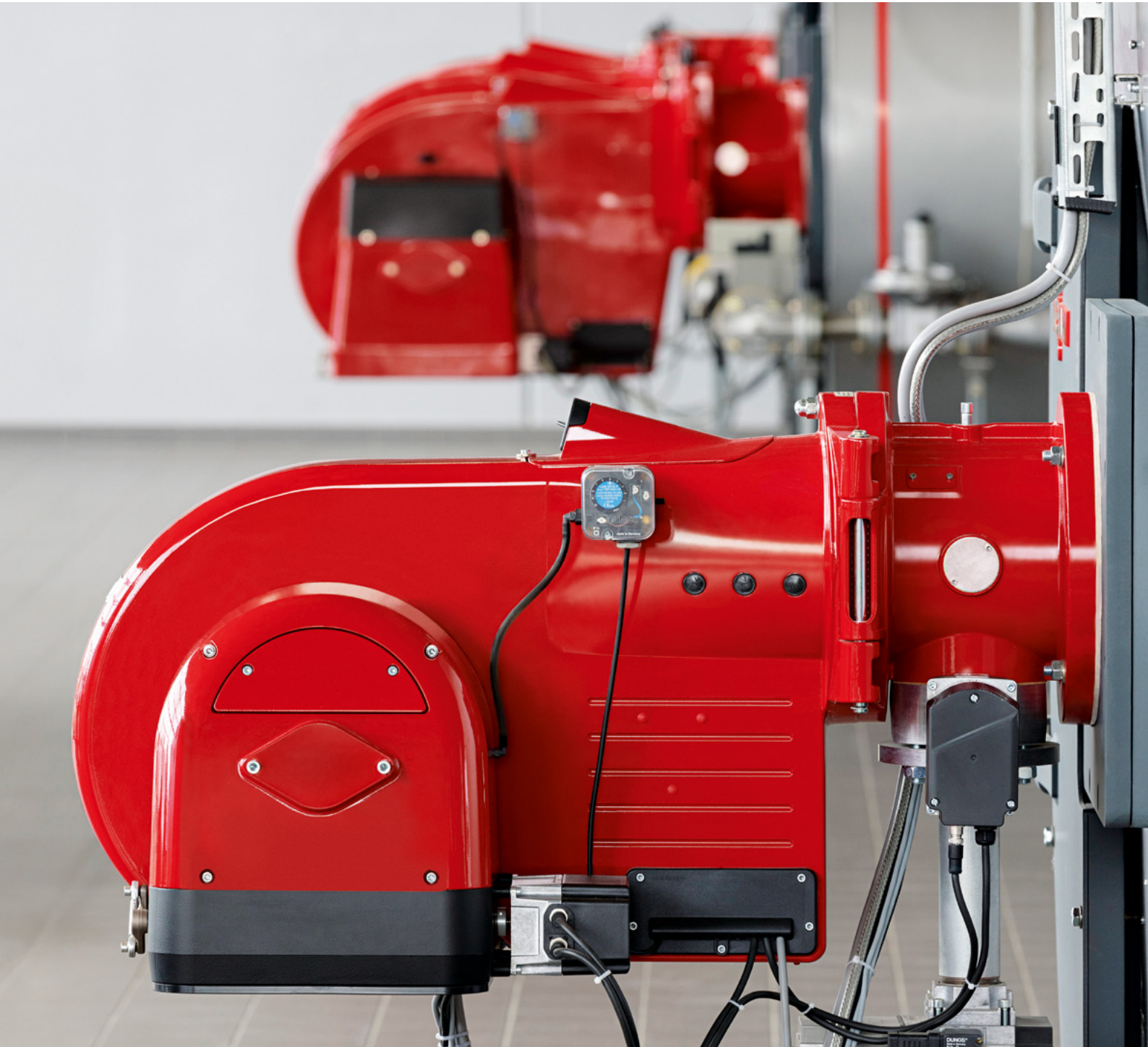


Burner solutions to meet MCP regulations

Stricter emission limit values from 01.01.2025



Solutions to meet the energy
technology demands of today
and tomorrow

Investing in new technology
is economically worthwhile

One-stop shop:
System solutions complete
with controls

“The consequences of these MCP regulations for plant operators are significant.”

