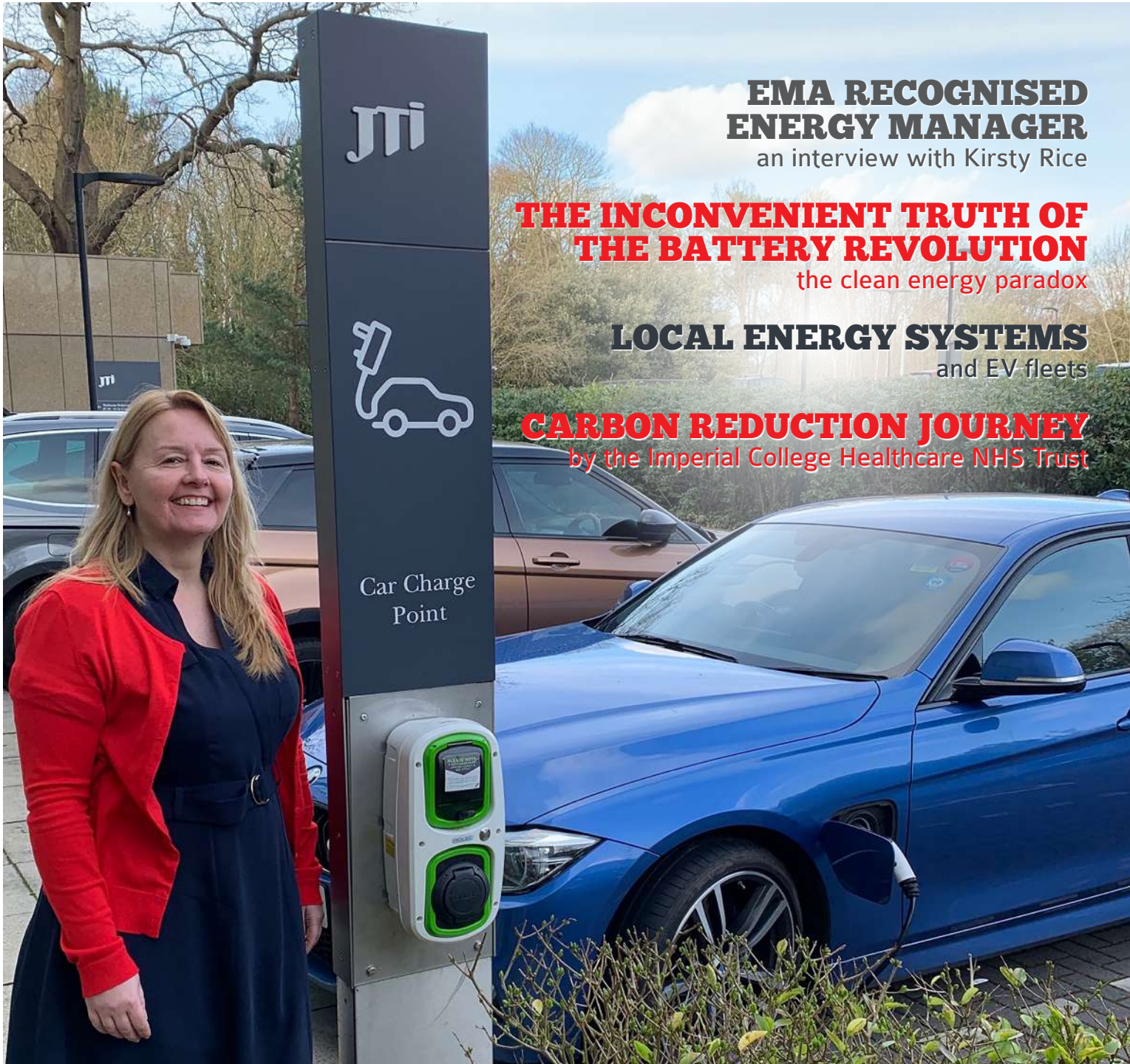


THE EMA MAGAZINE

www.theema.org.uk | ISSUE MARCH–APRIL 2020



EMA RECOGNISED ENERGY MANAGER

an interview with Kirsty Rice

THE INCONVENIENT TRUTH OF THE BATTERY REVOLUTION

the clean energy paradox

LOCAL ENERGY SYSTEMS

and EV fleets

CARBON REDUCTION JOURNEY

by the Imperial College Healthcare NHS Trust



Science-Based Targets



People Are Your 'Silver Bullets'



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by **CAROLINE HOLMAN**
Energy Efficiency Consultant at E&REC and
a Member of the EMA Board of Directors



THE EMA MAGAZINE

Dear Reader,

Welcome to the spring edition of The EMA Magazine. In this issue we have a wide range of informative and topical subjects including Science Based Targets (SBTs), procurement and energy management within the National Health Service (NHS).

Once you have absorbed and pontificated over all those acronyms, their meanings and applications, I would suggest moving to an excellent and engaging interview with Kirsty Rice, Environmental Manager at JTI UK on her career in energy management. As with all these interviews, I never tire of relating to the lessons learnt (good and bad) of those who share my passion for resource efficiency but particularly energy.

Learning from others' experiences, maintaining a thirst for new and improved knowledge, communicating and collaborating continuously with others facing similar challenges and opportunities, is a life-long and fundamental part of our continuous journey to a society which is an inclusive and sustainable environment for every generation to come.

All the above acronyms do prompt me to reflect on efficiency, waste and targeted improvement. I do sometimes wonder whether those who come up with all these abbreviations have actually pondered this as well. It may well be that these acronyms reduce space on the printed page, but by the time I have found the definition I could probably have completed a far more productive and efficient activity. Well, at the very least reduced my search engine footprint!

However, all levity aside, how do we filter out the 'vital few' and target meaningful priorities and actions within our own spheres of influence? There is so much information, science, opinion and alarm in various media about the challenges we all face – depleting finite resources, packaging, emissions, climate change, risk, resilience and mitigation.

To be honest I do not have a complete, finite or succinct answer. However, what I do know from my own experiences is that knowledge / best-practice sharing, benchmarking and continual-learning are fundamental to business success, efficiency and sustainability.

I hope, as I do, that you find the various and diverse articles, willingly shared by a wide range of energy professionals and EMA members, informative and inspiring – enjoy!

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The EMA Magazine is published bi-monthly
on behalf of the EMA by HEELEC Limited,
the organisers of the annual energy
management exhibition, EMEX.

©2020 HEELEC Limited, registered in
England & Wales Company no. 8785975
VAT number: GB 176 1796 71 Registered
office: Treviot House, 186-192 High Road,
Ilford, IG1 1LR

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Science-Based Targets: the Pros and Cons

Seeking an approval for energy efficiency projects and campaigns from organisations' key stakeholders can be a daunting process. Increasingly, reputational issues and corporate responsibility towards climate change can drive organisational energy efficiency in the right direction and have a positive influence on getting approval and financing for upcoming energy management projects. Nowadays, setting a science-based target (SBT) could be counted as an influencer amongst senior management. There are several options how a target can be set and the EMA members share their experience of setting their target and describe the stages of considering, preparing and committing to SBTs in their organisations.

Parthena Exizidou – Energy & Carbon Reduction Manager at British Antarctic Survey



Target: commitment to address the 1.5°C global warming challenge

The British Antarctic Survey (BAS) operates in the most remote places on earth like the Antarctic, the Southern Ocean and the Arctic. The challenges around logistics and extreme weather conditions entail many risks associated with

energy security, fuel dependency and carbon emissions. Future-proofing BAS against these risks is a high priority.

To future-proof BAS's longevity to continue to deliver world class environmental science and contribute to the global effort of addressing climate change, BAS is working towards net zero carbon emissions from own operations before 2040¹. Committing to climate action and developing an ambitious vision for the future will help BAS remain at the forefront of climate protection, influence and drive change within its supply chain and beyond.

Recognition of the climate change emergency is rapidly escalating. At BAS, we aspire to act in ways that are consistent with our understanding of global climate change, and with the science that we communicate – it is not enough to solely “talk the talk” we also have to “walk the walk”.

Within our responsibility to address the 1.5°C challenge of the Paris Agreement, BAS has committed to

- Intensify how we share the scientific evidence.
- Practice what we preach: work towards net zero carbon emissions from our own operations before 2040¹.
- Invite others to join us on that journey.

At the same time understanding the challenges around decarbonisation of BAS operations is crucial in order to achieve the target. An important part of the process is to understand what responding to the 1.5°C challenge means for us. What is the timeframe? How can we achieve this? What changes do we need to make in our science delivery?

Setting a science-based target

A first step is to develop a carbon reduction target in line with the scale necessary to limit global warming to 1.5°C, also known as a science-based target (SBT).

SBTs represent a robust approach for managing emissions for short- and long-term horizon, setting interim targets for 2025, 2030 and 2035 that are crucial in order to steadily progress and keep track of the organisation's performance.

To develop a target for BAS², we worked with an external consultancy who took into account the nature of our operations, reviewed our historic carbon data, developed a baseline and identified the importance of different elements of Green House Gas (GHG) emissions within Scope 1, 2 and 3 (see below). The following step was an analysis of the different methodologies around SBTs and the identification of a credible science-based GHG reduction target for the organisation.

A review of the assumptions, advantages and disadvantages of six widely used SBT methods was carried out before selecting the Absolute Emissions Contraction (AEC) method as the most appropriate. The AEC method was considered appropriate due to its rigor, transparency and simplicity to communicate. It considers all three scopes of emissions including: Scope 1 direct emissions (those produced by our sites in the UK and Antarctica

¹Aligned with the commitment of the Natural Environment Research Council and the UK Research and Innovation.

²The science-based target was developed for the Natural Environment Research Council (NERC). The British Antarctic Survey is part of NERC and therefore the policies/strategies are aligned.

including our ships and aircraft), Scope 2 indirect emissions (those produced through purchased electricity in the UK); and Scope 3 all indirect emissions (those attributed to purchasing goods and services, Antarctic and non-Antarctic business travel, investments, leased assets, etc.).

Under the SBT initiative and the 1.5°C scenarios, a minimum annual linear reduction of 4.2% in GHG emissions is required to meet the global level of reduction in order to remain within 1.5°C. Absolute targets are the most meaningful in reducing overall global emissions because they are straightforward to calculate and communicate.

