

THE EMA MAGAZINE

www.theema.org.uk | ISSUE JULY-SEPTEMBER 2022

GUEST EDITOR:

CAROLINE HOLMAN

*HEAD OF ENERGY
SOUTH STAFFS WATER*

**WATER - WHY WE ALL HAVE A PART TO
PLAY IN PROTECTING THIS PRECIOUS
RESOURCE**

**CAREER INTERVIEW WITH COLIN
HAWTHORNE**

BEYOND NET ZERO

**FROM SELF-DRIVING CARS TO WATER
TREATMENT: HOW AI IS SHAPING
INDUSTRY**



RESPONSE TO ESOS CONSULTATION



INTERVIEW WITH KEIRA MCLUSKEY



BEDFORD ENERGY PARK PROJECT

**WHEN
YOU CAN'T RELY
ON THE BRITISH WEATHER...**



...RELY ON POWERSTAR

Build resilience, sustainability, and affordability into your power with groundbreaking hardware, software, and control systems from Powerstar. Our range of products includes transformers, voltage optimisation, and a unique solution for UPS using battery energy storage technology, all manufactured and supported in the UK. Our solutions intelligently manage customers' power flows to make power greener, cheaper, and more secure, come rain or shine.

Find out more at
powerstar.com



Making your power

Reliable



Affordable



Sustainable

powerstar 

GUEST EDITOR

Caroline Holman, Head of Energy at South Staffs Water and Member of the EMA Board of Directors

Caroline is a Chartered Environmentalist with the Institute of Environmental Managers and Assessors (IEMA), Fellow of the Institute of Engineering Technology (IET), and Board member of the Energy Managers Association (EMA).

Caroline has over 30 years' experience, predominantly in the automotive sector. This experience includes engineering, manufacturing, supply chain, sustainability & CSR, project management, energy strategy & policy, carbon, and utilities risk management.

As Head of Energy at South Staffs Water (SSW), Caroline works closely with various sector, internal and external stakeholders, developing and leading SSW's Energy and Carbon Strategy as part of the critical, and exciting journey to Net Zero.



04 FOREWORD
By Caroline Holman

FEATURES

06 WATER – WHY WE ALL HAVE A PART TO PLAY IN PROTECTING THIS PRECIOUS RESOURCE...
By Natalie Akroyd

12 BEYOND NET ZERO
By Parthena Exizidou, Michael Johnson and Nasrin Khanom



CAREER & TRAINING

27 CAREER INTERVIEW
With Colin Hawthorne

29 WOMEN IN LEADERSHIP INTERVIEW
With Keira McLuskey



INDUSTRY FOCUS

33 FROM SELF-DRIVING CARS TO WATER TREATMENT: HOW AI IS SHAPING INDUSTRY
By Matthew Stephenson

37 BEDFORD'S GREEN ENERGY INNOVATION PARK
By Gemma Drake, Paul Pace and Shah Faisal

40 THE GOVERNMENT RESPONSE TO THE STRENGTHENING THE ESOS CONSULTATION



by Caroline Holman, Head of Energy at South Staffs Water and Member of the EMA Board of Directors



THE EMA MAGAZINE

Dear Reader,

Welcome to the 'thirst-quenching' July - September edition of The EMA Magazine - as a recent but passionate 'convert' to the water industry I make no apology for this bias.

With the summer months ending, and hopefully fully 're-charged' from our summer breaks, we now need to focus on the autumn/winter season and its many challenges – not least energy security, cost, and resilience.

As someone who is unapologetically a 'weather obsessed stereotype' I am ashamed to say that until recently I just took water for granted and did not consider the broader impact of our need for water; other than specific water challenged hot spots in other parts of the world. I never thought I would be so pleased when the smiley sun face turned to water droplets on my weather app!

However, the good news is that all my skills, experience and incredible cross sector contacts are as applicable in my new role in the water sector as any other. The opportunities for collaboration, shared learning, and good practice replication are greater than ever – I, and others, just need to accelerate and leverage the synergies.

As energy managers we are constantly striving to effectively apply sound efficiency principles, assess the common ground and opportunities across multiple problems and sectors, while progressing our ambitious but very necessary Net Zero transition.

In this edition we explore, amongst others, the opportunities and challenges of Artificial Intelligence (AI), and the impacts of climate change on water availability.

We also have two career interviews sharing insights, learning and experiences from two established energy professionals from the automotive and transport sectors.

Huge thanks to all contributors, the EMA board, and staff.

And finally, a big thank you to you, the EMA members - I hope you enjoy this issue.

Caroline Holman

PUBLISHER

The EMA Magazine is published quarterly by the Energy Managers Association (EMA).

EDITORIAL

The Energy Managers Association
www.theema.org.uk
Tel: 0203 916 5516

CONTACT

Edita Krupova; Editorial Enquiries & EMA Membership Services Manager
edita.krupova@theema.org.uk

CONTRIBUTORS:

Caroline Holman, Natalie Akroyd, Parthena Exizidou, Michael Johnson, Nasrin Khanom, Colin Hawthorne, Keira McLuskey, Matthew Stephenson, Gemma Drake, Paul Pace and Shah Faisal

The EMA would like to thank to the above contributors for their time and effort in providing the content and making this issue possible. Their willingness to share experience and knowledge is exemplary and inspiring, and we hope it will encourage others to come forward and contribute in the future.

ADVERTISING SALES

The EMA Team
Tel: 0203 916 5516
enquiries@theema.org.uk

ABOUT EMA

The Energy Managers Association (EMA) was set up in February 2012 and represents Energy Managers across all industries. Our priority is to improve the position of energy management experts and their profession and act as their united voice. We aim to develop the skills, knowledge and experience of professionals through our training, high-quality peer to peer guidance and best practice exchange.

@2022 Energy Managers Association, Registered in England and Wales, Company No 7943728, VAT No 151339624, Registered Address: Suite 77, 95 Mortimer Street, London, W1W 7GB.

No part of this publication may be reproduced, stored in, or introduced into a retrieval system, or transmitted in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise) without prior written permission. Any information or material sent by advertisers and contributors, including advice, opinions, drawings and photographs, is the view and the responsibility of those advertisers and contributors, and does not necessarily represent the view of the EMA.

EMA ENERGY MARKET REPORT

SUBSCRIPTIONS AVAILABLE:

3 MONTHS

6 MONTHS

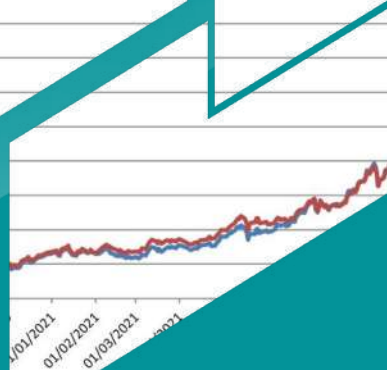
12 MONTHS

Forward annual gas and electricity prices

	This week's price	Last week's price	Change
Gas (€/MWh)	141.5	141.5	0
Electricity (€/MWh)	145.1	142.6	2.5
Gas (€/therm)	105.1	104.4	0.7
Electricity (€/therm)	105.0	104.3	0.7
Gas (£/MWh)	75.7	74.8	0.9
Electricity (£/MWh)	77.4	77.4	0
Gas (£/therm)	75.7	74.8	0.9
Electricity (£/therm)	77.4	77.4	0

Latest energy wholesale prices

— Gas wholesale price — Electricity wholesale price



Email: ema.team@theema.org.uk

Website: www.theema.org.uk/energy-market-report/

by Natalie Akroyd, Head of Water Strategy & Environment, South Staffs Water & Cambridge Water



Water – why we all have a part to play in protecting this precious resource...

People, agriculture and other businesses depend upon ready access to clean water. The water environment also provides many recreational, health and wellbeing benefits.

In 2021, the Environment Agency reviewed water availability across the UK and designated a further seven areas as “seriously water stressed”, taking the total to 14. Whilst such challenges in the East and Southeast of England are well documented, some of the newly classified areas may come as a surprise – they include much of the Midlands area and stretch as far north at Staffordshire and as far west as parts of Somerset.

These areas can also face significant pressure from climate change, economic challenges, population density and housing development. Just to be clear, the remaining parts of the country that are not classified as seriously water stressed are also facing water resources challenges.

So why is water becoming scarcer?

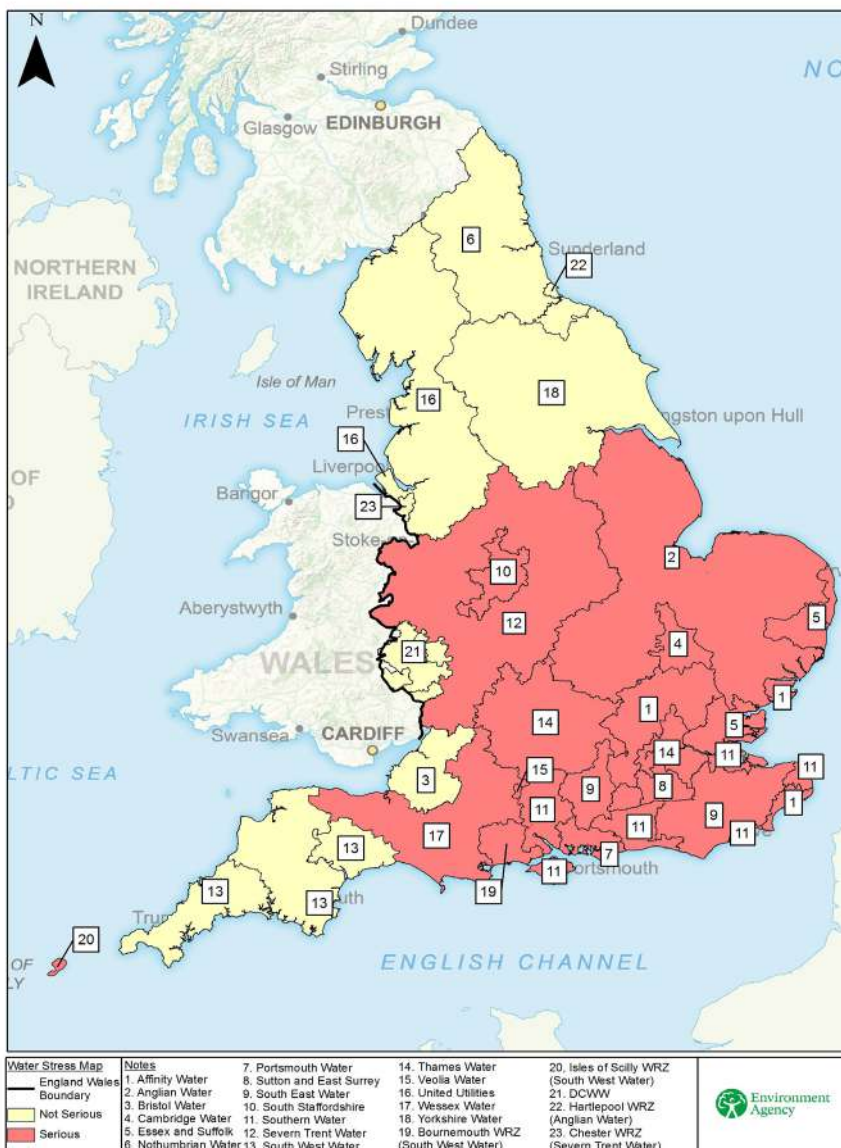
Our planet is covered in water, but less than 3% is freshwater and the remainder is saltwater. Two thirds of that water is locked up in ice caps, glaciers and permafrost. This means less than 1% of the planet’s water is available for drinking.

The population on our planet is increasing rapidly; in 1975 there

were around 4 billion people – today, that number is over 7 billion, and is forecasted to be nearly 10 billion by 2050. Furthermore, we now use more water than ever before in our daily lives. In England, we use approximately twice as much water per person per day as we did in 1975. On average each person uses 1145 litres per day. This is the equivalent of each person having a bath (80 litres), doing one



Blithfield Reservoir | South Staffs Water (south-staffs-water.co.uk)



Source - Environment Agency (<https://www.gov.uk/government/publications/water-stressed-areas-2021-classification>)

load of washing (50 litres), using the dishwasher (10 litres) every day, and other uses / consumption (5 litres). In Germany, the average is 121 litres.

And this is only one factor leading to increased pressure on our precious water resources.

The other major factor in water availability is climate change. Obviously, the future impacts of this are uncertain, but water companies run various scenarios looking at a range of temperature increases. **All of these scenarios show that climate change will reduce the amount of water available.**

The risk of hotter, drier summers will increase likelihood of drought conditions. Wetter winters see an increased risk of flooding, and the challenge is how to capture these huge flows when they do fall without creating expensive, carbon intensive and infrequently used infrastructure.

Temperature increases can also lead to raw water quality issues, requiring further water treatment either by chemicals, energy intensive processes - or both!

Linked to this, we also need to factor in the needs of the environment. Abstraction has increased due to rising

populations and consumption, and this process removes water from the environment, sometimes with negative impacts on ecology and biodiversity.

We need to take steps now to protect the environment from further increases in abstraction and to mitigate the future impacts of climate change. In some areas, we need to reduce abstraction further to restore and enhance the local environment; chalk streams are a good example of this.






