

# Unite response to the Department for Energy Security and Net Zero:- Smart Secure Electricity Systems Programme 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 interest to this consultation Unite represent, 63,000 members in the Automotive industry, 62,000 members in Construction and Allied Trades, 30,000 members in the Energy sector and over 220,000 members in the various methods of transport, moving good and people around the UK. Each of these sectors will feel the impact of the proposals in this suggested programme with the need to enhance its workforce with additional skilled engineers at a rate which requires significant government intervention.
- 1.3. In this response Unite will stress the importance to consider the workforce in the various industries for whom a just transition to a new secure role is going to be required in order for highly sort after roles not to be lost. A programme is needed to identify much needed transferable skills, among the workforce at risk in order to reduce the expense and delays of retraining requirements. Unite will highlight in this response the need for a Just Transition<sup>1</sup>, adaptation and substantial investment to help it convert the energy networks to a more flexible and smart sustainable future.

## 2. Observations

- 2.1. In 2012 the Government reviewed the projections of energy demand and supply and realised that we either massively increase supply or find a way to reduce demand, ideally both. Therefore, the Government set out plans to have installed in every home, industrial and commercial premises the ability to see from an easy to read display the flow of both gas and electricity to the property, its cost and how the property was being charged for the energy it consumed. The aim was to move the meters display from the back of a cupboard to a desktop display, so the bill payer could see what was draining the most energy, giving them the option of reducing their bills and energy consumption. The smart meter was also able to combine the usage data with the tariff applicable at the time and toll the consumer what they were being charged.
- 2.2. The Governments latest statistics highlight that despite having 12 years to roll out these meters, only 62% of homes and businesses have them installed<sup>2</sup>. There are several reasons for this:-
  - 2.2.1. Sadly, the government left the details of the design of the meter to the largest suppliers who decided that the best way of having the smart meter to work was to connect it to the wireless mobile phone network. At the time the technology meant that the meters had to be 2G and 3G compatible. The problem with the mobile phone network is that the country isn't covered with relay towers that reach into every property. In cities the mobile phone signal may be blocked by buildings and in rural environments trees or the landscape can block the signal, leaving several black spots leaving communities there is no service at all. This meant that a lot of time was wasted, arranging an appointment, getting engineers out, installing them so they had power, only to discover after the meters had been installed that there was no way to connect them to the network and therefore no way to programme them in for the property. As a result, the engineer had to remove the new meters and put the old ones back before they left.
  - 2.2.2. Additionally, the mobile phone networks have, in a bid to provide faster data connections, changed the network protocols are now moving away from 2G and 3G, shutting down services, and are now even looking at ending the use of 5G as they work toward the release of 6G in the next few years. However, they can only move on to these new technologies if they discontinue older data services to free up some bandwidth on their transmitters. As a result, they have a schedule to slowly discontinue the

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<sup>1</sup> As defined by the UN's International Labour Organisation. Please see the [link](#)

<sup>2</sup> See the [statistics till March 2024](#)

## Unite response to the Department for Energy Security and Net Zero:- Smart Secure Electricity Systems Programme Consultation

- availability of 2G and 3G services over the next 9 years. This will of course end the ability for all the existing operational smart meters in these areas to communicate with their base, increasing the number of black spots where smart meters will not work.
- 2.2.3. Other issues were discovered, after installing it, that the location of some meters was so far apart, blocked by thick walls etc. that communication between the meters proved impossible.
- 2.2.4. In a bid to retain customers the energy companies initially designed the meters, so they only worked if the customer stayed with that supplier of electricity and gas. Therefore, as soon as the customer changed providers, they would need a new appointment to have their new smart meter replaced with one that worked with their new providers' network. Additionally, only the big 6 companies had a smart meter technology, so not only were customers denied access to the technology but if the customer had a smart meter and changed to a smaller provider, the smart meters functions returned to their default settings.
- 2.2.5. As highlighted many properties cannot have a smart meter as they are in a signal blackspot. Engineers were none the less instructed to remove the old meter and install the new one and then try and get them to communicate. If this proved impossible the only option was to put the old meter back as stated above. It takes around two hours to safely replace the gas and the electricity meters, in a property, so the lack of a signal added over two hours to the length of the call. this would create unforeseen delays causing appointments to be missed. Even where the communications were established the amount of data that had to be transmitted to and from the meter over a 2G network could take a further 45 minutes.
- 2.2.6. As the role out was not done systematically but as requested by the customer, a lot of the engineers' time was spent driving between locations. Had the roll out been systematic on a street-by-street basis Unite believe that a lot more of the country would now have a smart meter.
- 2.2.7. The general public's initial interest in smart meters was damaged due to the delays in rolling out the meters as there were not enough staff employed to do the task, Smaller energy providers were not even required to provide smart meters or support them, As a result, as soon as the customer chose their cheaper tariffs, their smart meters would stop working. If energy providers were required to have tariffs and technology that worked with these smart meters from the start, even if they didn't have to have engineering teams out installing metres, then at least when the cross-compatibility issues were resolved.
- 2.2.8. On the old analogue meter, the volume of energy used was easy to read off from the display. The new smart meters make it far more difficult for the consumer to provide the energy company with a meter reading as it can require the navigation through several sub menus before reaching the required display. As a result, it was not uncommon for incorrect meter readings being provided.
- 2.2.9. In buildings of multiple occupation specialist meters or space was needed for a bank of smart meters are required in order to sort out the billing of one customer instead of their neighbours flat. In such an arrangement it has to be a unanimous decision to move to a smart meter and as this met resistance from some, these specialist meters were not fitted.
- 2.2.10. installations were heavily delayed as the calling engineer, unearthed things like: substandard wiring that was in a dangerous condition; the discovery of white asbestos backing plates to older gas meters, which would require specialists to come in and remove before the new meter could be installed; etc.
- 2.2.11. What is more the number of smart meters that have failed and have become non-responsive is higher than expected. Currently Unite estimates that there must be over 4 million smart meters that fall into this non-responsive category. We know that at present British Gas has over 1.1 million of these devices.
- 2.2.12. As the training time for a smart meter engineer was compressed into just a few weeks, by the energy companies, numerous mistakes were made including cross polarity wiring and gas leaks occurred frequently which could have resulted in the deaths of residents in that home or business. Unite strongly believes that the installation of systems and equipment and environmental technologies for smart secure energy, whether via retrofit or new installations, and the ongoing repair and maintenance of such equipment should only be undertaken by fully qualified craftspeople and technicians. In many

## Unite response to the Department for Energy Security and Net Zero:- Smart Secure Electricity Systems Programme Consultation

cases however, the lack of mentors meant that trainee engineers were left alone in a domestic setting after just 10 weeks of training with the mentor only calling in to visually check the work, when they themselves might have been working in that role for less than the time it takes for an electrician to complete their minimum qualifications.

- 2.2.13. The minimum training requirements are to ensure maximum consumer safety and competent installation, i.e. undertaken by the occupationally competent electricians, plumbers, heating fitters and air conditioning technicians that already have the requisite core skills sets, gained through industry recognised apprenticeships or mapped equivalent craft training, in turn working for companies with the necessary self-certification and accreditations etc. These include but are not limited to: Electrical Energy Storage Systems (EESS “battery storage”), Solar Thermal, Air Source and Ground Source Heat Pumps, Biomass, Hydrogen Ready Boilers, Mechanical Ventilation Heat Recovery, Smart Heating Controls, Energy efficient lighting and controls, Electric Heating – including storage heaters, infrared and panel heating, EVSE (Electrical Vehicle (EV) Supply Equipment – domestic, commercial, industrial), microgeneration including Solar PV (Photovoltaic), Micro Hydro, Micro Wind Turbines, plus mechanical services including Underfloor Heating, Grey Water Harvesting, and Rainwater Harvesting.
- 2.2.14. When it was learned that the smart meters could be changed remotely to ones that require prepayment due to arrears, without discussion with the customer, the last straw was placed on the camel’s back and the desire for a smart meter in some quarters was turned in to open hostility. Customers have lost faith in the technology but now find it increasing more difficult to find a tariff that does not require them to have a smart meter.
- 2.3. As the government set unachievable deadline after unachievable deadline, some energy providers started to make teams of engineers redundant as the companies felt that the idea of smart meters was a failed idea of the past. Even today many Smart meter engineers have been transitioned to also fit EV charging points and even heat pumps in addition to their ongoing duties to fit and maintain smart meters, reducing the capability to fit new smart meters. The aim of smart meters is to reduce the need for estimated billing where the energy supplier could overcharge and sit on a huge pile of consumer overpayments for which they paid zero interest, to one where the consumer paid for the amount of energy they used and had the potential to reduce their bills further by switching off unused items and using things like washing machines in the middle of the night rather than at peak times further reducing their energy bill. As the energy providers are paid on the margins between the cost of energy and the amount, they can bill the customer for, the roll out of smart meters is an attack on their bottom line so they want to see the experiment fail.
- 2.4. For the governments Smart Secure Electricity Systems Programme to work there needs to be a smart meter in every home. As has been stressed, so far, the easy to fit smart meters have been fitted and now the monumental task is to correct the errors of the past and find a solution to the smart meter problems.
- 2.5. Unite’s energy and construction sectors membership would be happy to discuss potential solutions especially as the much-predicted energy shortages are now upon us<sup>3</sup>. We have known the designed lifespan of nuclear power stations; we know that every wind turbines life expectancy is 20 - 25 years, meaning that the existing turbines will all need replacing before 2050; and have known that the ‘Dash for Gas’ of the 1990’s will eventually see the day when due to end our association with fossil fuels, when the UK would change from being a net exporter of electricity to one importing it if nothing was done. Unite hoped those days of energy underinvestment and insecurity were over. In the Dukes October to December 2023 Energy Trends<sup>4</sup>, it states “*that UK energy production in 2023 dropped 9 per cent to the lowest level since records began in 1948*”. We are now facing an energy supply crisis so need every watt of power we can obtain from any source even if it is currently heavily polluting – just to keep the lights on.
- 2.6. The need to balance the grid with a highly adaptable source of power has meant any installed wind, solar or other such renewable capacity has a gas fired power station waiting, with turbines turning, but not producing

