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the environmentalist

IEMA

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to sustainability

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September 2016



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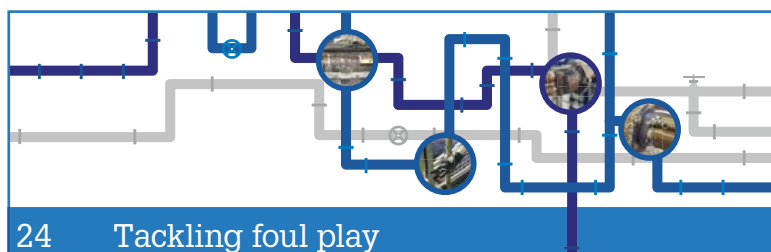
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Heineken is using spent grain to produce biogas to power beer production at its brewery in the Austrian town of Göss. David Burrows visits the plant

'Doing sustainability'

I have heard it said that the three most common lies people say to avoid immediate trouble are: 'The cheque is in the mail'; 'I love you'; and 'It was like that when I got here'. I think we could add a fourth: 'We do sustainability'. This is what I have heard time and again from chief executives over the past few years. I am unsure whether I hear this so often because the people I speak to are genuinely weaving sustainability into the fabric of their businesses – I certainly know of many inspiring examples – or whether it is because sustainability has now become a business buzzword. Mostly I feel I am not hearing the real story from the right person.

Although high-level sustainability leadership is crucial, I would be more assured about the validity of what I was being told if I were speaking to the person who had put in place the capability and governance that reflect their organisation's sustainability aspirations. This is when transformation happens. I would glean more insight about the challenges they faced and the solutions and initiatives they implemented to overcome them. I would also better understand how sustainability governance works in the organisation, how deeply engrained the sustainability thinking is, and how committed the organisation is to recruiting and developing its environment and sustainability professionals. It is those conversations where the reality about whether the business really does do sustainability comes out.

My point is that it is the working experts in organisations worldwide that will make the transformation to sustainability a reality. Sure, chief executives will set the culture and ensure their organisation takes the right road, but they will not achieve anything without the work of skilled environment and sustainability professionals. That is where the power of our professional alliance has its impact.

Speaking of those working experts, we are receiving excellent feedback from recruiters and employers about the relevance and value of the new Practitioner membership, which was introduced in June. They recognise what a PIEMA can do and understand how practitioners with up-to-date knowledge can help transform their operations. Practitioner level is proving to be the attractive business proposition we knew it would be and, with more than half of IEMA members boasting PIEMA status, that spells good news for organisations that really are going to do sustainability.

Practitioner level is proving to be the attractive business proposition we knew it would be and, with more than half of IEMA members now boasting PIEMA status, that spells good news for organisations



Tim Balcon,
CEO of IEMA

IEMA is the worldwide alliance of environment and sustainability professionals, working to make our businesses and organisations future-proof. Belonging gives us the knowledge, connections and authority to lead collective change, with IEMA's global sustainability standards as our benchmark. By mobilising our expertise we will continue to challenge norms, drive new kinds of enterprise and make measurable progress towards our bold vision: transforming the world to sustainability.

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Scotland and Wales move ahead with amending EIA

The Scottish and Welsh governments are pressing ahead with consultations on transposing the amended Environmental Impact Assessment Directive into national legislation.

The UK remains obligated to implement directives until it has formally left the EU. The deadline for transposing the amended EIA directive is May 2017. The communities department (DCLG) had yet to publish its proposals for England when *the environmentalist* went to press.

The consultation had been expected before the summer, but the Brexit vote delayed publication. Ministers must approve consultations before they are published but DCLG has a new ministerial team, now led by former business secretary Sajid Javid. A spokesperson said: 'We will announce the [EIA] consultation in due course.'

Simon Colvin, partner and head of environment at law firm Weightmans, said the government would have to decide on its approach to new laws and directives post-Brexit. 'There must be some transitional arrangement, with a cut-off date, otherwise you might implement it and then have to repeal it,' he said.



Meanwhile, Defra has published a list of 15 directives awaiting transposition. It includes: 2013/51/EURATOM, which sets requirements for the protection of the health of the public from radioactive substances in water intended for human consumption; 2015/1127, which amends Annex II to Directive 2008/98/EC on waste; 2015/1480, which amends rules on assessing air quality; 2014/99/EU on amending 2009/126/EC on stage II petrol vapour recovery at service stations; and 2015/2193 on the limitation of emissions of specific pollutants into the air from medium-size combustion plants.

Use of 50001 a 'slow burner'

Auditors had mixed views on whether uptake of ISO 50001 as a route to complying with the energy savings opportunity scheme (ESOS) would increase in the next compliance round.

The data from the scheme's regulator, the Environment Agency, on submissions for round one revealed that just 325 out of an estimated 10,000 companies used the standard for all their sites. A further 109 firms used 50001 for some sites.

The energy management standard is widely seen as the more complex and costly route to compliance, but also more effective than ESOS audits.

Tom Johnston, general manager at certification services firm Exova BM TRADA, said: 'It's still a slow burn on 50001.' He cited the low price of oil and uncertainty over the UK's position on ESOS after Brexit as possible reasons for companies 'having their heads in the sand' on energy efficiency.

Darryl Mattocks, managing director at energy management consultancy Enistic, said most firms regard ESOS as a 'box-ticking exercise'. 'Judging by their public persona, even companies that should care more about their energy use don't,' he said. 'We have dealt with some companies with energy spend in the tens of millions of pounds and they just weren't interested at board level. Senior directors accept energy as a cost of doing business.'

He said 50001 needed a stimulus, such as tax incentives. Alternatively large companies or public sector bodies could require certification in commercial tenders and push it down the supply chain.

Hugh Jones, managing director of advisory at the Carbon Trust, believes take-up of 50001 will 'increase substantially' in future rounds of ESOS. 'It's particularly attractive to organisations with multiple sites in the EU as all of them need to meet the Energy Efficiency Directive,' he said.

Short cuts

Support for spending

Two-thirds (67%) of Europeans want the EU to spend more on protecting the environment and more than half (52%) believe current action is insufficient, according to Eurobarometer, the European Commission's pollsters. Almost 28,000 people across the 28 member states were surveyed to gauge opinion on where the EU should target its resources. Support for more environmental protection was highest in Sweden (83%) and lowest in Estonia (45%). Support for more intervention was also relatively low in the UK and Ireland, at 59% and 62% respectively. The survey results also revealed a slight decline in overall support for the importance of spending on environmental protection, with 20% of those polled regarding it a priority in 2015 compared with 23% in 2008. Overall, young women tended to be more supportive of EU intervention than older generations.

Free fleet advice

Research commissioned by the Energy Saving Trust suggests that medium-sized enterprises in England could save £1bn a year if they sent drivers on fuel-efficiency courses and added electric or hybrid vehicles to their fleets. According to the trust, SMEs in England are responsible for 2.4 million vehicles, but many owners mistakenly believe that driver efficiency training will make little difference and think low-carbon vehicles are impractical due to their short ranges and prohibitive prices. 'Something as simple as providing fuel-efficiency training for drivers has been shown to cut consumption straight away by 15%,' said Andrew Benfield, director of transport at trust. It is offering SMEs free fleet reviews, which will aim to reduce costs and mileage, and maximise fuel efficiency. The reviews can also help firms understand opportunities to introduce into their fleet electric and plug-in hybrid vehicles, said the trust. To apply, go to bit.ly/2b5Yz1t; email transportadvice@est.org.uk; or call 020 7222 0101.

