

STEAM, THE ULTIMATE **NATURAL TECHNOLOGY**

Steam is familiar in nature and part of life every day.
Yet this extraordinary fluid is a high efficiency, mission-critical tool
for diverse and important industries, and increasingly relevant as part of
our sustainable future. Steam is too small a word for it

This is Natural Technology.

NEXT STOP NET ZERO - NATURAL TECHNOLOGY THAT IS FUTURE READY NOW

STEAM HAS HELPED REVOLUTIONIZE MODERN INDUSTRY AND TECHNOLOGY.

With clean, efficient steam systems, we can sterilize medical equipment for an operation, produce vaccines and other pharmaceuticals, and even brew the beer on offer in your local pub.

But as we fight the climate emergency, is it realistic to talk about steam as an essential component of the journey to zero carbon? Can steam generation be decoupled from fossil fuels, making it a genuinely sustainable technology?

WITH NATURAL TECHNOLOGY, THAT IS EXACTLY WHAT WE ARE AIMING TO ADDRESS.

Today's boilers are highly efficient, minimizing the amount of energy needed. Steam also has a high heat content and energy density, which means that the production infrastructure and pipework can be compact, thus saving space and using less raw materials.

As the world moves towards more electricity production from renewables, steam will become even more sustainable and low carbon: it can be produced by clean electricity, green hydrogen or in biomass boilers, so making steam with reduced carbon emissions achievable right now. For example, it is a key part of energy solutions such as thermal storage and combined heat and power (CHP) systems.

Managed correctly, steam is intrinsically clean and safe. With no fire risk or toxic waste products, the only by-product is water. This can be condensed and re-used in a similar way to the natural water cycle of rain and evaporation that keeps our planet alive.

35%

OF INDUSTRIAL
HEATING IS A STEAM
SYSTEM

The potential benefits offered by steam are massive. For example, 35% of all the UK's industrial heating is achieved by steam systems. As 73% of the

UK's total energy demand is for heat, improving the efficiency of steam generation will have a big impact¹.

73%

OF UK ENERGY
IS HEAT

CLEAN TECHNOLOGY

To support these environmental objectives, Spirax Sarco is developing new technologies to ensure steam is a long-term part of our decarbonized future.

When used with 100% renewable power sources, such as hydroelectric, solar and wind, electric steam

generators have no emissions and generate no carbon dioxide. They can convert renewable electricity into steam at 97% energy conversion efficiency².

Another option is using green hydrogen as the fuel to heat water and generate steam. This technology also reduces flue gas volumes by 10 per cent, thus significantly improving boiler efficiency³.

Steam can also be generated by combustion of organic waste materials such as olive pulp, rice husks and palm kernel shells, which are the by-products of food production. This biomass can be used to generate electrical energy as well as heat, when used in a Combined Heat and Power (CHP) system. The reduction of organic waste and the utilization of biomass improves environmental sustainability, while also reducing energy bills.

STEAM IN PRACTICE

Clearly, there are benefits to be derived from different approaches to steam, but what does a steam system actually consist of?

TO SUPPORT ENVIRONMENTAL OBJECTIVES, SPIRAX SARCO IS DEVELOPING NEW TECHNOLOGIES TO ENSURE STEAM IS A LONG-TERM PART OF OUR DECARBONIZED FUTURE.

The core of a steam system is a boiler, which today often burns fuels, but could instead be run using electricity or biomass. The heat from the burner sends hot gases through tubes in the boiler, which run through the tank of water that is being heated.

Once the water is hot enough, it boils, and bubbles of steam are produced which are then routed through pipes and valves in the steam system. The temperature of the steam depends on the pressure in the boiler and might typically be $>150^{\circ}\text{C}$.

Once the steam reaches its destination in a factory or plant, there are many ways it can be used: for example, in an 'autoclave', which is a steam-filled chamber to sterilize medical equipment, or to boil or cook food, using a 'jacketed pan' which surrounds the pan with a jacket filled with steam.

Typically, the flow of steam will be measured at multiple points throughout the system, enabling energy consumption and efficiency to be closely monitored. As part of the growing digitalization of industry, including the shift to the Industrial Internet of Things (IoT), this presents an opportunity to optimize and automate the new steam technologies, to save money with preventative maintenance, and to drive greater efficiencies.

