

A detailed photograph of an industrial steam recovery system. The system consists of a complex network of polished stainless steel pipes, elbows, and a large horizontal cylindrical vessel. A vertical pipe on the left has an upward-pointing arrow. In the background, a large vertical cylindrical tank is visible. The entire system is supported by a metal frame. A yellow warning sign is visible on the right side of the frame.

Recover Energy, Not Just Condensate

Improving and sustaining
condensate recovery factor

*Actual site installation

For over 75 years Forbes Marshall has been providing innovative solutions to help businesses improve their process and energy efficiency and be more environmentally responsible. We work with industries globally to improve production, quality and energy efficiency.

Condensate and flash steam accounts for over 20% of the total energy supplied to the boiler. Maximising the quantity of condensate recovered and its heat content reduces water cost, effluent treatment costs and fuel consumption. Condensate which is not recovered, due to contamination, pumping distance etc, is sent to the ETP or is used as cooling tower make-up. This either increases the effluent load and hence effluent treatment cost or increases the cooling tower load.

Elevated feedwater temperature offers secondary benefits of reduced thermal shocks and superior response time for boilers. Considering all the benefits, typical return on investment for condensate recovery systems ranges from 2-6 months. Forbes Marshall flash steam and condensate recovery solutions help improve the Condensate Recovery Factor (CRF) across industry segments.

Prevailing Condensate Recovery Scenario



No recovery / drain

- Complete flash steam and condensate loss
- Low feedwater temperature
- Increased make up water load in boiler
- Increased load in ETP and cooling tower
- Increased water treatment cost