The key initiatives to deliver the carbon reductions in line with the SBT are:

- Replacement of ageing buildings with new energy efficient infrastructure designed with low energy demand for all stations in Antarctica and offices in Cambridge;
- Continue to invest in robust renewable energy technology where possible – two new solar roof projects are in the pipeline for 2020, to follow from the completion of a solar carpark in Cambridge during 2019;
- Investigate large scale renewable energy generation and storage systems to completely decarbonise BAS's largest Antarctic station, Rothera;
- Develop a smart grid to ensure efficient energy and load management for the reliable supply of electricity and reduced vulnerability at Rothera Research Station;
- Electrify heating by investing in energy efficient sea water or air source heat pumps in the Antarctic stations;
- Supply of 100% renewable grid electricity for Cambridge offices since April 2019;
- Travel strategy to support SBT reduction and influence behaviour change – Prioritising travel and identifying

- alternatives ways with reduced environmental impact;
- Electrification of station vehicles and boats in Antarctica;
- Procurement of a replacement inter-continental aircraft that reduces fuel use and supports the use of sustainable biofuels;
- The new ship's innovative design which makes use of the latest technologies to reduce carbon emissions, including a hybrid electrical system;
- Embedding embodied carbon into the design decision making process for all new construction projects.

Benefits of science-based targets

There are many benefits of setting a SBT:

- Strengthening reputation; BAS works in partnership with business, government, civil society, the public and the wider research community to shape the environmental research and innovation agenda. It is therefore crucial for BAS to maintain its reputation across its partnerships and science community.
- Increasing operational efficiency; Operational efficiency also stimulates innovation, drives down costs and increases competitiveness enabling BAS to remain an attractive organisation and a fascinating place to work.
- Increasing resilience; Setting short- and long-term targets will also help in being prepared for the shift in public policy required to meet the UK's 2050 target for net-zero GHG emissions and therefore increasing resilience.



**British
Antarctic Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL



Challenges and opportunities

Although we are making significant global progress in reducing the operational carbon emissions, embodied carbon is still not actively taken into account. At BAS, we aim to improve the process of capturing and assessing embodied carbon and embed it into the design decision making process for all new construction projects. Another challenge on BAS' decarbonisation journey is the commissioning and operation of the new polar ship, RRS Sir David Attenborough. The operation of the new ship will account for a large part of BAS' carbon footprint going forward. However, its innovative design can significantly reduce the ship's carbon emissions.

For example, the ship has a hybrid electrical system consisting of large capacity batteries and four main engines – two nine-cylinder and two six-cylinder models. This configuration of different engine sizes means the ship can operate efficiently, whatever environmental conditions she faces.

The hybrid system allows the RRS Sir David Attenborough to operate on a single main engine, preventing the need to run engines at part-load to provide enough spinning reserve for transient spike loads. This will save a significant amount of fuel over the life of the ship.

Panelling around the hull has been laid internally to provide a smooth hull, reducing friction and further increasing the ship's fuel efficiency. Even the ship's heating system is designed to save power – waste heat from the engines is recycled to heat water and keep the ship warm.

Technological advancements around shipping have not progressed enough to assist with BAS decarbonisation efforts. However, there are areas that renewable energy technology can help us decarbonise sooner, such as at Cambridge offices and in most of our research stations. This will reduce the need for ship visits to the stations (e.g. to deliver fuel) and it will have a significant impact of reducing the ship's carbon emissions.

Delivering the maximum of our capacity within the following years is the main focus of our efforts at BAS for decarbonisation. A review of carbon insetting/offsetting approaches would be the following step that will help BAS completely decarbonise. On the positive side, future technology like low-carbon hydrogen/ammonia is likely to play an important role especially for shipping and long-term energy storage and might accelerate the decarbonisation process.

Note: The SBT was developed by an external consultant for BAS/NERC following the guidelines of

the science-based targets initiative (SBTi) for 1.5°C. The target is following the absolute-based approach where a percentage reduction in absolute emissions is required by the 1.5°C scenario and is applied to all companies equally. The target is not validated from the SBTi; however it gives BAS a clear path, through setting interim targets, for targeting and monitoring progress in the journey of addressing the 1.5°C global warming challenge.



Sarah Jolliffe – Company Energy Manager at BAM Nuttall Ltd

Target: set at 2°C in April 2019

The science-based targets initiative (SBTi) has been born out of a collaboration between 4 organisations, WWF, UN, CDP and World Resources Institute in order to set out a more robust and tangible system whereby companies can set meaningful carbon reduction targets.

The scheme has been in existence for a little over 5 years and is increasingly seen as the 'gold' standard in carbon reduction labels. But unlike simple narrative carbon reduction statements, the SBTi requires organisations to not only measure and report emissions, but also identify a tangible pathway of emissions reduction activities which is assessed by the SBTi panel. It also requires organisations to include reduction strategies for their organisations indirect emissions associated with Scope 3 activities where those activities comprise more than 40% of the total emissions.

Pros

- They are more tangible against the backdrop of well-established global climate models.
- They are founded on the principle of absolute emissions reductions – not intensity related.
- It forces organisations to look deeper into their emissions sources to identify a reduction strategy.
- They go beyond the traditional '5 year' business plan – SBTs must be between 5 and 15 years.
- They complement other business aspirations such as improving air quality, social value and innovation.
- Enables businesses to be more competitive.

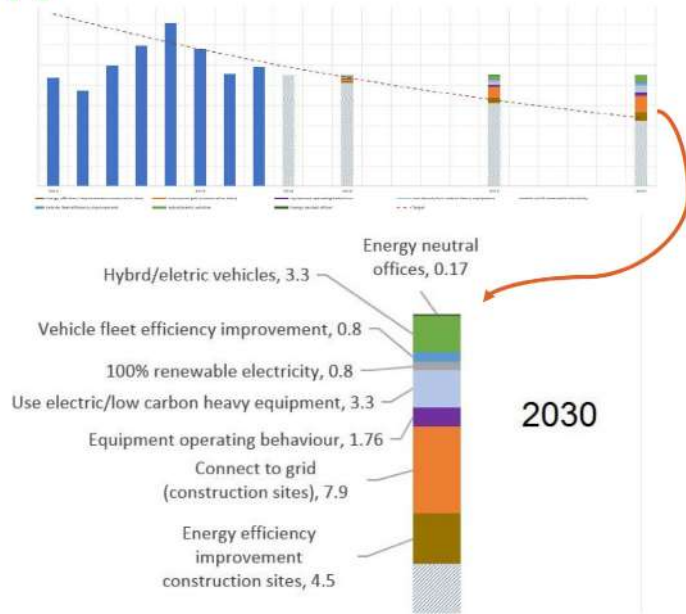
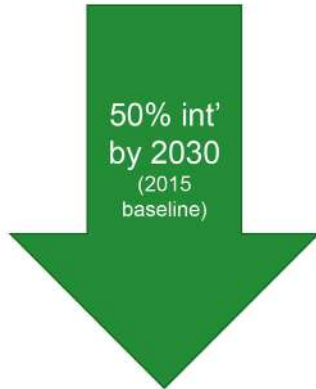
Cons

- Requires a high level of granularity which may be difficult to measure, particularly for Scope 3 emissions.
- You cannot exclude more than 5% of direct emissions (typically associated with de-minimis activities).
- Scope 3 target is mandatory for the vast majority of applicants, but measurement methodologies are for the most part very high level and have a high error margin.



How has BAM applied them?

Scope 1 and 2



BAM's experience

BAM Nuttall (subsidiary of Royal BAM Group nv) is a large Tier 1 contractor who undertakes civil infrastructure projects such as marine structures, highways, tunnels, bridges, railways, energy and aviation. It has been in existence for over 150 years and supports a workforce of 3,000 direct employees plus thousands more in its supply chain ranging from SME's to well-known material suppliers as well as sub-contractors and labour providers.

BAM has long been recognised as a leader in sustainability, having secured CDP 'A' list status for over 5 years. But in order to maintain this, it has been necessary to seek out better and better ways to measure and reduce our carbon impact beyond simply doing business as usual. We learned of the SBTi through our affiliation with CDP and it seemed a great fit for BAM, so in 2017 we undertook a complete carbon baselining exercise in collaboration with the Carbon Trust. From this we were able to identify the focus areas for emissions reductions which enabled us to approach SBTi and commit to our next generation – long term strategic carbon reduction target.

We found the process quite straight forward requiring only a few meetings and some back and forth clarifications. SBTi ratified our SBT in 2019 and we are now well underway with implementing the action plan. Being a large construction and civil engineering company, naturally our focus is in the materials we use and also the use of millions of litres of liquid fuel. Actions being implemented include:

- Seeking alternatives to cement-based products;
- Eliminating liquid fuel power generation on site;
- Utilising renewable power sources;
- Making sure the construction process is as streamlined as possible.



Penelope Guarnay – Carbon Programme Manager at BT

Target: set 1.5°C in September 2017

BT is one of the world's leading communications services companies. We serve the needs of customers in the UK and in 180 countries worldwide. Our main activities are the provision of fixed-line services, broadband, mobile and TV products and services as well as networked IT services. In 2008, BT set its first Science Based Target to reduce emissions by 80% by 2020. BT met this target in 2016 – four years ahead of schedule. In 2017, BT then set out a more ambitious target – to achieve a 1.5-degree SBT of 87% reduction in the

carbon emissions intensity of its business by 2030, and to become a net zero carbon emissions business by 2045. We also aim to get almost 90% of the way there by 2030.

Our goals are not arbitrary. They represent a firm commitment to achieving the targets set out by climate scientists in the Paris Agreement – that is, taking the action necessary to prevent dangerous climate change by limiting global warming to well below 2°C.



SBTs are vital in providing companies with a clearly defined pathway for reducing greenhouse gas. The Science Based Targets initiative brings together partners such as the UN Global Compact and the World Business Council for Sustainable Development who help promote the importance of taking measured and validated action.

The SBTi has been a key factor in achieving boardroom buy-in. Previously, we could go to the board and ask to set a carbon reduction target e.g. 20% by 2020 or 80% by 2080 – but there was no basis, and the board knew we could make up any number. Now, we can demonstrate to the board that our targets correlate to the recommendations of the scientific community, which brings more weight to the table and has accelerated discussions around adaptation and driving the required changes.

