

Institute for Public Policy Research



THE HEATWAVE

UNLOCKING THE ECONOMIC
POTENTIAL OF UK HEAT PUMP
MANUFACTURING

**Simone Gasperin,
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October 2024

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This paper was first published in October 2024. © IPPR 2024

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ACKNOWLEDGEMENTS

The authors would like to thank IPPR colleagues George Dibb, Dave Hawkey, Abi Hynes, Richard Maclean and former IPPR colleague Luke Murphy for their support and contributions throughout the research, writing and editing process. The content of this report has been informed by engagement with external stakeholders, including experts from industry associations, executives of companies and senior civil servants. Our thanks go to Tomas Roberto (Kensa), Richard Warren (Kensa), Russell Dean and Rodney Ayre (Mitsubishi Electric), Jeff House (Baxi), Victoria Matthews (Vaillant), Emma Bohan (IMS Heat Pumps), David Pinder (Mixenergy), Tom Oldfield (Mixenergy), Olivia Smalley (Heat Pump Association), Eleonora Shehu (EHPA), Andrew Marsden (Nesta), Matthew Aylott (DESNZ), Agne Toleikyte (European Commission), Eric Lecomte (European Commission).

We would like to acknowledge the financial support of the following funders: the Laudes Foundation and the European Climate Foundation.

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Citation

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Gasperin S, Narayanan P and Emden J (2024) *The heatwave: Unlocking the economic potential of UK heat pump manufacturing*, IPPR. <http://www.ippr.org/articles/the-heatwave>

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SUMMARY

Heat pump manufacturing is a strategic priority for the UK economy. It is a clear example of how the transition to net zero can foster economic growth, sustain qualified jobs, alleviate regional imbalances and reduce the cost of living via saving on energy bills. Previous IPPR analysis – *Manufacturing Matters* (Narayanan et al 2024) – pointed to the opportunity of building a competitive heat pump manufacturing industry from related activities located in existing industrial clusters. This report further expands this evidence and argues that a comprehensive green industrial strategy for heat pump manufacturing should focus on coordinating the acceleration of domestic heat pump installations with the expansion of domestic heat pump manufacturing capacity, primarily via diversification from existing UK producers of boilers and air conditioners.

KEY FINDINGS

- **Heat pump manufacturing in the UK represents both an opportunity and a necessity.** Domestic production of heat pumps is not only feasible but also more cost-effective for domestic end users, considering logistic costs and the specific national characteristics of the heat pump market. Additionally, the forecasted global supply shortages by 2030 underscore the importance of establishing domestic production to meet increasing domestic as well as foreign demand in the future. Developing a competitive heat pump manufacturing industry will enable and accelerate the domestic deployment of heat pumps in the UK.
- **The UK could have one of the largest domestic markets for heat pumps in Europe.** While heat pumps sales have increased in past years, in 2022, 29 gas boilers were sold in the UK for every heat pump. The UK has less than half a million heat pumps installed – the second lowest in Europe on a per-household basis. It will need to install at least 5 million by 2030 and 19 million by 2050.
- **The UK has the capabilities to make heat pumps at scale, building on its competitive boiler manufacturing industry.** In value terms, Britain is the largest producer of residential gas boilers in Europe, but ranks only twelfth in heat pumps. It is also the fourth largest producer of air conditioning systems. The production processes for boilers, air conditioners and heat pumps share common skills and equipment needs. Supporting existing production facilities to convert to heat pump manufacturing should be a priority as it is fairly quick and requires relatively low capital investment.
- **Heat pump manufacturing can contribute to regionally balanced growth and higher paid permanent jobs,** especially if developed by converting boiler and air conditioning manufacturers clustered in the Midlands, North East and Scotland.

CHALLENGES

- **As stressed by our stakeholders, the UK needs a stable and long-term policy environment for heat pump installations and manufacturing.** The previous government's strategy (under Rishi Sunak) was not consistent with net zero objectives and was subject to too many changes in recent years. It also lacked a comprehensive approach that could help the broad heating and cooling industry coordinate installation objectives with manufacturing investments.
- **Domestic heat pump manufacturing is driven by heat pump demand for domestic installations, but these have failed to accelerate due to high**

installation and operating costs. With new builds providing a significant but limited source of demand from 2025, the priority is to develop the market for replacing boilers in existing buildings. Past and existing measures to incentivise retrofitting by subsidising installation costs have proven to be ineffective. At the same time, operating costs in the UK have been among the highest in Europe, due to a disadvantageous gas-to-electricity price ratio that makes replacing gas boilers with heat pumps relatively less cost-convenient.

- Coordination of demand-side policy to accelerate domestic installations with timely manufacturing investments by boiler manufacturers is critical. Conversion of production in existing facilities can be done quicker, saving on capital expenditure and redeploying existing skills.

KEY RECOMMENDATIONS

A more ambitious, stable and long-term industrial strategy, with a comprehensive approach that encompasses the broad heating industry, should be focusing on some key elements.

- **In the short term, installation costs need to be brought down with more stable and generous subsidies, differentiating between different types of heat pumps.** Complementary support can be granted via government-backed low-cost financing. Installation and operating costs can also be indirectly reduced by increasing public funding for training heat pump installers.
- **Temporary measures to reduce the operating cost of electricity – such as power purchase agreements with heat pump adopters or heat pump tariff discounts – are essential to make heat pumps more attractive. In the medium to long term, accelerating the rollout of renewables will be the sustainable solution to achieve cost reduction and the full decarbonisation of residential heating.** Operating costs can also be indirectly reduced by increasing public funding for innovation grants aimed at ameliorating the operating efficiency of products manufactured in the UK (with potential long-term competitive advantages for the export market).
- **The expansion of heat pump manufacturing capacity, particularly through reconvert existing boiler manufacturing, should be coordinated and supported with public financing instruments such as the newly established National Wealth Fund (NWF).** Minority equity investments by the NWF can alleviate the cost burden of scaling up production in the first period, while signalling the government's long-term commitment to develop a domestic heat pump manufacturing industry that can contribute to national installation objectives.

1. THE CASE FOR HEAT PUMP MANUFACTURING IN THE UK

1.1 THE UK IS UNIQUELY PLACED TO DEVELOP HEAT PUMP MANUFACTURING

UK manufacturing has seen a significant decline in the past three decades. Reversing this trend is a priority for delivering growth that is sustainable, regionally balanced and resilient to energy and geopolitical shocks. The UK is primed to seize growth opportunities for green manufacturing thanks to its existing industrial capabilities. In *Manufacturing Matters*, IPPR identified heat pumps as a priority for the UK (Narayanan et al 2024). The case for expanding the UK's specialisation in heat pump manufacturing comes down to five core facts.

Demand for heat pumps is expected to grow both nationally and internationally

The UK has the potential to become one of the largest domestic markets in Europe for heat pumps in residential buildings, given the large existing stock of gas boilers that could be replaced. Globally, 10 per cent of sales in heating equipment is accounted for by heat pumps, up from 5 per cent in 2010 (IEA 2023c). Growth of heat pump sales is expected to accelerate further: by 2030 they should represent 43 per cent of global heating equipment sales under the International Energy Agency's scenario compatible with net zero targets.

Global heat pump manufacturing capacity currently falls well short of levels needed to achieve net zero

The world is projected to face a shortage of manufacturing capacity of 64 per cent under a net zero scenario by 2030 (IEA 2023b). Global undersupply confirms the opportunity for manufacturing expansion within the UK. Expanding manufacturing capacity in the UK will contribute towards this gap, helping to ease potential supply shortages or trade disruptions. In the long term, it can represent a potential for exports.

The UK's existing industrial structure means that it is well placed to make the shift

On the supply side, UK conditions are ripe for domestic heat pump manufacturing thanks to existing strengths in heating and cooling manufacturing. UK manufacturers of gas boilers and air conditioners already possess much of the knowledge base, skills and supply chain networks to develop heat pump production. Most of them are subsidiaries of multinational companies that successfully manufacture heat pumps elsewhere (particularly in Europe). Since the technology and production processes are well established, the cost of entering this market is low compared to green products – particularly for businesses already operating in the heating and cooling market (BEIS 2020).

Domestic heat pump production provides competitive cost advantages

At the same time, national configurations of buildings, together with cost differentials relating to the logistics of shipping and storage, represent natural barriers to imports that create a competitive cost advantage for domestic manufacturers to supply products for the domestic market (Lyons et al 2023). This is further reinforced by the small impact of direct labour costs (assembly and logistics) on the total value of the heat pump product (less than 5 per cent, according to our stakeholders), which makes production in low-wage countries not particularly advantageous.

Heat pump production is strategically important to deliver installation rates compatible with net zero objectives

Only 1 per cent of UK households currently use heat pumps to heat their homes (DESNZ 2024a). The predominance of gas boilers as the main heating system makes the residential sector responsible for a significant share of greenhouse gas emissions (see box). Heat pumps will need to be deployed to around 19 million homes around the country if the UK is to achieve its net zero targets (CCC 2019). Previous Conservative governments aimed to accelerate heat pump deployment and set the target of 600,000 installations per year by 2028, of which half would be manufactured in the UK (HM Government 2021). A strong heat pump manufacturing sector can facilitate the UK's deployment plans and provide resilience against the possibility of global supply shortages.