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<sup>3</sup> According to our records both of Unite’s parent trade unions (Amicus and the T&G) flagged this as a potential outcome way back in 2006 but have continued to be critical of the lack of planning and investment into Nuclear energy in particular.

<sup>4</sup> The report can be found [here](#)

**Unite response to the Department for Energy Security and Net Zero:- Smart Secure Electricity Systems Programme Consultation**

any power, as it is on standby just in case the wind dies<sup>5</sup> or a cloud covers the sun. Following the realisation of the potential of Climate Change, the UK has stopped purchasing power from coal fired power stations. Instead, wherever practicable, the coal stations have migrated to burning non-recyclable municipal waste to energy and Biomass to energy facilities that produce more emissions than coal<sup>6</sup>, but which are more acceptable as they are not derived<sup>7</sup> from fossil fuel deposits. If coupled with a CCUS facility to remove the CO<sub>2</sub> from the flue gasses biomass could provide the UK with a way to remove the carbon from the atmosphere, for good and still generate power.

- 2.7. In 2023 provisional figures highlight that 'a reduction in gas demand from the electricity supply and buildings and product uses sectors. Greenhouse gas emissions from electricity supply fell 10.8 MtCO<sub>2</sub>e (19.6%) in 2023, primarily due to higher electricity imports from France, unlike 2022 when the UK had higher than usual exports. The UK needs to draw a close to its use of natural gas.<sup>8</sup> Which equates to approximately a 5.4% drop in net emissions to 384.2 million tonnes of CO<sub>2</sub> or equivalent greenhouse gasses (MtCO<sub>2</sub>e).
- 2.8. In 2023 the domestic population of London unknowingly faced the potential of a widespread blackout as there simply was not going to be enough power available from the national grid to power both the general public and the financial districts of the capital. Therefore, the decision was taken to black out the domestic customer's electrical supply. This crisis was only averted when Centrica was financially persuaded to release stored electricity from battery banks in Belgium at a premium financial reward.
- 2.9. The actions of Vladimir Putin's Russia to prevent access to natural gas supplies, to Europe that caused energy Prices to skyrocket, highlighted that the UK was not alone to Energy Security woes. In recent times, however, the threat of the plug being pulled on energy supplies has caused opened the door to blackmail. The Island of Jersey has also been threatened by the French with blackouts if the UK did not reopen discussions about fishing quotas. The Offshore wind industry has refused to pick up new contracts to supply energy until the UK was prepared to pay more for the supply. Even when the capacity was constructed the delays in providing grid connectivity by the National Grid meant that the wind farm connected to other nations grids instead. From the above what is clear is that the experiment to deliver gas and electricity to consumers using private companies has been a disaster for the UK economy removing its Energy Security, leaving it exposed to the blackmail.
- 2.10. There is no longer a situation where the UK is independent of external exploration by foreign powers, as was clearly demonstrated by the acts of Russia when the invaded Ukraine. In 2023 the nation for the first time became dependant on imported electricity as coal powers era was ended and we moved towards a renewable supply which highly unpredictable. To counter this gas power stations are required to fuel their turbines just in case they need to step in and bolster supplies. Nuclear power stations are being asked to extend their lifespan beyond their designed expiry date to further bridge the gap if it is safe to do so.
- 2.11. The UK urgently requires new sources of electrical generation as illustrated by the graphs from the Resolution Foundation, (Figure 1) the cost of upgrades to grid and generation is going to cost billions.
- 2.12. In order to replace output generated by coalfired power stations, the UK has turned to burning domestic waste and biomass which releases far more greenhouse gasses than coal. The burning

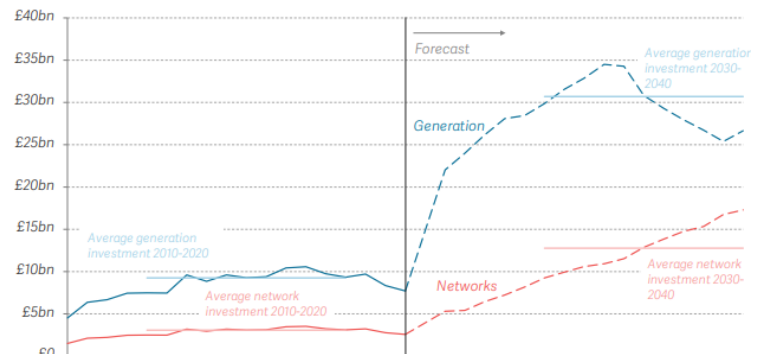


Figure 1 Investment in the nation's power system needs to increase almost four-fold. Annual historic and projected total capacity expenditure in the electrical sector (2023 prices): GB

Source:- Resolution Foundation

<sup>5</sup> Or becomes too strong. Every wind turbine is designed to work at peak output if the wind reaches an ideal speed, any slower and there is not enough energy to turn the turbine any faster. Too fast and the blades are feathered, and the brakes applied to stop the wind from doing damage to the blades, turbine, gears or brakes. The capacity of the Wind Turbine is measured at this ideal wind speed, so the potential to generate power at that ideal speed is therefore limited to only ideal wind conditions.

<sup>6</sup> A study in PLOS Climate highlights that incinerators may produce approximately 1.70 kg CO<sub>2</sub>e/kWh more than any other power source. In contrast coal releases around 1.00 kg CO<sub>2</sub>e/kWh

<sup>7</sup> Obviously any waste plastics are generally derived from crude oil.

<sup>8</sup> The link to the 2023 UK greenhouse gas emissions, provisional figures can be found here.

## Unite response to the Department for Energy Security and Net Zero:- Smart Secure Electricity Systems Programme Consultation

of biomass while currently worse for the environment than the consumption of coal can become beneficial if combined with carbon capture and storage technology. Doing so turns biomass from a source of emissions into one which is a carbon sink<sup>9</sup>. The technology to do this at Drax was first proposed in 2012<sup>10</sup> but government funding was pulled leaving investors high and dry and weary of investment into further CCUS schemes.

- 2.13. To plan and clear land for the potential of a new Nuclear station can take over 10 years and that is before the first spade is dug to build the plant. Unite hopes that the experiences learned from the construction of Hinkley Point C.
- 2.14. Unite believe we need Smart 2.0 - a plan that can be marketed to the consumers as a move away from the past and into the future of energy management which works with smart home technology to reduce bills.
- 2.15. The utilisation of electricity to power private cars will cause demand for power to increase by ten times current levels according to a recent resolution foundation study. The decarbonisation of other sectors of the economy – within road transport, residential housing, and industry is reliant on the availability of green electricity. Equally the dream of bi-directional electrical flows to properties and wiring capable of handing the currents needed to power home heating and the charging of home EV's will mean every home and office will require an industrial standard three phase supply. This move will mean that every street's substation and the wiring to it will require replacement. A further demand for electrical power is developing with respect to other transport modes like civil aviation for short distance, domestic aviation to remote communities and from shipping to provide quayside power, in order to allow ships to shut down their engines when at the quayside.
- 2.16. A recent report by Transport and Environment revealed concerning levels of air pollution emanating from ports<sup>11</sup>, one of the key recommendations from the report is quayside power connections, but when a large cruise ships power demands at least 5MW, perhaps approaching 10MW. For a hub port like Southampton might have up to 6 ships berthing on changeover day, the total power demand could be 60MW alongside for at least 11 hours. This demand is equal to the combined output of the gas-fired generators at Bristol Road, Tonypany and Carrington<sup>12</sup>. This is just one UK port wanting to provide the quayside power option. In addition to these there is the increasing demand for Electric tugs, recharging electric ferries, etc. What is clear is that there is not currently enough to go round.
- 2.17. If the goal is to utilise the energy storage of the homeowners EV batteries, then the customer needs to be aware that this may invalidate their vehicles battery warranty<sup>13</sup>, as they are only designed to power the vehicle over the duration of the vehicles journey's in the period of the warranty not handle the power demands of a home. If the vehicle is hydrogen fuelled, this is a different matter as a hydrogen fuel cell could easily provide enough output for several houses and out live not just one vehicle but several.
- 2.18. Furthermore, according to one study<sup>14</sup> a third of UK homeowners don't have a driveway or garage to install a home EV charge point. So the proposal to use EV's to back up the grid are far from a universal solution.
- 2.19. Unite feels a more realistic proposal would be a greater level of support for domestic and industrial solar facilities with domestic battery storage. If there were to be such a programme, the package needs to be drafted in such a way that prevents developers of solar farms from using up all the financial incentives and feed in tariffs. Solar can be fitted to every property with a window to the sky<sup>15</sup> as transparent panels can now be fitted instead of window glass. Therefore, even high-rise buildings without any roof space can now benefit from solar generation. A solar array should always come with battery storage that is designed to run a home or in larger facilities a commercial property. These solar battery storage systems are designed to provide power to the grid and

