

# Unite response to the Department of Energy Security and Net Zero, (DESNZ) Boiler Upgrade Scheme Regulations Consultation.



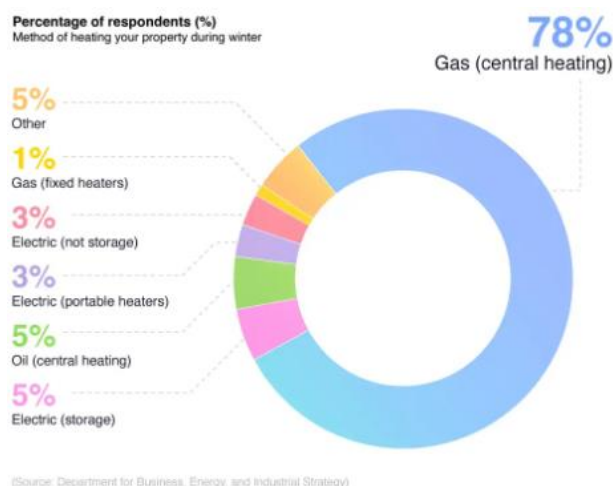
## 1. Introduction

- 1.1. This submission is made by Unite, the UK's largest trade union with over one million members across all sectors of the economy, including manufacturing, financial services, transport, food and agriculture, construction, energy and utilities, information technology, service industries, health, local government and the not for profit sector. Unite also organises in the community, enabling those who are not in employment to be part of our union.
- 1.2. Of particular relevance to this submission, Unite represents almost 41,000 engineers and technicians in the Energy and Utilities sector carrying out every task from the most menial to the most highly skilled engineers and scientists in the country and represents 63,000 workers in the construction industry including workers in heating and plumbing companies and thousands more members in estates management for corporations, local authorities and maintenance roles. Not to mention the members in the Chemicals and Processing sector who extract and process hydrogen, natural gas and crude oil or the thousands more members who are part of the manufacturing supply chain.

## 2. Obtaining the Workforce to Meet the Challenge

2.1. Over 170,000 private homes were built in England and of these new builds, 94.1% had a new gas boiler in 2022. Preliminary estimates for 2022 show that the UK installed only 60,000 heat pumps – equivalent to two heat pumps per 1,000 households. Although the Government is also working with industry to reduce the £10,000 to £20,000 upfront cost of heat pumps, they do not appear to be doing enough to ensure there is a large enough workforce to achieve net zero by 2050 or the supplies of the equipment to make the move to a heat pump affordable and an attractive option. At the same time the price of a “hydrogen ready” gas boiler can cost under £5,000.

2.2. According to UK boiler market statistics from the Heating and Hot water Industry Council (HHIC), sales of UK domestic boilers hit almost 675,000 for the first four months of 2021—a 41% increase from the same time in 2020, when more than 476,000 units were sold. Had that trend continued over 2 million boilers would have been purchased in the year. Further statistics from the Department of Business Energy and Industrial Strategy, stats that alongside the Gas Central heating and gas fixed boilers, there are also highly polluting oil fired central heated homes, and homes with portable electric fires, which are highly inefficient and need to be replaced. According to the 2021 Census only around 9% of homes in England and Wales relied on electric only heating. According to the DESNZ's own statistics, this percentage remained only slightly changed by the winter of 2022.



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- 2.3. According to the 2021 census there were 26.4 dwellings in England and Wales (24.9 million in England, 1.5 million in Wales) <sup>1</sup> assuming the average increase between 2011 and 2021 continued this means there should have been approximately 25.3 million homes in England and 1.52 million homes in Wales. According to the census report 80.5% of homes in England and 73.6% of all homes in Wales will need a replacement heating system. This means that combined total number of jobs to be completed as of 2023 is around 21.5 million homes just in England and Wales.
- 2.4. According to the Deputy Director Heat in Buildings Policy and Regulation<sup>2</sup> 37% or 920,000 households are in fuel poverty in Scotland in April 2023. If so, this means there are roughly 2.486 million households. In addition, the paper states that 43% of this number are powering their heating only using electricity. If so, this means there must be 1,069 homes in Scotland, heating their homes in this way and therefore 1.417 million households in Scotland whose heat is obtained in some other way not counting the second or holiday homes.
- 2.5. According to the 2011 and 2021 census the number of occupied households of Northern Ireland increased by an average of 0.93% per year to 768,810 by 2021. Assuming this trend continued it means that by 2023 there would be 783,111 households in Northern Ireland in 2023. According to those NISRA statistics<sup>3</sup> over 50.5% of households are heated by burning coal or oil and another 31.58% are heated by burning only natural gas. Once you exclude those households that are electrically centrally heated, are heated using renewables (including wood burners) this meant that 97.98% (767,292) of all households in Northern Ireland will need a renewable alternative form of heating their homes. Due to the lack of even a gas main to some of these properties the most efficient replacement option is a heat pump.
- 2.6. Restricting the number just to the home and replacements for those up to 2025 when the original ban on boilers in new homes comes in and assuming a 7.3% increase in the overall number of households in 2025 it suggests that there will be around 24.7 million households in need of either a heat pump, a hydrogen gas boiler, or some other sustainable heating solution. If we further assume that the general public will not wish to have a new gas boiler installed if they know that expense will need entered into in a few years to replace that boiler with something more sustainable, then the decline of new natural gas boiler installations drops by say 60% a year, it will very quickly decline to a situation where there it is unsustainable to produce that form of natural gas boiler. It is therefore not unreasonable to assume, that given the above that the number of heating systems that will need to be replaced will total approximately 23.25 million between the end of this consultation and 01/01/2050 given the array of boilers both gas, coal and oil which need replacing.
- 2.7. On top of these 23.25 million properties there are the natural gas fired water heaters in second/holiday homes and caravans, in industrial and commercial premises, substantially increasing the difficulty to achieve what is a legally binding target of net zero emissions. By 2050 the number of new build homes could add an additional 10.8 million additional homes each of which will need to have a heat pump based on ONS population growth forecasts<sup>4</sup>.

