

THE EMA MAGAZINE

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INDUSTRY INTERVIEW

with the British Antarctic Survey

THREE KEY ELEMENTS THAT LEAD TO SAVINGS

by Jonathon Candy

DEVELOPING AN ENERGY STRATEGY

by Busola Lagoke

ESOS: REFLECTING AND IMPROVING

CLIMATE CHANGE PROTESTS

Should you glue
yourself to the CEO's
door?



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Energy Manager at University Hospitals of North Midlands NHS Trust

THE EMA
MAGAZINE

Dear Reader,

As Energy Managers, or people with responsibility for energy management in big organisations, we sometimes fear being dismissed as tree-huggers, so might be tempted to hide the carbon savings at the back of a business-case, or even leave them out altogether. Of course, whether you are answering to shareholders in a private company, or spending public money in an organisation like mine, the finances have got to stack up. However, I don't think we should shy away from hammering home the environmental message either.

It seems to me that more and more people are becoming aware of the impact that humans are having on the rocky ball that we're hurtling through space on. I'm sure most readers will be aware that there is no longer really a debate amongst scientists about whether climate change is at least partially man-made; but the arguments roll on in realms of politics and public opinion. I believe that the tide is turning though. A recent survey suggests that single-use plastic consumption has reduced by 53% due to the "Attenborough Effect" of people seeing awful images of plastic waste polluting otherwise pristine habitats on the Blue Planet II series.

With Sir David Attenborough having recently turned his unparalleled broadcasting skills to communicating the facts about Climate Change, we can expect a further increase in public concern for this area. However, if the public response to the recent Extinction Rebellion protests in London have taught us anything, it is that the public want something done about environmental issues, but that they don't want to be inconvenienced in the process.

The opportunity for Energy Managers is clear. Our shareholders, customers and service users want to "do their bit" without having to change their lifestyle too much. Our businesses, brands and organisations can tap into this by demonstrating real commitment to carbon emission reductions, so that they become the easy route to reducing personal carbon footprints.

With the help of the EMA's training resources, Energy Managers can identify, champion and deliver projects that will not only save money for their stakeholders, but will also enable them to feel good about their relationship with the planet.



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Climate Change Protests: should you glue yourself to the CEO's door?

Protesting about climate change should be encouraged, although sticking yourself (or parts of your anatomy) to the CEO's door, window or car is not. The immediacy and importance of the debate could help to change your organisation's policy in this area.

Many companies do not have a specific climate change policy and therefore to get a specific budget to mitigate climate change risk through energy efficiency is difficult. If you had a policy, it could be used in a submission to the Board to increase spending on energy efficiency. The EMA can work with you to develop policy and more importantly your strategy, to mitigate climate change risk; this will build energy management into the DNA of companies.



“MANY COMPANIES DO NOT HAVE A SPECIFIC CLIMATE CHANGE POLICY AND THEREFORE TO GET A SPECIFIC BUDGET TO MITIGATE CLIMATE CHANGE RISK THROUGH ENERGY EFFICIENCY IS DIFFICULT.”

There is a plan to stop irreversible change which is the agreed Paris targets on carbon emissions reduction. These targets, whilst set by Governments, can only be achieved if the necessary carbon reductions are made by organisations such as yours. The responsibility of companies to promote energy management is obvious, but how companies make the goal of reducing energy use part of their core strategy is often not. The new Streamlined Energy and Carbon Reporting (SECR) requirements will help by requiring companies to have energy reduction policies, but building carbon into Boards' thinking to the levels achieved in the 1990s is the real goal.

In the 1990s, Climate Change became a globally accepted issue, and the argument that it is manmade was accepted by almost the entire scientific community and targets to reduce the effects were enshrined in law in the 2008 Climate Change Act. This was followed by the formation of the Department of Energy and Climate Change (DECC) in 2008. However, the issue of climate change as a political imperative steadily lost political focus in wider society over the next 10 years.

The scale of the recent climate change protests has therefore taken the political establishment by surprise. Whilst the country has been fixated on Brexit, the concern around the environment, climate change, plastic pollution, the crash in insect numbers and extinction of species has been steadily growing. There is a consensus that something needs to be done, and there is growing pressure on politicians to act.

Whilst the Government has paid lip service to concerns over climate change, the actual policy initiatives enacted in the last four years have all been going in the wrong direction. The present Government has cancelled subsidies on renewable energy and FIT, ROCs and the RHI are all gone. Targets on zero carbon homes have been abandoned and protection of the environment has been

weakened through changes in the planning law (mostly to promote new house building). Following Theresa May's appointment as Prime Minister in July 2016, DECC was disbanded and merged with the Department for Business, Innovation and Skills into the Department for Business, Energy and Industrial Strategy (BEIS). The problem here is that BEIS is consumed by Brexit, and Climate Change is not seen as a major priority.

However, the recent visit of Greta Thunberg to Parliament led Michael Gove to claim, "we are listening". The listening part in politics usually follows issues that are shown to have real support across traditional political divides. The most notable feature of the recent demonstrations is that they have not only been peaceful but in the main backed by the majority of the country. Understandably, the number of police deployed was on a large scale and over a thousand arrests in London show this was not just another march, with pictures of the police dancing alongside protestors showing that this is not a confrontational issue.

How can you as energy professionals harness this sentiment? Energy management has always been a hard sell.

If energy is cheap and plentiful, why not waste it? How many buildings are lit up like Christmas trees for no real reason and why do a quarter of car purchasers surveyed this year aspire to buy a Chelsea tractor (a big 4x4), because they feel it makes them look good? The answer

is that since the dawn of time society has mostly favoured conspicuous displays of wealth. However, there are times when the pendulum swings the other way, the climate change protests have proved that there is a growing awareness that we are using too much, unsustainably.

Companies can make major energy efficiency savings but as most energy professionals know, there are rarely quick fix solutions that are the magic silver bullet. Real savings need a holistic long term approach that needs adequate and long term funding commitments. This is a constant problem for energy managers. I do not think I have been to a meeting when this has not been raised.

The best solution to this conundrum is through a Board strategy that is dissipated throughout all levels of the organisation. A lesson can be learnt from HSE; the

change in the law that created the offence of Corporate Manslaughter meant that members of Boards needed to take HSE really seriously, or risk long periods behind bars. This meant that all aspects of the work place needed to be covered, down to how people walk down stairs.

“ COMPANIES CAN MAKE MAJOR ENERGY EFFICIENCY SAVINGS BUT AS MOST ENERGY PROFESSIONALS KNOW, THERE ARE RARELY QUICK FIX SOLUTIONS THAT ARE THE MAGIC SILVER BULLET. ”

If we can get policies written into company strategy to that level, then we may even hit the targets set by Paris. The dancing policemen have proved one thing, this is an issue that is accepted by all, time to use that public sentiment to get organisations to get serious about energy management.



Energy Management at the British Antarctic Survey



In this regular feature, we focus on how organisations across different industries approach energy management. In this issue, we are going further than ever before with Parthena (Nopi) Exizidou, the Energy and Carbon Reduction Manager at the British Antarctic Survey (BAS).



Our work at BAS aims to unlock the secrets of Antarctica's past and present in order to help predict environmental change and improve our understanding of the planet. Through our world-class multidisciplinary science at BAS, we seek to answer fundamental questions around the links between human activity and climate change: What is the likely impact? What is the extent? And what is the timescale of this global change?

Our operations span across Antarctica and the Arctic, and we take our polar expertise to other parts of the world where it is of value, such as measuring the amount of fresh water stored in the Himalayan glaciers. BAS HQ in Cambridge supports Britain's polar research effort through the provision and

management of large-scale polar infrastructure assets, services and facilities. BAS operates three research stations in the Antarctic, two on sub Antarctic South Georgia, and one in the Arctic. In addition to the stations, research platforms include two ice-strengthened Royal Research Ships, a fleet of specially adapted aircraft and various off-the-shelf and specialised vehicles.

What does energy management mean at BAS?

BAS has a wide range of energy-intensive operations in the Antarctic, the Southern Ocean and the Arctic which comprise shipborne and airborne science, logistics support and operation of stations and field camps.

The remote nature of BAS operations combined with climate and logistical challenges has the potential to further increase the risks associated with fuel dependency and carbon emissions. It is therefore a high priority for BAS to reduce the carbon footprint whilst providing high quality living and working conditions for the scientists and science support staff. Energy management is the means to ensure the achievement of the energy and environmental targets and drive innovation throughout the process.

How does BAS deal with energy management?

Antarctic stations & deep-field operations

The remoteness of the Antarctic stations and the extreme environmental conditions can be challenging, from delivering fuel to

the stations to generating electricity, heating the buildings and producing potable water. Meeting the energy and water demands requires robust and reliable systems with backups that can be maintained and serviced on site by the BAS team. These include Combined Heat and Power systems that meet not only the power demands of the station, but also heating and hot water demands through the recovered heat. The production of potable water is delivered through Reverse Osmosis plants using sea water or by melting snow with heat from the generators. BAS also maintains a very effective hydro-electric plant at an existing dam at King Edward Point in order to meet the power demands of the station.

In addition to the operation of the stations, BAS enables deep-field science through an innovative system for transporting science teams and their equipment across vast areas of Antarctica's ice. Vehicles and sledges, known as a "Tractor Train Traverse" tow equipment and accommodation across hostile terrain, enabling science and support teams to live and work in remote areas a long way from the research stations at Rothera or Halley. The use of tractor traverse has replaced flying and has helped reduce the carbon footprint of deep field operations.

Ships

Operating our ships is a major contributor to our carbon footprint but absolutely essential. The BAS ships undertake research work and support logistics by delivering food, fuel, people and transferring cargo. At the moment, construction is underway of a new polar research ship, the RRS Sir David Attenborough (SDA), which will replace the RRS

Ernest Shackleton and the RRS James Clark Ross, which are nearing the end of their 25-year lifespan.

With greater fuel efficiency and an ability to use remotely operated and robotic technologies, the SDA is expected to reduce the environmental impact of ship-borne science and save more than £100m in operating costs over its 30-year lifespan.

