

Chapter 7: Combined Heat and Power (CHP)

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Key headlines

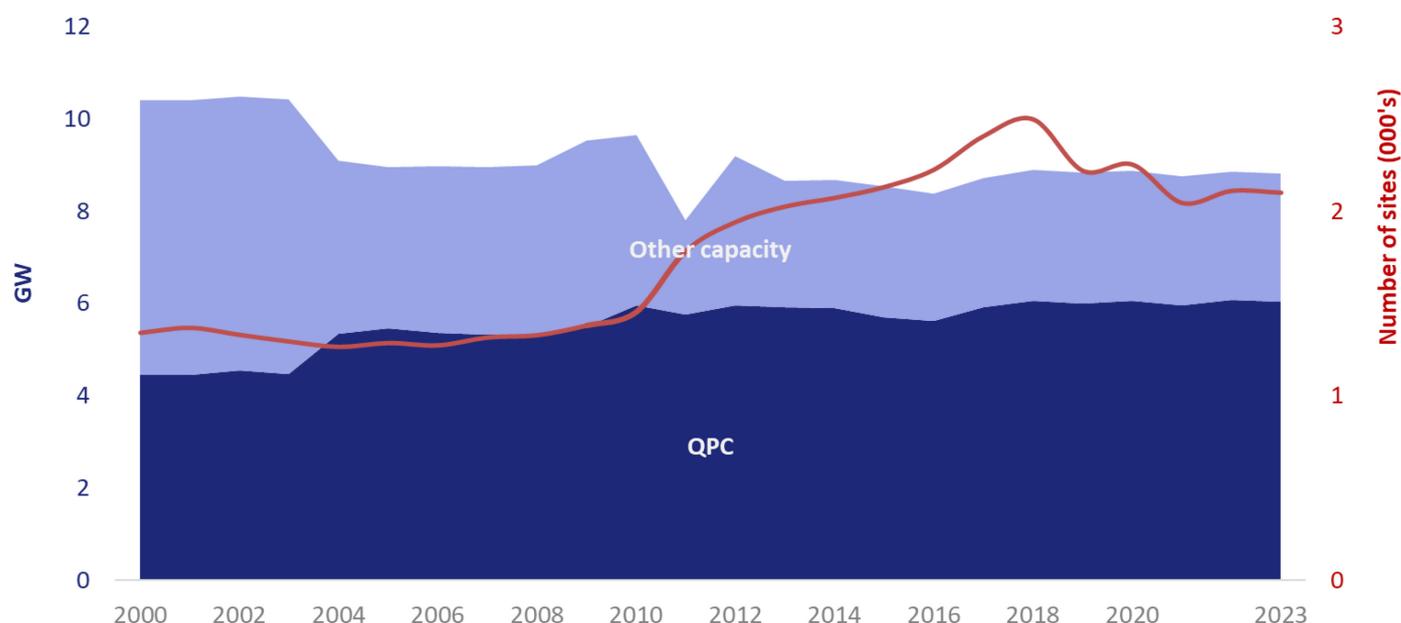
In 2023, renewable fuels accounted for 17 per cent of total CHP fuel input, a new record.

CHP qualifying output represented 7.6 per cent of total electricity generation, a 0.3 percentage increase on 2022; although CHP generation decreased, this was to a lesser extent compared to total UK generation.

Gas continues to be the main fuel consumed in CHP plants (around two thirds of fuel input), representing 8.4 per cent of gas demand.

CHP (or cogeneration) is the simultaneous generation of electricity and heat resulting in improved efficiencies when compared to meeting electricity and heat demands separately. The data for this section is primarily collected in support of the CHP Quality Assurance programme (CHPQA) but is supplemented with other sources to provide as comprehensive a picture as possible for UK CHP statistics. The CHPQA programme assesses and certifies schemes eligible for various incentives; not all output from a scheme is eligible, but where it is, it is referred to as 'good quality', or qualifying. Chart 7.1 shows the qualifying and other (non-qualifying) capacity compared to the number of schemes.

Chart 7.1 Comparison of total and qualifying electrical capacity from 2000 ([DUKES Table 7.1.A](#))