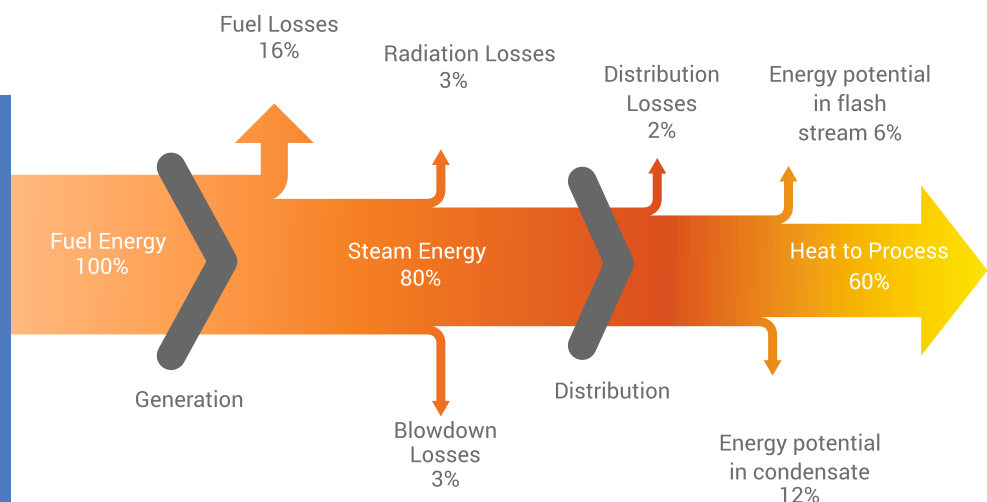


Trap pressure

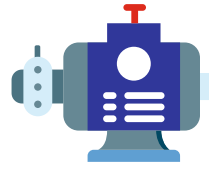
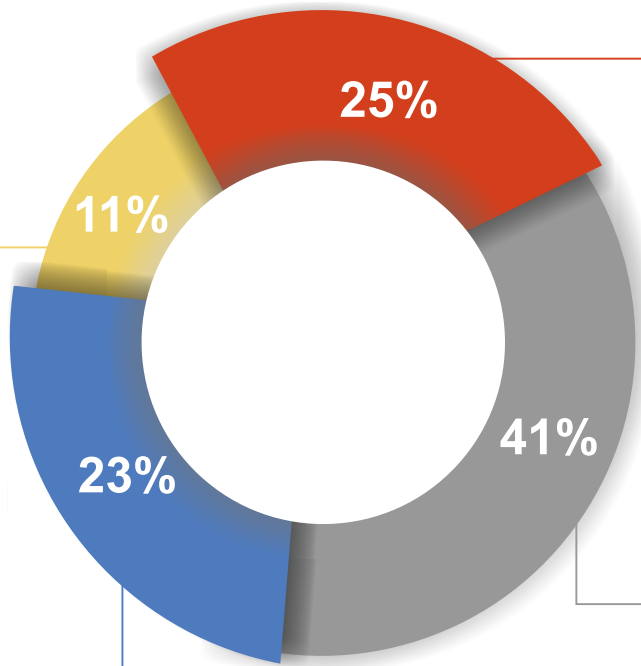
- Waterlogged traps
- Increased batch time
- Frequent bypass opening
- Fully open SLR
- Live steam venting from