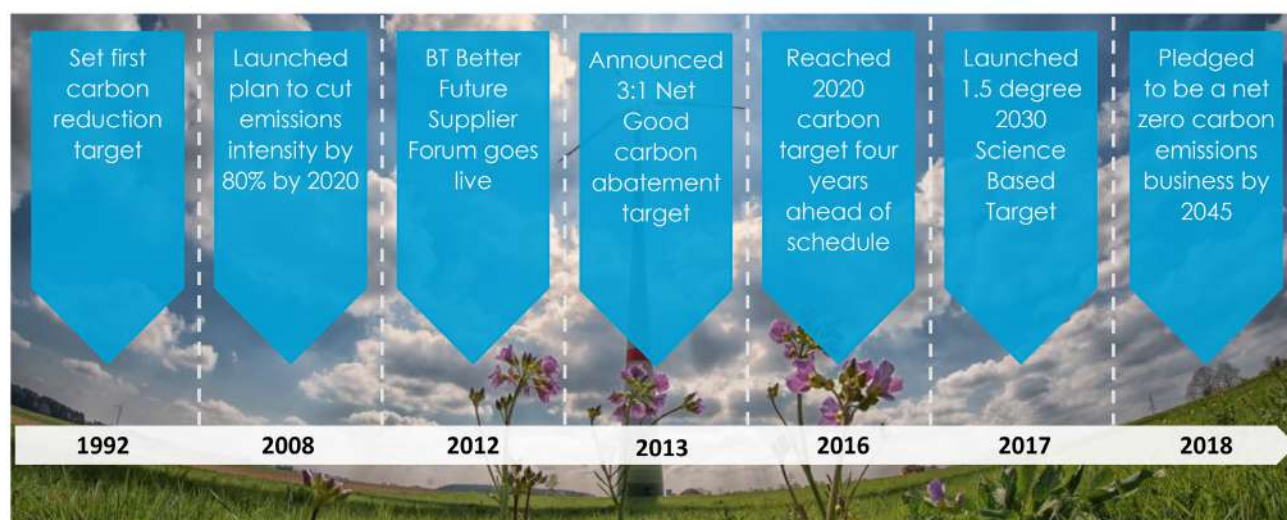
Our commitment to the SBTi isn't just good for the planet, it's good for business too. Companies taking a leadership position on climate bolster their credibility and reputation among stakeholders, and in 2019/20, BT celebrated its tenth year of investment in energy reduction programmes, through which we have consistently

125 of our top suppliers switching to renewable energy by 2020 – and have already exceeded this with nearly 140 suppliers now using renewable energy. Furthermore, nearly 300 of our suppliers now submit climate-related data to CDP; that's 30 more than last year and represents 51% of our total spend.

Lessons learned & the way ahead

Our experience at BT has demonstrated the value of working with an independent third-party consultancy in setting and adopting Science Based Targets. We joined forces with the Carbon Trust not only because we recognised that we didn't have the requisite carbon modelling expertise in house, but also because partnering with the Carbon Trust gave credibility to our goals. We also realised the importance of developing a business culture which makes long-term planning possible. Many boards and executive committees are focused on one, two or – at maximum – five-year plans but Science Based Target force organisations to look long term, galvanising the business to innovate and find solutions.

Tackling climate change and environmental challenges



We've saved over **£298m** through our energy efficiency programme since 2009/10



delivered energy consumption savings amounting to around £298m. We are also delighted that we have just achieved the CDP's highest rating yet again. We now have a four-year CDP "A-list" track record – a clear sign that we are pioneers in acting on climate change.

When BT initially set its targets, we didn't know how we were going to get there – however our commitment drove us to find solutions. We also saw the need to encourage and support our suppliers and customers to join us in cutting emissions. For example, we've teamed up with npower to offer our UK suppliers a deal on renewable electricity. We also set ourselves a target to get

At BT, we've done the easy bit, i.e. "Switching to Renewables". When we look at the future, we still have not worked out all the solutions required, for example, regarding Electric Vehicles and other unknowns such as heating. But we will get there, and we will achieve this through collaboration.

Climate change is a global issue and we're all in this together. Policy makers, businesses and industry – and it is only through working together that we will achieve our goals and make the necessary transition – globally – to a low carbon economy.



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EMA Corporate Patronage offers:

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- an effective way to invest in the future of your business
- the opportunity to gain the profile that your organisation deserves

**For more information, please contact
enquiries@theema.org.uk**



EMA Recognised Energy Manager

The Energy Managers Association is pleased to announce that Kirsty Rice, Environmental Manager at JTI UK, 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 or call 0203 176 2834.



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An Interview with an EMA Recognised Energy Manager

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

I became interested in the environment in my teenage years and went on to do a BSC in Environmental Science and Technology. My career just developed from there. I've spent time working as an Environmental Projects Manager, an Energy Specialist and now as an Environmental Lead. My drive is about creating a better world with practical solutions.

What does your role at your organisation entail?

I cover everything to do with energy, waste, water and biodiversity. The role is new, and this gives me a fantastic opportunity to start from the basics, bring the people along on the journey and to deliver some fantastic sustainability projects.

In the few months I've been with the company, I've carried out an environmental audit of our buildings and operations,

begun work on sustainability projects and developed the content for an interactive zone on environmental themes for our UK conference.

What is the most exciting part of your job?

I am currently developing the strategy for the UK market. This is an opportunity to shape the ambition for the company and reduce our environmental impact. All large organisations have a role to play in understanding their impact and mitigating this wherever possible. We are seeing a huge amount of press around Zero Carbon and Zero Waste targets and it's really inspirational to witness this change happening.

What has been your biggest achievement to date?

I worked for the National Trust as their Energy Manager, then Energy Specialist. During this time, I developed their energy strategy and targets, led on national projects and delivered training and support to create better awareness.

I worked up a multi-million investment programme to meet their renewable energy target, covering biomass, heat pump and hydro-electric projects. It took 6 months to develop and was tested out through a trial of 5 projects. The programme was approved and is still working successfully today.

What is the most frustrating part of your job?

It's a new role for me, so I've been along a journey of discovery. I've been really lucky in this and previous roles where I've been able to take ownership and drive the environmental or energy agenda. What complicates this is the multitude of priorities that any organisation faces.

In my previous experience, energy improvements can be the first to be cut from projects because they are perceived as a "nice-to-do" rather than a necessity. When the world is saying that climate change is our number one threat, we need to make room to consider this within our commercial decisions.

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

To remove the standby button. Not on everything – I realise that it will be needed in some circumstances – but we definitely don't need commercial coffee



machines, office printers or our own TVs on standby overnight. By doing this, we'll help reduce our emissions without even thinking about it.

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

- 1) Understand that yours isn't the only agenda that needs to be heard, but don't give up!
- 2) Surround yourself with colleagues who can support you and take ownership for themselves, for instance, by setting up an environmental/energy committee or network.
- 3) Start from the basics, identify easy wins and create buy-in from senior management.

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

If you have an inquisitive mind, are proactive and want to make a difference, this could be the role for you. You don't

need to have academic qualifications or to be a qualified engineer, but you do need to be prepared to learn on the job and gain professional accreditation. Being an energy or environmental manager is more than checking boiler settings or light fittings, it's also about engaging with your audience, testing out new ways of working and setting future ambition. You need to have a pretty rounded set of skills and those don't have to come from years of working solely in energy management.

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

Switching a light off when you leave a room and on again when you come back in uses more energy than just leaving the light on.

There are so many energy myths out there. Our technology has moved on considerably and many of them are no longer based on reality.

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

I had attended some of the training sessions run by EMA and thought the next step would be to undertake the interview to become a Recognised Energy Manager. I found it useful to identify strengths and weaknesses to help plan my training needs.

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

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.

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

To continue developing my skills and knowledge in the environmental field and to continue providing advice and direction for my organisation.

DO YOU DARE TO JOIN US FOR

HALLOWEEN...



Thursday 31st October

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Kerb - Sweeney Todd pie shop

Beef & Guinness 38g CO₂

Chicken & ham 5kg CO₂

Spinach & feta cheese 9kg CO₂

Healthy – Rotten pumpkin fritters with

maggot salad 1kg CO₂

Bistro – Halloween ribs and guts 18kg CO₂

(sticky pork ribs, caramelised onion & sausage with tomato chutney)

Hot Deli – Worms in toxic waste swamp 10kg CO₂

(mac, cheese & bacon bake)

Petrified pumpkin 0.3kg CO₂

(Pumpkin pie)



Wouldn't
scare your
Granny

Hiding
behind the
cushion

There's
something
under the
bed

People Are Your 'Silver Bullets'

In an ideal world, we would prefer to buy a piece of equipment that reduced energy without human interaction; however, realistically without the help of all the people in your organisation, savings will either not happen or be quickly negated. Without the engagement, the foundations of energy management are weak and quickly undermined, so having strong support is essential to hitting the targets you seek.

Success as an energy manager depends to a great extent on the ability to identify, engage and influence staff at every level of an organisation. Energy managers must have an understanding of the needs and concerns throughout the workplace to be successful. Whatever his or her role, with full engagement, any staff member can contribute to improving an organisation's energy efficiency.

The best performing organisations focus on supporting staff engagement through for example, respect of co-workers, empowerment with responsibility, manager's levels of trust and integrity. These things help generate pride in the workplace.

Whether you are implementing an energy awareness campaign or trying to increase your company's share value, staff engagement is directly correlated to work force performance and output. Multiple surveys show there is a direct correlation between staff commitment, doing their job well and how much they feel valued and respected. The more engaged employees are, the better they will perform.

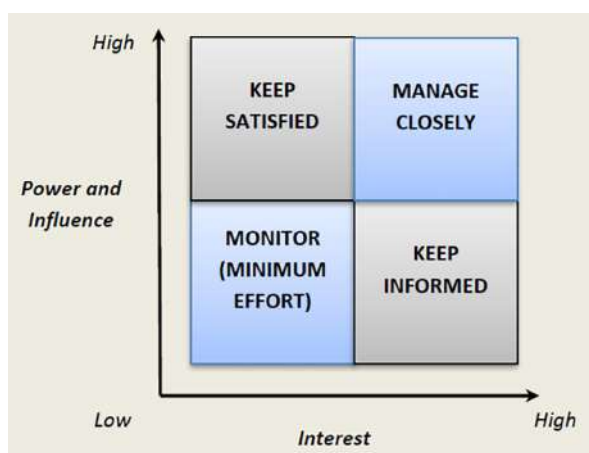
Obtaining feedback

Obtaining feedback from the various types of staff will help to determine where you are now and give you an understanding of the prevailing culture. A way to do this is to run workshops or send out a questionnaire. Use the information gained to determine the level of information and actions you will need to move the organisation forward.

Mapping your stakeholders

Influencing the staff of the organisation and driving changes in their behaviour necessarily involves encouraging people to be engaged in making energy saving a common goal. Behaviour change is about embedding the things that are 'new' or 'unique' at the current time into standard practices.

Any individual's or group's position on a "stakeholder's map" can help to determine the amount and quality of the engagement you should have with them.



High power – interested people: you must fully engage and make the greatest efforts to satisfy.