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<sup>1</sup> See -

<https://www.ons.gov.uk/peoplepopulationandcommunity/housing/articles/housinginenglandandwales/2021comparedwith2011#:~:text=In%202021%2C%20there%20were%2026.4,million%20dwellings%20respectively%20in%202011>

<sup>2</sup> See - [https://www.legislation.gov.uk/ssi/2023/177/pdfs/ssiod\\_20230177\\_en\\_003.pdf](https://www.legislation.gov.uk/ssi/2023/177/pdfs/ssiod_20230177_en_003.pdf)

<sup>3</sup> NI statistics <https://www.nisra.gov.uk/system/files/statistics/census-2021-ms-e11.xlsx>

<sup>4</sup> See -

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/dat>

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- 2.8. The government set a target to install 600,000 heat pumps per year by 2028. This target would mean that assuming 60,000 were installed in 2023, the number of heat pumps installed in 2024 and subsequent years would need to increase the growth rate by an additional 16,000 heat pumps each year until 2028 to reach the 600,000 so that in 2028 there are 140,000 heat pump installations. However, after that point, if the focus is going to go exclusively on heat pumps the number of additional installs and engineers would need to increase dramatically in order to reach Net Zero increasing the previous years install total by 25,050 extra in 2029 to at least 165,050 installations, by 34,100 in 2030 ( to 199,150 ), by 43,150 in 2031 ( to 242,300 ) etc. and spiraling ever upward by the previous years increase and an additional 9,050 in each year. This could mean in the final year instead of 60,000 heat pumps or hydrogen boiler installs the industry would be facing around 3 million heating installations to replace a minimum of 25.3 million natural gas boilers. To reach the additional target heating systems in the extra 10.0 million new homes the rate of increase would need to be the previous years total plus another 33,000 installs in 2029, 50,000 in 2030, 67,000 in 2031 etc. requiring at over double the number of heating engineers we have currently.
- 2.9. At 3 days per install on average just for an air source heat pump, and 253 working days in 2049 this means that would need to be 106,578 heating engineers assuming none have a day off sick or a family emergency to hit the replacement using heat pumps engineering total and 148,400 if you include new homes more if you include all the other properties. To hit this goal the industry would need to recruit and train a minimum growth of a net 570 additional heating engineers each year up to 2028 if you assume that it took 2,140 heating engineers out of the 4,500 stated in the consultation to achieve the 60,000 achieved in 2022.
- 2.10. Unite would strongly suggest that the government check the 4,500 through industry stakeholders such as associations , trade agreements and Unite as it is felt that this may well be short of the true total, making it a possibility that the 600,000 target could be achieved. Without a substantial increase in qualified heating engineers, however, the goal of replacing all fossil fuel heating systems before 2050 would be impossible.
- 2.11. It is also hoped that these engineers have not left the industry, have not retired, suffered ill health or an accident, etc. In addition to the installers the industry will need maintenance heating engineers, engineers to step in if the device goes wrong. To achieve the target of 600,000 heat pump installations, it is important that heating engineers have not ignored other work and have managed to install the odd hydrogen boiler or other sustainable option. It is also hoped that during this initial four years that some focus was achieved on other sources of heating and there have been moves to secure a supply of communal heating from waste industrial heat.
- 2.12. According to the Committee on Climate Change in their 2023 progress report<sup>5</sup>, their concerns about the delayed strategic decision regarding the role of hydrogen in heating systems. According to their report the UK the majority of the hydrogen will be required to replace the role of natural gas in electrical generation and in industrial applications. As such the UK will be a long way from being self-sufficient risking our energy security. Largescale investment is therefore required into even greater amounts of energy generation in order to start liberating hydrogen. The announcements by Prime Minister Rishi Sunak<sup>6</sup>, will therefore cause further delays and problems

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[asets/2020basedinterimnationalpopulationprojectionsyearendingjune2022estimatedinternationalmigrationvariant](#)

<sup>5</sup> See - <https://www.theccc.org.uk/publication/2023-progress-report-to-parliament/>

<sup>6</sup> See - <https://www.theguardian.com/environment/2023/sep/20/rishi-sunak-confirms-rollback-of-key-green-targets>

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for the sector in obtaining the investments to reach Net Zero. If there is doubt over the supply of hydrogen is it wise to install hydrogen ready boilers given the report by the committee on Climate Change report highlights a shortage of supply and given the price of heating a home would forever be linked to the price of natural gas if this remains as the principle source of the hydrogen. Shortages in supply of any resource generally pushes up the price and going by what happened only last winter it would be prudent for the government to invest more seriously into green hydrogen sources.

