

# THE EMA MAGAZINE

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## EMA RECOGNISED ENERGY MANAGER

an interview with Mohammad Rafique

## EMBEDDED WIND TURBINES

by Astley Fenwick

## KLÖCKNER PENTAPLAST - A GLOBAL ENERGY TASK FORCE ON A MISSION

by Ethan O'Brien

## WHAT NOT TO DO... IN ENERGY AUDITING

by Nasrin Khanom &  
Peter Johan Bergh Lindersen



EMA Awards Winners 2020 Announced



New Talent in the Spotlight



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ema energy managers association  
**winner 2020**

ema energy managers association  
**Energy Management Awards**

ema energy managers association  
**highly commended 2020**

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# Dear Reader,

This was meant to be the year when all of the plans and strategies for the new decade were set out. As we all know, the reality has been very different – more different than we could have ever imagined.

For most, it has been tough; for a few, it has been a test of survival. New opportunities may have opened up along the way for some, but, for all, it is a situation that continues to have a lasting impact on our businesses and our day to day lives.

It has been a busy year for the EMA adjusting to the 'new normal', supporting the members through online resources and gatherings, and increasing the free of charge membership numbers. Most importantly, we have continued highlighting the excellent work and achievements of passionate energy management professionals through the EMA Energy Management Awards and EMA Recognised Energy Manager status.

This issue is not different. We are bringing you an interview with Mohammad Rafique, Energy and Environment Officer at Surrey Police who has been awarded the professional status of a Recognised Energy Manager.

The EMA Energy Management Awards too provided a platform for the excellence and talent within the wider energy management network, and united and celebrated our community. While ongoing coronavirus restrictions prevented us from being together in a physical sense, we took the advantage of the technology and made sure that even after this year's rollercoaster we celebrated and recognised the best in this sector. Find the Awards' highlights on page 6.

The energy management journey continues with many new individuals joining the community, some of them share with us what attracted them to the sector and what their expectations are from the future on page 14.

Lastly, as we near the end of 2020, we wish to take this opportunity to sincerely thank you for your continued support and generosity this year. We have always been very honoured to represent you and appreciative of the support we receive from our membership.

Stay Healthy and Take Care!  
Your EMA Team

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# ENERGY MANAGEMENT ONLINE TRAINING SCHEDULE

Energy Management Theory Combined with Real-World Applications

JAN	19 <sup>th</sup>	SECR Compliance
FEB	5 <sup>th</sup>	Become an ESOS Lead Assessor
MARCH	2 <sup>nd</sup>	Monitoring, Targeting and Validation
	5 <sup>th</sup>	Lighting – Basic Understanding
	11-12 <sup>th</sup>	Fundamentals of Energy Management
	18-19 <sup>th</sup>	Energy Management in Building Services
	23 <sup>rd</sup>	Energy Procurement
	26 <sup>th</sup>	On-site Electricity Generation
APRIL	13 <sup>th</sup>	Battery Storage for Business
	16 <sup>th</sup>	Energy Auditing Techniques
	23 <sup>rd</sup>	BMS Essentials, Monitoring and Optimisation
MAY	27 <sup>th</sup>	Understanding and Delivering Behavioural Change
	28 <sup>th</sup>	Essential HVAC Control and Optimisation
JUNE	10 <sup>th</sup>	Waste Management
	11 <sup>th</sup>	Turning Data into Energy Savings
	17 <sup>th</sup>	Water Management



*Please note that all courses will be delivered online on the scheduled dates until further notice.*

## 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 a feedback on how to progress your professional development and advance your career.

## Group Training

All courses can be delivered 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](mailto:jana.skodlova@theema.org.uk) with your chosen course title and approximate number of staff. We can also develop new, bespoke material to fit specific client needs.

**For an up-to-date list of all our courses visit our website at [www.theema.org.uk](http://www.theema.org.uk)**



# WINNERS ANNOUNCED

**In its 6th year, the EMA Energy Management Awards once again attracted entries from dedicated and passionate individuals and teams and provided a platform for excellence and talent within the energy management industry. The 2020 winners and highly commended demonstrated the drive, passion and commitment that is required for driving energy efficiency in their organisations and for their clients. We are pleased to introduce the EMA Awards 2020 winners:**

## ENERGY MANAGER 2020 - PRIVATE SECTOR

**Ian O'Connor – Energy Manager - John Sisk & Son**

Ian is a driven engineer, passionate about sustainability with industry leading experience in the field of energy management, particularly in relation to construction services. He is experienced at developing medium- and long-term strategies with SMART targets and action plans for successful implementation. His approach has been to harness wide ranging expertise from key partners and stakeholders to build consensus and take a collaborative approach to achieving objectives. He is a keen proponent of pushing the boundaries of the innovative technologies such as data mining, battery technology and alternative fuels and this has led to the development of sustainable solutions that are pioneering in the global construction industry.

## ENERGY MANAGER 2020 - PUBLIC SECTOR

**Andrew Waggott – Energy Services Team Manager - Portsmouth City Council**

Andrew has over 8 years' experience of working in the energy management industry within a public sector organisation. Since 2016, he manages the Energy Services Team at Portsmouth City Council responsible for all energy services, which include energy efficiency and micro-generation capital projects, procurement and management of utilities and fuel poverty mitigation programmes across the Council's extensive and varied housing and corporate property portfolio. Under Andrew's management, the team has grown four-fold; expanding the scope and scale of their services and creating a graduate programme with the aim of training the next generation of energy management professionals.

## ENERGY MANAGEMENT TEAM 2020 PRIVATE SECTOR

**The Technical Services Team - British Land**

The Technical Services Team is responsible for engineering performance across over 22 million sq ft of real estate. This year, they successfully reached their 2019/20 reduction target, achieving 55% landlord energy intensity savings for their organisation and its occupiers, which cut energy consumption by 175 million kWh. The team achieved its incredible performance through proactive day-to-day management, identifying and implementing projects to bring about step change, and by driving progress through technological and process innovation, working collaboratively with hundreds of stakeholders. This has contributed to a 73% reduction in carbon intensity across the portfolio since 2009.

# Congratulations!



## ENERGY MANAGEMENT TEAM 2020 PUBLIC SECTOR

### The Energy Management Team - Gwynedd Council

The Energy Management Team works within the Housing and Property Department of Gwynedd Council. The team consists of the following members:

- David Mark Lewis – Energy Manager
- John Paul Ayling – Energy Officer – Data Management
- Richard Williams - Energy Officer – Project Management
- Glyn Roberts - Energy Officer – Awareness Raising/Data Management

The team is responsible for the day to day energy monitoring and energy conservation matters, planning and implementing projects as part of the Council's Carbon Management Plans as well as developing energy purchasing frameworks and the Gwynedd Energy Framework which is available to use by any public sector organisation.

## EMA MEMBER 2020

### Paul Graham - Utilities, Waste and Sustainability Manager - Kingston Hospital NHS Foundation Trust

Paul has been an energy manager for 3 years and has been employed by Kingston Hospital NHS Foundation Trust for 12 years. Equipped by the EMA's LEC 3 training programme, he leads the energy, waste, and sustainability agenda for the Trust as they serve the local population in South West London. He hopes to achieve meaningful carbon savings over the next five years by transforming the way the Trust is heated and powered as well as implementing smaller energy conservation measures.

## ENERGY MANAGEMENT CONSULTANCY PARTNERSHIP 2020

### University of Glasgow and Integrated Environmental Solutions

The University of Glasgow and IES Ltd partnership started in early 2019 when IES were engaged through the University's Smart Campus Working Group to develop a digital twin of three of the most intensely used student buildings. Working in partnership is paramount when developing a digital twin as the University's team are experts in their buildings and the electronic systems used to control these, whilst IES provide building modelling and twinning expertise and the systems to allow the enhanced interrogation for the production of useful and useable results. The Digital Twin is a living system and will require consistent and continued development, therefore a strong partnership is important to ensure full benefits can be realised both now and in the future.

## ENERGY PRODUCT 2020

### MegaFan Technologies Limited - Megafan High Volume Low Speed Fans

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temperature from floor to ceiling, whilst keeping clients and staff warmer, and reducing your heating consumption at the same time. During the summer months, the same solution will also create natural evaporative cooling over a 20,000 sq ft area with just one MegaFan.

## ENERGY MANAGEMENT PROJECT 2020

### Optimised Buildings Ltd

The Optimised Buildings Morrison's project began back in 2018, initially on a 6-month programme, in order to maximise energy savings from existing assets (specifically the BeMS and HVAC). This was soon taken over by our '24/7 Optimised Bureau' managed service, remotely monitoring performance of 496 stores HVAC, BeMS and lighting, to ensure continuous operational efficiency. In addition to consistent, year on year savings. Optimised Buildings (part of the Optimised Group) is an award-winning, energy management company, providing a market-leading solution / service that typically delivers an 8-10% total energy reduction to business customers with minimal capital expenditure and a typical ROI of less than 12 months.

## INNOVATIVE ENERGY PRODUCT 2020

### Zeigo - Zeigo PPA Platform

Zeigo is a clean-tech platform that helps corporate energy buyers contract energy directly from wind and

solar farms using data and technology to cut through the complexities of clean power procurement. It tackles some of the most significant barriers that block market access, lack of price transparency, limited market visibility, the complex legal process, amongst others.