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<sup>9</sup> According to the [CCC's Balanced Pathway scenario](#) 53 million tonnes of CO<sub>2</sub> could be removed per year in the UK by Biomass Energy with Carbon Capture & Storage (BECCS) by 2050.

<sup>10</sup> See details of the [White Rose Project](#)

<sup>11</sup> The [Transport & Environment report can be accessed here](#)

<sup>12</sup> See the [2016 press release on the opening of these power stations forming part of the UK Power Reserve.](#)

<sup>13</sup> Tesla and other EV manufacturers are voiding car warranties if homeowners' power more than just their vehicles using the batteries. The batteries have a warranty which specifies a set number of miles. If the vehicles is also being used to power a home the pack will wear out far sooner. See [this electrek article](#)

<sup>14</sup> See this [Transport Xtra article](#)

<sup>15</sup> There are now suppliers of solar windows capable of not just allowing light into a building but also [generating power from the windows](#)

**Unite response to the Department for Energy Security and Net Zero:- Smart Secure Electricity Systems Programme Consultation**

therefore could be use by the grid as a back-up supply which will not invalidate vehicle battery warranties. Unite is concerned, however, that if the grid is able to just tap in to consumer battery storage, that there is enough left for their use, and they are paid a commercial rate for the power they supply.

- 2.20. Given the lack of energy a guaranteed supply, Unite would strongly suggest that instead of fuelling a combined cycle gas turbine on the off chance that the supply will be required, Unite suggests that power should be drawn from it to charge regional strategic battery reserves to endure the lights stay on.
- 2.21. Unite also would strongly suggest that at the very least critical supplies to domestic homes with life sustaining equipment in them are given the same priority as hospitals. This would include individuals with home dialysis machines, nebulisers, sleep apnoea monitors etc. having a battery storage supply just in case there is a blackout. In an environment where we no longer have a guaranteed supply to properties, provisions need to be made or the lack of electrical supplies could cause casualties and a greater demand for NHS services.
- 2.22. DESNZ should be fully cognisant of the establishment under the HSE of the Building Safety Regulator (BSR), and its inextricable link to this consultation, to ensure the safe, quality and competently installed equipment and installations by personnel with the necessary Skills, Knowledge, Experience and Behaviours (SKEB) for safe, competent and efficient delivery.
- 2.23. To limit the amount of energy required to heat homes electrically, every home is going to need to be properly insulated. There are issues with this as there are a high number of homes that fall into the hard to heat category. In some post war properties insulation is going to be virtually impossible as they may be built with only a single course of bricks between the outside world and the residents within. In some listed properties any changes to the look of the building is unlikely to receive planning permission so any improvements need to be carried out inside the property. In some older historic properties, the bricks may be far greater than 30cm thick without a cavity to fill with insulation. On multistorey flats there is clearly a reluctance to add cladding following the devastating fire Grenfell Tower fire.
- 2.24. Following Grenfell in June 2017, Dame Judith Hackitt undertook her Independent Review of Building Regulations and Fire Safety, subsequently publishing "Building a Safer Future". Emanating from that, the Industry Competence Steering Group (ICSG) published the "Setting the Bar" report, establishing 13 working groups on competence across the total construction process, including Working Group 2 – Installers (WG2), and Working Group 12 – Construction Products Competence (WG12). Furthermore, to support this, the British Standards Institute (BSI) have developed "BS 8670-1:2024 Built environment. Core criteria for building safety in competence frameworks. Code of practice" to assist in the establishment of sector specific competence frameworks, the work upon which is now moving at pace.
- 2.25. A key recommendation from Setting the Bar, which has been fully adopted by industry specified the need for: Accredited third party certification of companies; qualifications at the appropriate levels for individuals; personnel certification of operatives with a card scheme such as the CSCS and its CSCS Alliance partner schemes; CPD refresher training and the maintenance of individual skills; All installers have a core knowledge of fire safety in buildings – training to be standardised and made mandatory.
- 2.26. Under the direction of the BSR's ICC (Industry Competence Committee), the ICSG is overseeing the large-scale process of developing sector specific competence frameworks for occupations and trades across the whole of construction and the built environment, which applies to all buildings, as well as those defined within the Higher Risk Buildings (HRBs) category. This includes the participation of professional bodies, employers trade associations, and technical trade and skills bodies, and Unite.
- 2.27. Therefore, to achieve this grand plan of a smart secure electricity system, undoing the damage caused by privatisation, we first need the engineers to make its delivery a reality and overcome all the challenges that will arise on the path to net zero. The correct competence, inclusive of skills, qualifications, training, experience and behaviours are imperative for a safe built environment, and by definition that built environment includes the delivery of net zero and a low carbon future. To do this in the time we have left before 2050 will require a mobilisation effort of war time proportions with a systematic roll-out of meters, battery storage, and solar to name but a few.
- 2.28. Increased investment is needed in the CPD (Continuing Professional Development) of the existing workforce through accessible and meaningful funding and grants with registered training providers, and for the corresponding advanced apprenticeships. Relevant apprenticeship standards in the likes of electrotechnical,

## Unite response to the Department for Energy Security and Net Zero:- Smart Secure Electricity Systems Programme Consultation

and Mechanical Engineering Services (including plumbing, heating and HVAC) now have Environmental Technologies embedded within the curriculum and are subject to periodic review to keep abreast of new and emerging technologies, and regulatory changes and requirements.

- 2.29. Unite, along with the Scottish employers' trade associations in building services engineering (SNIPEF, SELECT and BESA) supported the development of the following skills matrix by the Scottish Government that captures the requisite 'bolt-on' competencies and CPD for the safe and competent installation of Environmental Technologies in domestic and commercial environments, enabling the aforementioned qualified craftspeople to undertake the work competently across the array of Environmental Technologies<sup>16</sup>.
- 2.30. Also for the information of DESNZ, The Electrotechnical Skills Partnership (TESP) have undertaken comprehensive Labour Market Intelligence (LMI) with Pye-Tait consulting, looking at the current and future requirements of the electrotechnical labour market. Stemming from this research is the ECA's (Electrical Contractors Association) "Skills for Electrification" report, which was launched in Parliament in November 2023. Unite would urge DESNZ to be mindful of this important research when moving forward, for the delivery of safe, quality and energy efficient systems, equipment and infrastructure moving forward:
- TESP LMI for the electrical industry, including research reports into solar PV and EV charging.<sup>17</sup>
  - ECA / TESP – Skills4 Electrification – Growing the electrical workforce in England to match the local demands of accelerating electrification (2023)<sup>18</sup>
  - Industry bodies unite to upskill workforce and build a low carbon future (2021)<sup>19</sup>

### 3. Consultation Questions.

*1. Do you have a view on the lead time industry will require to implement the first phase regulations as proposed in this document?*

*2. Do you agree with our plan to proceed on the basis of phasing ESA device regulations as set out above whilst committing to keep this approach under review?*

- 3.1. Unite believes that tidying up the legislation is admirable, but it in no way should take that duration of time. Unite believes that it is critical that the Smart Mandate should be extended till 2028 at the very least as soon as is possible as the first move by the new government. This should be followed a bill to extend the roll out so that the skills of smart meter fitters are retained. If not, the energy suppliers will lose faith that the task can be resolved in the timescale. History has highlighted that whenever the target date has been approached in the roll out of smart meters, the energy companies start to make engineers redundant.
- 3.2. With enough resources the of reviewing the legislation is a task could be accomplished the task far sooner than the suggested review period. This is, however, like rearranging the deck chairs on the Titanic. The energy security of the UK is sinking without a trace and the most urgent need is to pass legislation to instigate a critical building programme that can overcome the hurdles left by the current government.
- 3.3. Since 2012 the government has stuck rigidly to the doctrine of the industry knows best and let them get on with whatever they wanted. There have been plans but they have gone nowhere with the system falling apart. Urgent action is therefore needed to not just plan how to restructure the energy industry but also turn those plans into reality.
- 3.4. The problem with advice on the roll out of EV's, heating systems, the layout of the grid and the design of billing systems are all predicated on the idea that when you plug something in, there will be the power delivered to where it needs to be. Unite strongly believe we do not have that luxury.

