

- Although, IE2 motor was expected to stop for knotting process, **it ran continuously for 18hrs**
- The trend analysis can also help in **capturing production loss and labour inefficiency on every machine** by finding when a machine is on/off or idle and thus **empowers the management to support it with data**

Validation of investment decision by Centrica's EMS - energy cost incurred on IE4 motor is 21% lesser than IE2 motor, hence payback on IE4 is less than 2 months

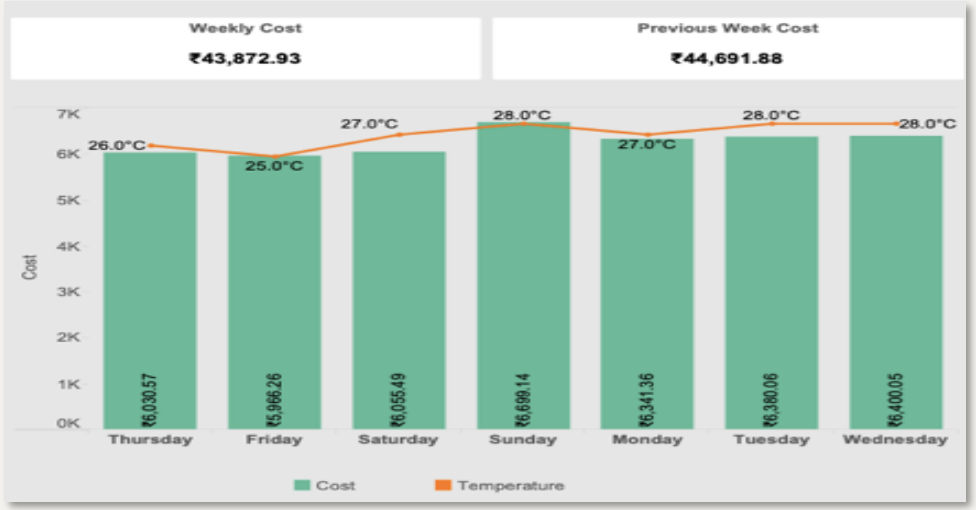


In Towel plant, Centrica sensors were applied on 2 TFO machines – one with IE4 motor and other with IE2 motor. After observing the trends on the two machines, following observations were made:

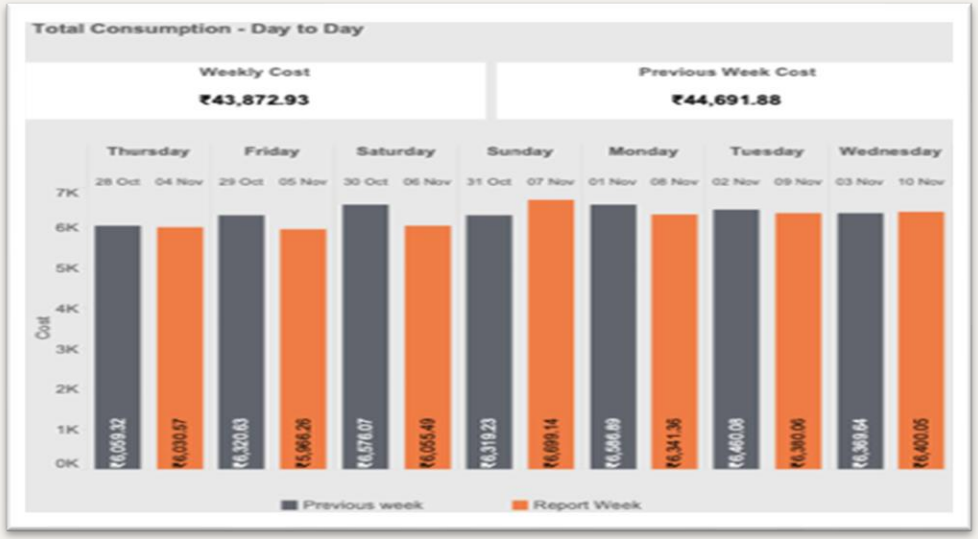
- IE2 Motor **incurred a cost of INR 4678** vs IE4 Motor which incurred a cost of **INR 3903** during **18 hrs** of observation.
- So, on a daily basis (24hrs), IE4 motor incurs **INR 1033** less than IE2. So, it leads to a saving of **INR 31,000/month** on a IE4 motor.
- Hence, incremental cost of IE4 which is at 50K premium to IE2 **can be recovered in less than 2 months**