Chalk streams are rivers that rise from springs in landscapes with chalk bedrock. Since chalk is permeable, water percolates easily through the ground to the water table and chalk streams therefore receive little surface runoff. As a result, the water in the streams contains little organic matter and sediment and is generally clear.

In the UK, we have 85% of the world's chalk streams, and these beautiful rivers and streams are extremely sensitive to water quality and quantity. We need to protect and restore these precious areas.

So what about energy and carbon?

For a water only company (WOC) such as South Staffs and Cambridge Water; delivering potable water to customers is an energy intensive process - extracting, storing, treating and pumping water to our business and domestic customers. Typically, across both regions our energy consumption is over 240 GWh per year. 100% of our grid supplied electricity is a Net Zero tariff and we also use ²HVO fuel in our standby generators at the Hampton Loade water treatment works.

South Staffs Water and Cambridge Water continue to target further efficiencies and our Net Zero roadmap includes; more energy efficient assets e.g., pumps, 'Smart' controls and analytics e.g., using AI to identify early asset deterioration, accelerated leakage reduction beyond current

	South Staffs region	Cambridge region
 Area served (km ²)	1,497	1,175
 Population served	1,366,845	347,243
 Water supplied each day on average (Million litres Ml)	323.11	83.32
 Residential connections	565,062	138,951
 Business connections	33,750	8,920

commitments, further reducing our use of fossil fuels – operations and vehicles, journey reduction by our employees (commuting and field operations), investing in renewable energy at our sites, reducing water consumption per connected property and In-setting / Off-setting.

For the South Staffs region the water we supply is taken from Blithfield Reservoir, the River Severn and some 26 groundwater sites located across

our area of supply. For Cambridge, the drinking water predominantly comes from ground water held in the chalk aquifer. The aquifer can hold large quantities of water in a network of fractures and cracks in the rock and we are able to abstract it from 24 boreholes.

The whole water sector is committed to ³Net Zero by 2030, and those plans are well underway in terms of deployment e.g. decarbonisation of energy, fleet

electrification, leakage reduction, investment in renewable energy generation, and process efficiency.

However, the need to conserve multiple precious resources including energy and water has never been more critical. Many energy managers will attest to the challenges of getting ‘water only’ savings projects over the line, and frequently ‘bundling’ them up into other projects to achieve investment return criteria.

We all need to challenge the norms and our expectation that there will always be water available for our needs e.g. how much ‘treated’ water is used in grounds maintenance; whether that be on our gardens at home, or our local cricket and football grounds? If we harvested rainwater we would not only reduce water extraction, but the energy used in water treatment and distribution.

It is a reality that the true cost of water (£, kWh, CO₂e and wider



Hampton Loade – South Staff Water Treatment Works

environmental impact) is not always visible and transparent to the end customer (household or business). As a water sector we need to become far more effective in understanding and communicating the broader whole system costs, and interactions (including other utilities), in order to better target just and affordable solutions.

From a scope 3 perspective; the more we all understand our supply chain; challenges and opportunities, the sooner we will be able to tackle robustly and sustainably whole climate, carbon and environmental objectives. If every part of the supply chain is focused on their scope 1 and 2, the majority of scope 3 takes care of itself. We should not just be 'expecting' our suppliers to up their 'Net Zero Game,' but also asking them how we can collaborate and learn from each other.

Future energy system decarbonisation may also add additional pressures e.g. Hydrogen production. Additional water is required for both methane

reforming with Carbon Capture, Usage and Storage (CCUS) and for production by electrolysis. In both cases water purification is needed and for methane reforming it is also used for cooling. However, on balance and as all technologies evolve, there will be efficiency improvements, alternative solutions including sea water de-salination but ultimately all use water and energy.

For Hydrogen production by electrolysis reported water consumption varies between 254 and 509 litres / MWh, and of course purified / remineralised water is required – another 'process' in the mix. However, water consumption for electricity production from natural gas can be up to 2,500 litres per MWh, so there is actually potential for a decrease in water requirements globally.

There is still much debate as to the opportunities and challenges from expanding Hydrogen production, and the 'water sector is fully receptive to

all solutions which support and deliver our Net Zero ambitions. However, whole life and system impacts need to be considered as part of our water resource planning; particularly in the coastal areas where many of the Hydrogen projects are located.

New technologies will also play their role in production of water at domestic and industrial level. These include atmospheric water generation (UK has plenty of humidity to play with); Solar water generation (less effective in UK maybe but has potential); Solar desalination plant – becoming more efficient at smaller scale and could be used to supplement supplies

So what is the water industry doing to tackle these various challenges?

A new approach has been adopted in order to ensure these issues are solved at a regional and national level, rather than just at a company



Photo used with kind permission of Staffordshire Birdseye View Photography

Blithfield Reservoir Blythe Valley – providing up to 100 million litres of water each day to more than half a million houses and businesses in parts of the Black Country, East and South Staffordshire and South Derbyshire.



Source: New chalk stream assessment to take place (cambridge-water.co.uk)

level. Five regional water resource groups have been created that are currently developing water resource management plans for their region for the next 25 years that look not only at public water supply needs, but all future water requirements in the region across all sectors e.g. agriculture, energy, navigation etc.

These regional plans are then overlaid to create a national plan that ensures the water needs are met across the country while representing best value to customers and the environment. These plans are intricately linked to water company individual water resource management plans (WRMP); all these draft plans will be published in autumn 2022.

The first and most important approach is to reduce the demand for water. The Government recognises the importance of this and so the new Environment Act is looking to create targets for demand reduction across households and non-households e.g. industry and commercial properties. Water companies have worked consistently over the last 30 years since privatisation to reduce leakage levels and educate

customers around their water usage to help reduce consumption. However, there is more to do and there are some ambitious targets across the sector which look to reduce leakage by 50% and reduce household consumption to 110 litres per person per day, both by 2050. If customers in the South Staffs Water region reduce their daily consumption by 30 litres each, it would save 40 million litres of water – equivalent of 16 Olympic sized swimming pools every day!

Since the market opened in 2017 for non-household supplies, retailers have owned the relationship with this sector. Water companies are working with retailers to identify how they can jointly help the non-household market reduce their demand - consumption and leakage. It is critical that we raise awareness across every single water customer to share the water resource challenges and to help provide the information customers need to make informed choices about their water usage.

The best way of doing this is through use of a water meter, although the sophisticated smart meters routinely seen in the electricity sector are

not available for water yet. Data from ⁵Water UK suggests that there is significant difference in water consumption between metered and unmetered households i.e. 139 versus 183 litres per person per day.

Currently, all non-household properties should have meters, but there is no legal requirement for domestic properties to have a meter. The classification of an area as seriously water stressed enables the water company in that region to explore compulsory metering – this must be supported by customers to be progressed, and water companies are undertaking extensive customer engagement to explore how this might work.

Understandably, as we find ourselves in a cost-of-living crisis, there are significant concerns around affordability, particularly for larger households which tend to find bills increase when on a meter, and solutions to support this need to be found.

However, in some areas, demand management alone cannot solve the potential future predicted deficits in supply that will occur due to all of the pressures outlined above. In these



SSW education programme; delivering exciting and engaging water-efficiency and water-cycle workshops and assemblies to Early Years Foundation Stage (EYFS), Key Stage 1 and Key Stage 2 pupils

areas, options are being explored to create additional supply, whilst ensuring that these future options do not cause additional stress on the water environment or cause any environmental harm.

For Cambridge Water, all the water currently supplied to customers comes from chalk stream aquifers, and there is significant growth forecast for the area. In order to protect and enhance the chalk streams and meet the needs of the future; Cambridge Water are exploring the potential for a new reservoir that could supply both Anglian Water and Cambridge Water customers, and could be in supply in the mid 2030's.

This is not the only new reservoir currently being proposed across the country, and other options being explored include transfers of water from areas of surplus to those of deficit, and the potential need for desalination.

In short, water scarcity is an issue of increasing significance in the UK. There are some ambitious plans in place to reduce the overall water demand and ensure we have enough supply for future predictions, but it is important that everyone understands

the role they play in these plans if we are to be sure they will succeed.

Education is the first step along that path, ensuring that we engage with our future customers and consumers, while providing a fun learning experience.

It is also important that lessons are being learned from countries such as South Africa as we work to ensure we do not see the same scale of challenge in the UK in the future. The plans currently under development will show clearly how these challenges can be overcome, but it is critical that all water users work together to input and deliver these if we are to ensure success.

Water is a precious resource we cannot take for granted - it is part of a wider diverse system and cannot be considered in isolation. Effective, robust, resilient and sustainable solutions require collaboration, joined up thinking and innovation – not just in technology but also in process application and our interaction with communities and the environment.

The message to all stakeholders including customers must be - it is a partnership; we invest in the technologies and leak elimination; we need you to reduce consumption, and

together we will reduce water stress in the UK...

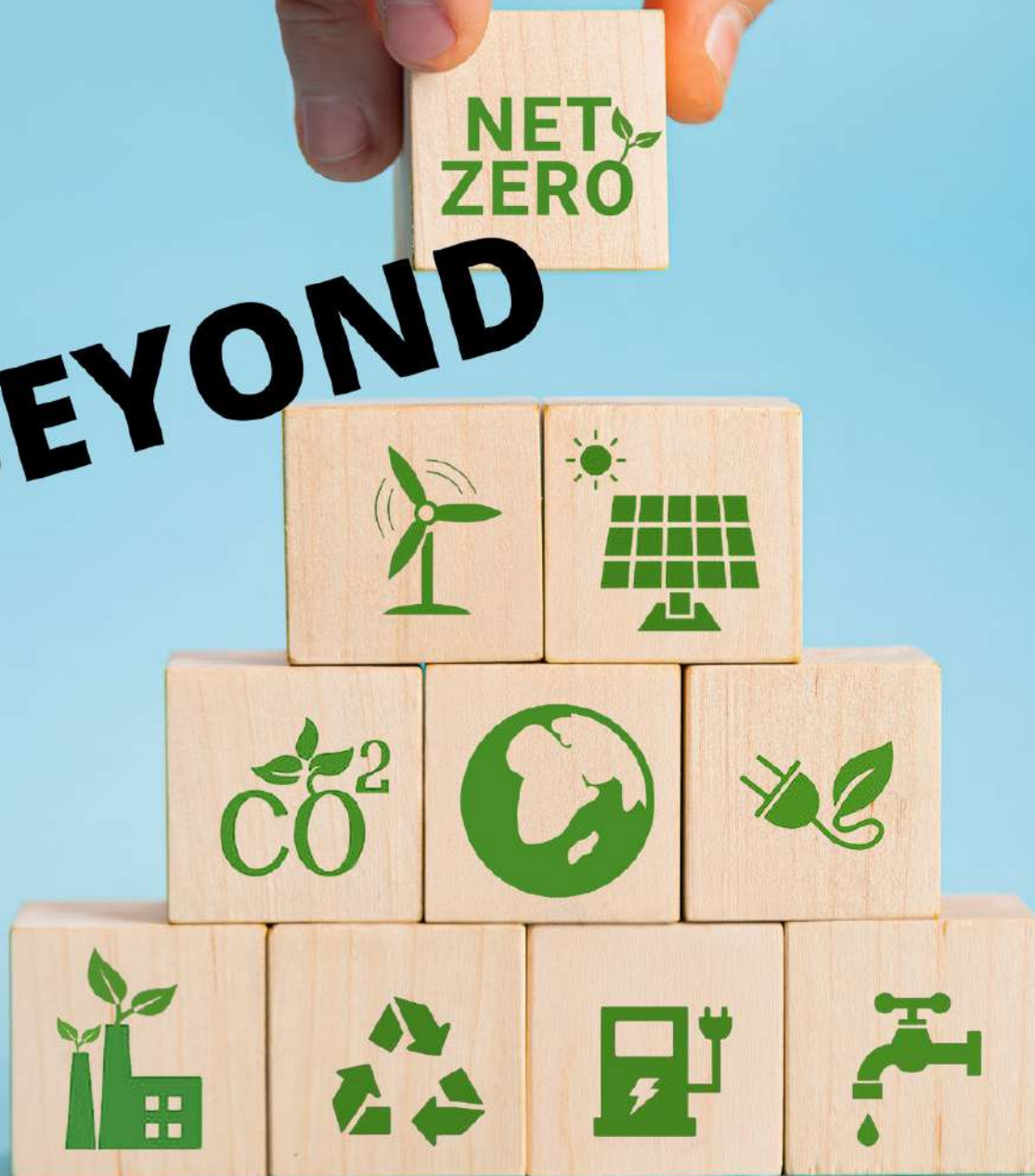
Author's Profile:

Natalie has been working in the water industry for nearly 20 years, and currently leads water resources and environmental planning teams for South Staffs and Cambridge Water. Natalie is a Chartered Environmentalist, a Technical Director for Water Resources East, and a Board member for the Society for the Environment.