1.2 HEAT PUMP MANUFACTURING BRINGS CONSIDERABLE SOCIOECONOMIC BENEFITS

Beyond facilitating heat pump deployment and its related benefits (see box), heat pump manufacturing itself has positive features. At present, the unit production value of a heat pump manufactured in the UK is around three times higher than a boiler.¹ Relative to boilers, manufacturing heat pumps requires more physical material and assembly time, leading to a larger induced job creation along the supply chain (Lyons et al 2023). Since the increase in production value² is higher than the number of jobs that can be created, specialising in heat pump manufacturing can foster economic growth through higher productivity, while the sectoral workforce can expect higher wages.

1 Our calculation is based on 2022 values from PRODCOM data provided by the Office for National Statistics (ONS).

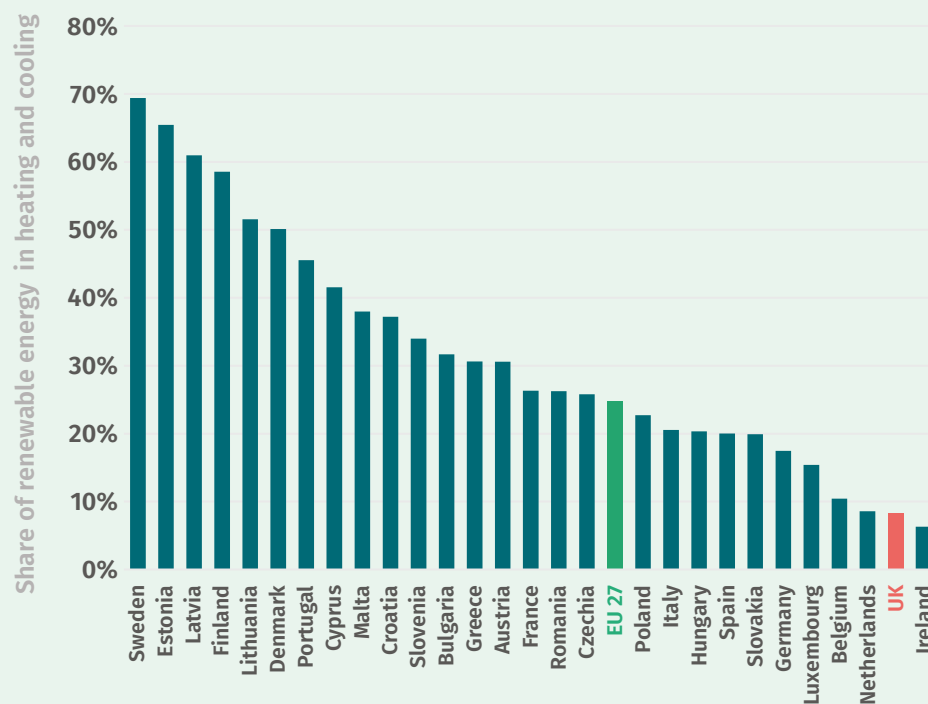
2 The Department for Business, Energy and Industrial Strategy (BEIS) (2020) estimated that manufacturing 636,000 heat pumps in 2035 (medium growth scenario) would correspond to a product value of £3.1 billion, more than twice the current production value of boilers.

WHY THE UK NEEDS HEAT PUMPS

The buildings sector³ is the second largest national source of greenhouse gas emissions in the UK, and emissions have increased from 13 per cent of the total in 1990 to 20 per cent today, despite a fall of 28 per cent in absolute terms (DESNZ 2024b). Much of this is driven by heating and cooling – and this is where the UK really underperforms. Britain has the second lowest share of renewable energy used in heating and cooling in Europe (figure 1.1),⁴ driven by a heavy reliance on gas-powered central heating.

FIGURE 1.1: THE UK HAS THE SECOND LOWEST SHARE OF RENEWABLE ENERGY IN HEATING AND COOLING IN EUROPE

Share of renewable energy in heating and cooling in 2022



Source: Authors' elaboration on Eurostat (2024) and DESNZ (2023b) data

Heat pumps are proven to be the key technology in decarbonising residential heating, especially when operated on renewable electricity.⁵ They are also more energy efficient than natural gas boilers. Deploying heat pumps on a mass scale translates into lower energy bills and higher disposable incomes across the economy (UK Energy Research Centre 2023). Electrification of heating through heat pumps is also important for energy security, helping to reduce the exposure to highly volatile natural gas markets in favour of domestically generated renewable electricity (Toleikyte et al 2023).

3 The buildings sector accounts for 20.2 per cent of total greenhouse gas (GHG) emissions and the residential sector in turn is responsible for two-thirds of GHG emissions by the UK building stock.

4 Europe here stands for the 27 European Union members plus the UK.

5 According to the International Energy Agency (2022), the rollout of heat pumps can globally reduce GHG emissions by 20 per cent with the current emission-intensive electricity mix, and by as much as 80 per cent if operating on renewable electricity.

In the remainder of this report, we suggest the need for a comprehensive green industrial strategy for heat pump manufacturing. Chapter 2 presents the UK market for heating equipment, showing the opportunity for a huge untapped heat pump market to drive domestic manufacturing investments. Chapter 3 provides a quantitative assessment of the UK heating manufacturing industry, in terms of production and trade patterns, showing the progress that needs to be made and where to start from. It also maps existing UK players in the sector. Finally, chapter 4 assesses the previous government's strategy on heat pumps, highlighting unaddressed challenges and outlining IPPR's industrial strategy approach and proposals for heat pump manufacturing in the UK.

2. THE UK COULD BECOME ONE OF THE LARGEST DOMESTIC MARKETS FOR HEAT PUMPS IN EUROPE

2.1 THE UK HEAT PUMP MARKET REMAINS RELATIVELY UNDERDEVELOPED COMPARED TO THE ONE FOR GAS BOILERS

Heat pump sales⁶ in the UK are on the rise but lag considerably behind the previous government's target, the Climate Change Committee (CCC) target and neighbouring European countries. In 2023, sales exceeded 60,000 units⁷ (HPA 2024a), more than twice the number sold five years earlier. However, IPPR analysis shows that with current growth rates, heat pump sales will not reach the CCC's 827,000 implied target until 2091, nor the previous government's 600,000 target until 2071.

Heat pump installations in the UK have been lagging behind all major European countries for 10 years (Nesta 2023), even when limiting the comparison to air-to-water (ATW)⁸ and ground source heat pumps (GSHPs).⁹ Across Europe,¹⁰ heat pump sales totalled 3.02 million units in 2023 (EHPA 2024a and 2024c). Standardised by population size, the UK is Europe's smallest market for heat pumps, with just 2.1 units sold per 1,000 inhabitants in 2023.

Over the years this translated into the UK having Europe's second lowest stock of operating heat pumps: less than 15 units per 1,000 inhabitants, while the European¹¹ average is well above 100. At the end of 2023, France and Italy had respectively 6 and 4 million operating heat pumps (including air-to-air), compared to approximately 440,000 in the UK.

At the same time, the UK remains Europe's largest market¹² for gas boilers, with approximately 1.7-1.8 million units sold each year (European Heating Industry 2023). For every heat pump sold in the UK in 2022 (last comparable year), 29 gas boilers were sold (figure 2.1).

6 Sales figures represent heat pumps sold by manufacturers to developers, not end users. For this reason, installation figures do not match perfectly annual sales.

7 90 per cent of them are air source heat pumps (ASHPs), the remaining share accounted for by ground source heat pumps (GSHPs).

8 Air-to-air (ATA) heat pumps have little relevance in the UK market due to the preference for radiators, the lack of cooling needs and policy schemes that apply only to air-to-water (ATW) and GSHPs. However, the utilisation of ATA heat pumps in Sweden, Denmark and Finland for heating purposes should validate their effectiveness also in colder countries.

9 GSHPs are particularly concentrated in Sweden and Germany, accounting for half of installations in Europe.

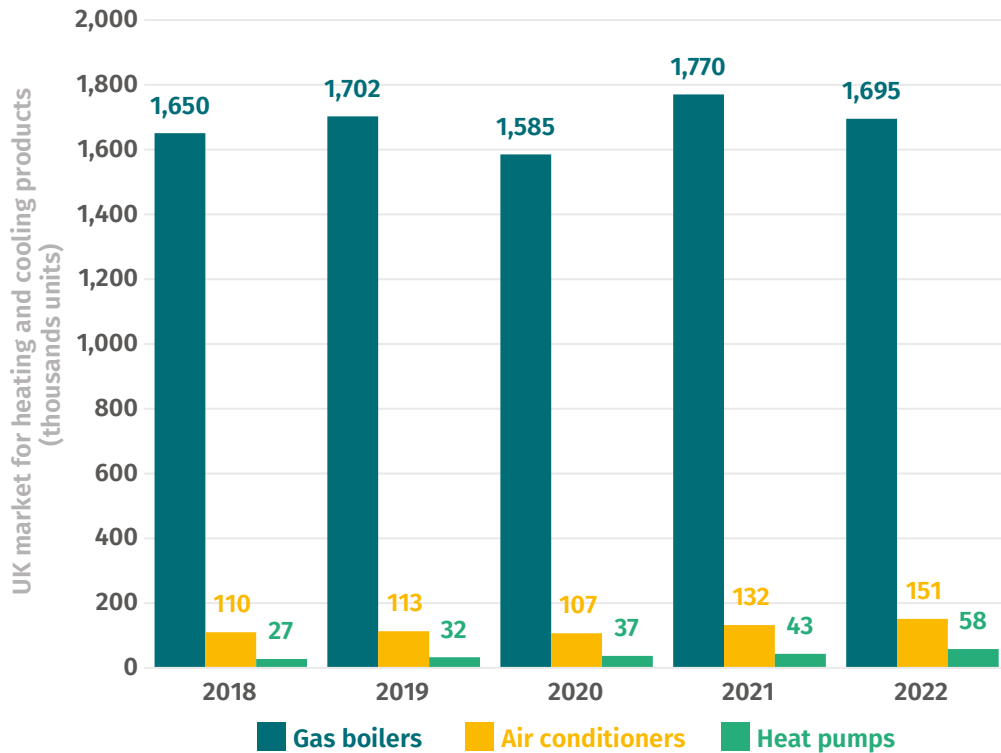
10 This refers to 21 countries surveyed by the European Heat Pump Association (EHPA). They are: Austria, Belgium, Czechia, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Lithuania, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland and the UK.