Centrica's **advanced energy analytics** detect invisible cost-reduction opportunities, **offering higher ROI**

Daily Energy cost vs. External Temperature



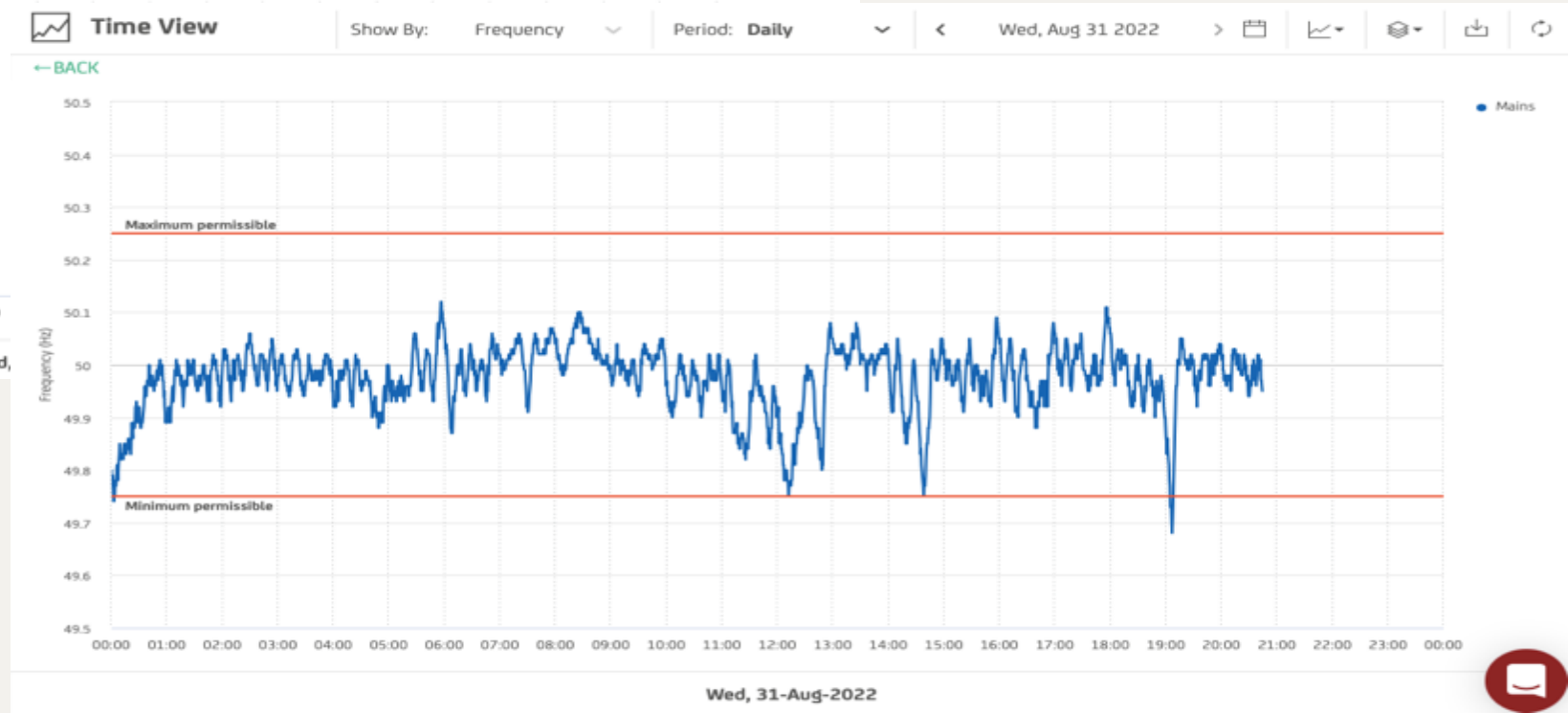
Energy comparison -Hourly/ Daily/ Weekly/ Monthly



Benchmarking Energy performance by Machine type

Centrica's **advanced energy analytics** detect invisible cost-reduction opportunities, **offering higher ROI**

Power Factor, Frequency, Reactive Power



CASE-STUDIES

Centrica's sensors enabled global building materials giant CEMEX to make direct cost savings and efficiency improvements at sites across the UK

Looking for a solution to build on

CEMEX is one of the world's biggest producers of building materials, with operations in more than 50 countries. Its industrial-scale plants and equipment consume large quantities of electricity at hundreds of production facilities, quarries, distribution centres and marine terminals.