Sources:

1. <https://discoverwater.co.uk/amount-we-use>
2. Hydro-treated Vegetable Oil – a fossil fuel free alternative to mineral diesel
3. [Water UK – Net Zero 2030 Routemap](#)
4. <https://www.jacobs.com/newsroom/news/how-can-water-sector-engage-future-hydrogen-economy>
5. [Water UK](#)
6. [Education services | South Staffs Water \(south-staffs-water.co.uk\)](#)

BEYOND



Parthena Exizidou, Michael Johnson and Nasrin Khanom give their views on the challenges of delivering carbon reduction targets to net zero and beyond.

by Parthena Exizidou, Senior Carbon Manager (Net Zero transition lead) at British Antarctic Survey



Beyond Net Zero



Many businesses have Net Zero roadmaps to 2025, 2030 and 2040, but what next?

Undeniably achieving Net Zero is the biggest challenge our planet faces at the moment and therefore most businesses' focus is on climate change mitigation measures to deliver their

targets. However, depending on which pathway we choose to take, the impact of the Net Zero transition period could be significant in a post-2050 world.

The Net Zero transition technologies, such as renewable and low carbon systems, require natural resources that are scarce, difficult to access and

with concerning issues regarding their decommissioning and end-of-life management. According to the International Energy Agency, there is a looming mismatch between our Net Zero ambitions and the availability of critical minerals that are essential for this transition¹.

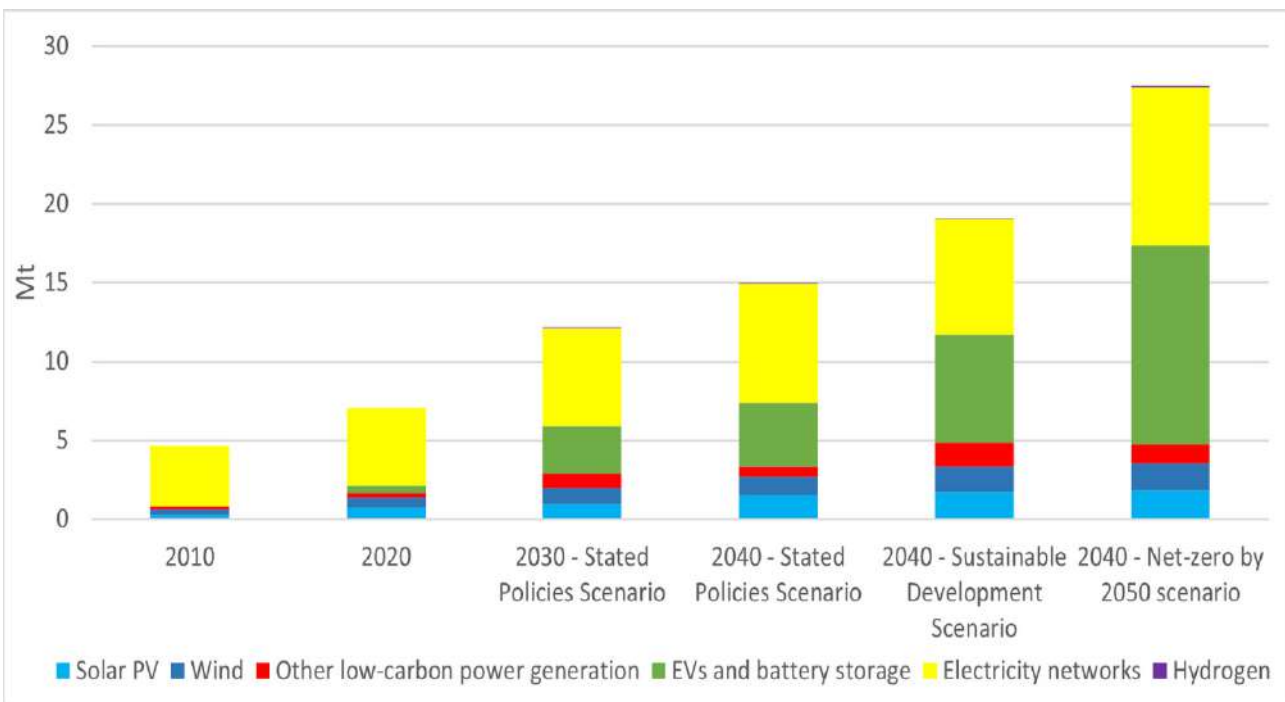


Figure 1: Total mineral demand for clean energy technologies by scenario, 2020 compared to 2040.¹

Demand for these technologies will significantly increase by businesses as they are and will be the backbones of the energy systems to support decarbonisation with potentially a significant environmental and social cost linked to the extraction/mining of these resources.

The graph on the previous page is a very clear illustration of the extend of the demand on these resources going forward.

Globally, as part the roadmap to 2050, 90% of the electricity generation will come from renewable sources with solar and wind to account for 70%². More specifically, here in the UK we have the largest offshore wind farm in the world and that capacity is expected to increase by 2030³.

Not carefully planned rapid scale up of low carbon technologies without consideration of available resources and their end-of-life stage could risk the security of supply and lead to supply shortages with an impact on cost and inflation.

Policy consideration should focus on embedding circular economy principles to the design of those systems that will ensure that the recovery of these minerals is enabled and therefore will improve resilience and improve accessibility.

On the other hand, businesses also need to invest more in circular economy and embed such principles for any new and established low carbon technology/system that is part of their Net Zero journey; to ensure that 20 or 30 years later at the end of their lifespan, which is very close to 2050, we have considered the end of life and decommissioning of these systems and minimised waste generation.

In addition, to achieve Net Zero by 2050 and looking beyond, we need to strategically consider diversification of energy sources and systems at a

business, country and global scale, which will ensure resilience and potentially solve some of the existing resource issues.

It is crucial that businesses assess the social and environmental impact of their Net Zero strategies for an extended timeframe post-2050 in order to prevent or mitigate any unintended consequences.

This long-term evaluation, beyond 2050, is also required at a government level to ensure that climate policy addresses these concerns. Whatever the pathway to net zero, it should ensure stable and affordable energy supplies beyond 2050.

What are the challenges to 2050 and beyond?

The first challenge we are facing is that we don't have adequate climate policy and strong implementation plans for reaching Net Zero by 2050.

The commitments by governments currently fall short, which according to UNFCCC, would lead to a 14% increase in global greenhouse gas emissions by 2030 compared to 2010 levels. To keep global temperature rise to no more than 1.5°C, a 45% reduction is required by 2030⁴.

Access to large scale financing, specifically to support the scale up of emerging technologies, is also falling short. The projections to 2050 indicate that almost half of the reductions are expected to come from technologies that are currently at demonstration or prototype phase and require scale up.

Moreover, we still have a number of key uncertainties in the pathways to Net Zero, such as the role of alternative sustainable fuels for hard to decarbonise sectors such as shipping, aviation and others, and the ability to scale up negative emissions technologies such as carbon capture and storage.

“ We will all need to play our part at personal and business level to overcome these challenges.

Moving away from fossil fuels will require fundamental change in the way we consume, produce and move and it will result in significant disruptions. We need to have appropriate measures and required resources to help us get through this transition period.

Another big challenge to 2050 and beyond is the land-use competition. A major shift in land use is required with adequate financial investments to increase carbon sequestration through afforestation, low-carbon farming along with re-skilling and education programmes and a significant reduction of food waste and consumption of highly carbon intensive foods.

We will all need to play our part at personal and business level to overcome these challenges.

How do energy managers inform and engage that we are on a continuous journey and Net Zero is just a milestone?

A rigorous assessment and evaluation of the net zero policies and pathways can identify potential unintended consequences and risks around the net zero transition and beyond 2040 or 2050. This is a process that requires a much wider contribution from across all areas of an organisation.

Effective communication and engagement are absolutely required as it's a key way of promoting dialogue and uniting people around the Net Zero commitment. This can be achieved through a variety of means including through the form

NET ZERO SCIENCE FOR THE FUTURE



Figure 2: Key pillars of the Net Zero Carbon Strategy at the British Antarctic Survey

of workshops; awareness events and talks, wider internal campaigns and above all more training such as Carbon Literacy and wider sustainability training.

Raising awareness and being transparent about our Net Zero journey, its milestones and beyond can drive the transformation process that the Net Zero agenda of any organisation needs.

What are the Scope 3 challenges and how are you engaging with colleagues and stakeholders?

The biggest challenge when it comes to supply chain emissions is accessing the data required to build a comprehensive baseline and set clear targets and guidelines for the suppliers to follow. The data need to come from suppliers directly as often these emissions can be well hidden in the supply chain.

In addition, Scope 1 and Scope 2 emissions are usually prioritised when there are limited available resources in an organisation.

At the British Antarctic Survey, Supply Chain is one of the 5 key pillars of our Net Zero Carbon Strategy. One of the key strategy objectives is to work closely together with our suppliers to develop common goals and targets around, not only carbon, but wider sustainability.

Last year we delivered a study to identify the top 10 contributors of our supply chain carbon. As expected, the construction activities from our Antarctic Infrastructure Modernisation Programme (AIMP) accounted for the largest part of Scope 3 emissions.

As part of the AIMP, we are delivering large scale infrastructure projects in Antarctica which include a new science and operations building,

an aircraft maintenance facility, improvements on our runway and more. This programme is crucial to future proof our facilities in Antarctica and support our decarbonisation plans.

To deliver this ambitious programme of works we have formed strong partnerships with our technical advisors and construction partners with whom we share common goals and values around sustainability. I find this of significant importance when it comes to reducing the impact of Scope 3 emissions.

Together we have developed a sustainability strategy based on the UN Sustainable Development Goals, specifically for the AIMP, and individual sustainability management plans that are delivered at the end of every work stage and for every project under the programme of works. We also follow PAS 2080 which is a standard for Carbon Management in the construction process to assess and help us reduce the carbon impact of our construction activities.

We are also working together with our procurement team, our engineers and estates colleagues to add sustainability criteria into all tender exercises which include among other, criteria such as embodied carbon impact of products, information on bidders Net Zero/Sustainability commitments, introduction of circular economy principles under specific projects and inviting suppliers/bidders to explain how they can contribute to the delivery of our Net Zero commitments.

There is still a lot more work to be done in this space, from understanding the impact of our whole supply chain to working together closely with more of our suppliers to achieve a reduction in the carbon impact of our Scope 3 emissions. Part of this effort includes the strengthening of the implementation plan under



our sustainable procurement policy. Fortunately, we recently secured funding to address this.

What would you do differently?

We started seeing the effect of people getting numb towards this huge challenge that we are facing. We need more inspiration and a better focus on the benefits and opportunities that this process will deliver for us as an organisation but also for humanity and our planet. I therefore think I would invest more time in communicating that message across our own organisation and more widely in our sphere of influence.

What approach are you taking to off-setting in short to medium term?

At the headquarters of BAS in Cambridge, since 2019, we buy renewable electricity from the grid through REGOs (Renewable Energy Guarantees of Origin) which is a form of carbon offsetting.

However, since 2019, we have invested significantly in renewables adding

more than 650kWp of solar on our site, in the form of solar carports and solar roofs through which we meet nearly 40% of our electricity demand and even exporting to the grid during sunny summer days. There is no other form of carbon offsetting that we are looking at as part of our roadmap to net zero in short and medium term.

Currently, we are racing to reduce our emissions through improving our efficiency, optimising our energy use and increasing the contribution of renewables across our estate to hit our interim target for 2025 which is approaching fast.

Is off-setting on the table beyond 2040, and if so, why?

I believe that Carbon Capture and Storage technologies will play a significant role in achieving 2040 and beyond. We will still need to use to some extent fossil fuels for the development of specific products even if we manage to decarbonise the energy and transport sector. The extent to which we will use such technologies will depend on the success of

technology scale up which is required to achieve our Net Zero targets.

Author's Profile

Parthena is the Senior Carbon Manager (Net Zero transition lead) at the British Antarctic Survey (BAS). She is an engineer by background with more than 12 years of experience on energy efficiency, carbon reduction and wider sustainability.

At BAS she is leading on the development and implementation of the Net Zero Carbon strategy for the BAS Infrastructure, Transport & Logistics and Supply Chain activities.

Sources:

1. [The Role of Critical Minerals in Clean Energy Transitions – Analysis - IEA](#)
2. [Net Zero by 2050 – Analysis - IEA](#)
3. Office for National Statistics: <https://www.ons.gov.uk/>
4. UNFCCC NDC Synthesis Report Update (Nov 2021)

by Michael Johnson, Environment & Sustainability Lead at Cheshire Constabulary and Cheshire Fire & Rescue Service



Beyond Net Zero

Many businesses have Net Zero roadmaps to 2025, 2030 and 2040, but what next?

Although there is a challenging target to get to net zero, many think that this is the objective. There will be no winning tape at the end of this race. It is easy to have a plan and there will be many neatly bound volumes showing the way. Perhaps the question should end “but how many will achieve it”? There continues to be challenges with many aspects such as funding and the whole enormity of the task. Many net zero plans cover all the technical advances in M&E efficiencies, self-generations via solar or wind, lighting, window improvements, but lack a holistic approach to the whole building.

Heat pumps are clearly a very favoured alternative currently, but in a 50s/60s building where there is not also a plan to manage and improve the fabric of the whole building it seems rather a short-sighted solution. Plus add the continuous costs to maintain a building at this level while funding further net zero building costs.

