

Economics of Combined Heat and Power (CHP)

Strengthen your business case
with demonstrable savings

centrica
Business Solutions

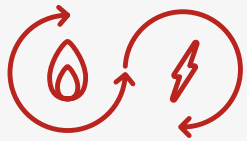




Secure energy control with onsite generation

In today's volatile energy environment, it can be difficult to build a business case for installing onsite generation. You may be facing soaring overheads, tough targets, or a changing supply chain – all of which can complicate any argument for changing the way you manage your energy. But is the price of doing nothing greater than the cost of investment?

This guide will walk you through the economics of deploying Combined Heat and Power, compared to the costs of doing nothing. So, equipped with all the data you need, you can build your business case. Investing in the energy of tomorrow can be daunting – but there's never been a better time to start building your low carbon future with CHP.



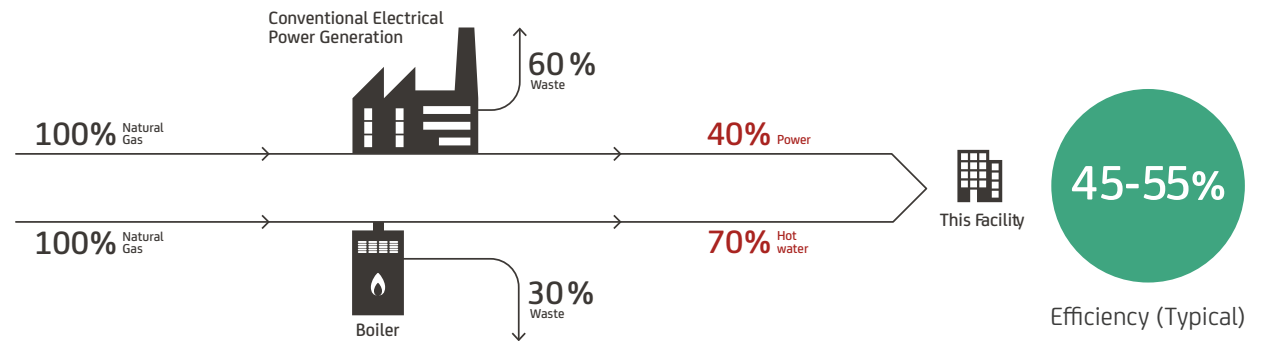
What is Combined Heat and Power?

Combined Heat and Power (CHP) converts a single fuel into both electricity and heat in a single process at the point of use.

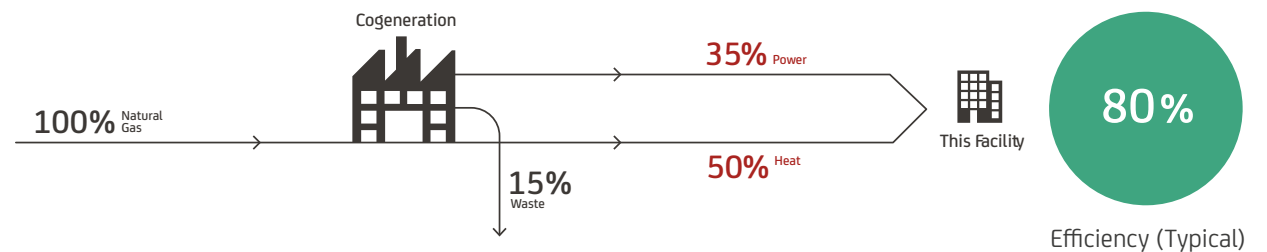
Recognised worldwide as a viable alternative to conventional generation, CHP is highly energy efficient and can deliver many positive financial, operational and environmental benefits.

Typically, a good CHP scheme can deliver an efficiency increase of anything up to 25% compared to the separate energy systems it replaces. Overall, it can reach a typical efficiency rate of up to 80%.

