



CO₂ reduction in industrial production companies



WHITE PAPER

**What options do you have and
what support can you count on?**
Find out in this report.

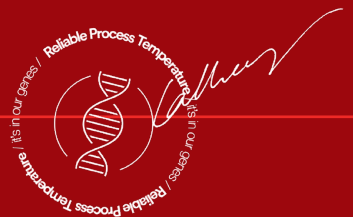




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Introduction

Industry has played a key role in the transition to a low-carbon society for many years. Initial efforts were driven by cost savings and process optimization. Now, legislation, social expectations, and energy uncertainty are leading the way.

Europe is already stepping up the pressure with ambitious targets.

- **Greenhouse gas emissions must be reduced by at least 55% by 2030 compared to 1990 levels.** This target is a binding ambition and a necessary response to the climate crisis and part of the broader European Green Deal.
- **At the same time, the pressure of high and volatile energy prices also plays an important role.** They undermine the competitiveness of European industry and force companies to fundamentally review their energy consumption.
- **With stricter emission standards, Europe wants to create leverage to accelerate the transition to a more sustainable, efficient, and resilient industry.**



However, CO₂ reduction is more than just a legal obligation. It represents a unique opportunity to work on energy efficiency, future-proofing, and operational security.

Callens is playing a pioneering role in this. With a smart combination of proven technologies, Callens supports industrial companies in making their installations more sustainable. From electrification and heat recovery to the reuse of residual flows and efficient emission control: step by step, we are working together towards a sustainable industry.

This report brings together insights, challenges, and opportunities relating to industrial CO₂ reduction. In the following chapters, we will guide you through the policy framework, explain why reducing CO₂ emissions is not only a matter of compliance or commitment, but also a clear economic choice, and demonstrate how Callens can help your company become more sustainable in an efficient and future-oriented way.

Legislative framework and sustainability objectives

Why waiting is no longer an option

The ecological transition of industry is no longer a distant vision of the future. It has become a policy reality. European governments are fully committed to making existing industries more sustainable. New rules, higher CO₂ costs, and targeted support programs are following each other in rapid succession.

If your company continues to wait and see, you will be taking ever greater strategic and financial risks. It is therefore crucial to make the switch now in order to remain competitive tomorrow.

European Fit-for-55 accelerates industrial transition

The European Green Deal aims to achieve a climate-neutral economy by 2050. For you as a company, this means faster, more efficient, and above all greener production. This ambition was given extra impetus with the Fit for 55 package, which aims to reduce greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels.



The message is clear: those who emit CO₂ will increasingly pay a price for it, both financially and strategically. At the same time, opportunities are emerging for companies that do invest in energy savings, electrification, and alternative energy and production technologies. If you take the lead now, you will strengthen your competitive position in the long term.

Clean Industrial Deal focuses on low-carbon industry

As part of this broad European strategy, the Clean Industrial Deal aims to modernize industrial facilities. **It promotes electrification, heat recovery, reuse of waste streams, and capture of emissions through technologies such as Carbon Capture, Utilization & Storage (CCUS).** Areas in which Callens has specialized for many years.



As a company, this deal not only gives you responsibility, but also the resources to become more sustainable. Think of investment support, adapted regulations, and customized guidance.

Today's actions determine tomorrow's profits

The legislative framework is clear: CO₂ reduction is no longer an extra, but a core task for every industrial player. Not only to comply with legislation, but also to ensure energy security, profitability, and future-proofing.



Companies that invest in proven technologies now are not only building a more sustainable business, but also a stable and competitive future.

EU ETS makes emissions more expensive

A crucial lever within that policy is the EU Emissions Trading System (EU ETS). Under that system, companies are allocated emission allowances, which they may or may not have to purchase. Those allowances will be phased out at an accelerated rate from 2026 onwards. For many carbon intensive companies, this could lead to structural additional costs that threaten their competitive position.

In addition, free allowances will be phased out gradually and a second system, ETS II, will be introduced, focusing on buildings and mobility. Although this system primarily falls outside the scope of industry, it will indirectly put pressure on (energy) prices for industrial users.

Finally, the Carbon Border Adjustment Mechanism (CBAM) will also come into effect: a carbon tax on imported products from countries without comparable climate measures.

All of this increases the urgency for European companies to rapidly reduce their emissions and make their production more sustainable.