In his interview, Paul Redshaw makes it clear that plant operators with large burners need to take action now. The company offers the right solutions to meet the demands of today and tomorrow.



Looking toward the future:
Weishaupt UK Ltd's
managing director,
Paul Redshaw.

Mr Redshaw, how significant are the effects of the MCP (medium combustion plant) regulations for plant operators with large burners?

Many, many thousands of systems are affected and time is now running out! The regulations were introduced in 2019 and lower emission limit values for existing plant with thermal inputs from 5 to 50 MW have been in force since 1 January 2025. For existing plant from 1 to 5 MW, the new emission limit values will apply from 1 January 2030. Plant operators must take action now. They should immediately check whether their boiler plant falls within the scope of the regulations and whether it meets the mandated NO_x emission limits. If not, the plant must be future-proofed without delay by replacing the burner.

Does this only apply to the EU?

No, the regulations apply within the United Kingdom as well as across the European Union. The EU's Medium Combustion Plant Directive (MCPD) was adopted in 2015 and subsequently transposed into national law across the EU. Crucially, the MCP regulations have also been retained under UK law.

Why do the MCP regulations focus on NO_x emission values?

Nitric oxide (NO) and nitrogen dioxide (NO₂) are collectively referred to as NO_x. Nitrogen oxides can act as irritants that harm the respiratory system and, alongside sulphur oxides, contribute to acid rain, as they play a role in the formation of nitric acid (HNO₃).

How exactly do nitrogen oxides form?

They are unwanted by-products formed during the combustion process by the reaction of the nitrogen (N₂) and the oxygen (O₂) present in the combustion air. High combustion temperatures and excess air encourage their formation.

Additionally, chemically bound nitrogen in the fuel is also oxidised with oxygen to form NO_x.

Can modern burners reliably reduce the NO_x levels of existing systems?

That is a significant challenge. However, Weishaupt burners make it possible thanks to our extensive experience and expertise. Weishaupt's large-burner product range today includes a wide variety of models, technologies, and capacity ranges. They are continuously developed and are regularly adapted to meet the latest requirements. This reflects our company's unique skills as a global leader in the marketplace for large burners – and the experience gained from their development since 1961. Customers worldwide rely on our products and Weishaupt service.



IN-HOUSE RESEARCH AND DEVELOPMENT

Weishaupt is advancing the development of efficient, low-emission technologies.



IN-HOUSE PRODUCTION
The main Schwendi plant produces burners of the highest quality.

What examples of combustion plant with state-of-the-art Weishaupt burners already meet the emission limits in force from 1 January 2025?

Together with our customers, we have already implemented numerous such projects. In this publication, we present reference projects that showcase solutions with internal recirculation (3LN multiflam®), external FGR (4LN multiflam®), as well as premixing and surface combustion (PLN). Additionally, we include a reference for the use of biogenic fuels.

How do plant operators know which burner and which specification is right for them?

This is where customers benefit from Weishaupt's extensive expertise. That includes our exceptional technical know-how, our renowned reliability, and the wide range of burner capacities we cover using different technologies. Just as important for customers is the fact that Weishaupt, thanks to its branch network, also offers the right services close by: our local specialists support

customers from the very beginning with all their questions. That includes everything from project planning and system design through to installation and commissioning. Once the system is in operation, they can rely on tailored service.

That sounds like important qualities that Weishaupt has always valued. Do you feel your strategic direction has been validated?

Absolutely. These characteristics are not only crucial for plant operators in the context of the MCP regulations, but they also define the entire Weishaupt Group. This includes energy technology from Weishaupt, energy recovery from BauGrund Süd, and energy management from Neuberger. Our customers show strong demand for the services offered by all business units. In 2023, group revenue exceeded one billion euros for the first time. Heat pumps and geothermal energy made a significant contribution to this achievement.



IN-HOUSE SERVICE
Weishaupt stands out for its network of regional branch offices.

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Weishaupt worldwide:

Representation in over 100 countries.