In many cases the improvements and actions we take today will have reached end-of-life before 2050 or even 2035/40 in some cases. Do the roadmaps include a commitment to continuously reinvest all savings back into future projects and improvements?

In July, we experienced the hottest day on record and I expect all our air conditioning and air handling systems (usually not initially designed for such temperatures) were working to their maximum and consuming more energy. So, what next? Review, revise, flexibility, continue learning, sharing and engaging with new techniques and technologies.

What are the challenges to 2050 and beyond?

I work with two “collaborated” organisations, but both different in their approaches to driving net zero and beyond. One comes under the control of the Police and Crime Commissioner and one under the Local Fire Authority. Both our

organisations are making satisfactory progress against published targets, but the final portions of emissions will be challenging.

The identification of the organisational embedded carbon emissions and the reduction of these is not yet available. Innovative technologies and fuel sources are being developed all the time and I am confident that there will be an answer in terms of technology, but I am less confident on behavioural and cultural change that will be needed.

The long-term challenge is the adoption of robust sustainable practises within organisations. Many do not understand what sustainability is and the reason this should be the main driver for progress. Organisations that fully embrace the need to respond to the whole social, bio-diverse and environment issues will be the longer-term winners. Reduction of carbon emissions is not the only metric to deliver a positive response to achieve and maintain a better, fairer and living planet.

How do energy managers inform and engage that we are on a continuous journey and Net Zero is just a milestone?

Getting engagement on Net Zero was a challenge until there was a ground swell of popular engagement. There has been a movement at a very senior national emergency services level and that is beginning to filter down, driven by this populous movement. The local authorities have also played their part in asking the important questions and setting agendas.

We have updated Impact Assessments to a quite simple format of questions that means more products and services do appear on my desk from the project teams. The benefits were viewed as making operational and purchasing colleagues think about aspects such as energy usage, even from a supply chain perspective in terms of where it was sourced from.

The second benefit was allowing engagement back to the project to ensure energy, environment, ethical procurement policies, sustainable questions were being considered.

What are the Scope 3 challenges and how are you engaging with colleagues and stakeholders?

Scope 3 will only get the focus it deserves when it is reportable. New procurement and social value policies have been put in place that should have some effects on this point, but no resource to investigate and analyse data. Real analysis of supply chain, commuting, waste and business mileage in our case is needed and will identify the value of managing and reducing these effects. How in the emergency service sector we deal with this will need specialist help in the measurement and then

direction on a solution.

We endeavour to source locally either material, equipment or services. This is challenging in many respects due to our specialist equipment requirements. Only the largest and better resourced organisations look seriously at Scope 3 currently. Waste and business mileage are easy wins in reporting and trying to drive improvements, but the major challenge is supply chain.

If you set a standard or policy and monitor and manage your procurement of a product or service, then you can see the value of improved performance in supply chain. I think many lack the next step of collecting and setting the data and then monitoring delivery. That is not an easy task if you have large, complicated supply chains. It is my opinion and perhaps the fault of people like me who do not spend enough time or have enough time on the detail of the specification of tenders.



Even in what appears nationally linked organisations it is clear from discussions that individual services are at vastly dissimilar stages of engagement from decarbonisation, renewables, to electric vehicles and sustainability.

What have you learned from the journey so far?

What I have learnt in recent years is that you must broaden your thinking from just energy, or the standard environmental compliances and look at the whole sustainability subject. The global UN goals gave us a template and importantly a leadership. Although at first glance some might appear to be outside the route to Net Zero, but on a closer inspection and understanding they are intriguingly linked. We must look

at people, planet and in our case the public purse to really make an impact and improve.

I currently chair the Emergency Services Environment and Sustainability Group (EESG) with representation from many of the Police, Fire and Ambulance services. We also include the Royal National Lifeboat Institute and Victoria Limbick (EMA Steering Group Member) is an active contributor to our bi-monthly meetings. Even in what appears nationally linked organisations it is clear from discussions that individual services are at vastly dissimilar stages of engagement from decarbonisation, renewables, to electric vehicles and sustainability.

For example, Mohammad Rafique who is another EMA Steering Group member delivered infrastructural and non-blue-light fleet to Surrey and Sussex Police several years ago with the benefits of carbon savings, reduced diesel fuel bills and reduced maintenance. However, many other

forces are only now starting the journey of looking at non-fossil fuel vehicles! Unfortunately, our group's loss has been the Home Office gain as Mohammad has taken his passion to the centre of Government, and we miss his contribution.

When I joined the EMA in the early days it was about sharing, learning, and engaging with other energy specialists. We try to follow a similar process with the EESG and share ideas, share best practice, share learning, share a national identity so we can all move progressively forward. This has been further progressed with the publication of our National Charter which has been endorsed at a senior police and fire national level.

My personal development has been maintained and enhanced by



sharing and engaging with many like professionals and my lessons learnt for the future is sharing and engagement must continue and grow as collectively we have a bigger voice and credibility to deliver.

What would you do differently?

Hindsight is a wonderful thing, and I do not know what I would have done differently with the messaging and communications to get some of the engagement we have now. I should have looked for more opportunities to share as above, but there was not as many opportunities as we have now. I worked in a Top 100 organisation as the requirements for CRC and then GHG were brought in, and the messages were clear about the future and what was required.

It did take introduced regulations to begin to get senior engagement and the growing trend of green investors in companies. There was also the “return on investment” criteria set by senior finance leaders at usually circa 2 years that made even simple LED projects difficult to pass muster.

I know many colleagues in different businesses who had the same challenges and the same story to tell at conferences and industry meetings. We were all envious of the person with an engaged CEO or CFO who saw the benefits of environmental

and sustainable improvement. Many did not recognise that improvement saved money longer term from reduced consumption, reduced carbon taxes, positive brand and communications opportunities, investor and stakeholder benefits, and most importantly a great message to their customers.

What approach are you taking to off-setting in short to medium term?

We have engaged with local offsetting linked to Cheshire Wildlife Trust and we are at initial stages in investigating this to mitigate emissions that we struggle to reduce due to technology or restricted capital expenditure. Our local authorities are engaged with this and there are many local projects, which links to our commitments to Cheshire. What form this takes has not been proposed or decided yet, but both organisations are committed with delivering a first-class service to the residents of Cheshire and I see this as another way that we demonstrate that commitment and lead by example.

Is off setting on the table beyond 2040, and if so, why?

My intentions currently are to look at short, medium and longer-term projects. Bio-diversity management will not cease with Net Zero, so I see

the need for Government, businesses and organisations like ours continuing to work with these projects. 2040 or 2050 will only be achieved and maintained with some forms of off-setting and management of our wider environment.

Poor investment in public buildings over many years means the bill to deliver the infrastructure everywhere in time is beyond the public purse. “Off-setting” as a term needs to change as I think it has attracted poor publicity and accusations of green-washing. If organisations engage with the global goals set out by the UN and embed these principals in their sustainable planning and engage properly with their colleagues, this will provide the progress we need. There are positive actions that can be taken by everyone, every organisation, large or small.

Author’s Profile:

Michael has worked with Cheshire Constabulary and Cheshire Fire and Rescue service for six years now. Previously, he ran his own company after spending 25 years with the Carphone Warehouse plc Group in a range of environmental roles. Michael is a Member of the EMA since the beginning, IEMA, CIWM and chairs the National Emergency Services Environment and Sustainability Group.

ENERGY MANAGEMENT ONLINE TRAINING SCHEDULE

Energy Management Theory Combined with Real-World Applications

SEPTEMBER

- 16th Energy Monitoring, Targeting and Validation
- 23rd Reaching Net Zero
- 30th Energy Auditing Techniques

OCTOBER

- 3rd SECR Compliance
- 7th On-site Electricity Generation
- 14th Essential HVAC Control and Optimisation
- 21st Become an ESOS Lead Assessor
- 27th Battery Storage for Business

NOVEMBER

- 3rd Turning Data into Energy Savings (in-person)
- 10-11th Fundamentals of Energy Management
- 17th Understanding and Delivering Behavioural Change Programme (in-person)
- 18th Energy Procurement
- 25th Water Management

REDUCED PRICES

Group Training

The majority of the courses can be delivered virtually to teams or groups of stakeholders from the same organisation or industry in a standard format, or as tailored sessions (minimum 6 candidates). For a quote email jana.skodlova@theema.org.uk with your chosen course title and approximate number of staff. We can also develop new, bespoke material to fit your specific needs.

Knowledge and Skills Gap Analysis Interview

Understanding of a range of energy management competencies is required for professionals to effectively manage organisation's energy cost and consumption, monitoring and reporting energy use, as well as meeting energy efficiency requirements. The EMA can assess your knowledge and skills through the Knowledge and Skills Gap Analysis Interview. The Interview is an informal 60-minute conversation that concludes with feedback on how to progress your professional development and advance your career.

For an up-to-date list of all our courses visit our website at www.theema.org.uk



Beyond Net Zero



Many businesses have Net Zero roadmaps to 2025, 2030 and 2040, but what next?

Historical emissions:

One of the most difficult challenges is addressing historical or lifetime emissions. These are the cumulative emissions that humans and organisations have produced since their inception. For many organisations, the current way of thinking about achieving net zero is to choose a carbon baseline for a period that reflects a typical operation and then reduce it to zero by 2025, 2030, 2040, and so on.

While there are advantages to this approach, it does not account for the total emissions that organisations have accumulated each year since incorporation. These are still emissions trapped in the atmosphere that cannot be ignored; organisations must be held accountable for historical emissions. There are opportunities for the government and industry sector bodies to guide organisations in both the public and private sectors in addressing historical emissions, starting with data gathering.

Climate justice:

Another significant challenge is achieving climate justice. By 2030, the United Nations Sustainable Development Goals (UN SDGs) will ensure that everyone has security and access to basic human rights, such as affordable clean energy.

The SDGs are also used as a framework for delivering climate justice, which is especially important in light of the current Climate Emergency. The SDGs make a central commitment to leaving no one behind, ensuring that development progress reaches the most vulnerable and marginalised populations. The SDGs require world governments to maintain an equal balance of environmental, social, and economic priorities in order to create a sustainable developed world.

According to a recent UN report, the world is not on track to meet the goals by 2030¹. The lack of progress highlights the difficulties in achieving a fair and just future for people and the planet, implying that efforts to create a sustainable world must continue beyond 2030.

While the UK government is responsible for achieving the SDGs at home and supporting their international implementation, both public and private sector organisations play critical roles in delivering environmental and social sustainability.

For example, the University of West London (UWL) has used the SDGs as a lens through which to focus efforts on both climate change and broader social sustainability concerns. UWL is committed to delivering long-term sustainability and will continue to contribute to sustainable development by adhering to the SDG principles.

What are the challenges to 2050 and beyond?

Government commitment to net zero:

It is clear that the UK government is in an instrumental position to take the lead in achieving the nation's net zero target, and failure to prioritise climate action puts the UK at risk of failing to meet net zero. Meeting our net zero commitments requires

¹<https://unstats.un.org/sdgs/report/2021/The-Sustainable-Development-Goals-Report-2021.pdf>

the government to implement the appropriate policies, strategies, and resources as well as ‘policing’ measures.

Analysing the previous trend is a good way to determine whether a goal is likely to be met in the future. In the past, it has been difficult for governments around the world to achieve environmental sustainability goals like the UN Millennium Development Goals².

The recent UN progress report on the SDGs demonstrate the current challenges in maintaining an equitable mix of environmental, social and economic concerns. In the UK, for example, there have been occasions when our national green targets have not been fully met, most likely due to competing priorities. However, the UK government has recently taken the lead in addressing the global climate crisis, particularly with the government reaffirming its commitment to climate action at COP26.

The UK has met its first and second carbon budgets as part of its net zero target, and is on track to meet its third, indicating that there is light at the end of the tunnel. However, according to the most recent Climate Change Committee (CCC) report, the government is falling short of meeting future carbon budgets³.

The CCC recommends that the government implement more stringent measures to achieve net

zero by 2050. This includes becoming more energy efficient and switching to low-carbon fuels for heating and transportation. It also entails shifting away from coal and gas-fired power and toward low-carbon sources such as renewable energy.

“The short-term challenges, however, highlight the stark reality that, while pressures to combat climate change are increasing, our ability to address the hard-to-abate energy sector is currently inherently slower than required. It also highlights the importance of accelerating innovation and creativity in order to address obstacles sooner.

The government’s recently released ‘UK Energy and Security Strategy’ reaffirms its commitment to decarbonisation and sets new ambitious renewable energy generation targets to reduce over-dependency on fossil fuels⁴. However, it also includes investments in new fossil fuel projects in the UK, which the government justifies as a short-term measure to minimise disruption on energy supply and meet demand whilst moving away from foreign sources of energy and transitioning to a low-carbon future. The government sees such investment as necessary because over 90% of our homes are heated by fossil fuels, and any energy shortage could result in a cost-of-living crisis.

While there is room for additional measures to reduce energy demand, the government emphasises that the strategy is intended to provide

long-term security and affordability of renewable and clean energy. The short-term challenges, however, highlight the stark reality that, while pressures to combat climate change are increasing, our ability to address the hard-to-abate energy sector is

currently inherently slower than required. It also highlights the importance of accelerating innovation and creativity in order to address obstacles sooner.