High power – less interested people: put enough work in with these people to keep them satisfied but not bored by your message.

Low power – interested people: keep these informed and talk to them regularly to ensure that no major issues are cropping up.

Low power – less interested people: again, monitor these people but do not bore them with excessive communication.

Running energy awareness campaigns

Energy awareness campaigns can help to communicate educational messages. They can be effective where individuals and teams are currently unaware of just how much energy is being consumed. Increasingly, however, campaigns are having a diminishing effect as people are frequently made aware of energy costs through media coverage and indeed their own household bills. People know that filling a kettle for just one cup of tea is wasteful, the knowledge is there; the challenge is to get people to act on that knowledge. Campaigns need to be fresh and carefully directed. Perhaps draw initial themes/ideas from staff suggestions.

Energy reduction techniques tend to fall into either one of two camps: technical or behavioural. The planning, launching, roll out and wrapping up of initiatives across the organisation are "campaigns" and should be identifiable as such. Each campaign then has its own identity (and name; "Energy Watch", "Energy Week", "Energy Matters" or perhaps a staff engaging competition).

Every campaign will require some common managerial elements; planning, organisation, leadership, funding, reporting, a start and end date and it will need to have a measure of success.

Delivering both a technical and behavioural campaign together as an integrated and co-ordinated package will have great power especially if each element of the campaign supports the other.

Elaborating and explaining energy bills may make a difference but helping people to realise the level of impact that each individual's energy consumption has on the environment could result in significant cost-saving behaviour.

Energy awareness training can become a key element in helping organisations and households reduce their energy cost. The EMA's approach is determined by our belief that people are pivotal to the reduction of energy use and, consequently, its cost. Staff training can significantly contribute to reducing unnecessary energy use within an organisation, and for this reason their energy awareness training should not be considered optional but compulsory, and where possible undertaken during one's induction period.

With this in mind, the EMA produced its own Energy Awareness course (LEC 1) which is designed for individuals, or as an employer led scope for entire organisations, interested in the reduction of energy consumption, management of energy costs, improvement of energy performance and boost of the company's profile.

The EMA Energy Awareness course (LEC 1) can be utilised as an effective off the shelf induction training on energy awareness to all employees in a company. The course is particularly suited as a tool for energy managers

SUCCESSFUL ENERGY CAMPAIGNS SHOULD



and energy management consultants to embed behavioural change based on simple and effective measures and energy awareness, within an organisation.

Every employee who undertakes the 25-minute e-learning will receive a LEC 1 certificate, and organisations training a substantial amount of their workforce will be eligible for LEC Silver, Bronze and Gold Award.

Measuring and reporting

At the heart of energy management are the numbers; how much power, at what cost? Supplying your staff with the right numbers in the right format will go a long way to encouraging them to make the savings you require. Most energy reporting will be the consumption data gained from one or more of a number of sources; billing data and especially "half hour" sites, online Automated Meter Reading (AMR) or perhaps for larger sites sub metering may be installed (e.g. at each production stage or each building). For most staff using energy will not be the first concern of their job. The challenge for the energy manager is to make energy information available without producing a deluge of numbers. Routine reporting is a good place to start; monthly to match your billing cycle or for larger sites or processes consider weekly or daily reporting.

- Keep reports simple – Colours highlighting good and poor performance, graphs to highlight trends and comparisons.
- Make targets or key

performance indicators (KPIs) visible alongside the actual power used.

- Encourage competition – Rank sites on their performance against target, units of production, improvement from a benchmark etc.

A supermarket has to sell two full shopping trolleys per second to pay their energy bill.

A hotel has to sell 432,200 hotel rooms per year to pay their energy bill.

To encourage good energy management by operators, show the half hourly data as a graph for each day or week. Consider whether the information should be given as £ or kW/hr to suit each group of staff. Maybe even convert the cost to another measure that may have greater effect e.g. in a restaurant business convert the cost to the equivalent number of meals that would need to be sold to buy that energy or the number of staff hours that the savings could buy, or simply Another measurement being used is Carbon Equivalent, or Carbon Emissions (CO₂e or CO₂), where the carbon footprint associated with energy use is used as a common





AVAILABLE ONLINE

Energy Awareness Course LEC 1



- Reduce energy bills
- Raise energy awareness
- 25-minute e-learning course with a multiple answer quiz



**FOR MORE INFORMATION ABOUT THE EMA
ENERGY AWARENESS E-LEARNING COURSE,
CONTACT [JANA.SKODLOVA@THEEMA.ORG.UK](mailto:jana.skodlova@theema.org.uk)**

"currency" combining all the different energy types (gas, electricity etc.) Real time information, perhaps linked to sub meters, can be used to promote immediate changes of behaviour. A wall mounted display of current usage and the week trend or comparing energy consumption to other sites may be effective for this purpose. A real time approach, particularly with sub metering also enables alarms to be used to indicate unusual consumption levels. As part of monitoring note regular "yardstick" times that can be used to benchmark future consumption levels. Also, look out for successful actions that can then be used as examples of "best practice".

Reinforcing the message

Once you have implemented the reporting, monitor for change and celebrate improvement with the staff who has made a difference. Behaviours can take time to change. Some studies estimate that half an energy saving programme can come from behaviour change – but only where there is good measurement communicated in the right way.

Reward and recognition

Always look out for examples of good practice and good results regardless of how big or small. Make sure that those responsible for this success are always genuinely and publicly thanked and perhaps rewarded for their efforts. Make an effort to catch people engaging in good practice and make sure you acknowledge their enterprise.

Social proof

People are motivated to follow the behaviour of others and are more likely to be mindful of energy usage if others are too. The 'normalisation' of actions e.g. turning lights off rather than leaving them on reinforces other people's behaviours.

Generation theory

For the first time in social history there are four generations in the workplace at the same time, and, for the first time the younger generations know more (computing)

than the older ones. This has significant implications on how staff are approached and managed since each of those generations tends to have very different value sets and triggers that will appeal to their particular characteristics.

Gamification

Every week millions of people including staff within your organisation spend hours playing multiplayer online games with a level of engagement they do not bring to work. 'Gamification' looks at how to transfer the key ingredients of game design – and the gamer challenges, excitement and focus that comes with it, to the workplace. Elements of game technology implemented into the workplace can solve a number of problems with morale, alignment and communication while honing skills like resource conservation, data analysis, teamwork, recruitment, leadership etc.

The good news is that engagement from all staff need not be as difficult as it may first appear. In fact, successful engagement plans have many common elements.

Being aware of roadblocks

Several factors can hinder progress in the influencing of staff but often some of these factors can also become enablers. Identifying and removing/dealing with obstacles to a project implementation will very much improve the chances of success greatly.

Some common barriers to success and progress are:

People don't like change for change sake – Staff may not appreciate that their behaviour has an impact on energy and therefore an awareness of business impact is vital. Make it known how important they are by demonstrating how their contribution can affect the organisation's performance in share price, sales, profitability, staff retention, salary levels etc.

Integrity and credibility – Energy managers have to earn the trust of colleagues by always delivering

promises and being honest about issues.

Relationships with senior staff – Good relations with those who have significant influence across all or parts of the organisation will hasten the progress of an energy strategy.

Lack of data – Measurement is key to any success: "if you're not keeping score, you're just practising".

'Old School' mentality – Some staff will have ingrained ways of doing things. Challenge the status quo but be sure to do your homework first and understand why the old way has been in use for so long. Give examples of how a different approach will give greater benefits all round.

Training – Many behaviours will be process driven and will need an element of retraining. A structured approach is essential to cascade new methods to all staff.

Communication – Identify who and how often staff need to be informed (use the stakeholder map above to help with this). Make all communication clear, concise and relevant to the recipient.

Funding – Business is in effect a machine to generate money. If it has poor cash flow funding for energy projects, then the energy manager's task will be made significantly more difficult. It is true though that reduced energy and carbon costs would provide a much-needed boost to the organisation's finances. Therefore, it is important to align sustainability to business goals.

Politics – It is often the case that departments or sections of an organisation can be territorial or have a 'silo mentality'. Energy managers need to be able to demonstrate the benefits of the energy efficient actions required to convince the board or finance leader in order to override objections from single interest individuals or departments.

For more information on the EMA Energy Awareness course, contact Jana at jana.skodlova@theema.org.uk.

The New Re:fit 4 Framework: Getting the Public Sector to Net-Zero



JOINTLY OWNED BY



The new Re:fit 4 energy performance contracting framework has just been launched. The Re:fit energy performance contract framework may offer your team a unique opportunity to make a step change in the operational and value for money performance of your entire asset base.

At Local Partnerships, Rachel Toresen-Owuor is responsible for the national Re:fit programme, outside of London.

Rachel Toresen-Owuor states *"At Local Partnerships, we ensure authorities have the necessary skills and tools to set and manage carbon budgets and review projects; we provide expert advice on project identification and delivery, organisational governance and decision-making processes. We are committed to a decarbonised public sector and can support you through all stages of your journey to net zero."*



Public Authorities can use the Re:fit framework for the accelerated development and delivery of long-term capital programmes capable of delivering short-term and strategic benefits to minimise carbon footprints whilst improving the performance of existing and newly-created assets.

At Local Partnerships, Tony Lawson focuses on the growth of the programme and the provision of client support.

Tony Lawson mentions that *"Re:fit has been the framework of choice for the public sector seeking to deliver at pace and scale; if not already doing so, councils should consider using the Re:fit framework. The framework helps authorities develop and deliver key elements of their climate response activities. It helps improve the energy performance of assets and guarantees substantial performance improvements (including cost savings) and the reduction of carbon emissions."*



This framework will give public sector organisations a tremendous opportunity to play their part in addressing the climate emergency and helping to meet European, national, local and organisational targets to reach net zero carbon emissions. These include:

- the UK Climate Change Act 2008 target to reduce carbon dioxide (CO₂)
- emissions nationally to net zero by 2050; and
- the Mayor of London's ambition for London to be zero carbon by 2050.

The Framework is an integral part of Re:fit – the highly successful national programme originally developed by the Mayor of London and available for use nationally – and provides a critical means of improving the energy efficiency of public buildings and assets. By uniquely combining an Energy Performance Contracting (EPC) framework with full cycle expert advice and support to public sector organisations, Re:fit cuts costs, achieves substantial guaranteed energy savings and/or energy generation, reduces carbon emissions and ensures best practice within the EPC market.

Now in its tenth year, Re:fit has delivered:

- Over £180 million of procured works
- Support across more than 1000 buildings
- In excess of 52,000 tonnes of CO₂ saved, and
- More than £10m of energy costs saved each year.