Recovering Condensate and Flash Steam Improves Steam System Efficiency by

>20%



Every 6°C rise in feedwater temperature saves 1% fuel.



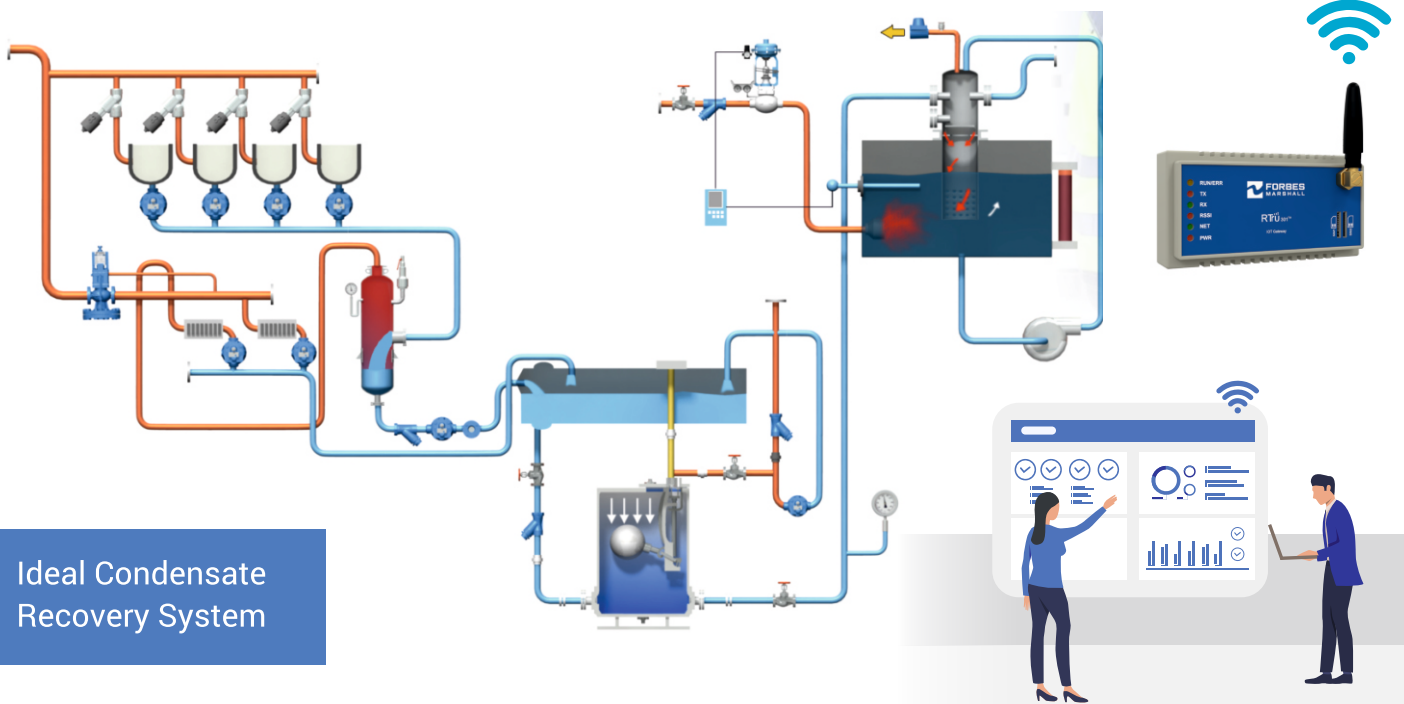
By centrifugal pump

Flash steam loss
 Low condensate return temperature (65-70°C)
 Pump cavitation issue