The vessel will be fitted with four main engines, a configuration of different engine sizes that will allow for efficient operations across a wide range of conditions. In addition, a smaller harbour

generator is also installed to allow the vessel to operate when in port without the main engines idling. The four main engines operate on ultra-low sulphur fuel containing less than 0.1% sulphur. This limits sulphur oxide emissions and meets the latest international environmental agreement MARPOL's (Maritime Pollution) requirements for operating in sulphur emission-controlled areas. The engines will also meet MARPOL requirements to limit the emissions of nitrogen oxides (NOx). In addition, the main engine exhausts are fitted with selective catalytic reduction (SCR) units, which use urea injection to further reduce emissions of NOx to meet strict MARPOL Tier III limits.

The vessel will be provided with a Green Passport to facilitate the application of the IMO (International Maritime Organisation) Guidelines on Ship Recycling. This document is produced by the shipyard at the construction stage and contains an inventory of all materials used in the construction of the ship. It is produced in a format that allows any subsequent changes in materials or equipment – for example, during a refit – to be recorded. This information is useful for recycling and safe disposal purposes at the end of the ship's life.

UK headquarters

In Cambridge, the Carbon Management Plan (CMP) is driving change and delivering significant energy savings. The first two priority projects under the CMP that are currently undergoing are

the refurbishment of the Antarctic Aquarium and Cold Laboratories with the use of CO₂-based cooling and refrigeration plant and the development of a solar carpark.

The new CO₂-based plant will meet the cooling and refrigeration demands of the upgraded Aquarium and Cold Laboratories facility and reduce significantly our carbon emissions and energy consumption. The energy reduction will be achieved by the insulation improvements, the heat recovery system and increased efficiency of the cooling/refrigeration systems.

The carbon footprint of the area will be more than 50% reduced due to the replacement of conventional refrigeration with low Global



Warming Potential refrigerant and due to the heat recovery potential, which will meet part of the hot water demands of the site. The replacement of the ageing systems will facilitate science delivery, reduce our carbon footprint and our energy bills.

In parallel, solar carports are currently being installed above the existing carpark bays at BAS Cambridge, integrating electric vehicle charging points. A new secure access controlled bicycle facility with a solar roof will increase the capacity for bike storage at BAS by 50% and contribute to the electricity generation from renewables. The project will deliver an annual reduction in carbon emissions by 35 tonnes and will meet 5% of the electricity demands of the site.

These are exciting and innovative projects bringing new technologies to BAS in the form of energy efficient CO₂ refrigeration and state of the art controls and monitoring systems. Increasing renewable energy generation and continuously investigating energy efficiency technologies assists in driving

innovation and future proofing BAS operations and facilities.

Moreover, at BAS Cambridge the electricity supply, through CCS Framework, is backed from 1st of April 2019 by certified renewable technologies (like wind, solar and biomass) which all have a zero emissions rating. That takes the BAS market-based emissions to zero.

What areas of every day's business at BAS are most challenging in terms of energy management?

Following the decision to operate Halley VI as a summer-only station until the Brunt Ice Shelf stabilises, BAS scientists and engineers spent last winter working on automating instruments at the station to enable ongoing data collection throughout the Antarctic winter when the station is unoccupied. The Halley automation project consists of a micro-turbine power supply and datalink to a suite of autonomous scientific instrumentation around the station and on the ice shelf.

Both the remote monitoring and science data streams are being successfully transferred back to Cambridge via the Halley VSAT link, which will remain active throughout the winter months. BAS is now looking ahead to next season at Halley, where the aim is to further increase the number of automated science experiments to extend the scientific output from the station.

The success of the Halley Automation Project will have a crucial impact to BAS future operations in line with minimising our environmental impact to the pristine Antarctic environment by reducing the BAS carbon footprint without compromising science quality and output.

How is energy management viewed by the organisation's stakeholders?

At BAS, we are extremely aware of the delicate nature of working in Antarctica and take environmental stewardship very seriously. In addition to the above, all our science is carried out in accordance with the Environmental Protocol to the Antarctic Treaty and follows strict environmental controls.

BAS aims to achieve the highest possible standards for its own environmental performance and to be a leader in environmental management in its field.

Minimising the environmental impact through effective energy and carbon management is a priority not only for BAS but also for BAS collaborators and the Natural Environment Research Council (NERC). None of the described projects and actions would be delivered if it wasn't for the support and passion of BAS & NERC teams, our technical advisors and construction partners.

Can you describe an energy management project that reflects the organisation's principles when it comes to energy management and environment?

There is so much happening at BAS that will have a positive impact in reducing fuel use and carbon emissions. The Antarctic Infrastructure Modernisation (AIM) Programme will transform how BAS enables and supports frontier science. Commissioned by the Natural Environment Research Council (NERC), this long-term programme will enable a world-leading capability to ensure that Britain remains at the forefront of climate, biodiversity and ocean research in the Polar Regions.

As part of the programme, a new Science and Operations building at Rothera Research Station is being designed that will replace the old energy-intensive buildings; new site wide services will ensure reduction of environmental impact and operating costs and future-proof Rothera as a

hub for a wide range of BAS, UK and international collaborative science programmes.

To improve the energy efficiency of Rothera, we have developed a site wide energy strategy. With the help of our technical advisors a bespoke tool was developed - the parametric Energy Simulation Workflow (ESW).

The next step was to identify and develop the optimal sustainable designs for heating and powering the research station. The ESW combined the CIBSE best practice energy modelling methodology with genetic algorithms to goal seek and find the best possible solution within stated parameters.

The tool evaluated solutions from over 5 million scenarios in a matter of weeks, ensuring that no stone was left unturned. The proposed solution not only meets energy demands, it reduces fuel consumption by more than 35%, a key component in the Rothera modernisation.

After undertaking the energy modelling, the mechanical and electrical services strategies were designed, using the optimal solutions to deliver the best energy efficiency, whilst ensuring they are simple to maintain by the BAS team. The proposed solutions include waste heat recovery from electricity generation, which will be fed into a district heating network and distributed around the station. A mix of Combined Heat and Power units of different sizes and solar PVs has also been included in the proposed design.

In addition, as part of the effort to deliver upgraded energy efficient facilities, BAS is using the environmental and sustainability

assessment tool - BREEAM with the target to achieve an excellent rating for the Science and Operations Building at Rothera.

In future phases, we aim to further reduce the energy demands of the station and introduce large scale renewable and energy storage systems which will facilitate BAS to achieve the development of a carbon-neutral Antarctic station.

What is in the pipeline for the future?

Addressing the challenge of global warming and the Paris Agreement is now introduced to our Operation Strategy. Developing Science Based Targets, a commitment to climate action and an ambitious vision for the future will help BAS remain at the forefront of climate protection, influence policy and drive change within its supply chain and beyond. On wider sustainability, our focus is also targeting a sustainable food policy for all Antarctic stations/ships and Cambridge offices and improving the implementation of our sustainable procurement policy.

Author's profile:

Parthena (Nopi) has an engineering background and 10 years of experience in energy efficiency in the built environment sector. Since 2017, she has been part of the BAS team, developing the organisation's energy and carbon reduction strategy and leading on carbon reduction initiatives of all BAS operations including Cambridge HQ, Antarctic stations, ships and aircraft.





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Developing an Energy Strategy

Energy is a key resource and the utilisation of energy from the grid emits greenhouse gases. Therefore, when a business takes that decision to manage and reduce its energy, it saves the business some money and also reduces the associated carbon emissions.

Energy continues to be one of the more important line items in any organisation's spend. With the price for energy continually on the rise, it is understandable that it continues to generate the sort of attention it gets from a cost perspective. As an energy manager, the one question I always used to get was "how do we reduce our energy spend?"

There are several factors that can influence the reduction of an organisation's energy spend, primarily, reducing your energy consumption could lead to a reduced energy spend. However, for any business to embark on the journey of reducing its energy use, there are several key steps that must set out the organisation's priorities and these should be articulated and communicated through an energy strategy written in a language that anyone, including non-subject experts, can understand and implement identified strategic objectives.

These key steps are listed below.

1. Set your goals;
2. Understand your energy consumption – gather your facts;
3. Integrate stakeholder engagement as part of your energy strategy;
4. Set a SMART but stretching target;
5. Identify relevant projects and put together a business case for funding;
6. Measure performance.

The first step to developing your energy strategy is commitment from senior management and appointment of an Energy Manager (or someone with expertise who has the responsibility for energy). No energy plan or strategy is likely to work without the buy-in of senior management. It is essential that the business benefits of having an energy strategy is adequately communicated and a senior business leader is named as sponsor.

1. Set your goals

Most businesses will have a business strategy they work every day to deliver, which is usually aligned to the values of the business and the culture they are designed to entrench within an organisation. An Energy Manager must ensure that the energy strategy feeds into that overall business strategy. Sometimes, this is not an easy thing to do; however, an energy manager must consider that the business strategy constitutes a thousand and one decisions and trade-offs, and this strategy will eventually be viewed as just one of many. Finding a way to make your strategy align to business objectives also allows for adequate governance and ownership by senior management.

“IT IS ESSENTIAL THAT THE BUSINESS BENEFITS OF HAVING AN ENERGY STRATEGY IS ADEQUATELY COMMUNICATED AND A SENIOR BUSINESS LEADER IS NAMED AS SPONSOR.”

2. Understand your energy consumption

To know where you are heading, you need to understand where you are now. Understanding the simple things around consumption pattern, and how your building works, creates the opportunity to optimise its functioning. It is generally said that what you do not measure you cannot reduce. This applies very much for energy, and it is essential to understand a building's energy profile.

Buildings are designed for different purposes, especially in the case of commercial businesses, and these can include a variety of uses from hospitals where you have a number of specialised equipment to small office blocks or schools. Each of these buildings will have its own unique energy use; therefore, it is essential to understand the breakdown of consumption whether it is for space heating, processes, lighting or appliances.

3. Integrate stakeholder engagement

Your energy strategy needs the buy-in of several people who interact with your building or facilities continually. It is essential that, as part of the process of developing your strategy, you involve your staff and identify and map any stakeholders as part of your environmental scan ahead of developing your strategic plan.

