inenco

2030: The Future Utilities Manager

The business leaders responsible for driving the UK's energy transition

Executive Summary

The Future Utilities Manager Report is the output of research examining how the role of an energy manager will change and adapt as our energy infrastructure evolves.

Non-domestic energy demand makes up around 75% of the UK's energy consumption. As this figure is unlikely to change by 2030, it follows that the way in which businesses consume, export and manage their energy will prove pivotal to the successful running of the country's future energy system.

The UK energy industry is changing at pace. The rapid rise of new technology, in the form of cutting-edge low carbon solutions and big data, is set against the backdrop of an increasingly de-centralised grid. These factors combine to create new challenges - as well as new opportunities - for UK businesses. Those who adapt, investing in their systems and processes as appropriate, will be able to manipulate consumption and work smarter. This will enable them to future-proof their own operations, whilst also helping the UK achieve environmental targets set out within the Carbon Budget.

With so much change ahead, it becomes necessary to sharpen focus on the essential role of the Future Utilities Manager – a role that we expect will see an expansion in remit and an increase in responsibility and seniority by 2030.

By embracing innovation and best practice, today's Energy Manager will evolve into the Future Utilities Manager: a senior-level, digitally savvy data scientist, who is responsible for ensuring that their business is minimising energy costs, whilst at the same time aiding the UK's transition to a low carbon economy.

The energy sector has seen unprecedented change over the last decade. Businesses have been party to constant change and innovation in products, technology, policy and legislation - and the speed at which this evolution is taking place shows no sign of abating.

Our research has pinpointed the way in which data is increasingly driving business activity and decision making in the world of business energy, with a fifth of respondents commenting on a substantial rise in the use of data during the past five years, and unanimous agreement that this trend is set to continue. In readiness for this data-driven future, 14% of today's energy managers are already investing in better data systems and analysis functions.

Today's energy managers are also keeping a close eye on emerging technologies and investments, from onsite generation and electric vehicles (EVs) to artificial intelligence (AI) and the Internet of Things (IoT).

With the pace of change moving so quickly, action is essential if businesses are to succeed in minimising costs and maximising commercial opportunities. To help businesses prepare for the future, Inenco has commissioned a report into the role of the Future Utilities Manager. This is an extensive piece of insight, supported by primary and secondary research.

As well as detailing the new responsibilities of the Future Utilities Manager and the skills they will require, the report also seeks to depict the new energy landscape in which they will operate.

Their world

The world of the Future Utilities Manager will continue to change in the years leading up to 2030, affected by the actions of countries working towards Sustainable Development Goals (SDGs) and the Paris Agreement. Resource constraints and air quality will continue to drive efficiency measures, improvements in the built environment, and innovation in the transport sector. The impacts of Brexit will become clearer.

As a result, energy regulation is set to become more complex, operating costs will increase, and power supply and procurement solutions are going to become more diverse.

Their role

Managing real time demand for energy is also going to become more challenging. As the adoption of EVs increases, consumers will need additional charge points both at home and at work, which will require close management. Battery storage will allow electricity demand profiles to be managed, minimising cost. AI and IoT will be critical to balancing electricity supply and demand.

Their skills

The Future Utilities Manager will be a digital-native who is able to use their IT skills to understand and manage data on energy, water, waste and transport activities. They will take a more strategic role, making larger investment decisions and providing input to all business departments. They are likely to be supported by a team of digitally-able professionals coming from both inside and outside of the business, outsourcing activity to specialists wherever necessary.

The Future Utilities Manager will have exceptional communication skills and will be in touch with developments across the business, sector and industry - communicating them effectively to employees and, where appropriate, to communities that interact with their business. They will think strategically about their power supply and have the knowledge to procure power from a wider range of sources. Those procurement options will also change and expand as the economy becomes more circular.

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1.0 Background

1.1 Methodology

This report is the product of extensive research commissioned by Inenco, that has tracked the changing role of the Energy Manager over the last decade and goes on to extrapolate the expected role of the Future Utilities Manager through to 2030, in light of a wide range of external variables observed in the market.

Inenco worked with two leading partners to conduct the research: DJS and Ricardo Energy & Environment. The results of this primary research have then been combined with market intelligence to provide practical insight into the role of the Future Utilities Manager.

1.1.1 Suppliers

DJS Research

DJS Research is a Market Research Society accredited agency, which has specialised in B2B energy for over 20 years. This government-approved agency works with a wide variety of businesses across the globe to deliver insight using both qualitative and quantitative methods.

The company's role was to conduct primary research amongst current energy managers to understand the changes that they have observed over the previous 10 years, and how these changes have impacted their role.

Ricardo Energy and Environment

Ricardo Plc is a global strategic engineering and environmental consultancy that specialises in the transport, energy and scarce resources sectors.

Its work extends across a range of market sectors – including passenger cars, commercial vehicles, rail, defence, motorsport, energy and environment – and their client list includes transport operators, manufacturers, energy companies, financial institutions and government agencies. It has recently worked within UK Government, advising the Committee on Climate Change and recommending carbon targets to 2050. The organisation has also advised the European Environment Agency on the EU's progress towards the Kyoto Protocol targets.

Ricardo used the insight from the primary research to forecast how they anticipate the energy manager's role is likely to change by 2030.

1.1.2 Approach

DJS Research contacted over 3,000 energy managers in the UK and subsequently conducted 88 in-depth and semi-structured interviews with energy managers in the UK, over 6 weeks in June and July 2017.

Pre-qualified interviews were qualitative in nature and explored each participant's current role and how it had changed in detail.

Ricardo used the insight from DJS, researched the subject matter independently and consulted with a range experts in their field to validate their hypotheses and findings.

Each expert provided direction, specific research and information and ratified the headline influencers that are expected to shape the Future Utilities Manager.

Where relevant, sources of information have been cited in footnotes.

2.0 The Evolution of The Energy Manager

2.1 WHO ARE THE UTILITY MANAGERS OF 2030?

Digital, strategic, senior data scientists

By 2030, the Energy Manager will have become a Utilities Manager. He or she will be a digital native, using their IT skills to their advantage. This will allow for more efficient use of data and thus more effective decision making.

- **The Future Utilities Manager will be a data scientist**
- **Their role will be more senior within the business and involved in more strategic investment decisions**
- **Teams will be smaller, with outsourcing of infrequent functions such as maintenance, servicing and safety checks**
- **Energy, water, waste, health and safety, and environmental regulations will all fall under the remit of the Utilities Manager, making closer working relationships with operations and maintenance teams a necessity.**

As the Future Utilities Manager will be digitally fluent, they will expect to work with a much higher level of automation and data analysis. It will be a more pivotal role with a remit broad enough to have considerable impact on the organisation as a whole.

Evolutions - A high status role

As Energy Manager becomes Utilities Manager, the following will change:

- The status of the role will be elevated due to: increasingly sophisticated IT solutions, the increased importance of energy to business outcomes, and the change in relationship with the energy system; making flexible energy management a revenue generating opportunity. Strategic decision making will become central to the role, as change occurs in regulation and infrastructure.
- Responsibilities will change and extend rapidly. The Utilities Manager will need to be ready to adapt and must be able to provide a fast response to altering business requirements. Energy will be included in all decision making processes, further advancing the role of the Utilities Manager and expanding their responsibilities.
- The breadth of subject matter that Utilities Managers must be familiar with will expand. As a result, their dependency on external parties to provide data insight and specialist support will increase.
- Due to the increased level of automation and outsourcing of specific roles, the utilities team will be smaller than it is today, in some cases becoming a single person. Outsourcing will become commonplace, either to other teams within the business or to appointed third parties.

Challenges – more information and greater complexities

1. Sourcing Insight

The four areas identified where energy teams currently have the most (often universal) responsibility are:

1. Keeping up to date with energy regulations
2. Complying with energy regulations
3. Consumption analysis and budgeting
4. Managing organisational behaviours

With smaller teams in place, finding one trusted source of policy and compliance changes will be a challenge.

2. Identifying Savings

When it comes to energy efficiency, by 2030 all of the easy-to-implement, low cost energy savings initiatives will have been implemented. The majority of second swathe projects will also be in place. Sources of energy savings will have become harder to find. The focus of the Utilities Manager will shift from energy reduction to the identification of income opportunities from energy, utilising onsite generation, energy storage, demand response and Time of Use (ToU) tariffs. As a result, the Utilities Manager will need to adopt a more dynamic approach. They must be able to identify opportunities, optimise processes and manage complex data systems.

3. Procurement

The Future Utilities Manager will have less direct responsibility for procurement and maintenance, which follows the trajectory of today's emerging trends; only 67% of Energy Managers interviewed currently have responsibility for procurement and by 2030 this will have moved out of their remit altogether. Complex energy buying, driven by an increase in small local networks and private wires, will see greater support and strategic direction from external partners.

4. Strategic Support

Today, over three quarters of Energy Managers use a broker or Third Party Intermediary (TPI) for some aspect of their energy management. Within some sectors, the use of TPIs is almost universal. By 2030, artificial intelligence (AI) will have enabled automated data capture, processing and analysis. This will allow scenarios to be run on real time information and enable businesses to react immediately to market changes; minimising costs and generating revenue. Automation will play a role in reducing the size of the energy team, increasing the requirement for support. Consultants will become valuable for the role they can play in structuring and utilising data, as well as end of year reporting.