THE REDUCTION OF ORGANIC WASTE AND THE UTILIZATION OF BIOMASS IMPROVES ENVIRONMENTAL SUSTAINABILITY, WHILE ALSO REDUCING ENERGY BILLS.

MAKING A DIFFERENCE

STEAM IS A TRIED AND TRUSTED TECHNOLOGY, BASED ON WELL-UNDERSTOOD PRINCIPLES WITH RELIABLE OUTCOMES. STEAM PROVIDES A LOW-RISK, LOW-COST WAY TO REDUCE EMISSIONS ON THE ROUTE TO NET ZERO, WITHOUT REQUIRING THE 'RIP AND REPLACE' OF EXISTING INFRASTRUCTURE.

Natural Technology is supported by decades of engineering expertise. It is based on specific, measurable outcomes, which are substantial enough to make a real difference – and which enable organisations to clearly demonstrate their commitment to sustainability.

It will enable industry to de-couple from fossil fuels and embark on a more sustainable route to zero carbon steam systems for heat, power, and sterilization.

SOURCE

- 1 Aggreko Report (March 2021), included at www.natural-technology.com/en
- 2 www.anu.edu.au/news/all-news/anu-scientists-set-solar-thermal-record
- 3 www.natural-technology.com/en

Q&A

WITH SPIRAX SARCO'S REBECCA BOWEN

PROJECT MANAGER AND NATURAL TECHNOLOGY LEAD

Q. How long have you been at Spirax?

A. I've been with the company for over two and a half years now, but I really feel part of the furniture. Everyone has been so welcoming and there's a great support network in place.

2.5

YEARS AT
SPIRAX SARCO

Q. What's your job role?

A. **I AM A PROJECT MANAGER FOR OUR NEW DECARBONISED SUSTAINABLE SOLUTIONS AND AM INVOLVED IN IMPLEMENTING THESE PROJECTS WITH GLOBAL CUSTOMERS.**

The solutions we have today under our Target Zero range have all been ideated from our R&D department within Spirax, and I'm lucky to be leading the Project role out.

I also have taken the recent lead on Natural Technology, which is a brand agnostic marketing campaign looking to educate and advocate stakeholders on not only the benefits of steam, but also that steam can be part of a net-zero future.

Q. What you were doing before you started your role at Spirax?

A. Prior to working at Spirax I was working in the Downstream Oil & Gas sector, from Sales to Business Development, and then leading the team on New Product Development in Marketing. I have a strong sales / Business Development and Marketing background, and utilised these skills to scope out and create new products through customer insight, as well as launch new innovative products to the market place. I was also representing the sector at a UK and European level on Future Fuels and worked with Government on policy and legislation changes.

Q. Why did you choose to go into the field of engineering?

A. Engineering companies are continually innovating, whether it's through regulation and compliance change,

customer needs, or recognition that new value chains need to be built. I have always been a problem solver, and enjoy creativity and out the box thinking, working in this industry allows me to grow this skillset, and also develop many others.

Q. What does a typical day look like as a Project Manager for Spirax Sarco?

A. I can categorically say that no day is ever the same. As a Project manager implementing R&D projects with global customers and leading such a talented and diverse Project team, I do not get bored. I am regularly challenged, through either problem solving with the team, customer interaction, on site challenges... the list goes on. Being able to be flexible, adaptable and respond to change is an important part of this role.

Q. What's the best part of your job?

A. **WORKING WITH GREAT PEOPLE AND LEADING CHANGE.**

Q. What would be your advice for other women who want to get into a STEM/ Engineering profession?

A. Engineering already is enriched with such a diverse culture, there's a great learning opportunity for anyone to progress in this industry. The development opportunities are there, just ensure you grab hold of them!

Q. What is your favourite quote of all time, and why?

A. A well-known quote but one of my favourites. I try and lead by example, and I always try and be kind. I'm not afraid to challenge the norm, and be different.

“ BE THE CHANGE THAT YOU WISH TO SEE IN THE WORLD. ”

MANHATMA GANDHI

BE THE
CHANGE
YOU WISH
TO SEE

MAKING THE GRADE

CORMAC HANLY DISCUSSES THE IMPORTANCE OF EMPLOYING THE CORRECT GRADE OF STEAM FOR APPLICATIONS WITHIN FOOD PRODUCTION ENVIRONMENTS

Thanks to its thermal energy properties, steam offers an efficient, cost-effective way of transferring heat through the production process. Sterilising, cooking, pasteurising, blanching, sealing, curing, humidifying – there can be no doubting its usefulness.