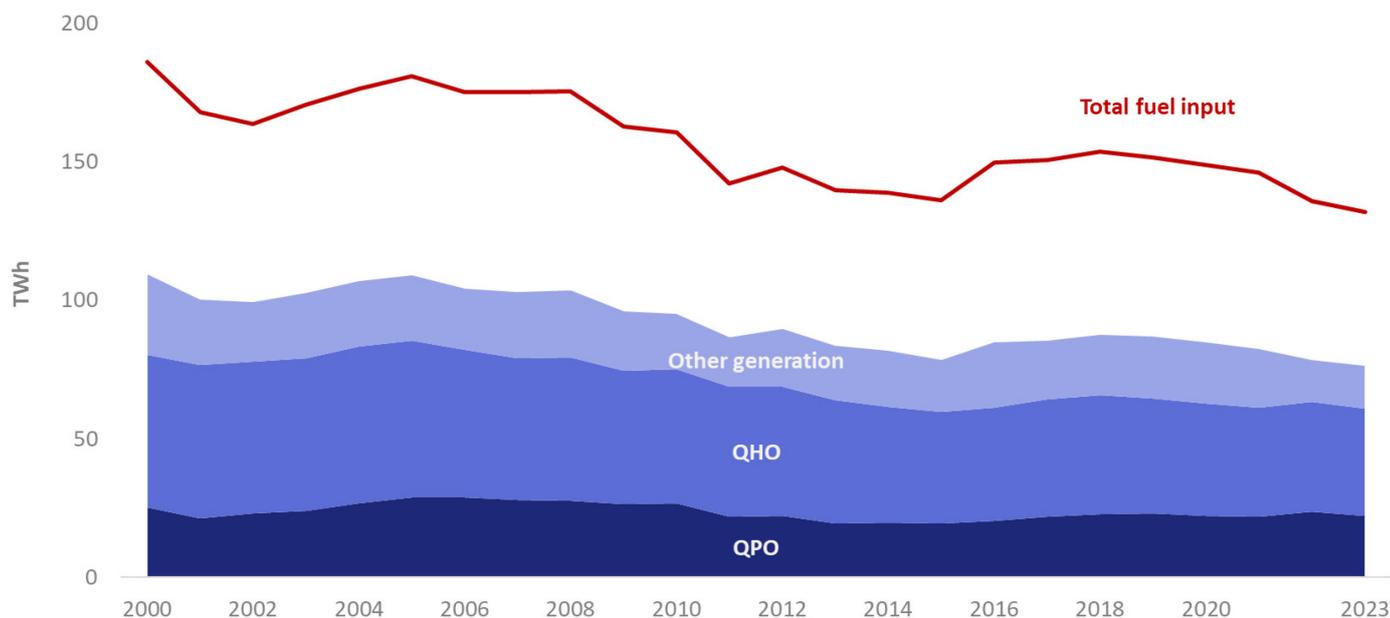


Since 2000, the number of sites remained steady until 2011 and 2012 when an additional data source was identified, and extra schemes were included in the database. The number of schemes then peaked in 2018, before falling by around 400 units between 2019 and 2023. This coincides with a decision taken by DESNZ to remove all schemes for which no new information had been obtained for at least nine years. Most of these

schemes were small scale (non CHPQA schemes) and whilst their removal is apparent in the time series for the number of schemes, the impact on capacity is barely discernible. Since 2000, total electrical capacity has fallen by 15 per cent but qualifying capacity has increased by 36 per cent, resulting in its share increasing from 43 per cent in 2000 to 68 per cent in 2023.

In 2023, 80 per cent of CHP outputs were deemed to be qualifying, around two thirds of which was heat. Chart 7.2 shows CHP outputs, qualifying and non-qualifying, compared to total fuel input.

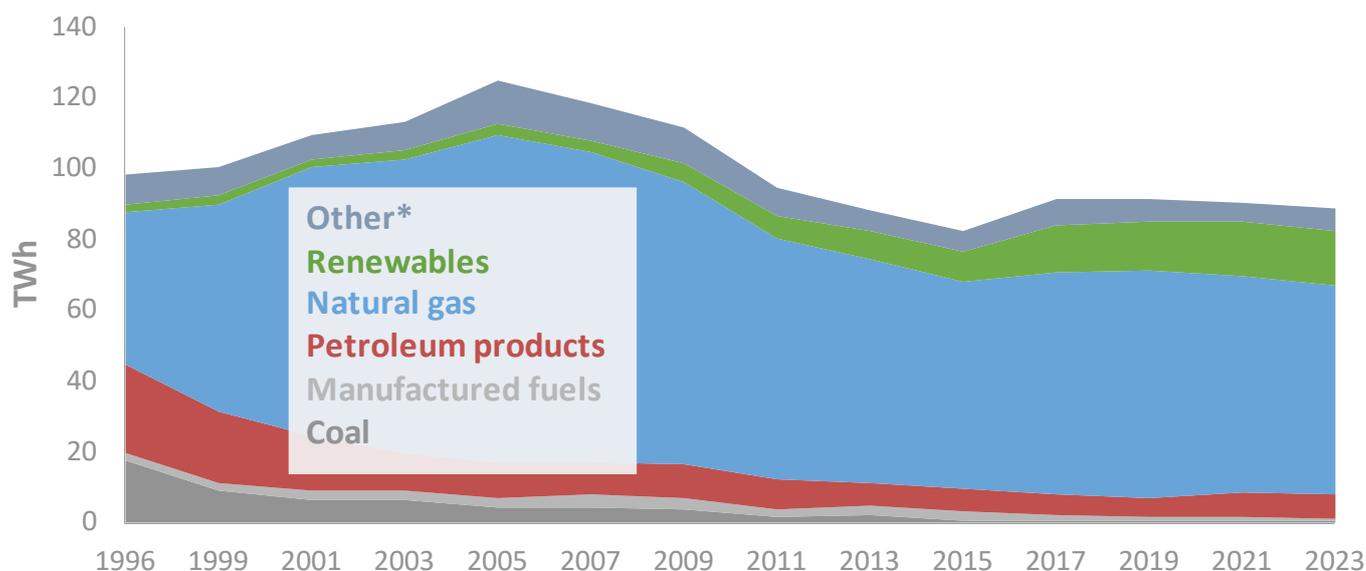
Chart 7.2 Comparison of total fuel and CHP outputs from 2000 ([DUKES Table 7.1.A](#))



