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Advance

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FOR A NATURALLY EFFICIENT AND SUSTAINABLE TOMORROW

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SUSTAINABLE STEAM GENERATION: POWERING A GREENER FUTURE

In the pursuit of a sustainable and eco-friendly future, the importance of transitioning to clean and renewable energy sources cannot be overstated.

Among the various methods of energy production, steam generation plays a significant role in many key industries, electricity generation, and district heating systems. By adopting sustainable practices in steam generation, we can reduce greenhouse gas emissions, improve energy efficiency and pave the way for a greener and more sustainable world. In this blog, we will explore the concept of sustainable steam generation, its benefits, and key strategies that can be employed to achieve it.

THE SIGNIFICANCE OF SUSTAINABLE STEAM GENERATION

Steam generation is an integral part of many industries, including Food and beverage, manufacturing, power plants, refineries, chemical processes, and district heating systems. Traditionally, steam generation has relied heavily on fossil fuels, leading to significant carbon emissions and environmental concerns. However, by embracing sustainable practices, we can transform steam generation into a clean and environmentally friendly process.

CONTINUOUS MONITORING AND OPTIMIZATION

Regular monitoring, analysis, and optimisation of steam generation processes are crucial for maintaining efficiency and identifying areas for improvement. Advanced monitoring systems and predictive analytics can help identify inefficiencies, optimize operations, and minimize downtime, leading to more sustainable steam generation practices.

Sustainable steam generation is a vital component in our journey towards a greener and more sustainable future. By embracing renewable energy sources, improving energy efficiency, utilizing waste heat, generating steam from carbon zero sources and exploring technologies like CCS, we can significantly reduce greenhouse gas emissions and mitigate environmental impact. Emphasising continuous monitoring and optimisation ensures that steam generation processes operate at their peak efficiency. Through these concerted efforts, we can harness the power of sustainable steam generation to propel us towards a cleaner, more sustainable world for generations to come.

COMBINED HEAT AND POWER (CHP) SYSTEMS

CHP systems, also known as cogeneration, are an effective way to achieve more sustainable steam generation. By simultaneously producing electricity and useful heat from a single fuel source, CHP systems can achieve higher overall energy efficiency and reduce greenhouse gas emissions. Steam turbines integrated with CHP systems can generate electricity while harnessing the waste heat, providing a sustainable solution for various industries.

CARBON CAPTURE AND STORAGE (CCS)

In cases where fossil fuels are still used for steam generation, implementing Carbon Capture and Storage (CCS) technology can help reduce or remove carbon emissions. CCS involves capturing CO2 emissions from steam generation processes and storing them underground, preventing them from entering the atmosphere and contributing to climate change.

SUSTAINABLE STEAM GENERATION IS A VITAL COMPONENT IN OUR JOURNEY TOWARDS A GREENER AND MORE SUSTAINABLE FUTURE.

BY ADOPTING SUSTAINABLE PRACTICES IN STEAM GENERATION, WE CAN REDUCE GREENHOUSE GAS EMISSIONS, IMPROVE ENERGY EFFICIENCY AND PAVE THE WAY FOR A GREENER AND MORE SUSTAINABLE WORLD.

TRANSITIONING TO RENEWABLE ENERGY SOURCES

One of the primary strategies for achieving sustainable steam generation is shifting from fossil fuels to renewable energy sources. Some viable options include:

BIOMASS:
Biomass steam generation utilizes organic materials such as wood chips, agricultural and food residues, or dedicated energy crops to produce steam. By burning biomass, carbon emissions are reduced as the process releases only the carbon that the plants absorbed during their growth.

CONCENTRATED SOLAR POWER (CSP):
CSP harnesses the power of sunlight to generate steam through the use of mirrors or lenses that concentrate solar energy. This method provides a sustainable and emission-free source of heat for steam generation.

GEOTHERMAL ENERGY:
Geothermal steam generation utilizes the natural heat from the Earth's core to produce steam. This renewable energy source is abundant and can power steam turbines without relying on fossil fuels.