As a plant operator, you must act urgently now!

The medium combustion plant regulations have imposed stricter emission limit values for oxides of nitrogen (NO_x) from 1 January 2025. Tens of thousands of boilers are affected. Here is an overview of the key points.

This is what you must do now as the operator of combustion plant



3

You must take steps now to replace your old burner as a matter of urgency.

Your local Weishaupt office supports consultants and plant operators in the **design of future-proof systems**. The appropriate burner is determined, taking into account boiler type and combustion chamber geometry, and a quotation is prepared. If there are no system data available, the necessary information can be gathered during a site visit. A validated efficiency calculation enables estimates of energy savings and the payback period of the investment to be made. An example of this is shown on pages 12–13. In coordination with the installer and plant operator, Weishaupt also handles the commissioning of the burner, as well as future service and maintenance work.

Talk to us.

The experts at your local Weishaupt office will advise you on the latest emissions regulations and their **specific effects on your own plant**.

Fuel NO_x emission limit value (mg/m³)

Natural gas **250** (from 01.01.2030)

LPG/other gaseous fuels **250** (from 01.01.2030)

Class D/Class A2 gas oil **200** (from 01.01.2030)

Other liquid fuels **650** (from 01.01.2030)

Natural gas **200**

LPG/other gaseous fuels **250**

Class D/Class A2 gas oil **200**

Other liquid fuels **650**

Natural gas **100**

LPG/other gaseous fuels **200**

Class D/Class A2 gas oil **200**

Other liquid fuels **300**

NO_x levels above these limits?

You must act! 3

The NO_x emission levels for your system should be detailed in the report from your latest burner service or an official emissions inspection.

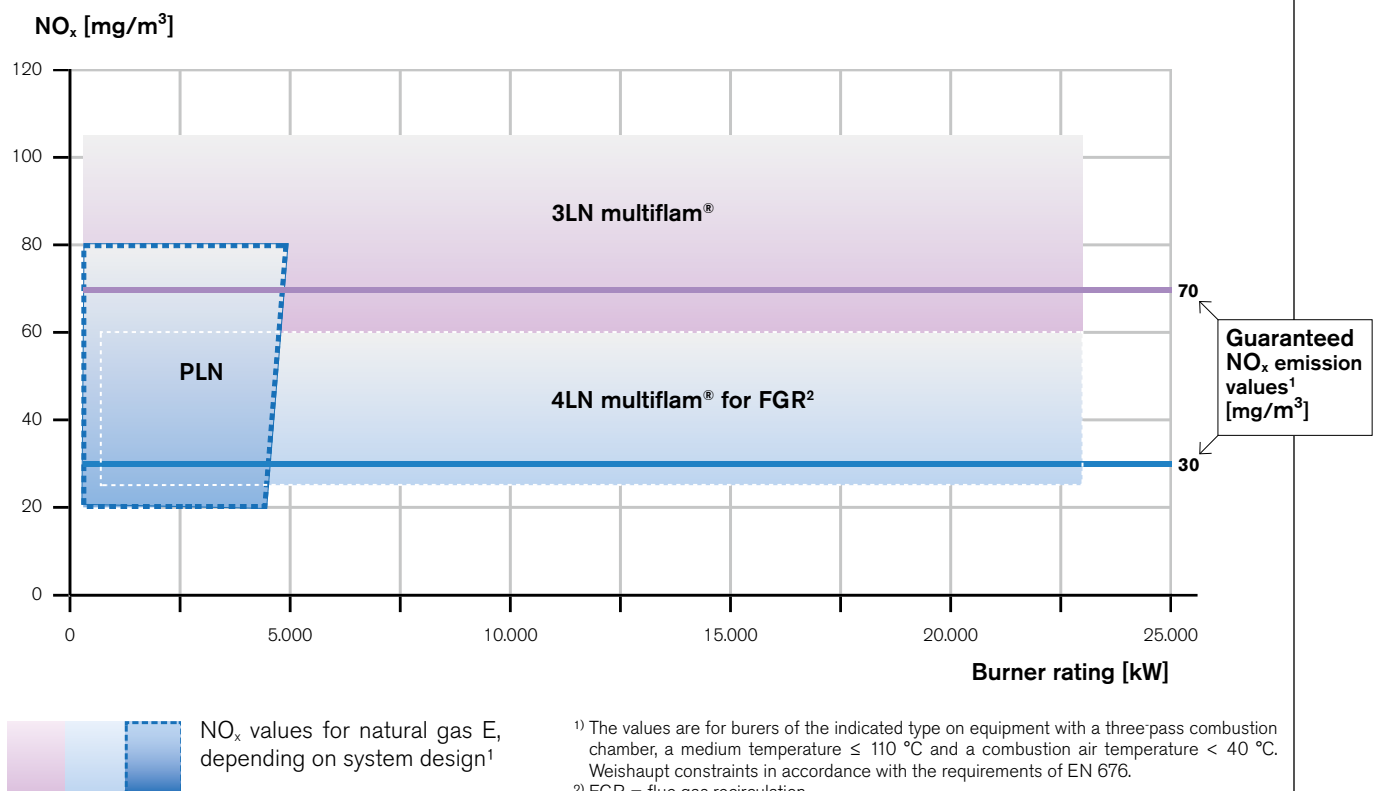
If these are not available, please contact Weishaupt to arrange a test.