Modern day condensate recovery

Flash steam recovery to feedwater tank or local process
 For atmospheric pump condensate temperature >90°C
 For closed loop system condensate pumping temperature >100°C



Ideal Condensate Recovery System

Recovering Heat and Maximising Efficiency

Flash Vessel

Flash steam contains 40 to 50% of the total energy in condensate and can be reused in low pressure applications or boiler feedwater tank. The Forbes Marshall Flash Vessel effectively separates the flash steam from condensate to maximise the efficiency of the recovery system.



FLASHJET™ Pump (FJP)

FJP is an integrated solution made up of a pressure powered condensate pump operated by steam and a flash vessel. It enables closed loop, total recovery of flash steam and condensate thereby ensuring energy balance. Condensate is pumped back to the boiler feedwater tank at above 100°C.



Pressure Powered Pump Package Unit (PPPPU)

The Forbes Marshall PPPPU, is a positive displacement pump unit operated by steam, compressed air or pressurised gas designed to pump hot condensate back to the boiler feedwater tank.



Compact Miniature Condensate Pump (FMmPump™)

The compact size of this pump enables it to be used for recovery of condensate from equipment with small steam/air loads and low condensate filling head applications.



Condensate Recovery Meter

The condensate recovery meter (CRM485R) calculates the amount of condensate and energy recovered from the system. It is available in Ex proof version



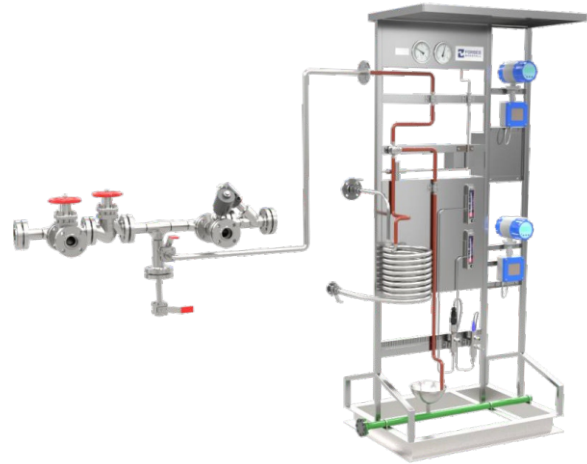
RTru301™

The RTru301™ is a basic building block for a single location remote monitoring to complex multiple locations. It collates field parameters from multiple processes and utilities, derives key performance indicators (KPIs) and key result areas (KRAs) from them, enabling proactive decision making on-the-go.



Condensate Contamination Detection System

Forbes Marshall CCDS is a compact, automatic and online condensate contamination detection system. It continuously monitors the condensate being returned to the boiler and diverts the contaminated condensate to drain to ensure only pure condensate goes to boiler.



Forbes Marshall Thermocompressors

The Forbes Marshall Thermocompressor maximises the flash steam recovery and enhances condensate removal from the drying cylinders by providing effective 'blow off'. It is custom built to suit specific industry needs and can be seamlessly integrated into the existing control system.



Forbes Marshall Level Indicator

The BM 26 is a simple, rugged instrument designed to indicate and control level of the feedwater tank to keep the make-up water consumption at optimum level. It indicates level using a float magnetically coupled to an index or a column of rotating flaps.