Short cuts

Bank completes policy

The World Bank has approved a new environmental and social framework it says will strengthen protection for people and the environment in projects it finances. The framework updates its previous policies, which were published more than 20 years ago, and is the fruition of a four-year consultation with governments, development experts and civil society groups in 63 countries. The bank has updated its aspirations for environmental and social sustainability and those for which it must meet itself. It has also set out the standards prospective borrowers and projects must meet. These include assessment and management of environmental and social risks and impacts; labour and working conditions; resource efficiency and pollution prevention and management; and biodiversity conservation and sustainable management of natural resources.

Joint research project

Consultancy AECOM and the University of Salford have formed a research partnership to improve understanding of how major infrastructure programmes interact with the natural environment. The organisations will fund environmental research in areas selected to provide benefits to specific schemes, and which help reduce adverse impacts and improve outcomes for the natural environment on future projects. Research areas include exploring potential issues for wildlife when working in areas with contaminated sediments; predicting disturbance to sensitive species from construction activities; and investigating perceptions of biodiversity within construction. The partnership builds on AECOM's work on the Mersey Gateway Project, a new six-lane toll bridge over the river between Runcorn and Widnes, which is due to open next year. The consultancy provided environmental advice and monitoring to help manage the impact of the new route, focusing on the complex and sensitive estuarine environment.

BSI to maintain EU standards

British standards body BSI has confirmed that it will seek to continue to participate in the European standardisation system after the UK leaves the EU.

BSI is one of 33 national standards agencies that belong to the European Committee for Standardization (CEN) and the European Committee for Electrotechnical Standardization (CENELEC). These set standards across member states and five other countries – Macedonia, Turkey and the three countries in the European Free Trade Association (EFTA) – Iceland, Norway and Switzerland. In a webinar, BSI director of standards Scott Steedman confirmed that the body did not expect its relationship with its European partners to change in the short term. 'UK experts have input into European standards and have a say into which international ones are adopted by CEN and CENELEC. This will remain the case,' he said (for more see pp20–23).

BSI said it would remain in CEN and CENELEC should the UK join the European Economic Area or EFTA, but it warned that changes to the statutes of the two bodies would probably be required for the British organisation to retain membership if the UK were to default to World Trade Organization rules. 'Much



will depend on the political settlement,' said Steedman.

Exports to the EU would have to continue to meet European standards whatever the UK's future relationship. However, a complete departure would put at risk UK input into standards because it would in effect lose all influence over their development. In a statement, BSI said it would work with government departments and CEN and CENELEC on its future role in the development of European standards.

BSI membership of the International Standardization Organization, ISO, would be unaffected by a UK exit from the EU.

Disclosures 'breach' rules

An environmental law group has filed a complaint against two oil and gas companies, alleging that they have breached reporting requirements.

ClientEarth has complained to the Financial Reporting Council (FRC) about annual reports by SOCO International and Cairn Energy, claiming that neither makes adequate reference to their climate-related risks. The complaints focus on the strategic report element of the firms' annual reports. The lawyers have accused the companies of breaching s414C of the Companies Act 2006, alleging they failed to provide a fair review of their business, specifically the main trends and factors likely to affect their future development and performance. They also allege that neither firm had described sufficiently the principal risks and uncertainties facing them.

The lawyers argue that both companies are materially exposed to climate risk, including the global transition from high to

low carbon intensity energy sources; and physical risks to assets of extreme weather, sea level rise and water scarcity.

David Cooke, lawyer at ClientEarth, said climate risks were now at the forefront of investors' minds. 'We very much hope the FRC will send a strong message to the market that climate risks must be reported in the strategic reporting framework.'

A spokesperson for SOCO explained that, in keeping with sector peers, climate change had not been included separately as a principal risk to the company's long-term strategy. Other business risks, uncertainties and trends potentially associated with climate change had been included. Among them were environmental impacts, commodity prices and operating costs. A spokesperson for Cairn Energy said the firm's annual report did refer to climate change, which he pointed out had been included in the comprehensive materiality matrix.

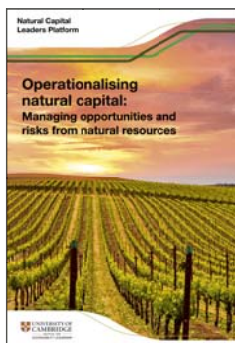
Natural capital focus shifts

Companies are looking for commercial opportunities from the natural environment rather than be reactive to risks as they arise, according to a study by the University of Cambridge Institute for Sustainability Leadership.

The institute found that the focus of firms in its Natural Capital Leaders Platform, which includes Asda, Mars and Nestlé, had changed since they were last questioned in 2013. Now they are more likely to look at the opportunities from maintaining the natural environment rather than adopting a risk-focused response to issues such as water scarcity, says the report, *Operationalising Natural Capital* (bit.ly/2buCOsC).

Strategic planning, supply chain transformation and market differentiation were identified as the main drivers for firms' decisions on the natural environment.

The study suggests that, as companies move to a more opportunistic and commercial approach to natural resources and ecosystem health, they are



able to engage departments beyond the corporate responsibility teams. These include supply chain and operations, communications, product and research and development, sales, and the senior leadership team. Engagement with sales and corporate functions, specifically finance, was a relatively recent development.

Adopting commercial language was most successful in engaging non-sustainability specialists. When discussing risks associated with the natural environment, terms like 'cost' and 'brand' were used, while 'yield', 'value' and social benefit' were more likely to be used when identifying opportunities.

Bosses support decarbonisation

Members of the Institute of Directors (IoD) overwhelmingly believe the UK needs to decarbonise its energy use to mitigate the effects of climate change.

Nearly three-quarters (74%) of almost 1,000 IoD members polled said they strongly or somewhat agreed that decarbonisation was necessary. The survey also revealed that the majority of members believe successive UK governments have failed to deliver an adequate energy policy, with two-thirds blaming politicians for failing to ensure the country's energy security. However, almost 60% agreed that policymakers had been reasonably successful in increasing renewable energy sources, and 45% were satisfied with efforts to reduce carbon emissions.

The survey revealed strong support for all renewable technologies: 88% backed tidal power; 87% endorsed solar; 79% approved of offshore wind; and 56% were in favour of onshore wind. However, Dan Lewis, infrastructure policy adviser at the IoD, said renewables were only part of the solution. "Technology based on the weather doesn't work all of the time, so the UK needs a mix of renewables, nuclear and the cleanest hydrocarbons," he said.

Meanwhile, a report by the World Energy Council says reducing barriers to trade and investment would support cost effectiveness and efficient decarbonisation of the energy sector. The global energy body said non-tariff measures (NTMs), such as customs procedures and technical standards, affect 80–90% of global trade and are estimated to have twice the impact on trade than tariff barriers. Reducing or eliminating these is key to developing a low-carbon economy and enabling countries to develop sustainable energy systems, says its annual *World Energy Perspectives* report.