However, there is more than one type of steam and it is important to make sure you are using the right one to reduce potential process hazards. There are different ways of assessing steam. One is its 'dryness fraction.' Dry steam simply means steam that has 5% or less water content. The quality of steam is a more relevant measure as it looks in detail at how the steam is produced, distributed, and applied, and grades its output.

Plant steam is the basic level – directly using steam generated by a boiler, with no further safeguards. Unsurprisingly, this grade carries the most risk as there will always be the potential for chemical and physical contaminants in plant steam. Boiler feedwater needs to be chemically treated to prevent corrosion and allow the steam system to function smoothly. This introduces the possibility of some being in the steam itself, especially when factors like boiler carryover are considered. Particles from within the boiler, or ageing pipework, may also be caught up in the steam, and checks should be regularly performed.

SO, IN THE FOOD PROCESSING ENVIRONMENT, PLANT STEAM MAY ONLY SAFELY BE USED WHERE IT DOESN'T MEET EITHER THE PRODUCT OR ANYTHING WHICH WILL CONTAIN THE PRODUCT.

The next stage up in quality is filtered steam. Here physical filters are used to trap any foreign bodies in the steam. Typically, a 5-micron filter is used, trapping 95% of all particles larger than 2-microns. It is best practice to install another pre-filter of 25 microns upstream from the finer one to prevent any rapid build-up of the main filter.

There is another term for filtered steam, and that's where confusion can occur. It is often referred to as 'culinary steam', which makes it appear to be the logical choice for food processing. Consequently, its use is widespread. However, it is worth considering a few points. The first is what that filter is designed to do – remove 95% of all particles. Leaving potentially 5% that won't be trapped. Then there is the unresolved issue of possible chemical contaminants. The filter isn't designed to deal with these, so a stringent testing regime will still be required.

95%
REMOVAL OF ALL
PARTICALS

Finally, there is the introduction of potential human error. When were the filters last checked, cleaned, or replaced? Are you certain they are performing adequately each time steam passes through them? Is the system designed to minimise the risks? The next level of steam quality is clean steam which relies on a secondary, dedicated boiler to produce the steam used in the production line. It also has a specially treated water supply, removing any chance of chemical contamination. Stainless steel metalwork and seamless welding all add to clean steam's attractiveness to food processors who want to eliminate any risk associated with steam production. Developments in clean steam for food processing are at an advanced stage too. Spirax Sarco, for example is developing a range of generators that take EC1935/2004 (relating to materials coming into contact with food) as their benchmark. The assumption that as you move up the steam quality hierarchy the costs increase is not always the case. Thanks to the treated water a clean steam system uses, there are significant potential cost savings by reducing the energy needed to produce steam. Operational efficiency and longevity of equipment are also positive points to count.

There is also the potential, by incorporating the steam's purity into the HACCP food safety regime, to demonstrate to customers that your commitment goes beyond the bare minimum, which is good for brand loyalty, customer satisfaction, and is something to make you stand out from the crowd. In addition, you will have mitigated the danger of an unwanted product recall.

5%
LESS WATER
CONTENT

DIGITALIZATION UNLEASHES THE POWER OF STEAM

IMAGINE THE MORE DIGITAL AND CONNECTED FACTORIES OF THE FUTURE.

In these environments, data gathered from sensors can be streamed seamlessly to the cloud, with this information being used to improve performance, boost efficiency, and increase reliability.

For steam systems, rapid advances in digitalization and the growth of the Internet of Things makes this kind of innovation and efficiency available today. Paired with steam technology, it holds the key to a sustainability revolution in industry.

STEAM – A NATURAL TECHNOLOGY

It is already possible to make steam systems highly efficient. But new approaches are going to help make steam a truly zero carbon technology. Boilers can be powered by electricity, for example, which can be provided by renewable generation such as wind or solar power. Electric steam generators can convert renewable electricity into steam at 97% energy conversion efficiency.¹

97%
ENERGY
CONVERSION
EFFICIENCY

Green hydrogen, created without carbon emissions, is another option to power steam boilers.

All of these alternatives could help organizations decarbonize their steam production. And it's all achievable at a surprisingly realistic level of investment, with re-use of existing equipment eliminating the need to put in costly new infrastructure.

But in order to quantify the return in these updates, demonstrate improvements to stakeholders and ensure the systems are living up to their full potential, there is another piece of the puzzle.