EMA ENERGY MANAGEMENT TRAINING SCHEDULE

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	11 TH	Essential HVAC Control and Optimisation
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JULY	3 RD	Become an ESOS Lead Assessor
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	3-4 TH	Fundamentals of Energy Management
	8 TH	Energy Monitoring, Targeting and Validation
	9 TH	Essential HVAC Control and Optimisation
NOVEMBER	5 TH	Battery Storage for Business
	6 TH	Water Management
	6 TH	Understanding and Delivering Behavioural Change Programme
	12 TH	Lighting – Basic Understanding
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This should include your stakeholders' interests and how they will be impacted by your strategy and rank them in accordance to how important they are to the delivery of your strategy.

Additionally, use your stakeholder map to create a system to solicit their feedback and incorporate such feedback and concerns during the creation of your strategic priorities. Also, establish a communication and engagement plan that enables you to feedback performance, share your successes and highlight any challenges you may have encountered.

you can specify and deliver on the overall targets requires a number of key actions broadly broken down into five key strategic themes:

i. Energy monitoring and management systems

This provides a robust and an essential base on which all energy reduction plans can be built as good management systems provide high quality datasets which are essential for accurate measurement of performance metrics. They also allow appropriate prioritisation of projects, based on having the fullest possible understanding of the way your organisation uses its energy resources.

ii. Energy demand reduction projects

There are a number of approaches to energy reduction. This article proposes two key approaches through which energy reduction can be achieved:

- Through the use and deployment of technology, which include a wide range of options such as Building Management System installation and upgrades, lighting sensors, insulation etc. and;
- Reducing demand through behaviour change with training and awareness programmes.



4. Set SMART targets

Setting your overall target

Having carried out the steps above, it is expected that you are now in a better position to set SMART targets (SMART is an acronym for Specific, Measurable, Achievable, Realistic and Timed). In setting your overall corporate level target, ensure that you simplify it as much as possible to avoid any misunderstanding.

The different methods to set your target are:

i. Incremental increase or "flight path"

Incremental targets work on the basis of setting small, achievable targets and allow for regular performance monitoring along the way. They are beneficial because they are specific, time limited and lead to progressive achievements.

ii. Benchmarking building performance

Benchmarking allows building owners to compare their building to similar building and brings the attention of building owners and managers to energy efficiency, resulting in behavioural and operational changes that spur reduction in energy consumption.

5. Identify relevant projects and put together a business case for funding

Set building/site level target

The next step will be to identify building or site level target. Working through the overall reduction target, you will need to apportion individual targets that contribute to the overall target. In order to achieve this, the strategic approach that you could undertake to ensure that

Technology is very important for energy management in buildings and equally important are the people who engage with and use the building. Effective combination of both approaches above is essential for an effective energy reduction programme.

iii. Low- or zero-carbon energy procurement

Procuring low- or zero-carbon energy does not reduce a business's overall energy reduction. However, it improves your organisation's carbon footprint. Ensure your business has an energy procurement strategy and understands the central premise behind undertaking your energy procurement strategy whether it is about managing and controlling price risk, and/or buying at the cheapest prices. Investigate any additional services that your strategy enables you to access through your supplier. These services sometimes include the installation of smart metering across your portfolio, energy audits etc.

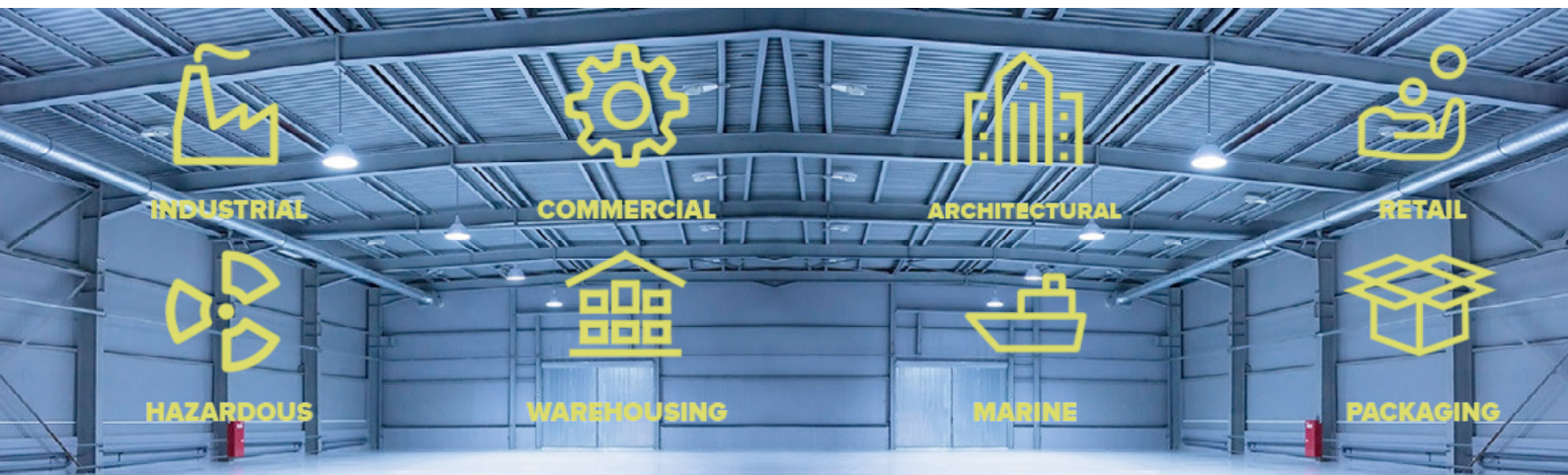
iv. Process changes

There are key strategic engagement areas within your business, and you may need to change their processes.



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These are areas that make decisions that impact on energy use in your business. Examples of such areas include procurement, finance, IT strategy, etc. You will need to look at the specifics in your own business to identify additional areas that may fall under this category and provide support and guidance where required.

v. Strategic partnerships

Develop key strategic partnerships that will enable the delivery of your targets. These partnerships are typically external to your organisation and they provide technical and project expertise that enable the achievement of your targets. Energy reduction projects will often require some level of funding. While the scope of this article does not cover the details of how to source funding and the models for funding, the sources of funding can be internal (from an organisation's own funds) or by bidding for external funds. Funding needs and requirement will differ between organisations therefore ensure you acquaint yourself with how it works within your organisation.

6. Measure your performance against target

Finally, measure how your efficiency measures are performing. Software platforms are great but they don't

improve energy use, they enable the gathering of data and analysis. If no one looks at the data, it is as good as not monitoring.

What is the best software to use? I happen to have worked with several monitoring and targeting (M&T) software platforms and my overall take is that an organisation needs to understand exactly what it wants to achieve with a software. That should be the factor that drives your purchase. Monitor performance whether this is real-time monitoring or periodically and use the outcome to influence future implementation plans within your strategy.

Author's profile:

Busola is a Chartered Environmentalist and holds a Master degree in Environmental Management. He has experience in delivering energy reduction projects and strategies across commercial estate portfolios. In his current role, he focuses on influencing senior business leaders through the simplification of complex sustainability issues by developing strategies and initiatives that enable the delivery of a sustainable railway as part of the rail franchising process.

EMA Energy Management Strategy and Plan Course will take place on 4th June 2019 in London.

The course offers overview of key steps in developing an energy management strategy and includes understanding of the drivers and approaches to setting an energy management strategy.



Three Key Elements That Lead to Savings

In my opinion, the three pillars of Energy Management are data, Mechanical & Electrical (M&E) and BMS. Individually they don't add up to much, but bring these three pillars together and they become mutually compatible allies.

Typically there are two types of data which you would gather from an audit. These are as follows:

- **Building data:** This equates to things like building pattern of use, architectural design, HVAC design and specification.
- **Operational data:** This includes energy data, half hourly gas and electric. I may also have the availability of sub meter data although during the initial phase of an audit this may prove to be too burdensome to deal with. Other types of data include BMS data which will give an indication of how well the plant is performing. It is possible that the BMS isn't set up to correctly gather data. If this is the case, then this needs to be addressed quickly.

The next step

Once I have a reasonable understanding of this data, I can bring together the M&E team and the BMS controls engineer to progress the scope for operational change. Typically, M&E and BMS don't communicate well together. The M&E team may not have energy as part of their KPI and the scope of the controls engineer may be limited to maintaining the system to the existing design which will involve making sure the system is properly backed up and that the sensors and actuators work correctly. In terms of saving energy this is completely inadequate and as the incumbent energy manager you will need to take full control of BMS controls engineer's scope of work. Adding

additional controls engineering days does come with a cost, but this cost will generally be negated by the savings.

From the initial survey, we should by now have an understanding of what the savings potential might be and therefore the number of additional days we can add in order to make these savings achievable. Typically the savings far outweigh the costs. During the initial BMS visit we would carry out a more detailed review of the system as we now have a greater ability to interrogate the system. As a basic list of items to check I would start off with the following:

- **Time schedules.** Are they right for the building?
- **Plant control strategy.** Is it the right strategy for the plant or right for the building?
- **Data quality.** Is enough data being logged to allow you to successfully determine if the plant is performing correctly? If no data is being logged it would be fair to say that we cannot determine if the plant is performing correctly or not, neither can anyone else.
- **Set points.** Are these appropriate for the situation? A good example is heating and cooling ambient hold offs; if these are a mile off where they should be, then this is a clear indication that there are some good savings to be made. This could also indicate that there could be some serious plant or building issues.
- **System oscillation.**
- **M&E repairs.** This allows us to provide feedback to the M&E team regarding any mechanical repairs they have not identified during their planned maintenance regime.

During this initial visit, it might be possible to make some small changes that will help to get the ball rolling.

The road block

At this stage, it is also important to engage with the M&E team – it is often the case during the initial visit that you will get some push back from the M&E team. Their involvement with the BMS system may be limited or they may have a good knowledge, either way getting the two sides together will often pave the way for more change.

They will want to know what you intend to do and the reaction to this will typically be one of the following:

- 'We have done that.'
- 'We have already had a billion consultants giving us advice to no affect.'
- 'Cannot do that, we get bombarded with complaints.'
- 'There are lots of problems with the building /plant that will prevent you from carrying out the changes you want to make.'

The simple answer for all of the above is that you are here to help, and from then you can open up the discussion around some of the evidence you found in the audit. For example, the scheduling may start at 2 am but the CO₂ data suggest that building occupancy starts at 8 am. This will allow you to get some movement on the timings and over a number of visits push these back to more suitable start times.