You are able to benefit from Weishaupt's low-NO_x solutions for large burners

Whether its for heat generators, LTHW or HTHW systems, steam boilers, hot-air units, or specialised thermal process plant, Weishaupt offers a tailored low-emission burner solution for every need. The basis for all this is Weishaupt's in-house research and development: future-ready products are a longstanding tradition at Weishaupt.

NO_x values according to Weishaupt gas burner version

Weishaupt offers the right burner technology for every application and output range. Varying nitrogen oxide emission limits can be met using different technologies tailored to specific requirements. This is illustrated in the graphic below, which compares burner versions 3LN multiflam®, 4LN multiflam® for external flue gas recirculation, and PLN with premixing and surface combustion when operating on natural gas E.





Weishaupt 3LN multiflam® burners

Low-emission multiflam® technology reduces the temperature of the flame root by splitting it into primary and secondary flames. This leads to internal recirculation of the combustion gases and a cooler flame, which lowers NO_x emission values. More details can be found in the information about a district heating centre in St. Gallen, from **page 8**.

Fuel: natural gas, LPG, and oil

Rating: up to 23 000 kW

NO_x: 70 mg/m³ guaranteed with natural gas E

Features: Fuel distribution and internal recirculation

Weishaupt 4LN multiflam® burners

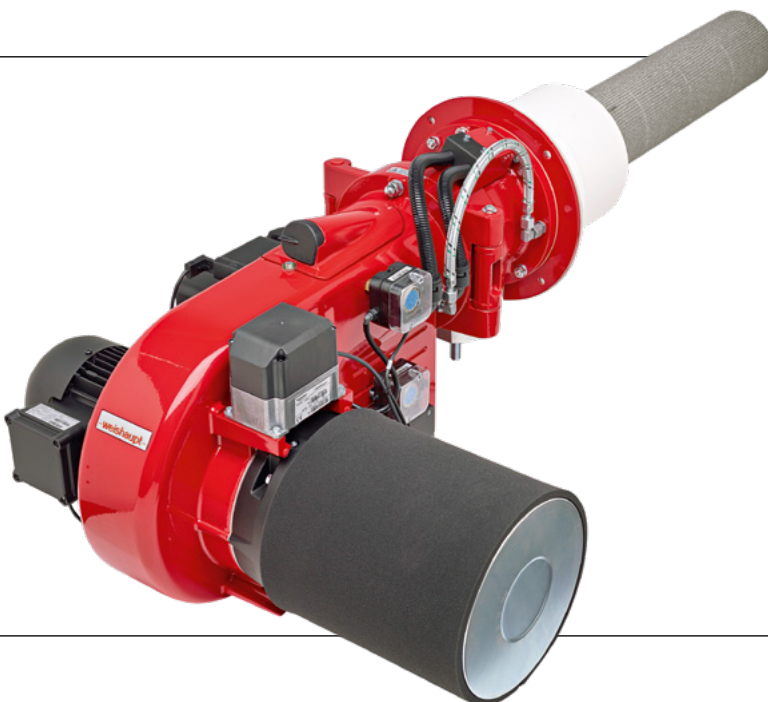
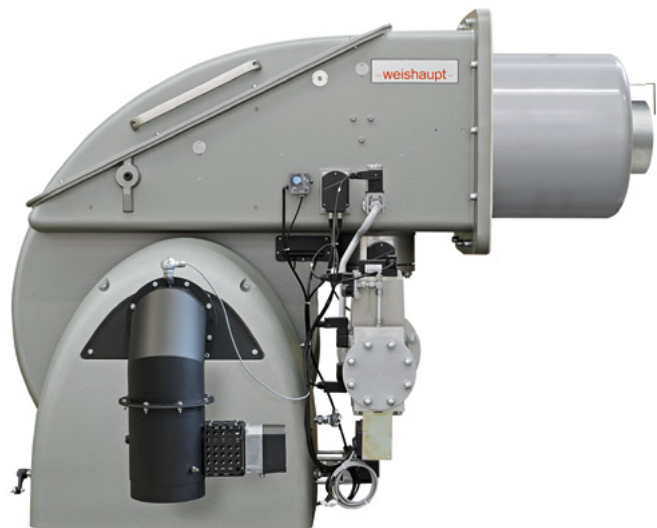
This technology features external flue gas recirculation and can meet the world's strictest emissions regulations. The recirculation of flue gases back into the combustion process reduces the formation of nitrogen oxides (NO_x); specific values depend on factors such as combustion chamber geometry. More details about 4LN burners can be found in the information about a power station in Bremen, from **page 10**.

Fuel: natural gas, LPG, and oil

Rating: up to 23 000 kW

NO_x: 30 mg/m³ guaranteed with natural gas E

Feature: External flue gas recirculation



Weishaupt PLN burners