It also uses smart technology to help companies find the best zero-carbon match for their energy consumption profile. Zeigo also works with the most reputable developers globally (100+), giving them a route to market and helping them to understand corporate procurement trends. Zeigo is fast becoming the platform to source renewable energy across the world.

## HIGHLY COMMENDED – ENERGY MANAGER 2020 - PUBLIC SECTOR:

**Nasrin Khanom – Environment and Sustainability Manager - University of West London**

## HIGHLY COMMENDED – ENERGY MANAGEMENT TEAM 2020 - PRIVATE SECTOR:

**The SMaRT Hub Energy Team at Arcus FM**

## HIGHLY COMMENDED – ENERGY MANAGEMENT TEAM 2020 – PUBLIC SECTOR:

**The Estates Planning Team at Keele University  
The Energy Services Team at Portsmouth City Council**

*Congratulations!*







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# EMA Recognised Energy Manager

**The Energy Managers Association is pleased to announce that Mohammad Rafique, Energy & Environment Officer at Surrey Police, has joined the ranks of the EMA Recognised Energy Managers after successfully demonstrating the knowledge and skills in energy management through the Knowledge and Skills Gap Analysis Interview.**

The EMA runs the Knowledge and Skills Gap Analysis Interview to help energy management professionals to not only pinpoint areas that may need expanding, but also to show that often energy managers know far more than they think they know.

The Interview is a professional discussion with other energy management professionals touching upon your current areas of professional knowledge, whilst at the same time identifying any potential gaps, and suggesting ways to fill those gaps either through learning or mentoring. If interviewees demonstrate all the necessary knowledge in the core energy management competencies during the interview they will be awarded

the official EMA endorsement of the Recognised Energy Manager.

The core competencies are:

- Technical and Operational Competency
- Energy Assessments, Measurements and Verification Competency
- Behavioural Change and Motivation Competency
- Regulatory & Legal Compliance, and Carbon Management Competency
- Energy Management Strategy and Plan Competency
- Waste Management Competency
- Energy Procurement Competency
- Energy Efficient Transport Competency
- Water Management Competency
- Information Technology Competency

For more information regarding the EMA Recognised Energy Manager status and the interview process, please contact [jana.skodlova@theema.org.uk](mailto:jana.skodlova@theema.org.uk) or call 0203 916 5516.

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# An Interview with an EMA Recognised Energy Manager

## What made you choose environment and energy management as a career?

I have been always keen on the environment we live in. In my earlier career, I was horrified to see environmental pollution related to trade effluent discharge. Studying environmental conservation had given me good insights about energy and environmental management and given me opportunity to contribute towards making a difference.

## What does your role at your organisation entail?

Surrey Police is responsible for policing the county of Surrey in South East England. Over 3,900 employees operate from 68 different buildings, and the Surrey and Sussex Police have a combined fleet of over 2,200 vehicles. I focus on driving energy and environmental strategy for the force and reducing operational impact on the environment by delivering energy and resources efficiency projects. I am also responsible for environmental compliance and manage utilities and waste contract for the force.



## What is the most exciting part of your job?

Developing Net Zero strategy for the force is the most exciting part of my job. Surrey police is aiming to be Net Zero by 2030. We will define our scope and deliver our action plan by the end of March 2021. I am also excited being involved in building a new force headquarters at Leatherhead, Surrey. We are aiming to build a Net Zero HQ which is due to open in 2024.

## What has been your biggest achievement to date?

Being recognised as energy manager by the Energy Managers Association.

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

Building management system and controls optimisation streamlined with occupancy and weather demand. This reduced 10% energy wastage and at the same time ensured building users' comfort. Win-win situation.

## What is the most frustrating part of your job?

Sometimes frustration arises from formal process change within the organisation. Resources are always a key obstacle for any changes. I accept this as a challenge and continuously seek every opportunity to make changes for good.

## If you had the opportunity to change one thing, what would you change?

Operational changes have a knock-on effect on energy usages which is much easier to mitigate if it's planned ahead. Lack of communication between departments and functions often accounts for lost opportunities. I would resolve this communication gap to make my job easier.

## If you could recommend three things to ensure success as an environmental manager, what would you recommend?

Energy market and technologies are changing rapidly. I would advise to learn, implement and develop your skills to keep up to date with the changes.

---

**What advice would you give to someone looking to become an energy or environmental manager?**

Develop analytical skills. Understanding the energy usage and proper analysis are key to success.

---

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

**This is somebody else's problem.** Individual action has direct and indirect impact to other livings.

---

**What prompted you to undertake the Knowledge and Skills' Gap Analysis Interview with the EMA?**

I have been working in this field for 10 years and achieved a number of academic and professional qualifications within this period. I wanted to find out the areas of skills and knowledge for my continuous professional development. EMA's gap analysis interview really gave me good insights.

---

**Do you think that the EMA Recognised Energy Manager status will allow you to highlight your credentials as an energy manager?**

I believe this credential had given me a strong recognition of my skills and knowledge in this field. This is an evidence

of my continuous development journey that I am connected to current good practice and being up to date with knowledge.

---

**How has Covid-19 impacted your role?**

Working in emergency services during Covid-19 is kind of business as usual. But we have to keep physical contact at minimum. Most of the meetings are now virtual. We spent less time on the road, more time in analytics. It is really interesting to see energy usage patterns. We switched our AHUs to 100% fresh air due to risk of airborne infection. Most of the support services are working remotely which has given us opportunity to review control strategy and streamlined it with the occupancy. Financial constraint is one of the real concerns for improvement projects due to Covid-19. Like all other organisations, we are only focusing on critical services.

---

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

I am looking forward to driving the Net Zero strategy for the force. Individual action has direct and indirect impact on other living things. LEVs for emergency response fleet and decarbonising heat for existing aged buildings are the key challenges but I am confident we will get through it. Our Building for the Future Projects, which are part of our Estate's Strategy Programme is an exciting opportunity for our Net Zero ambition.



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# THE EMA RECOGNISED ENERGY MANAGER

Professional status awarded for successfully demonstrating the knowledge and skills in energy management.

Does the EMA Recognised Energy Manager status highlight your credentials as an energy manager?

JOEL KIRBY



*"Absolutely, and this is one of the main reasons I wanted to become a Recognised Energy Manager. I would like to think that this also helps me to demonstrate competency to key members of staff within my workplace. It has not been long since I got the status, but it has helped from a confidence point of view if nothing else, knowing that your knowledge has been validated and that you do know what you are talking about."*

*"Yes. It demonstrates a level of competency and knowledge which I have used to assure my organisation of my abilities."*

PAUL GRAHAM



KIRSTY RICE



*"I think Energy Managers now are expected to also manage transport, waste and water – pretty much acting in some ways as an Environmental Manager. Having the EMA accreditation on my CV certainly allows me to demonstrate my professional aptitude in this area and a desire for continuing development which I think employers expect to see."*

*"It is nice to have the official endorsement of the EMA, and I am sure that it will increase my profile both inside and outside of my organisation. My natural position is to think that it shouldn't matter what qualifications or recognition someone has, as long as they do a good job. However, in reality it is essential for an energy manager to be seen as credible by a broad spectrum of colleagues, in order to garner support for the important work that they do."*

CHARLIE COX



DEWI DAY



*"I believe that an energy management training programme like this is an important aspect of my career development and has helped broaden my skillset. I have learnt a great deal from the modules that I completed as part of this programme as well as other professional training courses. Shortly after gaining the EMA Recognised Energy Manager status, I was recognised as a star performer in my department at QinetiQ. I also believe that having a recognised energy management qualification can strengthen a CV and help future career progression."*



Rewarding Energy Management Knowledge and Skills

Visit [www.theema.org.uk](http://www.theema.org.uk) for more information

by Justyna Clarke, Jessica Foster, Lisa Pardini, Beatriz Valdes and Rhea Campbell-Smith



# New Talent in the Spotlight

**The future of energy management is bright. Five talented and enthusiastic energy management professionals who got attracted into this field for different reasons and from diverse backgrounds share their routes into the profession, visions on the field of energy management and ideas on how to attract even more people into this ever-changing sector.**

**Justyna Clarke, Energy Officer at The Hyde Group**



**What attracted you into energy management, how have you started in it and what does your role entail?**

My adventure in energy management began when I got involved with a local charity called Sustainable Merton. I had just completed a master's degree in Environmental and Earth Resources Management, as part of a career change, and I was trying to get into the field.

I worked on several projects,

including raising awareness about plastic waste and air quality in the borough. However, the one closest to my heart was giving energy advice to Merton residents. Based on this experience, I got a job at housing association Southern Housing Group.

The time I spent at Southern gave me an amazing introduction to energy management, as I was dealing with the real issues residents faced. I also became familiar with a wide variety of heating systems and types of buildings and how these affected residents' lives.

This knowledge was very useful when I started working for the Hyde Group, one of the largest housing associations in London and the south east of England. My role is a mixture of strategic and operational tasks. Recently, my biggest focus has been on assessing Hyde's most significant environmental impacts and the credibility of our data.

Every journey to net zero carbon needs to start with an understanding of where a business' emissions come from and setting up realistic goals to limit them. For Hyde, this is obviously our homes, as well as the utility supplies to our offices and other buildings, and our vehicle fleet. I've also been looking at communal

heating, in particular its efficiencies, the new regulations and how it can help the UK meet its carbon emissions reduction targets.