The other important thing to remember is not to make too many changes at once, otherwise if there is a problem you end up reverting back to the original settings and starting again from scratch. Normally on a typical optimisation visit, I would have made all the changes very early on in the day and the rest of the time is spent adding functionality that will give us better information on which we can build a scope for further change.

Risk

I have recently been fortunate to gain experience optimising data centres. Again working with the M&E team but this time the road block was risk. My learning path was from carrying out the surveys and from this I found that we had a number of different scenarios for which we had solutions but no appetite for change due to the risk involved. We did some minor works on the BMS to improve information availability from which we were able to open up the scope of the conversations. After some time, I was given back my list of improvements, but they are no longer mine, the M&E team own the solutions. The task for me has therefore been more about change through education, for example we may see in the data that a compressor is short cycling on low load. Instead of saying that it is controlling badly I can ask 'why is this behaving in this way? Is there a way we could influence the control so that it is on more often or off completely?' We then move on and look at something else. The process then is that sometime in the future the M&E team have a light bulb moment and come up with a solution that is then implemented in the PPM. I then get an email to approve the change.

From the two examples above, we can see that the M&E team can at first appear to be difficult to deal with and in the worst case can block change. You can also see that if you persevere through the early stages they become more helpful in bringing ideas to the table and do some of your work for you.

BMS contractors come in different packages, both in terms of plant knowledge and skill in manipulating control strategy. I am very lucky in that as part of the business that I work for we have a large experienced BMS team, and it is very much the case that if I identify a change that needs to be changed then I can simply send them a scoping document and they will get on with it. On occasions, I have sometimes had to work with third party controls

contractors and it is usually the case that I have to look after them a little bit more and make sure any changes are fully tested, even something simple can prove troublesome as I have found to my cost.

Monitoring the results

After you have engaged with the two pillars, M&E and controls, it is time again to check the third pillar, data. For me this is the most exciting part of the job. I check all the sites I manage as often as possible, every day. I will be looking at the performance of sites where I have made changes to see if there is a benefit. It could also be the case that the M&E team have made some changes that have an impact on



energy which I will need to check. The other reason to make regular checks on data is to identify any changes which could be possible due to operational change, people movement, plant failure and plant in override.

If you are being measured on savings, then a single piece of additional equipment could wipe out a significant chunk of the building savings. Therefore following on from an increase in consumption, it is important that this is followed up by an investigation which could be a phone call to the FM or a visit to the site. I experienced a good example of this a number of years ago where my base load consumption went up by over 60 KW. The base load

was actually a good clue as we had previously got this to quite a low level therefore we identified that there was an issue with the IT cooling equipment. In this case, the building had suffered a lighting strike which had scrambled the control in two of the computer room air conditioning (CRAC) units. We had one in heating, one in humidification and one trying to compensate for the failure of the other two. We were quickly able to resolve the problem and get the base load back under control.

If changes to the controls have taken place it may be necessary to revisit the site to review the data to check that the control outputs are responding to the inputs in the correct manner.

To sum up. There is a clear simple process to follow:

1. Gather data, building and operational.
2. Review the data and build a scope for change.
3. Engage with M&E and BMS. Get them talking to each other, carry out change and redefine scope.
4. Monitor the data for change and go back to step 3.

Without proper management, it is unlikely you will get best value out of either the M&E or the BMS contractor, but if an energy manager takes control of these

two important strategic partners, then it is likely that you will get an improvement on quality and ultimately reduced energy bills leading to a net cost saving.

Author's profile:

Jonathon has a background in Electrical and Electronic Engineering and currently works as an Energy Manager for MITIE energy. He has 15 years' experience of trouble shooting SCADA systems (supervisory controls & data acquisition system) for major clients in the UK and around the world, prior to a career in building services consultancy and finally Energy Solutions management.

The launch of EMeX, the Energy Management eXchange



The event will take place at Chicheley Hall on the 20th June, with a reception and dinner the night before.

The EMeX team are thrilled to announce the launch of 'EMeX – The Energy Management eXchange', a retreat event with an evening and a day hosted by Lord Redesdale, Chief Executive Officer of the Energy Managers Association in a wonderfully relaxed environment.

This event has planned to ensure a value-rich experience and a safe environment for large industrial and commercial energy users to share knowledge, explore opportunities and discuss the most important issues at the top of the UK's energy and sustainability management agenda.

Items on the agenda include compliance with SERC, ESOS phase 2, latest developments in battery storage, some updates about UK Government's future regulatory plans and energy pricing.

Beyond the compelling content, the rigorous attendee selection criteria and the invitation-only structure creates a safe, peer-to-peer networking environment.

With an interactive program incorporating workshops, round table discussions and debates, there is a wide scope for engaging with attendees from a multitude of businesses who will be able to network and do business in beautiful, relaxing surroundings.

Participants to date include:

Energy Manager, **Tesco**
Environmental Manager, **TFL**
Energy Category Buyer, **YPO**
Purchasing Manager, **Sarens UK**
General Manager, Procurement, **BT**
Head of Procurement, **Premier Foods**
Senior Sustainability Manager, **Skanska**
VP Global Energy Management, **Sodexo**
UK Sustainability Manager, **Thomas Cook**
Head - Energy, Utilities & Sustainability, **DIO**
Senior Energy & Water Manager, **Hanson UK**
Senior Energy & Compliance Manager, **Hilton**
Energy Efficiency Manager, **Parkwood Leisure**
Head of Energy & Sustainability, **NHS Scotland**
Energy and Environment Officer, **Surrey police**
Compliance & Energy Manager, **Harrow School**
Energy & Carbon Strategy Manager, **Network Rail**
Environment & Sustainability Manager, **Royal Mail**
Global Head of Real Estate Procurement, **Pearson Plc**
Group Head of Energy and Sustainability, **Bourne Leisure**
Energy Compliance & Sustainability Manager, **Avara Foods**
Group Head of Environmental Sustainability, **Places for People**
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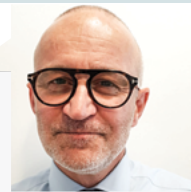
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SIMEC's portable bio-power offers large energy users a great low-cost and low-carbon solution

Antoine Kohler, Director of SIMEC Energy, explains how the company's portable biofuel generators can slash electricity bills and reduce carbon emissions for industrial users and wider business. SIMEC is the energy division of industrialist Sanjeev Gupta's GFG Alliance, a global standard bearer for green manufacturing of metals and engineered products.

Who are SIMEC Energy and what is the company's expertise in renewable energy?

We are a part of the SIMEC Group - an international energy, infrastructure and natural resources business, founded 50 years ago. Today SIMEC Group has annual turnover of almost \$2.5 billion and net assets valued at \$3.2 billion. Our activities span renewable energy generation, mining, shipping and commodities trading through key hubs in Europe, the Middle East, Asia and Australia. Our current renewables portfolio includes investments in wind, hydro, pumped hydro, solar, battery storage, energy from waste and biofuel generation. SIMEC is also a member of the global GFG Alliance and, as such, has a key focus on developing large-scale green energy capacity to support GFG's low-carbon metals and industrials strategy.

What are the biofuel generators and how long has SIMEC been working to develop this source of energy?

The generators are modular relocatable generating stations with capacities ranging from 1.2MW up to 18MW. Electricity is generated from sustainable biofuels primarily made from waste oils and residues, but fuels such as hydro treated vegetable oil, tallow, rapeseed and fatty acid methyl esters can also be used. These are ideal for large energy users such as manufacturers, large retail outlets, airports or data centres who wish to benefit from an Ofgem accredited renewable energy source together with substantial savings when compared to imported power prices and displacement of fossil fuel heat. Each station can be located on a spare piece of land at the customer's site and configured to recover the waste heat allowing sustainable steam, hot and chilled water to be produced, making SIMEC's generation plants the complete carbon-neutral energy solution.



We first identified the potential for using alternative fuels when our Innovation team were looking for sustainable ways to reduce the cost of power for our own industrial assets. We researched the existing renewable energy initiatives and identified that the Renewable Obligation (RO) programme was supporting renewable liquid fuels or liquid biomass. There were a number of constraints as the RO was coming to an end in March 2017 so we quickly developed the project using a particular fuel and successfully commissioned 120MW of generation capacity in the months leading up to the 31 March 2017 deadline qualifying the generators eligibility to participate in the RO until 2037.



What type of users will get the most from this solution and what are the benefits associated with it?

A wide range of industrial operations and other large users can take advantage of the biofuel generators, particularly those requiring a steady heat and power load 24/7.

The main advantage of the biofuel generators is, of course, cost reduction. Some industrial operations are eligible for significant energy rebates from the government, but many are not because of their particular situation or industry, so they will benefit from these generators because we are able to sell them energy significantly below the import power price. Other benefits include:

- Carbon footprint reduction - up to 97% CO2 emissions reduction associated with importing electricity and nearly 100% CO2 emissions reduction through displacement of natural gas with waste heat recovery
- MCPD compliant generation with low NOx, sulphur and particulate emissions.
- No capital expenditure required - we offer a fully wrapped technical solution with 100% CAPEX funding as well as operational management to those customers with the relevant demand profile.
- Monthly savings on energy costs – those will depend on the customer's consumption.
- Flexibility, resilience and security of supply.

Our biofuel generator centres require no major civil development work, and we also offer short-term energy purchase contracts with a 7-year initial term with options to extend or terminate at 3-yearly intervals.

How else can industrial energy users benefit from these units?

They are very flexible. Customers will retain existing network connections. We're not isolating them into a power island but we can deliver all the power they need up to the capacity they want to purchase. They could continue importing from grid if they need it and if they want to increase the capacity of their units, we have the ability to rescale plant capacity.

Most industrial or large users of energy, for example retail or data-centres, will not have enough space to install something relatively large. However, something small and nimble like our containerised mobile units are easy to install. It's not there for life, it's designed to be mobile so you can co-locate them for a few years and then remove them if the usage drops or if you have a better opportunity elsewhere. We want people to come to us with an open mind. The size of the unit they want should not be a limitation.

Are purchasers insulated from fluctuations in the cost of the biofuel?