PLN-version gas burners utilise premixing and surface combustion. This enables extremely low NO_x emissions of less than 30 mg/m³ to be achieved without flue gas recirculation. PLN burners are also suitable for small combustion chambers, meaning the new emission limits can be met without the need for modifications. More details about PLN burners can be found in the information about the Tollenbrink estate in Hanover from **page 11**.

Fuel: natural gas and LPG

Rating: up to 5 000 kW

NO_x: < 30 mg/m³ guaranteed with natural gas E
and < 100 mg/m³ with LPG

Features: premixing and surface combustion

Peak-load solution for district heating centre outperforms latest emission limits

Weishaupt 3LN multiflam® burners are the efficient heat generators at the newly constructed Lukasmühle district heating centre in the city of St Gallen, Switzerland. They achieve NO_x emissions well below the latest limit values.

The new Lukasmühle district heating centre in St. Gallen, Switzerland, relies on Weishaupt 3LN burners with patented multiflam® technology. Among other things, the facility is equipped with two 32 MW peak load boilers. The two boilers are each fitted with two Weishaupt WKGL80/1-A 3LN dual-fuel multiflam® burners. The burners operate using either natural gas or gas oil, delivering a combined output of 64 MW.

Low nitrogen oxide emissions with 3LN technology

The combination of a generously sized combustion chamber and patented Weishaupt 3LN multiflam® technology results in NO_x emissions significantly below the latest standards – even without external flue gas recirculation. This highly flexible system achieves exemplary low NO_x levels of max. 75 mg/m³ on natural gas and max. 130 mg/m³ on gas oil.

These 3LN-version burners represent the latest stage in over 25 years of continuous development of multiflam® technology. This innovation enables large-scale combustion systems to meet low-NO_x requirements without external emission-reducing measures.

That makes them ideally suited for the demands facing many plant operators today.

2050 municipal energy strategy

The Lukasmühle district heating centre covers peak loads and ensures a redundant heat supply, especially in eastern St Gallen. The project is a milestone in the city's 2050 energy strategy.



