The skills and workforce implications of a greener energy sector

The National
Skills Academy
POWER

Introduction

- **Energy & Utility Skills** delivers initiatives, products and services identified as essential for the long-term sustainability and attractiveness of the sector by its members
- The majority of the UK's largest utility-based employers

- **Rob Murphy, Workforce Planning and Labour Market Lead**
    - 30 years as a skills and labour market researcher
    - 17 years with Energy & Utility Skills
    - Supported most of the UK's regulated companies and their supply chain partners in understanding their current workforce dynamics and their wider labour market environment
    - A member of BSI's Human Capital Committee (HCS/1)
    - A Certified Member of The Market Research Society

Overview

- With the UK on a path to reach "net zero" carbon emissions by 2050, the sector must:
    - increase low carbon electricity generation
    - install low carbon heating systems
    - develop carbon capture usage and storage (CCUS) technology
    - develop hydrogen networks
    - install around 60,000 EV charging points

- To deliver this, National Grid estimates 400,000 roles
    - 260,000 new roles
    - 140,000 replacements for leavers

- This will require a more robust talent pipeline of young people (especially those from under-represented groups and disadvantaged communities) and substantial upskilling/reskilling

- Clearly this is a massive challenge for a sector, which has traditionally struggled to attract a diverse workforce

D&I in the current workforce

- The power sector's "technical" workforce falls short of national averages when it comes to employing young people, females, ethnic minorities and people with a physical or learning difficulty

Personal characteristic	Electricity sector	UK – All sectors
% aged 16-24	8%	12%
% aged 60+	12%	10%
% Female	23%	47%
% Ethnic minority	2%	11%
% Physical/learning disabilities	11%	15%

- A key aspect in addressing this issue is increasing the opportunities available to people in/from disadvantaged communities, where ethnic diversity tends to be greater and, often, educational attainment lower

- However, certain cultural and generational attitudes towards post-compulsory education routes, as well as the energy sector, present barriers

# Recent trends in "Green" recruitment

- 177,000 jobs advertised online over the past 12 months (4,000 in Wales)

- Top ten occupations:
    - Project Manager   Civil Engineer
    - Environmental Scientist / Specialist   Mechanical Engineer
    - Electrical Engineer   Sales Manager
    - Sustainability Specialist   Safety Manager
    - Maintenance Technician   Electrician

- Relatively high demand in Wales in areas such as:
    - Aberystwyth
    - Bangor & Holyhead

    (Also in Bridgwater and Bristol (Hinkley Point) and Scotland)

- Average advertised salary in Wales was c£4,000 lower than UK average
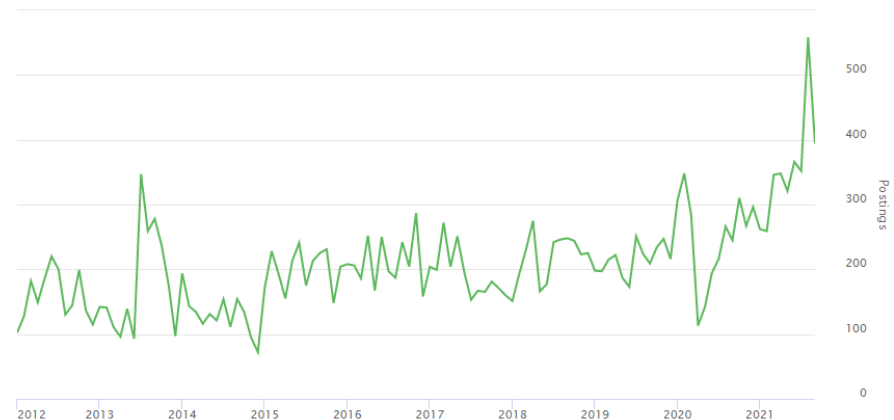
# Impact of new technologies on the power sector's workforce

- Extensive literature review and 25 interviews with industry experts

- Technologies considered:
    - Domestic low carbon technologies
    - Electric vehicle charging points installation
    - Digital and data literacy
    - Artificial Intelligence and data science
    - Automation
    - Augmented Reality and Virtual Reality
    - Cyber security and specialist IT skills
    - Smart networks

Domestic LCTs

- LCTs are very sensitive to government policies and incentives

- Between 2012 and 2020 there was a steady decrease in the number of job postings relevant to LCTs
  - falling from 30,000 in 2012 to 14,000 in 2019

- In the year to May 2021, there were 21,500 job postings, signalling a potential revival in the market and a strong bounce-back from the impact of the Coronavirus pandemic

- Demand for several occupations will be high in:
  - Construction Project Managers
  - Plumbing and HVAC Trades – technology specialists
  - Labourers