Yes, they are. There are two important aspects – there's no capex and no opex. It's all covered by the cost of energy, so they've got an annually indexed "all in" energy price with no other costs. The customer is not exposed to fuel price fluctuations. The only thing they need to provide is an area of land, the access and connection, and the rest we deal with. We will do the maintenance. The customer is just buying power, no different to what they're getting from grid. The only difference is that it's on their premises. However, if the customer wants something slightly different, we are willing to consider every option.

How sustainable are the biofuels SIMEC is sourcing and what measures are taken to guarantee their quality?

The fuels are decorrelated from the road fuel market, which avoids prices increasing. They are waste-based products so there's no great use for them at the moment. We have refined waste, found a second purpose for it and isolated it from the mainstream market.

The guardian of quality and sustainability is the energy regulator, Ofgem. Every single fuel that we intend to use has to be validated by Ofgem before we can burn it and claim the renewable obligation certificates. All our suppliers have got a specification contractually agreed and we cannot deviate from that so it will always be green and sustainable.

Where can interested parties obtain more information?

The SIMEC team is available to assist you with any queries you may have and discuss options for locating biofuel generators at your site. In the first instance please email us at greenpower@simec.com with your name, company and current annual energy usage and one of the members of our team will get in touch with you promptly.





Energy Management Platforms: great investment or a total waste of money?

There is no shortage of so-called energy management platforms. A quick web search will reveal a long list of providers claiming great energy savings, increased building efficiencies, simplified carbon reporting or tenant billing and cost allocation. In many cases, all these features are promised within the same solution.

The increasing use of cloud technology has allowed many new entrants to the 'energy platform' market. The installation of AMR for commercial properties, Part L building Regs for sub meters and the smart meter roll-out have increased awareness of the potential value in using metering data for analytics.



Cloud technology has also given the ability for faster and more complex analysis. With the increasing drive for machine learning and artificial intelligence, one could easily believe that energy management platforms are easy, comprehensive, accurate and due to the vast selection available, cheap.

“UNFORTUNATELY, THE REALITY OF THE PERFECT PLATFORM BEING SIMPLE AND ERROR FREE IS A MYTH.”

In some respects, all the above statements are true. These platforms can be very impressive, beautiful graphs, comprehensive report designs, animated dashboards with moving dials and flashing kpi indication. At the push of a button automated reports, submissions to benchmarking or certification body, automatic invoices sent directly to your customers, it all sounds so easy and so straight forward.

Unfortunately, the reality of the perfect platform being simple and error free is a myth. Plain and simple – if you don't get the fundamentals right, these platforms can be a total waste of money.

How can this happen?

- Some systems are oversold and far less capable in reality than advertised;
- In many cases, systems are designed with little or no consideration of the real world of data collection or the ability to ingest data from different sources;
- The client is 'wowed' into selecting a system based on its visual appeal rather than its ability to deliver the requirements;
- The other key reason that energy platforms do not deliver what they promise is down to the data they receive.

The typical business model for most platform providers is to have a clean break between the software platform and the metering data provided to it. Whilst this makes sense from a business perspective, it is not so helpful from a customer perspective. Platform providers can offer great things, but completely washing their hands of the real-world technical issues associated with collecting good quality data, can leave the customer with a big problem.

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How many energy platform users have experienced any of the following scenarios?

- 'The energy project I wanted to track was missing data at the critical moment'.
- 'My meter failed so I did not get the data'.
- 'I changed supplier and my gas data stopped'.
- 'The metering system stopped last year so we missed several months of data'.
- 'I have new metering, but it is incompatible with my platform'.

It is blindingly obvious that any energy management platform will only be as good as the data it receives. So why do so many organisations consider the energy platform in isolation to the metering and data collection? Considering both elements together does not need to hinder your choice of platform. If your hardware provider will not support a 3rd party platform, then I suggest you switch providers. There is little justification these days for proprietary hardware locking customers to a single platform.

It is absolutely essential that the quality of your metering/ data collection solution is robust, accurate and complete. It is equally important that there is some provision to check and manage the metering data – this is a task that is often neglected by energy managers due to other

workload pressures. The lack of meter management inevitably results in allowing bad or no energy data into your software. It is negligent to assume metering systems will work forever. Failure to detect and rectify problems quickly will simply mean your metering data degrading over time rendering your energy management platform useless.

How can you choose the right platform?

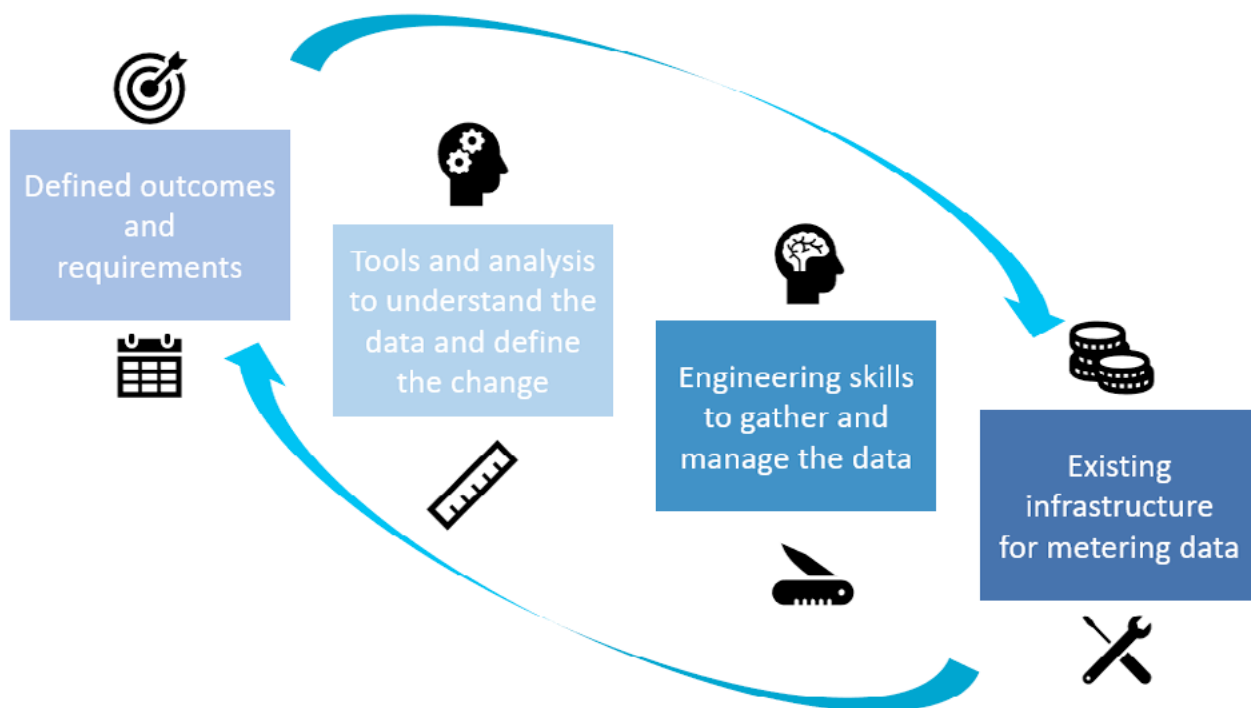
The most critical thing is to understand your requirements in advance. What is the platform actually required to do? Forget the fancy graphics if all you need is a tabular league table. Don't get sucked into clever analysis if you don't need it. Be thorough with your

requirements, be thorough with your evaluation of how the platform will deliver expectations.

Equally, the platform is unlikely to deliver results if the infrastructure feeding it is poor, incomplete or unmanaged. These functions should not be considered in isolation.

I strongly recommend that the full cycle of metering data is considered before making a final decision about platforms and analytics. Having the right metering system infrastructure partner in place is one of the

“THE OTHER KEY REASON THAT ENERGY PLATFORMS DO NOT DELIVER WHAT THEY PROMISE IS DOWN TO THE DATA THEY RECEIVE.”



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key components for metering and data in any energy management strategy.

In summary, energy management platforms can and will deliver great results. They should play a key role in any organisation's energy management strategy. However, energy management platforms do not standalone and must be considered with other system components. An energy management platform will be rendered totally worthless if the data it receives is not trusted or of sufficient quality. I therefore recommend a few key points to be considered when selecting an energy management platform:

1. Are my requirements clear and does the platform meet these requirements:
 - a. Don't just believe that a feature called 'Tariffs' will meet your needs – test the features if necessary.
 - b. Are my requirements detailed enough, just adding a heading to your list, for example, 'tenant billing', is not a requirement. How do you want to bill tenants, what data? What reports and outputs?

Have detailed requirements and ensure that they can be delivered.

2. Will my platform provider work with different data sources? Don't just accept a generic answer 'yes', check

which data sources are actually being offered and whether they are suitable for your data.

Ensure that there is proven integration with different data sources.

3. Understand the data needed to feed the platform.
 - a. Where does the data come from?
 - i. Existing system
 - ii. BMS
 - iii. A combination of systems
 - b. Wherever possible, insist on non-proprietary equipment (don't get locked into a solution – hardware or software).
 - c. Will my providers work together, will they integrate seamlessly? Avoid vendors blaming each other, choose vendors with a track record of cooperation.

Author's profile:

Tim Hooper is a UK energy industry expert in metering, energy management software systems, energy data analytics and data services. Tim has experience in both large and small businesses having held senior positions in a number of businesses including; Centrica, Capgemini, Npower and EnergyICT. Tim is a strong advocate of using data to deliver tangible benefits and outcomes.

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Energy and Engineering projects and partnerships will be scored on successful implementation of projects or delivery of services. **Whether your project's focus is on optimising, upgrading, replacing or behaviour change for your organisation or in a partnership with a consultancy service provider, we would like to hear from you!**



Products will be required to demonstrate evidence of benefits and outcomes and will be scored on their innovation, and ability to achieve energy efficiency savings and carbon reduction. **Whether you are a technology manufacturer or supplier, or an end user with a product that you would like to recommend, you could qualify for this category!**

ENTRIES

Entries are free of charge and can be submitted on the EMA website from 1 June until 25 October 2019.