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<sup>16</sup> See <https://www.gov.scot/publications/consultation-scottish-skills-requirements-energy-efficiency-zero-emissions-low-carbon-heating-systems-microgeneration-heat-networks-homes/pages/7/>

<sup>17</sup> See <https://www.the-esp.org.uk/current-lmi-information/>

<sup>18</sup> See <https://www.the-esp.org.uk/wp-content/uploads/2023/12/ECA3740-LSIP-Summary-A4-web-2.pdf>

<sup>19</sup> See <https://www.jib.org.uk/industry-bodies-unite-to-upskill-workforce-and-build-a-low-carbon-future>

**Unite response to the Department for Energy Security and Net Zero:- Smart Secure Electricity Systems Programme Consultation**

- 3.5. As stated earlier a third of UK homeowners don't have anywhere to park a vehicle to charge it safely. As has been seen by the number of reports in the media of the deaths of entire families when the batteries on electric bicycles, motorbikes or scooters bursting into flames, in people's halls; because the battery is faulty, and because the individual has nowhere else to charge the vehicle. If they live in a block of flats or there is only on street parking or parking in a distant parking lot. As leads can easily be unplugged and plugged into different vehicles it is difficult to ensure that the electricity the consumer pays for ends up in their vehicle and not someone else's. Therefore, if the plan is to allow the grid to dip into stored battery supplies, there is no way to ensure that the power is withdrawn from the correct vehicle. Many homes are simply designed without even a front garden that can be converted to an off-street parking space for EV charging. In some inner-city locations parking is in the street only often subject to resident parking permits where the parking space the home owner is able to utilise may be over a hundred meters away from the home. In such circumstances providing at home parking and reversable tariffs becomes next to impossible.
- 3.6. Vehicle manufacturers provide warranties for vehicles based on the life of the vehicles use on the road. The warranty will therefore be invalidated, and the usable life of the vehicle reduced if the vehicles battery and electrical system is used to power a house or act as a back up supply to the national grid. Unite would therefore suggest that if the power company wishes to utilise the vehicles battery, they reward the consumer with a high premium tariff for any power drained from the battery, to cover the eventual cost of a battery replacement, thus replacing the vehicles battery and electrical system warranty.
- 3.7. Additionally, would such a tariff restrict the usable amount of battery storage of the vehicle owner? What is to guarantee that when the supplier wanted to use stored power that it would be available. The home owner may be away or may have just returned from a long drive. The home owner may have disconnected the car or be charging a vehicle not covered by the tariff arrangement. Such an agreement would therefore only have very limited applicability given it would require the vehicle owner to comply and be willing to risk the lifespan of the vehicle.
- 3.8. Furthermore, to supply an electric vehicle it ideally requires a dedicated supply from the grid rather than relying on the power supplied to domestic housing. Due to the power drain of charging electric vehicles it only needs three or four drivers to try and recharge at the same time as their neighbours and they could black out their street as the substation fuse would trip. It therefore would, require all existing homes to be brought up to a standard three phase supply especially if they also plan to move from a natural gas heating system to one which is electrically powered. A dedicated supply to an EV point would also make it possible for the vehicle to be charged faster than from a 240V AC plugged in power socket as the volume of amps transferred can be much higher than would be used by their oven or power shower.
- 3.9. Such a rewiring programme is not one that can be completed overnight or in the 12-18 months envisaged to get the legislation deckchairs into a nice pattern.
- 3.10. Unite strongly recommends that the roll out of this rewiring the country programme is completed on a street-by-street house by house basis where home owners know their electrical supply to the house will be replaced on a set date during which someone will be required to be at their home to let engineers in. At the same time, it would be the ideal opportunity to exchange all electrical meters (with ones compatible with any existing smart gas meters) to ones that can communicate down a hard wired phone line, a separate upgradable communication module which can be swapped for new mobile phone communication formats or the home owners internet to base rather than relying on a mobile phone data connection service that will be replaced every few years with something new. It would also be the opportunity to install securable EV points and the terminals which would make the installation of heat pumps easier.
- 3. Do you have a view on when the smart mandate for heating appliances should be implemented? Please provide evidence to support your answer.*
- 3.11. Unite believes there needs to be meaningful engagement with property owners about the implementation of heating appliances which are not releasing greenhouse gasses, and tariffs that discourage the combustion of fossil fuels but pay for not just the cost of the fuel but also the cost of carbon capture in equal amounts to the volume of gas used. Provision would need to be made to protect individuals in privately rented or social accommodation, so it is the property owner that pays for the carbon abatement, with caps on the amount raised through rent. This will then hopefully encourage investment into alternative heating systems and insulation to reduce the energy cost for residents.



**Unite response to the Department for Energy Security and Net Zero:- Smart Secure Electricity Systems  
Programme Consultation**

- 3.12. Unite is unsure how smart would operate in non-standard operations where there is little control over the volume of heat. Solar water heating is similar to a heat pump, to preheat the water in a heating system. The twin benefit of solar water is that it can reduce the energy needed to bring heating up to the required temperature and will help cool solar photovoltaic (PV) panels, if fitted, so that it extends their life and keeps them operational into the optimal power generation temperature range. Clearly solar water heating only happens during the day and is free (apart from the small amount of power needed by the pump to circulate the water). With a communal heating system powered by waste heat from industrial processes or power generation for example and hence is only available while the facility is operational. In these examples there needs to be a method to store the heat for when it is needed when the supplies are off. This is similar to the old economy 7 system where radio signals from the BBC local transmitters triggered the heating systems to come on and provide power for heating systems. The problem with economy 7 was that it did not allow for the size of family use to be built in leaving those last to the bathroom with only cold water to wash in.
- 3.13. Therefore, any smart mandate for heating would need to be flexible and adapt to be applicable in order to encourage the most energy efficient use of any heating source and accept more than the one source of heating. Ideally, the details of the temperatures of homes in response to energy use could be fed back to highlight where there is a need for better insulation, thus allowing a more targeted use of limited resources.
- 4. Would you support the introduction of a metering accuracy requirement to the effect that all ESAs should have a means to measure their import/export consumption to up to or better than 2% nominal accuracy?*
- 3.14. Unite believes that all meters should be as accurate as is possible or at the very least the original meters they replaced. Unite believes that a 2% accuracy provides considerable scope for financial losses and gains over the life of the meter. Unite therefore suggests that the maximum inaccuracy permissible should be  $\pm 0.2\%$  in order to comply with the international standards<sup>20</sup>. While the UK standards are happy to accept a permitted margin for error that does not exceed +2.5% to -3.5% throughout the entire load range at which the meter is designed to operate, Unite believes that this standard has been around in one form or another for over a quarter of a century.
- 3.15. The existing SMETS1 and SMETS2 meters only have a warranty lifespan of 15 years! Therefore, after the 15 years the smart meters may not comply with the accuracy requirements and will need replacing.
- 3.16. According to the IEC standards used not just throughout Europe but beyond the Eurozone, Company standard meters for industrial applications need to be accurate to 0.01% especially given the volume of power that is used. Reference standard meters are required to be accurate to  $\geq 0.02\%$  so that they can check the accuracy of other meters and Class A Energy meters are required to be accurate to  $\geq 0.2\%$ . Setting the accuracy requirement so low means that unscrupulous providers cannot skim additional revenue from unsuspecting consumers & equally prevent consumers from cheating suppliers of revenue.
- 3.17. The European Commission EN 50470 series that reflects specific European requirements based on the 2003 IEC 62052 / 62053. The EN 50470 series adds specific aspects required by the Measuring Instruments Directive (MID) that include different accuracy classes, different terminology, some specific accuracy requirements and requirements for data protection and software to comply with the International Organization of Legal Metrology (OIML) a worldwide intergovernmental organisation on harmonising measurement accuracy.
- 3.18. In the United States the American National Standard for Electric Meters, Code for Electricity Metering the performance of all watthour meters is considered to be acceptable when the percent registration is not less than 98% or more than 102% for traditional meters but they also have the "American National Standard for Electricity Meters – 0.2 and 0.5 Accuracy" classes which as stated require an accuracy of  $\pm 0.2\%$  of true value and  $\pm 0.5\%$  of true value at full load for digital devices.