Challenges for CO₂ reduction

Between ambition and reality: where's the disconnect?

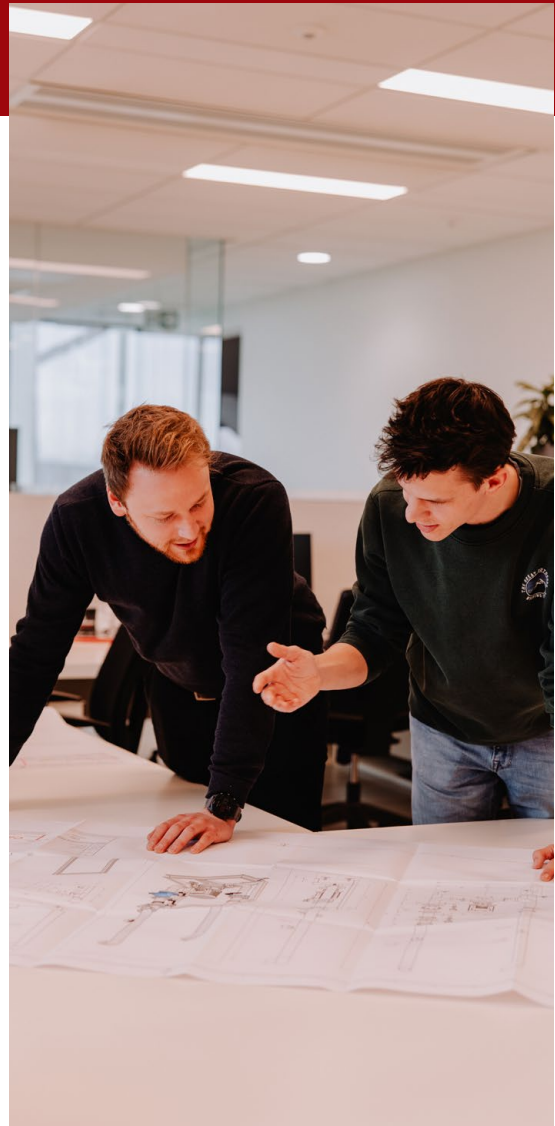
The will is there. The need is there. And so is the technology. Yet CO₂ reduction remains a complex process for many industrial manufacturing companies. There are many considerations to be made at different levels, which makes it difficult to find the right match between technology, timing, and context.

1. Economic considerations: investing at the right time

The industrial economy remains volatile. High energy prices, uncertainty about long-term returns, and pressure on margins are prompting companies to spread their investments strategically. This makes it difficult to opt for sustainability in the short term, no matter how rational that choice may seem in the long term.

2. Technical complexity of existing infrastructure

Many installations have been running for decades. They have been modified, expanded, modernized, and have evolved into highly customized systems. As a result, the



transition to alternative energy sources such as electricity, hydrogen, or biogas is rarely plug-and-play.

Any modification to an existing system can impact production reliability. And downtime? That costs a lot of money. As a result, companies often put off technical interventions, even if they know they will be necessary in the long term.



At Callens, we keep that production reliability intact. We also make modifications where necessary and lay a solid foundation to build on.

remaining uncertain and therefore doing nothing. That is precisely where the real operational challenge lies.

3. Operational uncertainty: which solution suits my process?

And then there is the biggest challenge: the multitude of possibilities. Electric boilers, heat pumps, electrodialysis, MVR, residual heat utilization, biogas, hydrogen, flue gas treatment... They all sound promising, but:

- What works effectively for your process?
- Which technology is future-proof in terms of legislation, energy prices, and technological progress?
- How do you combine multiple techniques into a single feasible approach?

Without in-depth knowledge of the full range of options and the preconditions (power requirements, operating temperatures, residual flows, etc.), your company risks

4. Need for customization and a multidisciplinary approach

CO₂ reduction is not a one-size-fits-all solution. Every production process, every building, every energy mix requires a customized approach and technical expertise. **Successful projects arise where process technology, engineering, and sustainability reinforce each other. And that is precisely where Callens comes in.**

Reducing CO₂ emissions does not start with choosing a technology, but with understanding your own situation. That is why Callens does not focus on a one-size-fits-all approach, but on solutions that suit your process, your timing, and your investment rhythm.