WINNERS & HIGHLY COMMENDED

The winners and highly commended in each category will be announced on Wednesday 27th November 2019 in London, and will be entitled to the benefits and opportunities:



- The use of the EMA Energy Management Awards 2019 logo;
- Have their category profiles published in The EMA Magazine and EMA website;
- Highlight their achievements with published case studies and/or articles (The EMA Magazine and website).

Submit your entries at www.theema.org.uk

The Breadth and Range of the EMA June 2019 Energy Management Courses

Strategic Planning of Your Energy Management – What to Consider

For many organisations an ad-hoc approach to energy management is not ideal, especially as a legislative burden is on the increase. Developing and following a good energy management strategy could be an effective way to help your organisation to save money, and manage your energy use. Strategy that is comprehensive and regularly reviewed should well complement all organisational practices.

If you are keen to put your energy management policy into action, consider the EMA Energy Management

Strategy and Plan course that has been designed to assist organisations in understanding key drivers and approaches to setting their strategy. The aspects such as scope, baseline, targets and resources, achieving the targets, monitoring, targeting and control, behavioural change, efficiency, reporting and reviewing do all require a close attention during the organisational energy management strategy development and are discussed during the course.

EMA Energy Management Strategy and Plan Course

Length: 1 day (09:30-16:00)

Date: 4 June

Location: London

Price: £450+VAT

Get the Most of Your Heating, Ventilations and Air Conditioning (HVAC) Systems

Heating, ventilations and air conditioning (HVAC) systems are an essential part of most modern buildings and can consume a large part of any energy used. Adjustments to these systems can contribute to significant improvements in buildings and could also transpire in an energy bill reduction.

Having understanding of basic operations and control of systems such as boilers, air handlers, fan coil units, chillers, pumping systems and air conditioning help users to relate them to energy consumption. Going even further and grasping the potential control methodologies can be used for optimisation. Control of speed, flow and differential

temperature will result in optimising their use and achieving lower energy consumption while maintaining adequate temperatures and comfort levels. The EMA Essential HVAC Control and Optimisation course will help you to add clarity when controlling and optimising your HVAC systems, controlling them via a BMS, as well as implementing and correctly using variable speed drives. The renewable versions of some of the HVAC equipment such as biomass boilers and heat pumps will also be introduced during the course.

EMA Essential HVAC Control and Optimisation Course

Length: 1 day (09:30-16:00)

Date: 11 June

Location: London

Price: £450+VAT

Ensuring Effective Energy Procurement

Procuring energy is fundamental to the running of any business, but mastering the buying of energy is a virtue of few. For the majority of organisations facing fluctuating prices and heaps of 'deals' from energy suppliers and brokers, it can be an ongoing challenge.

Don't tackle the challenge alone, the EMA Energy Procurement course is here to depict the procurement issues and give overview of electricity and gas industries, how they are structured and what impact that has on the prices that customers pay. Another objective of the course is to explain the main drivers of energy pricing in the UK,

how electricity and gas tariffs are structured, the types of available energy contract and the simple procurement process that can be used by energy users. The course will also help you to get your head around how third party intermediaries (TPI) and energy brokers work, how to get the best out of your contract with them and how to minimise your cost.

EMA Energy Procurement Course

Length: 1 day (09:30-16:00)

Date: 13 June

Location: Manchester

Price: £450+VAT

The EMA training courses are run by skilled and inspiring tutors, each with at least fifteen years' experience in the subject they are delivering, so you come away with practical tools that you can apply straight away. Your course attendance will be a varied and interactive experience with practical exercises which you may utilise during your future projects, and a way forward to achieving your professional objectives.

To apply to attend the EMA Energy Management training courses, please visit www.theema.org.uk or contact jana.skodlova@theema.org.uk.



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ESOS: Reflecting (Phase 1) and Improving (Phase 2)

The ESOS Phase 2 compliance deadline is now 6 months away and fast approaching. Some 37 notifications have already been received by the Environment Agency (EA) on their new notification system for Phase 2.

However, the EA's audits reviewing the organisations' Phase 1 ESOS assessments and compliance are nowhere near over. This important regulatory work is to continue over the coming months. Therefore, if you are selected for the audit, you should ensure that your ESOS assessment/evidence pack is readily accessible, just in case. As a result of the EA compliance audit you may be required to undertake 'further actions' to ensure that your ESOS assessment meets with the legal standard.

It said, if you are selected for a Phase 1 compliance audit, but your Phase 2 ESOS assessment is near completion, respond to the EA's audit selection email advising them of your position, as they may be able to audit your Phase 2 ESOS assessment instead.

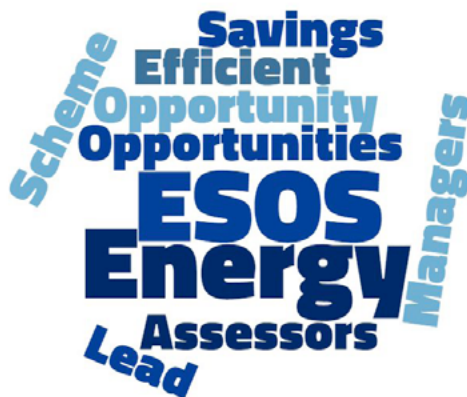
The EA completed 490 compliance audits and the main areas where issues were identified during the 2017/18 audits, and subsequent classification of non-compliance and remedial action, are shown below. These have largely remained the same over the past 3 years.

Some Areas where non-compliances were identified:

- ESOS Energy Audits did not meet minimum criteria stated in Regulations/Guidance
- Lead Assessor and or Board Director Sign off missing
- Sampling Approach not representative of Significant Energy Consumption (SEC)
- Moved Premises between qual. & comp. date so thought no need for energy audits
- Process energy consumption omitted
- Omitted transport consumption when a significant part of Total Energy Consumption (TEC)

Areas where remedial actions were identified:

Organisational Structure	ESOS energy audit data records
TEC reference period	Sampling approach
TEC data records	ESOS energy audit analysis
Calculations to support estimates (TEC and audits)	Extrapolation of energy savings to non-visited sites
Conversion factors	Cost benefit analysis
Errors in TEC and SEC	Alternative compliance route certification
Board Director sign off	Lead Assessor sign off



Apart from the common mistakes that the audits have identified amongst the participating companies, one of the main concerns raised also was the lack of consistency amongst the ESOS reports.

To reflect on the EA's compliance audits' outcomes from a different angle – the issued financial penalties. It has recently been announced that the Environment Agency have taken the actions against ESOS Phase 1 non-compliant companies and issued 27 Civil Penalties till the end of March 2019, 11 out of the 27 penalties were issued in March 2019, and there are 8 organisations that are still under review. The penalties varied from £1,000 to £45,000 and in total penalties amounting to over £250,000 were issued.

So, will the ESOS Phase 2 be any different? The EMA, as one of the ESOS Lead Assessor Registers, questioned ESOS Lead Assessors on their views ahead of the Phase 2.

In your opinion, what improvements can be made to the standard of ESOS assessments?

In-house Lead Assessors' views



"We have approached ESOS and the assessment as an opportunity to take a large, detailed and structured step forward on energy performance in our operations. However, feedback within the industry indicates that many assessments from other organisations were essentially a rush to get the box ticked for compliance and very little has been implemented since.

The likelihood of actions being implemented is greatly influenced by the quality of the assessment, business case and whether clear and practical next steps were presented to the board. Therefore, the standard of the assessment and recommendations are key.

The industry could benefit from a more defined 'standard' for energy auditing by creating a minimum standard for what should be assessed depending on what equipment or processes are on site.

For example, part of the audit is to establish areas of energy usage on a site. Once that is done, there could be a structure or guidance produced to define the minimum that should be reviewed when auditing e.g. a compressed air system (leaks, controls, treatment, pipework layout and size, compressor technologies, heat recovery), lighting (PIRs, Photocells, site behaviour, use of natural light, LED), conveyor system (conveyor loading, empty running, start up and shut down processes, controls, alignment).

This would help to establish a standard; the template could draw on best practice across sectors and should improve the detail of the energy audits completed and associated recommendations."

"Approaching ESOS 2019, it has again been very difficult engaging with top management to program work into the business agenda and I fear it will be again left until the last minute to conduct what will be an exercise in achieving compliance rather than the primary objective of improving energy performance. So, the consequences of not complying would best serve to encourage improved engagement."

Consultant Lead Assessors' views

"A lot of assessments appeared to fail due to the lack of robust application (or understanding) of the requirements for compliance. This was sometimes due to poor assessor practice and sometimes due to customers wanting 'tickbox' at the lowest price. Lead Assessors need to ensure quality assessments and the scheme administrators need to educate eligible businesses about ESOS much more clearly."

"Tougher assessor qualification routes might be an answer, there is too much variation in terms of what people think constitutes an audit. The Government guidance is fairly vague. As a starting point, a template report documents should be developed to define content and help define what good quality should look like."

"There was a massive variation in quality in Phase 1, and Phase 2 might be a race to deliver the cheapest reports and then rectify if the EA come knocking. Phase 2 should build on Phase 1, reviewing last data to this data and looking at movement over past 4 years – it is

something that organisations should do, but as it is not a requirement, it will probably not happen. It would also make sense mandate organisations to implement at least some of the recommendations."

"It has been seen that some companies were offering standardised reports/software. However, it's important to retain the requirement for a decent sample of site audits and a close relationship with senior management to ensure that businesses gain value from the process and measures are implemented."

"Highlighting the non-energy benefits of energy efficiency (eg. carbon emissions, employee engagement, extended plant life etc.)"

In your opinion, how to best approach ESOS assessments?

Consultant Lead Assessors' views

"Scoping meetings are key, no-one understands the business better than those that work in it. By starting at that point and building analysis and opportunities around the business it provides far more realistic and genuinely available opportunities than would otherwise be the case. On site audits with no predefined agenda can deliver real value."