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<sup>20</sup> The **International Electrotechnical Commission (IEC)**; French: *Commission électrotechnique internationale*) was formed in 1906 as an international standards organization that prepares and publishes international standards for all electrical, electronic and related technologies – collectively known as "electrotechnology". IEC standards cover a vast range of technologies from power generation, transmission and distribution to home appliances and office equipment, semiconductors, fibre optics, batteries, solar energy, nanotechnology and marine energy as well as many others. The IEC also manages four global conformity assessment systems that certify whether equipment, system or components conform to its international standards. <https://www.iec.ch/homepage>

**Unite response to the Department for Energy Security and Net Zero:- Smart Secure Electricity Systems  
Programme Consultation**

- 3.19. IEEE Standard Requirements for Instrument Transformers defines performance standards for instrument transformers, which includes voltage/potential transformers (PT) and current transformers (CT). Within this there are three metering accuracy classes are defined for instrument transformers; 0.3 class, 0.6 class and 1.2 class that have accuracy measuring of  $\pm 0.3\%$  of 100%,  $\pm 0.6\%$  accuracy measuring 10% of the rated current.
- 3.20. Ofgem estimates that the typical household in England, Scotland and Wales uses 2,700 kWh of electricity and 11,500 kWh of gas in a year. Dividing the amount of electrical energy consumed in the 12 months to March 2024<sup>21</sup> by the number of domestic households approximates that in Northern Ireland 3.900 kWh of electricity is consumed per household due to the lack of a natural gas supply to the majority of homes. Based on ONS data the mean natural it is possible to estimate that around 10,000 kWh of gas was consumed per domestic meter where there is a supply which is only on around 31.6% of all homes<sup>22</sup>. Using these numbers and the projected number of households in 2050. If the meters are only 2% accurate this figure can be out by 55.3kWh of electricity and 230kWh of gas. Multiply that by the number of households<sup>23</sup> (34.9 million in in 2050) results in a potential inaccuracy of  $\pm 8.0$  GWh of gas and  $\pm 1.9$  GWh of electricity.
- 3.21. What is more as the UK has an ageing population, by 2050 projections suggest will see<sup>24</sup>, that one in four people in the UK will be aged 65 years and over, an increase from approximately one in five in 2019<sup>25</sup> and around one in six people in 1999. With age can come infirmity and a reliance on more pieces of electrical equipment for medical purposes and frequently more time spent watching day time TV, DVD's or streamed services. As you age you often can feel the cold more intensely and require domestic heating or cooling during the day a greater degree than those at work. Furthermore, According to ONS projections, the number of households in England is projected to increase by 1.6 million (7.1%) over the next 10 years, from 23.2 million in 2018 to 24.8 million in 2028<sup>26</sup>. This equates to an average of 164,000 additional households per year in England with similar growth projections in the other three nations<sup>27</sup>. With a move to eliminate the use of natural gas use, for domestic heating the nation will need to provide all 14,200 kWh per household from electrical supplies.
- 3.22. Add on the demand for electricity to power EV's and while these are very wide and speculative projections of domestic customer needs, without an accurate system of measurement there is every possibility that energy measurements could be significantly out of line with reality. Just using the current limits on accuracy, the combined meter inaccuracies could amount to more than the combined supply from by three of the planned Nuclear power stations the size of Hinkley Point C. (3.26GW),<sup>28</sup>. This would make planning for generational requirements a nightmare.
- 3.23. What is clear is that the technology is available to provide higher levels of accuracy to reduce this margin for error by 10% so why shouldn't the government want providers to instal the most accurate measurement capability especially when every watt hour counts. If nothing else questions may be asked on an international stage over why the UK is diverging from the exacting international standards.

*5. If you are a manufacturer, would requiring a nominal 2% accuracy requirement impact your business or products? If yes, please outline the impacts and the costs and benefits with as much detail as possible.*

- 3.24. Not applicable as Unite is not a manufacturer of equipment.

*6. Do you agree that the scope of the smart mandate should be extended to include hot water storage and generation (indirect electric hot water storage cylinders, standalone direct electric hot water cylinders, and hot water heat pumps)? If not, please provide supporting evidence.*

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<sup>21</sup> See the [NI government press release dates 6<sup>th</sup> June 2024 Electricity Consumption and Renewable Generation in Northern Ireland: Year Ending March 2024](#)

<sup>22</sup> See the [House of Commons Library Briefing paper:- Households off the gas-grid and prices for alternative fuels](#)

<sup>23</sup> As estimated by the [Office of National Statistics](#)

<sup>24</sup> according to the ONS, see the links below.

<sup>25</sup> [Office for National Statistics, 'Overview of the UK population: January 2021' \(14 January 2021\)](#)

<sup>26</sup> [Office for National Statistics, 'Household projections for England: 2018-based' \(29 June 2020\)](#)

<sup>27</sup> See [National Records of Scotland projections](#), ONS [Subnational household projections \(local authority\): 2018 to 2043](#) and [Northern Ireland Statistics and Research Agency National Household Projections](#)

<sup>28</sup> Hinkley Point C, Sizewell C and Wylfa B

**Unite response to the Department for Energy Security and Net Zero:- Smart Secure Electricity Systems Programme Consultation**

- 3.25. Unite believes that the supplier and consumer should not be cheated out of heat, power or anything else and hence the water storage and generation systems, just like all the other measuring devices, should report as accurately as possible and at the very least  $\pm 0.2\%$  for the reasons stated earlier.

*7. Do you agree that the scope of the smart mandate should be extended to include the whole hybrid heat pump system (rather than just the heat pump within a hybrid), with requirements placed on the common controller? If not, please provide supporting evidence.*

- 3.26. Unite agrees that all equipment should comply to internationally recognised standards of accuracy and that warranties issued should only apply to the equipment's intended use. If there is a heating system which can supply heat for a lower cost simply by tapping into the grid at times of low demand, then this should be welcomed.

- 3.27. Given the projected increases in demand and the UK's inability to meet these future demands, however, Unite questions the frequency of low-cost low demand situations occurring. The UK's energy security is going the same way as some third world nations where power is only available at set times of the day and even then, rationed to so many kilowatt hours per household unless there is some medical reason. The Climate Change Committee recommends<sup>29</sup> that the Government must commit to a long-term cross-sectoral infrastructure strategy. This must narrow the space for future decisions on hydrogen use, aim for the use of the hydrogen with the lowest greenhouse gas footprint and on electricity infrastructure development, so that power can reach where it is needed. Clearly to deliver on these goals there needs to be the engineers and investment into training to ensure that the goals are delivered. Previously the flow of these finances has been into the pockets of shareholders rather than the ongoing development of staff and infrastructure, this trend has to be reversed.

- 3.28. According to the Resolution Foundation demand for EV power alone will multiply UK power demands by a factor of 10 by 2050. Add on the increasing population, their increased use of technology and need to heat and cool their homes in summer, and it is clear to see that there is a requirement for urgent and major construction projects to construct new sources of power, ideally owned by the state. A power network that connects these sources of power to consumers and a planning system to ensure that projects are not delayed by NIMBY<sup>30</sup> protestors on grounds that it will spoil the view or disrupt TV reception. Today all major channels are accessible streamed live over the internet so why do they need a TV aerial or TV reception?

*8. Do you have a view on whether standalone domestic battery energy storage systems (BESS) should be included in future legislation in order to be subject to the smart mandate requirements associated with the first phase regulations? Please provide evidence to support your answer.*

- 3.29. Unite does not have a policy view on this only in so far as to say we have no preference over the method of battery storage only that the engineers installing the system are properly qualified and the equipment is safe for deployment into domestic properties and use for the purpose of home backup power supply to homes and the grid.

*9. Do you have any data on what proportion of installed domestic battery energy storage systems (BESS) have smart functionality? Smart functionality is defined as being communications-enabled and able to respond to price and/or other signals by shifting and/or modulating their electricity consumption.*

*10. Do you have evidence on the extent to which domestic battery energy storage systems (BESS) with smart functionality already meet the minimum requirements set out in Table 1? Please provide evidence to support your answer.*

- 3.30. As a trade union unite does not have access to that information, save that which is freely available to all on the internet.