If we go back further in time, the Industrial Revolution, which lasted 80 years, was the last major change in how our world supports

and sustains itself. While we are much more advanced now, we are still developing and testing new technologies on the cutting edge of engineering and science, just as they were in the 18th century. To expedite this, we need significant investment and buy-in, and while the government must lead from the top with policy and education, every level of the business hierarchy, education system, and social fabric must take ownership to accelerate national progress.

Energy industry’s commitment to net zero:

Since it accounts for the majority of global emissions — nearly three quarters of all emissions — the energy industry has a big impact on the environment⁵. The energy industry is also a major contributor to the economy⁶. For example, The

²<https://ourworldindata.org/millennium-development-goals>

³<https://www.theccc.org.uk/publication/2022-progress-report-to-parliament/>

⁴<https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy>

⁵<https://ourworldindata.org/emissions-by-sector>

⁶https://www.ofgem.gov.uk/sites/default/files/docs/2020/02/oguk_evidence_economic_report_2019.pdf

Guardian published an article in July 2022 on a new study that revealed that over the past 50 years, the oil and gas industry has generated £2.3 billion daily in pure profit⁷.

This implies that the energy industry can play a significant role in achieving the UK's net zero target and creating a green economy, especially being the largest contributor to emissions and gross national income. However, according to a recent report published in November 2019 by Oxford University and the Transition Pathway Initiative and titled 'A survey of the net zero positions of the world's largest energy companies'⁸, only 13 of the 132 companies surveyed in the energy sector (or 10%) had committed to net zero.

According to the study, the energy industry appears to be only beginning to think about net zero. The low uptake by energy companies in committing to net zero implies that more work is needed in the industry to phase out activities that damage the environment.

One suggestion is for all businesses in the global energy industry to work together and make a commitment to net zero, with support from the world governments, starting with the formation of an international working group that establishes a governance and industry strategy for reducing global emissions.

Businesses commitment to net zero:

While the government must meet

its commitment to become net zero, businesses must do the same. The UK is taking the lead, according to the Department for Business, Energy, and Industrial Strategy, with at least sixty of the UK's FTSE100 companies signing up to the UN's Race to Zero campaign as of November 2021⁹.

This represents two-thirds of UK large businesses, however there is scope to expand into other FTSE indexes and capture the entire business community to commit to net zero.



It is also worth noting that small and medium-sized enterprises (SMEs) account for 99% of all businesses in the UK and account for half of all business-related emissions¹⁰. The government launched the 'Together for our Planet' campaign in May 2021 to encourage SMEs to commit to net zero.

However, only 3,357 SMEs had made a pledge by signing up to the UK's

SME Climate Hub as of July 2022¹¹. Given that there was 5.5 million of SMEs at the start of 2021¹², there is an opportunity to engage more SMEs in committing to net zero.

Education and awareness campaigns are one method of gaining support. Higher Education Institutions (HEIs) play an important role in achieving net zero, particularly in terms of education and awareness raising. Climate change was discovered by scientists and academics, and HEIs

continue to have a large pool of scientists working on solutions to this global problem. HEIs are viewed as anchor institutions during emergencies, and in this Climate Emergency, net zero is more important than ever for academic institutions to develop future thought leaders.

UWL is committed to net zero and is working hard to reduce its operational emissions and embed sustainability into the curriculum so that all our students are well equipped to work in the future global green economy. UWL is also committed to helping the local community

in reaching net zero through its outreach work.

UWL's award-winning Fresh Minds for Business programme is one example of how it is assisting SMEs in their transition to net zero. Fresh Minds for Business is a non-profit consultancy service delivered by UWL students and supported by experienced consultants at the Claude Littner Business School.

⁷ <https://www.theguardian.com/environment/2022/jul/21/revealed-oil-sectors-staggering-profits-last-50-years>

⁸ <https://www.oxfordmartin.ox.ac.uk/publications/a-survey-of-the-net-zero-positions-of-the-worlds-largest-energy-companies/>

⁹ <https://www.gov.uk/government/news/cop26-sees-uk-businesses-lead-the-world-in-climate-change-commitments>

¹⁰ <https://www.british-business-bank.co.uk/press-release/smaller-businesses-responsible-for-around-half-of-all-uk-greenhouse-gas-emissions-from-businesses-british-business-bank-research-reveals/>

¹¹ <https://businessclimatehub.org/uk/>

¹² <https://www.fsb.org.uk/uk-small-business-statistics.html>

Through this programme, our students are currently collaborating with local SMEs and local authorities to provide consultancy support for environmental sustainability, which includes education on net zero as well as calculating emissions and making recommendations for reduction.

It is also worth noting that the penalties intended to encourage climate action for all businesses and institutions that fail to comply with the Climate Change Act appear to be ambiguous and limited to participants in trading schemes such as the UK

Emissions Trading Scheme.

Extending the penalty's scope to the entire business community, as well as designing it to favour

climate action, including introducing a carbon tax, could encourage businesses to commit to delivering net zero.

Green finance:

Transitioning to net zero requires significant financial resources. However, some financially vulnerable groups, such as SMEs, third sector, public sector, and low-income households, will struggle to use internal funds for net zero projects and will require external funding to achieve net zero status, implying that green finance must be a key component of any 'Levelling Up' strategy.

The UK government has invested in green finance schemes to assist financially vulnerable groups, such

as the Public Sector Decarbonisation Scheme (PSDS), in which it has invested more than £2 billion to reduce emissions from public sector buildings¹³.

UWL received £5.1 million from the PSDS Phase 1 scheme in 2021, allowing the University to install large-scale renewable and clean technologies such as ground source heat pumps, air source heat pumps, and solar photovoltaic thermal systems. The combined measures save over 520 tonnes of CO₂ per year, bringing the University one step closer

“ As the evolution of technology and methodology demands creativity and innovation, it could be advantageous to promote further diversity in the green skills workforce as this is known to drive creativity by combining a variety of perspectives and life experiences.

to meeting its net zero by 2030 target.

Despite the current funding stream, UNISON published a report titled 'Getting to Net Zero in UK Public Services' in November 2021¹⁴, stating that the public sector can lead the way to net zero, but only if significant government funding is provided.

According to the UNISON report, the UK public sector will require £140 billion in funding by 2035 to achieve net zero. This demonstrates that significant government funding is required to transition to a net zero economy.

However, it also presents an opportunity for other businesses with significant financial resources to assist financially vulnerable groups in achieving the UK's net

zero target collectively; for example, local authorities can take the lead in delivering climate action in their communities by securing green finance and prioritising investment in low-carbon and renewable energy infrastructure, especially in high deprivation areas so that residents can tap into and gain access to free energy.

Green skills gap:

A skilled green workforce is required for the green economy. In January 2022, the Green Alliance published a report on 'Closing the UK's Green

Skills Gap'¹⁵, which identified that the UK is facing acute skills shortages across the sectors that need to decarbonise the most urgently.

The creation of 440,000 new jobs by 2030 is a key goal of the UK government's 'Net Zero Strategy'¹⁶. However, there are opportunities to further define and measure 'green jobs', which should lead to a reduction in the green skills gap.

HEIs play a critical role in closing the green skills gap. While there are examples of UK HEIs taking action to address this, such as some of UWL's degree programmes with environmental modules, this needs to be scaled up so that all courses include some elements of green learning. The Green Jobs Taskforce is assisting the UK government in meeting the target for green jobs. However, there are opportunities for HEIs to collaborate on closing the green skills gap as this is likely to

¹³<https://www.gov.uk/government/collections/public-sector-decarbonisation-scheme>

¹⁴<https://www.unison.org.uk/content/uploads/2021/11/26609.pdf>

¹⁵https://green-alliance.org.uk/wp-content/uploads/2022/01/Closing_the_UKs_green_skills_gap.pdf

¹⁶https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf

result in a far greater impact in a much shorter time.

There is also a lack of diversity in the environmental sustainability sector. As the evolution of technology and methodology demands creativity and innovation, it could be advantageous to promote further diversity in the green skills workforce as this is known to drive creativity by combining a variety of perspectives and life experiences.

Monitoring and reporting:

In recent years, sustainability reporting is becoming increasingly important. Organisations that report are transparent about their impact on sustainability issues. There are several frameworks for sustainability reporting nationally and globally for the private sector, but with little consistency.

In general, sustainability reporting is voluntary in the private sector, though in the UK, large businesses are required to report annually on their energy and carbon emissions performance under the Streamlined Energy and Carbon Reporting regulation, as an example.

However, in July 2021, the Chartered Institute of Public Finance and Accountancy (CIPFA) issued a report titled 'Evolving Climate Accountability: A Global Review of Public Sector Environmental Reporting'¹⁷, which stated that there should be a constant priority in aligning and harmonising activities for the main existing sustainability frameworks.

CIPFA also identified that sustainability reporting in the public sector is in its infancy, and that the lack of a mandate for this type of reporting, as well as the challenges identified in preparation, such as data availability and quality,

are significant impediments to widespread adoption.

UWL recognises the importance of delivering sustainability in all our activities, including teaching, research and operations. The 2021-22 Annual Sustainability Report¹⁸ is UWL's first report, and it details the University's sustainability accomplishments and plans for the future. The SDGs are used to track our contribution. Although we can claim a contribution to all the goals, we have chosen to focus our strategy for sustainability on four core goals and three climate action goals where we can make a particular contribution at local and national levels.

The core goals are where we consider we are already contributing to the realisation of the SDGs as they are part of our business-as-usual activity; namely quality education, reduced inequalities, decent work and economic growth, and health and wellbeing.

In terms of monitoring these goals, we will use established strategies and monitoring mechanisms. For example, for the reduced inequalities, much of the work we already undertake is monitored and reported on through the Equality and Diversity Advisory Group and this will continue.

The climate action goals are ones where we consider that we can make a contribution to sustainability but where we will need to stretch ourselves to achieve this.

These goals are climate action, zero hunger, and responsible consumption and production. For these goals, specific action plans will be drawn up as part of the sustainability strategy and monitored through the Environmental Review Board.

How do energy managers inform and engage that we are on a continuous journey and Net Zero is just a milestone?

Communication and engagement are critical to achieving net zero and beyond. Energy will be one of the largest sources of emissions for most organisations, so communications and engagement must not be overlooked.

At UWL, the key to ensuring long-term engagement in net zero and beyond is to embed sustainability throughout our existing governance structure, as this is the only way for it to become 'business as usual'.

“ Is it naïve to suggest there is no need or place for offsetting when there are challenges to net zero that are not being addressed quickly enough?

We are working hard to ensure that sustainability is on every committee's and meeting's agenda, and it is done in an appropriate and relevant manner that touches every aspect of the institution. Sustainability must not be treated as an afterthought, but rather as a central theme in all discussions.

Among the most recent examples of our communication and engagement work are the campaigns we ran in 2021 during the PSDS Phase 1 decarbonisation project. During this project, UWL ran campaigns to encourage staff and students to think about energy management on campus and beyond.

¹⁷<https://www.cipfa.org/protecting-place-and-planet/sustainability-reporting>

¹⁸<https://www.uwl.ac.uk/about-us/sustainability#Sustainabilitypolicies>

We also invited our engineering students to see the technologies that have now been incorporated into formal teaching, as well as holding information sessions with the local community to provide insights into the University's future plans and soliciting audience feedback on what could be done in the future. To engage key audiences in energy management, a dedicated web page was created for this project¹⁹.

In terms of broader sustainability, our students learned about biodiversity by participating in the redesign of the Memorial Garden at the main campus in Ealing, west London, as well as by assisting with carbon footprint labelling on our food menus.

Work is currently being done to develop a sustainable travel plan, which will be completed in collaboration with our students.

These examples provide a snapshot of how important it is to engage key stakeholders in sustainability activities and use it as an opportunity to keep the sustainability conversation moving forward.

Is off-setting on the table beyond 2040, and if so, why?

In an ideal world, the answer would be 'no,' because all humans and organisations will have reduced their consumption of unsustainable materials and resources to zero by 2050, eliminating the need for offsetting. However, is it naïve to suggest there is no need or place for offsetting when there are challenges

to net zero that are not being addressed quickly enough?

While the world is divided, the Intergovernmental Panel on Climate Change identified offsets as one of the tools for accelerating climate action in its Special Report in 2018²⁰. However, offsets should not be used as a long-term solution, but rather as an interim measure whilst working to fully transition to net zero.

Organisations such as the United Nations Environment Programme²¹ recognise the environmental, social, and economic benefits of offset projects such as reducing and capturing carbon, improving air quality, and allowing vulnerable people to access green finance to fund such projects. However, offsets should not be used as a "get out of jail free card", and instead used when no other feasible options for reducing emissions exist.

According to other reports, the net zero transition will be difficult in some hard-to-abate sectors, such as aviation, heavy industries, agriculture and food including beef cattle²². Many organisations still find it difficult to address scope 3 emissions, whole-life embodied emissions, and historical emissions; for example, our NHS needs to tackle healthcare incineration.