- 2.13. Heat pumps can operate using only solar panels on the roof and battery storage if there were the funds to install it. Doing so would potentially reduce demand on the grid connection to next to nothing. But this would require another team of solar and battery bank installation electricians with the right qualifications. If the homeowner invested into such a set up it would not take many years for them to recoup the cost of the set up too. The issue is the time and cost of the initial installation.
- 2.14. Like a pension fund the later we leave a decision to invest, the harder it will become. If you allow for 28 days holiday a year spread out over a year, and you also allow that in a year 5.7 days off per year due to ill health<sup>7</sup> working a five-day week there are just 5,789 working days left to achieve Net Zero between the date the transition closes<sup>8</sup> and 01/01/2050. The install time to fit an air source heat pump, is 3 days, potentially double that if the client chooses a ground source heat pump, due to the earthworks that will be required and the laying of pipework in the ground. If we further assume that whilst the installation time for a hydrogen boiler can be achieved in a day, that is no guarantee that the pipework or joints can withstand the change to hydrogen. It therefore could take a further day finding leaks and fixing them during which time of course the supply cannot safely be turned on. Therefore, currently the consumer has the choice of a fast cheap fix that may cost them a fortune in future (as you cannot easily generate and store hydrogen at home) or a fix that is going to be more expensive initially but then pay for itself in savings not just for them but the nation.
- 2.15. Unlike natural gas supplies, hydrogen is lighter than air and will rise through cavities in a wall very quickly meaning that finding a leak becomes a far more difficult prospect than finding a leak of natural gas, more so as hydrogen would not have that characteristic smell. Assuming the nation had teams of fully trained heating engineers already in place and the supply chain to support the task already becomes a mammoth one as we would need to maintain a workforce of engineers. To maintain and steadily increase the number of engineers the industry needs to invest heavily into new apprenticeships<sup>9</sup> as part of an industrial strategy delivering Heating Engineers with the appropriate qualifications in this area. Unites Construction sector would recommend that this should be at least to Level 3 given the potential for sub-standard training and workers ill-equipped to carry out tasks, leading to poor workmanship, injury or the engineer's fatality. It is also very important to mention the need to protect the customer too, as it is all too easy to install a boiler in a state that can result not just fatalities of the customer but the removal of the property in an explosion or cause a surface of a heat pump in a state where it is carrying enough power to stop a heart and cause severe burns.
- 2.16. Unite therefore is firmly of the belief that the governments estimates, regarding the number of created jobs and the amount that would be needed to stimulate a move to heat pumps, is way

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<sup>7</sup> Figures based on 2022 days off due to ill health from the ONS See - <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/articles/sicknessabsenceinthelabourmarket/2022>

<sup>8</sup> 12/10/2023

<sup>9</sup> If the apprenticeship is 3 years in duration and there is a 15% attrition rate they need 7,500

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short of the mark. Similarly with just 4,500 heating engineers they would barely scratch the surface of the future demand to be converted from natural gas let alone those that rely on oil or coal without a pipeline in place to provide a supply of hydrogen. In addition to the 25.3 million there the new boilers and/or heat pumps and heating engineers that will be needed to install a heating system in new builds. In 2000 there were around 24.4 million homes in the UK. By 2023 that number was approximately 27.5 million, which could increase to an estimated 35.5 million by 2050. This challenge is going to be difficult to achieve if we start off with such low ambitions for just 600,000 heat pumps by 2028.

- 2.17. According to the Building Engineering Services Association (BESA)<sup>10</sup>, there has been a collective failure to address diversity means the heating and hot water industry is missing out on crucial skills and putting its whole future at risk. *“Just 2% of the sector’s workforce are female and only 5% are from an ethnic minority background, according to new research from Energy Systems Catapult<sup>11</sup>, which is working with the Association to address skills shortages across the building services sector”*. The research highlights that the key needs for women and ethnic minorities entering or staying in the heating sector are:
- Increased availability and awareness of fair job opportunities
  - The option to train and work flexibly.
  - A healthy and inclusive environment, in which they feel a sense of belonging.
- 2.18. With the sector being predominantly white and male, opportunities to network are limited for women and ethnic minorities who may not be involved in social media groups where opportunities are promoted. The implicit bias caused by customer expectations to see a white man as their boiler & heating engineer is fueling a flawed, sector-wide recruitment process, because it is ‘easier’ and employers ‘know what they get’ when hiring white men. Access to, and awareness of, training in the heating industry is a significant barrier for women in particular as careers advisors pointing women into admin, beauty, nursing, cabin crew and other roles historically and incorrectly seen as the domain of women.
- 2.19. Financially, training courses can be prohibitively expensive while an awareness of available funding options remains low. This can cause financial uncertainty and worry that will deter potential engineers.
- 2.20. Following the devastating fire at Grenfell Tower in 2017, Dame Judith Hackitt’s Independent Review of Building Regulations and Fire Safety took place, and subsequently the HSE’s Building Safety Regulator (BSR) has now been firmly established. Following this review industry, employer and union representatives, are participating in the development of sector specific competence frameworks aligned to BSI Flex 8670, for the craft trades and construction related occupations. Whilst this work is aimed at Higher-Risk Buildings (HRBs) in particular, it is evident that this drive towards competency will impact every position within the workforce which require such competency to be applicable across the construction industry.
- 2.21. As employers are fully aware, strategically, industry recognised personnel certification card schemes, training, CPD and apprenticeships are being aligned to meet these new competency requirements and standards. This includes, as specified by Working Group 2 (WG2) in the *“Setting the Bar”* report, again emanating from Dame Judith’s review: *“Accredited third party certification of companies; Level 2 or 3 qualifications for individuals; A card scheme such as, but not limited to,*