NO_x emission values at this site:

**Natural gas E:
max. 75 mg/m³**

**Gas oil:
max. 130 mg/m³**

VERSATILE SYSTEM

The district heating centre has two 32 MW peak-load boilers, each fitted with two Weishaupt 3LN multiflam® burners.

SUSTAINABLE HEAT HUB

The Lukasmühle district heating centre is operating with four Weishaupt 3LN-version multiflam® burners for a total output of 64 MW, supplemented by two 2 MW CHP plants.



Maximum output meets the strictest regulations

Weishaupt 4LN gas burners with external flue gas recirculation can achieve NO_x emission values of 30 mg/m^3 when firing natural gas E.



**NO_x emission
values at this site:**

$40 - 45 \text{ mg/m}^3$

District heating in Bremen

In Bremen, the power plant located at the regional energy supplier's Hafen site has been equipped with a new gas-fired hot water boiler to provide redundant backup for the district heating supply. Two Weishaupt WKG80/2-A ZMH-4LN natural gas E burners have been installed, each with a 20.5 MW firing rate. The burners are equipped with external flue gas recirculation and digital control in addition to VSD and O_2 trim. The area served from the Hafen site also includes the attractive urban development project, Bremer Überseestadt. The 4LN burners redirect part of their flue gases back into the combustion process. This reduces the formation of nitrogen oxide (NO_x), as the oxygen supply in the flame's hot reaction zone decreases, and the flow velocity inside the burner increases. The 4LN technology can also be used under demanding conditions and with preheated combustion air.

A new dimension to reduced emissions

Weishaupt PLN burners draw on tried and tested technology from gas-fired condensing boilers for operation up to 5 MW with very low NO_x emissions.



FOTO: MAURITIUS/ROBBIN



NO_x emission
values at this site:
< 25 mg/m³

Hanoverian garden city showcases energy technology

The Tollenbrink garden city in Hanover was built in the 1970s. During its recent refurbishment, consultants set ambitious emission level targets for a district heating system that serves around 480 homes there. These were met using Weishaupt PLN burners, which achieve nitrogen oxide emissions below 25 mg/m³ and thus well below the requirements of MCP regulations.

Weishaupt successfully adapted a proven principle from gas-fired condensing boiler technology for its PLN range of burners up to 5 MW. Fuel and air are premixed to create a homogeneous gas/air mixture that is then combusted on the metal weave surface of a tube that projects into the combustion chamber. This produces a flame carpet with temperatures below 1 200°C, resulting in exceptionally low NO_x emissions.

It's worth changing your burner – and not just to meet legal requirements

Efficient technology pays back faster than you think

Those who act quickly to modernise their burner can save a substantial amount of money. Investing in modern energy technology significantly reduces consumption compared to older systems. This leads to short payback periods and, at the same time, boosts the availability of the equipment.

When plant operators invest in an efficient, state-of-the-art burner, the benefits extend beyond environmental impact. Such projects also make strong financial sense. Today's advanced technology consumes significantly less energy than older systems. In an era of high energy prices, that's a compelling reason to modernise equipment.

Savings with modern burners stem from both fuel consumption and electrical energy. The cost reductions can be substantial. For outputs above 1 MW,

replacing a legacy unit with a modern Weishaupt burner can yield annual savings on fuel and electricity in the five-figure range.