Savings on an industrial scale

Centrica initially deployed its energy insights solutions at three CEMEX locations in the UK. The deployment involved applying wireless, self-powered sensors **to monitor a range of essential machinery, including pumps, conveyors and crushers.** Managers could see immediately that the granular data and accompanying reports to fix under-performing or faulty equipment and to organise its maintenance programmes more efficiently.

The results

Detailed analysis showed that an aggregate conveyor motor at one of CEMEX's quarries was overloading and tripping out, creating a bottleneck in the process. Fixing it immediately increased production. When added to further energy saving measures made possible by the PowerRadar analysis, the solution delivered significant annual savings.

As a result, CEMEX rapidly expanded the use of energy insights with more than 1,600 sensors now monitoring equipment at 42 of its UK quarries.

Saint-Gobain Nor Pro site in Soddy-Daisy, Tennessee, USA

Objective:

Decrease peak demand, which accounted for almost 30% of the annual electrical energy costs in 2016

Case Studies and Identified projects

- Device Analyzer KPI tool for more predictive equipment maintenance
- Identical equipment with different electrical loads
- Batch process cycling longer than needed
- Dryer fans left on continuously

Results:

Centrica's solution resulted in 14% savings of 2017 electrical spend.

This was driven by the following:

- **2% savings -** Identical equipment with different electrical loads. Most efficient compressor was selected as the lead, leaving the least efficient as a back up.
- **7% savings -** Batch process cycling longer than needed
- **5% savings -** Dryer fans left on continuously

Case study

Net Zero target is no longer mission impossible

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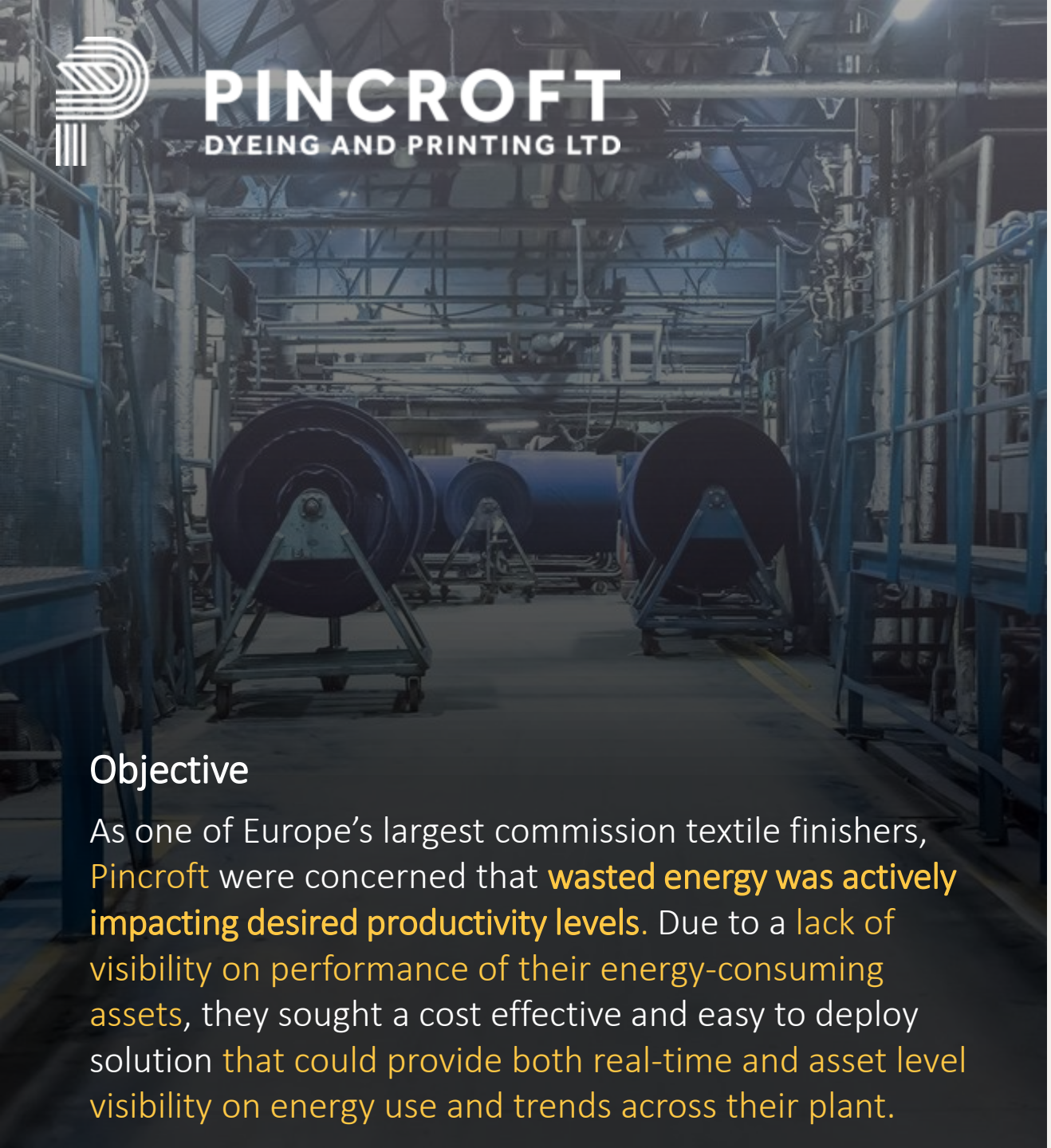
TARGET –