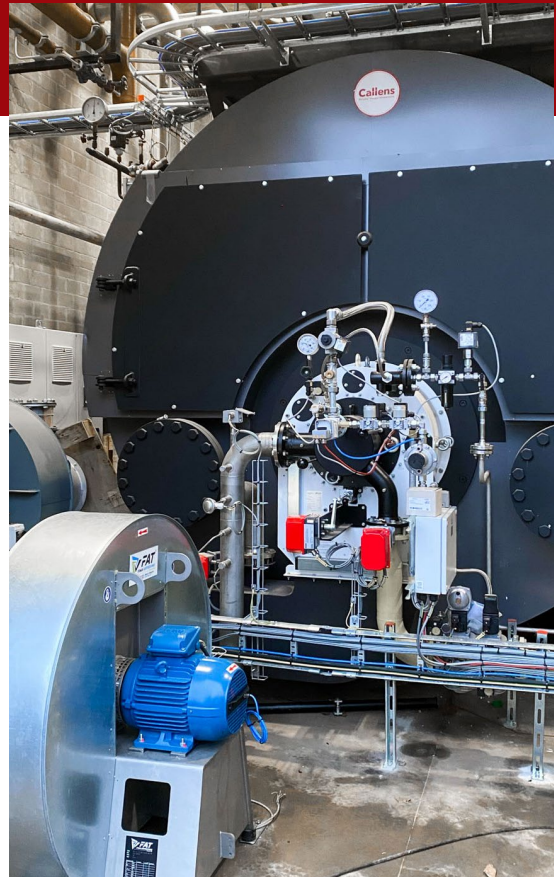
Callens' solutions for CO₂ reduction

Sustainable technology, proven in industrial environments

The road to CO₂ reduction is rarely straightforward. As manufacturing companies experience on a daily basis, good intentions often come up against technical, economic, and operational barriers. That is precisely why Callens has developed an approach based on practical experience.

We combine proven technologies that are already delivering results in industrial environments today. Always tailored to your context, and with an eye for efficiency, continuity, and future-proofing.

Callens is there for companies that want to strengthen and make their energy supplies more sustainable. Whether it's about achieving rapid and measurable CO₂ reduction, preparing for increasingly stringent ETS and environmental standards, or gaining more control over energy consumption and costs, our approach is in line with the strategic choices that manufacturing companies face today. With smart combinations of electrification, valorization of waste streams, energy recovery, and flue gas treatment, Callens offers concrete answers to the complex challenges of industrial decarbonization.



9 T/h hybrid steam boiler, combustion of odorous gases via burner

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No experiments, just robust solutions that deliver power, fuel processes, and significantly reduce CO₂ emissions at the same time.

1. Electrification

Electrification is one of the most effective ways to reduce greenhouse gas emissions to zero. By combining electrification with green energy solutions, you can significantly reduce your carbon footprint and achieve your sustainable energy ambitions. Callens offers various solutions for generating heat using electricity instead of fossil fuels.

■ Electrode boiler

Electrode boilers, or e-boilers, can switch on and off very quickly, which ensures high energy efficiency and lower CO₂ emissions thanks to optimal energy use.

■ Electric resistance boiler

Compact solution for continuous steam requirements without emissions. Interesting for smaller capacities or limited space.

■ Hybrid steam boiler

Combines gas and electricity in a single system. Switches automatically based on the availability and price of energy sources.

■ Mechanical Vapor Recompression (MVR)

MVR systems are a particularly efficient way of mechanically compressing residual vapors from processes and then reusing them as a heat source. The result: significant energy savings, lower CO₂ emissions, and a more efficient production process.

■ Industrial heat pumps

For medium temperatures up to 120°C. Perfect for use in food, chemical, and pharmaceutical environments where sufficient residual heat is available from other processes.

2. Valorization of waste streams

What is considered waste today can create value tomorrow. Through optimized design of burners and boilers, Callens helps you convert your own waste streams into sustainable energy solutions that make your production processes more efficient and benefit the environment.

■ Hydrogen-powered boiler

A hydrogen-powered boiler is ideal if you produce your own hydrogen or have residual flows available. These boilers can be switched on and off quickly, reach high temperatures, and are also CO₂-neutral.

■ Biogas-fired boilers

Biogas from fermentation or waste processing is a low-carbon alternative to natural gas. A biogas-fired boiler is ideal for generating energy and powering industrial processes.