Given the severe and increasing financial constraints facing public sector organisations, and their consequent focus on driving down costs, there has never been a better time for them to increase the energy efficiency of their assets, particularly where cost savings are guaranteed.

This, the fourth Re:fit framework, has been procured and run by a partnership of the Greater London Authority and Local Partnerships. As well as demonstrating a wide-ranging commitment to drive further uptake, this partnership brings with it strong political and commercial expertise and substantial experience in enabling EPC projects. We expect up to £500m of contracts to be let during the four years it will be in place.

The rising impact and cost of carbon emissions, and increased public awareness about the climate emergency mean that more and more organisations are under additional pressure to reduce their emissions to net zero and generate clean energy. As such, reducing carbon emissions leads to direct financial, risk management and reputational benefit to public sector, third sector and commercial organisations alike.

At Local Partnerships, Nathan Wicks' focus is the provision of client support.

"Achieving net-zero emissions is the only way to limit devastating changes that will otherwise be wrought by the climate crisis. Authorities should consider adopting formal emissions

budgets for each service area, with downward trajectories supported by tangible projects to meet a realistic zero-carbon date. Re:fit can develop and deliver programmes of such projects at pace and scale to achieve net-zero targets" states Wicks.

Since it was created, Re:fit has delivered a huge range of EPC projects to support the delivery of financial, energy and carbon savings across the public sector. The use of EPCs is growing in the UK with a number of public sector organisations having already successfully implemented projects and more planning to undertake them. EPCs have been delivered across a wide range of property types and different sectors including local authorities, the National Health Service, schools, further education, and universities.

“ACHIEVING NET-ZERO EMISSIONS IS THE ONLY WAY TO LIMIT DEVASTATING CHANGES THAT WILL OTHERWISE BE WROUGHT BY THE CLIMATE CRISIS. AUTHORITIES SHOULD CONSIDER ADOPTING FORMAL EMISSIONS BUDGETS FOR EACH SERVICE AREA.”

EPCs can provide a strong business case and offer organisations a range of attractive benefits but can be complex and new to public sector organisations. However, it is acknowledged that an EPC can cover many different requirements, buildings and phases and therefore it is important that these organisations know and understand the complexities of an EPC project to ensure they have a robust basis for:

- commencing a project
- getting approvals
- communicating requirements to bidders
- implementing a project
- measuring and verifying the savings achieved

Support to organisations outside London is delivered by Local Partnerships. The team at Local Partnerships LLP would welcome the opportunity to meet with leadership team members in local and combined authorities across the country.



Local Partnerships is a public sector joint venture between the Local Government Association, HM Treasury and the Welsh Government. Their aim is to strengthen public sector client-side commercial capability and its Board ensures entire focus on their public sector mission. They provide trusted, professional support to councils, helping the public sector deliver projects and change at the local level. They facilitate an interface between central government policy and local delivery to ensure key priorities are achieved and clients secure excellent value for money. Their team of experts works solely for the benefit of the public sector. They help organisations transform the way they deliver services.

Led by Rachel Toresen-Owuor, Local Partnerships supports the Re:fit programme, and its core team includes Tony Lawson and Nathan Wicks:

Rachel Toresen-Owuor

At Local Partnerships, Rachel has overarching responsibility for the national Re:fit programme, delivering energy savings to the public sector via energy performance contracts.

Rachel has a decade's direct experience working in local authorities experience, where she has led on energy management, procurement and strategy development. Experienced in project and contract management, Rachel has delivered multiple large-scale energy efficiency and renewable energy projects and an energy performance contract. Rachel can be contacted at rachel.toresen-owuor@local.gov.uk

Tony Lawson

Tony joined Local Partnerships in 2014 to provide commercial advice focused on Efficiency and Infrastructure programmes. Tony has worked in support of engagements across areas including Public Private Partnerships, Private Finance Initiatives, energy, infrastructure, waste, and health and social care for clients across central and local government departments and the wider public sector.

He has helped the development and delivery of infrastructure projects on behalf of both the private and public sectors in the UK and overseas. Tony can be contacted at tony.lawson@local.gov.uk

Nathan Wicks

Nathan joined Local Partnerships in March 2020 and is a Project Director for Re:fit and other climate response programmes. Nathan has over a decade of experience in delivering renewable energy and

environmental infrastructure projects in the UK and abroad. Nathan's experience in the renewables sector includes project and corporate financing, contracting, Power Purchase Agreements, M&A and construction.

Nathan is a qualified CIMA accountant and Chartered Project Professional. Nathan can be contacted at nathan.wicks@local.gov.uk

Localpartnerships.org.uk
[@LP_localgov](https://twitter.com/LP_localgov)

“**AT LOCAL PARTNERSHIPS, WE ENSURE AUTHORITIES HAVE THE NECESSARY SKILLS AND TOOLS TO SET AND MANAGE CARBON BUDGETS AND REVIEW PROJECTS.**”



LOCAL PARTNERSHIPS



How to turn the cost of energy into widgets?

Widgets is a fine generic term for anything a company produces, or is being used in this article as such. The problem for most energy managers is that the core purpose of a company is the production of widgets or, to use a more specific example, a supermarket chain sees their purpose as selling as many groceries as possible. Energy is often seen as a commodity that is needed in the running of a supermarket but otherwise ignored, a number on a balance sheet.

So how does the energy manager engage the directors of a board in an issue most show little interest in or understanding of? The answer is really quite simple, instead of using cost of energy or Kilowatt hours which is frankly meaningless to most people; convert the cost into the price of a widget. The widget might be a service, a piece of fruit, a cinema ticket, whatever is the main product of a company that can be unit costed, then divide the energy bill by the widget. This will give you a

clear way of expressing energy against the activity of the company. The board will be aware of the cost associated with a widget and it is a compelling argument to say if you as a company reduced your energy bill by x, you would not have to sell y amount of widgets.

A further refinement is to divide the yearly total into a short time scale: a year, a month, a week even a second. Dotted around the page are some examples with the answers at the end. The psychology of this approach works because the board can convert a bill into a metric they really understand.

Have a go with your own organisation; the potential savings can always be converted into profit or a reduction of sales projections or even the wages of staff. All these suddenly get quite a lot of interest and could put energy reduction finally at the top of the board's agenda.

Questions for the board

As a member or Trustee of a Board you are expected to understand all financial risks. Whilst energy may not be your largest cost, it could be the most variable next year.

Here are three simple questions to test your knowledge:

1

How much does your company spend on:

Electricity?

Gas?

Water?

2 What does this cost mean to your company?

To help you, see examples below:


**X
2**



A supermarket has to sell two full shopping trolleys per second to pay their energy bill.

= 1s

**X
1**



A construction company would need to build one mile of road a week to pay its road fuel bill.

= 1w


**X
7,200**



A pub has to sell 7,200 pints an hour to pay their energy bill.

= 1h

**X
432,200**



A hotel has to sell 432,200 hotel rooms per year to pay their energy bill.

= 1y

Try the calculation for your business! How much of your product/service would you need to produce in order to pay for your annual energy bill?

SHORT ENERGY MANAGEMENT TRAINING COURSES

FUNDAMENTALS OF ENERGY MANAGEMENT-ENERGY AUDITING-
PROCUREMENT-MONITORING, TARGETING & VALIDATION-HVAC
CONTROL & OPTIMISATION-WATER MANAGEMENT-
BEHAVIOURAL CHANGE-ONSITE GENERATION-LIGHTING-DATA-
BUILDING SERVICES-BATTERY STORAGE-STRATEGY AND MORE

by VIKAS AHUJA
Energy Projects Manager at Imperial College Healthcare NHS Trust



Imperial College Healthcare NHS Trust's Carbon Reduction Journey

Imperial College Healthcare NHS Trust provides acute and specialist care for around a million and a half people every year. Formed in 2007, we are one of the largest NHS trusts in the country, with over 12,000 staff and a turnover of over £1.1 billion. Our five hospitals - Charing Cross, Hammersmith, Queen Charlotte's & Chelsea, St Mary's and The Western Eye – have a long track record in research and education, influencing clinical practice nationally and worldwide. Alongside our academic partner Imperial College London, the Trust is one of the UK's seven academic health science centres, working to ensure the rapid translation of research for better patient care and excellence in education.

Our aim is to match the global Climate Change Act targets set out in the NHS Long Term Plan, with a reduction in carbon

footprint of 57% by 2025 from a 2007 base year and ultimately net zero by 2050.

The challenges

In that regard, the first and foremost challenge is our ageing estate. This makes it increasingly difficult to provide high-quality care with some facilities pre-dating the NHS itself. The increasing use of energy-intensive diagnostic equipment along with the associated air conditioning requirements means that some of our buildings already exceed the maximum electrical associated supply capacity.

Moreover, the sheer mix of buildings makes it very difficult to apply the same set of energy efficiency measures across the board. Instead, each building has to be looked at in isolation and therefore a lot of time and effort has been invested

in identifying and implementing a bespoke solution.

This programme of energy efficiency initiatives started in 2010 and since then the Trust has executed 35 different projects encompassing boiler economisers, building management systems, heating & hot water, LED lighting & upgrades, street lighting, transformers, voltage optimisation, VSDs and flue gas heat recovery.

The other challenge, as is the case with many other NHS Trusts, is access to internal funding for energy efficiency projects. Competing priorities mean clinical needs will always, and rightly so, take precedence. It is imperative then that we are really smart about the opportunities to reduce energy consumption without adversely affecting patients, staff and visitors.

The Trust has been really fortunate that the senior management has always been very supportive of energy

efficiency initiatives. However, the funding for these projects is not always easy to secure. That's the reason the Trust approached Salix Finance in 2010 and applied for interest-free loans. This methodology proved really effective and has been followed for all the subsequent 35 projects implemented since then.

Compared with the combined baseline of 202 million kWh for electricity and gas which would have reached 210 million kWh in financial year 2018-19 in the business-as-usual scenario, the actual consumption stood at 175 million kWh, a 17% reduction. This has been achieved on the back of an investment of £10.4 million of interest-free loans which is contributing to a savings of £2.9 million per annum (lifetime savings of circa £35 million) and carbon savings of 16,575 tonnes per annum to the Trust.

The project that the Trust has completed in the last financial year will address one of the longstanding issues with the Trust's CHPs. When these were commissioned in 2011, since the Distribution Network Operator (DNO) never allowed the Trust to connect these 2 sets on to their network, the Trust therefore had no option but to export all of the generated electricity on to the grid thereby losing significantly on carbon and financial benefits that a CHP brings.