11 Only Hungary has a lower per households stock of heat pumps.

12 For many years until 2015 – when China and South Korea took over – the UK was the world's largest domestic market for gas boilers (Building Services Research and Information Association 2007 and 2017).

FIGURE 2.1: 29 GAS BOILERS ARE SOLD IN THE UK FOR EVERY HEAT PUMP SOLD

Market volumes measured in number of units for gas boilers, room air conditioners and heat pumps in the UK in the years 2018 to 2022



Source: Authors' elaboration on HPA (2024a), Japan Refrigeration and Air Conditioning Industry (2023) and European Heating Industry (2023)

Notes: 'Air conditioners' refers to the demand for residential room air conditioning; 'Heat pumps' refers to sales by manufacturers to installers and distributors; 'Gas boilers' refers only to condensing gas boilers.

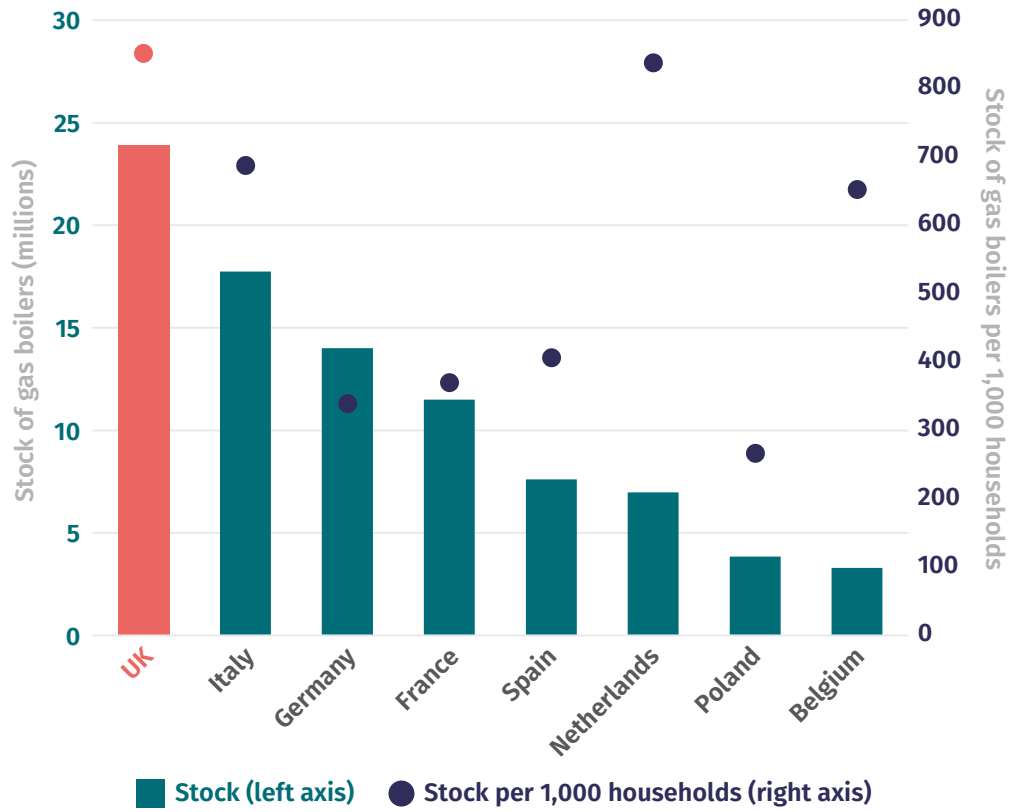
Finally, it is worth noting that the market for domestic air conditioning (AC), despite being larger than the heat pumps one (with 151,000 units sold in 2022), sees the UK in a slightly better position compared to other northern European nations, on a par with Germany on a per 1,000 household basis (Japan Refrigeration and Air Conditioning Industry 2023).

2.2 UK MANUFACTURERS OF HEAT PUMPS CAN EXPLOIT A POTENTIALLY HUGE DOMESTIC MARKET DERIVING FROM THE REPLACEMENT OF GAS BOILERS AS HEATING SYSTEMS

The replacement of gas boilers with heat pumps constitutes a huge potential source of demand for domestic heat pump manufacturers, given that the UK has the highest stock of gas boilers in Europe, even on a per household basis (figure 2.2). The UK stock of 24 million gas boilers that could be replaced in the next decade – at least 19 million of which potential UK manufacturers of heat pumps can address – is about the same size as that of France and Germany combined.

FIGURE 2.2: THE UK HAS THE LARGEST STOCK OF GAS BOILERS IN EUROPE

Number of units installed in absolute terms and on a per 1,000 households basis in the year 2021



Source: Authors' elaboration on European Heating Industry (2023)

3.

HEAT PUMP MANUFACTURING IN THE UK SHOULD DEVELOP THROUGH DIVERSIFICATION FROM THE EXISTING HEATING MANUFACTURING INDUSTRY

Establishing new manufacturing plants can increase domestic heat pump production capacity, but this process takes longer and often cannot rely on available local skills. Expanding current manufacturing capacity in existing production sites is an alternative option. However, this solution has limited scope in the UK context, given the relative scarcity of specialised heat pump manufacturers (see section 3.1).

While these two approaches should not be dismissed outright, the UK should focus its heat pump manufacturing strategy on diversification from existing related activities, specifically pivoting on boiler and air conditioning manufacturing – as argued in *Manufacturing Matters*.

In the case of air conditioning manufacturers, production lines for heat pumps could be introduced alongside existing ones, building on the similarity of components and technology.

Boilers and heat pumps are different technologies, but their assembly processes and associated skills are similar.¹³ Current production facilities and workforce can transition to heat pump manufacturing with relative ease, within reasonable time and at lower costs (BEIS 2020). This short-term opportunity could also help to increase the social acceptance of phasing out gas boilers, as manufacturing jobs will be preserved, although as IPPR has previously argued, any workforce transition will still need to be accompanied by a clear workforce plan that provides workers, unions and local communities with clarity over how their jobs will change in future, even in if the re-skilling process appears to be relatively simple (Emden et al 2024). The transition could happen gradually, with production lines for heat pumps initially operating alongside boiler production lines, as some UK manufacturers have already started to do (see section 3.2).

For these reasons, this chapter extends the comparison among heat pumps, boilers and air conditioners, by assessing the UK's manufacturing specialisation in each of those heating products.¹⁴

13 With the exception of pipe brazing and the handling of refrigerant gases, which are specific for heat pumps.

14 Quantitative figures refer to specific items identified by product codes outlined in the appendix.

3.1 THE UK HEATING MANUFACTURING INDUSTRY DISPLAYS STRENGTHS (IN BOILERS) AND WEAKNESSES (IN HEAT PUMPS)

3.1.1 The UK is the largest producer of residential boilers in Europe but remains a marginal one in heat pumps

The UK ranks only twelfth in Europe¹⁵ in heat pump manufacturing, with average production value of £24.3 million¹⁶ in the period 2018-2022 (figure 3.1). Paradoxically, this amount was higher in the early 2000s, even surpassing Sweden (currently Europe's largest producer), while Europe's total¹⁷ has more than doubled.

Despite having a niche trade specialisation in components used for temperature controls and reverse cycle refrigeration systems (as reported in *Manufacturing Matters*), the UK is also not a major producer of the primary material components for heat pumps.¹⁸ At the European level, it ranks fifteenth in the production of heat pump parts, and ninth in the production of compressors. Over the period 2013-2023, the UK has also displayed a persistent and growing trade deficit¹⁹ for parts of heat pumps that averaged £100 million, along with a fluctuating yet constant trade deficit for compressors, averaging £53 million. As indicated by specialist studies (Lyons et al 2023) and confirmed by our stakeholders, most of these components are sourced from Germany and Italy (within Europe) and from East Asia.

At the same time, the UK is the largest producer of residential boilers in Europe in value terms, with 22.7 per cent of Europe's share in production value on average during the period 2018-2022. The UK's huge domestic market has driven the growth of a strong boiler manufacturing industry, which satisfies more than half of the domestic demand (BEIS 2020) – an example that could be replicated with heat pumps. Production value is currently close to £1.5 billion, more than triple compared to the early 2000s, when the UK was behind Italy and Germany, despite being already the largest European market.

Interestingly, the UK is not a major manufacturer of boiler parts, ranking seventh in production value within the European context and displaying a persistent trade deficit, averaging £233 million over the period 2013-2023. Nevertheless, the specialisation in boiler assembly seems to have enabled a growing industry of component suppliers, as evidenced by a growing domestic production that halved the trade deficit throughout this period.