*11. Do you agree with government's proposal that electric heating appliances must be able to modulate output and/or change the time at which electricity is consumed in response to signals, including price and other signals that facilitate DSR?*

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<sup>29</sup> As can be found in the CCC's report "[A reliable, secure and decarbonized power system by 2035 is possible – but not at this pace of delivery](#)"

<sup>30</sup> Not In My Back Yard = NIMBY

## Unite response to the Department for Energy Security and Net Zero:- Smart Secure Electricity Systems Programme Consultation

*12. Do you agree with the proposal that electric heating appliances within the scope of the mandate must provide two-way communication in order to receive and act upon direct control signals, and to send signals on the device status?*

*13. Do you agree with the proposal that electric heating appliances within the scope of the mandate must be designed to be interoperable so that devices do not cease to have smart functionality if the owner changes electricity supplier?*

*14. Do you agree with the proposal that, as part of the first phase ESA regulations, electric heating appliances within the scope of the mandate must be designed to utilise open standard communication protocols for the application interface to remove a barrier to interoperability with DRSRPs?*

- 3.31. Unite agrees that any new electric heating appliances should have the functionality to connect to smart meters and the ability to only switch on if they receive the signals. Unite believe, however, that such systems should have the ability to be overridden by the homeowner in order to ensure their warmth and comfort. Unite would not wish to see a scenario where families are freezing in homes because they are unable to obtain enough heat as the demand for power elsewhere on the network is high.
- 3.32. Unite is keen to support the proposal that requires interoperability so that device's function if the owner changes electricity or the supply of any service. This is the failing that caused so many issues with the initial rollout of smart meters. If the government desires to have this technology in place across all four nations of the UK and before 2035, then an army of engineers will be required to install, maintain and service meters and infrastructure.
- 3.33. The energy companies are currently working to government deadlines not believing for one second that the task to fit the remaining smart meters in time is possible, so are thinking of making more trained engineers redundant, just as they have historically whenever a deadline is looming or has been passed. The government has the legal right to extend the deadline by up to 3 years without the need to return to parliament. Unite believes that in order to save these rolls and develop the smart programme, that the 3-year extension to the deadline should be granted as soon as possible. Simple mathematics will provide indicators of the size of the task ahead and the amount of time it has taken to date using the current workforce size highlights that unless hundreds of additional engineers can be found the task to roll out the smart (ESME) - E470 Series 3 SMETS<sup>31</sup> meter and three phase wiring to all consumers is impossible even if the meters worked in every location, but providing these extra 3 year will at the very least cause some energy savings to be made.
- 3.34. Firstly, to move to this integrated Smart 2.0 idea, there needs to be the team of designers to produce the designs for the equipment that will last longer than 15 years, providing it with the capacity to be upgraded by someone with only a screwdriver rather than a toolkit for the replacement of the entire meters. These meters will be required to be fully capable of communication via a method other than via mobile phone data transmission, as some locations will not be capable of communication via a mobile signal. This would then provide a backup method of communication if the mobile data signal drops (which can be due to solar weather conditions<sup>32</sup>) or is discontinued.
- 3.35. Engineers tasked with fitting these new meters, should not venture anywhere near a gas supply or electrical system unless they have undergone all the training required and not some Mickey Mouse in-house training scheme that took candidates off the street with no experience and allowed them to work on domestic properties unsupervised after just 3 months of training. These individuals had previously been subjected them to quotas requiring the instillation of an unrealistic number of devices in a day or possible disciplinary action, so jobs were rushed and understandably this led to a series of errors including cross polarities, making all metal connected surfaces live and situations where there was some major gas leaks. How more people were not killed or injured Unite does not know.
- 3.36. Unite is clear that the apprenticeship model is one which can provide the best outcomes which will enhance UK industry and deliver positive employment outcomes across our communities. While supporting more apprenticeships across the economy the need to ensure apprenticeships are high level, skilled and sustainable is paramount. UK wide standards setting bodies are required to halt and avoid fragmentation and deskilling at industry/sectoral level. UK wide quasi non-governmental skills bodies (like the Sector Skills Council model), supported by the UK Government and devolved administrations should be in place to ensure quality and

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<sup>31</sup> [The most recent innovation of the SMETS 2 smart meter.](#)

<sup>32</sup> [Details of the main impacts of solar weather can be found here.](#)

## Unite response to the Department for Energy Security and Net Zero:- Smart Secure Electricity Systems Programme Consultation

consistency of standards, research, and labour market intelligence. Governance and participations should include stakeholders from the relevant representative organisations from employers (employers trade associations), workers (trade unions), technical bodies, training, and professional institutes.

- 3.37. There is a recognised training course for electricians and gas safe engineers which take 3 years for the basic qualifications as an electrician and a further 18 months to train to be a gas engineer. All smart meter installers without such qualifications should be provided with this training immediately and they should be paid commensurate with at least the construction industries 'Green Book' industrial standards. If the engineer wishes to start work on heating systems, they should undergo the 2 years of basic training to be a heating engineer as a bare minimum. The same applies to any tools-based profession, there are recognised courses for the profession to ensure the safety of the engineer and the general public from their work.
- 3.38. In 2012, however, the big six energy providers were training smart meter installers to an inconsistent level of training lasting as little as 13 weeks, before the installer was working on their own in customers homes. These same installers are now being asked by the energy companies to install EV points, heat pumps and more in addition to the unfinished task of replacing the meters in homes and offices. According to the latest statistics just 55% of customers meters have been installed with the majority only capable of communication over 2G and 3G networks, all of which will need replacing just so they remain responsive to communications with the supplier. There are over 1.1 million smart meters that have been installed operated by British Gas that are non-responsive and that is just one of the energy providers. Eventually, of course, every one of the existing meters, smart or not will need to be replaced by a device that will comply with the DESNZ planned design.
- 3.39. What needs to be remembered is that the government is asking a company to provide devices to its customers that reduce the sales of the companies wares, thus reducing the companies profits. It is therefore understandable that the energy companies are not supportive or incentivising the roll out of smart meters. Unite believe that the roll out of smart 2.0 meters need to be compulsory and need to be rolled out in a street by street basis rather than sending engineers to drive hundreds of miles in a week. Why send engineers to areas that are known to have communications difficulties, if there is no other way to initialise the meters, other than to waste time and delay the rollout of the meters. In such situations it should be possible to plug in a device to the phone line that will provide the connection, unless the home is in such a remote location that the phone lines were not put in place. The snag with using phone lines is that they are now digital and hence in the event of a power cut these lines also become disconnected. In the past this wasn't the case.
- 3.40. What was learned from the initial roll out that reliance on consumer buy-in to smart has been made worse by the actions of energy supply companies in seeking devices that were not interoperable between suppliers. The government encourages the consumer to shop around so if they fear that their heating system will require replacement if they change suppliers, this would either make them a captive audience or one who changes providers with the weather and is not worried about smart operability, defeating the object of the exercise. The lack of interoperability significantly delayed the rollout due to the number of times engineers were at the same property changing meters and because many customers were discouraged from obtaining a smart meter due to the hassle. They say that you only have one chance to make a first impression and the first impression of smart technology was unfortunately very negative due to the number of mistakes, missed appointments and number of smart meters that were installed that had to be replaced.
- 3.41. To ensure the operability of smart technology all smart meters need the functionality to establish two-way communication with a range of devices, ideally to attract the attention of technophiles, include home automation systems, like Alexa, Google Home etc. that may already communicate with home heating systems via an integrated home management system. By doing so the meter could provide a better interface with the consumer including the ability to interface with the range of sensor equipment on the customer thus making the meter more user friendly. The currently installed smart meters are designed to be used by the industry to collect and process information about a customers use, but not to provide the customer with the information needed to provide the energy company with their own meter reading.
- 3.42. The original mechanical meters had a simple rotating disk and counter display making the reading of a meter for more accurate billing a very simple task. Today there are several menus and submenus to negotiate before the needed displays can be reached and it is easy to provide the wrong information and very difficult to correct the mistake. Ideally therefore, if the required meter display data could be sent either to the customers counter top display or to an app, this would make the interface far more user friendly.

**Unite response to the Department for Energy Security and Net Zero:- Smart Secure Electricity Systems Programme Consultation**

3.43. Unite recognises that opening up the meter to two-way external data transfers may cause security concerns if vital functionality is not protected behind a firewall to the billing and 'use data' transfers to the energy provider.

*15. Do you agree with the proposal that the mandate should require electric heating appliances to prioritise safe operation over responding to information or user input?*

*16. Do you agree that the mandate should require electric heating appliances to be able to continue to function to provide heating and/or hot water services when network connection is lost?*

3.44. Unite agrees that all devices be they meters, batteries heating systems etc. should priorities safety first, and this should include ensuring the security from internet hacking. Unite also believes that functionality should still be possible by the residents using the heaters interface, the turn of a tap or via a smart home management system.

*17. Do you agree with government's proposal that the mandate should not require a maximum turn/shut down time or minimum speed of response?*

*18. Do you agree with government's proposal that the mandate should not require specific control strategies to be installed with electric heating appliances?*

*19. Do you agree with government's proposal that hybrid heat pumps operated by a common controller must be able to receive and act upon fuel tariff data and be able to utilise the alternative heat source to meet heat demand during a DSR instruction?*

*20. Do you agree with government's proposal that all electric heating appliances within scope must provide a user interface?*

3.45. Unite agrees that there is no need to specify maximum response times or specific control strategies to be installed with electric heating appliances but suggests that they should have the customer interface and useability at the heart of designs. These designs should have a "Money Saving mode" which can utilise DSR instructions to not just control heating systems but also any connected smart device, i.e. dishwashers and washing machines. Unite would hope that any Smart Technology could be compatible as possible with existing home equipment, with the ability to combine the electrical heating appliance interface with all others on a single display.