**What do you think about the current state of the energy management sector and its opportunities for development and career progression, and opportunities for people entering the sector during this challenging period?**

Energy management is an extremely dynamic and exciting field at the moment. The climate emergency is increasingly recognised by local authorities, and across the housing sector. Organisations are also starting to introduce Environmental, Social and Governance reporting, to demonstrate to government, investors and their customers that not only are environmental issues high up their agenda but to also show what they are doing to reduce their impact.

As a result, there is a real demand for talented people, which is certain to continue. You need to have an open mind and be willing to embrace new ideas and technologies, if you're thinking about a career in energy management. It's about understanding how technology can be applied to help bring an

organisation closer to their net zero carbon goals.

### How would you “sell” energy management to those considering it as their career?

The challenge for energy management is only just beginning and there is an ocean of opportunities for people who want a career in the sector – there are some exciting innovations and collaborations starting to emerge. We’ll need to use a blend of approaches and technologies to help everyone become carbon neutral by 2050, such as improving building fabric, increasing the use of renewables and introducing smart grid technologies. Plus, you’ll be helping to improve people’s lives, their homes and communities, as well as contributing to the global reduction in carbon production. Why wouldn’t anyone want to be a part of that?

### Where do you see your future within the energy management sector?

I believe everyone deserves a home that’s comfortable, warm and affordable to heat and I want to help make that happen. I see myself being involved in large-scale projects to reduce carbon and fuel poverty in housing in the future. At Hyde, we’ll be focused on analysing and planning our energy investment and supporting our customers in the best ways we can.

**Jessica Foster,**  
**Energy Manager at Bensons for Beds**



### What attracted you into energy management, how have you started in it and what does your role entail?

I entered energy management from an environmental background. From a young age I’ve always had a passion for the natural world and so when I came across the Environment, Economics and Ecology degree at the University of York, I was sold. Fresh out of my degree I was lucky enough to secure my first role as Energy and

Utilities Analyst at DW Fitness First. At DW, I independently managed electricity, gas and water for the portfolio, from procurement to efficiency, legislation and everything in between. A position which truly threw me in at the deep end but one I couldn’t be more thankful for as a learning experience.

At present, my role is evolving from Energy Manager to Sustainability Manager for Bensons for Beds where I’ve worked since January 2019. I’m now helping to integrate climate change into our risk register and leading the development of our sustainability strategy to set out our climate action plan for our new Net Zero 2040 target. I’m also working to further embed climate change and sustainability within all areas of the business while still managing invoicing, procurement, legislation and energy efficiency.

### What do you think about the current state of the energy management sector and its opportunities for development and career progression, and opportunities for people entering the sector during this challenging period?

The industry is ever evolving. There are always learning opportunities as new technologies are invented or legislation is created and that means there are always new jobs materialising. It is a very challenging time in the current job market but I believe the biggest opportunities will be in this industry as governments around the world push for a ‘green recovery’ from the pandemic and innovation reaches its peak in helping us limit global average temperature rise to 1.5°C.

It is also very exciting with the momentum that’s building. Recent years have really shone light on our industry and helped it advance up the corporate and government agenda. We are starting to see a shift in mainstream society, but the tide has not fully turned yet in realising how climate change will really impact our lives and the urgency of required action. Once it does, which I hope is sooner rather than later, the momentum is going to really pick up. It is going to be something everyone wants to be a part of.

### How would you “sell” energy management to those considering it as their career?

We’re now officially in the Anthropocene, an age categorised by humans’ dominating influence on the planet. While the Anthropocene was denoted as negative, in the energy management world we have the opportunity to contribute in turning that negative into a positive. Let’s help shape our namely era to be one dominated with positive human impacts.

### Where do you see your future within the energy management sector?

We have just announced our support for the British Retail Consortiums (BRC) Climate Roadmap meaning as a business we will be targeting Net Zero across our scope 1, 2 and 3 emissions by 2040, which I could not be prouder of. In the near term, I see my future in putting Bensons for Beds on the right track in achieving this and helping them on the way to do so.

In time, I not only want to help companies in the UK transition to Net Zero, but I want to be leading multi-national teams in the fight against climate change.

**Lisa Pardini,**  
**Graduate Engineer at Ramboll UK Limited**



### What attracted you into energy management, how have you started in it and what does your role entail?

I have always known that I wanted to work in the renewable energy sector and that’s why I started my journey with a bachelor’s degree in Energy Engineering at the University of Pisa and then moved to Denmark to pursue a master’s degree in Sustainable Energy.

Denmark is one of the leading countries for renewable energy and there I really experienced what living in a sustainable country means. In my final semester, I had the

opportunity to develop my master's thesis on sustainable district cooling in collaboration with Ramboll, a leading engineering, architecture and consultancy company which has sustainability as a core value. Thanks to this collaboration, I am now working in Ramboll as a graduate engineer in the district energy department in London.

Our goal is to decarbonise the heating and cooling sectors, with a wider deployment of district heating and cooling schemes. My everyday work is never the same and I am involved in district energy projects at different stages of realisation, from masterplanning and feasibility studies, up to the delivery and realisation of the scheme. We do not only look at a technical perspective, but the economic and finance of the project are also studied.

**What do you think about the current state of the energy management sector and its opportunities for development and career progression, and opportunities for people entering the sector during this challenging period?**

Even in the current difficult environment, the energy sector holds a unique position and it is facing a lot of public demand. Climate emergencies and commitment to achieve net zero have been declared by most regions and cities in the UK, putting the energy sector in the spotlight. There is ever increasing demand for innovative products and solutions in the industry and the need to integrate and manage different energy sector's demands. My sector, just like many others, is facing a growing demand for sustainable heating and cooling solutions, which can vary from the reuse and upgrade of urban and industrial waste heat sources, hydrogen, ambient networks to smart energy systems.

The energy management sector is offering great opportunities and the role of energy engineer can be a key figure. It combines a strong engineering background and knowledge of renewable and sustainable resources, with a good economic and financial understanding of the energy

sector and a holistic view for its management.

**Where do you see your future within the energy management sector?**

Even if I am at the beginning of my career and it is hard to forecast where my journey will lead, I would like to continue advancing innovative solutions for the industry and be at the forefront of the decarbonisation of the energy sector.

**Beatriz Valdes, Energy Manager at Vodafone UK**



**What attracted you into energy management, how have you started in it and what does your role entail?**

I've always been super interested in energy and renewable sources, that's why I decided to study Energy Engineering in Spain and a MSc in Sustainable Energy Systems at the University of Edinburgh. Climate change and the current lack of natural resources bring to light the pressing need for an energy transition, and there is no better time than today to innovate and find alternative means of energy production and optimise the current ones.

After my studies, I joined Deloitte Spain as a Strategy Consultant in the Technology, Media and Telecommunications industry. I worked with national and international clients focusing and learning about market research, strategic analysis and business plans. Even though I loved my time there, after two years I decided to move to the UK and start a new adventure at Vodafone.

I joined the company through the Technology Graduate Scheme, having three exciting rotations across the Project Management Office, Technology Operations and Energy Management, where I was offered a permanent position. Working in the Energy Team is very exciting, as every day is different! Not only do I learn about new energy

efficient technologies and energy management, but I also have the opportunity to collaborate with different departments: Finance, Property, etc. I consider myself a very sociable person and this role allows me to practise my communication, team working and networking skills, which I really like.

At present my role consists of four major activities.

1. Leading the Measurement and Verification process by which all projects with an energy impact are reviewed, assessed and tracked by the energy team. I review the technical specification for projects, work with the project managers to evaluate the energy impact and use data and regression modelling to validate the expected outcome.
2. Focusing on understanding and forecasting the Energy Opex Budget: commodity and non-commodity costs, upwards pressures and energy efficiency projects, PPAs, etc.
3. Supporting the implementation of ISO 50001 across our portfolio and;
4. Promoting colleague engagement and raising awareness about energy efficiency and energy targets across Vodafone UK.

**What do you think about the current state of the energy management sector and its opportunities for development and career progression, and opportunities for people entering the sector during this challenging period?**

In my opinion, the energy management sector has a great potential and the demand for energy managers will increase in the coming years. One of the best things about being an energy manager is that we can choose from a variety of employers and career paths.

Governments and private companies are increasingly aware of the importance of good energy management and in many cases, it is a key part of their strategies. A good example of this is at Vodafone where 'Planet' is one of the company's three strategic purpose pillars. We have committed to halve the company's carbon emissions and purchase 100% of electricity from renewable



sources by 2025. We encourage the development of technical skills and support the development of new energy efficient technologies, better data and focus on energy optimisation. The possibilities are endless!

### Where do you see your future within the energy management sector?

This challenging period is affecting all industries and sectors, but I'm one of the lucky ones who can work remotely. I have had to change the way I work and interact with other people but I'm slowly getting used to this "new normal". These days I'm learning to create boundaries between office and out of office hours, I'm focusing more on my mental health, and I'm making sure that I have "focus time" to do my job. I have even started to practise yoga and barre to reduce stress and feel more energised.

My aim is to continue working in this field. I consider myself very lucky that I have found a job which I love doing and in a company that values our planet and energy efficiency. I have had amazing mentors and managers who have helped me a lot, so I would like to be able to provide similar guidance, potentially taking on a more senior role with more responsibility. I would also like to further develop other skills like leadership, empowerment and creativity, leading the charge towards a greener future.