- By around 2028/29, workforce levels will reduce as the industry moves into a long-term maintenance and repair phase (broadly stable at around 250,000 more than the 2019 baseline)

Electric vehicle charging points installation

- The EV installer workforce could develop in a number of ways:
  - A dedicated EV charging point installer workforce
  - A multi-skilled "Electrician+" workforce which is capable of routine domestic electrical work as well as the installation of domestic EV charging points
  - A multi-skilled "Low Carbon" installer workforce capable of installing EV charging points as well as one or more domestic low carbon technology (e.g. PV)

- There are also a range of support functions growing in demand:
  - Technical customer service staff
  - Installation Auditor
  - Fault findings and repairs, it is unlikely that this will require a qualified/ certified installer

- Recruitment activity in this has increased substantially over the past couple of years
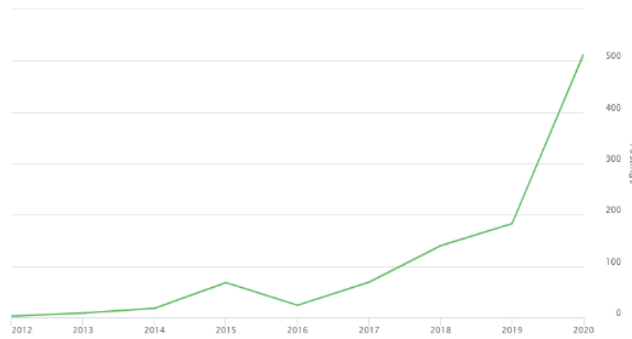
Digital and data literacy

- **Digital literacy** – the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills

- **Data literacy** - the ability to read, write and communicate data in context, including an understanding of data sources, analytical methods and techniques applied — and the ability to describe the use, application and resulting value

- **Cyber security awareness** – the ability of end-users to understand and identify cyber security threats, the risks they introduce and utilising best practices to guide their behaviour

- In 2019, digital skills were required in at least 82% of UK online advertised job openings – an amount that is likely to grow over the coming years.

Artificial Intelligence and data science

- Energy companies are employing AI to optimise, schedule, and automate their operations without disrupting energy performance
  - E.g. load forecasting, predictive maintenance and demand management

- Skills needed to harvest, analyse and make actionable insights based on data collected from both the assets and customers requires both core data analytics/ mathematics **as well as technology/ energy sector context**

- Demand for data scientists and data engineers has risen by over 231% in the past five years

Job Listings Containing the Key Words "AI" or "Artificial Intelligence" in the UK 2012-2021

- Attracting experienced hires into the energy sector could prove challenging
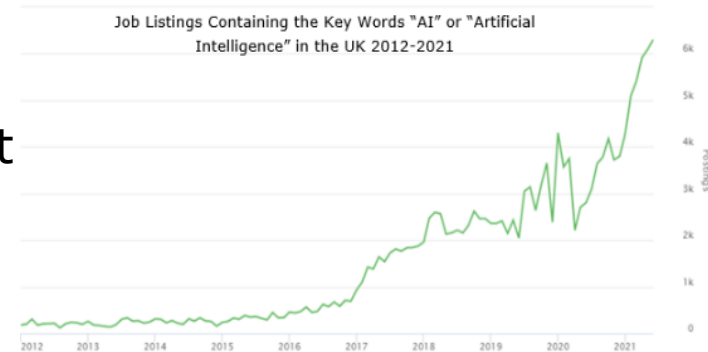
Automation

- Automation of repetitive and rule-based processes, for example in energy trading, finance and accounting and procurement
- Robots and drones in:
    - Maintenance, inspection, and repair of dangerous, time-consuming, or hard to reach assets
    - Installation and setup of technologies (e.g., offshore wind and solar panels)
    - Wearables and sensors can be worn by workers that allow for digital tracking to predict accidents (e.g., pulse rate monitoring to establish accident risk profiles)
    - IT automation can improve price forecasting, custom reporting, secure file transfers, file archiving, provisioning, onboarding, and auditing .

- Automation could occur in three waves:
    - Wave 1 (to early 2020s): algorithmic
    - Wave 2 (to late 2020s): augmentation
    - Wave 3 (to mid-2030s): autonomy

- During the first and second waves, women could be at greater risk of automation due to their higher representation in clerical and other administrative functions.