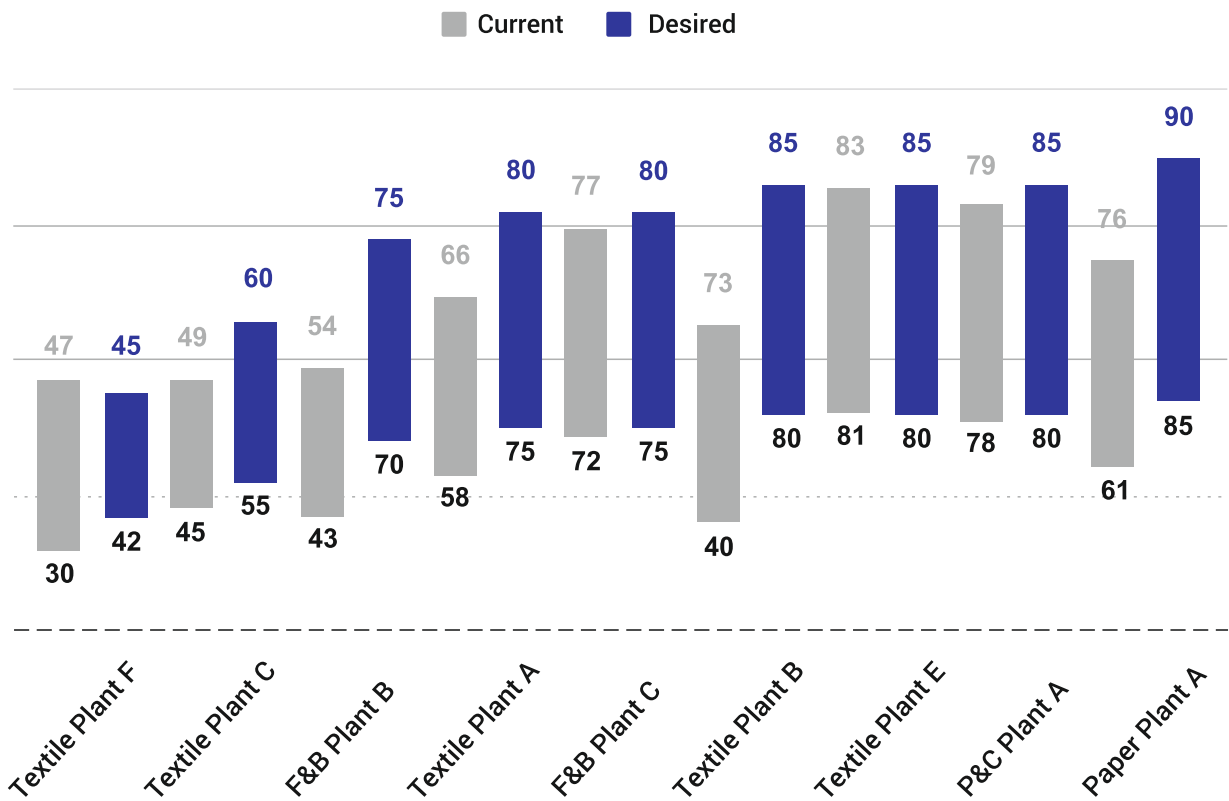
Forbes Marshall Deaerator Head

The Forbes Marshall Deaerator Head is designed to rigorously mix cold makeup water; condensate return and flash steam. The unique design ensures thorough mixing, uniform temperature and maximum deaeration in the feedwater tank.