■ Flue gas boilers

An exhaust gas boiler uses the residual heat from flue gases to generate energy. This avoids additional fuel consumption, increases energy efficiency, and reduces the CO₂ emissions of your installation. Ideal in combination with CHP units or combustion processes.

■ Boilers based on gaseous (syngas) and liquid waste streams

These boilers convert the energy present in gaseous and liquid waste streams into heat or steam. You can use this to power your processes while avoiding to use fossil fuels.

3. Energy recovery

The cleanest energy is the energy you don't have to generate. By recovering the residual heat from your processes and converting it into electricity and heat, you increase the energy efficiency of your processes, reduce CO₂ emissions, and meet your industrial energy needs in an environmentally friendly way.

■ Heat recovery systems

Heat exchangers, condensers, and vapor recompression can recover residual heat from chimneys, extraction systems, or process air and convert it into valuable process energy.

The power lies in the combination

In practice, we at Callens often combine multiple techniques. For example, residual heat can be recovered via MVR, while a hybrid boiler compensates for peaks with electricity. Or flue gas is purified after a biogas boiler. We always think in terms of your process: how can your company get the most out of its production processes, with the least impact on the climate?

4. Flue gas treatment

For some processes, incineration is unavoidable. But even then, there are ways to efficiently remove emissions and prepare for stricter regulations.

■ Carbon Capture, Utilization, and Storage (CCUS)

Advanced carbon capture technology significantly increases the efficiency of CO₂ removal from boiler flue gases. The captured CO₂ can then be used as a valuable raw material in a wide range of applications.

■ Nitrogen reduction (SCR/SNCR)

SCR and NCR systems help you remove nitrogen oxides (NOX) from flue gases, resulting in a cleaner combustion process. By burning more efficiently and complying with environmental standards, you also indirectly reduce your CO₂ emissions.



2 steam boilers of 5 T/h in cascade arrangement, with high-efficiency degasser

Economic feasibility and payback period

Turning insight into direction, and results where possible

The transition to CO₂ reduction is not purely a technical decision. Financial feasibility also plays a crucial role, of course: how much will it cost, what will it yield, and how quickly will the investment pay for itself?

These are valid questions that can only be answered with a clear understanding of your specific situation—taking into account both the figures and the context.

After all, the payback period for an installation depends on many factors: energy prices, operating conditions, available infrastructure, peak or base load consumption, and net energy savings.



Electric thermal oil boiler

Insight without complexity

At Callens, we make these investments transparent and tangible, without making them unnecessarily complex. We clearly outline the impact on energy consumption, map out gas and electricity prices, and also take into account factors such as availability on balancing markets (aFRR) or the possibility of utilizing residual heat. Without delving deeply into financial models, we give you a well-founded indication of which solution is most suitable for your specific context.

Providing direction with practical knowledge

At Callens, we look beyond the question "what does it cost?". We help you think about:

- Which technology is most future-proof?
- Where are the biggest energy wins in your processes?
- How can a sustainable solution be implemented without operational risks?

You can have comprehensive energy studies carried out by an energy consultant. Based on the results, Callens calculates which installation offers the best return in terms of efficiency and sustainability investments.

Energy efficiency as a structural advantage

Even when a solution does not have an immediate return on investment, structural energy efficiency remains a decisive advantage. Not every installation pays for itself in five years, but some do become profitable through higher energy efficiency, less maintenance, or avoided CO₂ costs. Especially in a context of fluctuating prices, stricter CO₂ regulations, and increasing pressure on energy consumption, a more economical system provides more control over costs and the future.



2 e-boilers, each with a capacity of 5 MW and 7.5 T/h steam, including balance of plant