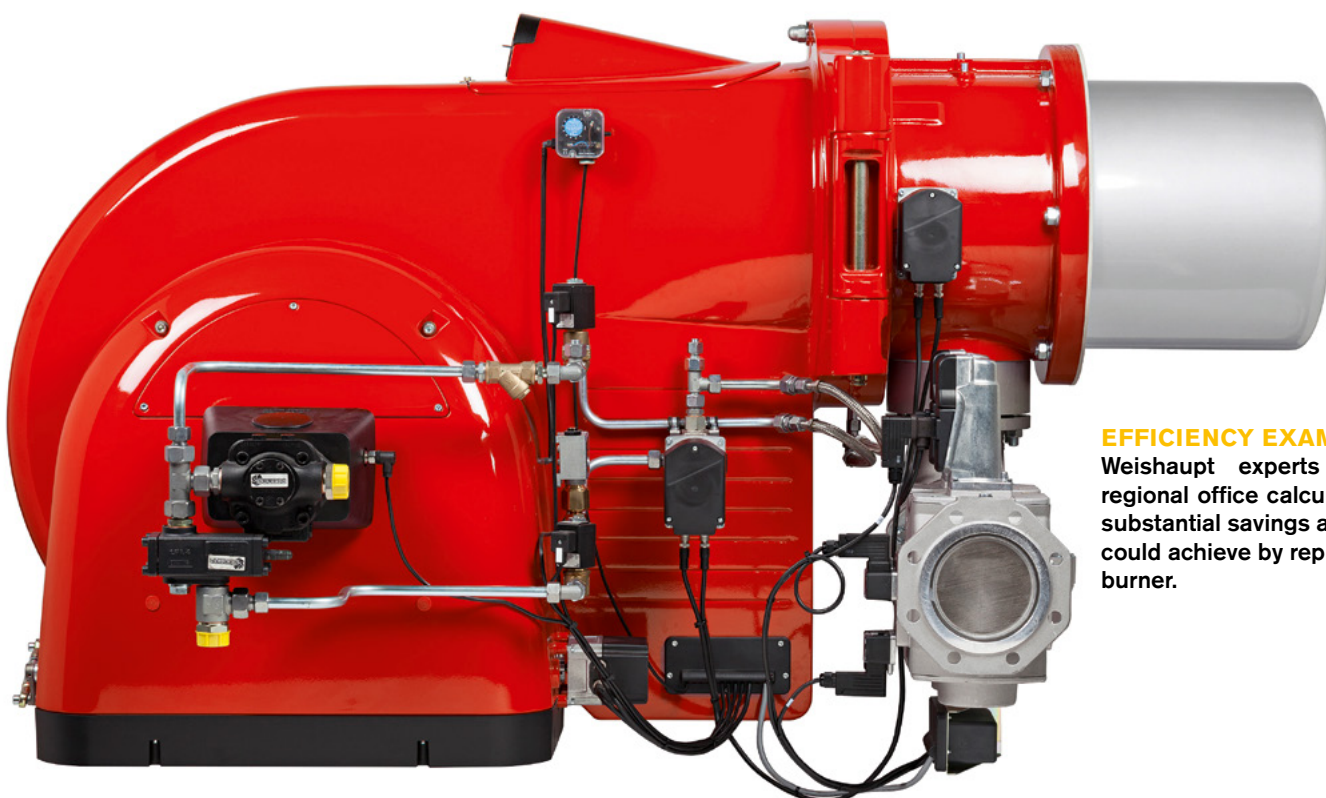
Precisely calculated

Plant operators want to understand the potential savings before making an investment. This is where the experts at Weishaupt offices come in. These specialists calculate, on an individual basis and even before detailed planning begins, the relationship between the investment and possible savings for each customer.

The example presented on this page comes from a modernisation project at a brewery. In this case, a new dual-fuel burner firing natural gas E and gas oil was installed on a standard boiler with

a nominal thermal output of 4 500 kW, replacing the existing system, which was ten years old. The new Weishaupt monarch® WM-GL50/0-A ZM-R-3LN multiflam® burner with VSD and O₂ trim delivers annual savings of approximately €27 000 compared to the old system. This results in an exemplary short payback period of just 2.6 years!

Similar savings can also be achieved in many other sectors that rely on Weishaupt burners for efficient and reliable heat generation. The range of uses extends from district heating schemes to industrial applications.



EFFICIENCY EXAMPLE

Weishaupt experts at the regional office calculated the substantial savings a brewery could achieve by replacing its burner.

Fuel savings

Approx.
3 000 l
gas oil per year

Approx.
14 000 m³
natural gas E per year

Approx.
€15 000
per year

Electrical energy savings

Approx.
47 000 kWh
per year

Approx.
€12 000
per year

Total annual savings*
€27 000

The **pay back period** for the investment in new burners (**€68 000**) is only

2.6 years!

Annual savings of **€27 000** can also be expected in the following years.