**Rhea Campbell-Smith,**  
Sustainability  
Coordinator  
at Bourne  
Leisure



### What attracted you into energy management, how have you started in it and what does your role entail?

I studied Environmental Resource Management at university and have been interested in sustainable behaviour change and environmental psychology since.

After realising that entry level

“ TALKING TO THE PAST ME, I WOULD SAY THAT ALTHOUGH ENERGY MANAGEMENT DOES NOT HAVE ‘SUSTAINABILITY’ IN THE TITLE, YOU SIMPLY CANNOT BE SUSTAINABLE WITHOUT IT. ”

jobs in such specific areas were non-existent, a friend and I decided to head to EMEX and see if we could share our CVs and find some work experience. It was there that I met Scott and Patrick, who were in the Sustainability Team at Bourne Leisure. After learning about what they were doing in terms of team training and how they were working sustainability into everyone's roles, I asked for a day's work experience and it pretty much went from there!

I've now been the Sustainability Coordinator for Bourne Leisure since June 2019 after a position became available, and in that time, I have been developing my skillset and applying what I've learned at university in a business environment. I was also lucky enough to share my experiences at EMEX in 2019 as a panellist.

### What do you think about the current state of the energy management sector and its opportunities for development and career progression, and opportunities for people entering the sector during this challenging period?

I'd say that, much like any industry, there are challenges now, and that energy management is a fairly competitive field. Once you have found the opportunity, there are plenty of opportunities and courses to help you progress and develop.

Personally, I think that finding an actual entry level position is the main challenge. When I was applying, I found that a lot of companies were offering 'entry level' jobs but also asking for a minimum two-year work experience too.

Outside of this though, I think that there's real opportunity for

the industry to embrace the changing times. Sustainability and energy management are becoming ever more important as we get closer to Net Zero, and so I think that the industry will have to grow, and with that, embrace

new, fresh faced talent.

### How would you "sell" energy management to those considering it as their career?

I understand that to many 'energy management' doesn't sound glamorous, but it's a very flexible and encompassing term for more than just 'managing energy'! Since working in energy management, I have been able to expand my skill and knowledge base, grow a network of likeminded and passionate individuals who all seem driven towards a goal of reducing the impact that a business has on the environment.

Talking to the past me, I would say that although energy management does not have 'sustainability' in the title, you simply cannot be sustainable without it. If you want to make a change, a positive and effective difference, then efficient energy management is key. Energy management also crosses so many sectors, so you may find you can combine your work interests and personal passions together!

### Where do you see your future within the energy management sector?

I can't say I've been in the industry long enough to really know yet! I'd like to move back to the 'softer' side of sustainability and energy management at some point, and through Bourne Leisure I have opportunities to do this!

Looking into the deeper future, I would love to be able to use my skills in education somehow, but I'm only getting started, so who knows what the future will hold!



# Aviva Opens One of the UK's Largest Solar and Energy Storage Initiatives at its Perth Site in Scotland

**Aviva Plc is an international Savings, Retirement and Insurance business serving 33.4 million customers worldwide. Aviva exists to be with people through all phases of their lives and when it really matters. By looking out for each other and being part of something bigger, together we create the future we all want to live in. Aviva has been taking care of people for more than 320 years.**

## Aviva's Sustainability Commitment

Climate-related risks pose a systemic threat to the financial stability of insurance companies, such as Aviva and its investors over the coming decades, therefore mitigating action must be taken. At the end of last year Aviva committed to the UN Net Zero Asset Owners Alliance, with the aim of being a net zero carbon asset owner by 2050.

More widely, Aviva has committed to aligning our company goals to the Sustainable Development Goals and won the UN Foundation Leaders Award in 2018. Prior to aligning Aviva's investment business to a below 1.5°C long term temperature goal, ambitious energy and carbon reduction activities have always been applied to our own operations.

Whilst achieving great success through community and renewable energy projects, we recognise that there is always more that can be done in our own operations, which include owned and leased properties across the UK and Ireland, as well as properties in some of Aviva's investment funds.

In the UK, we have colleagues (c18,000) operating in several large commercial properties located centrally in cities such as London, Norwich, Bristol, York, Sheffield, Perth and Glasgow.

Annually we consume c41GWh of 100% RE100 green electricity matched to solar, wind and hydro sourced green electricity, along with c34GWh of natural gas and c151k cubic meters of water. We now have 2,250kWp solar generation directly on our buildings and are continually looking to expand further as well as our pioneering energy efficiency projects which include:

- Smart building optimisation within our operational buildings has achieved a 12% reduction in energy consumption or 2,600 tCO<sub>2</sub>e, across the UK portfolio.
- 3yr 100% LED and controls upgrade saving 3,114 tCO<sub>2</sub>e per year.
- Supporting the global Aviva Group to cut carbon emissions by 66% since 2010.

At Aviva, we know that in order to earn the trust of our customers we need to act responsibly and sustainably every day. Only then will we be able to meet our strategic priorities and live out our purpose to be: 'with you today, for a better tomorrow.' As a company we aim to do the right thing for the long term. We are deeply invested in our people, our customers, our communities and our planet. By caring more today, we can leave a legacy of which we can be proud.

This year also marks the end of our previous five-year Corporate Responsibility (CR) strategy. We are proud to have met or beaten a number of our ambitious targets over this period, including reducing our CO<sub>2</sub>e emissions by 66% since 2010 (target: 50% reduction), supporting 4.8 million beneficiaries through our CR programmes (target: 2.5 million) and investing over £3.8 billion in low carbon infrastructure since 2015 (target: £2.5 billion). The following sections outline the key areas of progress we have made over the course of 2019.

## Putting the customer at the centre of everything we do.

In order to deliver great customer outcomes, we are committed to helping our 33.4 million customers protect what is important to them and save for a bright future. In 2019, we paid out £33.2 billion in benefits and claims around the world.

Our more than 60 green or accessible products and services across the world enable our customers to be more environmentally responsible or give them easier access to the protection they need for themselves and their families. (More details can be found in our Corporate Responsibility Reporting Criteria 2019 on [www.aviva.com/social-purpose](http://www.aviva.com/social-purpose)).

Aviva Poland's anti-smog campaign continues to benefit customers. Over the last two years the campaign has seen

us fund the addition of 400 external air quality sensors to the national network, with over half of these sensors placed in areas voted for by the public. The sensors are accompanied by a downloadable app, to help people keep track of pollution in their city and adjust their actions accordingly for the good of their health.

### Creating a better tomorrow for our planet.

To create a better tomorrow, we need to look after the planet we call home. Our plan to help tackle climate change is backed by our long history as a leader in sustainable practices. We continue to manage the impact of our business on the environment. Our Corporate Responsibility, Environment and Climate Change business standard focuses on the most material operational environmental impacts, which we have identified as greenhouse gas emissions. Our operational global greenhouse gas emissions data boundaries show the scope of the data we monitor and the emissions we offset. We report on greenhouse gas (GHG) emission sources on a carbon dioxide emissions equivalent basis (CO<sub>2</sub>e) in respect of Aviva's Group-wide operations as required under The Companies Act 2006 (Strategic Report and Directors' Reports) Regulations 2013. We also refer to the GHG Protocol Corporate Accounting and Reporting Standard, and emission factors from the UK Government's GHG Conversion Factors for Company Reporting 2019.

### The Challenge

At Aviva, we are well regarded as an environmentally conscious insurer: we became carbon neutral in 2006 – the first international insurer to do so - and purchase 100% of electricity used within UK offices from renewable sources. It is our aspiration to try and generate as much of our operational energy from our own renewable energy installations. Following thorough investigations, we could find no better way to use our car parks for renewable generation.

Following on from the success of the solar carport pilot scheme installed at our Norwich office, it was our ambitious intention to take another one of our largest offices off-grid. The "iconic" Grade A listed Pitheavlis building in Perth, Scotland, was chosen as it would have the biggest impact with one of the highest energy usage of any global Aviva office.



Aviva Norwich office

The Pitheavlis building also shares the same challenges as many buildings across the UK; therefore, it provided a suitable demonstrator project to aid future learning and a blueprint for replication. Such challenges include:

- Old infrastructure that requires a sensitive approach.
- Significant costly infrastructure upgrades are required to transition from gas heating towards a low carbon electric system.
- A desire to encourage staff and visitors to adopt low carbon transport by providing electric vehicle (EV) infrastructure.
- The site needed to remain fully operational during any infrastructure upgrades to minimise disruption to both staff and visitors.
- Protracted discussions with staff, the wider community and local authorities to secure support for the project.

The project secured funding from the Scottish Government's Low Carbon Infrastructure Transition Programme. The programme, supported by the European Regional Development Fund, is accelerating the development and delivery of low-carbon infrastructure projects across Scotland.

### The Solution

A bespoke solar carport structure was designed to provide low-carbon energy generation, combined with battery storage and extensive EV charging infrastructure to form an onsite smart grid; a blueprint for smart-energy systems of the future.

Integrated with the site's existing building management system, we gained a highly detailed view of how and when energy is being consumed, giving greater control over our operational overheads and helping to inform behavioural and procedural changes that are more conducive to energy efficiency.



The ability to both generate and store significant amounts of energy on site reduces reliance upon volatile and inefficient grid infrastructure; as well as providing the resilience of supply necessary to not only support but encourage the widespread uptake of low emission vehicles amongst colleagues, further reducing our footprint.