ELECTRIC:
Decarbonising the power that generates steam is, of course, a critical step. The usual method here is to switch from gas-fired to electricity, whether with a new boiler once the existing equipment reaches end-of-life or by retrofitting the burner. Electricity generation itself is rapidly changing to relying more on renewable sources, but in the near term, using electricity will incur more operational costs than gas. That isn't stopping organisations from acting now, with the UK's National Health Service recently negotiating a new energy supply deal to ensure 100% renewable electricity across its building portfolio. By procuring renewable electricity, they can also remove the scope 2 emissions associated with electricity use.

100%
RENEWABLE ELECTRICITY

ENERGY EFFICIENCY AND WASTE HEAT RECOVERY

Improving energy efficiency in steam generation systems is essential for sustainability. By implementing energy-saving practices and technologies, we can reduce energy waste and enhance overall system performance. Key strategies include:

HIGH-EFFICIENCY BOILERS
Modern, well-maintained boilers with advanced combustion and heat transfer technologies can significantly improve energy efficiency and reduce fuel consumption.

WASTE HEAT RECOVERY:
Capturing and utilizing waste heat from steam generation processes can be employed to preheat feedwater, generate additional steam, or provide heat for other industrial processes, thereby maximizing energy utilization and minimizing waste.

Sustainability | Energy Management | Efficiency | Safety

INTRODUCING ADVANCE STEAM CONSULTING

FROM SPIRAX SARCO

You see steam; we see natural technology enabling sustainable futures. Through Advance, Spirax Sarco gives your business a clear forward vision, harnessing the power of steam while optimising productivity for naturally efficient and sustainable futures.

Spirax Sarco Advance delivers proven consulting, products and services so you benefit from the capabilities of this powerful medium while decarbonising and working towards net zero.

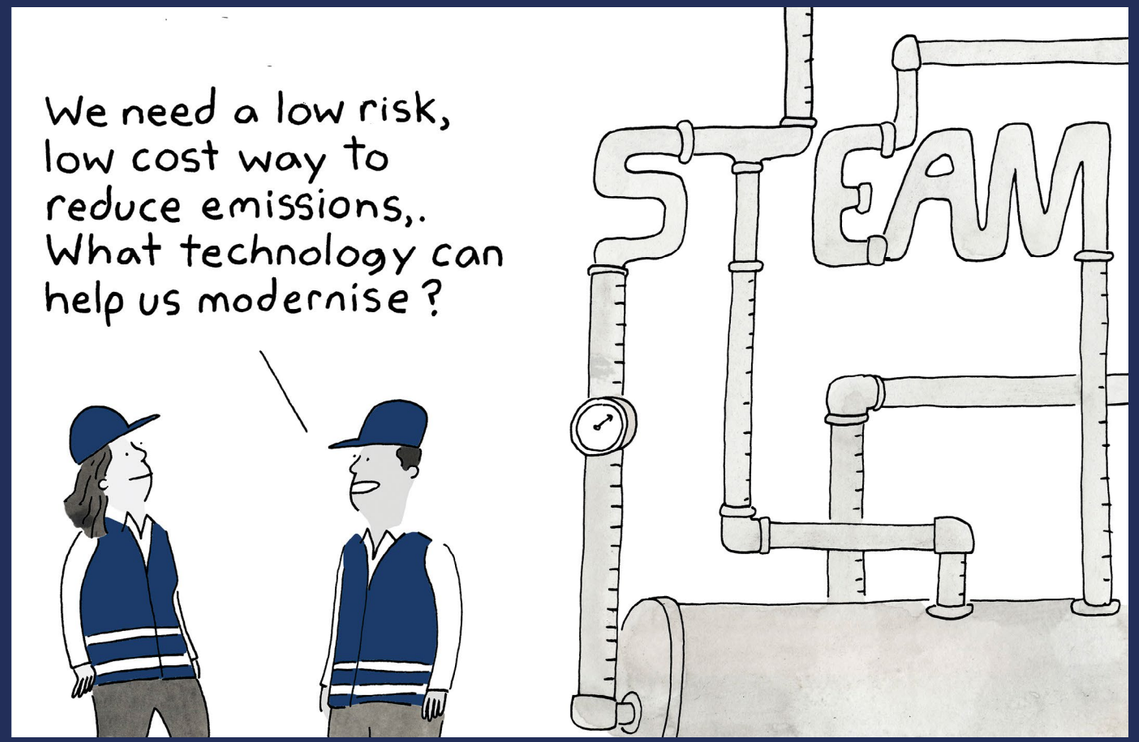
Advance is your gateway to tailored solutions that deliver twenty-first-century steam-powered operational efficiency, help you meet your sustainability targets and solve multiple business challenges.