When it comes to air conditioners, the UK ranks fourth in Europe, although this results from adding up three different product categories. The UK ranks first in residential air conditioning sets, despite the smaller production volume overall (£175 million on average in the years 2018-2022) – as most of the products in this category are manufactured outside Europe, mainly in China and Thailand.²⁰

15 Throughout this section Europe refers to the 27 European Union members plus the UK.

16 Production value figures for the UK were taken from ONS's PRODCOM data and originally reported in pound sterling. Production value figures for other EU countries were taken from Eurostat's PRODCOM data and originally reported in euros. Conversion into pound sterling was done through annual average €/£ exchange rates reported by the Bank of England.

17 Europe has a relatively solid specialisation in heat pump manufacturing, with 18 per cent of global capacity (IEA 2024), approximately the same share of global GDP (IMF 2024).

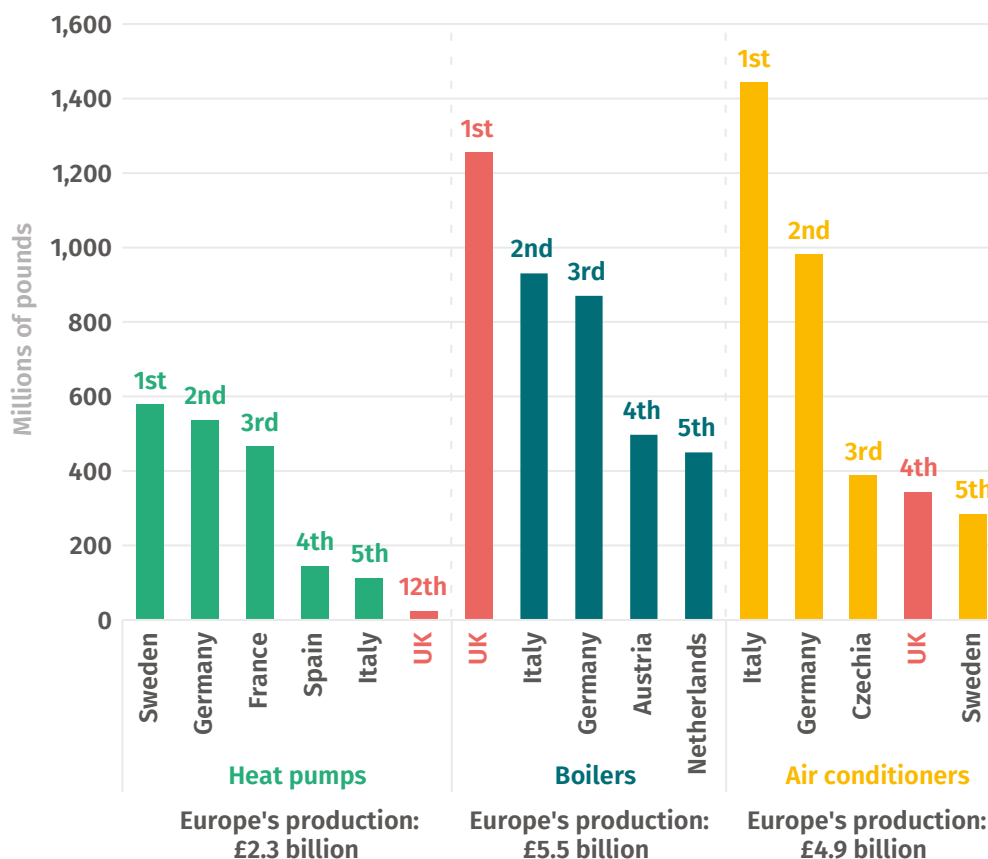
18 Here PRODCOM time series present more missing values.

19 Trade figures were originally reported in US dollars, as taken from the UN Comtrade Database. Conversion into pound sterling was done through annual average \$/£ exchange rates reported by the Bank of England.

20 China dominates global production of room air conditioning machines, accounting for around 55 per cent of global exports despite being the largest domestic market with a global revenue share of 26 per cent. Thailand accounts for another 25 per cent of global exports. These figures refer to the year 2022 and are based on elaboration from Comtrade data and from Statista (2024).

FIGURE 3.1: THE UK IS EUROPE'S LARGEST MANUFACTURER OF RESIDENTIAL BOILERS BUT RANKS ONLY TWELFTH IN HEAT PUMPS AND FOURTH IN AIR CONDITIONERS

Average production values for the years 2018-2022 in millions of pounds at current prices



Source: Authors' elaboration from Eurostat and ONS (PRODCOM data).

3.1.2 Structural trade deficits justify investment in domestic manufacturing to capture growing domestic demand and avoid slowing down installation rates

The UK already displays a structural trade deficit in heat pumps²¹ (£81 million on average in the period 2013-2023). Around two-thirds of heat pumps²² installed domestically are sourced through imports (BEIS 2020), while the remaining one-third is manufactured domestically (in the case of gas boilers this figure is above 50 per cent). This existing space for expanding domestic supply will grow further and will turn into a necessity, as demand for heat pumps picks up, globally and domestically.

Relying on imports for meeting domestic installation targets when manufacturing capacity is constrained is an unsustainable approach that will ultimately hinder heat pump adoption. As previously noted, storage and logistics costs make imported heat pumps more expensive, thus non-affordable to many end users. Additionally, supply obstacles to deployment could manifest as actual physical shortages. This scenario is predicted to occur globally by 2030, but we have already observed demand exceeding supply in Europe in recent years (see box).

21 Until 2004, the UK was recording a modest but positive trade surplus in heat pumps.

22 This figure refers to the unit of heat pumps sold.

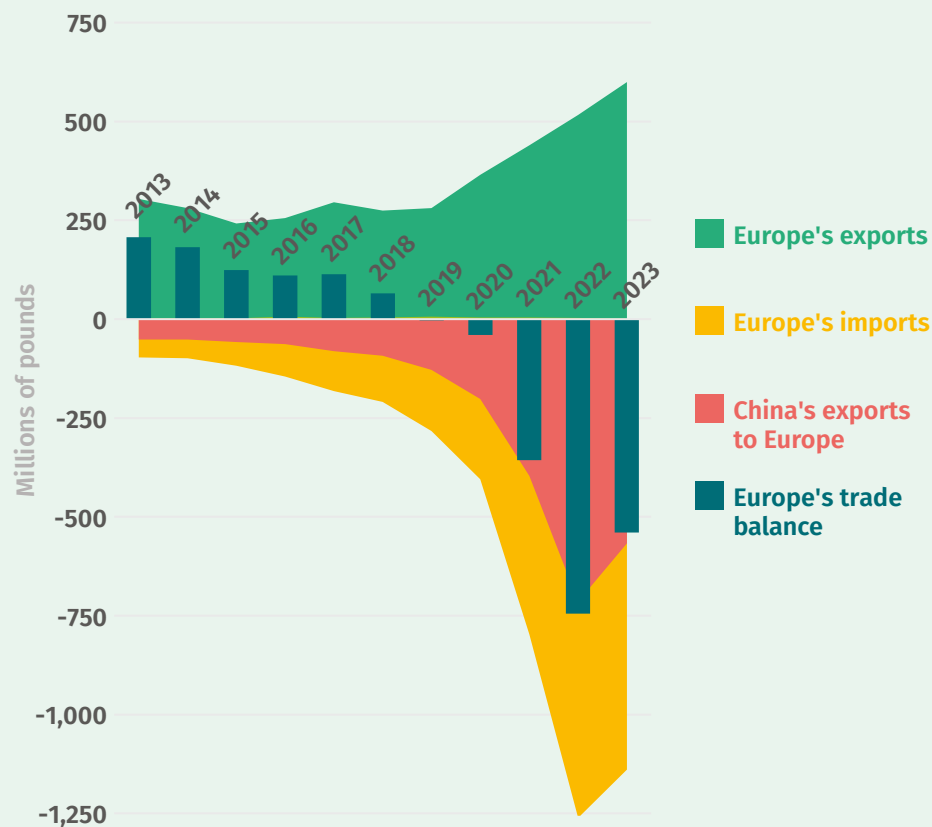
EUROPE'S INCREASED DEPENDENCY ON HEAT PUMP IMPORTS (FROM CHINA) AS DEMAND FOR INSTALLATION INCREASES

Until 2019, when the European market for heat pumps began to expand, all major heat pump manufacturing countries were running trade surpluses, with the exception of Spain. Since then, Germany, France and Italy have experienced the emergence and widening of trade deficits.

Europe as a whole has seen a progressively diminishing trade surplus with the rest of the world until 2018 (figure 3.2). This turned negative in 2019 and reached a record £745 million in 2022, despite still growing total exports. The negative trade balance is entirely explained by an expansion of imports,²³ which have increased four-fold between 2019 and 2023, while exports only doubled.

FIGURE 1.1: INCREASING DEMAND FOR HEAT PUMPS INCREASES DEPENDENCY FROM EXTRA-EUROPE IMPORTS BUT ALSO SIGNALS THE OPPORTUNITY TO EXPAND MANUFACTURING CAPACITY TO SATISFY DOMESTIC DEMAND WITH DOMESTIC SUPPLY

Trade of heat pumps in millions of pounds (2013–2023)



Source: Authors' elaboration on Comtrade database

23 China is responsible for much of the growing imports: exports of heat pumps to Europe have increased by a factor of 8.7 between 2013 and 2023 (compared to 6.1 increase of Chinese exports of heat pumps in total). Now Europe accounts for 33.6 per cent of China's exports of heat pumps, up from 23.5 per cent in 2013.