The Future Utilities Manager will be able to better manage their day-to-day tasks using the additional data available to them, but the consultancy support required will become more specialised. Consultants will advise on strategic decisions and the right approach to energy procurement, as well as assisting with the sourcing and structuring of new technology so that businesses can optimise their plant operations, energy supply, storage and EV use.

2.2 A Day in the Life of the Future Utilities Manager

"The utility dashboard notified me of a current market fluctuation, let's run option B to maximise profit."

"If we lease proc B, what are the e and entire Life C (LCA) differences

In the future become mor make decisio impact of th assets rathe

Information will be communicated in a more efficient, faster way. AI will interpret information dynamically for Utilities Managers, giving them the right information and solutions available to optimise costs.

Energy purchasing decisions are likely to become more complex, due to more varied options for energy supply and energy storage. Cost efficiency will therefore also become more difficult to achieve and will require closer management.

"I heard a local business is installing renewable generation, let's make a deal with them!"

The Utilities Manager will be working with local energy providers through multiple Power Purchase Agreements (PPAs) and private wires. This will allow businesses to potentially get local and cheaper energy, whilst supporting the local communities around them.

A typical day

The Utilities Manager of the future won't be covering the same activities that they spend time on today. Less time will be spent on site, as a greater depth of information will be available remotely. Their focus will shift to monitoring and decision making.

- They will have to make more strategic investment decisions
- They will have a higher-level of technology awareness and ability, using AI to aid decision making
- They will be tasked with optimising plant lifecycle and finding opportunity within the circular economy.

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, the circular economy is going to re important. Utilities managers will ons based on the environmental e whole life cycle, and will lease r than making a full purchase.

"The EV power storage is now at maximum just before peak demand."

Using EV battery storage to buy and store cheaper energy will become standard practice.

"What are the water and air quality implications of this decision?"

In 2030, the Utilities Manager will need to consider and report upon the broader impacts of business decisions. Air quality has always been important for the energy industry but it will become increasingly so for all types of business, particularly those purchasing vehicles. As the impacts of climate change and weather patterns become more apparent, water will also become a focus (even though water costs may potentially go down).

2.3 2007 To 2017 - What has changed?

Key changes seen by today's Energy Manager

Today's Energy Manager has experienced unprecedented increases in compliance and policy demands, as well as data.

This has led to a shift in responsibilities, with the role of procurement being moved outside of the team, replaced by a focus on managing energy behaviours, applied data analysis and ensuring compliance.

Macro and micro changes

- At the start of this period, oil costs and consequently wholesale electricity costs, were at record highs. However, both crashed following the recession. Oil prices never recovered fully, and in 2016 hit new lows. This had two effects: firstly, it increased paybacks on energy efficiency projects, and secondly, it disguised the ever-increasing non-commodity costs, as overall delivered costs did not appear to change significantly. If the UK saw a return to 2007 wholesale costs, consumers would typically see increases of over 20%.
- The recession in 2008 hit hard. Budgets were cut, energy efficiency was seen as a 'nice to have', and there was an increased drive for operational efficiencies.
- The CRC was introduced in 2008, increasing costs for larger businesses using 6,000MWh/yr of half hourly metered electricity. It introduced a new reporting burden and additional data analysis requirements.
- The introduction of mandatory GHG reporting in 2013 and the ESOS scheme in 2015 (a result of the European Energy Efficiency Directive) further increased reporting burdens and costs for larger businesses.
- The ROC, FiT, CfD and RHI schemes were introduced to subsidise new renewable projects. They succeeded in increasing renewable electricity generation to current levels of around 25% of all UK demand. However, the levies required to pay for these schemes now account for up to a quarter of electricity costs.
- Changes to the generation mix for the national grid have led to a number of new opportunities for businesses to get involved in providing additional capacity and/or frequency support services to maintain security of electricity supplies. This can be achieved either through on-site generation or by managing demand.
- Voltage optimisation became more accepted as a viable technology, though savings predictions are now more realistic than some of the early claims.

Team Size

Primary research has shown us that :

71% of today's Energy Managers have seen FTE stay the same or increase in last five years, a trend which is now set to change.

60% of energy teams have been established for 10 years or more. This varies by sector; retailers lead the way with 82% of energy teams in place for more than a decade.

In sectors where business energy costs have decreased due to investment in energy saving projects, the size of the energy team has not decreased proportionately. This is due to growing responsibilities and the increased importance placed on data (which has gone up by 27% in the past five years), compliance (which has risen by 23% in the same period) and managing energy behaviours (which has experienced a 35% increase).

Role

Only 67% of energy managers interviewed now have responsibility for procurement, of which only 31% have full responsibility. Procurement and finance teams are taking more control of this function.

"They decided at some point that procurement falls under finance now."

This is causing a sense of frustration among today's energy managers.

"Our issue with procurement is when we want to procure something! Say if we're procuring biomass, I'm heavily involved in leading finding the biomass pellets, but we also have to engage procurement to make sure we use the right framework. So it's not like I'm not involved in any procurement elements, I get very heavily involved in all things energy-related for procurement, but we all have to work with procurement to go through the right processes"

Health & Leisure

Data

The energy professionals interviewed in the primary research explained that their jobs are now far more data-driven, with a fifth commenting on a significant hike in data analysis and reporting over the last five years and unanimous agreement that this is set to grow further. In readiness for this, 14% of today's energy managers are already beginning to invest in better data systems and analysis functions.

Today's energy managers are also keeping an eye on emerging technologies and investments, from onsite generation to EVs.

"We're becoming increasingly complex. There are lots of additional opportunities coming through… it's a changing and developing area, with electric vehicles and fleet pumps etc. coming into view."

"We are looking at a significantly increased amount of onsite generation, using storage and back-up generators, not just used as back up, but for grid demand as well."

"There are a lot of changes happening all the time when it comes to energy! One of the key changes has been the introduction of the ESOS scheme and having to comply with carbon footprint agreements. Because energy rates and prices are always going up and down and we have a responsibility for trying to get our overall energy spend down, we need to be continually evaluating and assessing our consumption. This is achieved in part with the introduction of half hourly meter readings"

Commercial property

Support

Two thirds of today's energy managers now use a TPI and all expect this trend to grow to accommodate their increased responsibilities; in particular technology, data, insight and compliance.

Support varies by experience and knowledge. Those more established energy teams have moved away from outsourcing billing services (which tend to have been adopted jointly between procurement and the internal energy team), and are more focused on using the experts for knowledge based services, such as industry news updates.

Less established energy departments are more likely to use a TPI and more likely to use a wider range of services than their more long standing counterparts, with a particular focus on consolidated billing.

"It's gone from a lot of in-house work to being predominantly outsourced. There was an internal team for the energy side of things that had four members on the team. They did all the billing internally, all the buying of the energy internally alongside the energy efficiency work. But we've taken all of that out to a specialist company, and then focused the role that I have more on strategy, and the energy efficiency side of things."

2.4 2017 TO 2030 – WHAT CHANGES CAN WE EXPECT?

Emerging Themes

By 2030, energy will be higher up the political and financial agenda. The structure of people's daily lives will have also changed due to technological advances, a digital-native working population and increased energy costs.

- **Digital-natives will be in middle management roles**
- **Remote and flexible working will be more common, and will be supported by robust IT systems.**

Political and financial events

Between 2017 and 2030, several major political and financial events will take place. The UK is set to leave the EU, and history tells us that one or two further recessions are likely to occur, while international environmental regulations are expected to increase.

Technology

Computer speed will have grown significantly and microchip sizes will have reduced, leading to dispersed computing networks with substantial computing power.

A considerable level of EVs will be on our roads. This will not only change the way in which we plan our travel, but also business interaction with electricity markets.

Energy markets

The UK will have become more reliant on electricity not only to meet current demand, but also for travel and heat. This will push up prices initially, due to changes in demand and upgrading of the transmission and distribution systems, but will reduce over time as more renewables and storage solutions are connected; improving the business case for their installation. Nuclear may also have been installed to accommodate the predicted increase in base load.

The initial increase in electricity market costs will provide energy managers with a business case to invest in onsite generation. This may come in the form of Combined Heat and Power (CHP) for some sites and renewables for others. By 2030, the UK will still be heavily reliant on gas for heating purposes.

Working environment

Remote and flexible working will have become more commonplace, with much less business travel between sites for meetings.

Skills and knowledge: The future Utilities Manager

If free movement of labour is restricted in a post-Brexit market, it is anticipated that the UK will see a fall in the number of engineers and labourers, and a rise in wages. Industry training and apprenticeships will be key to addressing potential labour shortages[1].

A new generation of digital-native employees is likely to now be in middle management.

This new breed of Utilities Manager will be expected to have a more diverse skill set, ranging from understanding energy management systems to AI and IoT.