The council wants a global agreement on the phasing out non-tariff barriers on products that are covered in the current multi-national environmental goods tariff negotiations. Tackling NTMs that have an impact on the low-carbon energy sector should be a priority, says the report, helping countries to address the energy trilemma of security, equity and environmental sustainability.

'Addressing the energy trilemma presents extraordinary challenges for policymakers and requires an adequate global trade and investment regime,' said Christoph Frei, the council's secretary-general.

Businessplans

In the first year of **Virgin Media's** 'Five in Five' sustainability strategy, the telecoms and media business reduced its absolute scope 1 and 2 carbon footprint by 6.1%. The firm said this had been achieved through energy-efficiency projects and a major reduction in vehicle journeys. In 2015, Virgin Media reduced journeys by more than 800,000, which equated to a decrease of more than 2.3 million miles. Meanwhile, efficiency projects enabled the firm to increase the data on its network by 45% while reducing the CO₂e per terabyte of data by 35%. Five in Five is Virgin Media's pledge to deliver five key sustainability goals in five years (by 2020).

Transport and delivery business **UPS** has achieved its goal of driving one billion miles in its alternative fuel and advanced technology fleet one year earlier than planned. The US-owned firm set the target in 2012. It said about 12% of the conventional diesel and petrol fuel previously used by its ground fleet had now been replaced by alternative fuels. More than 7,200 vehicles have been involved in the company's Rolling Lab alternative fuels strategy. By the end of the year, UPS will have invested \$750m in alternative fuel and advanced technology vehicles worldwide since 2009.

Apple has announced that a major Chinese supplier, **Lens Technology**, has committed to use renewable energy to power all of its glass manufacturing for the US technology firm's products by the end of 2018. Apple said Lens Technology would meet the goal, which will avoid nearly 450,000 tonnes of carbon dioxide emissions each year, through power purchase agreements with local wind projects.

Doosan Babcock, the UK operation of Korean corporation Doosan, has been awarded the Carbon Trust Standard in recognition of the power equipment manufacturer's drive to cut greenhouse-gas (GHG) emissions. The firm's commitment to reducing emissions started in 2012 with the quantification and reporting of GHG data across its operations. The standard confirms a sustained reduction in emissions by Doosan Babcock over the subsequent three-year period and plans to cut them further.

Sepa on track to meet its 2020 targets

The Scottish Environment Protection Agency (Sepa) reduced its greenhouse-gas emissions by 13.6% in 2015–16, taking the regulator more than halfway to its target of cutting emissions by 42% by 2020.

Sepa said more efficient offices, optimising the use of its Angus Smith Building (ASB) near Glasgow, sustained drops in travel emissions, and a range of carbon reduction initiatives had contributed to the overall fall.

Electricity and gas use at ASB fell 15% and 17% respectively in 2015–16, saving 239 tonnes of emissions. Replacing most desktop and laptop computers with a virtual desktop system reduced energy demands by 86% and the regulator expects the introduction of flash storage in March to replace its conventional systems will lead to further reductions. The new equipment consumes 90% less power and the regulator expects it to reduce annual electricity demand in the building by more than 5%. The flash storage should reduce annual emissions by around 88%.

The latest progress report on how the regulator is tackling its environmental impacts also revealed travel emissions declined by 6.6% in 2015–16 compared with 2014–15, which was mainly due to an increase in the number of video conferences. Last year, Sepa employees were holding the equivalent of 18.5 hours of video conferencing a day, and 300 web conferences a month. Business car usage claims were down 12% on the previous year, while the number of kilometres travelled in low-emission electric vehicles totalled almost 6,200. Overall, staff travelled 2.41 million km less by car in 2015–16 than in 2009.

Sepa reduced its waste arisings by 18% in 2015–16 compared with 2014–15, with 67% recycled, saving 92 tonnes of CO₂



equivalent emissions. However, 12.7% of waste still went to landfill.

Terry A'Hearn, chief executive at Sepa, said work to tackle the agency's environmental footprint was essential and a powerful example to other organisations. 'There is still much for us to do to meet the challenging targets we have set, but the past year's performance is a strong result. It lays clear foundations for us to accelerate our efforts so that we can strongly deliver on our responsibilities to help Scotland to tackle climate change.'

From environmentalisonline.com...

New strategy

Tackling climate change and overuse of resources are featured in a new strategy by the Scottish Environment Protection Agency. Sepa said the original reason for creating environment protection agencies had been largely accomplished and that regulators must now also help society tackle wider environmental issues. Although there were still improvements to be made on reducing pollution, Sepa said it wanted to draw up sustainable growth agreements (SGAs) with industry leaders, targeting boardrooms rather than managers. Areas it planned to target include water use, carbon-based energy use, materials use and all forms of waste and pollution beyond compliance standards in ways that improve business profitability and long-term viability. The regulator is also planning to use new powers granted by the Regulatory Reform (Scotland) Act 2014 to streamline charging and develop new enforcement powers.

bit.ly/2aChhJ9

Green growth

Record low interest rates provide the opportunity for the government to borrow to invest in sustainable infrastructure for energy, transport and cities, according to the Grantham Research Institute on Climate Change and the Environment. It believes that the government should invest in infrastructure to boost growth rather than pursue austerity to reduce public debts. The strategy could also bridge any shortfall in investment arising from the vote to leave the EU and institutional frameworks should be reformed to promote decisions that are free from short-term political interference, it said. The institute's analysis was written by its co-head of climate policy and political science, Dimitri Zenghelis, who has worked for the Global Commission on the Economy and Climate, headed the Stern Review on climate change and the economy, and is a former head of economic forecasting at the Treasury.

bit.ly/2bhDOOQ

Standard due

An international standard to guide organisations on integrating sustainability into their procurement processes has reached its second round of consultation. ISO 20400 will complement ISO 26000, the international guidance on social responsibility, which was published in 2010. Sustainable procurement entails making better choices with all purchases, including office supplies, energy providers, caterers and building materials, ISO said. Until now, there have been few harmonised international guidelines that can be applied universally, and in sufficient detail, according to Jacques Schramm, chair of the committee developing the standard. Many organisations already include sustainable procurement in sustainability reports, but there are no clear guidelines on implementing and measuring such practices, he said. The final standard is expected next year.