However, this all changed by the end of financial year 18-19 thereby saving the Trust circa at least £250K per annum (after taking into account export income) on its electricity bills as the electricity produced from CHPs will displace one-third of the site demand.

Imperial College Healthcare NHS Trust

Finally, due to nature of services we offer (we operate 24/7/365) and our size (one of the largest NHS Trusts in the country) we are a big consumer of utilities and therefore responsible for the associated carbon footprint.

This means in order to achieve our net zero ambitions, the Trust will need to explore options like Energy Performance Contracts and therefore implement a comprehensive package of measures which offer an opportunity to benefit from truly innovative and cutting-edge technology, risk transfer alongside the assurance of guaranteed savings.

Final thoughts

The Trust is almost 24% down on our 2007-08 energy emissions baseline and it has taken some huge strides last year for making significant dents in its carbon emissions.

After having gained significant experience around implementing site-specific projects, the Trust is to start working on procuring an Energy Performance Contract that will enable it to not only take a holistic view of all the remaining avenues for energy efficiency and innovations but also profit from big-ticket items such as Combined Heating and Power Plant, power purchase agreements, battery storage and electric vehicle charging points (potentially even V2G if and when possible). In fact, the ambition is to integrate the above, aided by intelligent controls, so as to

benefit from improved resilience and commercially beneficial arrangements that would help reduce energy bills.

The Trust's track record over the past 9 and a half years has helped to bring a range of stakeholders – from Finance, Procurement, Accounting, IT and Estates – on the same page. The aim now is to share our experiences and encourage other Trusts to invest in energy efficiency initiatives.

As part of our Sustainable Development Management Plan, we are going to engage with stakeholders from across the board including Finance, IT, procurement, HR, communications and clinicians to ensure that there are action plans in each of these areas. We will set clear commitments to cut our environmental impact, reduce operating costs and improve wellbeing, covering each area of the triple bottom line of sustainability.

Author's profile:

Vikas Ahuja has 20 years of work experience spread across HVAC, ICT and energy management domains. With a background in Mechanical Engineering, an MBA from University of Cambridge and full membership of Energy Managers Association, Vikas oversees energy procurement, compliance, funding & implementation of major projects right through to measurement & verification and channelling of savings into further energy-saving projects.

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What Not to Do... In Energy Procurement

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.

Have you ever wondered what is the one thing that you should avoid doing when looking for a new supplier, undertaking a waste audit or



setting energy management goals? The EMA will be looking at key areas of energy management and asking those who focus on those areas at their organisations. In this issue, we have asked questions around energy procurement.

Jack Gale – Utilities Lead at Lush

When looking for a new supplier, you should never ever solely focus on price.

Customer service, account management, ethics and business integrity are all just as important when managing an estate directly with a supplier.

When renewing a contract, you should never ever just consider 1 year contract lengths.

There are often savings to be made looking at longer term options. If you spot a pricing dip in the market during your current contract, it can be beneficial to secure a new contract many months in advance of your contract end date.

When dealing with a bill validation, you should never ever skim over the minor details. Endless problems can be caused by incorrect addresses, dates and consumption figures. Check everything.

Paul Graham – Utilities, Waste and Sustainability Manager at Kingston Hospital NHS Foundation Trust



When looking for a new supplier, you should never ever give out your personal mobile number to all suppliers, they will call you.

When renewing a contract, you should never ever assume that their initial offer is the best value. It's always worth reviewing your options and testing the market first.

When dealing with TPIs, you should never ever believe they are as good as they claim without verification.

There are a wide range of good and bad practices out there, all of them claim to be the best at what they do. Get yourself clued up so you can tell a lemon from a peach, ask an expert for advice, ask for references and follow them up, make sure you have confidence that what they offer is good for you not just for them.

When dealing with a bill validation, you should never ever agree a flat fee payment unless you are sure they will find significant rebates.

Most will ask for a share of the rebate. Check their percentage against others before signing anything.

When budgeting, you should never ever assume next year will be the same as this year.

Finance departments like predictability but it pays off later if you encourage them to include a margin of error in their calculations. There's always the possibility that the market will be especially volatile and/or abnormal weather will increase your demand.

When forecasting, you should never ever assume you have all the facts up front.

Climate change is causing more exceptional weather events, wars in key energy producing countries

start quickly and have unexpected consequences, your organisation's site development plans change. It's worth building uncertainty and flexible strategies to plan for change as you go.

When dealing with tenanted properties, you should never ever make up fees (they often ask for backing) or forget to bill them if you provide their utilities (they don't always remind you).

Mark Taylor – Director at Taylor Made Energy Solutions



When renewing a contract, you should never ever forget to issue a written termination notice to your current supplier before the due date (although some will say they don't require it). If you don't do this, the supplier can roll you onto a new contract at a price of their choosing which you may not be able to get out of.

Terminating a contract does not force you to move suppliers but just allows you the choice to move if you wish.

When dealing with TPIs, try to avoid signing a letter of authority (LOA) that allows a TPI to sign contracts on your behalf unless it is strictly controlled and time limited. TPIs can use this type of LOA to sign further contracts that you may not be aware of and have not agreed to. Always agree under what circumstance a TPI can sign for you and try to agree parameters rather than letting them decide.



Phil Moran – Energy Management at University of Chester

When looking for a new supplier, you should never agree to enter into a contract without understanding the key points that could impact you.

- Your unit rates: These are unlikely to change on a fixed contract, however on a flexible tariff, your unit rate may change throughout your contract.
- All additional non-commodity charges: these include distribution and transmission charges, CCL, VAT and standing charges that can make up to 60% of your bill!



- The length of your contract: in most cases when your tariff/contract expires, your supplier will switch you to their standard rate. This is unlikely to be the most competitive tariff and may end up costing you a lot of money.
- The compatibility of your existing meters/AMR: not all suppliers' data collection systems are compatible with every type of meter or Automatic Meter Reader (AMR). Most suppliers encourage customers to install AMR on their supplies. Most suppliers include this service in your tariff. Metering helps you understand your consumption habits, identify waste or inefficiencies and only pay for the energy you use.

Never be afraid to ask questions about your contract. Most suppliers want to provide you with a good service and customer experience. If you work for an organisation that has a procurement or finance department, ask them to help. They will most likely have a procedure to follow depending on the overall cost, and experience in other areas of procurement that will help you be transparent with your selection process.

Never switch supplier without checking out potential suppliers' track record. Online reviews are a great place to view the experiences of current and previous customers.

When renewing your contract, you should never be afraid to switch supplier.

There are a variety of suppliers to choose from, offering tariffs to suit all requirements. From low unit rate costs, to ethical values. And excellent customer service to 100% renewable energy.

When dealing with bill validation, you should never assume you can't save money through checking historic bills. That said, never assume someone will be able to save you money either.

Take the time to understand your energy consumption and costs. If you have a multi-site portfolio, understand which buildings are less efficient or even unoccupied with the lights and heating on. Although it sounds unbelievable, it does happen regularly. There are a variety of service providers that can help you with this.

When budgeting, you should never expect your costs to stay the same.

A new tariff may offer a cheaper unit rate but have higher non-commodity charges. Assessing your whole or fully delivered energy costs should be considered. When budgeting you should never ignore the need to reduce your CO₂ emissions from energy. There is huge scope to be more sustainable by procuring

100% renewable electricity. Larger consumers can purchase their energy via a Power Purchase Agreement (PPA). This allows you to purchase a percentage, or all of your energy with 100% renewable electricity from a designated generator, whilst investing in future generation projects. Finally, when budgeting, never assume people will reduce their consumption just because they are told to, or that it's a good idea. In my experience, people want to be involved and shown the benefits of changing, shown how to change and be rewarded for their contribution. Creating ownership of energy and carbon emissions reduction is the key.

When dealing with tenanted properties, you should never include the cost of unlimited energy in the contract. This may remove the desire of the tenant to be efficient and responsible for their energy consumption. Encourage tenants to take ownership of their energy, provide them with the support and encouragement to be efficient and to identify and eliminate waste.

Consider offering incentives to encourage efficiency as this can lower your EPC rating making your property more efficient and also more desirable and attractive to tenants. This may in turn allow you to charge a premium for your energy efficient and sustainable property or space.



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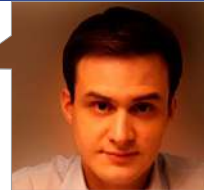
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The Clean Energy Paradox: the Inconvenient Truth of the Battery Revolution

Electric car sales have skyrocketed in recent years, reaching an all-time global high of about 2 million sales in 2019¹. Lithium-ion batteries are ubiquitous in our daily life: from home appliances to phones and electric vehicles, the alkali metal fuels our modern society.

The International Energy Agency predicts that meeting² the Paris climate agreement targets will require circa 140 million electric cars worldwide by 2030. This lithium battery addiction could leave more than 11 tonnes of used lithium-ion batteries in need of recycling by 2030³.

However, there is an even bigger issue: as the world is a frenzy to replace fossil fuels with lithium-ion batteries, the environmental impact of extracting and manufacturing such batteries is becoming a serious socio-environmental hazard.

This article aims to provide a deep look at the inconvenient truth of the so-called battery revolution and the potential tackling of such issues.

Extraction and manufacturing of lithium-ion batteries

Lithium is highly reactive, and as such does not occur in nature as an independent resource. Briny lakes and mines contain lithium salts, which acts as the source ingredient for producing lithium carbonates. These carbonates are the most essential raw materials for the manufacturing of lithium-ion batteries.

The extraction of lithium from briny lakes is a process that consists of drilling a hole and then pumping the brine to the surface to evaporate for 12 to 18 months.

The extraction of lithium from briny lakes has considerable environmental and social impacts, mainly due to the water pollution and depletion that occurs during the process, as around 50,000 litres of water are used to extract 1 full tonne of lithium⁴. This significant water consumption has its instant toll on the environment and local communities. In Argentina, local communities claim that the lithium extraction activities have polluted all the water used for livestock, crops and humans. In Chile, lithium extraction activities consume 65% of available water; as a result, local communities are forced to source from other water supplies⁵.



Instead of briny lakes, lithium can also be mined from rocks - using more traditional methods - such as in Australia and North America. However, this still requires the use of extensive chemicals in the extraction process. In fact, research in Nevada has found that lithium extraction activities have affected water sources as far as 150 miles downstream⁶.

Unfortunately, things get only worse when it comes to two other key ingredients of batteries: cobalt and nickel. The Democratic Republic of Congo - well known for its human rights violations⁷ - account for about three quarters of the global production of cobalt. In fact, it is estimated that at least 15% of the overall workforce are children as young as 6. These child labourers work under poor lighting and ventilation conditions and inhale lethal mineral dust for the equivalent to about \$0.65/day⁸.