Training such individuals could come at a considerable expense to the business, especially when taking into account each of the potential areas of which the new Utilities Manager should be knowledgeable. These include:

- Standards such as ISO 50001 and ISO 140001
- Energy use for the specific needs of their sector, such as manufacturing, HVAC of work space, operation of medical devices, or lighting designed to illustrate goods for sale.
- Data capture, processing and analysis will become a larger part of the Utilities Manager's role, and they will need continuous professional development to keep up to date.
- EVs, especially for businesses with fleets to manage, will become an integral part of the Utilities Manager's plans to optimise energy usage. Current Government forecasts put the number of EVs between 3 million and 10.5 million by 2030, with a median case of 7 million[2].
- The increase in remote working and virtual reality will both aid and hinder the efforts of the Utilities Manager. Although virtual reality may help the Utilities Manager to see what a remote engineer is seeing in 3D, it could also mean that staff are more dispersed and may be located across the UK or across the globe, complicating the monitoring of energy needs across the team.
- Within the UK, much of the current energy regulation is linked to the EU or has been in existence for some time. Close correlation with EU law is expected, even after Brexit. Some pieces of legislation have specific timelines, so by 2030 we will see regulation changed or new policies applied. Utilities Managers will need to monitor all existing pieces of legislation and their evolution over the coming years to understand the impact on their sector. Those with sites in Europe and beyond will need to find ways to harmonise operations for efficient compliance across borders.

The increase in the number and complexity of these policies could lead to the employment of a legislation expert to advise the Utilities Manager. For a number of organisations in areas such as health, education and local authorities, evolving (and possibly uncertain) legislative frameworks are seen as the driving force for change – perhaps leaving little scope for individual, forward-thinking energy strategies.

We might see change to existing policies, such as:[3]

- The CRC, which it has been announced will end in 2019
- Climate Change Agreements (CCAs) are long standing and target the industrial sector. The current phase runs from 2013 to 2023
- ESOS is the implementation of Article 8 of the European Energy Efficiency Directive – a directive that requires audits to be completed, although measures do not need to be implemented
- The EU Emissions Trading Scheme
- Energy Performance Certificates and Building Regulations, which form elements of the Energy Performance of Buildings Directive.

3.0 Driving Forces

3.0

Emerging themes

Over the past 5 years, we have seen a global trend towards sustainability, with governments all over the world agreeing to make substantial changes between now and 2050. Key initiatives include:

- **Ratification of the Paris Agreement**
- **The amendment of the Montreal Agreement**
- **Zero Emission Vehicle (ZEV) Alliance signatory**
- **The development of the Sustainable Development Goals**

The UK is committed to a continued focus on sustainability and reducing emissions. The political landscape and cost-competitiveness of the UK may mean further recessions and operational cost savings.

As a result, resource availability will decrease and the cost of importing goods is likely to increase, leading to a challenging operational environment and UK industry being unable to compete internationally. Consequently, it is possible that some industry functions will exit the UK.

These factors cannot be reviewed without addressing the subject of Brexit. With all its unknowns, we can only estimate what it means for the Future Utilities Manager by 2030. However, changes might include:

- Increased uncertainty, leading to fewer long term decisions being made
- Higher potential for labour shortages[4] and increased wage costs
- Higher costs for goods and services, including energy prices
- Reduced investment by companies who currently manufacture goods in the UK for sale to other European countries.

Regardless of Brexit, the UK Government will continue to champion emissions reductions and has already committed to the 5th carbon budget. It is probable that this will be delivered by additional regulation, as de-carbonisation of the grid is unlikely to offer further results by 2030.

The carbon budget requires a 57% reduction in GHG emissions by 2030 against 1990 levels, and this assumes that 60% of new car sales will be EVs by 2030, with approximately 40% of rigid HGVs and 25% of buses also being electric or hybrid.

This confirms the view that the challenge for the Future Utilities Manager is set to extend further than energy efficiency.

4.0 Roles and Responsibilities Industry Trends

4.0

4.1 A WIDER REMIT

The role of a Utilities Manager will be different and broader by 2030. Our research showed that many energy managers are already responsible for water, but transport is increasingly edging into their remit.

- We can expect the Utilities Manager to have more responsibility for all utilities
- The Utilities Manager will need to liaise and work with other areas - such as transport - within their business
- The Utilities Manager will have a greater stake in, and more responsibility for, strategic investment decisions
- Procurement will become more focused on the circular economy, with acquisition of services rather than assets. The procurement of water will become more complex, although the cost of water supply and treatment is likely to go down
- The role of the Utilities Manager will not always be an independent role, and is often supported by a range of departments and stakeholders.

4.2 WATER

The primary research has revealed that a large majority of energy managers currently have responsibility for water in their organisation (92%), and that in many cases this has been the situation for a long time (62% have held this responsibility for at least six years and 42% for more than a decade). Transport, however, is less well established within the energy team, with only 45% having responsibility for this area. Of this number, 27% have acquired responsibility for transport during the last five years.

The water sector, which has up until now been relatively simple and static, is about to change dramatically. As the cost of water is much lower than energy, water efficiency typically hasn't had the same level of focus as energy efficiency. However, in 2017 we have seen water retail market changes, with companies now able to shop around for the best water prices. By 2030 this will have driven prices down.

Water prices will be negotiated every five years in Ofwat's price review, which may bring a further decrease in water costs. Unlike energy, extensive future forecasting doesn't exist for water prices, so it has not been possible to present statistics or researched facts.

However, the technology deployed by the water sector is increasingly efficient, and water companies continue to create their water resource plans (out to 2080 at last look) in preparation for scenarios such as population increases and climate change. Resilience remains important for water companies, as is avoiding the risk of grid blackouts. With this in mind, it is unlikely that UK business will see an increase in cost unless shortages become more commonplace.

There are few incentives for businesses to cut water consumption and water companies have few tools at their disposal to encourage water efficiency. In the future, it is possible that a more complex type of tariff system will be introduced which will be tailored to the needs of different types of user and affected by times of the year.

Those with responsibility for managing business water can expect to experience additional resource requirement. Technology for water management is likely to follow that of energy, with significantly more data handling and analysis involved. By 2030, water markets will be more akin to today's electricity markets.

4.3 WASTE

Waste is another area where the Future Utilities Manager will take increased responsibility. The waste infrastructure is not likely to change much between now and 2030, with many waste-to-energy plants already planned but not actually scheduled to come online until 2020-2025.

A shift will be seen instead in the ownership and use of products. There will be more leasing - rather than purchasing- of smaller electrical and office goods, as well as manufacturing equipment; a further shift towards a circular economy. The cycle of replacement will then be able to keep up with technological developments. For example, the 'sell light as a service' research that has been championed by the Ellen Macarthur[16] foundation. In recognition of the circular economy as something that we should be aspiring to, BSI has developed and launched a circular economy standard this year[17].

4.4 POWER SUPPLY & GENERATION

Emerging themes

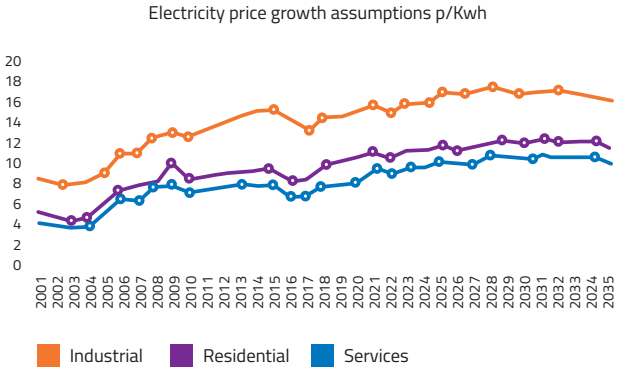
By 2030, the electricity grid will be drastically different from today, with significantly more dispersed generation and Time of Use (ToU) tariffs.

- **Grid power is going to increase in cost above inflation, the mix of renewables will slow and existing nuclear plants will start to close in the early 2020s, whilst new nuclear plants may come on line in the mid to late 2020s**
- **Transmission costs are likely to continue in an upward trajectory to support network upgrades in readiness for EV demand, particularly in urban areas. The costs will also pay for new interconnectors to sources of renewable energy in the Shetland Islands, Norway and Iceland**
- **Local power generation and 'private wire' activities are likely to become cheaper options for many businesses, particularly those with a lower number of sites.**

Power generation and supply in the UK is already undergoing a transformation. This transformation will continue for some time, but by 2030 it is likely to have stabilised.

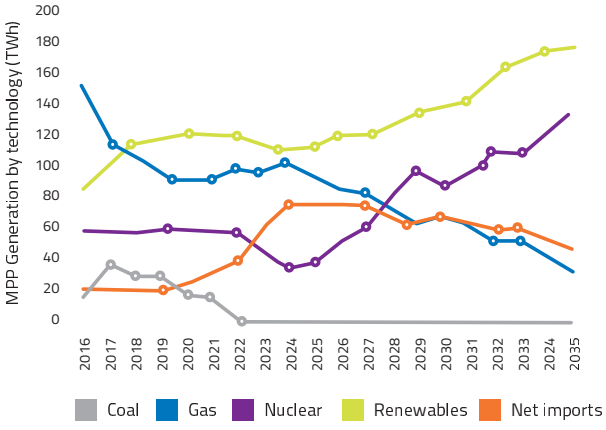
For the consumer (business or householder), prices continue to rise and this has been further compounded by the Brexit vote, which saw the Pound to Euro exchange rate drop by around 13%. This has led to a 10% price increase on imported natural gas. As a result, we are seeing wholesale energy prices increase in 2017.

The chart below shows the historic and predicted energy prices provided by BEIS[18]. It shows that industrial energy prices are predicted to increase by over 50% by 2030. After that point, they are expected to either plateau or reduce slightly.