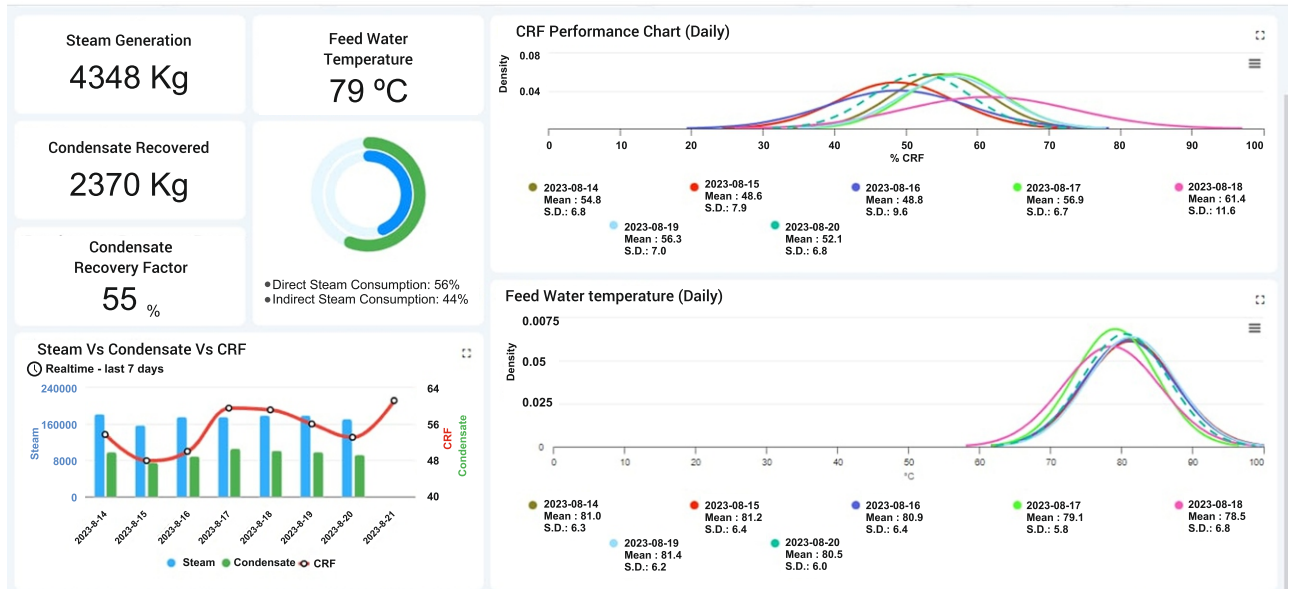
CRF
Sustenance
Service

In today's dynamic competitive landscape, where energy costs continue to rise, maintaining a steam system at peak efficiency is imperative for all industries. Many plants grapple with the variability of these crucial KPIs on a monthly, weekly, daily, and even hourly basis. This fluctuation necessitates real-time monitoring, continual analysis, and ongoing feedback to ensure sustained adherence to benchmark values. Condensate Recovery Factor (CRF), a critical factor in steam system efficiency, is inherently variable. It depends on production data, steam consumption, and the operational status of equipment. A study of a few sites shows that the actual CRF is far from desired. The chart below shows the current and possible CRF for a few sites.



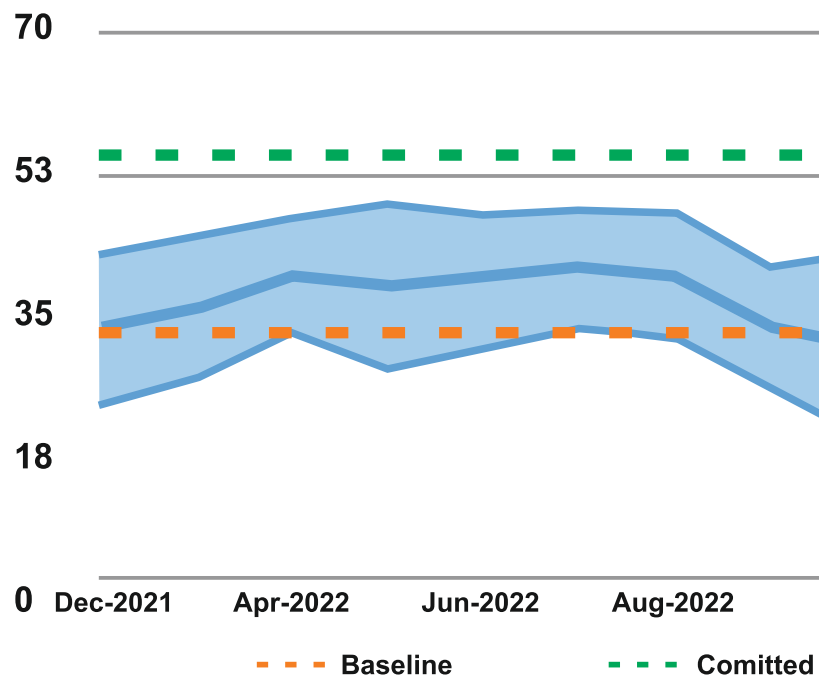
Recognising this, Forbes Marshall collaborates closely with customers to not only monitor CRF but also to understand the nuanced reasons behind its fluctuations. Through a real time engagement covering monitoring, analysis, troubleshooting and providing actionable insights, it is possible to narrow the band of variations and deliver a significantly higher CRF and feed water temperature. Daily fluctuations, can be minimised to a more stable range, thereby influencing the mean CRF positively. This results in a more energy-efficient steam system, contributing to cost savings and environmental sustainability. Our goal is to help you not just achieve benchmark CRF but also to sustain it over time.