The benefits of this investment are not confined to the site, we are now able to participate in a rapidly evolving energy marketplace, whereby diverse revenue streams can be earned for providing essential grid service that will serve to decarbonise the wider energy network. Together these technologies form a smart energy hub that is unique in its scale and provides a replicable blueprint for the decarbonisation of our energy networks. If a building of the architectural significance of Pitheavlis can become carbon zero, then it paves the way for other commercial buildings to follow suite.

### Facts

It is one of the UK's largest combined application of solar carport, battery energy storage, and EV charging infrastructure.

- It covers 342 parking spaces.
- No loss of parking spaces.
- Provides a combined annual carbon saving of nearly 400 tonnes.
- The solar carport supplies 26% of the site's annual energy demand.
- The 1.8MWh energy storage system allows the site to operate off-grid for 4-5 hours a day during peak times when the national grid is at its busiest.
- 50 x EV chargers.

### Benefits of the system

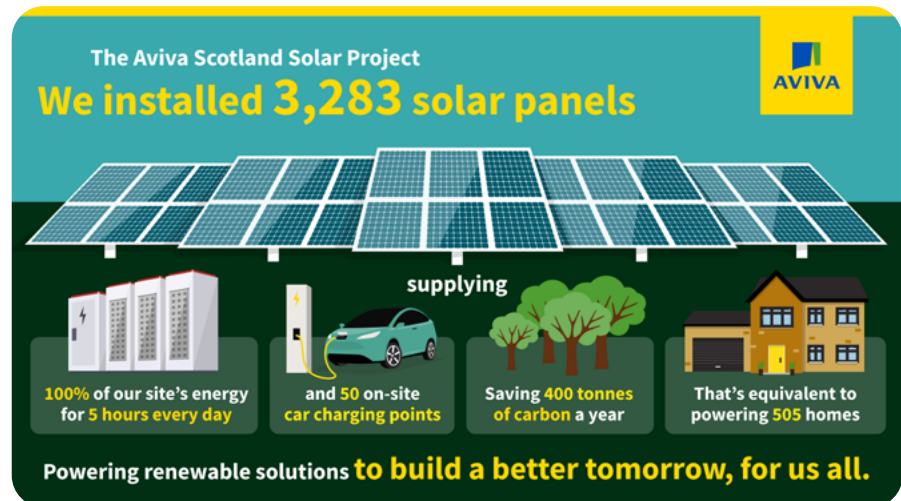
- Low-carbon technology retrofitted to a Grade A listed, architecturally significant commercial site, providing a blueprint for the UK's low carbon future.
- It offers an innovative exemplar demonstrator project to facilitate future learning of combining energy capture, storage and use.
- Innovative combination of technologies that is replicable at any scale, which provides a feasible solution for any business looking to secure a sustainable energy supply.
- The modular design ensures a quick and efficient build process which enabled the carpark and central bus route to remain fully operational throughout construction.
- The energy centre combined with the solar carport not only reduces our reliance upon volatile and inefficient grid infrastructure, but also relieves

pressures on the national grid, by taking the building off-grid during periods of peak demand.

### Operational feasibility

The Perth office is a Grade A listed building that houses around 1,100 employees every day. Careful project planning and design was required to ensure these factors did not become challenges. Parking is at a premium on this busy campus, so it was important not to lose any spaces and construction was managed to minimise disruption. The build was phased, so only 70 parking spaces were ever out of use at any one time.

Additionally, the design and layout of the solar array was carefully considered to complement the site and respect the natural environment. Pre-existing conifers shield the solar carport from the road, and the terraced landscape of the site means the carport is not obtrusively visible from the office building.



The battery and other auxiliary equipment reside in a self-contained energy centre for security. We wanted this to be easily accessible for regular maintenance, and so the energy centre can easily be included in facilities tours, a testament to our satisfaction with the project. To avoid the large container compromising the natural sweep of the hillside, the landscape was excavated to create a more discrete location for the energy centre.

In order to maximise the effectiveness of the scheme, our energy supply contract has been altered to create a bespoke arrangement appropriate for sites with onsite generation and storage opportunities. This allows us to maintain a high level of budget certainty relating to non-energy charges, whilst time-banded charges remain as pass-through in order to allow us to benefit from managing electricity consumption at peak times. We also had to connect the solar generation, energy storage and EV chargers to our pre-existing high voltage switch gear. Originally, we were going to retain the 1980s HV switch but decided to change to new. This was a big decision, but fortunately with a proactive and resilient

team we had enough time to design, order and install the new switch gear.

### Explanation of the results witnessed

The 1.8MWh energy storage system is underpinned by technology which manages power flows between the solar cells, office buildings, grid and electric vehicle charges, enabling the Perth site to operate off grid for 4-5 hours per day during peak times.

- The installation is powered by 3,283 solar photovoltaic panels and supports EV charging bays that can charge 50 EV at once.
- This green technology generates 812,000kwh. Aviva will use 77% of the generated energy, with the surplus entering the battery for later use or exported to the grid.
- All the manufacturing for the project was completed in the UK, with embedded carbon for the project kept to a minimum using 100% recycled steel from the North of England and over 60% of the project's construction and ongoing maintenance was completed and will be completed by Scottish workers.



The Perth renewables project helps Aviva on its way to meeting our ambitious environmental targets. Aviva aspires to purchase or generate 100% of its global electricity from renewables by 2025. The Perth renewables project is also in line with the Scottish Government's target to generate 100% of gross electricity consumption from renewables by 2020.

The array saves 250 tonnes of CO2 every year, with the reduction in internal combustion engine vehicles on site facilitated by the EV infrastructure expected to save a further 150 tonnes of CO2 per year. However, environmentalism was not the only motivator. The Perth site is one of the largest Aviva offices and consumes a high volume of energy. Generating more energy onsite allows us to reduce spend on grid power.

Whilst we already possessed rooftop solar PV at our Perth site, the solar carport is a more conspicuous display of our commitment to fighting climate change. We hope that the project will also inspire our colleagues to become more environmentally conscious, too. We think that EVs will become more popular among commuters now that they are able to charge onsite.

### Tech specification

- PV Inverters - 44 inverters.
- Strings per Inverter – 3-6 depending

on inverter model.

- Support structure – Bespoke galvanised steel framework, manufactured from 100% recycled steel.
- EV Chargers – 47 No. 7kW Solo, 3 No. 22kW solo.
- Energy Storage System – 8 battery units (1,784 kWh total) + 522kVA Inverter (400V AC) (to the Energy Centre Pad).

### Learnings from initial Norwich project and Perth

- Decided to leave panels with gaps with no guttering. This keeps the visual integrity of the panels.
- Panels provide shading for vehicles parked beneath them, keeping them cooler in summertime.
- Very important to clearly mark parking bays when carports are first used. Colleagues had a tendency not to park straight.
- Important to integrate LED lighting under the bays. Original carpark lighting not good enough.
- We had to include CCTV cameras under the carports. Important to protect our colleagues.
- New HV switch gear had to be installed within our plant room.
- Crash protection barrier had to be installed for energy storage centre.
- Grid export – very important to include District Network Operator in early scoping study.

### Future plans

We have several environmental initiatives across our UK sites including the installation of a solar carport at the Norwich office, only using green electricity compliant with RE100 and onsite beehives. We are also working towards the installation of a 77m 900KW wind turbine at the Perth site which, integrated together with the solar carport and energy storage solution, could deliver 93% of the power required to run the Perth offices.

### Author's profile:

Lee is an experienced and passionate environmentalist, with 17 years of industry experience working within large automotive and financial FTSE 100 corporations. At Aviva, Lee has so far driven a 66% global carbon emission reduction, versus a 70% target by 2030 through many energy efficiency projects. Lee is also a qualified lead ISO 14001, ESOS and ISO 50001 auditor.



# Embedded Wind Turbines

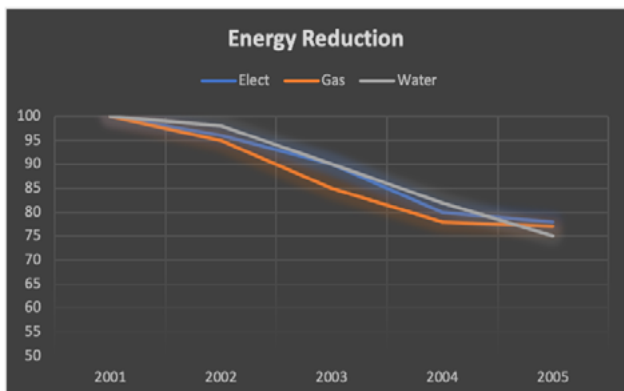
I started my career as an apprentice electrician, leading to becoming an electrician and finally an electrical engineer, as which I designed and managed the installation of electrical services for buildings and the manufacturing industry. I always had a strong interest in ensuring that energy efficiency was paramount in the services and systems I designed; this interest has led me to a greater involvement with energy management and more efficient use of the Earth's resources.

I was asked by the EMA to produce an article based upon my experience of installing two 250 kW wind turbines on the site of a factory for which I was the Site Electrical Engineer and Energy Manager. This refers to an 'embedded' installation whereby the electricity produce is supplied direct into the site's electrical distribution network. I am by no means an 'expert' on wind turbines and the article solely discusses my own involvement as the project engineer and manager for this installation.