Much of the price fluctuation is driven by external market forces, such as the cost of importing natural gas from the continent. However, our power generation capacity also has some influence on price fluctuations, particularly while it is undergoing a massive transformation.

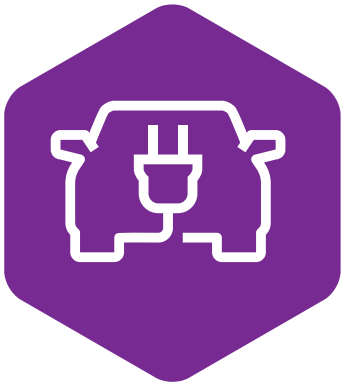
The CCC's most recent review of our carbon budgets found that there will not be a significant increase in energy generation from renewables, and that the main move has already happened. Therefore, we are currently reliant on natural gas until new nuclear plants become operational in the mid to late 2020s. The graph shows the UK Government's predictions[19] for the sources of energy consumption up to 2035, and illustrates the expected change in the energy generation market.



It shows that renewable energy capacity isn't expected to really grow until 2028-2029. The Feed-in-Tariff has gone, so the UK is less likely to see large solar photovoltaic (PV) developments. The only remaining big capacity is off-shore wind, which will continue to grow, but power will be sold overseas to places like Norway. This comes back to supply and demand management and with wind only being generated at specific times, the balance and storage of electricity will be important. All of this will influence the generation or wholesale prices; however, this only makes up one component of the retail price.

Retail prices include costs for transmission and distribution, which are broken down into a complex model. As the network continues to see demand rise with technology updates such as EVs, there will be an increased drive to replace parts where it is aging or unable to cope with the load. This may create an even higher increase in retail prices for those purchasing electricity and make self-generation a more cost-effective option. As a result, we are likely to see lots of additional small scale, localised PV as it becomes significantly cheaper to generate off grid.

The job of the Utilities Manager will become even more important. Costs of transmission and distribution are likely to rise and in turn affect business energy costs. This will be driven by the need for increased investment to cope with higher energy demand. EV uptake in urban areas will lead to less predictable peaks in demand, although it is hoped that technology will be developed to allow for smart charging and power storage to partially alleviate the issues.



4.5 POWER DEMAND – THE ROLE OF EVS

Emerging themes

By 2030, the Future Utilities Manager is going to have a much broader role. The changes in the transport sector are likely to be linked to the work of the Utilities Manager, particularly where EV charge points are required.

- **EVs are expected to make up 60% of all new car sales and to represent a much larger proportion of car fleets by 2030**
- **Diesel vehicles will be banned in many cities, with the UK banning new diesel and petrol vehicles from 2040**
- **Demand for electricity (from both businesses and consumers) is going to increase, leading to localised demand peaks and a need for greater management**
- **Managing the demand in both environments will require collaboration between the Fleet Manager and the Utilities Manager**
- **It also offers an opportunity, through additional power storage options, for managing peak grid demand.**

The environmental impacts of diesel and petrol, both in terms of carbon emissions and air quality, have continued to drive the shift from the internal combustion engine to EVs. From now until 2030, the UK can expect to see a substantial rise in the number of EVs on its roads.

The evidence is already present, with the UK Government actively funding EV innovation and investment. In addition, the Department for Transport (DfT) has been monitoring public attitudes[20] towards EVs and has found the number of new registrations to have grown rapidly in the last two years; an increase of 508% since 2014.

- EVs have become a business focus for the large OEMs, with companies such as Ford putting significant investment into the development of EVs and making claims that they will have more than 10 EV models in their range by 2020.
- Battery storage technology has improved and the Government has invested £35 million in supporting electric charge point infrastructure instalments.
- Charge points are to become widespread; the EU's Clean Fuel Directive, as proposed in January 2013, set a target of 800,000 publicly accessible EV charging stations to be installed throughout Europe by 2020. Progress was demonstrated by the London Mayor's[21] recent announcement that there are soon to be 1,500 new electric vehicle charging points installed across the capital. These are residential charge points for those that don't have off-street parking, to encourage people to switch.
- Air quality continues to be a major driver for the switch, with three of the largest cities in Europe; Paris, Athens and Madrid, having committed to banning access of polluting ICE diesel vehicles by 2025 as a means of tackling pollution. In July 2017, the UK announced that new diesel and petrol vehicles will be banned from 2040 in the UK.

Corporates may need to source alternative fleet vehicles to be able to operate in urban areas. Businesses will need to consider both the fleet they operate and the vehicles that staff use to reach their place of work.

The leasing and replacement of vehicles in corporate fleets means that they will also have the opportunity to select EVs. Staff may be provided with company vehicles, other forms of transport, or use their own vehicles.

Whichever scenario a business adopts, the Utilities Manager is likely to be involved in planning for future transport.

Working alongside other departments, they will need to decide the correct requirement of EV charging points required. This will involve understanding the types of transport in use, arrival and departure times, and charge demands. To support this, they will need to map demand against the existing profile of the business, to understand available capacity and identify whether any additional power capacity is required.

Once the new energy demand is understood, the Utilities Manager may also see opportunities for utilising batteries as a storage facility (and to provide additional advantage to the business through revenue creation and energy cost mitigation.)

This is likely to be a time-consuming and challenging exercise, but one that will protect the business from the expansion on time of day tariffs by 2030.

Personal EV users are likely to be able to agree multi-location charge rates with electricity providers and use public power points.

4.6 HEAT AND NATURAL GAS

Emerging themes

The supply of heat via the natural gas grid is under constant review for the future. A significant level of heat supply may be electrified by 2030, and the natural gas grid will see a notable increase in the use of shale gas and biomethane, or it may be converted to hydrogen.

- **The UK is reliant on natural gas and will continue to make investment decisions based on its presence in years to come**
- **Natural gas will continue to be available, with shale gas and biomethane added to the gas network**
- **In the long term, the gas grid and heat provision will need to move away from such a dependency on natural gas**
- **There is potential for natural gas to be replaced by hydrogen utilising the current natural gas grid, which would affect investment decisions**
- **Natural gas currently has relatively low non-commodity costs compared with electricity. However this is likely to change, starting with big increases in the climate change levy from 2019 until the mid 2020s.**

4.7 ENERGY PROCUREMENT

Emerging themes

Strategic decision making on energy procurement will be required, to ensure that a company optimises its energy supply.

- **Energy procurement will become significantly more complex, making selection of the right option for the business much more important**
- **Energy will be open to wholesale market fluctuations, as power prices are linked to currency exchange rates**
- **Funding streams for investment in traditional forms will continue while other sources emerge. Crowd funding and community initiatives may increase**
- **Energy tariff structures will become more complex. Water procurement is likely to follow suit.**

Energy markets are already complex, but the disaggregation of the power grid will increase that complexity. This is already beginning to happen, with a much broader number of procurement options now available to businesses.

The Utilities Manager of 2030 will have a more complex job than ever before. The historic survey revealed that more than three quarters of businesses already use brokers or take some advice on energy markets, and this trend will continue.

The options available to businesses and their level of interaction with the energy market is likely to change.

The power of choice for a business will include some or one of the following:

- **Traditional energy procurement – where (keeping it simple) energy is purchased either through a broker or directly with a power supplier through the national grid and the energy cost is made up of a mixture of power supply and distribution costs.**
- **Power purchase agreements (PPAs) between businesses and agents or local energy providers, including communities. The UK is seeing an increased number of PPAs, including instances where a community has developed their own scheme. John Lewis[24] Partnership has demonstrated that it is possible for a large business to enter into the marketplace.**
- **Private wire supply – where energy is generated locally and supplied directly to the building. The generation of power is not necessarily cheaper, but the transmission and distribution costs are potentially reduced. Private wire arrangements can support standalone or isolated plants. Traditionally, this has been perceived as suitable in limited circumstances eg. for manufacturing or campus universities, but in the future, we could see developments such as out of town retail units adopting this approach.**

It's worth noting that charges are a topic of contention between the grid operator and the energy purchaser. With the electrification of heat and transport across the UK, there is an increased need for reinforcement of the transmission and distribution systems. This is likely to lead to increased charges for the end customer. DUoS and Triad charges may disappear as they don't adequately cover the current costs of transmission and distribution. Tariff structures may then become more complex, potentially with both time of day and time of year variation.

This may lead to an increase in private wire arrangements, seeing them become commonplace by 2030. There will be significant impact on the revenue of the system operators and organisations that do not have a private wire arrangement in place will see cost increases, to fund a higher percentage of planned system improvements. This new dynamic adds another level of complexity into an already intricate market.

In addition, on-site generation (such as photovoltaics) has seen a significant decrease in cost over recent years, making this an affordable option for electricity consumers to displace their grid energy costs. Energy storage will also start to play a larger role in the displacement of grid electrical costs, especially with the deployment of EVs.

The large energy companies currently have a target to provide a percentage of renewable energy and are entering the PPA market as agents themselves. Businesses are already beginning to purchase PPAs directly or via others, with certificates providing an audit trail between the generation and consumption of this energy. The change in GHG reporting of Scope 2 is seen by many companies as a driver to purchase green energy, which in the past was more expensive but is now cost neutral. In the future (if purchased locally), it is likely to become cheaper.