bit.ly/2b1tXzp

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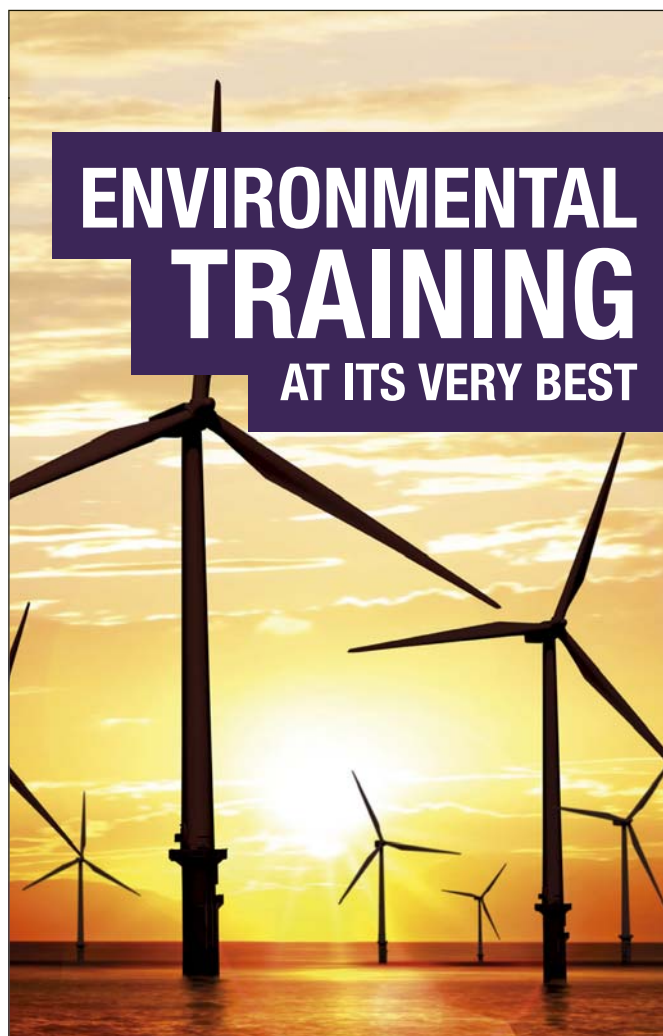


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Last chance to achieve MIEMA in 2016

Members seeking to upgrade to Full membership this year have a last chance to apply by using two special incentives, although time is running out.

Full membership is regarded as the gold standard for environment and sustainability professionals and gaining the MIEMA suffix can open doors by showcasing a high level of experience and knowledge to employers. This could lead to a salary boost and help build professional recognition.

IEMA has created two routes to achieving Full membership by the end of the year before the new standard and assessment method is activated. One is for members who feel ready to progress their application now, having already done some preparation. The other is for those who feel they would benefit from some assessor support, feedback and guidance.

Members who choose the support package will need to submit their short paper by 1 October 2016. Members who choose to forgo extra feedback and support will receive a £50 discount on their full membership application fee.



The two routes are open until the end of September so, if you are planning to upgrade now, it is important to act fast to ensure your application is progressed before the short paper deadline.

To find out more about the offers to upgrade to Full membership, visit iema.net/full-upgrade or call +44 (0)1522 540 069 to speak to an adviser.

Bookings are open for new IEMA Brexit and ISO 14001 workshops

With continuing uncertainty around Brexit and this month marking one year since the launch of ISO 14001: 2015, IEMA is holding a series of policy update workshops this autumn.

Hosted by IEMA's chief policy advisor, Martin Baxter, the series of free updates are an opportunity to hear about the latest developments and offer feedback on possible further changes.

In particular, the Brexit workshops are for members to share their views and help inform IEMA's priorities. Each session will discuss and address what could happen to environmental legislation, given that a large proportion of now comes from the EU. This is an opportunity for environment and sustainability professionals to discuss ways of improving protections already in place.

The 14001: 2015 workshops will allow members transitioning to the new version of the standard to share their experiences and feedback (see also pp16–19) on what has worked for them and what has been

most challenging. These events are your chance to glean real practical guidance from experts and experienced members.

Baxter will also give an update on expected new standards from the International Organization for Standardization (ISO). These are on: climate change adaptation; monetary valuation of environmental impacts; material flow cost accounting and its implementation in supply chains; and determining environmental costs and benefits in organisations. The workshops will take place after the plenary meeting in South Korea between 29 August and 3 September of ISO's environmental management committee (TC 207) where Baxter will head the UK delegation.

The Brexit and 14001 workshops are being held across the UK and organised in partnership with IEMA's regional steering groups. The dates and locations of the workshops are:

■ **7 Sep – Bristol:** Transition to ISO 14001: 2015.

- **14 Sep – London:** Brexit: implications for environment and sustainability.
- **15 Sep – Stowmarket:** Transition to ISO 14001: 2015 (am); and Brexit: implications for environment and sustainability (pm).
- **6 Oct – Edinburgh:** Brexit: implications for environment and sustainability.
- **7 Oct – Newcastle:** Transition to ISO 14001: 2015; and Brexit: implications for environment and sustainability.
- **11 Oct – Manchester:** Transition to ISO 14001: 2015.
- **14 Oct – Belfast:** Transition to ISO 14001: 2015; and Brexit: implications for environment and sustainability.
- **18 Oct – Birmingham:** Brexit: implications for environment and sustainability.
- **10 Nov – Nottingham:** Transition to ISO 14001: 2015.

Go to iema.net to book your place.

IEMA publishes new CPD policy and benefits map

Learning is a lifelong practice that supports a professional's work and the influence they can exercise. Having the right development opportunities and a meaningful structure for keeping track of those learning activities makes staying current simple and stress-free.

That is why IEMA has updated its approach to identifying relevant continuing professional development (CPD) and way of recording learning and development activities.

The benefits map launched last month helps members find the right learning opportunities and updates, while the new CPD form, which became available for use on 1 September, ensures members can quickly and effectively log their learning. When the skills map, benefits map and updated CPD form are used together, they can help members create a powerful, personal path of learning.

Members can use the benefits map to search by topic and type of activity. From

there they are directed to all the relevant events, webinars, downloads, listings and resources. Although all visitors to the IEMA website can explore the map, access to the activities and resources suggested are exclusive to members.

Once members have accessed and completed their activity, they can record their learning using the new CPD form. This allows space for factual recording of all learning and development and uses a self-selection of how many points the individual member would allocate to each activity, based on the value they gained from it. The form also prompts members to set objectives and reflect on their learning.

The new tools follow changes to the membership structure, which went live in June and supports the requirement for all professional grades to submit an annual CPD record in order to retain their status and suffix. 'The benefits map has been specially designed to

make finding and accessing all available learning opportunities easier than ever. Together with the skills map and the new CPD form, this package makes recording learning much easier, more valuable and certainly more meaningful,' said Claire Kirk, head of professional development at the institute.

'I would like to see members start using the form right away to set their objectives for the coming year and send that section back to IEMA. That will give us a clear idea of what type and topic of activities members need for the next 12 months and we can plan programmes accordingly,' said Kirk.

Go to iema.net to explore the new benefits map and begin recording your CPD using the new form. If you have any questions about CPD requirements, contact professional. standards@iema.net.



Reflecting on progress to value the natural environment

At the launch of the Natural Capital Protocol in July no one could fail to be struck by how far this movement has come. After its publication, I revisited early soundings on the barriers to valuing nature IEMA members were facing in 2012. Central was recognition that the natural environment will nearly always offer no immediate business value – although closer inspection will often refute this. By contrast, carbon was hitting the bottom line in a tangible way.

