ELECTRIFY INDUSTRY

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A PROGRAMME FOR GROWTH IN THE 21ST CENTURY

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ELECTRIFYING BRITAIN'S INDUSTRY

Electrification, a definition:

"Switching from using fuels such as gas or petroleum to using electricity. For example switching from using a gas boiler to an electric boiler for raising steam in industry."[1]

The UK is on the road to industrial change, and industry wants to play its part in navigating our route to net zero. But we currently lack the necessary tools to achieve this.

The Industrial Revolution was enabled by low-cost coal and gas, which underpinned the strength of UK manufacturing for decades. We are now at the dawn of a new industrial age as the UK heads towards net zero. It is important that the UK decarbonises an economy that is still overly reliant on hydrocarbons and our economy cannot afford for our industrial base to be left behind. Net zero is an economic growth opportunity for the UK but first we need to get the investment incentives, skills systems, and regulatory environment right.

UK industry needs a healthy mix of decarbonisation options to make net zero work – presently this is far from reality. A healthy energy market that embraces electrification and facilitates real decarbonisation technology choices is necessary for the UK industrial sector to continue to grow.

For many, electrification will be the most efficient and preferred option to decarbonise. Many global competitors are electrifying their industries, supported by local government incentives and lower electricity costs. The UK must keep pace.

[1]The Industrial Decarbonisation Strategy, Department for Energy Security and Net Zero, 20 October 2023, p.8

Electrify Industry has come together to create a voice to ensure that the right policy is developed for electrification by presenting a set of six starting recommendations.

Importantly, this isn't about picking one option over another, but rather creating genuine choice that facilitates the most efficient methods of decarbonising across UK industry, because industry recognises that it is vital that every business across the UK is given the opportunity to decarbonise in a way that is best for them.

We must act now to make the change from companies being otherwise obliged to settle for policies that could reinforce inefficiency from the start, ensuring the opportunity of using a decarbonisation option that is best for individual businesses.

The transition away from fossil fuels can only happen if all of industry is able to play its part. Our members have come together because they understand the importance of this mission and appreciate the value of the outcome.

With challenges around electricity pricing, grid capacity, supply chains, skills and innovation, it is important that a collaborative grouping is formed to create the collective voice. Our members want to embrace the opportunities available in a net zero world but to do so we need to increase the viability of electrification as a decarbonisation option and thus ensure that we create a level playing field with hydrogen and CCS. This will guarantee that UK industry does not simply survive but rather thrive for generations to come.

"FUEL SWITCHING TO ELECTRIFICATION IS EXPECTED TO PLAY A SIGNIFICANT ROLE IN INDUSTRIAL EMISSIONS REDUCTION, WITH THE CCC'S BALANCED PATHWAY SEEING EMISSIONS SAVINGS ON PAR WITH HYDROGEN"[2]

RT HON CHRIS SKIDMORE, 2023

[2]DECARBONISE NOW: SECURING A GREENER, CLEANER, BETTER INDUSTRIAL FUTURE: The Industrial Mission Zero Network Report, Girling G & Skidmore C, 2023

1.

UNLOCKING FUTURE GROWTH IN UK INDUSTRY

Industrial businesses that will come to rely on electricity as a power source for their work make up at least 9.3%[3] of the UK economy. These are profitable businesses making world class products, exported from the UK day-in-day-out. It is vital that a level playing field in energy pricing is guaranteed for our economy to continue to innovate and grow, and to further ensure that businesses are not forced to offshore their production to markets that offer a greater competitive advantage in this area.