I decided that before any form of renewable energy was considered it would be prudent to reduce the overall energy consumption, such that any renewable energy produced would not be wasted on plant and operations, which in some cases were wasting energy. I liken this to having a bucket with a leak in and to keep it full it has to be kept topped up, in our case energy from the mains was being leaked out and wasted. We needed to reduce the hole size in our bucket and plug the gap!

This was achieved by commissioning a Site Energy Management Team that embraced the challenge of reducing waste. The team included engineering team managers (from building services and production departments), an Operational Excellence Expert and an EHS Advisor. The team met once a month to discuss and co-ordinate energy saving initiatives and projects; within four years, the overall site energy consumption was reduced as shown below.

In terms of the **economic bottom line**, a substantial figure of £2m savings had been achieved by the end of 2005, prior to the turbines being installed.



Electricity reduced by 22% - Water reduced by 25% - Gas reduced by 23%

For the **environmental bottom line**, savings in CO2 emissions over the period 2001 – 2005 were nearly 12,500 tonnes. To try to put this into a context this is equivalent to the CO2 emissions of all the cars driven by employees over the same period. In other words, the savings offset the use of cars for 1000 employees for almost five years.

And for the **social bottom line and reputation**, in 2004, two 250kW wind turbines were installed to ensure that part of the electricity energy was derived from sustainable sources, which were approximately 10% of site usage. The wind turbines provided the most tangible and visible evidence within the local community that the site had a strong commitment to the environment. Staff involvement initiatives including awareness campaigns, audits, suggestion schemes, promotion presentations and the instigation of energy wardens who served to encourage employees to act as ambassadors in the local community.

## Why Wind Turbines?

In addition to the successful energy reduction programme, it made sense to then review further options regarding renewable energy and in particular with providing electrical power from renewable sources to supplement the site's supply network.

The main two options at the time were the use of building integrated P.V. Cells and wind turbines installed in an area of the site that was deemed unsuitable for future production development and far enough from existing buildings. The cost of electricity during this exercise (2004) was in the region of 8 pence/kWh and the Feed in Tariff was approximately 4 pence/kWh. There was an expected saving of some 12 pence/kWh.

The table below outlines the basic and rough costings that were used to conclude the decision and figures indicated where relevant at the time. These will now be somewhat different but hopefully provide some guidance.

Technology	Capital Cost/kW	Annual O/P - kWh/kW	Output Value/kW	Net Annual Savings	Payback Period (Years)
P.V. Cells	£4,000	1,000	£120	£120	33
Wind Turbine <50 kW O/P	£3,500**	2,300	£276	£276	12
Wind Turbine > 50 kW O/P	£1,500**	3,500	£420	£420	3.5

\*\* It should be noted that these are only ballpark figures and in practice will vary significantly. Accurate data can be obtained by comparing the proposed turbine output data against the recorded average wind speed for the location.

Based upon the above information and the size of available land the conclusion was reached that two



# WORKSHOP

# EMA ONLINE WORKSHOPS

## WHO SHOULD ATTEND?

- Those tasked with energy reduction and decarbonisation at their organisation or for their clients.
- Those interested in learning from experienced energy and sustainability managers.

## WHEN SHOULD I ATTEND?

Every Wednesday (almost)  
at  
11 am - 12 pm

## WHY SHOULD I ATTEND?

- Each workshop offers practical and impartial advice on the given topic.
- At each of the workshops you will have an opportunity to ask questions relevant to your challenges.

## OUR DECEMBER 2020 & JANUARY 2021 SCHEDULE

### 11 DECEMBER 2020 - DECARBONISATION OF HEAT – THE BASICS OF BIOMASS

This workshop will look at the basics of deploying biomass heating to help with heat decarbonisation and will discuss where it can be used, how to make sure its use is optimised and look at some of the common problems that occur with its use and the sourcing and storage of fuel.

### 16 DECEMBER 2020 - DELIVERING ENERGY EFFICIENCY – PLANS & TARGETS

The past year has brought challenges but also opportunities for organisations and their energy managers to test their options and capabilities for delivering energy efficiency. This workshop will outline how Surrey Police and the Royal National Lifeboat Institution (RNLI) are planning to deliver Net Zero and meet their targets. Mohammad Rafique, Energy & Environment Officer at Surrey Police will discuss their delivery plan for Net Zero strategy and Victoria Limbrick, Energy and Environmental Resources Manager at RNLI will focus on their considerations when shaping the Institute's energy and carbon plans.

### 13 JANUARY 2021 - DECARBONISATION OF HEAT – THE BASICS OF HEAT PUMPS

Decarbonising heat is key to achieving Net Zero. This workshop will look at the basics of heat pump deployment and use and discuss where heat pumps can and should be used and how to make sure their use is optimised. The session will also look at some of the common problems that occur with heat pumps.

**Attendees will receive 1 hour of EMA CPD.**

**For an up to date schedule and to book, please visit  
the EMA website**

**at**

**<https://www.theema.org.uk/ema-online-workshops/>**

250 kW machines would be the most suitable solution with an estimated payback period of some six years if new machines were purchased; however to ensure the project was more viable it was decided to purchase used turbines from Europe, the reason being that they were way ahead of using wind as a renewable energy source and used machines were available at much cheaper rates. This meant that the payback period was reduced to approximately four years.

Public perception of the project to install wind turbines posed the most significant challenge to its success.

An approach to mitigate and minimise the negative perceptions was developed. The approach included:

- Informal discussions with the Local Authority to gauge opinion.
- Advising the immediate neighbours of the proposals by personal contact.
- Holding a public exhibition and presentations which led to a Q&A session.
- Internal publicity and discussions with employees.
- Professional assistance with the planning application which included mock-up images of the proposals.

In the final analysis, minimal negative comment was received, and the planning application was processed in three months.

There are other factors to bear in mind if you are considering the installation of wind turbines:

### 1. Amount of local wind and the average wind speed for that area.

There are several sites online from which this information is available at different heights. Technical information should be available from the turbine manufacturers to indicate the expected output for differing wind speeds which should help decide on the optimum size for the area being considered, along with any physical constraints. This table indicates the manufacturer's output data for the 250 kW turbines that were installed.

Description	Beaufort scale	MPH	M/S	O/P in % of Rating
Almost calm	0-1	1	0.45	0
Just perceptible	2-3	2-3	1.0-1.5	1
Gentle breeze	4	4-5	1.8-2.3	2 - 4
Fresh breeze	5-6	10-15	4.5-7.0	1- 20
Fresh gale	7-9	20-25	9.0-11.5	50 - 70
Strong gale	10-11	30-35	13.5-16.0	90 - 100
Hard gale	11-12	40-45	17.0-21	100
Storm	13	50	23.0	100
Hurricane, tempests etc.	13+	60/80-100	27/36-45	Probable Shutdown

**2. Connection to Electrical Supply.** Another thing to consider when sizing the turbine is to ensure that the current and voltage levels can be safely accommodated within the site's electrical infrastructure. G59 protection must also be included, this ensures that the turbines are disabled if the normal mains supply is disrupted.

**3. Suitability of Location.** What are the constraints that could prevent the installation of turbines? Are the ground conditions suitable for the foundations? Wildlife including birds, bats that could be harmed, housing close by or even airfields whereby radar could be affected. These are just a few suggestions but worthy of note to give a feel to choosing a suitable location.

**4. Planning Permission.** This will need to be sought and it would be prudent to have informal discussions before any firm proposals are submitted.

**5. Financial Aspects.** Sometimes it all comes down to money and whether the proposals will meet the payback criteria. The Feed in Tariffs are provided by OFGEM and can be found on [www.ofgem.gov.uk/environmental-programmes/fit/fit-tariff-rates](http://www.ofgem.gov.uk/environmental-programmes/fit/fit-tariff-rates). The table concerning Wind Turbines is below and valid until March 2021. The cost saving by negating the supply from the grid can be obtained from utility bills.

Installed Capacity (kW)	Tariff pence/kWh
0 - 50	8.42
50 - 100	4.98
100 -1500	1.58
1500 - 5000	0.48

As I said at the start of this study, I am no expert, but I hope you found this article interesting. The project has proved to be of great benefit to the company and the turbines are still going strong today. In terms of age they will be some 26 years old. Payback proved to be four years and they have paid for themselves at least 10 times since installation. They have also become a landmark for Teesdale and as I said before an indication of the company's commitment to the environment.

### Author's Profile:

Astley has almost 45 years' experience within the building services sector and 30 years' experience with industrial power and process control systems. His specialities include power distribution, lighting, motor drives, HVAC controls, compressed air systems, building services design and maintenance as well as running stakeholders' engagement campaigns in his previous role as energy manager at GSK.



# The role of retrofit and net-zero

Retrofit of buildings to make them more energy efficient and greener is key to hitting net-zero targets. The Government is providing support through a £9bn package for energy efficiency measures. So far, one third of this package has been announced. £2bn has been allocated to domestic retrofit. £1bn was announced for non-domestic public sector buildings such as schools, libraries and leisure centres.

These funds come with tight deadlines for applications and delivery of projects. Organisations that had already prepared plans have been able to capitalise on the opportunity to access grant funding and mobilise quickly. We have successfully supported councils in the development of their bids to secure money from the

Green Homes Grant Local Authority Delivery scheme and the Public Sector Decarbonisation Scheme.