DATA DEMONSTRATES AND DRIVES RESULTS

Advances in digital technologies are enabling industrial plants to be monitored more closely than ever before and provide better visibility of asset performance. Sensors are affordable, compact and low-power, and often include the wireless connectivity needed to send their data back to a central server. Once this data is obtained, it can be processed locally, or sent to the cloud for analysis.

The data gathered from steam systems, such as from flowmeters, control valves, steam traps and heat exchangers means that relevant key performance indicators (KPIs) can be set. This will help the systems to deliver even greater efficiencies over the longer term.

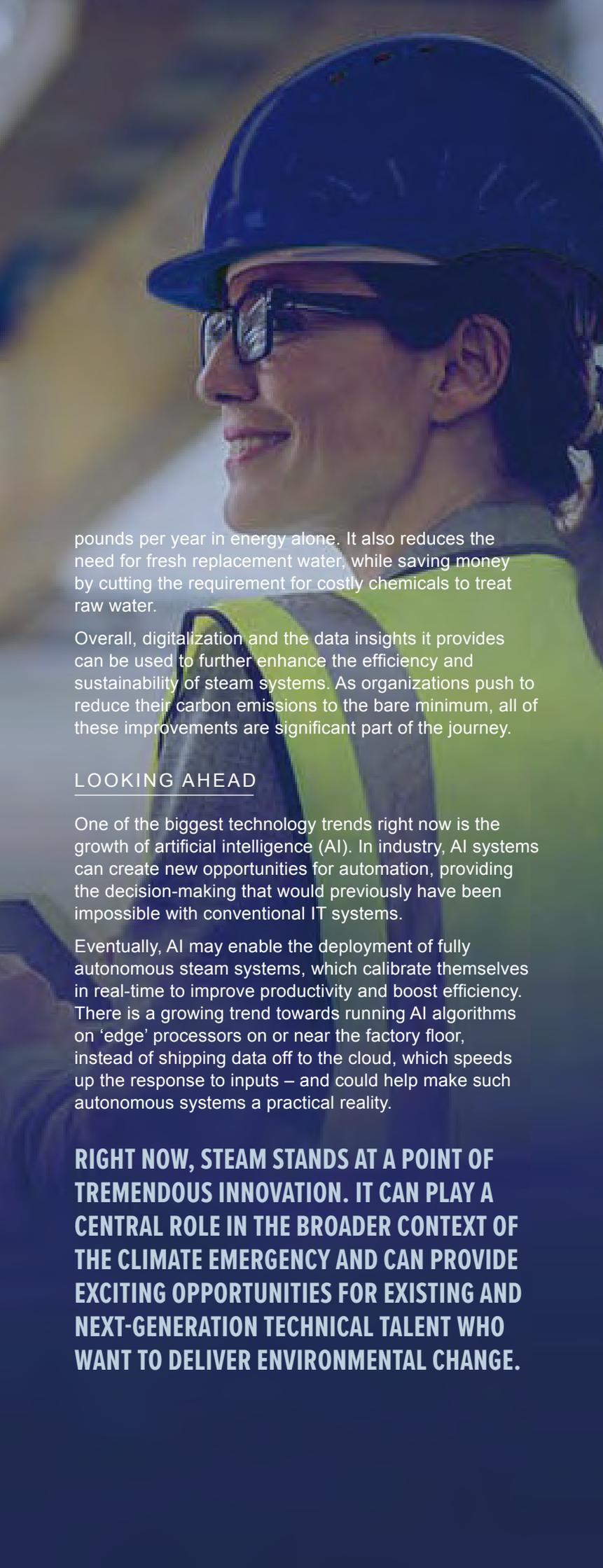
This data is also invaluable to monitor equipment for any problems. By spotting issues early, there's an opportunity for preventative maintenance, before any more severe issues might arise. This helps to minimize downtime, which can often be prohibitively expensive in large production plants. Preventative maintenance can also help reduce any leaks, thus reducing the demand for steam.

DIGITAL SOLUTIONS MEAN IT IS EASIER FOR STEAM SYSTEMS TO BE INTEGRATED INTO LARGER PLATFORMS.

Data from the steam systems gives full visibility to decision-makers and enables different solutions to be used depending on what is best at any particular time – for example, choosing when to generate and use steam in response to excess electricity available from solar cells.