So where are we now? Clearly the protocol cannot compete with the relative simplicity of carbon valuation and instead a menu of approaches is introduced and signposted. Valuing nature is an advanced test

for sustainability leaders. Unlike carbon or energy management, there is rarely any single driver that will carry through into decision-making. The protocol works a bit like a Haynes repair manual by providing practical pathways to valuation. However, its primary function is a companion to understanding and influencing decision-making.

Other barriers identified in 2012 were communication and language, and other functions failing to take seriously the concept of natural capital. These reflect the culture of organisations, their decision-making processes and relatively short-term thinking, and the general inertia of accepted business models.

In effect, valuing nature offers opportunities, adding value in bids and in delivering projects and services for clients, as well as for building brand and reputation. It also interacts with common tools and standards, such as ISO 14001. Integrating and mainstreaming is central to progress.

The skills set required by practitioners is in finding the business relevance. The opportunity is to plan, innovate, collaborate and pick the tools and approach for your situation.

The protocol is an important stepping stone on this journey.

Nick Blyth is policy and engagement lead at IEMA; @nblythiema.

Say hello to the future of the profession

The IEMA Futures steering group – from left to right: George Crone, Katie Atherton, Jack Buckley, Natasha Yorke-Edgell, Ben Somers and Sophie Parsons

We are IEMA Futures, the leaders of the future – let us change the game



New IEMA steering group of young sustainability professionals introduces itself to the membership

Environmentalists tend to talk a lot about their discipline. Most do so in the hope that others will eventually realise how dependent they are on the environment and change their behaviour to live sustainably. But we cannot wait. Brexit, climate change, species extinction and many of the other issues facing environmentalists are already happening.

In the face of a seemingly overwhelming list of challenges, there is an unprecedented and urgent need for action. Many experienced environment and sustainability practitioners are already making their mark and changing how their organisations operate. To ensure young professionals can make their own powerful impact, IEMA has established a team that is unfazed by the

challenges that lie ahead. Known as IEMA Futures, it comprises a group of students, graduates and young professionals who are working to fire imaginations and involve young people in transforming the world to sustainability. The mission is to connect, empower and inform young sustainability professionals on their road to creating a sustainable future.

In the months ahead, the group will host events to recruit, welcome, engage and connect new student and graduate members. The aim is to support these new members in their first steps in the profession, giving them access to opportunities to develop their skills and connections to build successful careers. IEMA Futures will be at university freshers' fairs, and organising webinars and arranging special talks

from experienced environment and sustainability professionals on the skills they are looking for in graduate recruits.

IEMA Futures will also have a regular column in *the environmentalist*, where members will comment on current affairs and policy changes. It will also use this space to showcase the success stories of members who made the journey from ambitious student to inspiring young sustainability professional.

If you are under 24 and interested in a career in environment and sustainability or would like to be kept informed about the work of IEMA Futures, contact the group at:

Linkedin: IEMA Futures
Facebook: IEMA Futures
Twitter: @iemafutures

Government departments give London City airport expansion the green light

A £344m expansion of London City Airport has been given the go-ahead.

Transport secretary Chris Grayling and communities secretary Sajid Javid have approved plans for an extended terminal, new aircraft taxiway and parking spaces for planes at the airport in the London Borough of Newham. The decision came after a public inquiry, which ended on 5 April, and an appeal against the council's refusal to grant planning permission. DfT and Dclg had recovered the appeal in December 2015 and have now agreed with the inspector's recommendation to approve the plans.

The council had said the demolition of buildings and structures, and the additional infrastructure and passenger facilities at the airport, which opened in October 1987, would increase noise pollution. However, Grayling and Javid concluded that the inspector was correct in his observation that construction noise would be adequately controlled by suitable planning conditions and the forecast levels would be significantly below 1dB LAeq 16hr in 2025.

'The proposed measures to mitigate and manage any adverse impacts of the proposed development would ensure that any adverse noise impacts would be appropriately managed to ensure that the proposal would not result in any significant



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unacceptable effect on the living conditions of local residents,' they wrote in a letter to planning consultancy Quod, which is acting for the consortium of pension funds that owns the airport.

Although Grayling and Javid conceded that there would be more noise, they said this would be outweighed by the 'significant' socio-economic and employment benefits that would result from the expansion, when taking account of the controls and mitigation provided under planning conditions and the s106 agreement.

Some 500 jobs will be created during construction phase and a further 1,600 once the project is completed. Under the plans, there will 32,000 additional flights each year from 2025.

The secretaries of state said the expansion would not result in any significant harmful effect on air quality in the area and that the recommended planning conditions would address most of the residual impacts of the proposed development, including those related to flooding, ecology, climate change and contamination.

Impact assessment practice update with IEMA's Josh Fothergill

The **Scottish and Welsh governments** are consulting on amending their EIA regimes to transpose the amended EIA Directive. In Scotland, eight EIA regimes are covered in the consultation (bit.ly/2aFhRpC), which ends on 31 October. They are: planning; energy; marine; transport and works projects; trunk roads; land drainage; agriculture; and forestry. IEMA is hosting a workshop on the consultation in Glasgow on 8 September. It will include presentations by Bill Brash, transposition lead at the government, and me (bit.ly/2b4RrxB). The Scottish government is hosting its own workshop in Edinburgh on 5 October (bit.ly/2b4TIOz). The focus in Wales is on EIA in planning. Its consultation (bit.ly/2bbk9wu) ends on 11 November and IEMA is in the process of scheduling workshops.

The **European Commission** has published guidance (bit.ly/2aG7TqN) on how to link EIA, Habitats Directive assessment and other related IA processes. The guide is aimed at interpreting Art 2(3) of the amended EIA Directive's joint/co-ordinated procedures when multiple impact assessments are required (see p15).

UVP Report, the journal of the **German EIA Association**, has published 11 of a planned 15 papers that consider the implications of the amended EIA Directive's transposition across different member states. The special issue, published in English and German, was edited by IEMA Fellow, Professor Thomas Fischer and includes a paper on UK implications produced by leading IA thinkers. The papers are available at bit.ly/2bnBraS.

In August, the **World Bank** took a major step forward in the way it would seek to enhance environmental and social risks related to projects it finances by approving a new framework (ESF). Its adoption comes after four years of consultations in more than 60 countries (p4). The new ESF is likely to come into force in early 2018 and will place greater emphasis on using borrower frameworks and capacity building.

The IAIA, with its Ireland and UK branch, ran a successful **symposium on water and impact assessment** in Lincoln on 1–2 September. It was chaired by IEMA Fellow Dr Ross Marshall, with another Fellow, former Environment Agency chief executive Dr Paul Leinster, providing the opening keynote.



BEIS and Defra finalise ministerial remits

Ministerial portfolios have been confirmed at the new Department for Business, Energy & Industrial Strategy (BEIS), with Ruislip, Northwood and Pinner MP **Nick Hurd** given responsibility for climate change.



Nick Hurd – climate innovation, carbon budgets and the GIB

Hurd's remit covers carbon budgets; international climate change, including funds to help developing countries adapt; climate science and innovation; the green economy, including the Green Investment Bank; and manufacturing and materials. In February, Hurd was named parliamentarian of the year in the Green Ribbon awards, run by the Chartered Institution of Water and Environmental Management. In David Cameron's government, Hurd was a minister in the international development department where his portfolio included climate and environment. He headed up the department's Energy Africa campaign, which aimed to achieve universal energy access on the continent by 2030.