Those who have already implemented initial energy efficiency measures should now plan for deeper retrofit focusing on low and zero carbon heat projects, as these are likely to have more success in securing funding.





Co-owned by the Greater London Authority and Local Partnerships, the Re:fit 4 Energy Performance Contract Framework offers a swift procurement route with an OJEU compliant framework of 16 providers. It is underpinned by a performance guarantee, providing certainty to organisations and de-risking projects, protecting the client and their investment. Mini competition ensures a fast and efficient tendering process with clear pricing and pre-agreed core call-off contract terms to reduce time between service provider selection and contracting with them.

Re:fit 4 is the framework of choice for the public sector because it enables change

to be delivered at scale and pace, helping accelerate the journey towards achieving net-zero. As a managed framework, dedicated expert support is provided to all organisations, through every stage of the project. We help minimise cost and maximise savings and assist in appointing the best contractors for the project. We help organisations to plan, procure and perform.

We help public sector organisations with the development of projects eligible for grant funding and support the procurement and design journey, enabling authorities to act quickly now, and when further scheme details are released.

### Steps on your Re:fit journey

<b>PLAN</b>	<ul style="list-style-type: none"> <li>▶ Sign Access Agreement</li> <li>▶ Sign Client Support Agreement</li> <li>▶ Gather data</li> <li>▶ Engage stakeholders</li> <li>▶ Benchmarking</li> </ul>	<ul style="list-style-type: none"> <li>▶ Scope projects</li> <li>▶ Develop strategy</li> <li>▶ Build your business case</li> <li>▶ Secure finance</li> <li>▶ Agree procurement route</li> </ul>
<b>PROCURE</b>	<ul style="list-style-type: none"> <li>▶ Tender development</li> <li>▶ Support mini competition</li> <li>▶ Assure compliance</li> <li>▶ Receive and review bids</li> </ul>	<ul style="list-style-type: none"> <li>▶ Bid evaluation support</li> <li>▶ Interviews</li> <li>▶ Contract award</li> </ul>
<b>PERFORM</b>	<ul style="list-style-type: none"> <li>▶ Contracts signed</li> <li>▶ Investment Grade Proposal</li> <li>▶ Delivery support</li> <li>▶ Works completed</li> </ul>	<ul style="list-style-type: none"> <li>▶ Performance monitoring</li> <li>▶ Service provider reporting</li> <li>▶ Plan next phases of work</li> </ul>

Full support provided by Local Partnerships for organisations based in England and Wales, and the Retrofit Accelerator for organisations in London.

## The Re:fit Framework has achieved to date



**250+**  
organisations engaged



**£180m+**  
of works procured



**1,000+**  
public sector buildings retrofitted



**52,000+**  
tonnes of CO<sub>2</sub> saved each year



**£10m+**  
audited energy saved each year



Rachel Toresen-Owuor  
Re:fit programme director

To find out how Rachel and her team can help you draw up robust plans to take advantage of the £1bn central government grant available for investment for energy efficiency improvements in public sector buildings, email [rachel.toresen-owuor@local.gov.uk](mailto:rachel.toresen-owuor@local.gov.uk) or call on 07825 963 218. If you're based in London please contact the Retrofit Accelerator programme delivery team at [retrofitaccelerator@london.gov.uk](mailto:retrofitaccelerator@london.gov.uk)

Local Partnerships is proud to be part of the public sector family. We are a joint venture between the Local Government Association, HM Treasury and the Welsh Government. We work solely for the benefit of the public sector.

Our experts provide trusted, professional support. We bring public and private sector experience that provides **confidence**, **capability** and **capacity**, helping public sector organisations achieve sustainable targets and a path to net-zero.



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# Klöckner Pentaplast - A Global Energy Task Force on a Mission

Klöckner Pentaplast ("kp") is a global manufacturer and one of the leading suppliers of sustainable plastic packaging products, serving customers around the globe with rigid and flexible packaging, as well as specialty film solutions in the pharmaceutical, medical device, food, beverage and card markets, amongst others. The global leader in recycled content products and high barrier protective packaging is purpose-driven to deliver the sustainable protection of everyday needs. With over 50 years in business, kp plays an integral role in the customer value chain by safeguarding product integrity, assuring safety and consumer health, improving sustainability and protecting brand reputation. Kp has corporate offices in London UK, Montabaur Germany, and Gordonsville Virginia, USA with a total of 32 facilities in 18 countries, with ca. 5,900 employees worldwide.

In 2019, as part of a broader focus on sustainability, kp established a Global Energy Task Force to address the challenge of energy usage in our manufacturing plants, to drive energy efficiency in operations, and reduce our environmental impact. Having only joined kp in early 2020 and becoming part of the task force, I instantly recognised and was inspired by the skills and knowledge of my colleagues, with decades of manufacturing excellence experience. Together, we have set our sights on energy to help achieve our sustainability goals. Here is how!

The Energy Task Force has developed a coordinated approach to seek out areas of improvement in energy, building on all the great progress over many years at kp, in operating efficient manufacturing plants. It consists of a cross-functional team of circa.100 experts or 'Energy Champions', with different expertise across Operations, Engineering, Maintenance, Procurement and Business Excellence. By coordinating activities, we can better achieve our desired outcomes. The diversity of skills, knowledge and experience in the team is a key strength, providing clarity and imagination to approach energy in a holistic way. A critical factor in ensuring the success of

the Energy Task Force was having a clear mandate from the Executive Team with a governance process to ensure targets and regular progress updates.

Early tasks involved building robust analysis tools and energy performance indicators (KPIs) standardised across our plants, which is key to demonstrating results. Next was to set a clear target: reducing normalised global energy usage by 3% annually against the 2019 baseline. This is a challenging target when benchmarked against our competitors in the sector.

We use our understanding and analysis of energy consumption and costs to drive ideas from the bottom-up. Whether it is optimising maintenance regimes, adjusting plant operations or investing in new equipment, our site teams know their plants better than anyone else. Furthermore, they understand the natural synergy

between energy efficiency and improved productivity. The spotlight is on translating ideas into energy saving projects with strong business cases that make commercial sense.

Given our global footprint, sites have developed tailored energy action

plans to improve performance, aligned with their local energy cost and regulatory environment. A 'one-size-fits-all' approach is not possible as some technologies will work well in one location and not so in others. It starts with doing fundamentals well and tackling the 'low hanging fruit'. The interesting thing about 'low hanging fruit' is they grow back and need to be continuously picked, so many projects need to be tackled each year. To support our efforts, we have created a Toolkit for facilities around the world to identify best practices that will help them reduce energy consumption, and in turn, emissions.

Finding and fixing compressed air leaks is an example. Every year we review our compressed air systems and seek to optimise performance in reducing system pressure, fixing leaks, decreasing manufacturing equipment demand, and upgrading compressed air equipment.

“ **WHETHER IT IS OPTIMISING MAINTENANCE REGIMES, ADJUSTING PLANT OPERATIONS OR INVESTING IN NEW EQUIPMENT, OUR SITE TEAMS KNOW THEIR PLANTS BETTER THAN ANYONE ELSE.** ”

We use Energy Workshops or 'Kaizen events' to generate energy saving ideas. The approach is grounded in the principles of the Plan-Do-Check-Act (PDCA) continuous improvement frameworks which, given kp's long and distinguished manufacturing history, are already integrated into business processes. It is a matter for harnessing these existing levers for energy. Kp is continuously investing in replacing less efficient old equipment with high efficiency technologies in existing plants.

The list of projects and innovations in energy efficiency at kp are growing at considerable pace. So far in 2020, there are over 50 projects globally reported in the Energy Task Force programme across different technologies

– compressed air, process cooling, LED lighting and high efficiency motors and drives. We will continue to complete energy efficiency projects, supported by our energy action plans, and report the savings resulting from those efforts. We are also exploring the opportunity for on-site generation of renewable electricity using solar panels.

We launched a 'Battle of the Base Load' campaign to tackle energy consumption that is not directly attributable to the manufacturing process – i.e. the energy 'overhead'. A proportion of energy used in plastics manufacturing is a base load and can be reduced with an effective plan – e.g. shut-down & start-up procedures, tackling processes held at temperature during downtime, reducing air leakage, adjusting cooling water set points. We have developed a lens to visualise and measure the base load, to focus minds on reducing it in day-to-day operations.



“ COMMUNICATING THE LESSONS LEARNED, EXPERIENCES AND RESULTS OF DIFFERENT IDEAS IS A KEY SUCCESS FACTOR FOR ANY PROJECT. ”

Key future areas of focus also include installation of energy-efficient motors, recovering waste heat from our processes, and improved energy monitoring systems to better visualise and measure energy. We are constantly seeking insight into energy performance at facility, process and machine level. Better energy monitoring in manufacturing plants is a key lever to the long-term success of energy efficiency.

Luckily, there is already a strong best practice sharing culture at kp, and the work of the Energy Task Force builds on this foundation, with process updates from each plant, discussed with the global team at regular meetings. Communicating the lessons learned, experiences and

results of different ideas is a key success factor for any project. Energy teams – like all others in manufacturing environment – must work in collaboration to achieve mutual goals.

Immanuel Kant famously asserted that “to will the end, you must also will the means”. Overall, at kp the direction of travel is set and the end goal established. Our emphasis now is to 'will the means' with a clear global action plan to do more with less resource usage, and meet our sustainability goals. The Energy Task Force is on a mission, and – as all readers of this magazine will know – one of the joys of working in energy is that there are constantly new challenges, innovations and opportunities ahead.