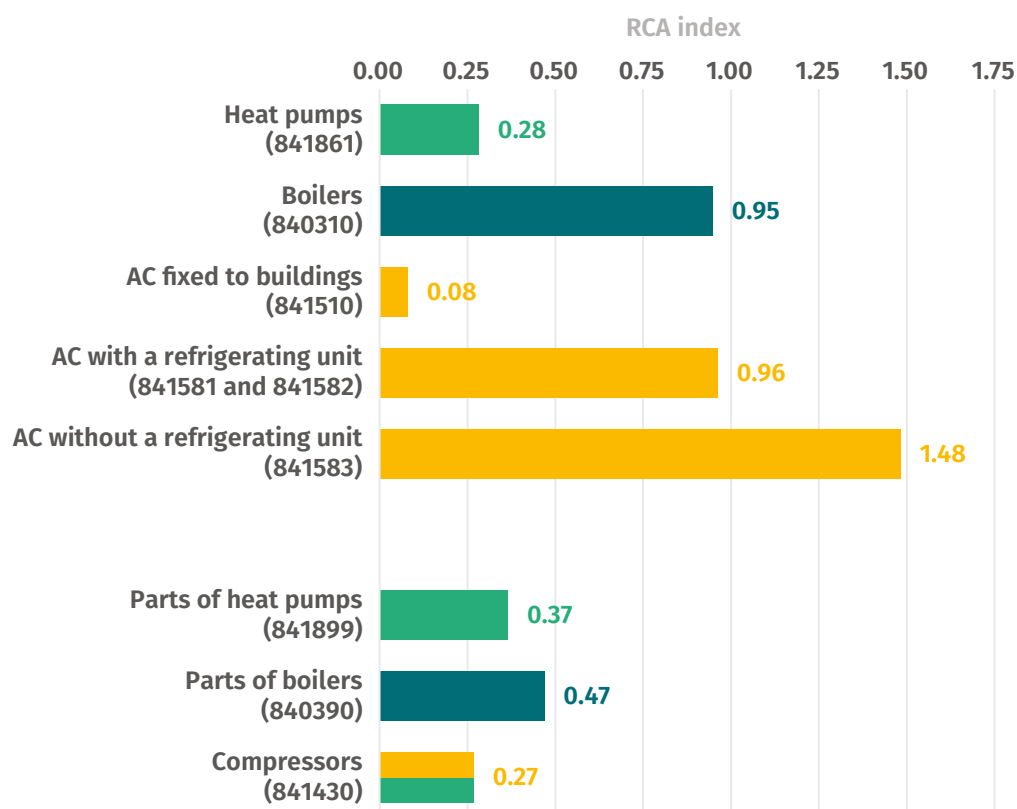
The UK trade balance in boilers is characterised by a persistent deficit,²⁴ driven primarily by imports. Exports of boilers have been growing in the past decade, but the UK ranks only seventh in Europe.²⁵ The UK has a modest and stable trade deficit in air conditioning machines with and without refrigerating units, while the trade balance for residential air conditioners is showing a deterioration from a small deficit of £5 million in 2013 to a larger one of £118 million in 2023, due to growing imports.

3.1.3 The UK can build future comparative advantages in heat pumps from its existing trade specialisation in boilers

The UK trade specialisation in heating products (and components) – illustrated by their Revealed Comparative Advantage (RCA) values²⁶ (Balassa 1965) shown in figure 3.3 – is coherent with previous findings. The RCA for heat pumps is low (0.28), similar to the value for compressors (0.27) but lower than the one for heat pump components (0.37). At the same time, the UK stands as a relevant exporter of assembled boilers, recording a near positive trade specialisation (0.95).

FIGURE 3.3: THE UK TRADE SPECIALISATION IS HIGH FOR BOILERS AND CERTAIN AIR CONDITIONING (AC) PRODUCTS, WHILE LOW FOR HEAT PUMPS AND MAIN COMPONENTS

Average RCA index over the period 2013-2023 for different product categories



Source: Authors' calculations based on Comtrade figures

24 £233 million on average in the period 2013-2023.

25 Average value for the years 2018-2022.

26 On average over the period 2013-2023.

Comparative advantage can evolve over time in response to manufacturer innovation, capital investment and the exogenous pattern of domestic and foreign demand for products. If more ‘competitive’ boiler manufacturers converted their productions towards heat pumps, this would reconfigure the RCA for these product categories. All things being equal, the UK comparative advantage in manufacturing heat pumps would increase and come close to 1. This might happen only after a significant portion of the domestic market for heat pumps is saturated, thus leaving space for increasing the number of foreign sales. In any case, the sooner the transition to heat pumps manufacturing is made, the sooner the domestic industry will be able to conquer export market shares (reflected in a higher RCA value).

3.2 THE GLOBAL HEATING MANUFACTURING INDUSTRY HAS A SIGNIFICANT, DIVERSIFIED AND DIFFUSED PRESENCE IN THE UK

The heating and cooling manufacturing industry²⁷ is a truly global one, dominated by large multinational companies with production units located near end markets. At the same time, these global leaders have national roots in countries²⁸ where they still have major operational sites (manufacturing and research and development).

The UK does not have any comparable native ‘national champion’ with a similar global projection. Aside from a few smaller native players, the UK heating and cooling manufacturing industry is largely comprised of production sites operated by UK subsidiaries of foreign multinational companies.

3.2.1 UK manufacturers of heat pumps are growing, but slowly

Besides the specialised players on large heat pumps for industrial and commercial district heating (Star Renewable Energy in Glasgow and ICAX in South Wales), the UK has only a few producers of residential heat pumps, most of them relatively small (with one notable exception).

Mitsubishi Electric is by far the largest manufacturer of air source heat pumps (ASHPs) in the UK. Its manufacturing unit and R&D centre²⁹ in Livingston, Scotland, has been producing air source heat pumps since 2009. Established in Truro, Cornwall, in 1999, Kensa is specialised in ground source heat pumps (GSHPs). With 3,000 units produced per year, it accounts for approximately 50 per cent of the UK market. Its workforce is expected to grow from 200 to 1,500 people with the establishment of a new factory producing up to 55,000 heat pumps per year. Other smaller British manufacturers of heat pumps – in this case air source – are Global Energy Systems in Lytham, Lancashire, and Clade in Leeds.

In recent years, several investment announcements in heat pump manufacturing have been made, notably Vaillant in Derby (hot water cylinders and components for heat pumps), Octopus Energy in Craigavon, Northern Ireland, and Ebac in Newton Aycliffe, County Durham, alongside its production of electric appliances. Some boiler manufacturers – namely Vaillant in Belper and Ideal Heating in Hull – have begun converting parts of their facilities into heat pump production lines. Glen Dimplex, a manufacturer of electric heating systems, has recently announced new investments to produce heat pumps in Newry, Northern Ireland.

27 There are only few cases of pure heat pump manufacturers, as they are typically small players with niche specialisation. Heat pump manufacturing is generally a product segment of large heating and cooling manufacturing companies.

28 Some examples are: Daikin, Hitachi and Mitsubishi in Japan; Carrier in the US; Midea in China; Vaillant, Stiebel Eltron and Viessmann in Germany; Groupe Atlantic in France; Ariston and Aermec in Italy, and NIBE in Sweden.

29 The Scottish facility is unique among Mitsubishi Electric plants globally in having both manufacturing and R&D functions working together on site.

These investment commitments appear modest when compared to those made by competitors in continental Europe (see box) and will be insufficient to achieve the target of manufacturing 300,000 heat pumps in the UK by 2028.

3.2.2 Main UK manufacturers of boilers

The UK boiler manufacturing industry, one of the world's largest, employs around 6,000 people (BEIS 2020). Apart from the aforementioned Vaillant and Ideal Heating, the other major boiler manufacturers are Worcester Bosch, with main manufacturing sites in Worcester and Clay Cross (near Chesterfield), and Baxi (BDR Thermea Group), located in Preston. Baxi is also a major producer of electric water heaters and water cylinders. Neither of these two has yet committed to producing heat pumps at their UK sites.

3.2.3 Main UK manufacturers of air conditioning (AC) products

Air conditioning systems in the UK are manufactured by companies making a broad range of products. Mitsubishi Electric produces heat pumps alongside AC units. Other major players, specialised uniquely in air conditioners are Airedale, with plants in Consett (near Durham), Rawdon (near Leeds) and, recently announced, Bradford. Daikin and its subsidiary J&E Hall International have production sites in Cramlington (near Newcastle) and Dartford (Kent) respectively. TEV, formerly Marstair, makes air conditioners in Brighouse near Huddersfield.

3.3 DEVELOPING HEAT PUMP MANUFACTURING VIA DIVERSIFICATION OF RELATED ACTIVITIES CAN GENERATE REGIONALLY BALANCED GROWTH IN EXISTING HEATING AND COOLING CLUSTERS

Existing industrial ecosystems enable regions to build related but new productive capabilities, driven by localised knowledge, skills, expertise and infrastructure links. In *Manufacturing Matters* we identified that certain industrial ecosystems specialised in boilers and air conditioning systems – located in the Midlands, in the North East and in Scotland – were particularly well positioned to develop heat pump manufacturing, due to their high level of relatedness.