The working conditions and environmental impacts of nickel extraction is also similar to that of cobalt. For instance, in Guatemala, which is among the top 10 nickel producing countries in the world, the adverse environmental impact⁹ of one of the major nickel mines led to its closure. However, more work is still to be carried out at El Estor - Guatemala's biggest mine - where the local communities have run out of drinking water, due to the high level of pollution resulting from nitrites and phosphates used in the mining process. As a result, agriculture is no longer feasible in the area and several inhabitants complain of constant skin rashes¹⁰. In addition, Philippines - the second highest nickel producing country in the world - has suffered severe socio-environmental consequences of pollution resulting from nickel mining. This led to the indefinite suspension of nickel mining throughout the country in September 2019¹¹.

Recycling of lithium-ion batteries

The scope for recycling lithium-ion batteries is limited, as the batteries are toxic, flammable and highly reactive. Therefore, incineration or landfilling¹² are the most common disposal methods. Recycling rates as low as



5% in Europe¹³ and 2% in Australia¹⁴ underscore the lack of solid legislation, low collection rates and public awareness.

Furthermore, because lithium cathodes degrade over time, new batteries cannot utilize old cathodes, as battery manufacturers are unable to ascertain the life-cycle point of such old cathodes. Manufacturers are also very secretive about the exact composition of their batteries, which makes recycling more difficult¹⁵.

Even if the used batteries are melted to recover the metals in the battery packs, lithium cannot be directly recovered, as due to its reactive nature, it ends up in a mixed by product, which can only be recovered at an additional cost¹⁶.

Reusing lithium-ion batteries, rather than recycling them, might be the solution to this issue. For instance, once an electric car reaches the end of its life cycle - around 250,000 miles or around 900 discharge cycles - they could retain circa 70% of their capacity, which could make them usable for home storage purposes¹⁷.

Conclusion

Some first steps are being taken to make batteries sustainable, such as the creation of the so-called Battery Passport a quality seal based on 10 principles signed by 42 organisations in January 2020 with the ultimate aim to create a responsible supply chain¹⁸.

According to Professor Paul Shearing, from the Royal Academy of Engineering's chair in emerging battery technologies: "The next 10 years are going to continue to be lithium-ion dominated. It has taken a long time to get to this productivity and technological maturity level. For anything to catch up will take a while"¹⁹. Furthermore, the lithium-ion industry will grow eightfold between 2017²⁰ and 2027.

Hence, this is a clarion call to all and sundry that if the world is going to be lithium-ion dominated, a high level of awareness coupled with economic investments is required globally to ensure that our ecosystems and communities do not pay the price of our lithium-ion addiction.

Authors' profiles:

Gabriel Hurtado González, Energy Solutions Manager at Mitie, and Sasaenia Paul Oluwabunmi, Operations Officer at the OPEC Fund for International Development, are specialists in International Energy Solutions & Strategies. Their portfolio includes multiple publications in Austria, Canada, India, China, Egypt, South Africa, New Zealand, UK and the United States. They have extensive experience in business development, project management and energy systems engineering.

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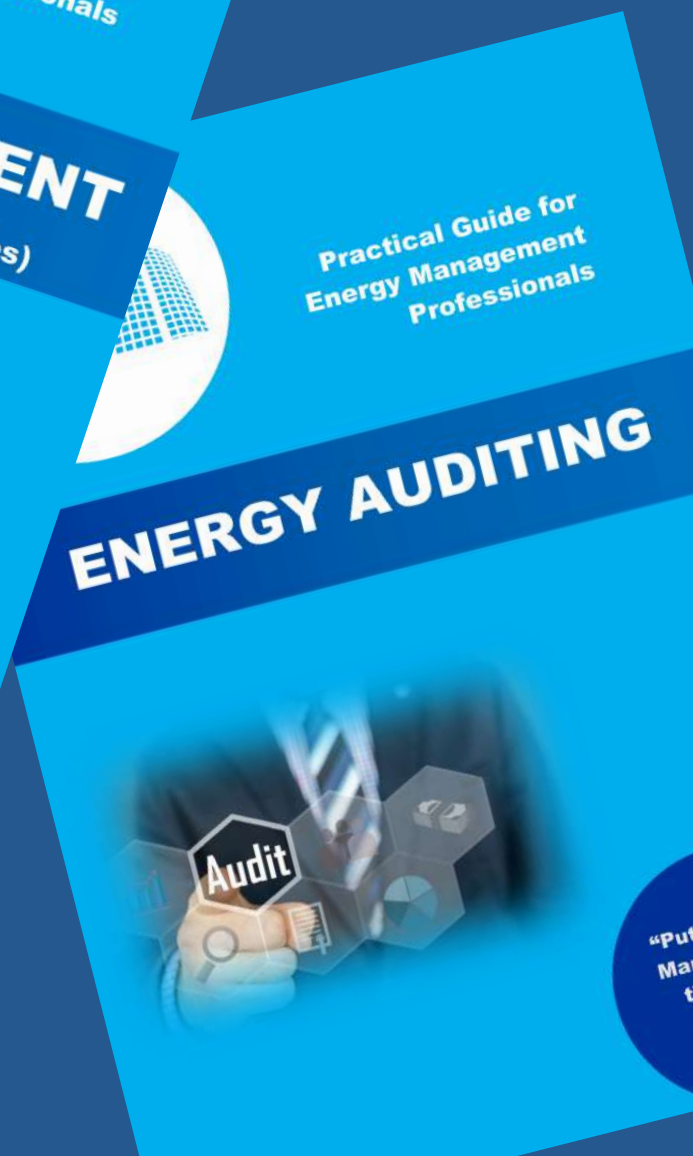
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Local Energy Systems and EV

Whilst UK business has more than halved greenhouse gas emissions between 1990 and 2017, transport emissions have remained stubbornly high, now accounting for the largest share of the UK's emissions. Internal combustion engine (ICE) vehicle efficiency has improved in this time, but this has not been enough to offset the increase in road traffic¹.

We therefore need an alternative technology, and vehicle manufacturers globally have largely settled on battery electric vehicles (EVs) for cars and inner city logistics vehicles. EVs emit no tail-pipe emissions and, with a decarbonising grid, EVs life-cycle greenhouse gas emissions could be 90% lower than an equivalent diesel/petrol car². With battery costs falling rapidly, ranges extending, and the introduction of government incentives, EVs are becoming increasingly attractive and as a result businesses are scaling up their EV fleets.

EVs require charging and installation of charging infrastructure can be a major hurdle for fleets. UPS and UK Power Networks Services have been working together at UPS' centre in Camden to develop and trial smart-grid technologies to overcome some of the hurdles involved. Through their work together they have demonstrated that:

- Fleet electrification brings commercial, environmental and reputational benefits.
- Smart-charging is key to minimising infrastructure CAPEX and disruptions.
- Smart-charging offers significant OPEX savings

through reduced energy costs.

- A strategic approach to infrastructure development is key to future-proofing and minimising regret costs.

This article describes some of UK Power Networks Services' and UPS' work to date to expand on these points.

An overview of UPS' experience with EVs in London

UPS is a global leader in logistics, employing 481,000 people globally, with a fleet of 123,000 vehicles, to deliver 20.7 million packages and documents a day (2018). The UPS Rolling Laboratory, where alternatively vehicle technologies are added into UPS' real-world operations, has trialled electric, hybrid-electric vehicles, gas and other alternatively fuelled vehicles. By testing vehicles as a part of real-world operations, UPS can determine which technologies are practical and offer real-world sustainability benefits.

As a key service centre for central London, UPS Camden has led the way for fleet electrification, with the first 12 EVs added to the delivery vehicle fleet for the London Olympics in 2012. The next tranche of EVs were added to the fleet as part of the Freight Electric Vehicles in Urban Europe (FREVIEW) project, where 15 Mercedes P80E vehicles were retrofitted with batteries and motors. To charge the growing EV fleet, UPS upgraded their electrical infrastructure at this point. This upgrade included a new 1,250kVA package substation on site, designed



Fleets

with capacity to supply the non-EV loads such as conveyor belts, and to charge up to 63 EVs. The cost and time required for this upgrade highlighted to UPS the challenge of installing EV infrastructure to supply a large vehicle fleet.

Further tranches of retrofit-EV vehicles were added to the UPS Camden fleet, bringing the total up to 42 by 2016. By incorporating a significant EV fleet into daily business-as-usual operations, UPS proved that EVs are practical, and offer real reductions in greenhouse gas emissions and tail-pipe emissions. UPS therefore increased their ambition for the Camden centre, aiming to reach a fully electric operation from the central-London site by bringing the total number of EVs to 170.

UPS were keen to avoid the cost and disruption of further electrical network upgrades. Using traditional methods to charge 170 EVs at UPS Camden would require a network connection of 2.5MVA. This connection capacity would have triggered significant reinforcements to the electrical network upstream to

the UPS Camden site, adding further costs and impairing the business case for transitioning their fleet.

UK Power Networks Services were asked by UPS to assess alternative options to an electrical connection upgrade. A feasibility study identified that installation of a smart-charging system and energy storage system (ESS) would enable UPS to fully charge an all-electric fleet of 170 vehicles without upgrading their existing connection capacity. This system was developed, installed, and trialled during the Smart Electric Urban Logistics (SEUL) project. The SEUL project was completed in September 2019 and demonstrated that the application of smart-charging and energy storage significantly reduces costs of charging EVs. As a result, the business case for transitioning entire fleets to EVs is improved, enabling UPS to further scale their EV operations. UPS recently announced a commitment to purchasing 10,000 electric vans from the UK based manufacturer Arrival³.

The Smart Electric Urban Logistics (SEUL) project

Freight electric vehicles, like those used by UPS, can consume up to ten times as much power as a typical home when charging. This means that charging large numbers of trucks simultaneously puts significant demand on the electricity infrastructure supplying a depot. For example, increasing the number of EVs at UPS Camden from 42 to the full fleet of 170 would have increased peak demand to 2.5MVA. Due to capacity

limitations, this would have triggered significant reinforcement works on the local electricity network.

Traditional network reinforcements could cost from £50,000 to £2 million, and often take more than six months to implement. To avoid this, UK Power Networks Services were appointed by UPS to design and deliver a smart-grid solution consisting of a dynamic smart-charging system and a 66kVA/150kWh battery ESS. The SEUL project was run by a consortium including UPS, Cross River Partnership, UK Power Networks and UK Power Networks Services and included further trials of large electric delivery vans.