The challenge for governments is to build a sustainable developed world by equally balancing priorities on three core pillars: environmental, social, and economic. The ongoing challenges imply that offsets will play a role until organisations and world governments fully transition to a

green economy.

While there is an offsetting programme in the hard-to-abate aviation sector called CORSIA that is expected to mitigate approximately 2.5 billion tonnes of carbon between 2021 and 2035²³, offsetting a tonne of carbon under CORSIA currently costs on average \$3-5 as a minimum²⁴.

The risk with low-cost offsets is that they make it less appealing for businesses to reduce their own emissions, and that lower-cost offsets do not reflect the true lifetime cost of the offset project including maintenance, assurance and insurance as well as consider the time it takes the project to reduce or capture carbon against the time carbon stays trapped in the atmosphere. The current lack of governance in the voluntary offset market enables potential mishandling of offsets.

Taking current issues into consideration, because offsets play a role in a net zero transition strategy, it is then critical that proper rules in the voluntary market is in place so that the public can only access credible offsets.

Author's Profile:

Nasrin has over ten years' experience in sustainability and is an ISO14001 and ISO50001 qualified lead auditor with experience in developing and implementing sustainability strategies and conducting compliance audits. In 2020, Nasrin was named one of edie's '30 under 30 next generation of sustainability leaders', and the EMA commended her as the 'Energy Manager of the Year'.

¹⁹<https://www.uwl.ac.uk/about-us/sustainability#carbon>

²⁰<https://www.ipcc.ch/sr15/>

²¹<https://www.unep.org/news-and-stories/story/carbon-offsets-are-not-our-get-out-jail-free-card>

²²<https://www.mckinsey.com/business-functions/sustainability/our-insights/sectors-are-unevenly-exposed-in-the-net-zero-transition>

²³<https://researchbriefings.files.parliament.uk/documents/CBP-8826/CBP-8826.pdf>

²⁴<https://www.lexology.com/library/detail.aspx?g=9186aa5b-57d7-4f8d-939a-2465be903c56>

Career in Energy Management

The Energy Managers Association aims to encourage and enable more professionals to enter the world of energy management and environmental roles. Being an environment and energy manager may not seem like the most obvious career for many. The EMA has taken on a challenge of changing the perception of energy management and associated fields, by raising the sectors' profile and sharing insights into the career progress and achievements of leading energy management professionals.

In this edition, we have asked Colin Hawthorne, FM Contracts Manager, (UK and International) at Jaguar Land Rover about his career in energy management so far.



What is your personal story? What was your journey to the position you are in today?

I qualified as a Marine Engineer and spent seven years at sea on a variety of older steam ships (probably the last generation of engineers to qualify on steam sadly) before moving shoreside once starting a family. My experience of boilers and combustion led to me joining the automotive industry to take on the running of a site boiler house with a brief to increase efficiency and extend its life.

Following the successful completion of the boiler house improvements and

the subsequent increase in efficiency and reduction of emissions and cost I took over as the site utilities manager, again with a brief to improve energy efficiency and reduce cost across the manufacturing site. This really sparked my interest in the science behind energy efficiency and the many ways it is possible to influence behaviour of the site occupants and drive the energy agenda forward.

I next took on this role for the wider business as regional utilities manager with responsibility for all European sites, excluding Germany, which had its own regional utilities manager already.

I then spent several years working to standardise activities and actions across my region and drive energy reduction throughout the business with a series of both project and investment opportunities and also with behavioural change activities. During this period, I had studied and passed the Energy Institute's EuREM training package which helped to solidify my experience and learning as an energy manager.

In 2013, I was approached to join another automotive manufacturer and became UK Energy Manager for Jaguar Land Rover (JLR). I introduced energy reporting metrics such as the non-production factor, led project development and funding applications and became an ESOS lead auditor to guide JLR through the introduction of that new legislation.

Amazingly, I am now just starting to plan phase three compliance activities, time really does fly. I am now a Chartered Energy Manager through the EI and my role within JLR has changed to incorporate facilities management activities, contract management and the energy manager role, which has become much more focused on sustainability and decarbonisation.

I am currently producing decarbonisation plans for a number of warehouses across the globe for which I also have FM maintenance responsibility and really enjoying the chance to talk with, and learn from colleagues from the US, China, Dubai, France, Spain and the UK and lead them on our sustainability journey.

What does your role at your organisation entail?

I have a split role at the moment, being responsible for FM contracts in UK and internationally, and secondly developing decarbonisation plans for those same sites.

What is the most exciting part of your job?

Meeting with site representatives from different countries and cultures and unifying their thinking regarding the journey to Net Zero.

What is your biggest achievement to date?

Introducing a weekly energy metric to the business – Non-Production Factor. It shows just how much energy is used (wasted) when everyone is at home. First results were in the order of 40-50% but over the last six years I have seen this reduce to regularly achieve 15% i.e., only use 15% of the full production electricity out of hours. There is still room for improvement, but it is now an ongoing process of refining shutdown procedures and starting up as late as is safe to do so. This is discussed every week on our sites and keeps energy on the agenda.

What was the most exciting project that you worked on and why?

Despite everything I have seen and done over the years I still think that the first project I ever worked on in automotive was the most exciting and productive. I joined an automotive manufacturer to manage the boiler house and found thirty-five-year-old boilers that had not really been upgraded since being converted to natural gas in 1975. I was able to review the boiler operations, write a specification for a new boiler management and combustion control system, complete with inverter drives

on the FD/ID fans and a new emissions monitoring system. It took two years to secure funding and another two years to complete but the outcome was a very satisfactory 40% reduction in gas usage and associated emissions with improved uptime and decreased maintenance requirements.

This came with a hefty cost reduction, and it was this project that led me to become the site utility manager and start my journey as an energy manager that has led to where I am today.



What is the most frustrating part of your job?

Watching sustainable elements of new builds and renewables installations being 'value engineered' out of projects on grounds of cost. This is now changing and our commitment to SBTi is a significant step forward in ending this short-sighted approach to major projects.

If you had the opportunity to change one thing that would make your job easier, what would you change?

I would make it an absolute condition that all projects would be subject to lifecycle analysis to prevent the use of cheaper and less efficient equipment or installations becoming a drain on the operational and carbon budget of the site.

If you could recommend three things to have success as an environment and energy manager, what would you recommend?

Knowledge – never stop learning.

Resilience – everyone is under pressure and will not always have time for 'the environment' so you need to be their conscience and keep pushing for what you know is right.

Collaboration – you cannot do it all yourself, do not even try. You need allies in the business and finding like-minded people who are interested in the environment even when it is not directly part of their roles is invaluable and makes progress more likely.

What advice would you give to someone looking to become an environment and energy manager?

Take the time to understand the processes and activities that go on in your company – if you understand what is happening it is easier to identify opportunities to reduce energy/

carbon/cost that are acceptable to business managers and less likely to be thought of as a diktat from the 'ivory tower'. It is about supporting the business whilst driving the necessary change to reach net zero.

What is the most absurd statement that you have heard in your job?

So many to choose from. "Compressed air is free" is probably the one most often heard which is ironic given its huge expense to a business, and usually uttered by people who have just teed into the main to provide a cooling flow of air to an overheating power supply rather than repair/replace it.

What are your long-term motivations in the company or the position?

I am fully invested in helping achieve the 2030 SBTi targets set for our business which will move a significant way towards the Net Carbon Zero by 2039 commitment.



Women in leadership interview

While it is perceived that there are many structural and other barriers that limit women's progress through the ranks in energy management, we would like to explore a different question: how have the women who have made it to the very top in energy management overcome those barriers. Keira McLuskey, Head of Sustainability for Network Rail (Scotland) shares her career journey so far.



What is your personal story?

About three quarters of the way through my geography degree, I knew that environmental science was where my real interest lay so I immediately signed up for a post graduate diploma in environmental management. I chose the diploma over the Masters because it offered a six-week industry placement and I thought my CV needed some experience other than working in video shops and cinemas!

I finished my exams on the Friday and started at Halcrow (now Jacobs) as an environmental auditor the following Monday morning. I had a couple of different roles, but I worked on Strategic Environmental Assessment and Environmental Impact Assessments auditing and CEEQUAL assessments.

I moved to Network Rail in 2013 to take up a role as Environment specialist, covering all of Scotland. At that point, environmental management was very much a poor cousin to health and safety and sustainability was not a well-known discipline.

My first year at Network Rail was a baptism of fire but I loved my role as I was given the autonomy to choose what to focus my time and efforts on and could see so much potential for growth and positive change – both in myself and in the business.

After a couple of years, it became clear that if I wanted a more senior

role then, I would need to move to our HQ in Milton Keynes, broaden out to Health and Safety or go elsewhere. But I was driven by the challenge and loved seeing the month-on-month improvements so I got my head down and stayed put.

I got my first shot at management when I took up a secondment with ScotRail and managed a team across both Network Rail and ScotRail. My main objective was to merge the teams to achieve common goals. I learned a lot but was not successful in gaining the permanent position and at that point 9 months pregnant, so after some maternity leave went back to my old role.

I had got a taste for leadership though and so did a couple of courses and went about trying to convince my organisation that they needed senior sustainability roles. It was a long slog but with a little help from Greta Thunberg and David Attenborough,

encouragement from my line manager and a progressive managing director, I created a team structure, wrote a strategy and convinced our Executive team, it wasn't really a choice.

I successfully interviewed for my current role the day before my second child arrived in the world and now manage a team of 11 with an aim to deliver the Scotland's Railway sustainability strategy.

What does your role entail?

Other than spending far too much time in Teams meetings, I provide regular leadership and direction to Scotland's Railway Executive and wider business on sustainability issues to meet legal targets, stakeholder expectations and internal objectives, drive continual improvement and deliver a sustainable modern railway for Scotland. I lead a newly established team of eleven specialists, providing motivation, support and guidance to continuously develop and grow the team.

Did you always know where you wanted to be professionally at this stage?

No. If I am being completely honest,

I have never been hugely driven by titles, salaries or the number of people working under me - and I'm certainly not following a 10-year plan! I have focussed on adding value, continual improvement and standing up for what I believe and know is the right thing to do.

I haven't got to where I am through chance though, I have set personal objectives, worked hard and I am driven, but for a sense of satisfaction, for trying to make a positive impact, and doing a job that I enjoy and that I am challenged by.

What is your leadership style?

I am fairly fluid and able to switch between styles as and when the context requires it. In my current role, I have had to establish a new team and I believe my inclusivity has helped people feel valued and confident to speak up. However, we also need to deliver against a lot of regulatory targets and deliver a strategy with demanding timescales so I am also decisive and at times lean towards a more visionary style.

I have been fortunate to be surrounded by many great leaders in my career.

My confidence has grown by watching and learning from others and through seeking feedback and advice from mentors, managers and other colleagues I respect and look up to.

What are, from your perspective, the biggest challenges for women in energy, sustainability and environmental management leadership roles?

This is a big question! Women are hit harder by imposter syndrome which can be hugely debilitating, women are more likely to give up work to become a carer and despite it being 2022 many women's careers suffer when they take time away to start a family. I devalued my own expertise and discipline for a long time and it took a particularly excellent (female) line manager to help me find my voice.

I am very fortunate to work for progressive and fair organisation and was promoted despite being on maternity leave at the time. Many others are overlooked and dismissed – the Pregnant Then Screwed website/ Instagram demonstrates how big the problem is.



Team tree planting day at Govan docklands during COP26



What can women do to overcome these challenges or to change these situations?

We need to support one another and raise each other up. We should open doors for females in junior positions and offer to mentor the less experienced. We also need to challenge the status quo, call out poor behaviour and create targets and policies that include both men and women so we can identify and eliminate barriers for everyone taking leave.

I don't think it is all on women though, we need to lean on our male allies, plus diversity is good for business. If for nothing other than improved performance, organisations should have strategic plans to increase the number of females in their leadership teams.

Many people struggle with finding a mentor or support to help them in their career journey. Did you ever receive any form of support or mentoring as you moved along?

Years ago, I enrolled in the Women in Rail mentorship scheme, I got paired with a really experienced, confident woman and felt empowered just being in her company. The scheme lasted a year but since then, I've had multiple mentors and can't recommend it enough. Some have been one-off sessions and others, like my current mentor, longer term. They have all come about by being pro-active and seeking out guidance and advice from people I look up to and respect.

I always have an objective for what I want to get out of a session, whether it's advice with a specific problem I'm dealing with, general tips from someone that is a leader in that particular area or a tactical session with someone I know who can help open doors for me. In my experience, people have always been happy to assist, and a good leader will always be willing to help others to succeed.

What about training? For those who want to be leaders, do you advise

that they get any formal training on how to lead?

I did ILM3 and would recommend it. I think experience counts for a lot but a formal qualification provides the leadership theory and shows commitment to your learning and development.

Looking back, what three pieces of advice do you have for your younger self?

- What you have to say is important, try to be confident and don't back down.
- Break out of the silos, I know you find networking uncomfortable but it will help you.
- Take your personal development plan seriously, spend time on it writing and actioning it – you absolutely do have time!

What are your long-term plans professionally?

The railway is already the greenest form of public transport but we have committed to the decarbonisation of passenger services by 2035 and to be net zero by 2045.