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<sup>10</sup> See - <https://www.thebesa.com/besa-latest-news/heating-industrys-lack-of-diversity-is-an-absolute-scandal>

<sup>11</sup> See - <https://es.catapult.org.uk/news/diversity-report/>



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*the CSCS; CPD refresher training and the maintenance of individual skills; Have a core knowledge of fire safety in buildings – training to be standardised and made mandatory.”*

- 2.22. As stated in the response there are nowhere near that number of engineers and the engineers that are fully trained, are fast approaching retirement. Despite this desperate need for the work to be commenced, the industry does not wish to invest in training engineers through the fear that the engineer will move from one company to another to obtain better terms and conditions. Unite knows of one energy company that did bite the bullet and invested in training up apprentices, but due to the slow take up of heat pumps, they ended up making most of them redundant, due to the lack of public interest in heat pumps.
- 2.23. The government needs to send out a clear message that heat pumps and/or hydrogen boilers are the way to go and promote the changeover, the savings that can be made by the change. As a result of this industry wide fear, we are fast approaching a cul-de-sac of zero trained engineers to carry out or act as mentors for apprentices. The solution is an obvious one, in that the industry needs to work with the government to fund a national skill centre similar to the one set up for other highly skilled professionals like those for tunneling or the Citb<sup>12</sup> national Construction Colleges in Kent, Norfolk and Scotland. Courses should have a positive bias to attract a more gender diverse workforce with a far greater ethnic background. This does not mean we should prevent white men from joining the course, but we should see a workforce more representative of the communities they are going to serve so there is a greater understanding of cultural, religious and ethnic diversity.
- 2.24. Unite welcomes the drive towards competency, building safety and quality. It is the Unite construction sector's hope and expectation that this will create a firm basis for a system of registration for qualified, competent craft workers and employer contractors, with the necessary skills, knowledge, qualifications, training, experience, and professional behaviours and ethics, fully integrated into the system. It is imperative that industry delivers the safe buildings and homes that the population deserve and require. Conversely it is hoped that the system will assist in driving out unqualified, unscrupulous and rogue traders within the industry. Unite believe that the JIB-PMES registration card scheme fees structure is the most fair and progressive amongst the CSCS partner schemes for employee participant and Unite members. With this in mind, it is the union's hope and expectation that this approach will also be reflected regarding any additional requirements as the competence agenda moves forward.
- 2.25. Such a centre of excellence needs to highlight critical health and safety issues like the repositioning of ventilation if a hydrogen boiler is installed. As hydrogen is far lighter than air and natural gas is heavier, the ventilation or airbrick needs to be relocated to a location higher up the building so that the gas does not pool in rooms from any leaks that have been missed or a pilot light that goes out. It needs to cover the safety around the voltages needed to run a heat pump. It would need to stress the need for airflow around an air-source heat pump so that the air extracts energy from does not reenter the fans.
- 2.26. Any training centre will need to compete for apprentices given the equal demand for engineers to connect new low carbon sources of electrical power to the national grid; engineers to connect those sources of energy to every domestic substation; engineers to provide every home to accept a three phase power supply; electricians to install and maintain EV charging points, solar generation, battery storage and other electrical systems. There will also be the need for engineers to lay pipes in order to ship hydrogen from where it is generated to homes. There will be the need

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<sup>12</sup> See - <https://www.citb.co.uk/national-construction-college/>

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to compete with insulation engineers, glaziers to fit more energy efficient windows and carpenters to fit and maintain better and more energy efficient doors. And this is just the future domestic demand, for it is believed that there will be far more jobs that will need to be filled in the green economy than are in the jobs market at the moment resulting in employers chasing qualified staff.