- **BioMar** is one of the world's **top aquaculture companies**. They have announced their intention to set science-based targets in line with the stricter 1.5°C standard on emission reduction and to achieve Net Zero within their own operations no later than 2050.
- Using 2020 figures as a baseline, they also plan to reduce the carbon footprint per tonne of feed produced by one-third by 2030.

SOLUTION –

- **Centrica was asked to deliver a science-based pathway to Net Zero** within BioMar's own operations for Scope 1 and 2 that would allow BioMar to align to SBTi and do that as cost effectively as possible
- Centrica **used their Energy management and Monitoring solution to obtain a granular view of existing energy usage and carbon emissions**
- It then **used science-based targets to define various glide paths to Net Zero** within BioMar's own operations, **outlining the Technologies** that could be used and the **financial implications** of each.



Objective

As one of Europe's largest commission textile finishers, Pincroft were concerned that **wasted energy was actively impacting desired productivity levels**. Due to a lack of visibility on performance of their energy-consuming assets, they sought a cost effective and easy to deploy solution that could provide both real-time and asset level visibility on energy use and trends across their plant.

94%

reduction in weekend energy costs

29%

reduction in weekday energy costs

3

months payback period

Solution

Centrica's sensors were deployed to monitor all HVAC, lighting and production equipment. Pincroft now has a comprehensive visibility into energy consumption of critical equipment enabling them to identify opportunities to improve efficiencies and reduce waste, all in real time.

With a **payback of just 3 months**, Pincroft has reduced their weekend energy spend by 94% and weekday energy spend by 29%. Furthermore, Pincroft is **saving 0.84 kWh per metre of fabric** produced – a significant carbon and cost saving for a company that produces **20 million metres of fabric each year**.

9.6
MWE

Power monitored

100%
COVERAGE

Total Consumption Coverage

12
DAYS

To complete the project

- Candiani needed a **quick and non-invasive way to monitor the energy consumption at its production plants** to comply with Italian Legislative Decree 102/14.
- Candiani's two facilities in the Metropolitan City of Milan employ around 650 workers and produce approximately 25 million metres of denim fabric per year.
- In December 2017, in order to comply with Italian Legislative Decree 102/14, Candiani decided to implement Centrica Business Solutions' Panoramic Power solution, installing **230 wireless sensors** and **25 grid bridges**, harnessing the power and flexibility of PowerRadar software to monitor consumption in real time. The solution was implemented in just 12 days, monitoring a total of 9.6 MWe of power.

- The system enabled Candiani to comfortably surpass the minimum coverage percentages outlined in ENEA (Italian national agency for new technologies, energy and sustainable economic development) guidelines on monitoring systems for industrial sites — it ensured 100% of consumption related to general operations and auxiliary services was covered, with 145 measurements in the first facility and 53 in the second.
- The solution enables the energy carriers at both production sites to be monitored, reported and understood from a single platform, controlling consumption in real time and better managing energy to establish saving strategies.

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Thank You

"Where companies once saw energy as a cost, now they are seeing it as a source of value and competitive advantage"

THE FRANKLIN

centrica Business Solutions

3 MILLION
Kilowatt-hours of annual energy saving

$214k
Energy savings

5.6 MONTHS
Payback on original investment

Award-winning engineering for Chicago office towers

Customer objective

The Franklin Building's management and engineering team was searching for new ways to uncover energy efficiency opportunities.