Dashboard

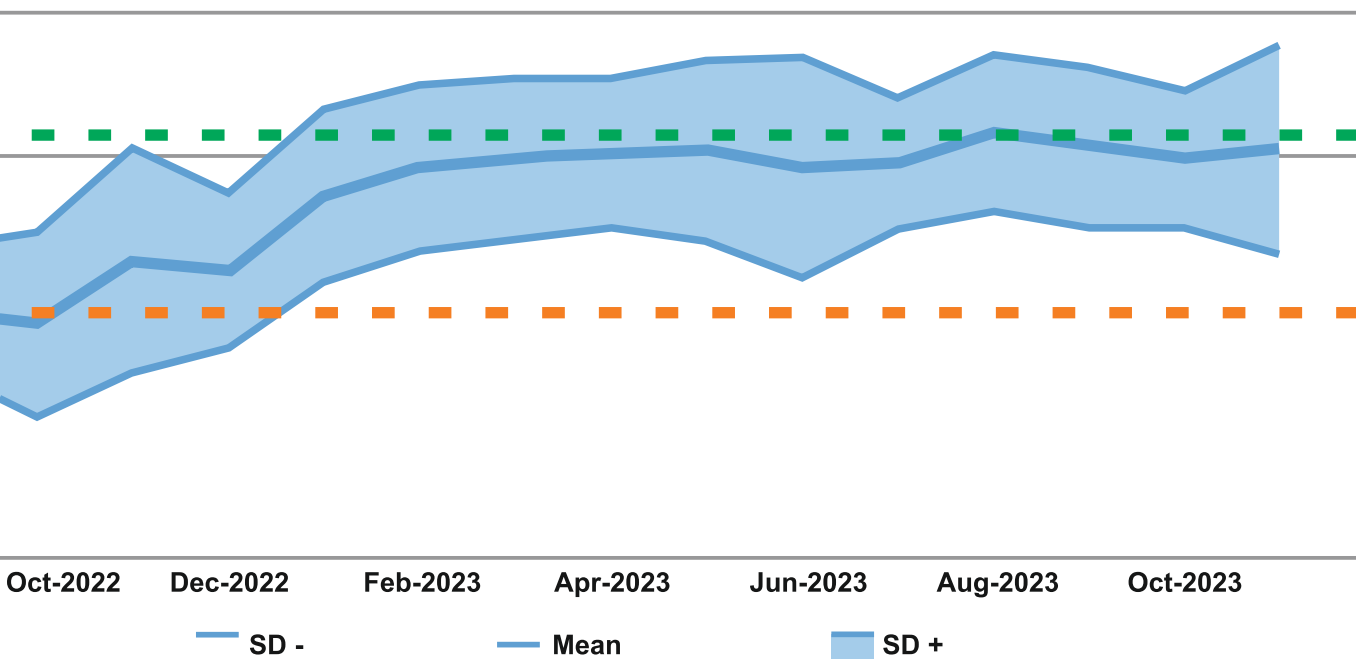
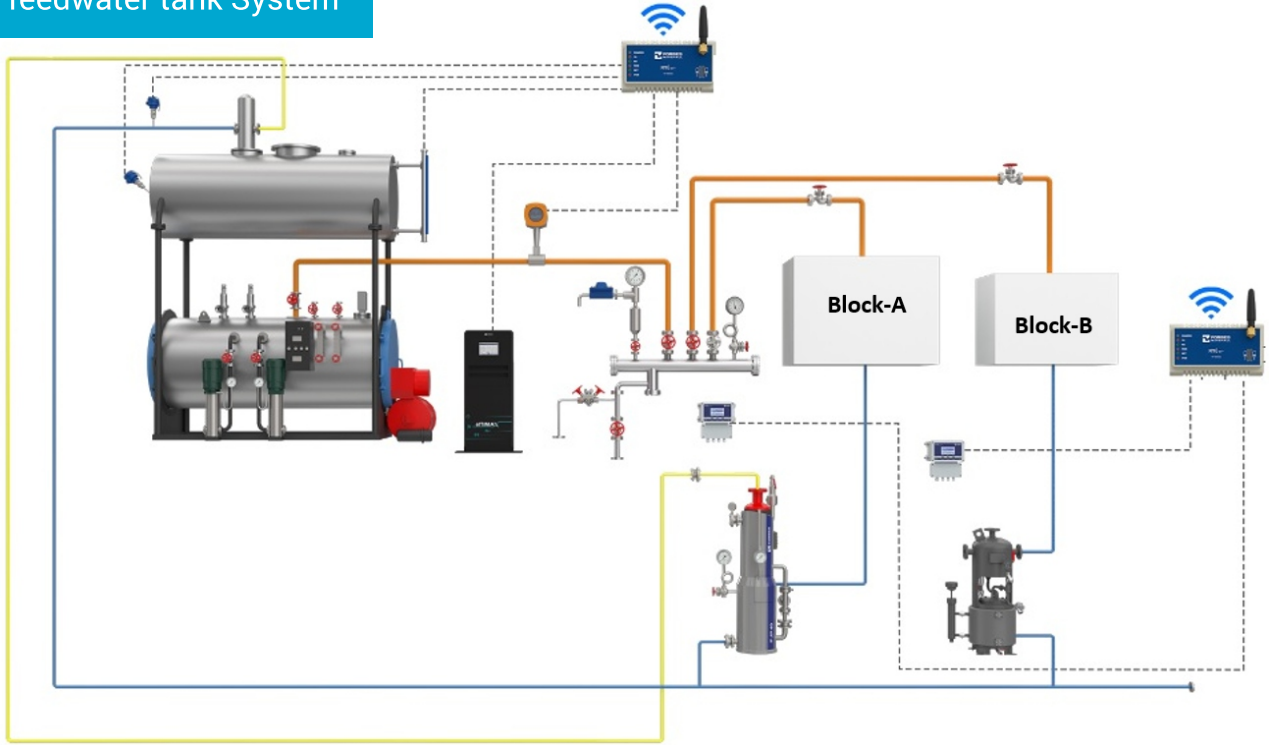