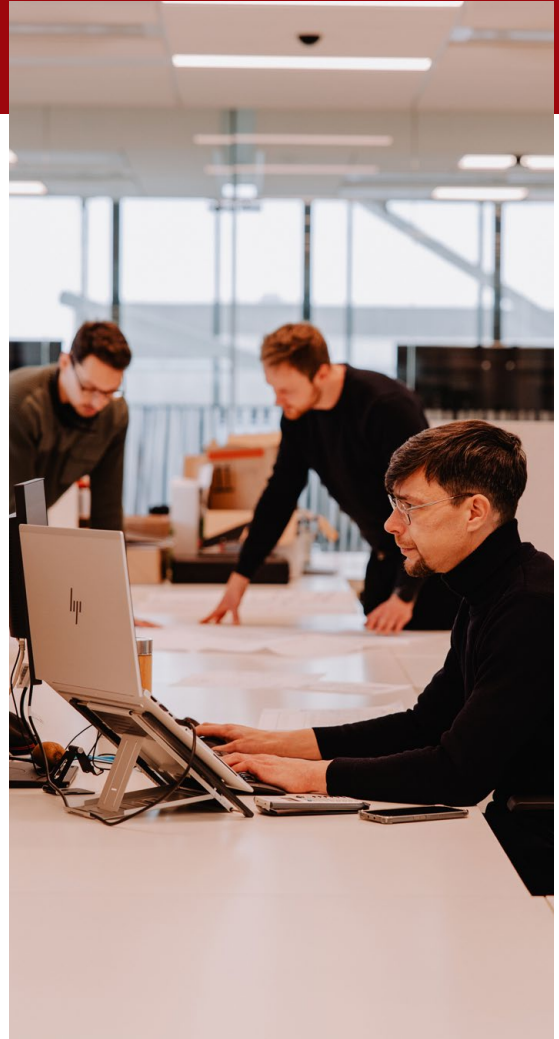
Subsidies and financial incentives

Additional support for sustainable investments

Sustainable industrial investments are often profitable in themselves, thanks to lower energy consumption, reduced CO₂ taxes, and more efficient processes. But for those who want to move even faster, there are numerous regional, national, and European subsidies and financial incentives available for technologies such as electrification, biogas or hydrogen-fired installations, residual heat utilization, and flue gas treatment.

Subsidies are not a reason in themselves to become more sustainable, but they can make a sound investment more attractive and quicker to pay off. Many of the technologies offered by Callens are eligible for these support mechanisms.

Below you will find a brief overview of relevant subsidy channels. This overview is not exhaustive: the available range of subsidies and incentives is regularly updated by the competent authorities. For more specific information, please contact an external consultancy firm.



Belgium

Flanders

■ Ecology Premium+ (VLAIO)

For proven energy-efficient technologies, such as e-boilers, heat pumps, biogas boilers, and residual heat solutions.

Support percentage depending on technology and eco-class (up to 40%).

■ Climate Leap Transition Contracts (VEKA)

Aimed at companies that are making significant CO₂ reductions through innovative technology.

■ GREEN Call

For projects involving electrification, green energy carriers (such as biogas or hydrogen), or residual heat integration.

Only if you are not eligible for the Ecology Premium+.

■ STRES subsidy (VLAIO)

For large strategic investments (minimum €3 million) in cutting-edge environmental technology.

Only for companies that have entered into an energy policy agreement (EBO).

■ Call "Green Heat" (VEKA)

For installations >300 kWth using renewable heat or residual heat.

Also supports linking process heat to heat networks.

Wallonia

■ GREEN support (as of 2025)

Replaces the former Aides UDE and supports investments in environmental protection and sustainable energy use.

Requirements include a mandatory energy audit (AMUREBA) and energy accounting.

Support percentages vary between 15% and 30%, depending on the nature of the investment and the size of your company.

■ Compensation for indirect emission costs (indirect carbon leakage)

For energy-intensive companies operating in sectors covered by the EU ETS.

Partially offsets the increased electricity costs resulting from CO₂ prices.

Requires an energy efficiency plan and compliance with environmental regulations.

■ Industry Agreements

Voluntary agreements between sectors and the Walloon government to improve energy efficiency and reduce CO₂ emissions.

Participating companies can benefit from additional support measures and guidance.

Belgium

Brussels

■ Energy subsidies for businesses

Support for investments in energy efficiency and renewable energy, such as heat pumps, solar panels, and insulation.

The amount and conditions vary depending on the nature of the project and the size of your company.

■ Investment support for environmental projects

Subsidies for companies investing in environmentally friendly technologies, including biogas plants and combined heat and power systems.

Support rates and conditions depend on the type of investment and its impact on the environment.

Federal

■ Increased investment deduction (Federal)

Up to 20.5% (2024) tax benefit on investments in recognized energy-saving technologies.

For SMEs and large companies.

■ More favorable VAT rates

Possible for certain low-carbon technologies (e.g. heat pumps).

The Netherlands

■ SDE++

Government support for projects that demonstrably reduce CO₂ emissions, such as electrification and renewable heat.

Projects are ranked based on cost per ton of CO₂ avoided.