We need to transition to a circular economy, achieve biodiversity net gain across our estate, create social value and make our railway more robust to the impacts of climate change. There is a lot to be done!

I truly believe that green rail is essential for achieving climate change targets and I hope I can be effective enough, for long enough, to see these goals become a reality.

On a more personal note, I want to grow to be a better leader, I want to further build my network to create and develop new opportunities, I want to innovate and introduce smart, green technology and I want to get to the bottom of my inbox each week!



ema

ENERGY MANAGEMENT AWARDS 2022

2022 Awards' Categories:

- Energy Manager of the Year - Private and Public Sector
- Energy Management Team of the Year - Private and Public Sector
- Sustainability Manager of the Year - Private and Public Sector
- Utilities Manager of the Year - Private and Public Sector
- EMA Member of the Year - nominated by the EMA
- Young Energy Management Professional of the Year
- Net Zero Strategy of the Year
- Decarbonisation Project of the Year
- Energy Management Consultancy Partnership of the Year

**CATEGORIES
&
NOMINEES**

**SUBMIT
BY
7 OCTOBER**

**TERMS
&
CONDITIONS**



ENTRIES

Entries are free of charge and open until 7 October 2022.

WINNERS AND HIGHLY COMMENDED

The winners and highly commended in each category will be announced during a virtual awards' ceremony in November 2022.

[**www.theema.org.uk**](http://www.theema.org.uk)



From self-driving cars to water treatment: how AI is shaping industry

Artificial Intelligence (AI) – or the ability of a machine to intelligently adapt in some way to what is going on around it – is now surprisingly common. In fact, it can often come as a surprise to realise there is AI in an appliance; in the same way that twenty years ago it was surprising to learn that there was a microcomputer inside your washing machine.

There are plenty of incredible examples of AI at its best all around us. Tesla's much vlogged full self-driving function on its electric cars is packed full of artificial intelligence. Using live data from five onboard cameras, ultrasonic proximity sensors and a digital map, the company represents some of the most ambitious leaps forward



Tesla autopilot



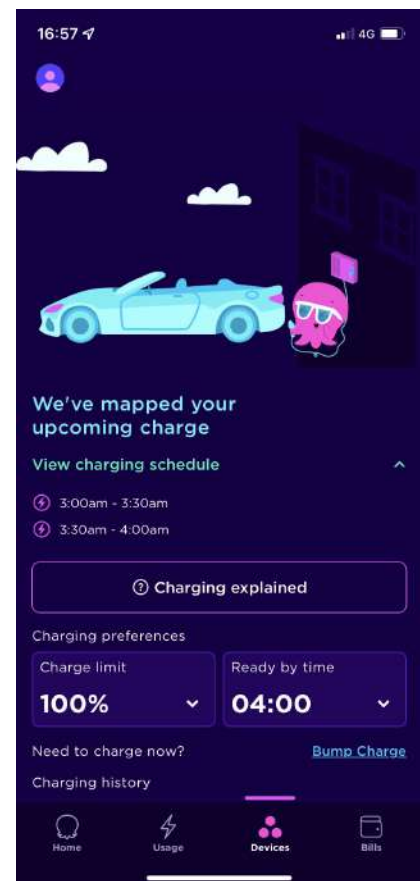
Amazon's Digital Assistant, Alexa

in autonomy through AI. It is hard to comprehend the thousands of decisions and reactions that must be made every second by a machine, in order to control a car safely in all circumstances.

Closer to home, our favourite digital assistants have quietly entered our lives. Alexa uses one of the most sophisticated natural language processing algorithms (a branch of Artificial Intelligence) ever conceived.

The breadth of commands we might throw at 'her' without a moment's notice is overwhelming. Not only can she differentiate accents and colloquialisms, she can also cope with commands as diverse and unexpected as "How old is Tom Cruise" or "play the song that goes like this <attempts to sing the song>." - An impressive AI application that has quickly become an everyday part of our lives.

Here in the UK, a good example of AI in use is Octopus Energy's mission to transform the energy sector. Founder Greg Jackson's dream is to utilise untapped capacity in the electricity distribution system by influencing consumer demand. Arguably one of their key facilitators is Kraken Flex – using AI to provide projections of electricity demand, availability, and



Octopus dynamic electricity tariff using Kraken Flex AI

prices. Armed with this technology Octopus can now incentivise time of electricity use through innovative tariffs. Users who can be flexible in when they take power, for example to charge their car at short notice; can benefit from significant price reductions. These tariffs are only commercially viable for Octopus with the confident predictions that come from the AI tool.

Could influencing consumer behaviour through AI based tools, i.e. through knowledge and fiscal incentives, be a powerful tool in addressing climate change?

A look into most sectors and we see predictive analytics used in many ways to make processes slicker, to enable monitoring and analysis of ever-more complex global supply chains; identifying efficiencies to improve the customer experience, and to help reduce energy and resource consumption in the vital services many of us provide and / or receive.

AI for industrial process optimisation

One of the most common industrial

applications of artificial intelligence is to use machine learning (ML) – a form of AI - for optimising processes. ‘Industrial processes’ are vastly diverse and can be found in any of the thousands of industries in the modern world from manufacturing goods, water treatment, maintenance, customer services, supply chains, to growing food.

Ultimately, the aim with machine learning applications is to target and use data to emulate the years of experience a process operator may have gained from managing a process through thousands of scenarios.

If the key variables that influence the outcome of a process are measured, and the outputs are also captured, then a machine can be taught how to react under different scenarios, to intelligently adapt to changing inputs.

What does it mean for an Energy Manager?

“ Ultimately, the aim with machine learning applications is to target and use data to emulate the years of experience a process operator may have gained from managing a process through thousands of scenarios.

Optimising processes can sound abstract, but there are plenty of examples of solutions that have introduced quantifiable financial (£) and energy consumption (kWh) savings. A real example is seen through the process of treating water – a process that typically involves mechanically energy intensive steps like pumping water and compressing air, as well as chemical treatment and high-pressure filtration.

Fine tuning the process to react dynamically to changing conditions can uncover many small savings that aggregate over time that have been shown to offer efficiency savings as high as 10-20% across the whole process.

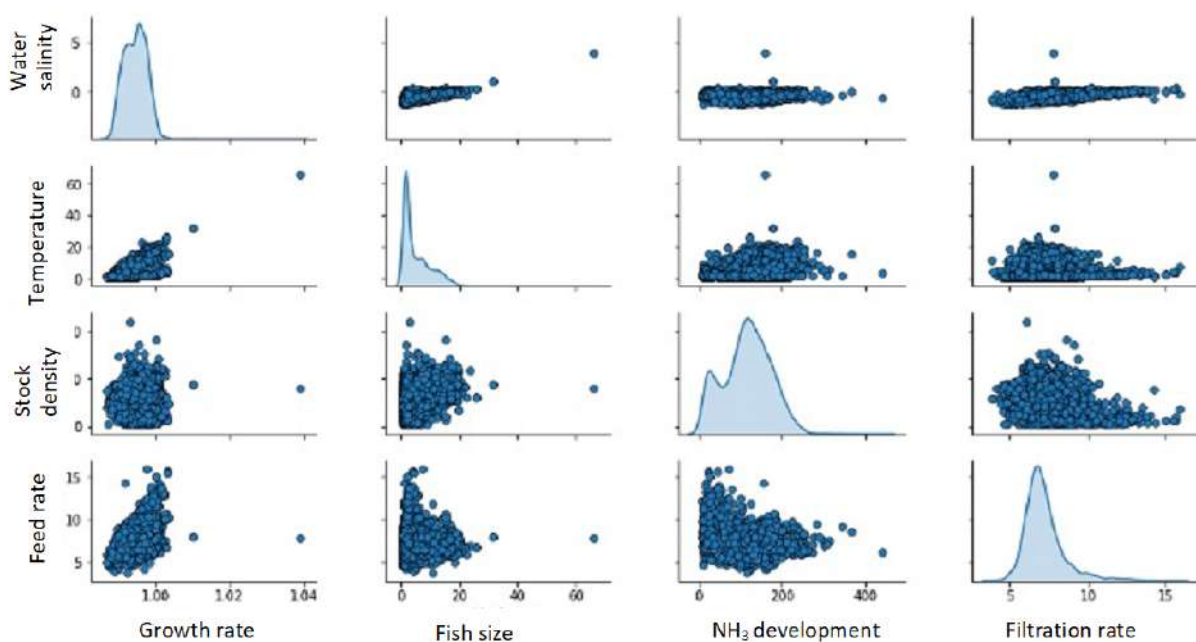


Figure 2 Multi-variate analysis of a salmon farming process

These savings may come from true reduction in kWh consumed as a result of less use of energy intensive assets, a reduction in chemical use, or from cost savings from shifting load to coincide with lower cost tariff times. Because of the dynamic variations in processes such as this; efficiency improvements can really only be attained by using advanced solutions that machine learning and artificial intelligence approaches offer.

Of course, there are additional benefits that can come from machine learning solutions. Frequently they are introduced to improve process efficiency but often they have the net effect of making operator jobs simpler at the same time. By using Machine Learning solutions to make process decisions we have the opportunity to remove much of the downsides of human subjectivity including conservativeness, or recklessness, and replacing it with consistent, quantitative decisions within pre-defined safety margins.

Improving the quality of decisions made by humans has massive potential to improve global efficiency and productivity through the removal of subjectivity, off-days and human-error.

“Success in creating AI would be the biggest event in human history. Unfortunately, it might also be the last, unless we learn how to avoid the risks.”
— Stephen Hawking

Are the Machines taking over?

Of course Machine Learning and AI in general do not come without some risks, limitations and need for consideration. For instance it can be natural to be concerned about the replacement of jobs by machine learning or AI solutions. While this concern may be founded in a

handful of cases, in industrial AI/ML applications this is rare.

A more common scenario is that ML solutions are used to enhance and assist what human users are doing, and increasingly AI solutions are unlocking our ability to do things that would simply have been too complicated to do previously.

AI has the potential for improving efficiency and output through better and more informed decision making, but with that potential comes the need for responsible and ethical approaches when creating AI solutions. While it is absolutely right to carefully consider the exponential growth of AI and its impact on our daily lives, it would be incorrect to imagine that machines are doing anything more or less than what they are programmed to do, by us.

“ AI has the potential for improving efficiency and output through better and more informed decision making, but with that potential comes the need for responsible and ethical approaches when creating AI solutions.

Creating AI solutions

The creation of new and unique Artificial Intelligence applications is not beyond the reach of any organisation. There is so much potential to improve almost any part of an organisation's processes. Creating AI solutions is really a combination of Data Science, Data Engineering and Software Engineering.

If you are a process owner who can see a potential role for AI in your day-to-day work then you are wholeheartedly encouraged to contact your in-house data science department (many large organisations now have these), or a data science specialist organisation to see if your

idea has real potential.

Ambitious AI solutions – think Alexa or Tesla self-driving – are years in the development with hundreds of developers behind them, but more modest process-centred applications can be created in months and can often have strong cost-benefit returns. Creating solutions such as these typically follow four key steps to success:

Step 1: Your data

Do you have data that captures the key variables of your process? Most organisations are drowning in data, but a common worry is that data is often spread across different systems or of questionable quality.

AI needs data and data feeds and so this is always the first consideration once the drivers for the AI solutions

have been established. Pulling from variable data sources, verifying data, and cleaning data sets of errors and misleading readings is a standard part of this process.

Step 2: Selecting or creating a data model to fit your application

A model will describe how the variables interact. For example, a bread making data model might describe how baking time changes with different oven temperatures, ingredient quantities and baking moisture levels.

Sometimes research has already been done to investigate the relationship between the variables and a data model can be selected from online open sources. However, in many cases a new model will need to be created by examining the data to confirm various hypotheses e.g. will a lower oven temperature and longer cooking time result in a loaf of better or inferior quality?

By examining how multiple variables interact, and seeking statistically reliable relationships between them, a best-fit data model (sometimes named an algorithm) is created that can describe expected outcomes from given inputs. Complex AI solutions often involve multiple data models.

Step 3: Teach and test

This is an important step where the full strength of the data is converted into 'artificial experience.' Teaching can be both a human process and a machine process, typically with a process expert providing input on some of the significant real events that might have happened and describing how it shows in the data. The machine is left to crunch the years of more mundane data.

The model is tested for accuracy by allowing it to predict results and then observing how closely they match real world outcomes. Final calibration and adjustments can be made to improve the match.

Step 4: Operationalise

Arguably, this is the step that differentiates AI research projects from commercially deployed AI solutions, for example Alexa having immediate answers and Tesla in driving mode without crashing. These AI models work because they are almost perfectly operationalised i.e.

the theory is matched by the way they work in reality.

Not all solutions need to operate in real-time, but all solutions need to have robust data feeds and an ability to compute quickly so that the user gets feedback as soon as it is needed. Scalability to deal with large quantities of incoming data or users is also an important element of operationalisation.

Typically the hardware for measuring and feeding latest data into the data model needs to be in place to support the speed of the process. Cloud computing is often the facilitator in many solutions allowing input data to be computed in microseconds and served back to the user with an answer. Whatever the AI challenge, how to operationalise the solution so that the user's experience is seamless is a critical step.