The Future Utilities Manager will have detailed knowledge of their energy consumption and an overview of the market, but will often need more help to understand their full range of options. The advice they seek may be around which strategy or approach to take. They may need advice on more innovative approaches to energy procurement, including online auctions for energy providers to bid for business.

5.0 Technology Changes

Technology is going to rapidly evolve over the next 13 years and it will increasingly change the way we operate, use resources and make decisions. We will see computing speed increase substantially and hardware sizing decrease substantially (eg. microchip size). There will be an increased use of real time data, rather than models predicting the future. Automated decision-making computers will become business-as-usual.

Open source and cloud computing will increase and this will lead to a rise in the risk of cyber-attacks, even though security technology will improve.

There will be a significant deployment of IoT devices in the domestic market, but there will be less impact on the non-domestic market due to plant replacement schedules.

AI and the IoT will transform the transportation of goods, especially once autonomous vehicles become commonplace. More specifically, AI will be used to produce a data-driven analysis of energy demand, generation and supply markets, and will aid the decision-making process.

By 2030, several technological changes will have taken place. Computers will be smaller and faster, with quantum computing capabilities making an entrance on some scale. The IoT and AI will be used daily to collate and process data and make decisions. There will be a more in-depth level of monitoring, both in terms of resource consumption and movement of people.

Advancements will been seen in building services technology. The two main areas of advancement are likely to be in photovoltaics and the storage of electricity. Phase change materials will also become more commonplace, to help reduce daily cooling loads.

With regards to energy markets, significantly more technology will be used as standard. Blockchain energy market structure with embedded generation will make the energy grid more complex to manage, but will offer the benefits of reduced carbon emissions, lower energy prices and ease of financial tracking. Distributed cluster computer networks will also be commonplace, which will reduce the cooling loads associated with server rooms.

What is blockchain?

Blockchain is a continuing list of records that has a timestamp and transaction marker. It allows data to be built up over time, decentralising records of actions while building a consensus of activity and a shared database. It provides transparency and removes the requirement for privacy features. For energy management, this means that information from one source can be shared and used with information from another in an open and transparent marketplace.

Significant advancements have been made in control systems and data and asset visualisation. By 2030, it is envisaged that a few larger energy consuming sites and organisations will have these deployed. These may be semi-autonomous decision-making control systems and/or preventative maintenance organisation tools.

Security technology will also advance, for the monitoring of people and internet traffic. Open source technology will become more prevalent, increasing the risk of attack and driving the development of new security technology.

The cost of sensors has reduced considerably in recent years, aiding the advancement of the IoT. Thermal imaging sensors will be key to the visualisation of heat flows in buildings, currently invisible and therefore difficult for energy managers to track.

Drone technology is advancing at a rapid pace, with new legislation on their use recently implemented. For the Utilities Manager, a drone can help identify issues at a significantly lower cost than before. Being able to inspect an issue high above the ground can now be done at a much lower cost with a drone, unlike in the past when cherry pickers, scaffolding towers, or professional high-level audits were needed. With the potential of thermal imaging sensors being placed on drones, this gives the opportunity to identify areas with the potential for significant heat loss savings, at a low cost.

The IoT is already making great headway in many areas, such as automated vehicles and security systems. It can be surmised that the same will apply to energy consumption in business operations.

What is the Internet of Things (IoT)?

The IoT is the network of physical devices, vehicles, buildings and other items that are embedded with electronics, software, sensors, actuators, and network connectivity, enabling these objects to collect and exchange data.[25]

With the decrease in sensor costs, large-scale deployment of IoT is becoming more realistic. Many businesses are already collecting vast amounts of data, but are unable to do anything with it due to a lack of manpower, budgets or time.

By 2030, operations will need to be managed in a more refined and accurate manner to meet the carbon budget. This huge amount of data will need to be processed and analysed, and this is where AI

plays its part. The quantity of data that will need to be analysed will be beyond human capability, hence AI will be used to extract information from massive data sources to assist decision making. It will do this by finding trends, building relationships between datasets and potentially running 'what if' scenarios.

Many companies already operate BMS or even BEMS systems. IoT technology developments will enable better control and more importantly, will allow for autonomous decision making. This should lead to better, more refined operating conditions for occupants, as well as operational efficiencies.

An example of IoT in practice

An improved IoT operated system is likely to be able to take account of the supply and demand of a site.

Our example site generates electricity through a PV installation that is run by the local community. The local community wish to have power during some parts of the day, but not all of it. The panels themselves generate the energy throughout the day, but this generation peaks in the early afternoon. The business requires a consistent level of energy throughout its working day but not beyond working hours, peaking slightly mid-morning and then dropping off mid to late afternoon.

Our IoT system works alongside the BEMS and utilises AI to look at the weather, assess the likely demand and profile of the community, store the energy and make sure that it is used by both consumers at the time when the power is going to be at its highest cost from other sources. On days of high demand, it might look for additional storage from EVs charging locally, which have their drive itinerary recorded as part of their AV systems and therefore can communicate spare capacity.

None of this is new technology, but the IoT ties it together and offers optimum efficiency.

This is just one example of the IoT's application, but we can expect the IoT to be embedded in the operational plant of building systems, communications systems, transport systems, and our daily routine. Its deployment and success will depend on plant replacement cycles and the cost effectiveness of available plant on the market at the time. Decision making and sizing of replacement plant has always been important, but the replacement cycles and increased influence of equipment with IoT will mean decision making is more complex than before.

In the domestic sector, we have already seen a significant uptake in intelligent controls such as Nest, which are being used as test beds for more complex systems. At a more commercial level, both building systems and technology companies are already investing significantly in developing IoT tools. The evolution of IoT and AI is now moving at a rapid pace, as the majority of AI is thought-based and not reliant on building hardware. Recalling early mobile phone technology and advancements over the past 10 years provides context for what may be possible.

There are some negatives for the Utilities Manager: with this increase in AI and IoT there will also come an explosion of data centres and cloud computing. Utilities managers will be required to maintain a low carbon computer system. The cooling of equipment may also be important in balancing utility costs with environmental and technical requirements.

5.1 TECHNOLOGY AND BEHAVIOURS

Emerging themes

The individual of the future is going have higher expectations of businesses, and so are communities

- **Millennials will have progressed to middle management and they will be technologically adept. Their expectation of job longevity, work life balance and flexibility will drive processes and information storage**
- **Wider data dissemination will ensure that behaviours change and communities are able to take responsibility for environmental impacts**
- **Businesses are more likely to work with communities on a more localised level to secure power supply and engagement.**

Within the next thirteen years, there will be some substantial shifts in the way that individuals interact with each other.

The millennial will possibly be in a post previously occupied by Generation X. Their expectations concerning job roles, style of working and daily activity levels will be different. The idea of the technical Energy Manager who is focused on interacting mainly with the facilities team (and perhaps procurement) is unlikely to exist in its current form. The Utilities Manager will be more interested in understanding, managing and communicating data to a wider audience. They will expect flexible working, remote working and more autonomy.

They will need to be able to engage with people at all levels of their organisation, and be able to consider and sign off large investment decisions. Their expectation of staying in a job for a sustained period of time is also likely to change. We know from existing research that workers over 35 years old are likely to stay in their roles longer than those who are 18-34. Currently it is thought that the length most employees remain in a job is on average six years. Yet the survey of historic energy managers showed that many had stayed in post for over five years and some for over 10. The concept of a 'job for life' is disappearing and in the future we cannot expect our Utilities Manager to break this mould. Knowledge accrued will need to be recorded.

Society as a whole is likely to look very different to the way it does now. Everyone will eventually be an IT-native. They will use their phones and technology in a completely different way - it will be second nature. They will read their watches and phones, know what the weather and news is as soon as it is published, and may even know the internal conditions of their office before they arrive. They will have booked a desk and made meeting arrangements as they travel to work. They will be on public transport or will be using an automated vehicle to get to work.

The communities that businesses operate in will expect to see environmental and social initiatives, and the implementation of the SDGs at a national level will drive change. We can expect that the workplace, surrounding environment and resulting product or service will be sustainable in every way, benefitting not just the business but also those that are involved in production or use, or are simply close by.

SDGs explained

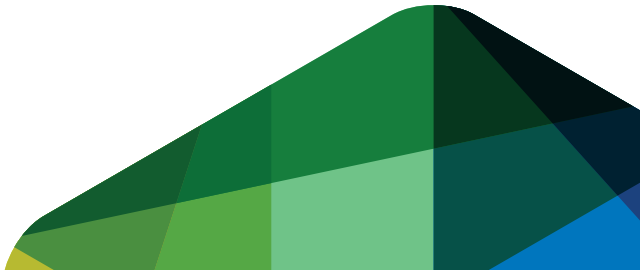
SDGs – Sustainable Development Goals

These are a collection of 17 goals with 169 underlying targets that have been set up by the United Nations for all countries to implement as part of the 2030 agenda for sustainable development. They are relevant in the sense that countries are obliged to implement them, and therefore companies operating within those geographical locations will have to abide by their regulations.

Staff retention and productivity will continue to be a focus. Behaviour change as we know it (usually posters and training) may no longer be seen as the primary way to change opinions, so alternative methods will have to be adopted. Social media and other communications media have already proven successful in engaging staff and communities, and this will increase and evolve. Higher levels of refined information and technology, using IoT, will allow the dissemination of knowledge in a much more cohesive way, raising familiarity and awareness among employees.