Typical case



Combined Heat and Power





Why invest in a CHP unit now? Analysing the payback period

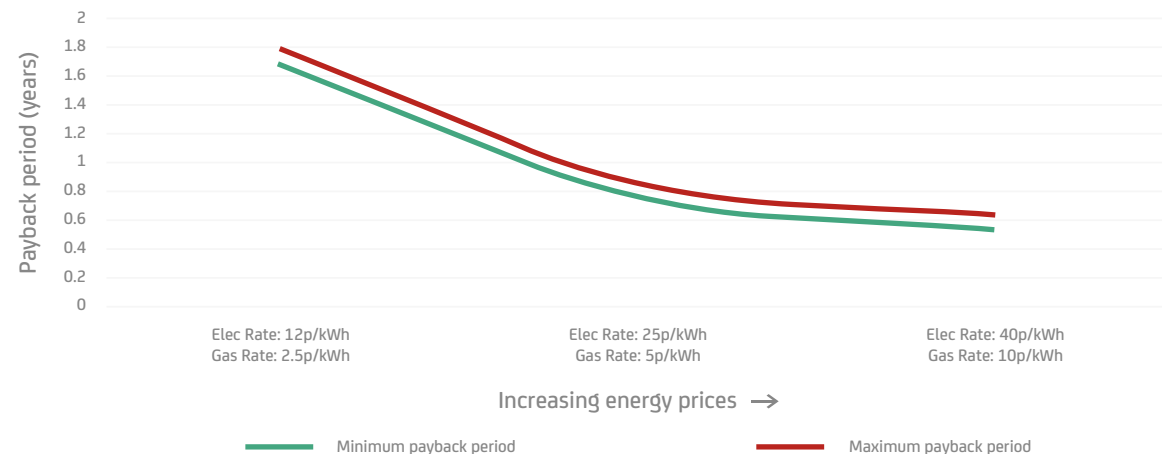
Now is the right time to start saving with onsite heat and power

We're in a constantly changing energy landscape. Prices are volatile, budgets are unpredictable, and many organisations are searching for a way to secure their energy supply for the future. But volatility can provide unexpected opportunities to secure control of your energy spend.

As energy prices increase, the business case for CHP becomes more attractive – and its payback period decreases. So much so, that your CHP could potentially payback in less than a year.

For example, with electricity rates at 12p/kWh and gas rates at 2.5p/kWh, you could expect a maximum payback period of around 1 year and 9 months. If those prices increased to 40p/kWh for electricity and 10p/kWh for gas, you could see that payback period decrease to less than 8 months.

So, even in the face of price volatility, you could take control of your energy – and see a return on your investment within a few years, or even months. All this, combined with helping you to decarbonise and improve your energy efficiency, means that CHP could be the key to your future energy supply.





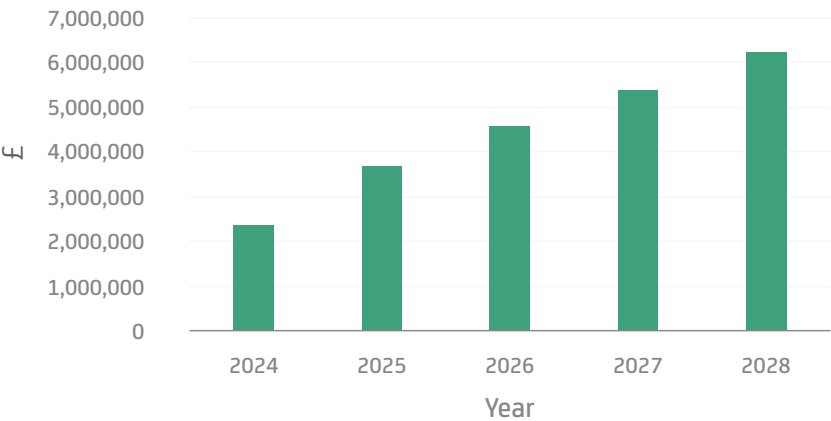
What’s the cost of doing nothing, and sticking with a traditional boiler?

Assuming that your boiler covers your heat requirements now, what are your plans when it reaches its end of life? Instead of replacing it, could you make cost savings by swapping to a CHP unit?

Take an example of a manufacturer, like a paper company. They need heat for their production processes and need around 1MW of low-temperature heat per hour. Instead of replacing their boiler at the end of its life, they choose to install a new 1MW CHP unit, under a five-year Discount Energy Purchase (DEP) contract.