- 2.27. The industry needs to be attractive to retain and develop its existing skilled workforce, plus attract new talent and prospective apprentices in a tight UK labour market. A quarterly report into the state of the UK Labour market commissioned by SNIPEF, BESA, ECA and SELECT), reports that increasing labour shortages are impacting on business performance, with almost half (42%) of respondents stating that labour shortages were the biggest concern for their businesses<sup>13</sup>.
- 2.28. The CITB's 2023-2027 Construction Skills Network (CSN) report, identifies an ARR (Annual Recruitment Rate) of 1,250 people per annum, the ARR representing additional numbers required over and above the normal "churn" (i.e. **it does not include the normal inflow and outflow of workers**, including for instance those retiring, leaving, and those coming into the industry, including via apprenticeships<sup>14</sup>
- 2.29. Dame Judith's report highlighted an unacceptable and inadequate regulatory system that was not fit for purpose, enabling a "race to the bottom", with a culture of ignorance, indifference, ambiguity, and fragmentation within the UK construction industry. To tackle this, the establishment of competency frameworks will form a key part of reforms moving forward. The union's construction representatives are therefore fully conscious and advocating that initiatives should not develop into a 'job tax' on workers, and be appropriately funded by industry, employers, government, and clients. Working people should not be made to pay for the previous failings of the UK construction industry and inadequate governmental regulation.
- 2.30. The nation cannot afford another smart meter fiasco that has used up huge resources and could now result in the process returning to the beginning, designing yet another meter that will be capable of communication to the customer the price at that moment and the amount of fuel used and at the same time accurately report to the company the customers usage information. What is clear, relying on a mobile phone signal was a major mistake as many areas are in a mobile phone dead zone. Furthermore, as has happened in this instance, if the mobile networks decide to move away from providing that service the installed meters loose contact and need replacement.
- 2.31. The Government only tasked the Big six energy companies, and only more recently the other energy companies, with the removal of all the existing electricity and gas meters and replace them with a pair of meters that could report back to the billing company how much energy the individual household used and importantly when. Up to that point a customer's meter readings and bills were estimated and only updated when a customer rang in the readings, or it was checked by the energy supplier. These estimates could result in the energy company sitting on large amounts of the customers money or the customer receiving a nasty surprise.
- 2.32. To date, however, just over half of all the meters have been installed due to a series of errors. Firstly, the government gave the task of designing the meters and the meters functionality. The government believed that the industry knew best and did not consider that the energy supplier would not want to share the information from the meters they had installed with their

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<sup>13</sup> See - <https://www.eca.co.uk/news-and-events/news/2023/may/impact-of-labour-shortages-worsen-for-engineering->

<sup>14</sup> See - <https://www.citb.co.uk/about-citb/construction-industry-research-reports/construction-skills-network-csn/>

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competitors. Consequently, newly installed meters had to be replaced time and again as the consumer sought the cheapest tariff from their current provider and its competition. As some of the meters were installed in the pre- World War One era and had not been touched since, there were issues with asbestos and wiring that was in breach of safety regulations.

- 2.33. To add to the woes all smart meters that have been installed rely on the 3G mobile phone network the lack of universal coverage resulted in meters being installed only to discover the data signal could not be connected to base, so the engineer had the task of reinstalling the original meters. As customers needed to book a time slot to have an engineer call and replace the meters these appointments were often missed as the engineer was held up on a previous call. The appointments were not rolled out on street by street and not scheduled by the area in which the engineer had another job, but more on the convenience to the customer, the engineer could spend a large amount of their time driving from place to place.
- 2.34. As highlighted earlier the 3G phone data network is now being discontinued in the next few years meaning that every one of the smart meters being installed to date, will need to be replaced again undoing 12 years of work!
- 2.35. The nation cannot afford to repeat these errors that have occurred with the roll out of smart meters when it comes to the home heating solution. In 2011 Unite called on the Government to install meters on a street-by-street basis, replacing meters with a single design thereby obtaining discounts due to the economies of scale. By doing this, the issues re asbestos, poor data connectivity and problems of inter supplier communication of customer data could be overcome. If we apply this to the roll out of hydrogen boilers, they could be located in areas where there is the infrastructure to supply the hydrogen first. In Northern Ireland due to the lack of mains gas connectivity, there needs to be a focus on heat pumps to move customers away from oil or coal fired heating solutions. Due to this there will also be the need for national power grid enhancements to ensure the security of the electrical supply.
- 2.36. At the present due to the financial crisis almost every household faces due to the steady erosion of average pay behind the true cost of living, the high bank of England base rate and RPI, most families cannot afford a new heating system, but the government needs to find a way to ensure they roll out the conversion to such devices by slowly condemning existing gas boilers based on their carbon footprint. The government needs to ensure that homeowners have access to grants and loans to assist them in their transition but also the government needs to manage demand by not condemning too many boilers too quickly and forcing too many homeowners and landlords to make the change too soon as this will simply ramp up cost and cause disappointment due to the inability for them to find a heating engineer.
- 2.37. Whilst, fortune telling is not normally the role of a trade union, based purely on the statistical trends and the number of days we have left and size of the task in hand it means that as around trained engineers working in teams of three will be required to hit the ground running just to replace or install the heating systems of existing homes and those built up to 2025 and all other natural gas heating system installed up to 2035. This also assumes a team of three on each job. A minimum of two is required on a heat pump install simply to move the hot water tank and the air source heat pump itself. If a hydrogen boiler is installed it may also require the services of a plasterer to follow up and cover the pipework that had to be exposed in order to find the leak. If a ground source heat pump is installed the more, you have on the job laying the pipework doing the ground work and drilling any holes the better. Therefore, an estimate of three on each job is probably a best-case scenario as it allows for space for an apprentice to shadow their mentor and



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someone to make good on any plaster work/decoration the number is based only on replacing home heating systems and not those water heating options in non-domestic locations.