He has also been a member of the House of Commons Environmental Audit Committee and led work on climate change for the Conservative Party's policy group on quality of life. He served on the climate change bill committee, was a member of the Globe International parliamentary network for climate change and sponsored the Sustainable Communities Act 2007 as a private members bill. He voted in favour of remaining in the EU.



Baroness Neville-Rolf – nuclear power and low-carbon generation

Baroness Neville-Rolf has been given the portfolio for energy. This covers nuclear power; oil and gas; low-carbon generation; security of supply; energy efficiency and heat; smart metering; and international energy. She was previously a minister in the business department and director of corporate affairs at retailer Tesco. Between 1973 and 1992 she was a civil servant at the ministry for agriculture, fisheries and food.



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Jesse Norman – infrastructure, nuclear, and oil and gas



Margot James – corporate responsibility and governance

Jesse Norman will support Hurd and Neville-Rolf at BEIS. The Hereford and South Herefordshire MP has been appointed Under-Secretary of State for Energy and Industry, with particular responsibility for nuclear, oil and gas and infrastructure and construction. Meanwhile, the responsibilities of BEIS under-secretary, **Margot James**, MP for Stourbridge, include corporate responsibility and governance.



George Eustice – food, farming, fisheries and better regulation

At the environment department (Defra), new pro-Brexit secretary of state Andrea Leadsom will be supported by **George Eustice**, who retained his ministerial position. Eustice, who also voted to leave the EU, has been given responsibility for food and farming, including the Common Agricultural Policy, fisheries, better



Thérèse Coffey – biodiversity, floods, air quality and waste

regulation and science and innovation. Parliamentary Under Secretary of State for the Environment **Thérèse Coffey's** remit takes in the natural environment, including biodiversity, the marine environment, and international wildlife trafficking, floods, water and waterways, air quality and waste management. She was parliamentary private secretary to former business and energy minister Michael Fallon when he was responsible for transposing the Waste Electrical and Electronic Equipment Directive.

The Defra team is completed by **Lord Gardiner**. His responsibilities include climate change adaptation.

In his first speech as energy and climate secretary, Greg Clark spoke at the Royal Society in London about the importance of science and innovation. He noted that the UK's climate change commitments had driven the growth of the renewables sector, including the £1bn Siemens investment in Hull. In his first month in office, Clark approved the 1.8GW Hornsea Two offshore windfarm and a 17.4 km overhead electricity line in north Wales to allow wind farms to connect to the grid. He said offshore wind would play a fundamental part in building a clean, affordable, secure energy system in the UK.

In court



Severn Trent Water fined £426,000 for pollution incidents

Repeatedly polluting a watercourse in the east Midlands with sewage has cost Severn Trent Water almost £465,000.

Nottingham Crown Court fined the company £426,000 and ordered it to pay Environment Agency costs of £38,642 as well as a victim surcharge of £120 for the incidents at the Shire Brook on the border of Derbyshire and Nottinghamshire between May 2013 and April 2014. Severn Trent had pleaded guilty to the offences at Nottingham Magistrates' Court in November 2015.

The court was told crude sewage had been discharged into the brook on three separate and unrelated occasions, and that the pollution cost thousands of pounds to clean up. The first incident was on 9 May 2013. Officers from the agency found grey, milky water flowing into the brook and sewage fungus in the bed of the watercourse and vegetation. Sanitation products blocking a combined sewer had caused the problem. A similar grey, milky discharge was found on 17 December 2013. In an interview under caution, Severn Trent staff stated that the pollution was the result of a blockage in the sewer system caused by a build-up of fat. On both occasions, the sewer that transported raw sewage had backed up and leaked into the surface water drain that led to the brook.

The final incident occurred on 29 April 2014. A further blockage resulted in thick sewage sludge and solids polluting a hillside, 'sewage pools' at ground level and grey water and sewage fungus in the brook.

Justice Carr said there had been a known pollution risk and described Severn Trent's approach as insufficiently proactive. The risks had been entirely foreseeable and Severn Trent had not proactively investigated the sewers, she concluded, and found the company negligent. Although the judge said the effect on the water quality had been limited, she noted that the firm had a history of offending: 'Between 2000 and 2015 it was convicted and fined on some 40 occasions for offences including causing polluting matter to enter a watercourse and failing to comply with the requirements of an environmental permit. This is relevant offending, albeit involving one matter in the Crown Court.'

Severn Trent expressed regret and apologised for the three incidents, but said it had acted swiftly to clean up the brook each time. It is now carrying out frequent observations of the sewer.

The agency said the fines imposed on Severn Trent were outside the ranges suggested by the Sentencing Council's guidelines and had been set to send a clear message to the firm and its shareholders. 'This is one of the largest fines ever to be imposed on Severn Trent and I hope it sends a strong message that it is far more cost effective to avoid these incidents,' said an agency spokesperson.

In September 2015, Sheffield Crown Court fined the company £480,000 after raw sewage twice leaked from a 35-year-old pipe into Slacks pond in Bramley, near Rotherham. The utility company had already been warned about earlier incidents.

US regulator agrees settlements

The US Environmental Protection Agency (EPA) and the Department of Justice (DoJ) have reached a \$177m settlement with Enbridge Energy for oil spills in Illinois and Michigan in 2010. Enbridge has agreed to spend at least \$110m on measures to prevent future leaks and improve operations across more than 3,200 km of its pipeline system in the Great Lakes region. The firm will also pay civil penalties totalling \$62m for violations of the Clean Water Act (CWA)

violations – \$61m for discharging at least 20,082 barrels of oil in Michigan and \$1m for discharging at least 6,427 in Illinois.

Meanwhile, cement manufacturer Cemex has agreed to reduce harmful air pollution from five US plants as part of a settlement with EPA and DoJ to resolve alleged violations of the CWA. It will also pay a \$1.69m civil penalty; conduct energy audits at the plants; and spend \$150,000 on energy efficiency projects to mitigate the effects of past excess emissions of nitrogen oxides.

Case law

Sustainable development principles and planning

In *Menston Action Group v City of Bradford Metropolitan District Council*, the Court of Appeal held that the local authority's approval of a surface water drainage scheme required under a planning condition was not unlawful and did not have to improve the drainage of land next to the site or nearby.

The condition attached to the planning permission for the proposed housing development stated that work should not begin until a surface drainage scheme for water passing through the site and based on sustainable drainage principles had been submitted and approved.

The court had to determine what was meant by the concept of sustainable drainage principles and whether the developer should have considered the improvement of flooding resistance in the area. The developer noted that it was not its responsibility to resolve any prevailing flooding issues, although it accepted that the development should not make the situation worse. The action group argued that the scheme should help alleviate flooding in the vicinity.













The court held that the planning permission and its conditions must be construed as a whole and as a 'reasonable reader' would. In this case, the expression 'based on sustainable drainage principles' in the condition had to be interpreted in the specific context of a planning permission for the development. In this context, the condition did not have the effect of compelling the authority to require, or the developer to submit, a surface water drainage scheme that would alleviate the problem of flooding beyond the boundaries of the development site.