A case study

In one of our customer's plants, the data uncovered not only monthly variations but also frequent fluctuations within the same month in their CRF. By delving into this data, we were able to not only calculate the ideal CRF factor for their plant but also provided solutions that not only increased it but ensured sustained CRF and plant performance over time.



Smart feedwater tank System



What we do



Real-time Measurement of Condensate Recovery and Steam Consumed

Monitor CRF and trap performance online. The plant has steam flow-meters at the outlet of the boilers, condensate recovery meters on pumps, feed water tank level control and feed water tank temperature transmitter to facilitate this.



Asset Health and Uptime Maintenance

Ensure the optimal performance of condensate recovery pumps, control valves, steam traps and pipeline accessories.



Applying our Domain Knowledge and Market Expertise

Leveraging our in-depth domain knowledge and market expertise, we are committed to delivering excellence by learning from our past energy audits and the insightful analysis conducted by our team of energy experts.



Operational SOPs

Establish standardised operating procedures for maximum CRF.

Benefits



Reduced Carbon Emission

Sustaining feed water temperature through condensate recovery minimises fuel usage that leads to reduction in CO₂ emissions, aligning with our commitment to environmental sustainability.



Reduced Fuel Consumption

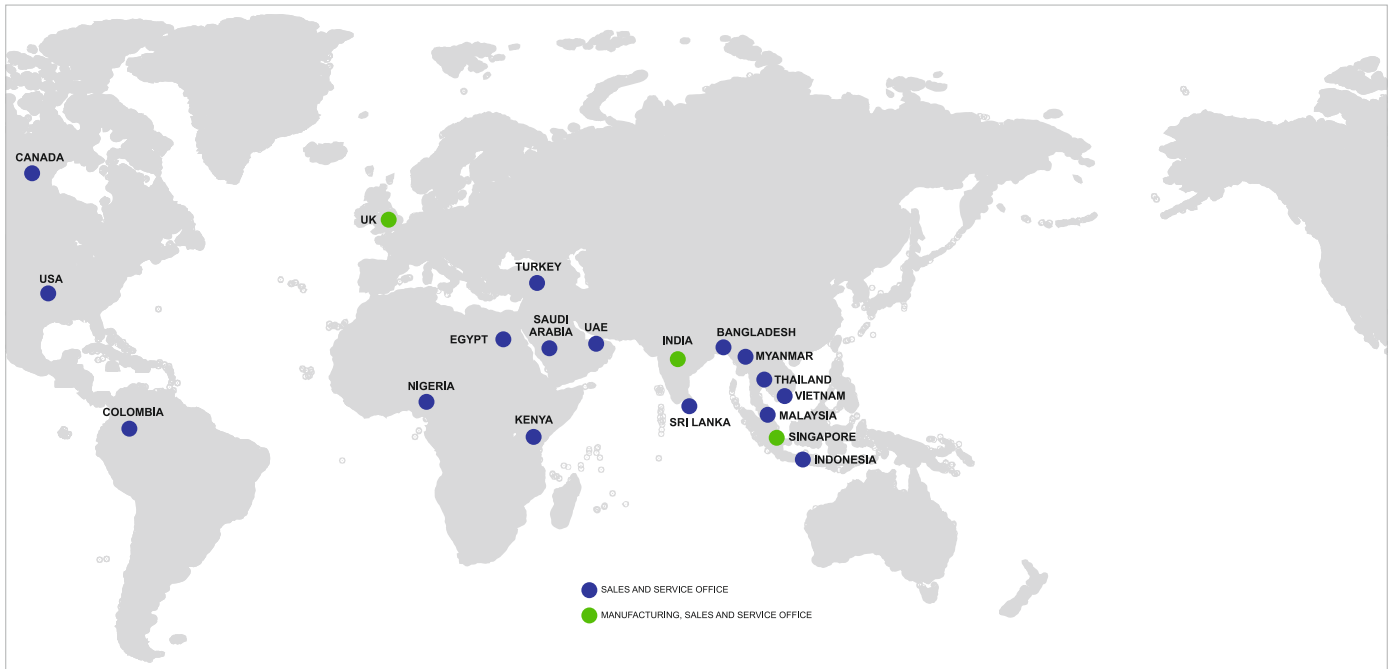
With condensate recovery there is an improvement in the feed water temperature leading to lower fuel consumption in the boiler. Sustaining feed water temperature is a key strategy for reducing the overall fuel bill, ensuring cost savings and operational efficiency.



Reduced Water Consumption

More condensate recovery means less dependence on freshwater, resulting in lower water consumption and reduced water bills. Sustainable condensate use enhances energy efficiency and promotes an environmentally conscious, cost-effective approach to water usage.

Energising Businesses and Communities Worldwide



A Multinational with Indian Roots

18	Countries
37	Offices Worldwide
18	Distribution Centres
500	Sales and Services Engineers
8,000	Customers Worldwide

World Class Technology from World Class Facilities



Enabling Results



Process Efficiency



Energy Efficiency



Optimum Productivity



Improved Asset Uptime



Environmental Responsibility



Safety and Regulatory Compliance



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