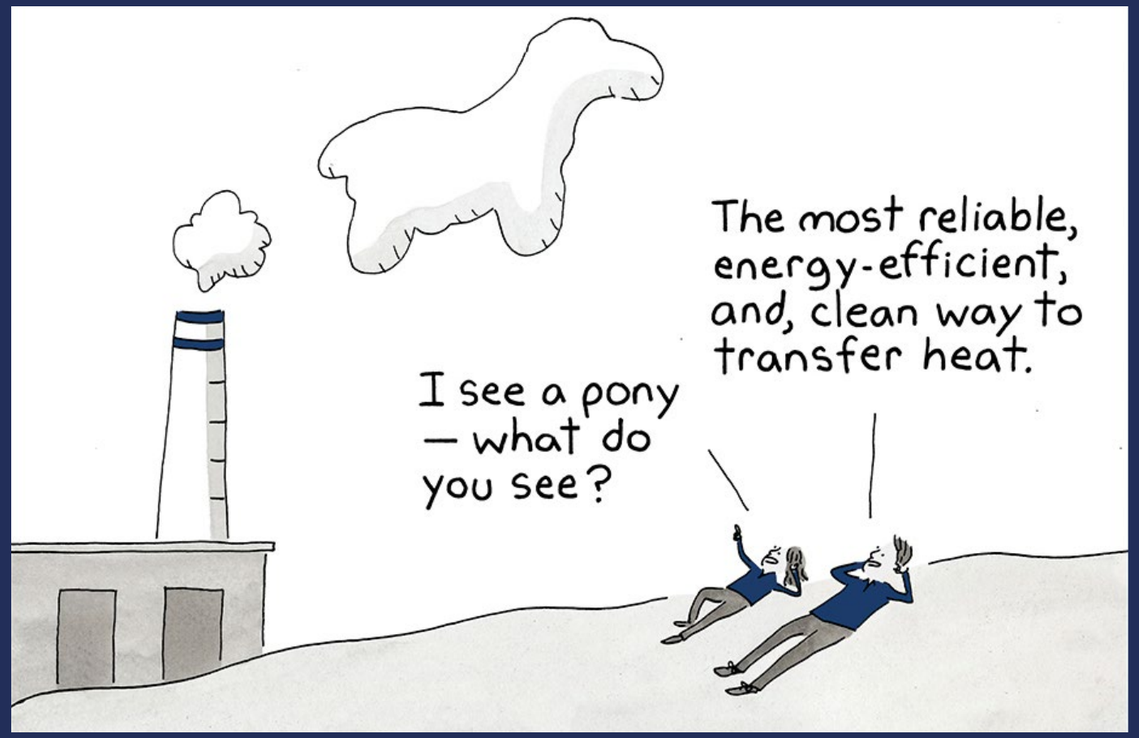
ENGINEERING WITH PURPOSE

To engineer a more efficient, safer and sustainable world you need the right steam and thermal energy partner.

ADVANCE. IT'S TIME TO MAKE THE MOST OF STEAM AS PART OF YOUR DECARBONISATION JOURNEY.

MAKE THE MOST OF STEAM IN YOUR SUSTAINABLE FUTURE





When steam's job is done, it only leaves behind water

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TRANSLATING CARBON REDUCTION GOALS INTO DELIVERABLES FOR BUSINESS WITH STEAM SYSTEMS

The climate crisis is one of, if not the biggest, challenges facing humanity. From increasingly extreme weather events to loss of biodiversity and rising sea levels, it has huge implications for global social, economic, and environmental systems.