Jen Hawkins

Lexis®PSL

New regulations



In force	Subject	Details
9 May 2016 	Hazardous substances	Directive (EU) 2016/1028 exempts lead solders in external contacts of temperature sensors used periodically at temperatures below -150°C from the Restriction of Hazardous Substances (RoHS) regime until 30 June 2021. bit.ly/2aNP5qp
10 May 2016 	Hazardous substances	Directive (EU) 2016/1029 exempts the use of cadmium anodes in Hersch cells for oxygen sensors used in industrial monitoring and control instruments where sensitivity below ten parts per million is required from the Restriction of Hazardous Substances (RoHS) regime until 2023. bit.ly/2aK8ENR
13 Jun 2016 	Permitting	European Commission decision 2016/1032 establishes best available techniques (BAT) conclusions for permitted installations in the non-ferrous metals sector. Authorities in each member state are required to update permit conditions affected by 13 June 2020 (see emissions monitoring article on pp20–23). bit.ly/295eEQe
12 Jul 2016  	Energy	The Onshore Wind Generating Stations (Exemption) (England and Wales) (Revocation) Order 2016 revokes the Onshore Wind Generating Stations (Exemption) (England and Wales) Order 2016 and its subsequent amendment. This order is no longer needed because the Energy Act 2016 will transfer the responsibility for planning permission for onshore wind farms of more than 50 MW to local authorities. bit.ly/29Azvu4
12 Jul 2016 	Energy	The Energy Act 2016 (Commencement No. 1 and Savings Provisions) Regulations 2016 brings into force sections of the Energy Act 2016, including establishing the Oil and Gas Authority (OGA). bit.ly/1U4IiKw
14 Jul 2016 	Energy	The Electricity Capacity (Amendment) Regulations 2016 amend the 2014 regulations to allow a supplementary capacity auction for delivery in 2017–18; reduce the class of participants eligible to take part in the second of two demand side response (DSR) transitional arrangements auctions; and facilitate the trading of capacity market obligations. The 2016 regulations also amend the Electricity Capacity (Supplier Payment etc) Regulations 2014. bit.ly/2aDqcO7
20 Jul 2016 	Energy	The Contracts for Difference (Miscellaneous Amendments) Regulations 2016 amend four regulations on the contract for difference (CfD) regime. The changes permit unincorporated associations to participate. CfD contract requirements are also updated, including allowing signed contracts to be revised to reflect modifications to sustainability criteria. bit.ly/2ag0ZLh
21 Jul 2016 	Climate change	The Climate Change Act 2008 (Credit Limit) Order sets a limit of 55 million tonnes carbon dioxide equivalent (MtCO ₂ e) that may be credited against the UK's third carbon budget (2018–2022). This budget is set at 2,544 MtCO ₂ e. The limit excludes any net use of credits from the EU emissions trading system. The Carbon Budget Order 2016 sets the carbon budget for the 2028–2032 period at 1,725 MtCO ₂ e. bit.ly/2aA9WuV ; bit.ly/2a0v92t
31 Jul 2016   	Environment protection	The Nuclear Decommissioning and Waste Handling (Finance and Fees) (Amendment) Regulations 2016 amend the 2013 regulations by extending the cost recovery arrangements in the funded decommissioning programme (FDP) to include costs incurred by the secretary of state (SoS) for obtaining advice in relation to: an agreement between the SoS and the operator to modify an FDP; an agreement for the disposal of relevant hazardous material (mostly radioactive waste); and a proposed FDP or modification before it has been submitted for approval to the SoS. bit.ly/2b84n7w

This legislative update has been provided by Waterman's Legal Register available at legalregister.co.uk

Latest consultations



9 Sept

Corporate governance



The Financial Stability Board (FSB) has launched a peer review on the implementation of the G20/Organisation for Economic Co-operation and Development (OECD) Principles of Corporate Governance. The objective is to take stock of how FSB member jurisdictions have applied the principles to publicly listed, regulated financial institutions, identifying effective practices and areas where good progress has been made while noting gaps and areas of weakness. As part of the review, the FSB is seeking feedback from financial institutions, industry and consumer associations as well as other stakeholders. bit.ly/2b08XqI

23 Sept 2016

Climate change agreements



The Department for Business, Energy & Industrial Strategy (BEIS) has published a discussion paper on the Climate Change Agreements (CCA) target review 2016 and options

for changing the buyout price in target periods three (TP3) and four (TP4) – 2017–18 and 2019–20. It states that the department has decided not to initiate a detailed review of the targets set in 2012, although separate arrangements would apply to sawmilling and datacentres because these joined the CCA scheme in 2014. In terms of the buyout price, BEIS is seeking views and evidence to inform a decision to adjust it for TP3 and TP4. bit.ly/2aBMf74

26 Oct 2016

Shale wealth fund



The Treasury is consulting on creating a shale wealth fund, which it said could provide up to £1bn over 25 years to communities hosting shale gas developments. The consultation document states that the proposals aim to ensure the benefits of onshore operations will go to local people first, and that individuals and communities who host developments will be directly involved in the decision-

making about how the tax revenues from shale gas exploration are spent. bit.ly/2ayVdiN

28 Oct 2016

Vehicle emissions



Separate consultations from the European Commission focus on the emissions performance of light-duty and heavy-duty vehicles. The consultation on the revision of regs 443/2009 and 510/2011 on setting CO₂ emission performance standards for light duty vehicles (new cars and vans) will establish post-2020 targets. It will also consider the measurement of emissions and the introduction of a utility parameter, which is a way to differentiate between manufacturers' fleets. The consultation on the preparation of legislation on monitoring/reporting of heavy-duty vehicle (HDVs) fuel consumption and CO₂ emissions will inform plans to set fuel efficiency standards and a carbon dioxide monitoring scheme (already in place for cars and vans) for HDVs. bit.ly/2aOnz9c; bit.ly/2aOo8A2

New guidance

EIA

The European Commission has published guidance on streamlining the environmental impact assessment process under the revised EIA Directive (2014/52/EU) (bit.ly/2aG7TqN). It focuses on specific steps in the EIA procedure and identifies ways of streamlining different environmental assessments in the context of joint and/or co-ordinated procedures. It advises that developers start collecting data while the project is being prepared, on the basis of the advice received by the competent authorities; scoping is good practice whether in joint, co-ordinated or combined procedures; if a member state opts for the joint procedure, the environmental report should preferably be drawn up as a single document including all the necessary information and conclusions; and if a member state opts for the co-ordinated procedure, the developer may draw up more than one environmental report, which could later be consolidated into a single document or their contents co-ordinated.

Fire prevention

A guide to fire prevention and environmental permitting has been published by the Environment Agency (bit.ly/2aUP3dE). The guide is for operators storing combustible wastes at sites covered by a permit and focuses on developing and submitting a fire prevention plan. This includes waste metals (end-of-life vehicle (ELV) sites and scrap metal) and non-hazardous waste. It also applies to operators in the following sectors, although not to all their activities: biowaste treatment (open windrow, in-vessel composting and dry anaerobic digestion); agriculture (intensive farming only); incineration; combustion; paper and pulp; and cement lime and minerals.