Schemes such as community energy, supported by local businesses, will become much more common - with local communities benefitting from business investment.

The Utilities Manager will need to be able to broker these conversations. They will need to be more commercially minded to seek out opportunities and ensure that the company also benefits.



6.0 Sector Variations

6.0

The Future Utilities Manager will respond differently to the tasks in hand, depending on their sector. For example, the health sector will be focused on meeting legislation and regulations, whereas the retail sector will be more focused on making strategic decisions. From the primary research, there have been many verbatim comments indicating this diversity:

"There will be greater emphasis on carbon emissions reductions and legislation will be focused and targeted more towards the NHS"

Public sector

"We joined up the UK businesses so we will be looking at developing a single energy strategy for the whole of our UK operations, as opposed to the two separate strategies we currently operate"

Retailer

Emerging themes

- The public sector is less likely to adapt to the future than other sectors eg. finance and retail, due to investment constraints and inertia in long term decision making
- Manufacturing has more opportunity to secure local supply, but is likely to still have a hands-on energy management focus rather than one that is more strategic
- Finance and retail sectors will be supported by a data scientist who manages data and information, rather than by facilities management.

MANUFACTURING

2017: Today's Energy Manager - Manufacturing

71%

- 71% of departments have been in operation for more than 10 years
- The average size of the department where energy sits is five
- Top three responsibilities today: energy consumption analysis, keeping up to date with energy compliance regulations and compliance with energy regulations
- 45% expect their role to change significantly in the next five years

2017: Today's Energy Manager – Construction

40%

- 40% of departments have been in operation for over 10 years, 40% for 6-10 years
- The average size of the department is six
- Top three responsibilities today: procurement, energy consumption analysis and keeping up to date with energy compliance regulations
- Only 20% expect their role to change significantly in the next five years

Market trends

Continuation and potential growth of certain sectors, diminishing and reduction of other sectors, such as F&D, automotive

Energy trends

On site energy generation, private wire, data heavy monitoring processes, longer term infrastructure investment decisions

2030 Utilities Manager

More focus on technology led energy efficiency and demand management. A closer relationship with procurement functions.

Sector trends

Over the past 15-20 years, we have seen much of our heavy industry leave the UK, moving to places where it is more economically viable. It is unlikely that the UK will see the return of heavy manufacturing by 2030. However, we may see the return of textiles manufacturing.

Intelligent manufacturing and food and drink will play a large role within the manufacturing sector. Manufacturing will become more data driven, with all resource use scrutinised using sensors, IoT, AI and advanced visualization. This will drive the need for a more technically savvy Utilities Manager. 'Just in time production' is likely to increase, with a company's supply chain being monitored with increased scrutiny to ensure goods are delivered on time.

It is widely documented that the IoT is opening up a huge range of new markets, products, services and opportunities for collaboration. At the same time, connected manufacturing has the potential to reduce costs through smart factories and more efficient supply chains[7].

By 2020, 50 billion devices will be networked on the IoT[8]. It is reported that investing in smart factories could boost British manufacturing productivity by up to 30%[9]. The world contains about 1.5 billion large manufactured objects – only 2% of these are currently connected[10].

The value of the global market for connectivity components and services for cars alone will be €170bn by 2020 – five times higher than today[11]. By 2030, connected and autonomous vehicles could create an additional 320,000 jobs in the UK, of which 25,000 will be in automotive manufacturing[12, 13, 14].

The growing availability of 3D or additive printing is transforming manufacturing and enabling customers to secure individualised services. This creates new opportunities, as well as disrupting traditional business models[15].

Development in new sectors in manufacturing will bring investment and lead to the integration of IoT – our Utilities Manager will need to link it to the demands of the market, primarily managing the supply of energy to meet demand patterns.

RETAIL & LEISURE

2017: Today's Energy Manager – Retail

82%

- **82% of departments have been established for over 10 years**
- **The average size of the department where energy sits is 12, greater than the average across all sectors**
- **Top three responsibilities today: keeping up to date with energy compliance regulations, compliance with energy regulations and maintenance and facilities management**
- **Akin to the manufacturing sector, 45% expect their role to change significantly in the next five years**

2017: Today's Energy Manager – Leisure

40%

- **40% of departments have been in operation for over 10 years**
- **The average size of the department is six**
- **Top three responsibilities today: keeping up to date with energy compliance regulations, compliance with energy regulations and consumption analysis**
- **60% expect their role to change significantly in the next five years**

Market trends

Traditional retail will move away from the high street, the high street will diversify, leisure will continue to grow.

Energy trends

AI to handle data and assess market conditions. Increase in leasing of equipment and use of alternative funding models. Rise in EV use.

2030 Utilities Manager

Remote data management, strategic planning and investment. Higher levels of engagement with customers and staff.

Sector trends

It is estimated that global middle class spending on retail and leisure will almost triple by 2030. This is due to an aging population, the rich becoming richer, and shrinking household size increasing disposable income. There is an increased demand for convenience and a demand for personalisation/ customisation. 3D printing may also change the way in which retailers market and cater for individual needs for personalisation and customisation.

With the rise of the millennials, the sharing economy has increased significantly. There is also a significant focus on health and wellness. This has also lead to an increased focus on buying local produce and social media driven consumption.

There is an increased focus on the shopping experience, moving online sales back to in-shop sales. However, there is an increase in the direct to consumer models; especially in the social media field. By 2030, the world will be living in a slower growth economy, hindered by resource scarcity and rising commodity prices. This will lead towards continued consolidation and the simplification of choice. As the world strives towards a low carbon society, the high street will need to be significantly more efficient to compete with the online market place. This will mean higher levels of collaboration between teams.

The retail market has already seen the success of 'circular economy' reusing platforms such as eBay and Shpock. Others may follow.

PUBLIC SECTOR

2017: Today's Energy Manager – Health Sector

72%

- **72% of departments have been in operation for over 10 years**
- **The average size of the department where energy sits is 15**
- **Top three responsibilities today: compliance with energy regulations, procurement and consumption analysis**
- **44% expect their role to change significantly in the next five years**

2017: Today's Energy Manager – Education

71%

- **71% of departments have been in operation for over 10 years**
- **The average size of the department is eight**
- **Top three responsibilities today: compliance with energy regulations, consumption analysis and keeping up to date with energy compliance**
- **47% expect their role to change significantly in the next five years**

Public Sector Market Trends

The health sector will see continued change as NHS strategy evolves. There will be increased care in the home and increased on-line education.

Energy trends

Increasing importance of energy demand management to ensure continuity of supply, control of EV energy demand and transport infrastructure. Diversification of investment models.

2030 Utilities Manager

Increased focus on forward planning of energy demand management activities and technologies.

Sector trends

By 2030, the UK's aging population will have grown exponentially, and our young people will continue to need education. Our aging health and education estates will see growing demand thrust upon them. Patient care is expected to change, and changing student educational models will mean that educational facilities can be used more flexibly to support a higher number of students.

In the Health sector, there is a necessity for hospitals to be warm and well-lit for patient care. Improved knowledge of building operations will be used to investigate means to reduce consumption without impacting on patient care. This will be a new approach to energy management within the sector and this may involve complex models using real data to trial energy improvements, as trialling in real hospitals could impact on patient care. Currently, many NHS Trusts have signed up to 15-year Energy Performance Contracts, which will finish around 2030. At that point, future strategic decisions will need to be made both on the estate to be used and the systems that are put in place.

Smarter control systems have been shown to be an important improvement in the education sector. These controls are used to only heat and light areas that are in use, at the times they are in use. These smarter control systems will potentially use AI and IoT by 2030 to determine areas to heat/cool and light, determined by staff and pupils' mobile phones.

Drivers to explore future potential are lower in the public sector, due in part to the fact that ESOS does not apply to public sector bodies, meaning that there is no requirement for a four yearly audit of operations.

PROFESSIONAL SERVICES INCLUDING FINANCE AND TELECOMS

Market trend

Smarter office space, increased home working, increased technology and adaptability of workforce

Energy trend

EV infrastructure for staff, refined energy and data management

2030 Utilities Manager

Strategic decisions, more about purchasing of energy and products, smart AI control of environments. Staff engagement and awareness increased

Sector trends

Advances in technology and the wider reach of faster internet speeds with 4G has propagated the numbers of workers choosing to work flexibly or from home. This is a trend which is it is expected will become more embedded across many industries in the future. One result of this will be a reduction in the number of traditional office environments. More sophisticated IT equipment has also led to the demise of the desktop computer, which are gradually being replaced with low-heat emitting laptops and tablets, and to the further dispersion of staff to locations outside of a central office location.

The effect of this dispersion is the requirement for larger servers for central repositories of information. The finance sector, for example, is moving more and more into large datasets and thus requires significant computing power to meet these needs. There will be a significant need for better metering and control on energy use to enable this sector to manage increased server loads. This will therefore lead the energy manger further down the path to becoming a data manager.

7.0 Conclusion

The findings in this report demonstrate how significantly the role of today's Energy Manager will have evolved by 2030. Hopefully, this report provides today's energy managers with food for thought and an insight into the exciting future that lies ahead – also outlining how pivotal their role will be in the years to come.