With time running out and scientists issuing final warnings, the fight against climate change has gained a lot of momentum across the globe. The push to reduce greenhouse gas emissions and our collective carbon footprint impacts nearly all aspects of our lives.

But with growing pressure from governments to hit net zero by 2050 and limit global warming to 1.5°C, businesses shoulder a lot of the responsibility. One of the most significant ways businesses can combat climate change is by reducing carbon emissions across Scope 1, 2, and 3 emissions:

01 SCOPE 1
DIRECT EMISSIONS FROM OWNED OR CONTROLLED RESOURCES

02 SCOPE 2
INDIRECT EMISSIONS FROM THE GENERATION OF PURCHASED ENERGY

03 SCOPE 3
INDIRECT EMISSIONS NOT COVERED IN SCOPE 2

But reducing carbon emissions isn't easy — especially for companies that use industrial steam systems. The good news is that it's possible to significantly reduce your carbon footprint and save money and energy at the same time. One of the best ways to do this is to set ambitious (but achievable) carbon reduction goals and translate them into operational deliverables.

At Spirax Sarco, we specialise in helping businesses to optimise their steam systems. Through optimisations and upgrades, we've helped countless businesses:

- **SAVE MONEY**
- **REDUCE ENERGY CONSUMPTION**
- **LOWER CARBON EMISSIONS**
- **HIT SUSTAINABILITY TARGETS**

This guide has everything you need to know about carbon reduction goals and your journey to net zero. It has everything from the reasons they're essential to converting goals into deliverables.

THE NEED FOR CARBON REDUCTION TARGETS

Scientists worldwide have voiced a clear and urgent consensus that we need to make drastic changes to reduce the effects of climate change. Climate change is a substantial threat to our planet, and overwhelming evidence shows that it's caused primarily by us. Without any action on our part, we're likely to see significant changes in the world around us:

+ More frequent and severe heat waves disrupting ecosystems and agriculture
+ Extensive flooding of coastal cities and displacement of millions due to rising sea levels
+ Collapse of coral reefs due to ocean acidification
+ More intense and frequent extreme weather events
+ The extinction of species that are unable to adapt
+ A rise in infectious diseases, malnutrition and mental health issues.

SETTING REALISTIC AND ACHIEVABLE TARGETS THAT TAKE INTO ACCOUNT THE SIZE OF YOUR COMPANY, YOU SECTOR, AND YOUR RESOURCES IS KEY TO A SUSTAINABLE CARBON REDUCTION STRATEGY.

As individuals, we can all do our bit to reduce carbon emissions and the effects of global warming. But businesses, as key contributors to carbon emissions, have a crucial role to play, and that's where carbon reduction goals come in.

Establishing carbon reduction targets is a practical step that businesses can take to contribute to the climate effort. Your targets serve as clear and quantifiable goals that can guide and motivate your company's eco-initiatives. But they also help you to monitor progress and demonstrate your commitment to environmental responsibility. **But setting targets is just the first step.**

To effectively reduce carbon emissions, you first need to understand where they come from and work out how to improve them. This is particularly true for businesses that rely on steam systems that can be a significant source of carbon emissions.

The good news is that steam can be clean. In the following sections, we'll explore how you can:

UNDERSTAND AND SET CARBON REDUCTION GOALS

IDENTIFY KEY AREAS FOR CARBON REDUCTION

TRANSLATE GOALS INTO ACTIONABLE TEAM DELIVERABLES

UNDERSTANDING CARBON REDUCTION GOALS

Governments around the world are acknowledging the importance of reducing carbon emissions. This has resulted in the creation of new regulations and targets for carbon reduction. On local, national and international levels, new policies are being implemented to try and reduce the effects of global warming.

The UK Government was the first major economy to pass net zero emissions laws. The new law requires the UK to bring all greenhouse gas emissions to net zero by 2050. This new law has seen the ban on petrol and diesel vehicle sales beyond 2030 but has also brought in industry-specific goals and benchmarks.