The smart-grid solution was built and tested in three main stages:

- **Design and development** of the smart-charging software, including integration testing with the ESS and EV chargers.
- **Installation** of sub-second power meters, new smart charge-points, an Ethernet network and server to host the smart-charging software, and upgrading of all existing charge-points to enable communication and control.
- **Technology trials** to test vehicle response, system dynamics, fail-safe measures, and long-term performance.

Design and development

Smart-charging and ESS technologies were assessed as part of a feasibility study conducted prior to the design stage. The key requirements were to avoid a grid upgrade, ensure the system installed is scalable and future-proof, avoid disruption to UPS' business, minimise environmental impact, and optimise for cost.

This study considered the options described in the following paragraphs and concluded that a dynamic smart-charging system with an ESS was the optimal choice. A dynamic smart-charging system is able to fully utilise available power from the 1.25MVA grid connection while balancing EV charging demand against non-EV demand such as conveyor systems. An ESS was required to provide additional power during winter peak periods.

Further sophistication in smart-charging such as integration with fleet telematics systems to enable proactive scheduling of charging was not necessary at this stage but is discussed further later in this article.

Static smart-charging

In its simplest form, smart-charging divides the available power capacity between each connected EV charger. For example, a site may have 100kW of capacity available, with 20 chargers installed. If all 20 chargers are in use, each is provided with 5kW, if only 10 are in use then vehicles can charge at up to 10kW.

Static smart-charging at UPS Camden would only be able to charge 149 of the 170 vehicles.

Dynamic smart-charging

The next step in sophistication involves monitoring total site power demand to calculate the real-time power capacity available for charging. At this point the smart-charging system becomes dynamic. If the site has a 250kW connection, with non-EV load drawing up to a peak of 150kW, a static smart-charging system would only be able to use 100kW for EV charging at any time of day. However, non-EV load may reach a peak of 150kW only once a day, and during the rest of the day more than 100kW is available for EV charging. By installing a power meter at the site, and using dynamic smart-charging, the power made available for EV charging can be maximised at each point in time.

Dynamic smart-charging at UPS Camden would be able to charge 169 of the 170 vehicles.

ESS

With battery ESS costs still high, the business case for ESS must be built by stacking revenue streams such as shifting energy demand to cheaper tariff times, known as peak shaving, and providing grid services. For businesses with growing EV fleets, such as UPS, the re-use of old vehicle batteries in "second-life" stationary applications may reduce ESS costs.

An ESS was added to charge the last vehicle, bringing the total to 170. The ESS brings additional benefits of resilience and providing an opportunity to test the

integration of ESS, and smart-charging for future sites with further constraints.

Installation

The smart-charging system and ESS was installed towards the end of 2017. The team were able to work around UPS' operational schedules and so avoided disruption to UPS' business. The key components of the installation are described below:

- **Sub-second power meter:** This is required to measure real-time power demand of the site, and so enable the smart-charging software to balance load and maximise utilisation of the grid connection capacity.
- **Upgrading of old charge-points:** Communication and control capabilities were added to each of the old charge-points to enable integration with the smart-charging system.
- **New smart charge-points:** Additional smart-enabled charge-points were installed.
- **Onsite server:** A server was installed onsite to host the smart-charging software, enabling isolation of the system from the internet for security.
- **ESS:** A containerised 66kW/150kWh ESS was installed on site and connected to the in-depot electrical network.
- **Ethernet network:** The power meter, charge-points and onsite server are connected with an Ethernet network to avoid ongoing mobile data costs.



Technology trial

The system was extensively tested during site-acceptance tests (SATs) and a long-term trial over one year. The SATs demonstrated the functionality of the system to UPS before commissioning.

- **System response:** Non-EV and EV power demand was increased at the site to test the system response to curtailment under two alternative modes. The first mode curtailed EV charging first, bringing the ESS in later, and the second deployed the ESS first curtailing the EV charging later.
- **Fail-safe modes:** The system must fail safe, ensuring the grid connection capacity is not exceeded whilst providing maximum power to each vehicle for charging. Each charge-point has a fail-safe limit individually set; under any error event each charge-point reverts down to this fail-safe limit.
- **Long-term data collection:** During the system trial period UPS would not reach a fully electric fleet and so a system model was developed and fed with data collected over the year to assess the suitability of the smart-charging and ESS.

SEUL project findings

Extensive data collected throughout the SEUL project was used to build a detailed profile of the UPS' Camden fleet and centre operations. With this profile we demonstrated the suitability of the smart charging solution installed, proving it could significantly reduce capital costs (CAPEX), and ongoing operational costs (OPEX) for a depot-based EV fleet.

Smart-charging reduces fleet charging infrastructure CAPEX by up to 70%.

Capital cost reductions are achieved by minimising peak power demand to avoid triggering grid infrastructure reinforcements. Peak demand at the Camden centre was reduced from 2.5MVA to 1.25MVA, avoiding a major upgrade to the electrical network. Cost savings will vary from site to site as the cost of grid connection upgrades can vary significantly. However, for sites similar to UPS Camden, CAPEX cost savings of up to 70% are expected.

Smart-charging reduces EV fleet charging OPEX by 10% to 35%.

Ongoing energy cost savings can be achieved by charging at times with cheaper energy costs. In order to understand the potential for reducing ongoing energy costs, the UPS Camden fleet was modelled, and a flexibility profile was developed. This was used to estimate how the centre's energy demand profile can be shaped. Energy purchase cost was then modelled, firstly assuming fixed two-tier energy tariffs, and secondly by including access to energy flexibility markets such as the Balancing Mechanism used to ensure that supply matches demand in real-time.

It was found that a 10% energy cost reduction could be achieved by using the smart-charging system to charge vehicles during cheaper overnight tariff periods. Further to this, if the existing 1.25MVA grid connection was increased to 1.5MVA (which would require no changes to UPS' onsite infrastructure), energy cost reductions could be increased to 15%. Alternatively, through participation in the Balancing Mechanism, energy costs could be reduced by 19%. In summer, when vehicles do not need heating and batteries perform better, energy cost reductions could reach up to 35%.

It should be noted that this energy saving from access to flexibility markets is purely from providing flexibility in when the vehicle is charged, and so does not require the use of bi-directional "vehicle-to-grid" (V2G) chargers. Whilst V2G may stack up for personal vehicles with lower daily usage, the operational fleet profiles we have collected from both the logistics and public transport sectors do not currently show a positive business case for the technology.

Next steps

Whole-life-cost parity for electric vans in inner-city logistics operations is expected this year, and so the roll-out of electric vans across UK businesses is expected to accelerate in 2020. The technologies demonstrated as part of the SEUL project will be key to keeping the business case for this transition viable by minimising electrical infrastructure costs.

A key benefit of EVs is that lower fuel costs and smart-charging can be used to maximise this benefit. The SEUL project identified EV charging OPEX savings of between 10% and 35% are possible for a fleet like UPS'. Achieving this OPEX saving requires delaying charging of EVs, and so potentially puts UPS' operations at risk. Technology can be used to mitigate this risk; analysis of real-time telematics data can be used to regularly update the charging flexibility profile of the fleet. This charging profile can be used to flag constraints, prioritise charging of certain vehicles, and minimise energy costs for charging the fleet.

Author's profile:

Jon Bassett is a senior consultant at UK Power Networks Services, with a background in decentralised energy technologies including EV charging. Jon works with fleet clients such as UPS, councils and bus operators to develop EV infrastructure solutions and strategies.

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Decarbonisation Prove to Be More Important Than Ever Amidst Crisis

WHO declared Covid-19 a global pandemic as many countries go on total lockdown. The resilience of the energy sector is vital to support everyone in such crises.

Energy will be affected in three major ways; surge of demand, shift of demand, and global recession. It is unclear yet how electricity topology will look like, but grids need to be prepared to adapt from generation onto distribution.

Hospitals and medical clinics are operating on full capacity, this might even extend to use hotels as medical facilities. Some manufacturers have had to increase their production capacity to cater for bulk buying. All this causes a surge of demand in some sectors over others.

Whereas, we will see a shift in demand as more people work from home or self-isolate. The new curve

of electricity consumption over the course of a day might be different than usual. Instead of using shared heating systems in offices and classrooms, people will start heating their homes separately. Communication will shift online and will need more electricity at different times than usual.

With the global recession, decarbonisation and energy efficiency should be at the heart of every conversation. In the UK, we can no longer ignore the fact that most electricity distribution transformers in use nowadays were manufactured in the 50s. With the Ultra-Low Loss Amorphous Transformer technology from Wilson Power Solutions, energy waste of these transformers can be reduced by 60%. Wasting electricity and money can no longer be justified in the times of a crisis.

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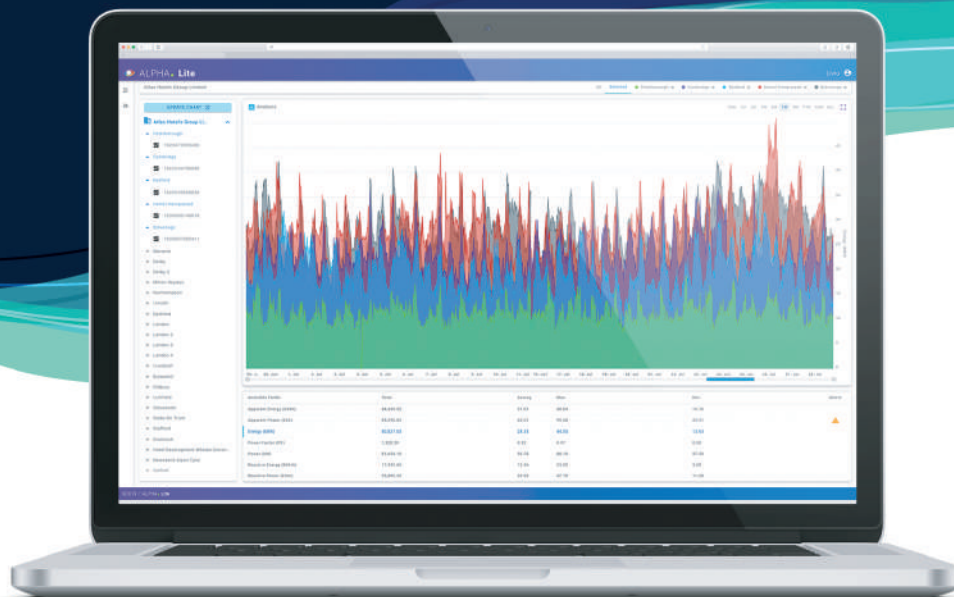
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