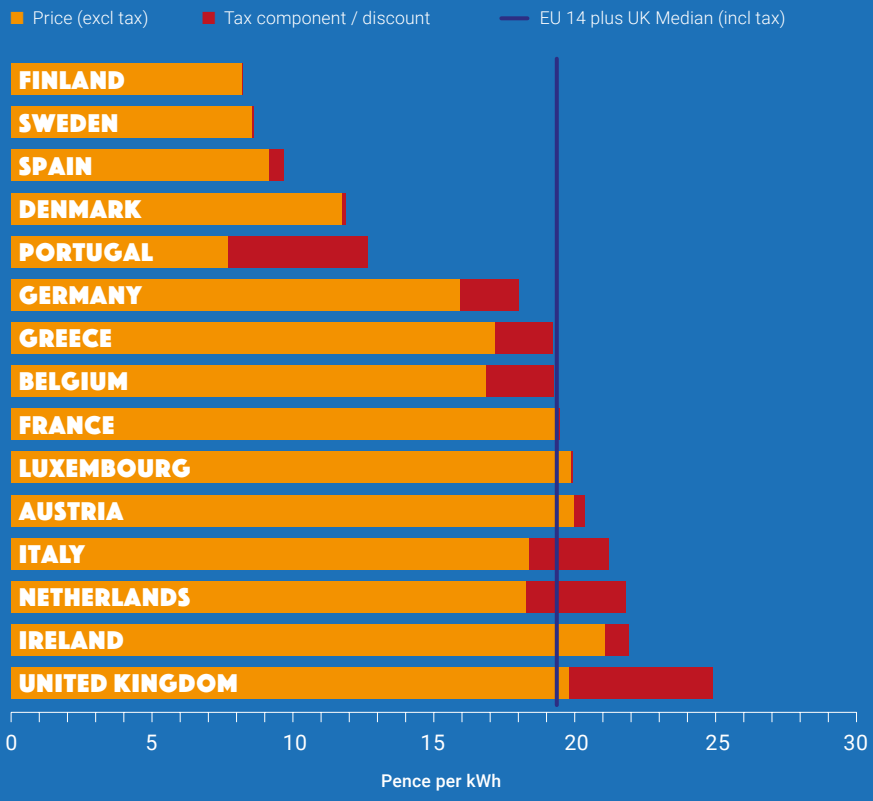
Historically, high electricity prices in the UK have deterred industrial electrification. Instead, lowering the gas price has incentivised companies to use this fuel, leading to the development of supporting supply chains and a focus on training for a gas-led UK industry. With the advent of the climate challenge and industry's role in tackling this issue, the status quo must be challenged at pace.

Comparative industrial electricity prices from across Europe (as shown in Figure 1) clearly demonstrate the impact that policy costs have had on the total cost to industry and identify how electrifying a process is harder to justify in the UK.

As industries look to decarbonise, there is a real risk to the UK economy that businesses will relocate to where the electricity cost is most competitive.

[3]Manufacturing: Key Economic Indicators, House of Commons Library, 23 May 2024

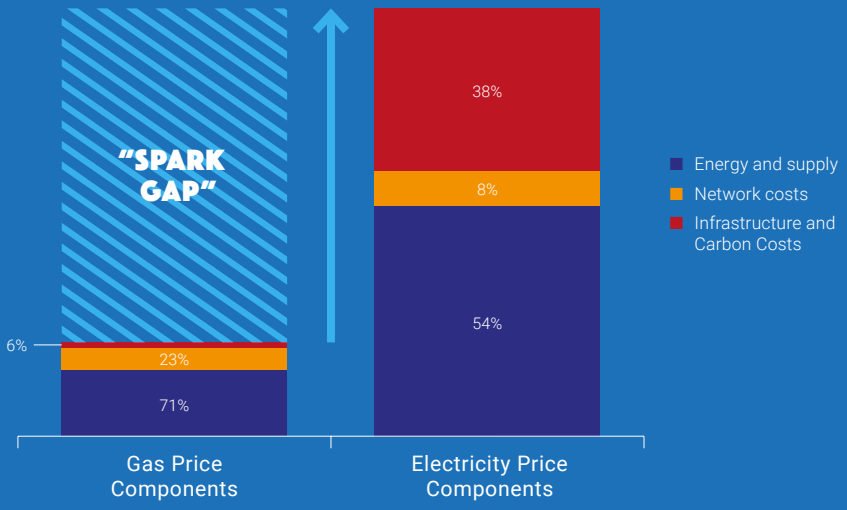
FIG. 1: COMPARATIVE INDUSTRIAL ELECTRICITY PRICES ACROSS EUROPE



Source: Quarterly Energy Prices: UK July to September 2023, Department for Energy Security and Net Zero, 21 December 2023, p.22

The price differential between gas and electricity is known as the 'spark gap'. Reducing the 'spark gap' will help enable electrification. Under the UK's existing electricity pricing policies, the 'spark gap' in the UK is higher than many competitor markets, effectively deterring a shift towards electrification in the UK.

FIG. 2 BREAKDOWN OF INDUSTRIAL ENERGY PRICES IN 2019 (2022/KWH)



Source: Enabling Industrial Electrification: A call for evidence on fuel-switching to electricity, Department for Energy Security and Net Zero, July 2023, p. 38

Although hydrogen and CCUS offer the best option for a number of businesses and industries, electrification is typically the most energy efficient option to decarbonise the majority of UK industry. A policy approach that does not take this reality into account introduces a substantial risk of driving industries down a decarbonisation route that is neither appropriate nor efficient for individual businesses, putting the wider UK economy and our nation's competitiveness at risk. This would constitute a failure in UK energy policy for decades to come.

The total value of UK manufacturers' product sales was £429.8 billion in 2022, an increase of £28.4 billion (7%) from £401.5 billion in 2021. Much of this manufacturing base uses gas for heating of some kind.