Augmented Reality and Virtual Reality

- Use of AR and VR technologies in the power sector can be categorized into three main purposes:
  - Training - Use of immersive technologies can simulate realistic and dangerous situations to produce a more hands-on training experience
  - Operational Processes and Asset Maintenance – VR can be used to troubleshoot in the event of a problem, as the cause of failure can be identified more efficiently and safely using the virtual version of the plant
  - Knowledge transfer – Using AR to pass on data to a subject matter expert, guiding on-site technicians through remote consulting

- While energy companies will likely out-source the initial development of AR/VR technology to specialist developer companies, they will need to facilitate the development:
  - Communicating the company's needs (be an intelligent client)
  - Possessing sufficient background knowledge to be instructed by the provider on how to be a trainer ('train-the-trainer')
  - Analysing quantitative or qualitative feedback and communicating findings and their implications

Cyber security and specialist IT skills

- Wherever digital communications exist, there also exists the potential for security breaches – with technology comes vulnerability

- The cyber security roles in greatest demand include:
  - Engineers
  - Analysts
  - Architects
  - Managers
  - People who need to be able to communicate risks and good practice in an engaging way to non-cyber staff, while working collaboratively across the business to develop a holistic cyber security strategy.

- Cyber security specialists are highly skilled, with academic achievements to match
  - Around 90% of job postings required a degree qualification or higher
  - 75% require 3+ years' industry experience
- Apprenticeships can be a strategic way for the energy sector to attract and develop its cyber security workforce, providing them with the required technical skills and also the necessary business knowledge/context

Smart networks

- Smart networks mean structural changes to reinforce or upgrade the network assets, implement decentralised energy data processes, change processes and business models, establish more flexible energy markets, and modernize system operations

- There is likely to be increased demand for roles such as:
  - LV protection engineers
  - Automation engineers and technicians
  - System and network planners
  - Data network engineers
  - Engineering and connections design roles
  - EHV network design engineers
  - Senior Authorised Persons

- Potential for a Smart Network Craftsperson/ Technician/ Engineer Apprenticeship standard/ framework at circa Level 4

External challenges to workforce resilience

- In addition to the specific challenges highlighted above, we must consider the wider context that the energy sector operates in:
  - The most recent data shows that the labour market is continuing to recover from the Coronavirus pandemic
    - Employment is increasing and unemployment is decreasing
    - Redundancy rates have returned to pre-pandemic levels
    - Job vacancies have reached a record high
  - Investment levels in the UK's essential infrastructure is planned to exceed £600bn over the coming five years, with the utilities sector accounting for one in every five pounds of investment, including 31 individual projects worth more than £1bn, many of which will run concurrently
  - An estimated that 25% of vacancies in England were skills shortages.
    - 29% within "Primary Sector & Utilities" - only "Manufacturing" (36%) and "Construction" (34%) report a higher proportion of skills shortages
  - Brexit appears to have had only an indirect impact the energy sector in that it has reduced the general supply of construction/engineering construction trades in the UK labour market, particularly at the lower-to-mid skill levels.

Conclusions

- Over the coming years, the following skills/job roles will be heavy demand and will require the sector to take both individual and collaborative action to ensure supply meets demand:
  - For electric vehicle and domestic low carbon technologies – reskilling/multi-skilling to enable competencies across a wider range of installations (e.g. heat pumps and EV charging points)

  - Engineering occupations – with data, digital and commercial skills
    - LV protection engineers
    - Automation engineers and technicians
    - System and network planners
    - Data network engineers
    - EHV network design engineers
    - Senior Authorised Persons
  - Development of a "Smart Network Craftsperson/ Technician/ Engineer" Level 4

  - ICT Specialists (Data Analyst, cyber security, ICT Technician) – with industry context knowledge
  - Project Managers, Business Developers, Commerce and Trading

Conclusions

- The success or failure of a digital, data or cyber security strategy depends on the skills, knowledge, and actions of the entire workforce – and all should be included in relevant and appropriate training
  - Digital literacy
  - Data literacy
  - Cyber security

- Energy companies should consider the ways it reaches out to prospective employees to ensure that opportunities are available to all, no matter what their age, gender, ethnicity, disability status or where they live.
  - Entry requirements may be exacerbating diversity and inclusion issues
  - Requiring a Degree or industry experience (where, in reality, they are not essential) could effectively rule out many from disadvantaged communities and certain ethnic minorities.

- The benefits of employing neurodiverse people in data areas is increasingly being recognised
  - Including people with Autism, Dyslexia, Dyspraxia and Attention Deficit Hyperactivity Disorder (ADHD).

Conclusions

- The reporting of robust and transparent human capital metrics to both internal and external stakeholders can help employers demonstrate its commitment to its people

- To support this aim, the National Skills Academy for Power is currently working with DNOs to develop a framework which seeks to measure and benchmark workforce resilience from a skills and resourcing perspective.

- It is likely that metrics will be developed relating to the following aspects:
  - Attraction
    - Workforce characteristics
    - resourcing
  - Skills development
    - Upskilling, multi-skilling and new skills
  - Retention
    - Leavers
    - Succession planning
    - absenteeism

Questions and further information

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