Data can also enable better management of the condensate water in the system, and the steam traps used to remove it for return to the boiler. Condensate typically contains about 25% of the usable energy of the steam from which it came². Returning this to the boiler feed tank can save thousands of

25%
USABLE ENERGY
FROM
CONDENSATE



pounds per year in energy alone. It also reduces the need for fresh replacement water, while saving money by cutting the requirement for costly chemicals to treat raw water.

Overall, digitalization and the data insights it provides can be used to further enhance the efficiency and sustainability of steam systems. As organizations push to reduce their carbon emissions to the bare minimum, all of these improvements are significant part of the journey.

LOOKING AHEAD

One of the biggest technology trends right now is the growth of artificial intelligence (AI). In industry, AI systems can create new opportunities for automation, providing the decision-making that would previously have been impossible with conventional IT systems.

Eventually, AI may enable the deployment of fully autonomous steam systems, which calibrate themselves in real-time to improve productivity and boost efficiency. There is a growing trend towards running AI algorithms on 'edge' processors on or near the factory floor, instead of shipping data off to the cloud, which speeds up the response to inputs – and could help make such autonomous systems a practical reality.

RIGHT NOW, STEAM STANDS AT A POINT OF TREMENDOUS INNOVATION. IT CAN PLAY A CENTRAL ROLE IN THE BROADER CONTEXT OF THE CLIMATE EMERGENCY AND CAN PROVIDE EXCITING OPPORTUNITIES FOR EXISTING AND NEXT-GENERATION TECHNICAL TALENT WHO WANT TO DELIVER ENVIRONMENTAL CHANGE.



SOURCE

- 1 <https://www.anu.edu.au/news/all-news/anu-scientists-set-solar-thermal-record>
- 2 <https://www.spiraxsarco.com/global/en-GB/news/on-the-road-to-a-greener-future>

ON THE ROAD TO A GREENER FUTURE

HOW YOU CAN ACHIEVE QUICK WINS FROM YOUR STEAM SYSTEM.

Steam is an inherently natural medium and is something familiar that we can all understand on its simplest level – it is just the boiling of water, but with some totally unique properties.

This is why it has been adopted as the preferred method of delivering thermal energy and motive energy throughout our industrial history. Distributing steam around a system, a building or a process can be done safe in the knowledge that is just water in its gaseous state, but with far higher thermal qualities.

As technology advances, through methods of Green Generation and Thermal Battery technology, steam will continue to become increasingly sustainable, to capitalise on renewable sources and optimised through digital advances. Steam is a long and well-proven source of energy used across a wide range of applications and sectors including healthcare, pharmaceuticals, energy, food and drink. As businesses rise to an increasingly complex set of energy and sustainability challenges, the need for sustainable solutions is greater than ever. Northern Europe Business Development Manager at Spirax Sarco, Michael Hyde provides insight into what can be done today to optimise your steam system.

UNDERSTAND THE STARTING POINT FOR YOUR PLANT

There should be ongoing activities to look at how steam systems are currently operating and to make sure they are operating effectively and efficiently. Even when considering significant plant changes to address sustainability and energy, it is important to understand the starting point for your plant, the base-line energy consumption. Optimising the efficiency of your steam system could be easier than expected.

THERE ARE SEVERAL WAYS IN WHICH OPTIMISATION CAN BE REALISED:

- + ACHIEVING DEMAND REDUCTION THROUGH IMPROVED PLANT MANAGEMENT & PREVENTATIVE MAINTENANCE
- + ADOPTING STEAM SYSTEM BEST PRACTICE TO MINIMISE PLANT CONSUMPTION
- + ADDRESSING AREAS OF ENERGY LOSS BY IMPLEMENTING HEAT RECOVERY SYSTEMS & TECHNIQUES
- + MAINTAINING STEAM QUALITY TO MAXIMISE PROCESS EFFECTIVENESS
- + MEASUREMENT OF UTILITIES TO TREND AND OPTIMISE PERFORMANCE

But where to start? A good place to start is to take a look at your steam trap population, which is the most important link in the steam and condensate loop. We know that removing condensate and air from your steam system is essential whilst returning condensate to the boiler house maximises use of energy. A healthy steam trap population allows condensate to be removed from the steam system effectively meaning it can be re-used. Effective steam trapping through a management programme is a critical factor to ensuring a healthy steam trap population and can greatly contribute to lowering energy consumption, maintaining product quality and increasing productivity.