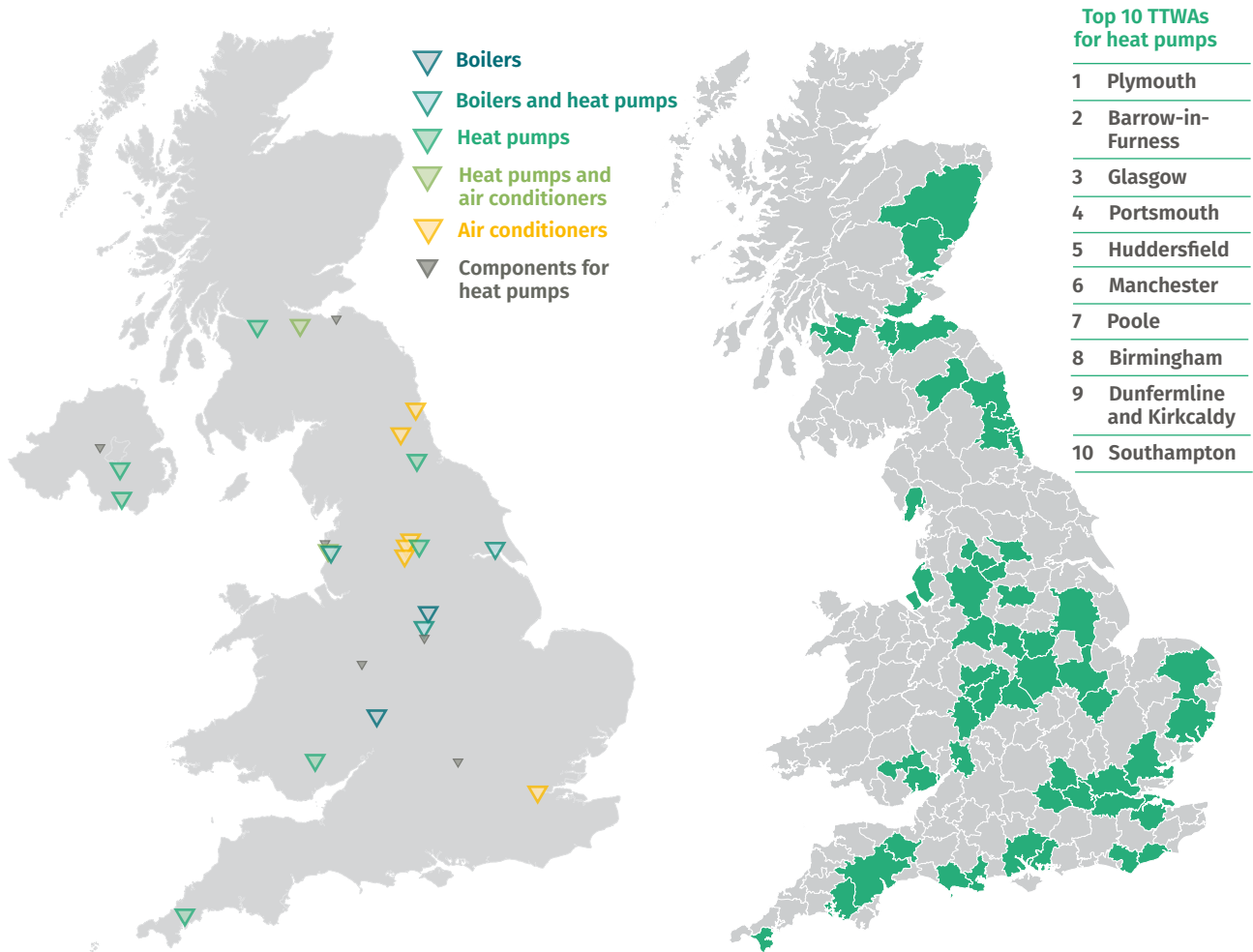
Figure 3.4 provides further confirmation of existing³⁰ and potential industrial clusters in heating and cooling manufacturing. It illustrates that the geographical locations of existing boiler and air conditioning manufacturing facilities align with high-potential areas for developing heat pump manufacturing.

Developing heat pumps manufacturing through the conversion of boiler production sites will particularly benefit these regions of the country. The alternative is an uncompensated decline in the boiler manufacturing industry, which would further exacerbate regional economic imbalances.

30 For instance, Vaillant's heat pump manufacturing takes place in the Derbyshire cluster of boiler manufacturers, while other smaller heat pump manufacturers have their production units near the AC cluster around Leeds (Clade) and in Lancashire (Global Energy Systems).

FIGURE 3.4: REGIONS WITH EXISTING CLUSTERS OF HEATING AND COOLING MANUFACTURERS HAVE HIGH POTENTIAL TO DEVELOP HEAT PUMP MANUFACTURING³¹

Locations of heating and cooling manufacturing facilities in the UK (left), and travel to work areas in Britain with high potential to develop heat pump manufacturing (right)



Source: Authors' elaboration and Narayanan et al (2024)

³¹ Travel to work area (TTWA) is the UK definition for commuting zones, a collection of wards for which at least 75 per cent of the economically active resident population works within the same area. Potential to develop heat pump manufacturing is measured by level of employment in industries that are related to heat pump manufacturing. See Narayanan et al (2024) for further elaboration of the methodology used for this analysis.

4. A GREEN INDUSTRIAL STRATEGY FOR HEAT PUMP MANUFACTURING

4.1 LIMITATIONS OF THE CURRENT POLICY ENVIRONMENT

The UK's policy environment (see table 4.1 for a summary) in recent years has fallen short of the kind of industrial strategy needed to develop a competitive heat pump manufacturing industry. Beyond the limitation in scale of individual measures (Emden and Murphy 2023), there are some structural challenges across the policy landscape which need to be addressed.

TABLE 4.1: A SUMMARY OF POLICY MEASURES FOR HEAT PUMPS INTRODUCED IN THE UK IN RECENT YEARS

Category	Policy	Description
Driving heat pumps adoption	Future Homes and Buildings Standard	New homes built from 2025 should produce 75-80 per cent less carbon emissions (England)
	New Build Heat Standard	After April 2024, new buildings will not be allowed to use oil and gas boilers (Scotland)
	Social Housing Decarbonisation Fund	£3.8 billion fund over a 10-year period to improve the energy performance of social rented homes in England – £1.2 billion since end of 2020
	Public Sector Decarbonisation Scheme	Funding aimed at reducing emissions from public sector buildings by 75 per cent by 2037 – £1.08 billion since 2020, plus £1.17 billion until 2028
	Boiler Upgrade Scheme	Up to £7,500 grants for the installation of heat pumps in residential buildings (England and Wales) – £450 million available between 2022-2025, £1.5 billion in 2025-2028
	Home Energy Scotland Grant and Loan	Up to £7,500 grants for energy efficiency improvements and up to £7,500 grants for clean heating systems, plus interest-free loans to cover the remaining costs (Scotland)
	Home Upgrade Grant	Grants for energy efficiency upgrades and low-carbon heating to low-income households living in off-gas grid homes in England – £1.1 billion allocated until 2025
	Phaseout of gas boilers (England and Wales)	Phase out the installation of new and replacement of natural gas boilers beyond 2035 in England and Wales
	Phaseout of gas boilers (Scotland)	Phase out the installation of new and replacement of natural gas boilers beyond 2028 for privately rented homes and 2033 for owner-occupied homes
Infrastructure	Freeports	Special fiscal and customs treatment in 12 UK ports
	Investment zones	Special fiscal treatment and grants for skills, business support and infrastructure to 12 clusters in the UK

Building of a domestic supply chain	Heat Pump Investment Accelerator	Grant funding for manufacturing investments in heat pumps and related components – £30 million in total (£15 million max per project), closed in 2023
	Clean Heat Market Mechanism	Obligation for manufacturers of heating products to reach a certain proportion of low-carbon heat pumps relative to fossil fuel boilers (from April 2025)
	Business loans	Low-cost financing available from the British Business Bank (BBB) and the UK Infrastructure Bank (UKIB)
	Capital allowance	100 per cent first year allowance for businesses investing in plant and machinery
	UK Export Finance Development Guarantee	Financing support for export-oriented businesses
Support to innovation	Heat Pump Ready Programme	Grants for heat pump innovation projects – £60 million in total
	R&D tax credits	Tax relief for R&D investment
	Patent Box	Reduction in corporation tax on profits earned from patented inventions
Upgrading skills and investment in training	Microgeneration Certification Scheme	Standards for low-carbon energy technology products, contractors and their installations
	Heat Training Grant	£5 million supporting 10,000 training opportunities in low carbon heating (England)
	Home Decarbonisation Skills Training Fund	£15 million since 2020 for 16,000 training opportunities in energy efficiency (England)
	National Transition Training Fund	£1.5 million for 3,350 training opportunities (Scotland)
	Low Carbon Heating Technician Apprenticeship	Support for new installers to enter the low-carbon heating industry
	Plumbing & Domestic Heating Technician Apprenticeship	Support for apprentices learning how to install heat pumps

Source: Authors' elaboration from HM Government (2023)

4.2 ADDRESSING THE CHALLENGES FOR HEAT PUMP MANUFACTURING

Previous IPPR work – *Making Markets in Practice* (Alvis et al 2023) – has developed an industrial strategy framework that can be applied to various activities to become a practical toolkit, as done recently with wind manufacturing (Gasperin and Emden 2024).