Although not a perfect relationship, CHP outputs tend to be driven by the underlying difference between the price of gas and electricity, the spark gap; the larger the gap, the cheaper gas is relative to electricity which makes cogeneration more economically viable. This partly explains the decline from 2006 to 2015 and the subsequent turnaround following a widening of the spark gap in 2013.

Natural gas remains the main fuel consumed by CHP schemes representing 66 per cent of the total in 2023, although its share has fallen slightly over the most recent years. The use of coal and petroleum products continues to fall with renewables increasing its share to 17 per cent in 2023. Chart 7.3 shows this long-term trend.

Chart 7.3 Trends in fuel demand for CHP¹ 1996 to 2023 (DUKES Table 7.1.B)



In 1996, the share of natural gas was just 44 per cent but by 2005, it had reached a maximum of 74 per cent. Although its share then stabilised at around 70 per cent, it has fallen by around 4 percentage points since 2019. Conversely, coal and manufactured fuels' share represented 20 per cent in 1996 but has plummeted to 1.4 per cent in 2023. Use of renewables was stable at around 2 per cent until as recently as 2007 but has steadily increased to double digit figures since 2014, reaching a record high of 17 per cent in 2023.

CHP is deployed across a variety of sectors including power generation, refineries, industry, public administration, and commercial. Around two thirds of CHP sites operate in services (public administration and commercial), with industrial schemes making up for the remaining third. However, industrial CHPs are larger in terms of capacity, with refineries alone accounting for the largest share of electrical capacity, 35 per cent, but just 0.5 per cent of the number of sites. In contrast, the commercial sector has 23 per cent of the sites but accounts for just 4 per cent of the capacity.

The concentration and size of CHP schemes also varies across the UK, with the differences often mirroring the needs of the area's most developed economic sectors. Chart 7.4 shows Yorkshire and Humberside has the highest CHP capacity including the UK's largest scheme resulting in the highest average capacity per site (Table 7.8.A) across the regions (11.0 MW, markedly higher than the next highest at 3.5 MW for the South East). The South West has the lowest average capacity per site (0.9 MW), and the region with the highest number of schemes is the London (average capacity per site at 1.0 MW).

¹ Fuel demand for heat and qualifying electricity output

Chart 7.4 Number of schemes and capacity by region in 2023 (DUKES Table 7.8)



Table 7.8.E shows the distribution of capacity across the different sectors and regions with London accounting for almost half of all capacity in the electricity, gas, steam and air conditioning supply sector which includes district and community heating schemes. The chemicals sector which, along with oil refineries, is suitable for CHP, is concentrated in the North East, the North West and Yorkshire and Humberside; taken together these regions account for over 80 per cent of CHP capacity in those sectors.

The large share of capacity employed in vehicle manufacture in the West Midlands is in line with the importance of this region to the automotive sector. More than a third of all capacity in the food and drink sector is in the Eastern region reflecting the large heat demands associated with sugar manufacture. The concentration of large horticultural sites (i.e. greenhouses) in South East England helps to explain the deployment of 44 per cent of all agricultural capacity in this region. The distribution of capacity serving public administration, mostly hospitals and education, tends to align with population density.

In 2023, 32 per cent of qualifying outputs (heat and electricity) were exported with the remaining 68 per cent being used on site. Less than half of qualifying electricity is exported (43 per cent) with the majority being split between power suppliers (i.e. exported to the grid) and sold under contract. Other generation, however, is mostly exported (77 per cent) with exports fairly evenly distributed across the output sectors. Heat is mostly consumed within the CHP scheme but of the heat which is exported, the majority is sold under contract (this heat is reported under the ‘heat sold’ column in [DUKES Table 1.1](#)).



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