The solution

Used PowerRadar data to reduce annual energy use:

- 3 million kWh saved annually
- Saving more than 7% of the property's historical annual energy consumption
- Project awarded an Excellence in Engineering award from the ASHRAE Illinois Chapter

Using Centrica's sensors, it was discovered The Franklin was unnecessarily heating the property during unoccupied hours, while year-round heating tendencies led to simultaneous heating and cooling in the summer

Air Compressor 1 & 2: Annual saving potential of ~ Rs. 3.33 lakh due to excess consumption of Compressed Air by Washing machines

Date (November)	8	9	10	11	12	15	16	17	18	19	21	22	23	24	25	26	28	29	30
Total Production (Kgs)	6614	8766	10409	8442	10307	10050	8857	9304	8566	8107	9272	10119	9385	9222	9467	8810	10479	10155	9624
Total Production (Ton)	6.6	8.8	10.4	8.4	10.3	10.1	8.9	9.3	8.6	8.1	9.3	10.1	9.4	9.2	9.5	8.8	10.5	10.2	9.6
Air Comp 1 + Air Comp 2 (KWH/ Day)	544	577	803	841	801	855	892	847	826	876	625	856	841	846	783	804	632	808	827
Considering 50% of Comp. Air for Washing M/C (KWH/Day)	272	289	402	421	401	428	446	424	413	438	313	428	421	423	392	402	316	404	414
KWH/Day/ Ton of production	41	33	39	50	39	43	50	46	48	54	34	42	45	46	41	46	30	40	43
Considering a Baseline of 30 KWH/ Day/Ton	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Excess KWH/ Day/Ton	11	3	9	20	9	13	20	16	18	24	4	12	15	16	11	16	0	10	13

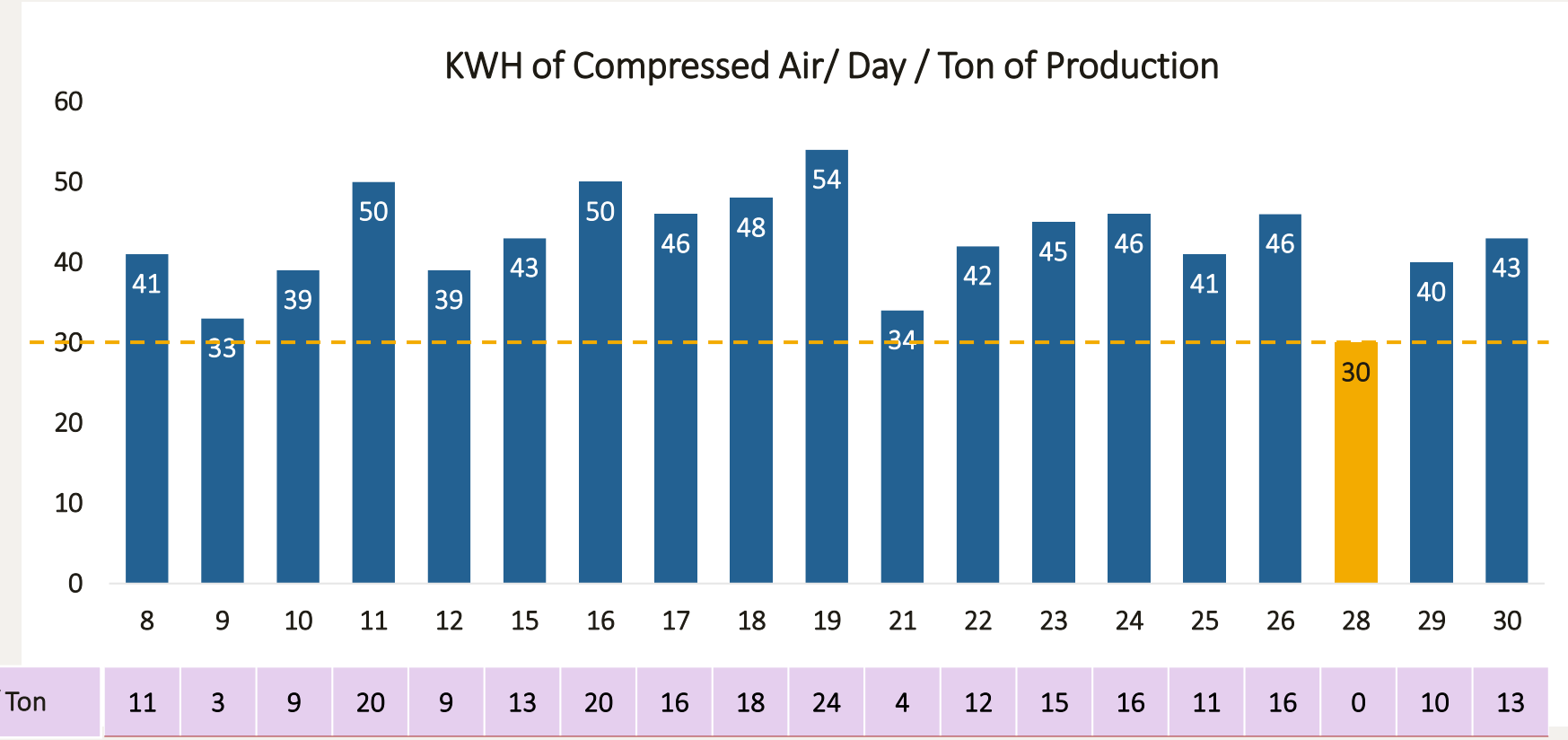
Total excess in 18 days (KWH/Day/Ton)	238
Days in consideration	18
Excess KWH/ Day/Ton (Average)	13.2