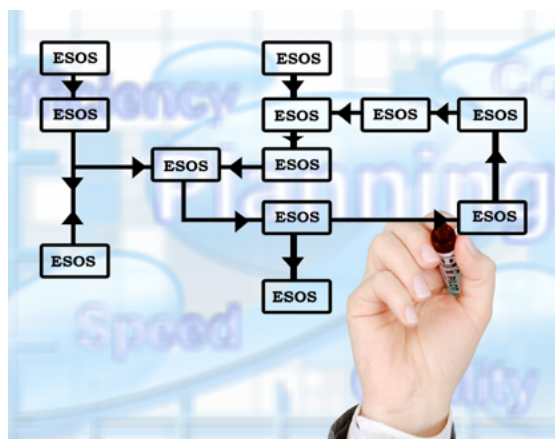
"For all energy assessment works understanding the operating context of the client is extremely important. This means:

- general understanding how processes or buildings work;
- detailed and general understanding of any legal and voluntary requirements on processes or buildings;
- understanding the aim of the proposed energy assessment;
- understanding any organisational, regulatory and/or customer requirements that may affect the recommendations.

In-house Lead Assessor's view

"Detailed understanding of all processes within the organisation, a detailed knowledge of operations and established relationships with all levels of the business (site operators to board level) is key."

If you are ready to make your ESOS Phase 2 submission ahead of the 5th December 2019 deadline, the new notification system for Phase 2 of ESOS is now available. The new system replaced the existing Phase 1 notification system, which is closed. The Phase 2 notification process is very similar to the Phase 1 system and also looks very similar. There are two significant changes. Firstly, if you



wish to tell EA that you do not qualify (DNQ) for ESOS, then you can do this using the new Phase 2 Notification System as the DNQ option is now built in rather than a separate system.

Secondly, there is now an option to upload a list of all the organisations in your participant group, either as a

standard template (downloadable from the notification system) or in any other format, such as group structure chart.

The EA has already received 37 notifications on the new system. Do not leave your compliance notification too late.

The next EMA ESOS Lead Assessor training day is 3rd July

Candidates will be required to go through the EMA ESOS Lead Assessor 4 step process which includes:

Step 1 – Application Pack

Candidates are required to complete a detailed application form; prepare CV highlighting the relevant knowledge and skills and good quality energy assessment and energy audit experience; gather copies of relevant qualification certificates and agree to the EMA Code of Conduct.

Step 2 – Training Course – 3rd July in London

Once the application pack has been submitted, and approved by the EMA ESOS panel, the candidate will attend the EMA training course 'Become an ESOS Lead Assessor'.

Step 3 – Post-course Assessment

At the end of the training day candidates will be instructed to complete and submit a post-course assessment within 7 days of attending the course.

Step 4 – Peer Review and Technical Interview

The Peer Review and Technical Interview is conducted to assess candidates' competencies (as required by PAS 51215) and technical skills and experience.

When all of the four steps described above are successfully completed, candidates will become Registered EMA ESOS Lead Assessors. To discuss the process further please contact Jana Skodlova on jana.skodlova@theema.org.uk or 0203 176 2834.

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The Role of Natural Gas in the Transition from Fossil Fuels to Renewables

Projections by the International Energy Agency¹ and current trends in the automobile industry opine that almost all new vehicles in Europe, the United States and China will be fully electric by 2040. Low and zero energy solutions will skyrocket while carbon emissions will inexorably plummet. However, despite the fact that energy efficiency and electrification will continue being at the top of the agenda, experts believe that achieving the global warming target of below 2°C would be challenging².

If the aforementioned projections are accurate, then renewable energy technologies will generate more than 50% of global power by 2040. However, if this is the case, what role will fossil fuels play in such a scenario? More importantly, can a synergy exist between fossil fuels and renewable energy technologies? This article aims at answering these pertinent questions.

Existing challenges with zero carbon technologies

While renewable energy/zero carbon technologies have had a rapid growth in the last decade, there are some challenges affecting the wide scale use of these technologies such as:

- **Regulatory and political barriers:** A wide range of policies and regulations are necessary to boost renewables growth and development. Furthermore, regulatory measures such as standards and codes of practice are necessary to enhance the favourable adoption of renewable technologies. Unfortunately, most developing countries lack the regulatory and political approach for an adequate development

of these technologies. The well-established fossil fuel industry presents a formidable 'market entry' barrier for renewable energy technologies³. Furthermore, energy utilities globally have invested in fossil fuel technologies, which are very mature and well understood with an already existing infrastructure. Hence, government interventions are necessary to reduce regulatory and political barriers hindering the growth of renewable technologies.

- **Technological barriers:** The lack of adequate equipment, facilities and trained personnel in remote areas or in developing countries hinders the development of renewable energy/zero carbon technologies. This lack of physical facilities as well as adequate renewables transmission and distribution networks, represent an infrastructural challenge in the development of such technologies⁴.
- **Socio-cultural barriers:** Research⁵ has shown that there is a huge disconnect, especially in developed countries, between the realities of energy generation and the social perception that energy will always be readily available. This disconnect leads to public apathy and the misconstrued notion that energy will always be an infinite resource. Hence, there may be an opposition to renewable technologies not because such technologies are a poor alternative to fossil fuels, but because society does not comprehend why renewable technologies are required. Additionally, public reservations about renewable energy also focus on potential landscape changes

and the consequent disruption such changes produce on established 'ways of life' for nearby communities. Hence integrating the location of renewable energy programs and development planning is very important to overcome this barrier⁶.

- **Financial barriers:** The expansion of renewable technologies has been very limited in most South East Asian countries due to the continent's bank-dominated financial system with its underdeveloped capital market. This leaves banks as the major source of funding for renewable energy projects in this region. As these projects are very risky with low rates of return on invested capital, the reluctance of banks to finance such projects has been the major barrier to the expansion of renewable energy technologies in the sub-continent⁷. Hence, addressing this financing challenge is expedient for green energy expansion in this region.

The role of fossil fuels in the transition to renewable technologies

It is a well-known fact that burning natural gas produces almost 50% less carbon emissions compared to burning coal and 20-30% less carbon emissions compared to burning oil. In addition, as opposed to other fossil fuels, the combustion of natural gas releases zero co-pollutants, such as nitrogen oxides (NOx), sulphur dioxides (SOx) and mercury (Hg)⁸. Hence, the use of natural gas in power generation provides a cleaner alternative to fossil fuels, which consequently results in less harm to human health and environment.



Apart from this, there are also several other reasons why the electric grid will benefit from natural gas more than ever before, especially in recent times when a higher percentage of renewable energy technologies are being integrated to the electric grid (for instance, circa 30% of the electricity in Germany comes from renewables while 25% of the energy grid is renewable in California, this is underpinned by ambitious targets which are being reviewed every year⁹).

In most energy markets, natural gas competes with coal and oil since the electric grid receives electricity on a marginal cost basis; because of this arrangement, whenever there is a renewable resource available, the grid receives it because it has a zero fuel price. However, a reliable energy source from fossil fuels is required to supplement and support the renewable power grid when renewable energy resources are unavailable.

Additionally, natural gas fired generators are able to accommodate renewable technologies in the electricity grid, as they can easily and rapidly adjust their output depending on the intermittent nature of renewable technologies. Compared to other fossil fuels such as coal and oil, which have limited adaptability, the flexibility of natural gas enables its integration with renewable technologies.

Furthermore, natural gas is a highly versatile fossil fuel, which is suitable for a wide range of industrial applications, including heating, and as a transport fuel in the maritime and road sectors. In 2017, in the U.S.A, which is the world's largest natural gas consumer, the proportion of natural gas used for both industrial

purposes and power generation was equivalent. This trend will continue with applications in the transport sector also swiftly growing¹⁰.

Circa 40% of the energy generation in the UK comes from natural gas, however, this percentage is declining slightly to accommodate for zero carbon technologies, thus supporting the renewable transition. The renewable energy generation increased from 24.6% in 2016 to 29.4% in 2017 and 33% in 2018, while the natural gas energy generation decreased from 42.3% in 2016 to 40% in 2017 and to 39% in 2018¹¹.

Finally, the reliability and sustainability benefits of natural gas are key factors to mitigate major risks associated with zero carbon/renewables technologies. Whilst it could be argued that battery storage might also be a feasible option, currently it is not a cost-effective solution. Natural gas provides the fastest and most economic path towards a less carbon intensive and cleaner world.

Conclusion

The actualization of the 2°C target will not stop the global natural gas demand. Natural gas will play a critical role in meeting future energy demand due to its high flexibility when used to generate power and its potential use as a supplement the renewable energy grid. Furthermore, significantly low carbon emissions and high versatility add value to natural gas a versatile energy resource.

Although electricity storage costs will fall in the long term, making batteries cheaper, cleaner, flexible and cost-effective, natural gas

power plants will be required to lead the way towards the renewable energy revolution. Hence, the potentials and advantages that natural gas generation has to offer to an energy sustainable future are bullish.

Authors' profile

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 the US, UK, China, India and Africa. They have extensive experience in business development, project management and energy systems engineering.

¹World Energy Outlook, International Energy Agency, 2018.

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⁷Financial barriers to renewable and green energy projects in Asia. Asian Development Bank, 2018.

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¹¹UK Energy In Brief. Department for Business, Energy & Industrial Strategy, July 2018.

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Can and Should the UK Abandon Gas?

In 2017, the total UK gas consumption was a staggering 74.3 billion cubic meters. The Government's current policy position is to phase out gas as part of a transition to a fossil fuel free low carbon economy in the UK. Great strides have been made in renewable generation from wind and solar but the focus on renewable generation of electricity hides a fundamental problem. How will we generate heat without gas?

At present, the UK is reliant on gas for power generation, on most days gas generates as much as 50% of the UK's electricity, but more importantly it is almost totally dependent on gas for heat. To put this in context, between 2015 and 2018 domestic demand for gas peaked in winter at around 250Twh. Gas used for electricity generation in the same period peaked at around 80Twh. These figures show the mountain that must be climbed if gas is to be phased out as three times as much gas is used for heat than to generate electricity; however, this major use of gas often seems to be ignored in the energy debate.

The Government's solution to replacing gas in domestic and commercial heating is mainly based around the use of heat pumps. Air Source or Ground Source heat pumps

are mature technologies, and their efficiency is improving, but there are some major impediments to their universal roll out. A significant number of properties will not be able to install Ground Source heat pumps, such as flats or for those without reasonably sized gardens. Air Source heat pumps have their own requirements that make them more flexible but are also impractical in many locations. As a technology, heat pumps should be championed, but the question is whether this is a feasible policy objective to replace gas.