Cumulatively, over the next five years, they could expect to save £6,222,537 with a CHP compared to sticking with a traditional boiler – as shown in Figure 1.

Figure 1: Cumulative savings

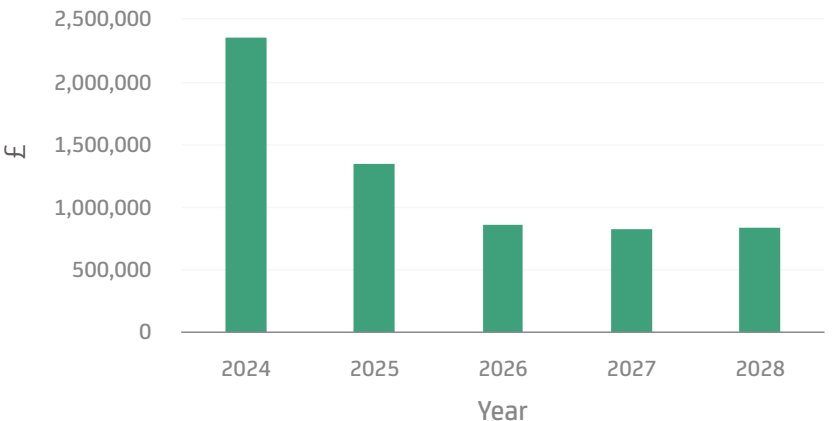


What could happen if prices stabilise, or if you don’t use all the heat?

The paper company would still make savings even if, as expected, energy prices stabilise in the next few years. Figure 2 shows that, whilst annual savings would likely reduce each year, our paper company would still be making significant savings versus doing nothing. The data is clear: installing CHP would be the right choice to make savings on their energy spend.

Even if they didn’t use all the heat generated, they’d still be likely to save around £2m on electricity costs versus importing this from the grid. And if their production processes required cooling or steam too, they could save even more: trigeneration, which provides heat, power and cooling or steam, is even more efficient than cogeneration.

Figure 2: Annual savings



Assumptions used in this report: 80% heat utilisation and 98% electric utilisation, with the CHP installed by the end of 2023.

	2024	2025	2026	2027	2028
Price assumptions (p/kWh):					
Natural Gas	20.00	10.00	8.00	5.00	5.00
Electricity	70.00	40.00	30.00	25.00	25.00

How can CHP help you to decarbonise?

Say our paper company's supply chain, or internal stakeholders, were concerned about carbon emissions from the CHP unit and wanted to explore a greener option.

When building their business case, the potential savings from CHP could justify the investment by freeing up funds for other sustainability measures.

For example, a 1MW heat pump to meet the paper company's requirements would typically cost around £2.2m. The cost of this investment could be secured in less than one year of CHP cost savings. And if they needed more heat, a 2MW heat pump costing around £3.9m could be paid for with under three years of CHP savings. And continuing to run both in parallel could even help to build the business case for a heat pump, as continued CHP savings could offset the running costs of a heat pump. So, with CHP, you don't have to choose between the demands of planet and profit: you can make savings to invest in becoming more sustainable.

With DEP, the paper company would also be securing stable, predictable energy costs. The price of electricity and heat would be fixed for the life of their contract (in line with inflation). So they'd be able to predict their energy spend and secure resilience against a volatile market, keeping them efficient and independent in a changing energy landscape.

On top of all this, with energy management platforms such as PowerRadar™, the paper company could stay on top of predictive maintenance and performance. With this information available even across multiple sites, they could align their costs with their CHP's output – helping them to improve their cost efficiency.



could be paid for with
under three years of CHP savings





What are the running costs of CHP versus a boiler?

Let's return to our paper manufacturer, who need 1MW of low-temperature heat per hour for production. In the **first five years following installation**, what would their running costs be if they invested in CHP, versus sticking with their boiler?