Total Production for 18 days (Tons)	165
Average Production/ Day (Tons)	9.2

Excess KWH/ Day	13.2*9.2 = 122
For 300 days	36517
Cost/KWH (Rs./KWH)	9.11
Excess Cost due to Air wastage (Rs.)	3,32,674

Average Annual Cost of Comp. Air for WM	10,81,964
Air Wastage %	31%
Total saving Potential (Rs.)	3,32,674

Note: We have considered only 50% of compressed air is being used for Washing M/C. Rest 50% if used in Sewing M/C and other sections



Excess KWH/ Day/ Ton	11	3	9	20	9	13	20	16	18	24	4	12	15	16	11	16	0	10	13


Cooling meter
UH50-G70C-EN06-E
Class 2 EN 1434
Env. class M1 E1
qp: 25 m³/h
qi: 0,25 m³/h
qs: 50 m³/h
θq: 5...50°C
PN 25 / PS 25 bar
DN 65
Inst. in return flow
70 221 177
0...130°C
3...120 K
Year of constr. 2019
6-year battery
90 67 382
prev.year
tariff
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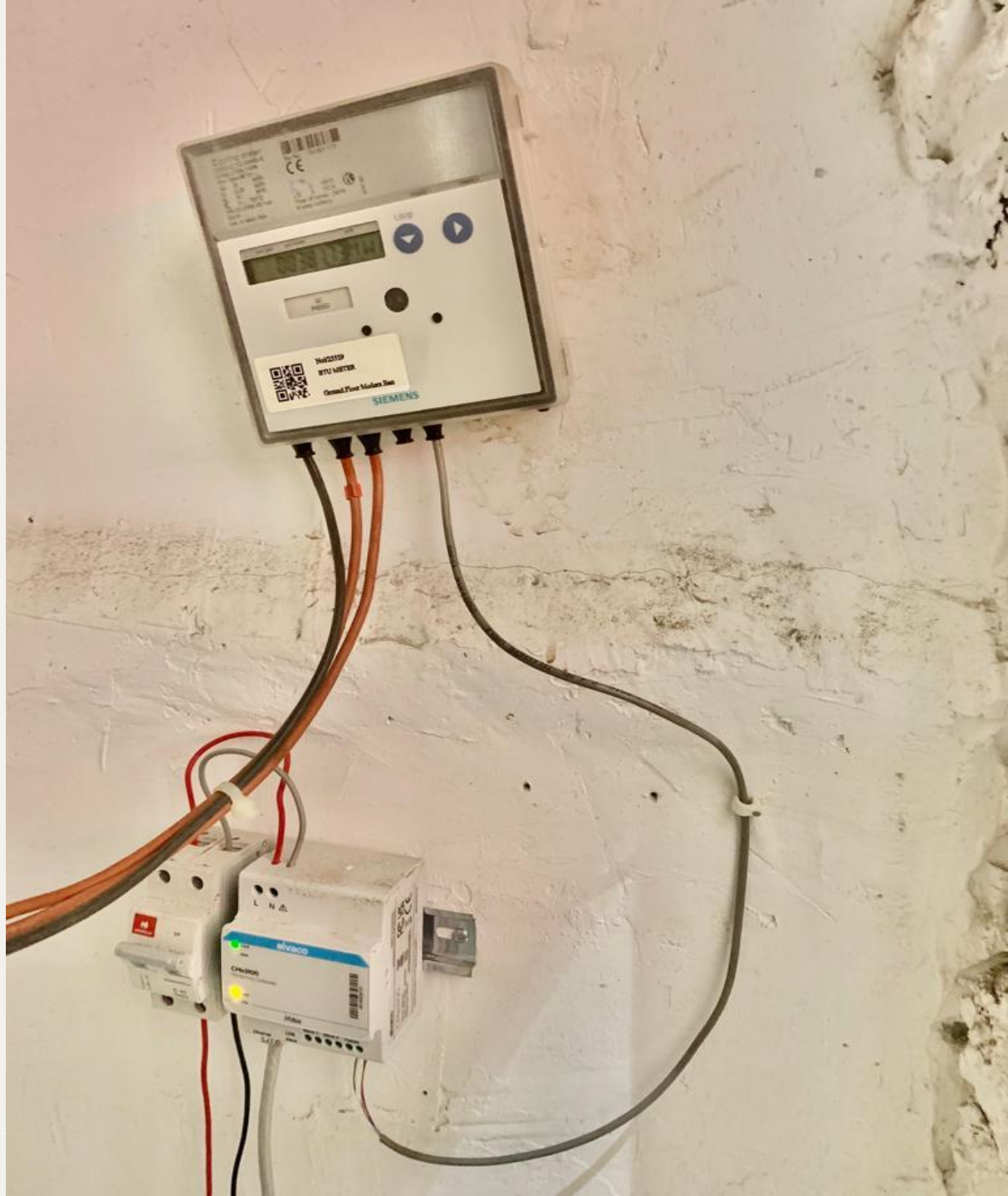
PASSED
No1/25559
BTU METER
Ground Floor Modem Bay
SIEMENS