- 2.38. What is clear that for every day that it takes to prevaricate over the direction we travel on sustainable heating systems and the supply of enough electricity and or hydrogen, the recruitment and training of the engineers, support teams and supply chains, the greater the challenge becomes, requiring even more staff.
- 2.39. The recommended apprenticeship for a heating engineer is 36 months plus another 12 under supervision. It is possible to complete a basic heating engineering course in 2 years with another under close supervision and equally an apprenticeship can take 5 years depending on the skill level required. As a result, Unite would recommend that the first time a newly qualified heating engineer recruited on the 01/01/2024 could start installing boilers or heat pumps would be 01/01/2027 or possibly as late as 2029, if they can find a mentor and only then if they scored well in all the stages up to that point. If the goal of 600,000 heat pumps installed is to be achieved this will either have to be done by recruiting back retired engineers or seeking them out from other industries.
- 2.40. In May 2022 figures for England from the Department for Education show that for the 2021-22 academic year, approximately 3,780 apprentices commenced the Plumbing and Domestic Heating Technician advanced Apprenticeship Standard, and for 2022-23, latest available figures showed a further 2,400 starts. Although these figures show that in all construction occupations, apprentice plumber recruitment figures are near the top of the table, at third place with electrical being first, followed by carpentry and joinery, in conclusion, it is apparent that there are still too few apprentices being recruited and trained to meet current and emerging skills shortages, including replacing the ageing skilled workforce as they imminently retire.
- 2.41. Assuming an average 5% attrition rate, this means that if the course starts from 01/01/2024 the project to replace every natural gas boiler would require if we only installed heat pumps around 3,880 recruits a year, every year from 01/01/2024 until 2050. There will always be recruits that will not stay the course and some will leave or retire but the better staff are treated the more likely they are to stay. Obviously the later the start of the apprentice programme or the higher the attrition rate, the more that needed to be recruited. If the average attrition rate was 10% for example the number of apprentices recruited would need to be 5,530 a year. 15% and the average recruitment would need to be 7,500 a year. With a 15 % attrition rate left a year before it starts, The point being made here is that Unite would suggest that recruits are found nationally and trained as heating engineering apprentices each year from now till 2050 just to cover heating system replacement needs and every effort should be made to ensure they do not leave the industry. It should be remembered that these numbers in this paragraph are only for illustration.
- 2.42. While the government estimates of the number of certified heating engineers could be correct, what this figure indicates, is that there will not be enough mentors to go round. The average heating engineer is in their late 50's according to the gas safe register<sup>15</sup> meaning that in a few years they will be retiring and taking with them decades of experience. With them in retirement the hole they left installing and maintaining heating systems will need to be filled. Unite is seriously concerned that the government is underestimating the scale of the problem and the challenge ahead.

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<sup>15</sup> See - <https://www.gassaferegister.co.uk/media/2490/decade-review.pdf>

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- 2.43. Unite believes that the simplest option is to retrain gas boiler engineers and those workers who are displaced from employment elsewhere in the economy, whose existing skillset would otherwise end up on the scrap heap as part of a joined up Just Transition<sup>16</sup> programme. Had there not been the issue with the 3G network, Unite would suggest that the smart metering engineers would be ideal recruits as they already know the basics of how to bend and solder pipe work and work with electricity.
- 2.44. Of course, there are a lot of assumptions made in the Unite modelling but Unite would be willing to sit down with employers and hammer out a methodology of how such a conversion from fossil fuels to a sustainable option can be achieved.
- 2.45. What is clear, the sooner that the fossil fuel system is removed the better it is for the planet and our chances of staying below 1.5°C. By 01/01/2050 there cannot be a single household with a fossil fuel powered heating system so leaving the purchase of such heating systems as a choice cannot be an option. While the government can highlight that supplies of the fuel will no longer be available in the area, the determined individual will try to find a way to use something that is not sustainable or safe. Tracing which properties have had their heating systems replaced will therefore be vital to ensure none are missed.
- 2.46. Ground Source heat pumps can achieve a heating coefficient of 7 which means 1 watt of energy in creating 7 watts of heat out. The best a hydrogen boiler will ever achieve is 0.7 as it is not drawing heat from a secondary source such as the sun's radiation. As a result a heat pump will shave far more money off of bills and reduce the energy demands to that property and of the sector of the economy to the nation. Additionally, to create hydrogen and pump it to where it needs to be requiring even more energy meaning that the nation will therefore require more infrastructural power to cause the same impact. With a heat pump the power to run the devices can be drawn from solar panels on the roof and stored in batteries in the loft. Such a move to solar fueled heating systems would free up the hydrogen supplies for other purposes, such as transport but the ideal would be an increase in green hydrogen.
- 2.47. The growing demand for charging points at home for electric vehicles, the electrical supply grid to houses will require the supply to the property to be upgraded. It would not therefore be as much of an upheaval and cost to lay a hydrogen network to every property, especially to remote locations where heating oil or coal are currently used. Biomass could offer a solution in these locations if the issues of more powerful greenhouse gasses can be overcome.
- 2.48. Whilst it may not be possible to place a heat pump on the outside of a 12<sup>th</sup> floor flat it is possible to provide communal heating with air source heat pumps on the roof or a ground source one from

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<sup>16</sup> The global Labour movement proposed the following definition of a just transition to be used to guide the work of the 28th Conference of the Parties (COP28) in Dubai later this year.