*21. Do you agree with government's proposal that electric heating appliances must be able to estimate their power consumption, with the manufacturer free to choose the estimating (calculating or measuring) approach?*

*22. Do you see any difficulty with the position that government is proposing? Please provide evidence to support your answer.*

3.46. Unite does not have policy on these areas but would hope that any system should be as responsive as possible and ideally a basic learning algorithm that utilizes the sensors throughout the building and applies the heating requirements for each depending on occupancy, in order to more accurately 'estimate' energy usage.

*23. Do you agree with government's proposal that electric heating appliances will not be required to collect data on their thermal output?*

3.47. Unite believes that any heating system, should require the provision of this efficacy data especially during initial instillation. This will help providers identify which properties need assistance with insulation and help those home owners drive down the heating issues.

*24. Do you agree with government's proposal that all electric heating appliances, on set up, should require users to set their heating preferences, that DSR and TOUT operations to be enabled by default, and for functions that can be undertaken outside of peak hours to be pre-set to do so?*

*25. Are there any other requirements that you believe should be included in the minimum requirements for the smart mandate?*

*26. Do you agree with government's proposal to require the appliance manufacturer to provide appliances with integrated or 'add-on' ESA functionality?*

**Unite response to the Department for Energy Security and Net Zero:- Smart Secure Electricity Systems Programme Consultation**

*27. Do you agree with government's proposal to require sellers to ensure that an electric heating appliance (or system of appliances) is sold with either integrated or add-on ESA functionality?*

- 3.48. Unite believe that the technology should on set up, define their Digital Storage Radiator (DSR), so that the temperature in (TIN) and Temperature Out (TOUT) settings can be adjusted, to fit in with customer's demand. Such devices should be capable of receiving software updates from a secure server using high quality encryption, be firewalled from any third party by using cryptography that identifies if the data has been accessed in transit. The heating system should include the ability to speak to Energy Smart Appliance (ESA) functionality or any other similar protocols. The last thing Unite wishes to see is the rolling replacement of one technology with the next state of the art device. Unite would wish to see maintenance and servicing being trained and accredited to be able to carry out<sup>33</sup>, basic repairs to ensure the metering and energy management devices are operating within tolerances. This could include installing software and hardware updates without the need to remove the meters.

*28. Do you agree with government's proposal not to place any legal obligations on installers of smart heating appliances?*

*29. Do you have a view, and supporting evidence, on how government ensures that installers have the awareness and ability to successfully install smart heating appliances?*

- 3.49. Unite believes that there should be any legal obligations on the installer companies of smart heating appliances to ensure that the equipment used is fit for the purpose. If installed incorrectly the home will either use too much energy or not work at all causing the owners to be without heating or incur costs as they try to regulate the temperature by opening doors and windows. All installers need to know what they are doing so need to have completed a suitable heating engineering course for their role. The only way the government or the home owner can have any security and confidence in the engineer and the system is if they are qualified to work on these systems.

*30. Do you agree that open data standards are required to enable EV charge point interoperability with energy suppliers and DSRSPs?*

- 3.50. Unite agrees that this would be desirable.

*31. What are the barriers to implementing such open data standards?*

- 3.51. Unite believes that the only barriers are legal ones which, it is hoped, the incoming government could resolve.

*32. From your experience does EV-EVSCP interface communication regarding battery state of charge pose a barrier to access to the full range of EV tariffs and DSR services?*

*33. What other technical and commercial barriers have you experienced to EV drivers accessing a full range of available tariffs and DSR services?*

- 3.52. Unite agrees does not wish to comment.

*34. Do you foresee any issues with adoption of ETSI EN 303 645 for Phase 1 requirements for all ESAs? If so, how could these issues be mitigated?*

*35. To what extent would requiring cyber security testing of ESAs prior to them being sold or distributed in GB impact ESA supply chains? What other approaches could be used to provide sufficient assurance that cyber security requirements were being met?*

*36. Do you have any suggested alternative solutions to the random offset function which would mitigate the risk of large-scale synchronised changes in load?*

*37. Please comment on the assumptions and methodology used in the cost appraisal of the analytical annex. Can you provide estimates of the costs of providing consumer interfaces and monitoring?*

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<sup>33</sup> as part of a five or ten-year check on meter accuracy.

**Unite response to the Department for Energy Security and Net Zero:- Smart Secure Electricity Systems Programme Consultation**

3.53. Unite does not wish to comment further on the merits of EV Charge points or security standards other than to repeat the points highlighted earlier in this response. If the hurdles of warranty invalidation etc highlighted above can be overcome, what is clear that any smart technology must have interoperability between supporting suppliers of equipment be that vehicle, a state-of-the-art digital interface or the design of pins on the plug to match the vehicle.

*38. Do you agree with using the Designated Standards approach as the basis for government to design the Approved Standards framework for the SSES programme?*

*39. Do you have any comments, suggestions or changes to the initial view described above for how Approved Standards could work; especially for the proposed manner of assessing potential new approved standards?*

3.54. Unite does not wish to comment further beyond the points already raised regarding training of engineers.

*40. Are there any areas where you foresee the need for additional standardisation beyond PAS1878? If so, in what areas and over what timeframes would you expect new standards to develop?*

3.55. Unite does not normally indulge in crystal ball gazing but can foresee a time in the not too distant future when the removal of heat from properties is a priority due to the speed of climate change especially if the 2.0°C barrier is breached. At that time additional UK standards may be required. This is especially true if we suffer the 40°C + temperatures of June 2023.

*41. Do you believe that there is a need for standardisation of Implicit (also called Routine) DSR in order to meet the government's interoperability objective? If so, what aspects do you consider would need to be standardised, and are there any existing technical standards that you believe could be used?*

3.56. Demand Side Response (DSR) services simply involve businesses increasing, decreasing, or shifting their electricity use – in response to a signal from the Grid – to help balance Britain's electricity system often in exchange for a preferable power supply tariff. There is a system that is already working but this may require a control room contacting a business by phone to give them a warning that such a response is needed. While these interruptible contracts can be digitised, the relationship between large scale users of energy and the supplier is better maintained with some degree of a personal touch, rather than the customer only learning this is happening when they move to turn on a furnace. Given the fear that the UK grid is not going to be capable of scaling at the required speed to prevent black outs, the occurrence and frequency of interruptions to supply arrangements, may require the business to invest in self-generation of power to provide for a back-up supply in the near future. Unite hopes that if there is standardisation, that it does not lose that customer service interface or place a strain on the occurrence and use of these arrangements.

*42. How should an approved standards approach be designed to ensure that DSRSP interoperability is maintained?*

3.57. There has already been several millions spent<sup>34</sup> by the UK alone on automated Demand Side Response Service Programmes (DSRSP) that seek to provide warning and routes by which power can be moved around the network to provide power to energy intensive customers or remove it to fill gaps in the delivery of power to its core customer base. For DSRSP to work however the courtesy call may go the way of the dinosaur, as a standardised digital system. Unite only has the one concern with the use of DSRSP and that is making it possible for that customer to continue in their core business with the least level of inconvenience so they can maintain their levels of production and do not fall behind competitors causing any loss of sales or jobs.

*43. How complex would it be for DSRSPs to update their system to have the functionality to interact with an ESA that uses a new approved standard? What would the likely timeframes be and how could the technical challenges be managed?*

3.58. Unite agrees that this would be desirable for DSRSP to work in harmony with the ESA and believes that the potential for this to happen is only a software issue. Unite would have thought that this is a fix that, given the resources, could be resolved in very short order.

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<sup>34</sup> See the list of [Interoperable Demand Side Reasons Programme: Successful Projects](#)



**Unite response to the Department for Energy Security and Net Zero:- Smart Secure Electricity Systems Programme Consultation**

*44. What criteria should be applied to ensure that any proposed standard is fit for purpose, and to avoid an excess of standards adding undesirable complexity?*

*45. Should DSRSPs be required to ensure that services they offer are interoperable with all ESA types that they offer that service to? (for example, a service for EV drivers should be compatible with any approved standards for EV charge points).*

- 3.59. Unite agrees that this would be desirable for DSRSP to work in harmony with EV charging points so that the consumer can have the charger for the vehicle come on when there are low grid demands. Unite questions, however, how frequently this will be given the state of the grid currently. Unite would hope that the DSRSP will work in harmony with all EV's to maximise their usability and hopes that the ability to supply the grid is automatically shut off is there is a danger the EV battery is going to be drained below that needed by the consumer.