2.

INVESTING TO GROW THROUGH ELECTRIFICATION

The UK needs a domestic level playing field in government policy to enable electrification. For decades UK industry has been driven to combust gas rather than use electricity for heating. Reducing electricity prices will naturally incentivise electrification and as part of a long-term, robust and modern industrial strategy we can positively incentivise industrial decarbonisation through policies that address capital outlays and longer-term operating costs:

I. REFORMING THE ENERGY MARKET

One of the first priorities for any new UK government should be to address the urgent need for reforms to the UK's broken energy market.

II. ADDRESS THE COST OF DISTRIBUTION

Distribution costs paid by UK industries are large in comparison to global competitors. The UK Government should reduce this network cost to comparable levels.

III. REMOVE THE POLICY COSTS THAT HAVE BEEN ADDED TO THE PRICE OF ELECTRICITY

If we are to include such costs in energy going forward there is a good case for them to be rebalanced to support industrial electrification. The super-charger programme has greatly helped the energy intensive industries to decrease the burden of policy costs and is a good example of an innovative policy that delivers for business.

However, while implementing these recommendations might offer a promising start, the UK Government must also consider capital support for electrification. Electrification of a heating process usually requires the purchase of new heating infrastructure, rather than simply an alteration or upgrades to the existing process.

This requirement to purchase a new process increases the potential capital cost to businesses and reduces the likelihood of industry electrifying. The simple fact is that for UK businesses to be able to invest in such transformational change, we need to see a shift in policy approach and execution on the part of the UK Government.

IV. PROVISION FOR CAPITAL OUTLAY

> Buying new ovens, steam boilers, heat pumps, and induction heaters will need to be seen as attractive investments for industry. Like other countries, the UK should support these investments to help ensure that companies invest in the UK.

Several electrification projects have received study funding via the Government's *Industrial Energy Transformation Fund* and the *Net Zero Innovation Portfolio*. This a good start but such programmes must be expanded urgently and an electrification business model will also be needed.

To ensure that UK industrial businesses can lead the way on innovation and growth creation, a combination of each of these approaches will be necessary. Only through the adoption of these recommendations can we ensure the UK is in the best possible position to meet modern industrial demands and guarantee that our industries can be competitive in a net zero world.

3.

OPTIMISING AND GROWING GRID CONNECTIVITY

There is considerable work to be done to ensure that companies aiming to electrify their processes are provided with the electricity grid connections that they need. The UK Government must convene industry and Grid stakeholders to ensure that a collaborative process is undertaken and that the time available is used in the most efficient way.

While we acknowledge that work on these issues has already begun, Electrify Industry intends to work with partner organisations to ensure industrial connectivity is at the top of Government's agenda over the next five to ten years. We have one chance to get this right and only by working together can we ensure that we do not waste it.

An electrified UK industry with a combination of onsite renewables, onsite electricity and thermal storage and flexibility mechanisms can support local grid constraints. By working together with industry leaders and stakeholders, we can develop electrical capacity in a way that is mutually beneficial.

GOVERNMENT REPORTS SHOW THAT
'NEARLY HALF OF TRANSMISSION GENERATION PROJECTS HAVE A CONNECTION DATE OF AT LEAST FIVE YEARS ON, WITH SOME SCHEDULED TO WAIT TEN YEARS OR MORE.'[4]

[4]Connections Action Plan: Speeding up connections to the electricity network across Great Britain (publishing.service.gov.uk) Department for Energy Security and Net Zero, Nov 2023

4.

GROWING THE SUPPLY CHAIN

Supply chains created for gas and oil have done an excellent job of providing industry with access to affordable energy solutions. This has allowed businesses to run, innovate and turn a profit, allowing for additional investment and growth.

If the UK economy is to continue to innovate and grow, we must now develop and maintain supply chains around electrification. Without such supply chains, it does not matter how much electricity the UK is able to produce or the price at which that electricity might be purchased, UK industrial businesses will not have the capability to use electrified processes effectively or efficiently.

The UK is starting on the back foot compared to international competitors, due to disproportionately high electricity prices that have historically driven UK industry to use gas. This has meant that the processes and supply chains within our industries have not developed around industrial electrification as quickly as they have done elsewhere.

As the industrial world looks to electrify, the global demand for electric options is set to grow beyond all recognition. In 2020, the Climate Change Committee suggested that:

"new demands from transport, buildings and industry (moderated by improving energy efficiency) mean electricity demand rises of 50% by 2035, before doubling or perhaps even trebling by 2050".[5]

It is clearly necessary for the UK Government and industries to work together to accurately predict total demand for process equipment requirements. This can be a catalyst for the creation of a UK supply chain plan, ensuring timely and secure delivery of the vital elements needed in the UK's industrial transition. This offers the opportunity for significant future growth for the UK economy.