#### Author's Profile:

Ethan O'Brien is Group Energy Manager at Klöckner Pentaplast. Ethan is a regular contributor to The EMA Magazine. He is a Full Member of the Energy Institute (MEI) and a Chartered Energy Manager. Ethan won a '35 Under 35' UK Environment Media Group award in 2018. Ethan holds a master's degree from the University of Edinburgh Business School.



# What Not to Do... In Energy Auditing

**Energy management professionals usually define themselves as 'wearing many hats', which makes the profession interesting and dynamic but also requires an all-round knowledge and experience in key subjects. Whilst there is a plethora of information available out there in each topic, there are only so many hours in the day that can be devoted to reading and research.**

The EMA is looking at key areas of energy management and asking those who focus on those areas at their organisations for their views and tips. Throughout this year, we tackled what not to do in energy procurement, waste management, energy management strategy and behaviour change and motivation. In this issue, we turn our attention to energy auditing.

**Nasrin Khanom, Environment and Sustainability Manager at University of West London**

**When gathering and analysing pre-audit data, you should never ever assume that the data is accurate.**

Have a closer look at the data to identify any gaps and if any has been estimated. It is helpful to gather the source of data so you can analyse it in advance and prepare questions to ask on the day of the audit.



**When selecting the most appropriate auditing technique, you should never ever do the audit without following any official guidance on how to do an energy audit.**

There is much well-known guidance such as ISO 50002, BS EN 16247 and EMA's Energy Auditing Guide that provides a useful structure to follow when conducting the audit and presenting the findings in a report.

**When auditing a building's lighting, you should never ever forget to take a measurement of the lux level.**

If you are recommending changing the existing lights to LEDs, then consider the impact the new fitting will have on the occupiers of that space as LEDs are generally brighter. Try to avoid recommending for a like-for-like replacement, and instead consider installing the LEDs based on a full lux level design for each space.

**When auditing a building's heating systems, you should never ever neglect the potential savings from insulating the heating system, tank and pipework.**

Insulation reduces heat losses and increases efficiency of the heating system. A good insulation could even generate an energy saving of up to 30%.

**When auditing a building's cooling systems, you should never ever review the cooling systems setup without taking into account the outside air temperature.**

In general, the climate of the UK is often cool and therefore there will be days when the cooling system does not need to be in operation.

**When auditing a building's pumping systems, you should never ever ignore the potential savings associated with changing the pumps to Variable Speed Drives (VSDs).**

Installing VSDs is the easiest and most efficient way to reduce the pump's power consumption. Reducing the motor speed by 20% could generate an energy saving of up to 50%.

**When auditing a building's ventilation systems, you should never ever assume the fans are in good working condition.**

It is handy to use an air flow meter during the audit as it will give you an idea about the fan speed. If you find the speed is low, then further investigation is needed. Also have a look at the PPM schedules to check when the fans were last cleaned.

**When auditing a building's compressed air generation, you should never ever forget to review records of air leaks to determine if there is a pattern of continuous leaks and physically check the piping system.**

On average, 15-50% of the air production flows through the leaks, and so it is important to repair leaks.

**When auditing a building's control systems, you should never ever assume the HVAC plant configuration on the control system has been set up correctly.**

There may be some plants and data that are not displayed correctly on the system, and some plants that are not controlled by the system. It is a good idea to double check the setup on the control system against other useful information such as schematics, O&M's and energy data as well against the information from a visual inspection of the plant.

**When writing an energy audit report, you should never ever forget who the end user is.**

Try to limit the information you present to what the end user would need to know in order for them to take it to the next stage.

**When including technical information in an audit report, you should never ever write it in a way that is difficult for the end users to grasp.**

Consider your writing style and the terminologies used and try to keep it simple by presenting key information. This is important so that the report could be understood by a large audience and it becomes useful enough to take further action. If you need to add more details, then maybe consider a separate report for a technical user.

**When including financial information in an audit report, you should never ever forget to add any contingency costs such as the cost for follow-up technical design surveys, and VAT.**

The end user needs to understand the full costs so they can make plans to set aside realistic budget to implement the energy saving measures.



**Peter Johan Bergh Lindersen,  
Senior Consultant at DNV GL**



**When gathering and analysing pre-audit data, you should never ever trust the data you received from the customer without asking additional questions to ensure the quality of it.**

You should check if it makes sense based on the size of the site you are auditing and the work that takes place on the site.

**When selecting the most appropriate auditing technique, you should never ever use the same fit-for-all for your audits.**

You should adapt it to the people you will be working with as you would like to collect as much information as possible. People think differently and it is good to be able to adapt to the people you are performing the audit with. You are interested in as much useful input as possible to create a good audit report.

**When auditing a building's lighting, you should never ever trust only what you see in the ceiling when the light is on.**

Try to see if you can see which light bulbs or tubes are being used as there are often some replacement tubes and bulbs in the maintenance room. This should hopefully confirm what you see and can be used as input to your energy balance.

**When auditing a building's heating systems, you should never ever only trust what the maintenance people on site are telling you about the heating system.**

You should try to see it with your own eyes and check how it is set up in the BMS, if they have one.

**When auditing a building's cooling systems, you should never ever only trust what the maintenance people on site are telling you about the cooling system.**

You should try to see it with your own eyes and check how it is set up in the BMS, if they have one.

**When auditing a building's pumping systems, you should never ever only trust what the maintenance people on site are telling you about the pumping system.**

You should try to understand how it is connected to the heating, cooling and the domestic water systems like toilets and sinks. By working out how it is all connected, it should help you to get a good input for your energy balance calculations.

**When auditing a building's ventilation systems, you should never ever only see how it is supplied to the site you are visiting.**

You should always try to see where the air is supplied from and how these machines work as there are large differences in how ventilation can be supplied to a site.

**When auditing a building's compressed air generation, you should never ever only see the compressors.**

Try to see how compressed air is delivered and where there could be potential leaks. The better you understand the system, the better improvement opportunities you can suggest such as reducing the pressure as many systems use a too high pressure that creates wasted energy.

**When auditing a building's control systems, you should never ever only see the system with your own eyes.**

Try to speak to the maintenance people on site on how they use it and if they can show you how the system works. This allows you to understand if they are able to use the system and if they use it correctly. Many sites have a BMS, but only a few of them use it correctly.

**When writing an energy audit report, you should never ever include information you are not using in your report.**

I would recommend including only information that is useful for the reader to understand what has been audited and then include the analysis part such as an analysis of the energy data, an energy balance and the energy saving opportunities. I have seen several reports that include unnecessary information and only confuse the reader of the report. Try to make it accurate and to the point with all the required information.

**When including technical information in an audit report, you should never ever copy and paste directly from a technical document.**

Try to understand if the information you add in your report is useful to understand how the equipment works. Adding equipment dimensions from the fact sheet will most likely not be useful for the energy audit report.

**When including financial information in an audit report, you should never ever say that it includes 100% correct information as this very often changes quickly.**

Estimates for energy saving opportunities are there for the customers to understand what price range we are looking at, but not the exact cost of implementing an opportunity. There will always be variations, and this would not be fully understood before a more detailed study of the selected opportunity takes place.







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# Energy management sub-metering is 'made to measure' – But how deep should you go?

**With savings of 30% of energy spend possible, and potential payback periods from 18 months to 1 month, how does sub metering help to unlock the savings potential of energy management and transform them into a return?**

Sub-metering for energy management provides the data on which energy management strategies are based, a fundamental part of a Building Energy Management System (BEMS).

How deeply to sub meter is one of those Goldilocks questions with the answer firmly rooted in site specifics. Maximising returns on investment by balancing the costs of energy management systems with the savings to be made is dependent on a full, and ongoing understanding of all relevant factors on each individual site.



## • Part L2 Guidance:

CIBSE's TM39, which provides the detailed guidance for compliance with Part L2 of the Building Regs, recommends installing sub-metering where there is a valid business case for doing so, roughly defined as one that will more than repay the cost of the sub-meters installed.

Part L2B recommends at least 90% of the estimated energy consumption within the mandated Part L envelopes is attributed to the relevant load type eg lighting etc.

## Leveraging the breadth of parameters measured by energy management sub-meters.

As well as the depth of sub-metering to consider there is also a breadth of parameters to consider that can potentially be used dependent upon the specifics of each site.

Multi-function meters can provide data on a wide variety of parameters including : **•kVAh**: apparent or total energy; **•KWhs**: active energy; **•kvarh**: reactive energy caused by inductive and capacitive loads which reduces the proportion of active energy. This can be improved by improving power factor. **•Power Factor**: technically is the ratio of active power (**kW**) to the apparent power (**KVA**). It is a measure of how effectively the incoming electricity is being used. It is being used at it's best when the PF value is between 0.9 and unity. **Individual Harmonics**: can cause distortion in voltage & current waveforms caused by electronic switching devices. **Total Harmonic Distortion**: is a measure of the total distortion from the individual harmonics. **Export kWh**: eg Solar energy generated on site and exported to the grid... etc, etc. This is by no means an exhaustive list and with no 'one-size fits all' answer to the potentially very rewarding investment in energy management, it pays to search for advice from time served experts in this field.

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Julia Szajdzicka  
Managing Director



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