A STEP IN THE RIGHT DIRECTION

From trapping stations to specific trap devices, steam traps are considered to be one of the most effective resource-saving measures, so how can an effective steam trap management programme help you? There are four key benefits to consider:

HEALTH AND SAFETY

As with any utility in the plant, such as hot water or electricity, a steam system must be well managed to ensure safe operation. Correctly designed and operating steam trapping allows condensate to be effectively removed from the system, eliminating any potentially hazardous situations, such as pipe or component failure.

PRODUCTIVITY AND PROCESS IMPROVEMENT

Correctly functioning steam traps allow the steam system to deliver the thermal energy required for process applications to operate efficiently. Condensate in the steam supply can affect the operation of applications, causing issues such as slow start up times and poor heat transfer. Removing the condensate from the system allows the steam to perform its task effectively within the process.

SUSTAINABLE ENERGY SAVINGS AND REDUCED CARBON EMISSIONS

Condensate typically contains around 25% of the usable energy of the steam from which it came. Returning this to the boiler feed tank can save thousands of pounds per year in energy alone and reduces the requirement for fresh replacement water, whilst minimising the need for costly chemicals to treat raw water.

Condensate removed from the steam system and returned to the feed tank also reduces the need for boiler blowdown, which is used to regulate the concentration of dissolved solids in the boiler. This therefore reduces the energy lost from the boiler during the blowdown process – all contributing towards your overall sustainability goals.

LOWER COST OF OWNERSHIP

Removing the unwanted condensate from the system ensures there is less chance of damage from issues like waterhammer and corrosion. Steam traps remove the condensate as it forms, keeping better quality steam in the system and protecting pipework and equipment from erosion and corrosion.

EFFECTIVE STEAM TRAP MANAGEMENT IN PRACTICE. DON'T JUST TAKE OUR WORD FOR IT...

The stats really do speak for themselves. Take this example of the largest food factory in Europe. The Heinz factory in Wigan produces canned soups, baked beans, pasta and puddings for the UK and European market, and its on-site energy centre generates up to 140 tonnes of steam per hour to keep the canning lines running. In order to reduce carbon emissions and save energy, Heinz worked with Spirax Sarco to implement a steam trap management programme at the Wigan site following the success of a previous, one-off steam trap survey, which saved enough energy and treated water to pay for itself in less than nine months.

140
TONNES OF STEAM
PER HOUR

Spirax Sarco engineers surveyed the site every six months; checking, tagging and recording the condition of each steam trap.

“ WHEN SPIRAX SARCO CARRIED OUT THE ORIGINAL SURVEY THEY PUT IN A CONSERVATIVE ESTIMATE OF SAVINGS AND WE ENDED UP SAVING MUCH MORE. IT HELPED US DECIDE TO OPT FOR THE THREE-YEAR PROGRAMME. IF THE NEW SAVINGS ESTIMATES ARE CORRECT, THE PROGRAMME OFFERS EXCELLENT VALUE FOR MONEY AND SHOULD HELP US ACHIEVE A 4% REDUCTION IN ENERGY CONSUMPTION AND REDUCE OUR CARBON EMISSIONS BY 200 TONNES A YEAR.

”

says Barry Aspey, the Utilities Manager for Heinz.

.....
Could you be achieving similar results? The first step on the road to a greener future is to ensure all systems are working correctly and fully optimised – often the quickest wins too.

EFFICIENT STEAM TRAP MANAGEMENT

HOW TO MAINTAIN A SAFE, LOWER CARBON AND ENERGY-EFFICIENT STEAM SYSTEM

Implementing an effective steam trap management plan, doesn't need to be complicated. Lowering Carbon output, increased production and energy savings are all benefits you could achieve from regular management.

So, why is effective steam trap management so important? A healthy steam trap population allows condensate to be removed from the steam system effectively, this means that process efficiency can be optimised, equipment is protected and the condensate can be re-used. All factors that contribute to your overall sustainability targets.

LET'S START WITH FOUR KEY BENEFITS OF EFFECTIVE STEAM TRAP MANAGEMENT

1

HEALTH AND SAFETY

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effectively removed from the system, eliminating any potentially hazardous situations, such as pipe or component failure.