However, these goals won't be completed overnight. The journey to carbon neutrality is a marathon, not a sprint. Balancing the need to make changes, the external pressures and your company's capabilities is crucial.

SETTING REALISTIC CARBON REDUCTION GOALS

Setting realistic and achievable targets that take into account the size of your company, your sector, and your resources is key to a sustainable carbon reduction strategy. The most effective strategies focus on gradual, sustainable changes rather than dramatic, unsustainable shifts.

LIMIT GLOBAL WARMING TO LESS THAN
2^0C

Carbon reduction goals vary drastically depending on the size and sector of a business. But many businesses are using science-based targets. These reduction targets align with the Paris Agreement's goals to limit global warming to less than 2°C above pre-industrial levels and pursue efforts to limit warming to 1.5°C. These targets are usually split into absolute targets and intensity targets:

+ ABSOLUTE TARGETS
A company may aim to reduce its carbon emissions by a certain amount over a specified period.

+ INTENSITY TARGETS
A company may aim to reduce its carbon emissions by a certain amount over a specified period.

Before you can set any targets, you need to understand your emissions. You can do this by conducting a carbon footprint analysis to analyse where your emissions come from. This will include Scope 1,2 and 3 emissions.

Once you have the results from your analysis, you can establish a baseline for your emissions. Your emissions baseline will be the level which you measure your progress against.

Next, you'll need to identify opportunities to reduce your emissions which we'll discuss in the next section. With your baseline emissions and opportunities identified, you can move on to setting your reduction targets. For example.

+ YOUR ABSOLUTE TARGET MAY BE:
A company may aim to reduce its carbon emissions by a certain amount over a specified period.

+ YOUR INTENSITY TARGET MAY BE
You commit to reducing your carbon emissions by 50% by 2030 compared to 2020 levels.

IDENTIFYING KEY AREAS IN STEAM SYSTEMS FOR CARBON REDUCTION

When setting goals for carbon reduction, it's crucial to identify key areas for potential improvements. In the context of steam systems, several key areas can drastically reduce your carbon emissions quickly:

ENERGY EFFICIENCY IMPROVEMENTS

One of the best ways to reduce the carbon emissions from your steam system is to reduce the energy required to run it. This can often be achieved through better insulation, regular maintenance and improved heat recovery.

FUEL SWITCHING AND ALTERNATIVE ENERGY SOURCES

Reliance on fossil fuels is the biggest driver of climate change. Changing to cleaner fuels can significantly reduce the carbon emissions from your steam systems. Integrating renewable energy sources, like solar and wind power, can reduce your reliance on fossil fuels and lower your carbon footprint significantly.

STEAM SYSTEM OPTIMISATION

Inefficient systems lead to a lot of energy wastage. You can make your whole system more efficient by improving steam trap management, automating controls, improving condensate recovery and implementing other measures.

Steam has the potential to be a natural, clean technology when appropriately managed. But achieving carbon reduction goals go beyond these key areas.

DEVELOP

A carbon reduction roadmap — This roadmap should outline the steps you'll take to meet your carbon reduction goals. It will provide you with a clear path forward and help everyone stay on track.

CREATE

Team-specific goals — Different teams within your company will have different roles to play in reducing carbon emissions. By setting team-specific goals, you can ensure everyone knows what they need to do and how they're helping hit your overall target.

ENCOURAGE COLLABORATION

Climate change affects us all, and we're in it together. Foster an environment where everyone feels they can make a difference and contribute to reducing carbon emissions. You can do this with regular team meetings, brainstorming sessions and collaborative projects.

MONITOR & REPORT PROGRESS

Set up a system for tracking your progress towards your goals. Doing this can help you to maintain your momentum. It's also important to share this information with your team and stakeholders, as it keeps everyone informed and motivated to achieve your goals.

ADAPT & SCALE

As you progress towards your goals, look for new ways to improve and innovate. If you have a strategy that works well in one area, test it to see if it will work in other areas.