■ EIA (Energy Investment Allowance)

Tax scheme that allows companies to deduct up to 45.5% of investment costs for energy-saving technologies or renewable energy.

Suitable for heat pumps, CHP units, biogas boilers, and residual heat utilization, among other applications.

■ Increased investment deduction (Federal)

Up to 20.5% (2024) tax benefit on investments in recognized energy-saving technologies.

For SMEs and large companies.

■ More favorable VAT rates

Possible for certain low-carbon technologies (e.g., heat pumps).

France

■ Chaleur Fund (ADEME)

Support for the production of renewable heat (such as biomass, biogas, geothermal energy, and residual heat) in industrial installations.

Aimed at companies that want to reduce their fossil fuel consumption.

■ CEE scheme (Certificats d'Économies d'Énergie)

Mandatory system whereby energy suppliers provide financial support for energy-saving investments made by third parties (such as industrial companies).

Can be applied to electrification, heat recovery, insulation, etc.

■ France 2030 – support for the decarbonization of industry

Specific subsidy and support programs for industrial decarbonization.

For electrification, CO₂ capture, green hydrogen, and efficiency investments, among other things.

■ Crédit d'Impôt pour la Transition Énergétique (CITE) – for SMEs

Tax deduction for investments in energy-saving technologies and installations.

Applicable to certified equipment for energy efficiency and emission reduction.

Europe

■ Innovation Fund (EU ETS)

European funding for large-scale industrial projects that deliver significant CO₂ reductions.

Focused on innovative technologies and demonstration projects within the EU ETS sectors.

■ LIFE program

Grants for environmental projects focusing on energy efficiency, renewable energy, and climate adaptation.

Also available for collaborations between companies and knowledge institutions.

■ Horizon Europe – Cluster 5 (Climate, energy & mobility)

Support for research and innovation projects that contribute to the European Green Deal objectives.

Often in consortium with international partners.

The exact conditions, percentages, and application procedures vary from year to year. Therefore, always seek advice from a specialized subsidy partner or your financial advisor.

Practical case study

Industrial heat pumps save CO₂

A building materials manufacturer is switching to a sustainable heating solution. Three industrial heat pumps, powered by 100% green electricity, capture energy from warm, humid drying air and convert it into usable heat.

CO₂ emissions significantly reduced

This system replaces most of the gas-fuelled heating system, reducing CO₂ emissions. What's more, the combination of air and heating technologies doesn't only have ecological benefits, but financial ones too.



Technical properties

- Capacity: 4.2 MW
- Energy source: 100% electricity
- Type: piston compressors
- Temperature range: from 33°C to 80°C
- Refrigerant: ammonia
- 2-stage compression



Residual heat as a primary energy source

Drying compressed stone generates a substantial airflow of some 100,000 m³/hr at a temperature of about 44 °C and a relative humidity of up to 92 %.

That heat used to be untapped. In the future, it will be captured by two heat exchangers that transfer the energy to water at about 33 °C. This circular approach makes optimum use of residual heat that would otherwise go to waste.

Three heat pumps raise the temperature to 80 °C

Three heat pumps with a thermal capacity of 1.4 MW each raise the temperature of the lukewarm water to a suitable temperature of 80 °C. The hot water is then used again to heat the dryer, creating a selfsufficient, efficient heating circuit. Each heat pump will have a power supply of 100% green energy.



Practical case study

E-boilers combine higher output with lower CO₂ emissions

How can you increase the necessary production in your company while minimizing CO₂ emissions? Two e-boilers perfectly resolve the contradiction for this pharmaceutical company.

E-boilers for new production line

Two 5 MW e-boilers now handle the site's entire steam supply. The initial configuration designates one unit as a backup for the other.

However, thanks to their generous sizing, both boilers can operate simultaneously, making the setup ideal for future production expansions

Electricity for maximum efficiency

With an electrical efficiency of 99.9%, the e-boilers prove their worth as a highly efficient, low-carbon heat solution. Since the water is heated directly by electricity, hardly any energy is lost.





Balanced energy across the site

The balance of plant includes a range of technologies to maintain a stable energy flow across the site. The boiler room was equipped with:

- a feedwater tank
- a condensation tank
- a thermal deaerator
- a high-pressure steam collector
- the full piping network

Finally, the new installation provides greater flexibility across the site.