“A just transition secures the future and livelihoods of workers and their communities during the transition to a low-carbon economy, effectively limiting global temperature rises to 1.5 °C above pre-industrial levels. Just transition plans should be co-created with workers and their trade unions to provide and guarantee decent work, social protection, training opportunities and job security for all workers affected by global warming and climate change policies.

Plans must be underpinned by the fundamental Labour rights of freedom of association and collective bargaining and facilitated through social dialogue between workers and their unions, employers and governments, as established by the International Labour Organisation (ILO).

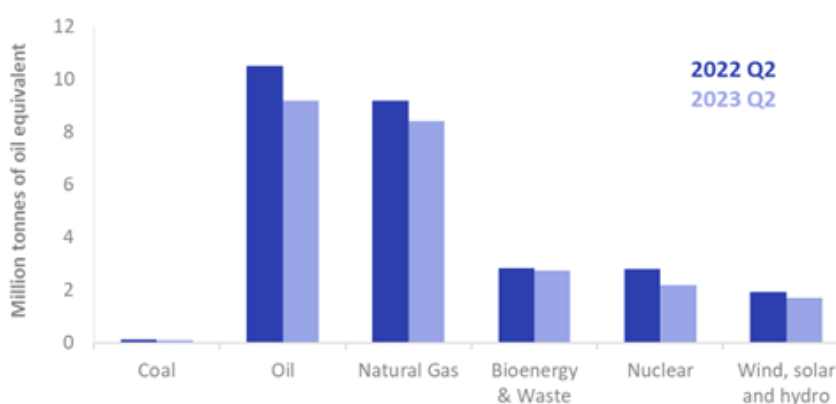
A just transition requires guarantees for intra-, intergenerational and gender equity, racial justice, respect for the rights of Indigenous peoples, impacted communities and migrants and promotes and protects human rights and ILO fundamental Labour rights”.

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the grounds around the block especially from beneath footpaths and communal areas. If away from a hydrogen pipeline it is always possible to have hydrogen delivered and stored on-site. What is clear, the volumes of hydrogen and electricity that will be required to fill the gap left behind when we can no longer burn fossil fuels will be huge.

2.49. What is more with an ever-growing trend towards hotter summers as a result of climate change that ways need to be found to provide a cool place of refuge from the heat of the day. A properly insulated home can help but so can a heat pump. Some pumps can store the excess heat underground or in a heat storage device such as those that use vats of sand or salt. A hydrogen boiler can only heat a property and a separate air conditioner would be required to provide cooling.

2.50. The most recent DESNZ Energy Trends highlight the huge volume of coal, oil and natural gas that will need to be replaced with an alternative come 2050, and with the volume of nuclear generated energy only set to fall with the closure of nuclear facilities that have currently been thrown a life extension, wind farms that will all need to be replaced (they are only designed to work for 25 years each) and the desire of the aviation sector and shipping to use municipal waste and landfill to create fuel, the challenge of ensuring energy security and self-sufficiency will be a difficult one.



Source :- Energy Trends Chart 1.1 UK Primary energy production – September 2023

2.51. While it is possible to extract hydrogen from wastewater pipes and by using pyrolysis<sup>17</sup> extract fresh drinkable water, hydrogen and black carbon powder instead of CO<sub>2</sub>. This idea has yet to catch on in the UK but there is a demonstration plant working to turn animal waste into Green hydrogen in Germany. Such a plan could also deal with this nation's water industry legacy of illegal human waste dumping into water courses and the ocean that has raised such health concerns for swimmers. By locking away the carbon as black carbon powder there is a secondary benefit in providing the raw material for carbon fibre, graphene, industrial diamonds, and a host of other products that will not degrade into methane or CO<sub>2</sub>.

2.52. One final option is the greater utilization of waste industrial heat. Many parts of industry require large volumes of heat that can be captured and stored in molten salt or sand. Such a reservoir of heat can not only cut down on the cost to pre-heat the industrial processes, but it can also be used to help the industries neighbours.

### 3. Government Proposals and Questions

<sup>17</sup> In the article the process is called in the article Plasmalysis but the principal is the same if it is animal waste or human. <https://fuelcellsworld.com/news/new-tech-turns-manure-into-hydrogen/#:~:text=Unlike%20conventional%20methods%2C%20plasmalysis%20uses,%E2%80%93%20a%20so%2Dcalled%20plasma>

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- 3.1. The Governments proposals are far too weak in their ambition and if they are followed it will make it increasingly difficult for a following government closer to 2050 to achieve the goal of reaching net zero.
- 3.2. While the government estimates of the number of qualified heating installers totals 4,500 in the UK, it is hoped that the number of engineers that will be needed will be far greater. For that reason, Unite firmly recommends that the government and industry sit down with unions and schools and colleges to hammer out how a program of education can be thrashed out.
- 3.3. Unite does not believe that the financial incentives are large enough for a homeowner or landlord to invest the money into a heat pump rather than a replacement gas boiler. If the government is serious about this more is needed to make their plans public before time runs out.
- 3.4. With over 25 million domestic installs to be completed between now and 2050 this means there needs to be almost a million installs happening every year from now, on average, not a target of just 600,000 installs by 2028 although Unite recognizes above that engineers need to be recruited, trained and retained if this target is to be met. What the government should not lose sight of is the additional demand from industry and commerce to replace their heating systems too.