The future

The range of AI applications around us today and the role AI has played in transforming industries and commerce is impressive. While there are many examples of big game-changing AI developments in our lives, we should also remember there are millions of examples of AI being used to deliver small incremental benefits of equal aggregate value.

It is hard to think of a sector today that would not benefit from some form

“ While there are many examples of big game-changing AI developments in our lives, we should also remember there are millions of examples of AI being used to deliver small incremental benefits of equal aggregate value.

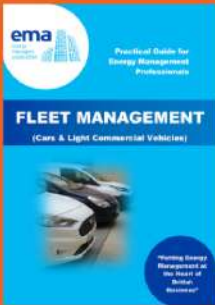
of change to support the challenges of climate change and relentless economic pressures.

The good news is that if you have the data, and a relatively complex problem, then creating a new AI solution to help solve that problem has never been easier to achieve.

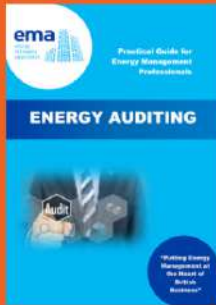
Author's Profile:

Matthew is Managing Director of HAL24K Water, an organisation specialising in the creation of AI solutions for the built environment. Matthew has a 25-year career in the utility sector developing innovations, leading digital transformations and promoting new digital solutions that help drive industry into the future.

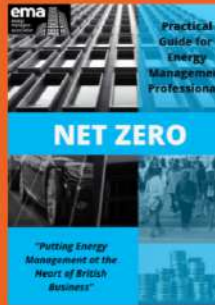
PRACTICAL GUIDES



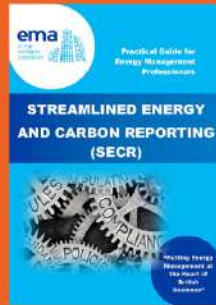
FLEET MANAGEMENT
(Cars & Light Commercial Vehicles)



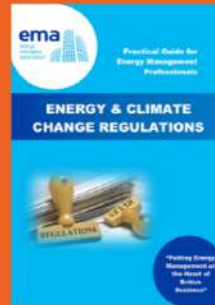
ENERGY AUDITING



NET ZERO
"Putting Energy Management of the Heart of British Business"



STREAMLINED ENERGY AND CARBON REPORTING (SECR)



ENERGY & CLIMATE CHANGE REGULATIONS

FOR ENERGY MANAGEMENT PROFESSIONALS

Bedford's Green Energy Innovation Park

Project Overview

Bedford's Green Energy Innovation Park is a project to deliver low carbon, clean energy generation technologies on a closed 30ha mineral extraction and waste disposal site. It is a prime location situated on the Oxford-Cambridge Arc with close links to the M1 and A1 Motorways. It will act as a model to provide an education resource, training and encourage others to reduce carbon emissions, adopt innovative technologies, and improve air quality.

The development promotes education through joint working with two universities and local colleges, while promoting the wider acceptance of renewable energy technologies. It also provides the Council with the opportunity to generate green, clean energy through the initial solar farm project constructed on the site.

The first project to be developed on this site was the Elstow Solar Farm, which has the capacity to generate up to 4.2MW of clean energy that feeds into the national grid. The solar farm is connected to the DNO's substation. The clean, green electricity generated is put onto the grid and has enough energy to power over 1,000 homes.

When initially proposing this project for approval, the options for this site were;

1. do nothing,
2. await the market to develop the site and create the Energy Park,
3. for the Bedford Borough Council to develop the site itself.



Bedford's Green Energy Innovation Park

Option 3 was the most viable option because it allows the site to generate the clean energy quicker, provide jobs in the current economic climate, and potentially kick-start the early green innovation and energy for businesses to develop and grow in Bedford.

The total project cost was £4,150,000 and is broken down by that of funding from South EAST Midlands Local Enterprise Partnership (SEMLEP) of £1,867,500 and that of the council's contribution of £2,282,500.

Feasibility

The first step taken was to find a key partner organisation to help the Council make an informed decision on the technology and assist with putting a robust business case and funding bid together. The

chosen partner carried out financial modelling to assess the feasibility for the best-sized solar farm to fit onto the site's allocated footprint and of the grid capacity to export.

Capping and restoration work

The Council's work to cap the entire closed landfill site with clay in accordance with the planning approval for this site has now been completed. The southern slope of the site was set aside for the solar farm and split into three operational areas: Area 1, 2 and 3. By November 2021, all three areas were capped and levelled with clay and inert materials to make the ground ready for the installation of the solar farm.

The southern slope of the landfill site where the solar panels were

installed was primarily capped with a one metre thick layer of clay compacted in 250ml layers through an approved CQA procedure. The capping layer was then overlain with at least 1m thickness of restoration soils to protect it. Steeper slopes were regraded to achieve a 1:7 uniform gradients across the site.

A further element of the current onsite leachate extraction system was also installed, made up of leachate wells and fin drains. The installation of these was challenging as it involved drawing down leachate. To facilitate this work, we used heavy machinery to dig up to 5 meters below formation level to install the fin drain. A lagoon at the bottom of area 3 also needed to be drained through the onsite pump as part of the overall restoration requirements and future management of the site.

The Environment Agency (EA) required various surveys, geotechnical information and CQA validation reports upon completion of each of these areas, which have all been sent off and approved by the EA.

Solar PV installation

Bedford Borough Council went out to open tender for the works to install the solar PV panels which included as a minimum; transformers, mounting

structures, solar PV modules, inverters, LV Switchgear (DC and AC cabling), security system, CCTV, fencing, control and fibre cabling and ancillary and control equipment.

Solar modules needed to be secured, mounted and tightened on a very stable and durable structure, protecting the array against various weather impacts. In order to secure the solar panels to the site, piles and mounting structures have been installed to give a strong foundation.

As our site had to be capped, pile testing was needed to make sure the ground was secure after the capping. All piling work including auguring, ballasting and installation of the mounting structures commenced in November 2021 and was completed by February 2022. The solar PV installation began in January 2022 and finished in early April.

The project contains some 8,004 solar panels installed onto the mounting structures across the Southern Slope. Low Voltage (LV) and High Voltage (HV) cabling was installed in ducting in order to connect the solar panels to the substation. The procurement of the solar PV panels caused some problems due to supply chain issues during the COVID-19 pandemic. There was a force majeure with our original solar PV panel order, however,

our partner organisation was able to switch suppliers and source the panels from the USA instead which resulted in minimal delays.

Grid connection

Throughout this process, we have been working with the DNO, in order to connect the energy project to the National Grid. The size of the array has been limited by the grid capacity in the area. If we wanted to increase the array size, an upgrade to the grid would have been needed which was outside of our budget.

Working with the DNO has been challenging as they have their own schedules and it is difficult to get projects expedited. With hindsight, we would have allowed more time for organising with the DNO as this did slightly delay the project fully going live and generating to the grid.

The DNO fully mobilised on site in March 2022 and installed trenching, ducting and cabling work for their substation. The new substation GRP (Glass Reinforced Plastic) unit was installed on a new concrete pad, and equipment fitted inside the substation in readiness for final connection.

The DNO issued us with our import and export MPANs and we arranged with our energy suppliers for



PV panels installation



Site visit

installation of an import-export meter. There were delays with this due to supply chain issues with this specific type of meter. The meter was installed on 12th June and the bench testing completed the week commencing 13th June. Generation from the site onto the grid occurred on Monday 27th June 2022.

Project Evaluation

Overall, this has been a very successful project even though our energisation and commissioning dates have been pushed back a couple of months.

Over the past few years, there have been unforeseen issues with supply chains, which we have overcome by establishing excellent relationships with our contractor and suppliers. This had been factored in to our funding agreement with SEMLEP, which allowed for some movement on the timelines towards the end of the project.

The original deadline was to be fully constructed and generating energy by 31st March 2022. However, due to the issues we faced during the project, this was pushed back to June 2022 instead.

A point of note that came from this project was the amount of time it took for the DNO to process the various parts of this project. If we had known this, and had the luxury of time (had to deliver the project to meet the funding requirement criteria, timescales) we would have started the application to them earlier to get things moving further ahead of time.

Future plans

We have signed a Spill PPA agreement with our energy supplier for the time being in order to sell surplus clean energy back to the National Grid to help us generate income. There are alternative long-term arrangements

that we are looking into, including partnering with local businesses or educational partners.

As this project is now ending, the Council is currently developing plans for restoring the remainder of the landfill site into other renewable energy end uses utilising the latest technology including energy storage and ground/air source heat pumps.

Authors' Profile

Shah Faisal – Project manager for capping/restoration of the closed landfill site and the solar farm.

Paul Pace – Fulfilled the project sponsor position and was responsible for the overall delivery of this project

Gemma Drake - Environment Officer (Carbon Reduction) supported the project team with great enthusiasm.

The Government Response to the strengthening the ESOS consultation

The anticipated Government Response¹ to the consultation on strengthening the Energy Savings Opportunity Scheme (ESOS) which proposed changes to increase the energy and carbon savings made under the scheme and align it to the UK's net zero commitments was published by the Department for Business, Energy and Industrial Strategy (BEIS) this summer.

The Government Response sets out a summary of feedback received, and decisions made, following careful consideration of the responses with widespread support across the groups of respondents for the proposals.

Some of the ESOS reforms are expected to be implemented in advance of the current Phase 3 compliance deadline, and others in Phase 4, although this will be subject to the Parliamentary timetable and scrutiny of the necessary legislation.

Regulations for the Phase 3 changes are intended to be brought into force ahead of the 5 December 2023 compliance deadline. BEIS and the Environment Agency will work with relevant stakeholders including Professional Bodies which register ESOS Lead Assessors, Lead Assessors and the scheme participants on advancing and embedding the changes. The changes relate to:

- A standardised template for including compliance information in the ESOS report, generally comprising ESOS information the participant should already have available
- The reduction of the 10% de minimis exemption to up to 5%
- The addition of an energy intensity metric in ESOS reports
- Requirement to share ESOS reports with subsidiaries
- Requirement for ESOS reports to provide more information on next steps for implementing recommendations
- Requirement for participants to set a target or action plan following the Phase 3 compliance deadline, on which they will be required to report against for Phase 4
- Collection of additional data for compliance monitoring and enforcement

The Government and the Environment Agency will also work with ESOS Professional Bodies to identify which changes could be made to improve the quality of ESOS audits in Phase 3 through more active monitoring of ESOS lead assessors' work.

The changes for Phase 3 will involve additional reporting to the scheme

administrator (the Environment Agency) via the scheme portal, and other improvements in the quality of audits. They will generally not require re-visiting site level audits that meet the requirements under the current ESOS regulations.

However, some organisations may be required to audit additional sites as a result of the reduced de-minimis. Given the Total Energy Consumption (TEC) must include the qualification date, it cannot be calculated until January 2023 at the earliest.

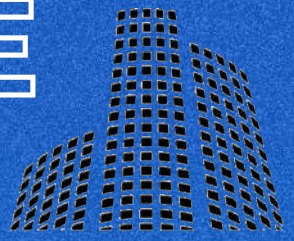
The addition of a net zero element to ESOS audits will not become a requirement until Phase 4. However, BEIS is currently working with BSI on the production of a new net zero audit PAS standard, which will enable ESOS participants to implement the proposal in Phase 3 on a voluntary basis.

Participants can also implement other Phase 4 changes on a voluntary basis in Phase 3. ESOS participants should consider these new requirements when they appoint Lead Assessors for the purpose of reviewing or carrying out the ESOS assessment.

Updated guidance on all the proposals, including more detail on new elements, will be provided by the Environment Agency as soon as possible.

¹Strengthening the Energy Savings Opportunity Scheme (ESOS): Government Response, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1094702/energy-savings-opportunity-scheme-consultation-govt-response.pdf

EMA CORPORATE PARTNERSHIPS



AFFILIATION PARTNERSHIP

ACCESSIBLE PROMOTION OF YOUR PRODUCTS AND SERVICES >>>

CORPORATE PATRONAGE

EFFECTIVE INVESTMENT IN THE FUTURE OF YOUR BUSINESS >>>

KNOWLEDGE PARTNERSHIP

PROGRESSIVE APPROACH TO REACHING YOUR NET ZERO AMBITIONS >>>



NET ZERO FUNDAMENTALS AND STRATEGIES COURSE

As more and more organisations make their commitments to achieve Net Zero targets, this course explains what Net Zero can mean, how different interpretations can be applied and the possible routes to achieving it. It also explains the basics of what would be included in an organisation's carbon footprint, and how it can be measured using standard emission factors.

[REGISTER HERE >>](#)

NAVIGATE THE SHIFT TO NET ZERO



REACHING NET ZERO COURSE

The course offers a guide on how to prepare for and reach your targets. It outlines a typical road map to achieving the desired targets and practical measures to achieve them. It highlights where the carbon impact can come from, how to create a strategy for reduction of emissions, identification of the practical measures needed as well as auditing and verifying progress.

[REGISTER HERE >>](#)

**FOR THE LATEST DATES VISIT
WWW.THEEMA.ORG.UK**