[5]The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf (theccc.org.uk) page 67

5.

INVESTMENT IN SKILLS TO UNLOCK GROWTH

UK industry knows a *lot* about burning things. Gas. Oil. Coal. Even household rubbish. But we need to ensure that future skills policy focuses on the energy solutions of today, whether at a first stage education level or a retraining level. If we are committed to stopping the burning of fossil fuels, people must learn how to heat, create and, *make* in a post-hydrocarbon world.

With an industry base historically used to combustion, our electrical skills are weak when it comes to:

- **Assessing decarbonisation options.**
- **Process integration for maximising efficiency.**
- **Electrical installations and maintenance.**
- **Grid connection and flexibility processes.**

Added to this, the growth in renewables; development of electrolytic hydrogen; importance of grid enhancements and prevalence of domestic heat pumps as the UK moves towards a Future Homes and Building Standard,

and embraces building technologies such as modular construction, will all draw significantly on electrical skills. This will inevitably split the skilled resource availability for manufacturing, so industry and the UK Government must act now to ensure that growth, productivity and the population of skilled workers remain high for UK businesses.

The shift to electrification offers significant opportunity for the employment – or re-deployment – of skilled workers. Labour market data from the *Unit for Future Skills (UFS)* indicates that increased demand for electrical engineers, electronics engineers, and electrical and electronic technicians will lead to growth in employment of at least 13,300 jobs in these areas by 2035 from 2022 levels.[6]

Existing demand for these skills is also not currently being met. The UFS data shows that vacancies for electrical fitters are among the highest of all occupations, and 82% of these are considered hard to fill.

Some of this current and future demand will be addressed through apprenticeship training. The Installation and Maintenance Electrician apprenticeship standard is one of the most popular engineering and manufacturing apprenticeships on offer, with annual starts of more than 6,000 in England.[7] However, industrial businesses will have to compete with demand for these future employees from other commercial settings. Ensuring the right support for training providers to deliver these apprenticeships at volume and scale for industry to benefit is crucial.

These apprenticeships also typically take four years to complete – industry needs to start addressing these critical gaps in skills and labour now with fully competent workers. Increasing the supply of other options for shorter, modular and flexible training available to employers will help these skills reach the labour market faster. Further support for employer investment in upskilling and retraining for the existing workforce will also be needed to help skilled workers adapt to changes in manufacturing operations and learn to use new equipment.

[6]Analysis of data provided by UFS Jobs and Skills Dashboard
[7]Department for Education – Education Statistics

6. RESEARCHING AND INNOVATING FOR GROWTH

Industry's historical reliance on combustion has defined research and innovation for many years. However, as the move away from fossil fuels becomes a necessity and the popularity of renewable electricity grows, the challenges that electrification poses for industry represent a significant opportunity for research and innovation. The Industrial Decarbonisation Research and Innovation Centre (IDRIC) has begun a great body of work to focus attention on some of the key wins that are achievable in the transition to a post-hydrocarbon economy.

The UK Research and Innovation (UKRI) Catapults could come together to support electrification of industry in the same way as they have done for hydrogen with their Hydrogen Innovation Initiative (HII) programme.

First and foremost, industry will need to innovate to ensure that fuel switching to electrification retains or grows productivity and quality of product, as well as high safety standards. To ensure the most efficient decarbonisation across industry, national demonstrators and information sharing will become more important and help to de-risk investment in new technology.

Moreover, existing electrification technology will need to be optimised for new applications. Innovation will be necessary to extend the capability of electrification and maximise heat recovery options, especially in an age of heat pumps.

Further research into electrification also yields benefits for the community. Not only could electrification help local grid constraints by creating flexibility with possible onsite storage and renewable energy generation, but further, a reduction in fossil fuels will improve local air quality.

Electrification offers the opportunity to develop world-leading new technologies, make products in new ways, and innovate to improve the UK economy, but only if government and industry embrace it. We must work together to make this change now, or we risk being left out of the competition entirely.

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Electrify Industry, powered by Make UK, is working with our innovators to create a sustainable future for the UK economy. By harnessing the opportunities and technological developments in the green energy transition, the UK can ensure its industrial base continues to thrive and grow. Our members want to invest, they want to adopt the technologies of tomorrow; embracing the creation of growth and jobs available in this time of change. They are looking forward and are thinking big, taking bold decisions that will underpin our national industrial economy, they are creating the opportunities for all who follow them on this journey.

#ElectrifyIndustry

For more information, please contact:

Daniel Paterson
dpaterson@makeuk.org

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