After **10 years** the plant operator will have achieved a cumulative nett saving of **€189 256!**

The plant operator – and the environment – also benefit from CO₂ savings of around **70 t per year**.

For context: **70 t CO₂** corresponds to the annual emissions of **10 mid-sized cars** (120 g CO₂/km) **being driven 58 000 km each**.

* Sample calculation based on an interest rate (financing) of 2.5 %, annual fuel cost increase of 2.0 %, annual electricity cost increase of 1.5 %, and an annual service cost increase of 2.5 %. Values will vary depending on the system. Your Weishaupt advisor will be happy to determine your specific savings potential individually.

Fast return on investment in a new burner

Year	0	1	2	3	4	5	6	7	8	9	10
Nett saving		26 565	26 375	26 186	25 998	25 812	25 628	25 444	25 263	25 082	24 903
Acquisition cost	68 000										
Cumulative	-68 000	-41 435	-15 060	11 126	37 124	62 936	88 564	114 008	139 271	164 353	189 256
All figures in Euro											

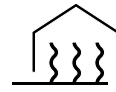
Weishaupt burners for numerous applications



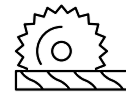
Waste recovery



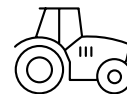
Chemical industry



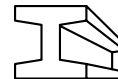
Heat generation



Wood processing



Agriculture



Metal industry



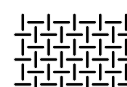
Food industry



Paper industry



Mineral products



Textile industry



Transportation

Complete flexibility with the use of alternative fuels



The range of fuels based on renewable energy sources continues to grow. Many of these “green fuels” can be used with Weishaupt burners, even in dual-fuel or simultaneous operation. That benefits both the environment and business. For example, many plant operators use biogas from their own production processes.

Paraffinic oils

include liquid fuels derived from “green hydrogen” (PtL), biomass (BtL), hydrogenated vegetable oils (HVO) and hydrotreated used cooking oils (HUCO). Weishaupt burners of all series are available for use with fuels.

Fatty acid methyl ester (FAME)

is produced from fats, oils, or methanol. FAME is also referred to as **biodiesel**. All large Weishaupt burners have a version suitable for its use.

Bioethanol

is a **versatile alcohol** produced from biomass or waste materials. It can be used **in combination with gas oil or gas**.

Biokerosene

is an **ATJ fuel** (Alcohol-to-Jet). It can be fired by larger Weishaupt burners with staged or modulating load control.

Blended mineral oil and FAME

is available as **gas oil with 3 to 99.9 % bio content**. Weishaupt offers various versions to cover all possible mixing ratios.

Cold-pressed oils

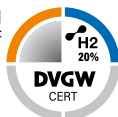
were the **first biogenic liquid fuels** on the market. They are produced exclusively from oil-rich plant fruits.

Biogas

is a **versatile energy source made from renewable raw materials**. It is produced in fermenters from green waste, other biogenic residual materials, and renewable energy crops.

Hydrogen

“Green hydrogen”, which is produced using **electricity from wind and solar power**, is expected to play an important role in the future transformation of the energy sector. Most gas-firing Weishaupt burners are suitable for hydrogen admixtures of up to 20 % (DVGW certified up to 1.8 MW burner output).



WM series



Staged load control

These burners, which switch between full and partial load, are suitable for **all liquid biogenic fuels**.

WM series



Modulating load control

Digital Weishaupt burners facilitate **modulating load control with biogenic fuels**, whereby infinitely variable load adjustments are made in response to heat demand from the plant. Available for the WM, WKmono, and WK burner series.

WKmono 80



WK series





NO_x
emission values:
Biogas/Nat. gas:
max. 75 mg/m³

Biogas at the Bitburger brewery

The Bitburger Brewery uses biogas from its own production processes in addition to natural gas to generate the heat used in beer production. Two 3LN-version Weishaupt WKmono 80 monobloc multiflam® burners rated at 10.9 MW each (one dual-gas and one dual-fuel burner) convert the fuels into process heat. They are notable for having NO_x emissions considerably lower than the limits laid down by the new MCP regulations – even without external flue gas recirculation.

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