***Question 1: Do you agree with the proposal to allow for the potential differentiation of the grant levels for different types of property or property owner within the regulations? Yes/No. Please provide evidence to support your response.***

- 3.5. **Yes** - For the reasons given above Unite believes that the differentiation of the grant is a way to encourage investment in the desired technology but feels that the levels of that grant also need to reflect that the amount of available capital to spend on replacement heating systems is limited due to years of below inflation pay rises and freezes leaving over half the nation facing fuel poverty. When faced with the prospect of having no choice but to replace the heating system of the home, the individual in such a situation will go for the option that costs the least and not consider the pay back time regarding pay back times.

***Question 2: Should we maintain the current requirement for a valid EPC with no outstanding recommendations for loft or cavity wall insulation? Yes/No. Please provide evidence to support your response.***

- 3.6. No – Unite believes that it is no use fitting a heat pump or new boiler into a home where the heat is not retained and used to heat the atmosphere. If anything, the investment into insulation needs to increase and equally increase dramatically to ensure homes stay cool in summers and warm in the winter even before the heating/cooling system is switched on.

***Question 3: If you consider the EPC requirements to be a barrier to uptake, what specifically do you consider to be the issue:***

***a) Requirement to have a valid EPC***

***b) Requirement to have a valid EPC with no outstanding recommendations relating to loft or cavity wall insulation***

***c) Other***

***Please select one of the above and provide evidence to support your response.***

- 3.7. Unite believes there needs to be a valid EPC with more than recommendations over insulation but with the assistance of government and the energy industry to help this be achieved.

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***Question 4: If we retain the EPC requirements, are there any potential changes we could make to ease the consumer journey without risking heat pumps being installed in unsuitable properties? For example, allowing the submission of an expired EPC with no recommendations for loft or cavity wall insulation.***

- 3.8. No property is unsuitable if the proper remedial insulations take place and there is more than one type of heat pump option. There are still a number of properties without a cavity in their walls or cladding and without double glazing to retain the heat, being used in social housing. There are properties where the landlords have seen that there are recommendations but decided that because it costs them money not to invest in the upgrades and maintenance needed. In such houses a coat of paint over a crack will not stop the heat from escaping. When families are making the choice to heat their homes or put food on the table, it creates a burden on society to help those individuals through the intervention of the NHS just as surely as if there were no public safety requirements around the insulation around electrical conductors or properly fitted gas pipes, the only difference is the speed at which the lack of regulation kills. The issue is the price to carry out the repairs or bulldoze and start from scratch.
- 3.9. As long as there is a separation between the property and an air source heat pump or space under which enough pipework can be laid for a ground source pump, this includes space under a neighbouring road, or space to drill a borehole then a heat pump solution will work. This would include the installation of pumps on the roof of a block of flats as part of a communal heating system.
- 3.10. Equally heating systems such as community heating schemes should be included in investigations especially those using waste industrial heat.

***Question 5: Should we allow biomass boilers with a cooking function provided the cooking function is integrated and cannot be controlled separately to the heating function of the property? Yes / No. Please provide evidence to support your response.***

- 3.11. Unite believes that biomass if sustainably grown is in keeping with the task of reaching Net Zero by 2050 and as such would agree that such boilers should be allowed.

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### 4. Conclusion

- 4.1. Unite believes that the longer we leave the creation on a programme to train staff and secure the creation of sustainable heating systems for homes the harder it will be to have housing stock fit for the future the harder and more expensive the task will become. Unite understands why the government has set a low starting point for heat pump insulations in 2028 but unless the government can secure enough supplies of hydrogen to make hydrogen gas boilers a feasible alternative in the long run there is little option but to look to raise expectations over the number of installs and apprentices needed.
- 4.2. There is huge economic investment planned to support the move to a zero-carbon economy in the UK, coupled with improvements in energy generation and transmission to homes and businesses, the creation of affordable housing, the infrastructure to create the equipment and fuels of the future, and the retrofit buildings. The industry must embrace the development of a new green industrial deal. Increasing investment in future skills through apprenticeships and developing the knowledge and skills base of those already working in the building services engineering sector remains a critical priority for Unite and its membership as is the need to ensure they are working in an environment that provides job satisfaction and security.
- 4.3. Unite believes that it is only utilising long standing and industry leading national agreements that support grading structures, apprenticeships and provide best terms in employment rewards, will the industry flourish and be attractive as a career for prospective talented recruits in a competitive labour market.
- 4.4. Unite would also strongly highlight the need for proper training through a proper level 3 advanced apprenticeship with the ability to learn with an experienced mentor. Given the shortage of experienced heating engineers, Unite suggests every effort should be made to attract those individuals who have left the industry so they can pass on their wisdom after a suitable refresher course to shake off the cobwebs and bring them up to speed with the current technology.

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