Below are listed some of the key challenges³² facing heat pump manufacturing in the UK, divided into four categories identified by IPPR to conceive an industrial strategy.³³

Challenges related to overall **industrial strategy**:

- There is broad consensus among our consulted stakeholders about the need for a stable and long-term policy commitment. In recent years, several policies have

³² Several of these points were raised during the conversations with our stakeholders.

³³ These are: 'industrial strategy', that is the planning and governance of the strategy; 'economic conditions', underlying aspects of an economy such as skills, infrastructure, education and innovation levels; 'production', interventions that affect how goods are produced; 'purchasing', interventions that affect how goods are demanded on the market.

been changed, delayed or scrapped altogether at short notice. Most prominently, the previous UK government introduced the Green Homes Grant in 2021 to offer grants between £5,000-£10,000 for energy efficiency and low-carbon heating but, despite having over-subscribed demand, it scrapped the scheme within a year. In addition, the UK government's³⁴ originally planned ban on the sale of oil boilers for 2026 was postponed to 2035, while the ban on the sale of all boilers by 2035 was watered down by proposing an exemption for 20 per cent of households (Carbon Brief 2023). These changes are believed to worsen the policy scenario for decarbonising buildings (CCC 2024).

- The current installation target of 600,000 heat pumps per year by 2028 is not consistent with net zero objectives, as acknowledged also by the CCC (2022). In fact, even the CCC target of 827,000 units per year by 2028 is low compared to some other countries. The CCC target implies 5 million additional installations by 2030, which is approximately half of what Italy is aiming to achieve over the same period.³⁵
- The current policy environment does not encompass the broad heating and cooling industry, nor does it adequately coordinate installation targets with the expansion of heat pump manufacturing.

Challenges related to **economic conditions**:

- The heat pump technology is already mature, with technology readiness levels (TRLs) reaching the maximum value of 9 (Lyons et al 2023). While there is limited scope for process innovation and productivity improvements at the factory level – given the standardisation of production lines – marginal product (and component) innovation could increase the efficiency of heat pumps, thus further reducing operating costs. A recent review of forecasts on the total installed costs of heat pumps reports a median value of a 17 per cent reduction in the cost of equipment by 2030 (Heptonstall and Winskel 2023).
- There is currently a deficit of skilled heat pump installers, which will worsen as demand for installation increases. The Heat Pump Association (HPA 2024b) calculates that servicing the 600,000 installation target would require 33,700 installers by 2028 (growing to 70,000 by 2035), up from the current 4,500 certified today (DESNZ 2023a). However, as of 2019 there were 130,000 gas safe-registered heating engineers (Lowe 2019), for most of whom undertaking heat pump training would only take a few weeks (BEIS 2020; IEA 2023a), while new installers will require years of training. When receiving best practice training (Emden 2022), installers can achieve Seasonal Coefficients of Performance (SCOPs)³⁶ of around 4.5, well above the industry average SCOP of around 3 (Emden et al 2024).
- Heat pumps can only fully reduce emissions in residential heating when running on renewable electricity. This requires an accelerated rollout of renewables, also to support the additional – albeit modest – demand for electricity during peak times (Toleikyte et al 2023). An even better approach would be to consider heat pumps as heating systems, rather than simply products. This would justify the support for combining heat pump installations with rooftop solar photovoltaic (PV) arrays and PV-ready hot water tanks.

Challenges related to **purchasing policies**:

- Without government support, the upfront costs of replacing current heating systems with a heat pump are still prohibitive for many households – especially the larger and more efficient ones (such as GSHPs). The main subsidy scheme for accelerating replacement of gas boilers in England and Wales – the

34 The Scottish government has also delayed its plan to begin phasing out fossil fuel boilers by at least three years.

35 Italy aims to achieve 11.6 million installed heat pumps by 2030, up from the current 4 million (Enel Foundation 2023).

36 SCOPs measure the ratio of useful thermal energy generated from each unit of electricity.

Boiler Upgrade Scheme (BUS) – has only seen relatively modest take-up from households and has only limited financial resources available in the first place (see box). Furthermore, the BUS grant does not differentiate between ASHPs and the more expensive GSHPs, as other European countries do.³⁷

THE LIMITATIONS OF THE BOILER UPGRADE SCHEME

The median reported cost of installation in England and Wales for the period May 2022 to May 2024, as reported under the Boiler Upgrade Scheme, was £13,099 for ASHPs and £25,000 for GSHPs (DESNZ 2024c). Under the previous government central scenario (based on innovation in equipment and economies of scale in installations), the average installation cost is assumed to fall by 20 per cent by 2028.

However, at present, official available figures show that the median costs of installation for ASHPs have not diminished in the past two years, despite a decrease in the median capacity of heat pumps being installed. Our stakeholders have also confirmed that there is no evidence of falling installation costs. Consequently, even with a £7,500 BUS grant and the current VAT exemption, installing an ASHP remains prohibitive for many households.

The scheme also has limited overall financial capacity. The £450 million allocated between 2022 and 2024 is far below the amount of grants and tax credits provided by other European countries in recent years to support heat pump installation in residential buildings. According to Trinomics (2023), Germany has allocated almost 5 billion euros (£4.3 billion) in 2022, followed by Italy with 2 billion euros (£1.7 billion) in 2021 and France with 1 billion euros (£855 million) between 2021 and 2022. Furthermore, under the extra £1.5 billion allocated by the BUS for the period 2025-2028, future grants would only support the installation of fewer than 70,000 heat pumps per year on average.

- According to our stakeholders, the Future Homes and Buildings Standard has the potential to add between 150,000 and 300,000 heat pump installations³⁸ each year through new homes built from 2025. However, this will only represent a fixed annual amount. The growth of heat pump retrofitting remains too slow to achieve even the 600,000 installation target.
- The cost savings on energy bills from installing a heat pump instead of a gas boiler are greater when the electricity-to-gas price ratio, known as the ‘spark gap’, is lower. Higher spark gaps are correlated with lower heat pump installation rates (Nesta 2023). The UK³⁹ has one of the highest spark gaps in Europe: our analysis based on Office for National Statistics (ONS) data shows that in the period from 2015 to the first half of 2023, the UK had an average ratio of 4.02, only lower than Belgium (4.70) and Germany (4.59). Leading heat pump nations such as France, Italy and Sweden have had much lower values – 2.48, 2.86 and 1.51 respectively. To encourage households to install a heat pump, the European Heat Pump Association (EHPA) recommends that the price of electricity should be at most double the price of gas (EHPA 2024b).

37 For instance, installations of GSHPs can receive grants of up to €15,000 (£13,000) in France and up to €18,000 (£15,650) in Germany (EHPA 2023a).

38 The low range figure was a realistic estimate suggested by our stakeholders, the high range figure corresponds to the government’s target of new homes to be built in England by 2025. Around 210,000 new builds were completed in England during the financial years 2021/22 and 2022/23 (DLUHC 2023).

39 However, it is important to note that even at current gas prices, well-installed heat pumps can save households up to £188 on energy bills compared to running a gas boiler, as previous IPPR analysis shows (Emden et al 2024).

Challenges related to **production policies**:

- Our stakeholders have repeatedly stressed that investing into heat pump manufacturing fundamentally depends on demand expectations for domestic heat pump installations. Several stakeholders have also declared that it becomes cost effective to convert production lines into heat pump manufacturing only beyond the threshold of 250,000 units sold per year on a national level (up from the current 60,000). According to existing studies (BEIS 2020), and confirmed by our stakeholders, this conversion process can take between 12 to 18 months.
- To avoid the risk of delaying (or anticipating) investment in heat pump manufacturing capacity relative to the expansion of the domestic demand, it is also critical that demand-side policy is coordinated with regulations imposing obligations on existing boiler manufacturers to change their production lines. Regulations imposing obligations on manufacturers of heating equipment, such as the Clean Heating Market Mechanism, must be sequenced properly to come into force alongside the policy-driven expansion of domestic demand for heat pump installations.

4.3 IPPR'S GREEN INDUSTRIAL STRATEGY FOR HEAT PUMP MANUFACTURING

An industrial strategy approach for heat pump manufacturing should be comprehensive, coordinated and transformative.

- **Comprehensive** because installation objectives should be accompanied by considerations on manufacturing challenges and opportunities.
- **Coordinated** because manufacturing investment in this sector can be secured mainly through positive expectations of a growing domestic demand, which in turn depends on stable long-term policy schemes that affect households' behaviour. This has been recurrently stated by our stakeholders and finds confirmation in the pattern of recent announcements made by heat pumps manufacturers in Europe (see box).
- **Transformative** because the replacement of at least 19 million gas boilers in the UK with heat pumps implies the need, but also the opportunity for a just transition, by converting a large domestic boiler manufacturing industry into a greener heat pump industry.

EUROPEAN MANUFACTURERS OF HEAT PUMPS ARE EXPANDING PRODUCTION CAPACITY FOLLOWING POSITIVE EXPECTATIONS ON DEMAND FOR INSTALLATIONS

Heat pump manufacturers in continental Europe have reacted positively to the growth of the European market – from 1.6 million sales in 2020 to 3 million in 2022 (EHPA 2023b) – with a series of investment announcements aimed to expand production capacity in existing sites or by establishing new plants. EHPA (2023c) estimated these investments amount to nearly 7 billion euros (£6.1 billion) for completion within three years.