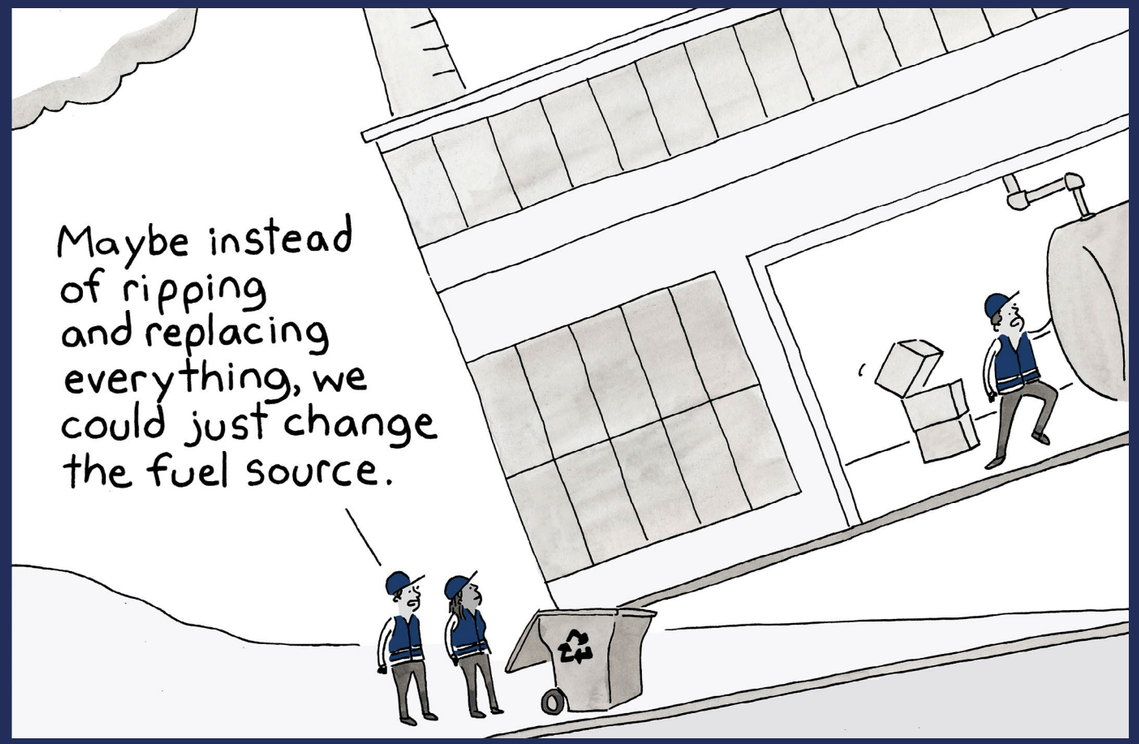
HIT YOUR NET ZERO TARGETS WITH SPIRAX SARCO

The path to net zero is not a straightforward one, but the rewards will be worth it. Beyond helping to reduce the effects of global warming, companies that hit their goals also reap the benefits of a boost in corporate reputation, cost savings and customer goodwill.

Translating these high-level goals into practical, achievable team deliverables can be a complex process. But you don't have to navigate this process alone. Our Advance consulting service is designed to help you hit your carbon reduction goals and work towards a healthier planet.

Our Advance Consulting is split into six stages that identify optimisation and upgrade opportunities to make your steam system cleaner and green.

REAP THE BENEFITS OF A BOOST IN CORPORATE REPUTATION, COST SAVINGS AND CUSTOMER GOODWILL



When steam's job is done, it only leaves behind water

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STEAM CONSULTING FROM
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Sustainability
Energy Management
Efficiency
Safety
FOCUS ON DELIVERING VALUE TODAY
FOR A SUCCESSFUL AND SUSTAINABLE TOMORROW
To engineer a more efficient, safer and sustainable world you need the right steam and thermal energy partner.
Whatever your key drivers, Spirax Sarco have you covered.
Find out more at spiraxsarco.com/advance
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