2

PRODUCTIVITY AND PROCESS IMPROVEMENT

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3

SUSTAINABLE ENERGY SAVINGS AND REDUCED CARBON EMISSIONS

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25%
OF USEABLE
ENERGY

feed tank can save thousands of pounds per year in energy alone and reduces the requirement for fresh replacement water, whilst minimising the need for costly chemicals to treat raw water.

Condensate removed from the steam system and returned to the feed tank also reduces the need for boiler blowdown, which is used to regulate the concentration of dissolved solids in the boiler. This therefore reduces the energy lost from the boiler during the blowdown process – all contributing towards your overall sustainability goals.

REDUCING
ENERGY LOST
FROM THE
BOILER

4

LOWER COST OF OWNERSHIP

Removing the unwanted condensate from the system ensures there is less chance of damage from issues like waterhammer and corrosion. Steam traps remove the condensate as it forms, keeping better quality steam in the system and protecting pipework and equipment from erosion and corrosion.

EFFECTIVE STEAM TRAP MANAGEMENT IN PRACTICE. DON'T JUST TAKE OUR WORD FOR IT

The stats really do speak for themselves. Take this example of an oil refinery we worked with. Let's break down the story below.

MAIN OBJECTIVE

To reduce their overall energy costs and carbon output, improve safety and production performance.

OUR ACTION

- + Spirax Sarco carried out a turnkey project involving a wide ranging steam trap and energy audit of the plant.
- + Steam trap issues identified:

20% OF STEAM TRAPS ON SITE HAD FAILED LEADING TO SIGNIFICANT LOSSES.

OUR ACTION ON SITE

The joint action plan we decided on was to install new steam traps, to help solve their issue.

- + Energy savings after one year

£100,000

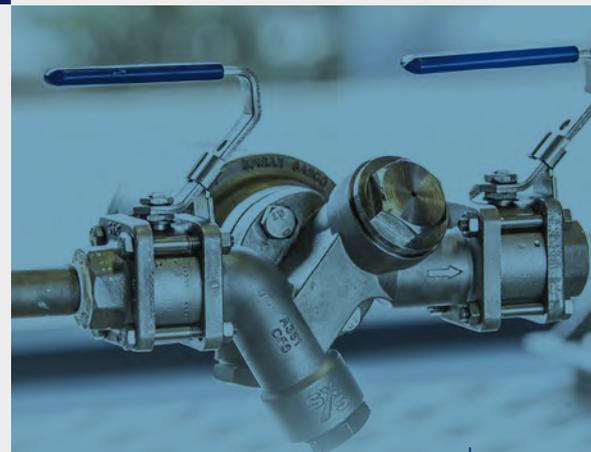
- + Payback period

1 YEAR, 4 MONTHS

IF YOU'RE THINKING ABOUT THE HEALTH OF YOUR STEAM SYSTEM, BELOW ARE SOME COMMON CAUSES TO LOOK OUT FOR THAT CAN HAMPER ITS PERFORMANCE:

- + Infrequent steam trap surveys
- + The presence of corrosion and certain site conditions
- + Localised flash steam plumes
- + Excessive boiler feed tank temperatures
- + Improper sizing, equipment or installation

A HEALTHY STEAM TRAP POPULATION ALLOWS CONDENSATE TO BE REMOVED FROM THE STEAM SYSTEM EFFECTIVELY, THIS MEANS THAT PROCESS EFFICIENCY CAN BE OPTIMISED, EQUIPMENT IS PROTECTED AND THE CONDENSATE CAN BE RE-USED.



STEAM WILL BE CENTRAL TO THE TRANSITION TO GREENER TECHNOLOGIES

More and more industries and organisations are recognising steam as the Natural Technology that fits with their responsibility agendas. With new steam generation technologies, we're on a path towards carbon-free steam generation.



more likely to invest in greener steam technology following Covid-19.

% of survey respondents,
Source: Aggreko Report March (2021)



of all the UK's industrial heating is achieved by steam systems. Since **73%** of the UK's industrial energy demand is for heat, raising the efficiency of steam generation will make a huge sustainability impact long-term.

Source: Aggreko Report March (2021)



immediate energy savings through better maintenance and low-cost improvements of steam systems.

% of survey respondents,
Source: Aggreko Report March (2021)

LIFE DEPENDS ON IT

Steam lets us live on Earth.

The steam and condensate loop emulates the water cycle, which controls planetary temperature and provides hydration for all life.

Steam lets us leave Earth.

The Saturn V rocket used two of the biggest steam engines ever made.