*46. How should an approved standards approach be designed to ensure that the SSES cyber security, grid stability and data privacy objectives for devices can be met?*

*47. What information of the cyber security, data protection and grid stability criteria would industry need to be able to design a new approved standard?*

- 3.60. Unite always believes that if there is an international standard for safety or security that these should be the minimum requirements upon which enhanced tighter parameters should be used to improve matters. Unite does not believe in relaxing standards to make the job cheaper if it does not provide the same level of protection.

*48. What template of "open" or "fair and equitable" licence should government require before allowing technical specifications that require this intellectual property into the standard?*

*49. Given the additional detail provided in this chapter, do you believe that the proposed 24-month period between when the first and second phase regulations come into force is appropriate?*

*50. Are there any documents (such as specific standards, protocols, guidance, code, specifications) that should be explored for inclusion into the SSES technical framework? Please can you provide within your answer why their inclusion would help meet the SSES policy objectives and why the SSES technical framework is the best delivery mechanism.*

- 3.61. Unite does not wish to comment further beyond the points already stated.

*51. Do you believe that in the future, homes with multiple devices will have problems (such as sub-optimal energy management, grid stability concerns, etc) if there is not an active management of the devices at a premises level?*

- 3.62. Unite is very concerned that the energy supply to the UK is subject to the whims of foreign governments, energy supply companies and the weather. As such there is no guarantee that energy will be supplied to a home to power heating systems and control technology. In an ideal world every home, commercial premises and industrial facility should have solar panels and a battery back up supply to ensure there is a degree of independence from the national grid. For industrial facilities this could take the form of hydrogen storage / fuel cells and maximise the commercial opportunities of waste heat to power. Given the unpredictable nature that has become the fate of National Grid supplies, there needs to be a strategic reserve back up supply of energy that could be maintained by storing excess power generation.

*52. What is your definition of a Home Energy Management System (HEMS) and what, if any, role do you see HEMS having within the SSES technical framework?*

- 3.63. Unite does not have an official policy level definition of a HEMS or any official suggestions of how it could integrate with the Smart Secure Electricity System (SSES) technical framework. That said it could be envisaged that instead of expecting a disabled, old or frail customer to dive into the dark reassesses of a cupboard, to navigate their way past multiple submenu's and readings that they do not understand to reach the data needed for a meter reading that the HEMS could do that for the customer.

- 3.64. The HEMS could use the customers smart phones GPS to determine who is in the property (in the absence of IR sensors in the rooms and thermostats in each room) using the customers mobile phone supply temperature

**Unite response to the Department for Energy Security and Net Zero:- Smart Secure Electricity Systems Programme Consultation**

data, while the phone is active. Why have a thermostat in the hall or living room when each customer has a temperature measuring device on them or sitting close by. By integrating with an iPhone's Siri, or Androids Google Home, Alexa etc. customers could see air conditioning switch on automatically if the heating is off and it is still too warm. If the grid has a high demand and the customer has charge left to donate from the solar panel batteries, they could sell the power to the grid to have it returned with interest when there is spare generation capacity.

3.65. What Unite does not wish to see is a situation where the energy supply companies rely on the good will of domestic customers to keep the supply to commerce and industry. In addition to the smart transformation of domestic and industrial consumers, power generation needs to develop a strategic reserve of stored energy.

3.66. The CCC suggests that this should be in the form of green hydrogen generation to back stop renewable sources of power. Unite agrees but also suggests that other promising developments be looked at including prize winning ideas like the use of an open cycle ROC CO<sub>2</sub> battery<sup>35</sup>, that provides not just energy storage but also a sustainable way of creating bicarbonate from Agora Energy Technologies<sup>36</sup> which won the 2021 Keeling Curve Prize for Capture & Utilization.

*53. Does this list capture all the required functions to maintain the technical frameworks necessary to facilitate load control? Are other functions needed?*

*54. Do you agree with the overall model of technical governance? Can you suggest any existing governance that would be well suited to take on this function?*

3.67. Unite does not wish to comment further on these points.

*55. Does this list capture all the necessary functions to deliver security governance? Are other functions needed?*

*56. Do you agree with the overall model of security governance? Can you suggest any existing governance that would be well suited to take on this function?*

*57. Do you agree that electricity network licence holders are best placed to meet certain costs of setting up and maintaining technical and security frameworks during the Transition Phase? Please explain your answer.*

*58. Do you agree with the proposed approach for recovering the costs of administering a licensing regime? Please explain your answer.*

3.68. Unite does not wish to comment further on these points.

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<sup>35</sup> See this helpful [review of the technology](#)

<sup>36</sup> See more at <https://agoraenergy.ca/technology/>

## Unite response to the Department for Energy Security and Net Zero:- Smart Secure Electricity Systems Programme Consultation

### 4. Conclusions

- 4.1. From the content of this consultation, it appears that the correct questions are being asked, to properly handle the introduction of a smart 2.0 energy network. One hopes that this time, the general public can get behind this, making the customer interface, the prime concern followed closely by the needs of the country and eventually the industry. If there is not a customer buy in to this making it a must have item in your home, there will not be the acceptance of the equipment or goals to not just save the customers money but also keeping the lights on for UK plc.
- 4.2. Unite would stress one more time that before the removal of the first screw or the cutting of the first pipe or wire that the engineer carrying out the task is qualified to the required construction industry minimum standards and is receiving the correct rate for the job. Unite believes in the regulation of every task so that it complies to, at the very least, safety standards, to protect the worker and consumer. There should be no corners cut in the interest of time.
- 4.3. Smart energy systems need to work with heating systems to minimise the cost to the consumer and identify homes in need of additional insulation. As highlighted Unite along with the Scottish employers' trade associations in building services engineering (SNIPEF, SELECT and BESA) supported the development of a skills matrix that the Scottish Government and these bodies agreed sets out the 'bolt-on' competencies and CPD for the safe and competent installation of Environmental Technologies in domestic and commercial environments, Like Smart enabling the aforementioned qualified craftspeople to undertake the work competently across the array of Environmental Technologies:
- 4.4. Smart energy systems need to work with EV's to minimise the cost of recharging. If the warranty issues can be overcome or the access to solar electrical systems and their battery storage should be utilised to supply the home with power or in an emergency the grid. While there may be hurdles to overcome with the delivery of EV battery supplies to the grid, Unite cannot see many hurdles in the case of using solar battery storage as an emergency grid supplier. Unite does not wish to see the grid using the good will of consumers instead of providing its own industrial scale battery storage capacity. The consumer must receive a tariff that recompenses them not just for the power but also for the reduced lifespan of their batteries<sup>37</sup>. Drawing power or fast charging of batteries does reduce the life of lithium-ion batteries but not by as much as once thought according to the early results from a study at Stanford University. According to the study, results to date drawing or charging slower does not provide additional lifespan<sup>38</sup>. The study goes against previous research that suggested a rapid decline in performance due to the crystal formation and cracking on the electrodes under the strain to deliver or store high volumes of power quickly.
- 4.5. Unite is concerned over the significant potential for blackouts in the near future. Unite would urge the government to act and implement a national critical infrastructure planning regime to push through plans for grid connectivity, generational capacity and the upgrading of domestic and industrial power supplies so it is ready for the 22nd century. Even though it took 12 years to put up 4,000 miles of transmission lines in the 1950's, between 1965 and 1966 another 1,300 mile of lines were built. This clearly illustrates that over 50 years ago, if there is the will it is possible to build the additional network, quickly, it could happen. The grid today is having been hamstrung by underinvestment, bureaucracy and planning inquiries, has delayed the delivery of powerlines by up to 10 years. This needs to be built today alongside the upgrades needed to provide every home with a three-phase supply, to allow for rapid charging of EV's and the additional power required by heat pumps and air-conditioning systems.
- 4.6. The limiting factor in the delivery of these grand plans is the provision of trained, skilled labour. Unite would urge the government to mandate for a Just Transition<sup>39</sup> of workers to reduce delays in the delivery of this programme. Where skills can be migrated safely, they should be offered the opportunity to be passported over from one industry to the next. To attract staff the rates of pay need to be at the industry standard rather than done on the cheap by workers who may not be aware of what they are doing due to inadequate training, placing their lives and those of the customer at risk.

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<sup>37</sup> The lifespan of the [warranty on a set of solar batteries is just 5 to 10 years](#) although warranties of up to 15 years are available.

<sup>38</sup> [Link to the Stanford University study.](#)

<sup>39</sup> As defined by the UN's International Labour Organisation. Please see the [link](#)

**Unite response to the Department for Energy Security and Net Zero:- Smart Secure Electricity Systems Programme Consultation**

- 4.7. Unite is happy to work with government to provide a conduit for workers views in order to make the transition to a smarter grid possible, but as has been illustrated there are some major problems to overcome.

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