The reliance on heat pumps in future policy is an indication of the lack of alternatives to gas. The only other alternatives are biomass and anaerobic digestion (AD). Biomass is a versatile fuel source and was supported by the Renewable Heat Incentive (RHI) which was introduced by the Government in 2009 to promote the use of renewable biomass. Whilst the scheme promoted uptake in biomass, the subsidy has since been discontinued by the present Government.

At the largest end of the biomass scale is Drax, Europe's biggest biomass-fuelled power station. However, whilst Drax is pioneering Carbon Capture and Storage, using wood has its own problems in policy terms. Burning biomass has higher carbon emissions than gas, and often



exceeds regulated emission standards, and there is a real question of the sustainability of burning the amount of wood needed to generate significant power.

At the smaller end of the scale, biomass boilers do have a role to play especially if linked to larger boiler systems in for example schools. One problem at the domestic scale is that these boilers have a significant effect on air quality which means that domestic biomass boilers are far from suitable for built up areas.

The production of methane through AD is the other renewable alternative. AD uses farm or green waste or sewerage or a mixture as feedstock. The gas is often used for power generation but can, after treatment, be pumped into the gas grid. Whilst there is a finite supply of feedstock for AD, we are a long way from reaching a maximum potential. However, the lack of subsidy after the closure of the RHI scheme has reduced new build.

With limited alternatives, should we be looking to replace our gas infrastructure at all?

The elimination of fossil fuels needs to be a priority and whilst gas carbon emissions are lower than coal, it still is our major source of CO₂ emissions. To meet the 2030 emission targets, renewable heat is a priority; however, all new policies will need to be judged not only on the emission savings but also on the carbon cost of replacing infrastructure.

Gas is the only viable means of meeting our heat production needs in the short term as the largest consumer of gas is the domestic heating sector. Four out of five domestic boilers in the country burn gas. It will be possible to change to other boilers as the present fleet ages and needs to be replaced, however the alternative will need to match the 90% efficiency of most present boilers and if they are to be electric, the power will need to be available.

The UK has major problems in meeting present demand. In theory, we could build far more wind turbines and commission 10 or 20 new nuclear plants, but that will need political backing which the present Government has shown no inclination in providing.

One reason that the UK may be forced away from gas will be the security of supply. The North Sea gas fields meant that Britain has been a net exporter over the last 20 years, but this will change as the amount of gas coming from the North Sea is expected to decline significantly. By 2030, the UK will be buying at least 70% of its gas from outside the UK. Happily, Norway and Qatar now provide most of our imported needs, but as more and more countries look to gas for generation, a secure supply is going to be the energy security issue in the future.

Gas has replaced King Coal, and in turn it will be replaced in the power generation market by renewables. However, the hardest nut to crack will be heat. The short term answer to this problem is reducing the heat needed through energy efficiency, but to follow a policy that has no agreed means of being achieved means we could be cooking with gas for quite some time.

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LED Industrial Lighting Co. Ltd, a leading supplier of energy efficient LED solutions to the industrial and commercial sector, are pleased to receive recognition at the recent Energy Efficiency Awards 2019 for their LED project at DS Smith Clay Cross.

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“ I would not hesitate to recommend LED Industrial Lighting Co. to those looking for a long-term sustainable solution to their industrial lighting requirements. ” Martin Mead, Head of Energy Efficiency, DS Smith Plc

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Going Beyond Compliance

Emma Hird, Client Optimisation Manager at Inspired Energy talks about how businesses can make energy legislative compliance a revenue positive exercise.

Many businesses perceive ESOS and Streamlined Energy and Carbon Reporting (SECR) as a cost exercise. Undeniably, both schemes do represent an administrative and managerial commitment. But what they also represent is an opportunity to create long term energy, cost and carbon savings which can increase a company's bottom line.

How can you make compliance a revenue positive exercise?

Preparation in advance of the reporting deadline is key, this allows qualifying organisations to ensure that they have a robust methodology in place for collecting their energy data on a regular basis, as well as identifying and implementing energy efficiency actions throughout the reporting year.

Inspired Energy has an extensive history of working on government compliance schemes such as ESOS and CRC, with 100% compliant external audits for both schemes. In fact, we identified savings of over £14m for our ESOS Phase 1 clients.

Do you qualify?

Approximately 12,000 organisations will need to comply with SECR and ESOS. Quoted companies, large companies and LLPs are the target for these government schemes.

It's important to note that the qualification criteria differ slightly for these two schemes.

If you are unsure whether your organisation will be affected by one or both schemes discussed in this article, we would strongly urge you to find out.

Are there penalties?

Non-compliance, such as failure to submit on time can incur a fixed penalty and in the case of ESOS, publication of non-compliance.

What next?

Organisations who qualify need to review how they collect energy data, report and demonstrate energy efficiency improvements.

The final countdown for ESOS Phase 2 and SECR has begun, with the deadline for ESOS Phase 2 submissions on 5th December 2019.

To find out more about these schemes visit:

www.inspired-secr.co.uk

www.inspired-esos.co.uk

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Commercial Heating & Cooling Systems – The lost full picture of energy savings

Many buildings throughout the UK are suffering from the silent system killer known as 'dirty water' in their heating and cooling systems.

Many will have experienced some problems associated with dirty water, such as:

- Radiator cold spots
- Poor flow within the heating/cooling distribution
- Blocked terminal units
- High operational costs associated with the heating/cooling system to ensure it "limps along" until a CAPEX budget can be found to replace these core items of plant and meanwhile increasing financial trends to the building OPEX budgets (Gas/Electricity, small works, call-out charges, etc.).
- Ongoing customer complaints/loss of reputation (never great to have if you are a facilities manager).

What is the cause of the above-listed effects?

Simply put, it is a change in the water chemical and (sometimes) microbiological state. Imagine heating at home – it is a closed loop circuit of water under pressure, which then circulates and operates at various degrees of temperature. Take into account copper pipes, radiators and boiler. Suddenly, what we now see is effectively a "chemical reactor", as the metals react with the water chemistry, leading to various types of corrosion. In the summer, these are left shut down (and stagnant), and the systems are prone to become microbiological incubators. Mains water for 'top-up' contains bacteria which, under such conditions, will use metals, minerals and oxygen as a source of food.

Within 2 weeks, these bacteria can produce a biofilm (slimy-like deposit) that encapsulate pipe walls and the feeding frenzy below this slime can continue unhindered. It's the most common reason many schools and other such establishments find problems after the summer shutdown (in early October) turning on the heating system for the first time and suffer pump seal failures, boiler breakdowns, radiator leaks, air in radiators (hydrogen gas) and so on.

How does this correlate to energy efficiency?

Dirty water will cause erosion to pipe walls and sensitive items; even fine sediment will cause damage and render routine maintenance treatment with corrosion and scale inhibitors ineffective. Heat meters can become 10% less accurate, whilst particles begin to settle out and restrict flow (leading to pin hole leaks). Reduced flow rates and thermal barriers equal inefficient kw of thermal heat exchange (higher gas/electricity bills), along with the lifecycle of the system being extremely compromised.

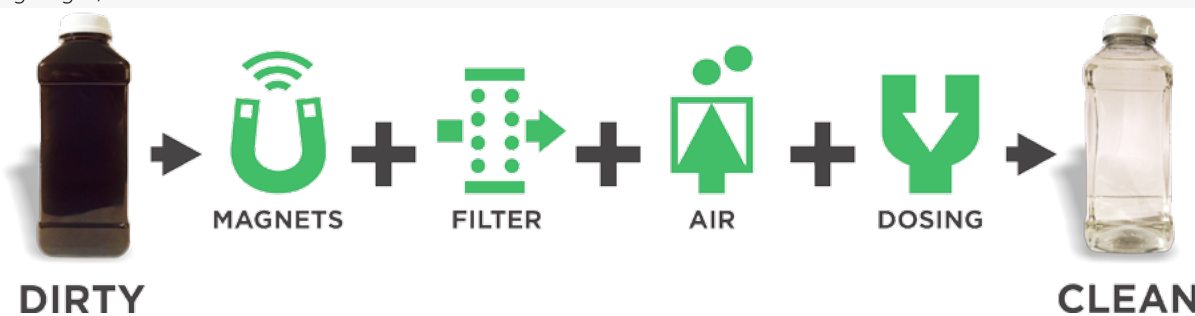
There are some very simple things you can do to reduce these risks.

Here are the real basic yet important ones:

1. Ensure the supply water quality is adequate.
2. Ensure the system pressure is adequate.
3. Maintain flow throughout all parts of the system (avoid dead legs and stagnant conditions).
4. Circulate all parts of the system a minimum of 1 hour in every 24 hours.
5. Install filtration/devices that can extract magnetite metals and non-magnetic materials (biofilm, copper, scale etc.) at 5 microns (0.005 mm) to maintain treatable clean water.
6. Use industry-accredited corrosion and scale additives suitable for the system materials.
7. Employ accredited (CSCA) water treatment companies to conduct system analysis and treatment.

So, next time you are considering what more you can do to maintain or even restore efficiency within your building, consider ensuring you maintain industry best practice water quality in your heating and cooling systems, as it's the lifeblood of these systems.

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True efficiency starts with optimising, not replacing or adding.

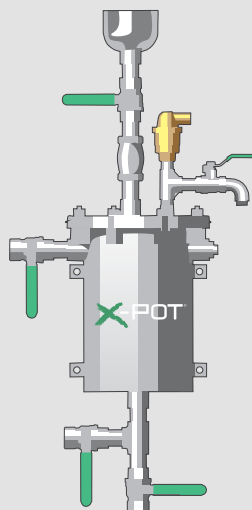


Your heating and cooling system might perform better than you'd expect. It just needs proper care.

No matter how efficient your infrastructure is as a whole, heating and cooling systems form the lifeblood of your buildings and distribute heat and energy where it's needed. Like any circulatory system, it suffers from silent energy sappers - blockages and insufficient flow. This becomes apparent in cold spots, customer complaints and system failure, which takes crucial time and resources away from you and those in your care.

That is why industry-leading facilities managers are turning to X-POT integrated system filtration. By having cleaner water and better circulation, you can save even before you have to start looking at costly 'green' upgrades. Patented and award-winning technology will help your heating and cooling system operate more effectively and reliably and includes all you need in one device for dosing, filtration and air removal.

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