The running costs of a new CHP unit would look like this:

2024: £3,598,000

2025: £1,799,000

2026: £1,439,200

2027: £899,500

2028: £921,988

Total costs for heat and power: **£8,657,688**

And the running costs of a new boiler would look like this:

2024: £1,547,557

2025: £795,147

2026: £644,665

2027: £418,942

2028: £428,347

Total costs for boiler heat: **£3,834,659**

Initially, a new boiler looks cheaper to run. But this will only supply heat, so the paper company will need to import electricity from the grid. For the same amount of electricity as a new CHP unit would generate – based on forecasted energy prices – the company could expect to pay:

Imported grid electricity only:

2024: £4,713,800

2025: £2,693,600

2026: £2,020,200

2027: £1,683,500

2028: £1,725,588

Total costs of imported electricity: **£12,836,688**

Total costs of boiler heat and imported electricity: **£16,671,347**

So, when you take electricity purchasing into account, the total running costs for the paper company's new boiler would total **£16.6m**. That's almost double the cost of running their new CHP unit for five years. Replacing their boiler with a CHP system would be the perfect choice to reduce costs, improve resilience, and free up funding for investment in further sustainability measures.

Total cost of heat and power with CHP: **£8,657,688**

Total cost of heat and power with a boiler + grid power: **£16,671,347**



How has the business case for CHP changed over time?

To calculate the viability of a CHP project, we use **spark spread**.

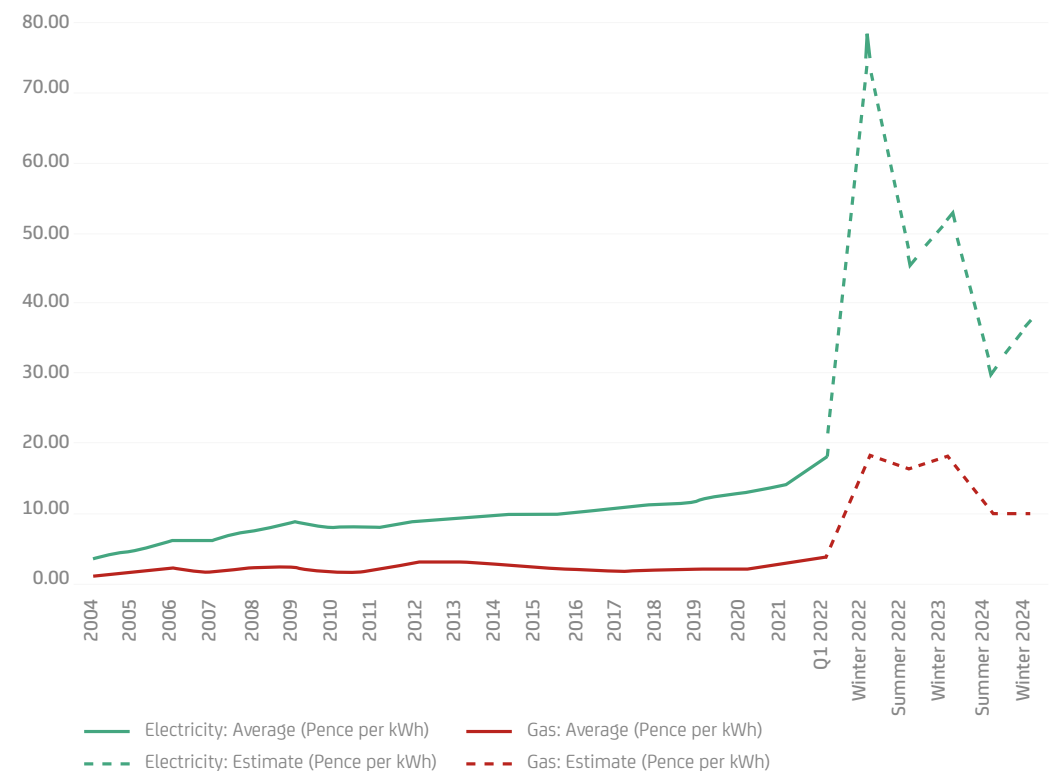
This is the difference between the incumbent electricity tariff and the cost of the fuel (usually natural gas) used to produce onsite CHP energy. Generally, a spark spread between 4 and 8 is a good starting point.