In the future, the utilities manager will be a senior-level role spanning most, if not all, business areas - including transport. The role will be essential in delivering the UK's low carbon agenda and will be expanded by the evolution of AI, access to real-time data connections across the IoT, the introduction of new low carbon technologies and a decentralised grid.

There is a risk to be recognised in terms of developing this key role; to deliver the utilities manager of the future, there is a need for investment in technology and training – with significant challenges to overcome.

Firstly, sourcing energy from pockets of local networks and private wires will be complex. Secondly, the utilities manager will need the ability to structure internal systems and data to ensure IoT connections are maintained and that artificial intelligence can optimise all business processes. Thirdly, they will need to be able to understand, manage and communicate data to a wider audience in order to make strategic investment decisions, quickly. Then finally, with at least two new energy compliance schemes forecast to be introduced in the next 13 years, they will need the knowledge and expertise to navigate and manage new and existing energy legislation.

Unless businesses are effectively supported and are able to embrace best practice and innovation, the ability of the UK to meet its energy targets could come under threat. In addition, technological and communications gaps between sectors will exist, which will further hinder progress towards meeting carbon emission reduction targets.

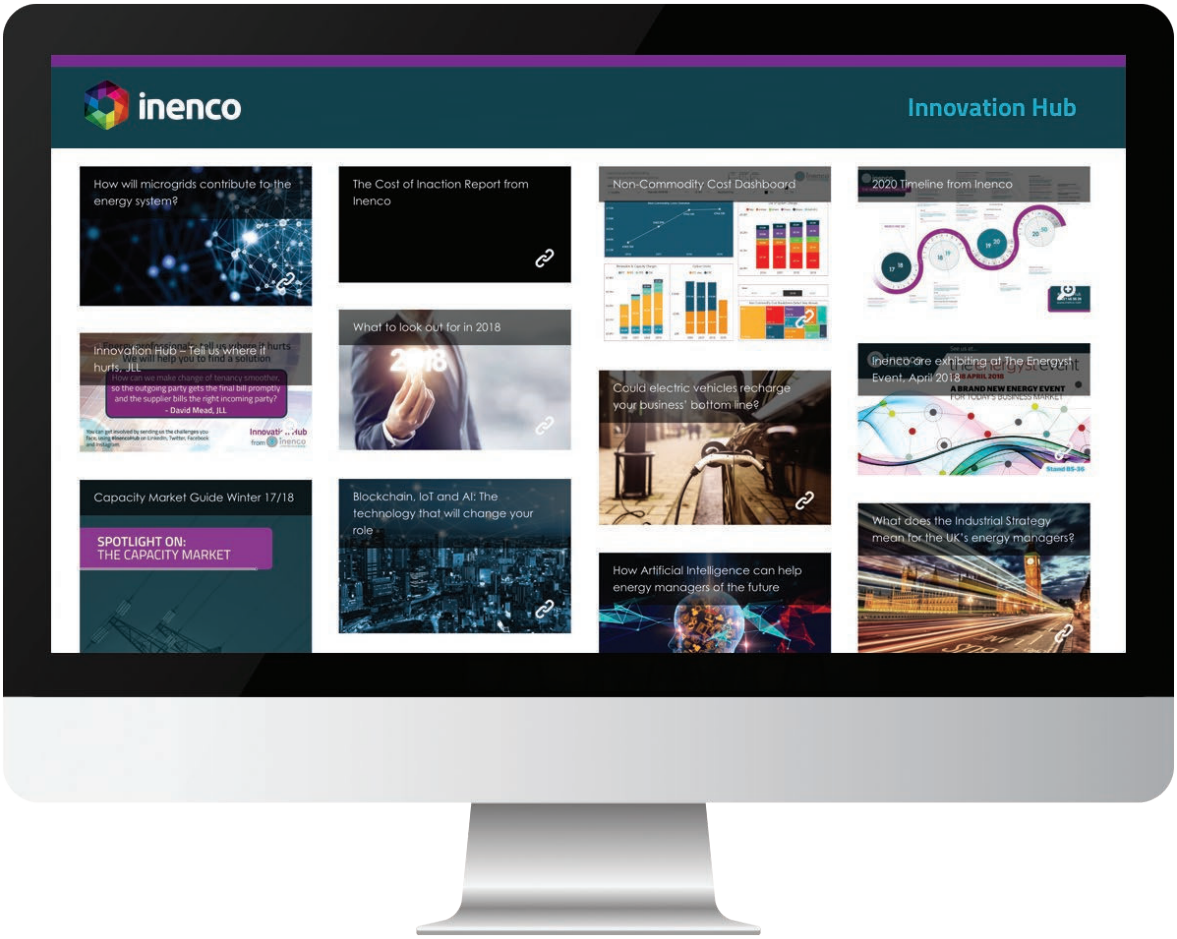
The changes on the horizon will make training and personal development essential, and Inenco will help by providing support and putting solutions in place. By embracing innovation, training and best practice, today's energy manager will evolve into the Future Utilities Manager by 2030 – a senior-level, digitally savvy data scientist, responsible for making strategic decisions and ensuring that the business they work for is cost efficient, commercially future-proofed, and aiding the UK's transition to a low carbon economy.

7.1 OUR INNOVATION HUB

Jon Bauer, Inenco CTO

To help today's energy managers bridge the gaps and overcome the challenges identified in this report, and to also inspire the next generation of energy professionals, Inenco has created an Innovation Hub.

The Innovation Hub contains industry insight and case studies. It's a place for energy managers to find informative and interesting content designed to meet their specific needs. Our aim is to provide the answers to a full spectrum of energy-related questions in one fast, easy and accessible resource. A trusted ally for the busiest work-day, our Innovation Hub is just one of the ways we are working to provide valuable support to energy managers.



8.0 Reference Sources/ Appendix

8.0

i **References**

ii **Persona:** Jake, 2030 Utilities Manager

iii **A Focus On**: The Wider Landscape of Politics and the Future Utilities Manager

iv **A Focus On**: Heat and Natural Gas

REFERENCES:

1 https://knowledge.energyinst.org/__data/assets/pdf_file/0017/304451/Energy-Barometer-2017.pdf

2 https://www.spenergynetworks.co.uk/userfiles/file/Electric_Vehicle_Uptake_Forecasts.pdf

3 https://www.gov.uk/government/publications/the-great-repeal-bill-white-paper

4 https://knowledge.energyinst.org/__data/assets/pdf_file/0017/304451/Energy-Barometer-2017.pdf

5 https://www.theccc.org.uk/tackling-climate-change/reducing-carbon-emissions/carbon-budgets-and-targets/

6 https://www.theccc.org.uk/publication/meeting-carbon-budgets-2016-progress-report-to-parliament/

7 https://www.bitc.org.uk/system/files/bitc_-_pinsent_masons_-_the_future_of_manufacturing_report.pdf

8 http://www.cisco.com/web/solutions/trends/iot/portfolio.html

9 Manufacturing Britain's Future

10 Peter March, author, New Industrial Revolution

11 http://www.mckinsey.com/insights/manufacturing/

12 SMMT research

13 http://www.wired.co.uk/article/london-taxi-company-electric-vehicles-uk

14 http://www.bbc.co.uk/news/uk-england-40579907

15 https://www.bitc.org.uk/system/files/bitc_-_pinsent_masons_-_the_future_of_manufacturing_report.pdf

16 https://www.ellenmacarthurfoundation.org/case-studies/selling-light-as-a-service

17 https://www.bsigroup.com/en-GB/standards/benefits-of-using-standards/becoming-more-sustainable-with-standards/Circular-Economy/

18 https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2016 Annex M

19 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/599539/Updated_energy_and_emissions_projections_2016.pdf

20 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/551446/electric-vehicles-survey-2016.pdf

21 https://www.london.gov.uk/city-hall-blog/1500-electric-vehicle-charging-points-be-installed-across-london

22 https://www.gov.uk/government/publications/the-future-of-heating-meeting-the-challenge

23 https://www.gov.uk/government/publications/industrial-decarbonisation-and-energy-efficiency-roadmaps-to-2050

24 http://www.energylivenews.com/2013/12/13/john-lewis-signs-deal-to-buy-100-renewable-energy/

25 https://en.wikipedia.org/wiki/Internet_of_things

Persona: Jacob (Jake)
2030: Utilities Manager

BACKGROUND

What Jake doesn't know about energy demand, local energy sourcing and real-time automated data solutions, isn't worth knowing.

Jake understands the detail. He's completely up to date with the industry who's who, with what's going on in the energy world today and with what to expect on the road ahead. As a digital native, Jake uses his IT skills to understand and model real-time data on energy, water, waste and transport activities. Jake is a strategic player who is comfortable making large investment decisions that are linked to all business departments.

Background

Jake is a utilities and data specialist.

He sends out regular communications to his team, employees and partners - ensuring everyone is aligned, informed and motivated.

Jake has exceptional communication skills and keeps up with developments within the business, sector and industry. He really takes the time to make sure his message is adapted for his many different audiences.

Jake is a friendly, articulate, focused professional who is passionate about using both insight and technology to move his business forward.

Frictions

Jake gets frustrated when processes, data issues or outmoded systems slow him down.