This confirms that manufacturing investment in heat pumps can be delivered in a relative short period, but remains extremely sensitive to sudden changes in policy-driven demand trends. With heat pump sales in Europe flattening in 2023 (EHPA 2024a), major European manufacturers have also started scaling back their investment announcements, while shortening working hours in current facilities.

Between 60 and 73 per cent of heat pumps sold⁴⁰ in Europe are currently assembled in EU countries (Lyons et al 2023), with the European Commission aiming to maintain a 60 per cent share of EU demand satisfied by EU production by 2030 (European Commission 2023a).

40 These figures are expressed in nominal value terms.

Table 4.2 illustrates IPPR’s suggestions for how to address the challenges discussed above, with a detailed set of interventions that amounts to a comprehensive industrial strategy for heat pump manufacturing in the UK.

TABLE 4.2: IPPR’S INDUSTRIAL STRATEGY TOOLKIT APPLIED TO HEAT PUMP MANUFACTURING

		Priority	Suggested intervention	Challenge addressed
Industrial strategy	Planning	High	Increase the official installation target by adopting CCC’s recommendation of 827,000 installations per year by 2028	Insufficient installation targets to achieve net zero objectives and low in comparison to other European countries
	Governance	High	Comprehensive approach to the heating industry (heat pumps, boilers, AC) coordinating installation targets with manufacturing necessities	Limited focus on heat pump deployment
Economic conditions	Infrastructure	Low	Investment in electric grid capacity	Increased demand on the electric grid in peak times
	Infrastructure	Medium	Rollout of renewables and rooftop PV associated to heat pump systems	Partial reduction of CO2 emissions with the current electricity generation mix
	Education	Low	Reform school curricula introducing heat pump specific training	Lack of heat pump-specific school curricula for training new plumbers, electricians, heating technicians
	Skills	High	Retrain gas boiler installers with best practices to improve installation efficiency	Deficit of skilled heat pump installers that play a major role in ensuring high performance for heat pumps
	R&D	Medium	R&D innovation grants to improve the efficiency of heat pumps and its components	Improving coefficients of performance and therefore cost savings in heat pumps
Purchasing	Cost	High	Increase the available amount of grants for replacing boilers with heat pumps and differentiating between ASHPs (including ATA) and GSHPs	High installation costs halting heat pump retrofitting
	Cost	Medium	Government-backed low (ideally zero) interest loans to cover extra installation costs	
	Cost	Medium	Prolong the 0 per cent VAT on heat pumps installation beyond 2027	
	Cost	Medium	Accelerate the deployment of renewables and promote rooftop solar PV in combination with heat pump installation	High electricity-to-gas price ratio reducing the size of cost saving implicit in replacing boilers with heat pumps
	Cost	High	Power purchase agreements with favourable conditions for users of heat pumps or heat pump tariff discounts	
	Rules	Medium	Harmonise and bring forward the phaseout of boiler sales across the UK	Low public awareness of the economic benefits of heat pumps

Production	Cost	Medium	Reinforce government's commitment to heat pump manufacturing by complementing purchasing measures with public financing support for heat pump manufacturers (eg via NWF's equity financing)	Unfavourable domestic market conditions for investments in heat pump manufacturing, particularly critical given the need to convert the large boiler manufacturing industry
	Rules	Medium	Obligations on boiler manufacturers – such as the Clean Heat Market Mechanism – should be designed to avoid lack of time coordination between growing demand for heat pumps and investment in domestic manufacturing capacity of heat pumps	Risk of delaying (or anticipating) investment in heat pump manufacturing relative to the expansion of the domestic demand

Source: Authors' elaboration

Beyond the importance of reframing **industrial strategy with more ambitious installation objectives and a stable, long-term comprehensive strategy that encompasses the broad heating industry** – in terms of installations objectives as well as manufacturing needs – there are some key policy priorities emerging from our list of proposed interventions. These were selected based on the analysis of technical reports and after consultation with our stakeholders and experts.

1. In terms of **economic conditions, reinforcing existing public funding support for training and innovation can have a multiplier effect on the deployment of heat pumps via reductions in installation and operating costs.** High-quality training of heat pump installers – possibly by retraining boiler installers – can unlock faster and more efficient deployments and higher cost savings. Similarly, public funding to research and development (R&D) projects aimed at increasing the energy efficiency of heat pumps and components can improve the coefficient of performance and lower energy bills more quickly.
2. **Purchasing policies are critical to the development of a domestic demand for heat pumps, the essential condition for investment in domestic manufacturing to take place. A significantly higher commitment of public resources is required to bring down installation costs and foster the replacement of gas boilers with heat pumps in residential buildings.** While the existing BUS grant could be further reformulated (also introducing a differential between ASHPs and GSHPs), the total budget for the scheme needs to increase to match similar schemes in Europe. Besides grants, special low-, ideally zero-, interest loans provided by government-backed financial institutions could cover the remaining part of installation costs.

Reducing lifetime operating costs of heat pumps – relative to boilers – through lower electricity prices remains of complementary importance. Initially, this could be done via subsidised power purchase agreements (PPA) with heat pump adopters or through tariff discounts (HPA 2024c). In the long term, structural electricity prices will need to come down by accelerating the rollout of renewables. Finally, a premium on installation grants could be attributed to heat pump adopters that opt for a complementary rooftop solar PV, which can further drive down electricity prices.

3. **Production policies** are relatively less critical for advancing heat pump manufacturing, due to the lower capital requirement and technological complexity of the product and given the existence of productive capabilities in the UK heating manufacturing industry. Instead of offering one-off manufacturing grants – as typically adopted in Europe in the recent period (see box) – **the UK**

government could consider financing the conversion or establishment of heat pump production facilities through public equity instruments available with the newly established National Wealth Fund (NWF). As illustrated in previous IPPR work (Gasperin and Dibb 2023), the NWF could make minority equity investments into new or existing UK subsidiaries of multinational heating players with the aim of supporting specific capital expenditure projects, but also signalling the government's long-term commitment to its heat pump manufacturing strategy, while saving resources⁴¹ that could be more effectively allocated to accelerate residential installation.

EUROPEAN POLICY SCHEMES FOR HEAT PUMP MANUFACTURERS

Under the Temporary Crisis and Transition Framework, adopted by the European Commission in March 2023, EU member states enjoy a significant relaxation of state aid rules to support industrial sectors that are key to the net zero transition (European Commission 2023b). Manufacturers of heat pumps and components are eligible recipients of grants, tax advantages, loans or guarantees.

These can range from 150 million euros (£130 million) per company to 350 million (£304 million) when investment is located in poorer regions, covering a share of total capital expenditure that varies from 15 to 60 per cent depending on the size of the company and the location.

Countries like France and Slovakia have recently received approval for aid schemes that support heat pump manufacturing of 2.9 billion euros (£2.5 billion) and 1 billion euros (£870 million) respectively, in the form of tax credits (European Commission 2024). In April 2024, the French government unveiled its plan for achieving 1 million heat pumps manufactured by 2027 (Ministère de l'Économie 2024).

⁴¹ Public equity investments can be a free source of financing for the recipient company and allow the government to recover the invested amount if divested (i.e. when it is sold to the majority shareholder or to other willing investors), as IPPR illustrated in Gasperin and Dibb (2023).

5. CONCLUSION

The road to sustainable green growth is paved with many well-established technologies, among which heat pumps play a crucial role, especially in the context of the UK's ambition to decarbonise residential heating. But great opportunities and challenges come on the manufacturing side.

This report reinforces and qualifies the message of previous IPPR work: the UK is particularly well placed to become a world leader in heat pump manufacturing, leveraging on existing related productive capabilities, skills and technologies.

This will not occur on its own. It requires a comprehensive green industrial strategy that aligns net zero targets with a just transition of the UK economy to achieve regionally balanced growth and better living conditions for all.

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APPENDIX

TABLE A.1: LIST OF PRODUCT CODES ANALYSED IN CHAPTER 3

		Production values (reported in euros)	Trade values (reported in US dollars)
Assembled heating appliances	Boilers	PRODCOM code 25211200 - Central heating boilers	HS code 840310 - Central heating boilers
	Heat pumps	PRODCOM code 28251380 - Heat pumps other than air conditioning machines	HS code 841861 - Heat pumps other than air conditioning machines
	Air conditioners	PRODCOM code 28251220 - Air conditioning machines designed to be fixed to a window, wall, ceiling or floor, self-contained or split-system PRODCOM code 28251250 - Air conditioning machines containing a refrigeration unit PRODCOM code 28251270 - Air conditioning machines not containing a refrigeration unit	HS code 841510 - Air conditioning machines designed to be fixed to a window, wall, ceiling or floor, self-contained or split-system HS codes 841581 & 841582 - Air conditioning machines incorporating a refrigerating unit HS code 841583 - Air conditioning machines not incorporating a refrigerating unit
Components	Parts of boilers	PRODCOM code 25211300 - Parts for central heating boilers	HS code 840390 - Parts for central heating boilers
	Parts of heat pumps	PRODCOM code 28253070 - Parts of refrigerating or freezing equipment and heat pumps	HS code 841899 - Parts of refrigerating or freezing equipment and heat pumps, n.e.s.
	Compressors	PRODCOM code 28132300 - Compressors for refrigeration equipment	HS code 841430 - Compressors for refrigeration equipment

Source: Authors' elaboration

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