When we look at historic gas and electricity prices, spark spread has been on the rise. And looking ahead to forecasted prices, this looks set to continue – so CHP will remain a viable source of onsite energy generation.

But energy prices are set to stabilise in the next few years. So, organisations who want to maximise their financial return should act quickly. Installing CHP by the end of 2023 could mean that your organisation can optimise return on investment.

And there are still significant benefits to installing CHP, outside of the cost savings you could make. Our CHP engines are hydrogen-ready, so even if you decide to transition towards a hydrogen blend in the future, you can be assured that you're already prepared. And there's more:

- Reach efficiency rates in excess of 80% by using waste heat onsite
- Gain budget stability through predictable electricity costs and accurate forecasting of operating expenses
- Enhance site resilience and minimise the risk of operational failures
- Stay compliant with assessment and regulatory requirements, with the option to monitor performance, downtime and actionable steps through PowerRadar™





Financing your CHP unit

So how can you invest in CHP? If you have upfront funding available, you could invest via capital purchase. But if you don't, there are still several ways you can deploy CHP. Our in-house financing options can be specifically tailored to your requirements regardless of project size, cost or complexity.



Discount Energy Purchase (DEP)

Our in-house DEP option enables installation and operation of CHP at your site, with no upfront cost.

We can offer to fund either all, or any proportion of, the costs associated with your CHP project. We'd recover initial capital costs and ongoing maintenance charges over a contractually agreed period, usually 10 years, by charging a p/kWh rate for the electricity generated by the CHP plant.

DEP benefits include:

- No capital outlay and immediate savings
- Lower risk
- No ongoing maintenance costs
- Rapid deployment
- Long term, capped energy costs



Flexible Term Agreement (FTA)

Our FTA helps organisations to realise the energy savings offered by onsite generation.

With the option to return or relocate your CHP unit, FTA allows you to benefit from a contract that flexes in line with your changing demands. Even if you have to move sites, your contract can move too and we'll support you in moving your CHP plant.

- Relocate or return your CHP every 3-5 years, without penalties
- If you choose to relocate your CHP unit, your contract moves with you
- Achieve immediate savings of 15-20%
- Unlock deeper savings after 3-5 years of up to 40%
- No set up costs or initial capital outlay



Energy Savings Agreement (ESA)

With our in-house ESA, you could install or upgrade CHP with no capital outlay.

We'll recover initial capital costs through a fixed monthly fee, typically across a 10 year contract – which is often covered via the savings from your new CHP unit, resulting in a potential net cost of zero. You'll also benefit from maintenance and support in a holistic energy solution package.

ESA benefits include:

- Guaranteed savings and levels of service delivery
- Zero capital outlay
- Reduced energy consumption
- UK and EU Emissions Trading Schemes (ETSs)

Could you secure control of your energy spend with CHP?

We've seen how one company could benefit from deploying Combined Heat and Power, instead of replacing their traditional boiler. Could your organisation do the same?

If you're thinking of investing in CHP, now is the right time. The energy landscape is volatile, and the potential savings could save you thousands – which could be reinvested into your net zero goals. With significant return on investment available before the end of 2023, you could benefit from acting fast.

Our team of CHP experts is happy to help if you're looking for a large-scale solution. Our end-to-end solution, including CHP Operations & Maintenance, means you can be assured your CHP unit performs at its best. And with PowerRadar™, our integrated energy management platform, you can track the performance of your CHP – helping you to make data-led decisions about your energy estate.

No matter the sector you operate in, we can help you to secure a low-carbon energy supply for the future.





Our credentials



Over

35 years

experience with CHP



Over

700MW

of CHP operated and maintained
by us worldwide



1,800

UK & Ireland sites



34

countries we operate in

Find out more

At Centrica Business Solutions, we provide energy expertise and solutions to organisations around the world to improve their operational efficiency, increase resilience and help them become a sustainable business.

We are part of Centrica plc, an international energy services and solutions company that's focused on helping businesses and households to live sustainably, simply and affordably.

To find out more about how we can help:

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