SIEMENS
elvaco

Validation of new technology's ROI - "Motor with VFD" consumed 20% less power than "Motor without VFD" - a saving of INR 46,000 / year/ VFD motor

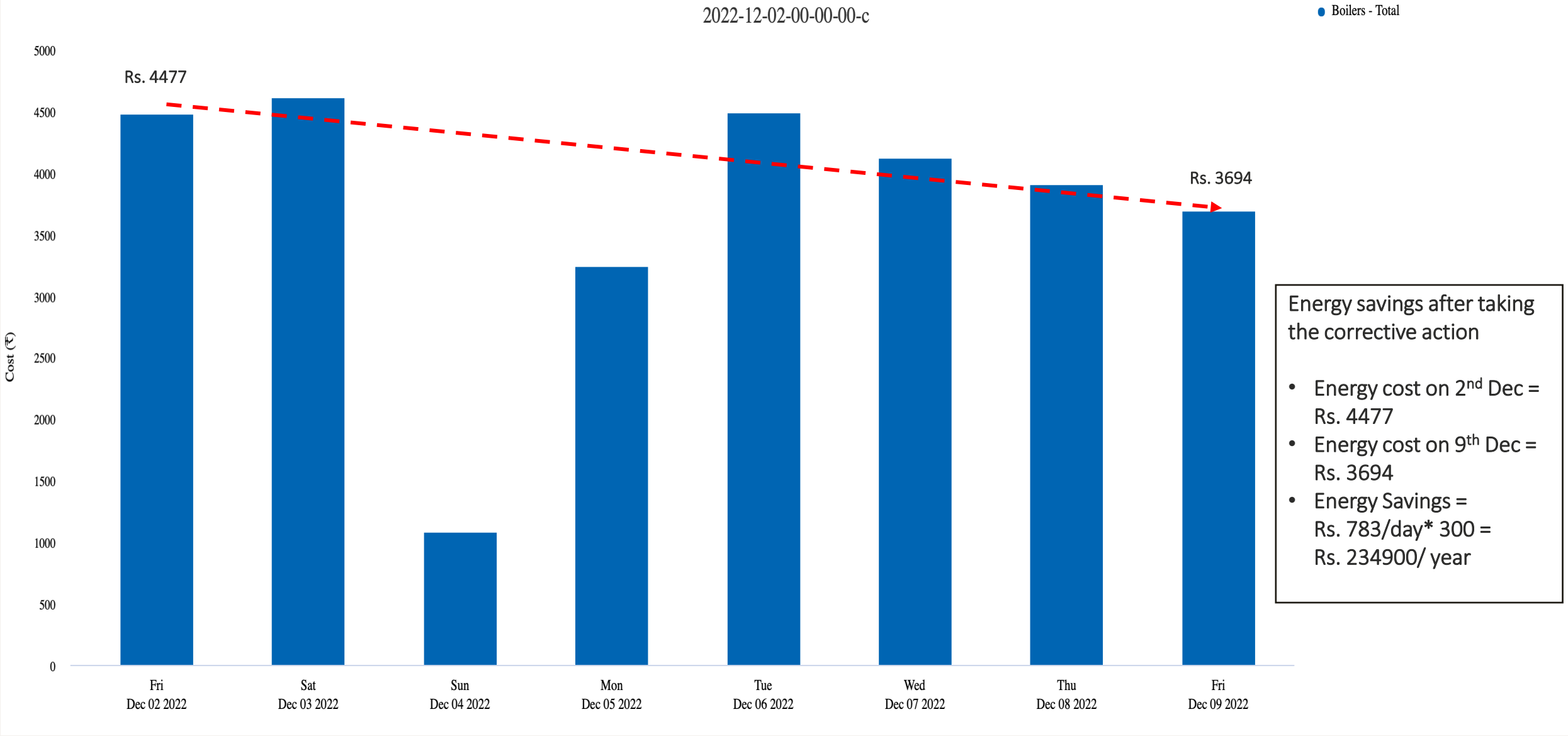
In Yarn plant #5, Centrica sensors were applied to compare "motor with VFD" and "motor without VFD". After observing the trends on the two machines, following observations were made