Technical properties

- Capacity:
2 x 5 MW
2 x 7.5 T/h steam
- 15 kV connection
- Design pressure: 11 barg
- Working pressure: 8 barg
- Electrical efficiency: 99.9%

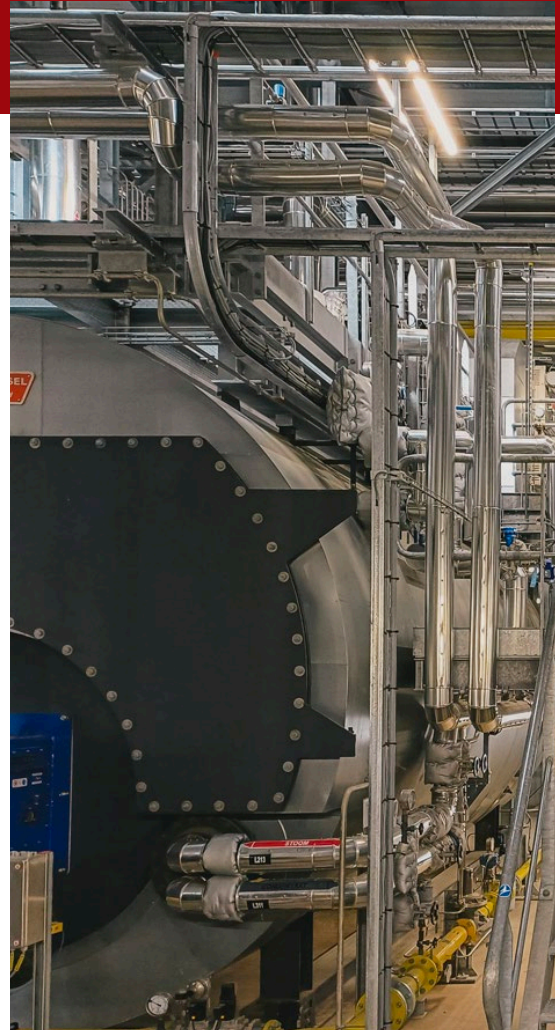
Practical case study

Zero by 2050 is getting closer with hybrid steam boilers

To achieve CO₂ neutrality by 2050 – step by step, with the first milestone being a 50% reduction in emissions by 2030 – we installed two hybrid steam boilers, each with a capacity of 20 tons/hour, for this sugar producer.

Hybrid steam boilers with complete balance of plant

In this initial renewal phase, the two hybrid steam boilers replace the outdated cogeneration system, which relied on an inefficient steam boiler. Now, both electricity and gas can serve as energy sources for these powerhouses. The client selects the optimal option based on availability and prices.



We also took care of the entire balance of plant, including:

- Condensate tanks: 2 x 130,000 liters
- Hot water buffer: 350,000 liters
- Degassers: 1 x 33 tons/hour and 1 x 125 tons/hour
- Impressive piping system measuring over 1,000 meters



Beet harvest speeds up launch

To make the most of the sugar beet harvest starting in September, we completed the installation by that time – in a record pace of just eleven months.

Thanks to thorough rigorous project management, solid preparation, and as much prefabrication as possible, we made it happen. For instance, we prepared over 1,000 meters of pipes in our own workshop.

Technical properties

- Capacity: 2 x 20 T/h
- Medium pressure: 13 barg
- High pressure: 139 barg

Conclusion

Ready to take a sustainable step forward?

The road to industrial CO₂ reduction is not an easy one, yet it is necessary. Between policy pressure, rising energy prices, and technical challenges, there lies an excellent opportunity: if you invest now in smart, low-emission technology, you will give your company a head start—both economically and ecologically.



What you need is not a *one-size-fits-all* solution, but an approach tailored to your process, your infrastructure, and your pace. That is precisely where Callens makes the difference.

At Callens, we offer reliable solutions that can be deployed today:

- Electrification where it pays off
- Innovative fuels where needed
- Energy efficiency as a common thread

Our installations work in practice, not just on paper. We understand the technology, its limitations, and its possibilities. And we think along with you: technically, future-oriented, and without empty promises.



Curious to find out which step could make a difference for your company?

Let's take a look at how you can:

- reduce CO₂ emissions without compromising on power;
- respond intelligently to energy prices and markets;
- be prepared for future regulations.



Callens



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Please contact us for an exploratory meeting or technical analysis.

This will help you discover what is both realistic and affordable.

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