With so many stakeholders, from Finance to Transport to Procurement, Jake sometimes struggles to cope with day to day demands whilst effectively staying on top of what's going on in the industry.

Jake gets excited about new opportunities such as technologies and local supply sources, but with a smaller team than 10 years ago, he doesn't always have the resource or time to explore them.

Jake

Needs

Jake needs system support he can rely on; to ensure that data inputs are connected, automated and optimised, and to enable him to make informed decisions, fast.

Staying informed on and managing changes to compliance takes time. Jake needs one trusted source to provide him with easy access to key, need-to-know information.

With so many small local generators, structuring a deal and weighing up the best options can often be complex. Jake uses third party support to source and manage these partners.

Feelings

Jake is proud of the positive impact he is having on business energy demand and bottom line, as well as wider UK energy demands.

Jake is approachable, firm and fair. As a confident senior manager, he is respected business-wide and is trusted to make key strategic decisions.

Jake does things the right way, making informed decisions based on insights from his tailored demand optimisation tool.

A FOCUS ON:
THE WIDER LANDSCAPE OF POLITICS AND THE FUTURE UTILTIES MANAGER

The global views related to emissions and climate change are becoming increasingly consistent. The general consensus that the issue has no geographical boundaries has led to the Paris Agreement, which was reached in December 2015, having been negotiated by 196 parties at the 21st Conference of the Parties of the UNFCCC in Paris. Ratified in 2016, the agreement reflects and marks significant global progress and international action, despite the USA's decision to withdraw from the agreement. The aims of the Agreement concern the Utilities Manager. They include limiting the rise in global temperature to below 2°C, pursuing efforts to hold it to 1.5°C, and zero emissions in the second half of the century.

In addition, on October 15 2016, an amendment to the Montreal Protocol was agreed. This latest update looked to phase down the consumption of HFCs, which we all know are the GHG gases we use for refrigeration and air conditioning (AC). This updated agreement itself, which is between 197 countries, has the potential of limiting the rise of global temperatures by 0.50°C by the end of the century.

The UK is one of the countries that has ratified both agreements and is now considering what climate policy is required to feed into the UK's emissions reduction plan.

In light of both of these major international agreements, the energy manager of today isn't responsible for just one area, but many. Take for instance energy and the use of HFCs, which is an everyday essential to operate HVAC and refrigeration equipment and has a major environmental impact.

In addition, the UK was one of 13 international members of the Zero Emission Vehicle (ZEV) Alliance, signing a commitment to promote cleaner motoring and slash transport emissions, alongside Germany, the Netherlands, Norway and California. It includes an agreement to make all passenger vehicle sales zero emission vehicles by 2050.

Brexit

Brexit offers both challenges and opportunities, although it is currently hard to predict what the outcome will be. What we know is that on 23 June 2016, the United Kingdom voted to leave the EU and in March 2017, Prime Minister Teresa May delivered a letter to the Union notifying them of our intention to leave.

The Government now has to go into negotiations with the Union to agree on the terms of Brexit. There are many words that are bandied around, including hard or soft Brexit, but the main focus of discussions is the ability of the UK to trade with the union and globally once we depart from the single market. Our WTO membership is also tied to our membership of the Union.

The implications of this have been theorised and there are so many options and permutations of the outcome it isn't possible to discuss it in detail, nor should it be in this report. But there are two areas that are likely to impact on our Future Utilities Manager:

- Firstly, what is clear is that the way in which we trade goods, services, capital and labour is likely to change. As mentioned above, the trade agreement of the single market has allowed them all to move freely across borders. Without a single market, there may well be an increase to import and export taxes and therefore an increased cost associated with goods, including energy.
- The second point is that current regulation and standards which are often linked to EU legislation

and directives will also need to change. We will need to amend those so that they no longer link to the legislation. For the Future Utilities Manager, this will include ESOS, NFR, ETS and potentially all those BS EN standards that are followed. That said, and dependent on the outcome of the trade discussions, it is unknown how the UK is going to deal with regulation and standards going forward. However, the Government has already committed to ensuring that UK framework for environmental legislation meets commitments both at an EU and international level, stating "The Great Repeal Bill will ensure that the whole body of existing EU environmental law continues to have effect in UK law." It is therefore likely that we will see some regulation remaining and offering continuity to businesses. However, it is likely that regulations will be amended to ensure focus on UK outcomes. It will also give the UK the right environmental credentials to continue trading with EU countries. This may be particularly pertinent in markets such as energy, where power may be sold across boundaries in the future.

Government

With or without Brexit, the Government has committed to a series of carbon budgets. It has committed to reduce emissions by at least 80% of 1990 levels by 2050 and contribute to global emission reductions, to limit global temperature rise. Most relevant to us is the 5th carbon budget, which is 2028 to 2032. The target for reduction is to drop to 57% below 1990 levels by 2030.

The CCC[5] publishes regular updates on how the UK is progressing and how the budgets are monitored. In its most recent progress report[6] (2016), greenhouse gas emissions were 38% below 1990 levels.

Within the UK power sector, emissions had fallen rapidly but that progress has stalled in other sectors such as heating in buildings, transport and industry. It is recognised that more needs to be done in all sectors and that current policies are not sufficient to meet future budgets. This is because the decarbonisation of the grid and replacement of coal-fired generation with low carbon generation will only provide approximately half of what is needed to meet the reductions by 2030. The uptake of low carbon technologies and behaviours in the buildings sector has been slow and increased travel has offset any savings made with improved vehicle efficiency. The industrial sector and agriculture also show minimal progress.

This has led CCC to recommend the need for stronger low carbon policies in the emissions reduction plans, so we are likely to see more regulation in specific areas. The CCC recommends that credible policies are required to encourage the adoption of low carbon technologies both in existing and new buildings.

It is also worth noting that the Paris Agreement target is more ambitious than the basis of the UK's statutory target for 2050 (which aims to limit temperature rise to around 2°C, implying a very low risk of a 4°C change).

Policies that our Utilities Managers of the future can expect to be introduced between 2015 and 2030 include:

- **Clear, consistent and credible policies to drive deployment of heat pumps and district heating**
- **Standards to ensure new build properties are highly energy efficient and use low carbon heating systems by default**
- **More progress on improving the energy efficiency of non-domestic buildings, including a consolidated reporting mechanism for commercial and public buildings, new emissions reduction targets for the public estate and new policies to support SMEs in England**

A FOCUS ON:
HEAT AND NATURAL GAS

In 2015, just over a third of the UK's energy came from natural gas and just over two fifths of this natural gas came from the North Sea and Irish Sea. The rest was imported from Belgium, Norway and the Netherlands via pipelines. Liquefied Natural Gas (LNG) was also shipped from Qatar, Algeria, Trinidad & Tobago and Nigeria.

- Natural gas, as already discussed, provides energy for a substantial amount of our electricity generation, but it is also widely used in industry (in six sectors in particular: oil refineries, basic metals, food and drink, pulp and paper, non-metallic minerals – including ceramics, cement and glass – and chemicals), for power and heat as well as in our domestic environments, where 4 out of 5 homes use gas to heat their homes. There are several alternative sources of gas being considered and these are expected to provide gas supply until the mid-century.
- Shale gas is a natural gas trapped inside rock formations deep underground. Pumping water, chemicals and sand into a drilled well at high pressure releases the gas. This is called hydraulic fracturing or 'fracking'. There have been a number of well-published articles associated with fracking and its potential risks. However, as an example of the potential capacity, the British Geological Survey has estimated that there is around 1300 trillion cubic feet of gas in the Bowland-Hodder shale in northern England. And there are now two sites looking at fracking in Lancashire and North Yorkshire. BEIS is currently granting funding to research monitoring of the environmental conditions around the sites to determine any environmental impacts, such as gas leaks or contamination of underground water reserves.
- The other source of gas is biomethane. This can be traded using Guarantees of Origin, in a similar way to REGOs. In the UK, Biomethane is at least 99% methane when it is injected into the grid, with certificates available for purchase via the Green Gas or Biomethane Certification schemes. While the volume of biomethane isn't massive at present, there is an opportunity for some businesses to purchase certificates and reduce their footprint. The biomethane market is expected to increase, with a much larger volume of certificates available as we get closer to 2025. Trading of certificates issued across Europe will also take place. For our Future Utilities Manager, opportunity to reduce their business' carbon footprint is significant. However it is likely to increase the energy cost; at present this increase in estimated to be around 10%.

Is this the longer-term solution? Biomethane is expected to support the production of shale gas and offer a solution for the next few decades, but after that the shift required away from natural gas and the grid network will become much more of a challenge. At this point, the Future Utilities Manager will need sector specific options to ensure that heat and light, or industrial processes can continue to be supported. We can expect to see the UK Government considering future options over the next decade. Indeed, some thought has already gone into the industrial element. The Future of Heating[22] strategy published in March 2013 provided an indication of the challenge ahead. Since then, decarbonisation and energy efficiency roadmaps have been published for sectors to 2050[23]. These roadmaps focus on the sectors covered within this report, providing a range of techno-economic and business decision making evidence on the decarbonisation issues that are most relevant to each sector.

There is the possibility that the natural gas grid will be converted completely to hydrogen. This will mean that a complete retrofit of all natural gas burning equipment will be needed, like that during the transition from town gas to natural gas. This will affect all investment decisions made now, with regards to natural gas burning equipment.

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