- While "Motor without VFD" consumes **3.5 KW** power, "Motor with VFD" consumes **2.8 KW** power **(20% less)**
- This would lead to a **saving of INR ~46,000/ year on a motor with VFD**

BTU Meter Real-Time Readings

#serial. No	created	ENERGY,MWh	ENERGY,Wh	volume,m3	power,W	volume-flow,m3/h	flow-temp,°C	return-temp,°C
16029721	2023-01-20 08:40:00	381.73	381730000	141985,200	2700	16,360	17	17
16029721	2023-01-20 08:45:00	381.73	381730000	141985,200	2700	16,360	17	17
16029721	2023-01-20 08:50:00	381.73	381730000	141985,200	2700	16,360	17	17
16029721	2023-01-20 08:55:00	381.73	381730000	141989,300	1900	16,440	17	17
16029721	2023-01-20 09:00:00	381.73	381730000	141989,300	1900	16,440	17	17
16029721	2023-01-20 09:05:00	381.73	381730000	141989,300	1900	16,440	17	17
16029721	2023-01-20 09:10:00	381.74	381740000	141993,400	5500	16,830	16	17
16029721	2023-01-20 09:15:00	381.74	381740000	141993,400	5500	16,830	16	17
16029721	2023-01-20 09:20:00	381.74	381740000	141993,400	5500	16,830	16	17
16029721	2023-01-20 09:25:00	381.74	381740000	141997,700	1100	17,040	16	16
16029721	2023-01-20 09:30:00	381.74	381740000	141997,700	1100	17,040	16	16
16029721	2023-01-20 09:35:00	381.74	381740000	141997,700	1100	17,040	16	16
16029721	2023-01-20 09:40:00	381.74	381740000	142001,800	7100	16,810	17	16
16029721	2023-01-20 09:45:00	381.74	381740000	142001,800	7100	16,810	17	16
16029721	2023-01-20 09:50:00	381.74	381740000	142001,800	7100	16,810	17	16
16029721	2023-01-20 09:55:00	381.74	381740000	142006,000	10500	16,610	17	16
16029721	2023-01-20 10:00:00	381.74	381740000	142006,000	10500	16,610	17	16

Energy saved Rs. 2.35 lakh / year by regulating the motor speed as per the steam demand variation



Energy savings after taking the corrective action

- Energy cost on 2nd Dec = Rs. 4477
- Energy cost on 9th Dec = Rs. 3694
- Energy Savings = Rs. 783/day* 300 = Rs. 234900/ year

This can be supplemented with **real-time monitoring** of other motor parameters

- Vibrations
- Surface Temperature
- Acoustic Emissions
- Magnetic Flux
- Instantaneous RPM
- Humidity
- Real time fault detection - Alerts & notifications
- Quick installation Installation in 5 mins
- No Gateway required
- Edge Processing