WEEE

Defra has published revised guidance on what to include in a waste electrical and electronic equipment (WEEE) compliance fee proposal and how it will be scored (bit.ly/2b7Yg5I). To discourage producer compliance schemes (PCS) from collecting WEEE significantly above their targets and then seeking to sell that surplus, the 2013 regulations established a system of household WEEE collection targets for schemes. If a scheme fails to achieve its collection targets, the PCS may choose to pay a compliance fee in order to meet the cost of its financing obligations. The guide is for organisations considering submitting a proposal for a compliance-free methodology to be considered by the secretary of state.



14001: 2015 – lessons from the early adopters

Marek Bidwell talks to four organisations that were among the first to achieve the revised standard

More than 250,000 organisations worldwide will have made the transition to ISO 14001: 2015 by September 2018, yet for most this challenge still lies ahead.

There is plenty of advice available about the changes, but organisations that have already been through the process may provide the most practical insights. These include precision metal fabricator Hydram Engineering, project development and construction firm Skanska UK, train operating company Northern (formerly Northern Rail) and Manchester Metropolitan University.

Existing strengths

Common to the four was the advanced state of their environmental management systems (EMS). Northern, which was the first organisation anywhere to be certified to the new standard, had carried out a context analysis in 2012 as it developed an environmental strategy for a two-year franchise extension, implemented an energy management system and reviewed its procurement process according to the requirements of BS 8903 (principles and framework for procuring sustainably).

Meanwhile, Manchester Metropolitan University has been active in sustainability for at least five years and in 2013 topped the People and Planet Green League, the independent table of UK universities ranked by environmental and ethical performance. It is now working to embed sustainability into its teaching curriculum. Skanska UK has developed a tool to embed sustainability into the lifecycle of all major projects, and has introduced an internal and external communications plan. The firm's chief executive, Mike Putman, chairs the Green Construction Board.

The organisations found that the work they had done in these areas eased the transition to 14001: 2015. This makes sense because one objective of ISO's Future Challenges Study Group, whose work fed directly into the drafting of the revised EMS standard, was to consider new approaches and methods for management systems. The overriding message was to adopt best practice.

Practitioners should be encouraged that their advances in areas such as lifecycle thinking and sustainable procurement need not be rewritten for 14001: 2015. Rather they will provide objective evidence towards meeting the new requirements.

Getting ready

To give themselves a head start, all four organisations obtained copies of the early drafts of 14001: 2015. They tracked subsequent changes and consulted other sources of information and support. One source was the ISO 14001: 2015 Road Test Group (reported in the August 2014 issue of *the environmentalist*, pp23–25), a cross-sector band of environment practitioners who had reviewed the planned changes and the implications for their organisations. Andrew Robertson, HSE manager at Hydram Engineering, hosted the first meeting of the group. He says: 'It was interesting to find out about how the other companies were dealing with the likely changes, because they were from all sorts of backgrounds.'

Helena Tinker, environment and energy systems manager at Manchester Metropolitan University, worked on achieving the final stage of EcoCampus, the framework to help higher and further education institutions manage their sustainability performance, and the transition to 14001: 2015 at the same time. She says: 'I attended a number of consultation workshops run by Martin Baxter [IEMA chief policy advisor and UK representative on the group that developed the revised standard], which were useful as they gave an early insight to the changes that were being proposed. EcoCampus was also helpful; we worked together to understand the impact of the changes on our system.'

All of the early adopters carried out a gap analysis of the systems they had in place against the new requirements, but they were keen to ascertain more than a mechanistic understanding of the changes. Nigel Sagar, senior environmental compliance manager for Skanska UK, says: 'I was attempting to identify not only the new aspects of the standards, but also the way in which they would be interpreted. That was the hardest element.'

Main changes

Despite the strengths of their existing EMS, all four organisations had to develop their systems to meet the new requirements. 'Our main concern was purchasing in clause 8.1,' says Robertson. 'In metal fabrication, most raw materials are specified by the customer, and the purchasing team was initially uncomfortable with the whole idea.' On investigation, Robertson found that, when pricing a job, the commercial and design team could advise customers on other methods of manufacture that might use less steel. These design changes ultimately reduced upstream impacts, benefiting both the customer and the environment.

There has been a shift in emphasis in the new standard from training to competency. Skanska UK now requires staff to have specified professional membership levels for particular tasks. 'Anyone can write an environmental aspect and impact assessment, but it now has to be ratified by an associate member of IEMA or equivalent,' says Sagar. 'Similarly, anyone can write a project environmental management plan, but they have to be reviewed and approved by a full member of IEMA or equivalent.'

A further new requirement in 14001: 2015 is the need to 'maintain knowledge and understanding of compliance status'. This includes status with compliance obligations that are non-regulatory, and Northern took these into account when amending its system. Kyle MacNeill, environmental assurance manager, says: 'We were measuring certain contractual requirements, but we started including other non-statutory compliance obligations, such as noise complaints associated with public address systems. This has been a huge advantage to us because sometimes local managers made commitments and then left the company, the complaints would start again and the residents would have more information about previous problems than us. But now we do know about them and the process is more resilient.'

Tinker took a devolved approach to the new requirements for context analysis at Manchester



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Metropolitan University. She held workshops on each policy area that involved a PESTLE (political, economic, social, technological, legal, environmental) analysis. She then presented the key risks and opportunities to the university's environmental strategy board for review.

Comparing the process of identifying risks and opportunities to environmental aspects, she says: 'I found it more useful than the aspects assessment exercise, especially for the travel and waste policy areas; it helped teams think about how their activities are influenced by internal and external factors. It encouraged them to think more holistically and plan for the future.'

Although the university already has an objective to embed environmental and social sustainability into the curriculum, the changes to 14001: 2015 have helped with its business case to garner resources.

Audit findings

Many practitioners will be wondering how the certification bodies will interpret the new requirements and whether nonconformities will be more common in some areas than others.

Robertson says the team at Hydram Engineering was not overly stretched during its transition audit process. 'It was just like other audits we have had in the past,' he says. Hydram Engineering was audited by certification body SGS. Sagar says of Skanska UK's audit: 'It was a learning process, both for our certification body and for ourselves. On this occasion, the auditor spent more time interviewing senior managers from our central enabling functions, such as procurement, HR, design and fleet. Employees from the procurement department were asked about our sustainable procurement policy and designers were questioned about taking a lifecycle approach.'

Between them, the transition audits for the four early adopters lasted 12 days, and covered more than 14,000 staff. Seven audit findings were raised associated with the new requirements of 14001: 2015 (see panel, p19).

None of the four organisations were required to take corrective actions associated with the new requirements for top management commitment, despite polling consistently showing that this was the change of greatest concern to system managers. The extent to which assessors interviewed top management varied between the four organisations. Robertson says: 'The assessor had the opportunity to speak to the chair of the company, but he did not interview him in detail. I think he was satisfied by the detailed management review minutes I had written, as well as everything he picked up from the team.'

Only one observation raised during the audits was associated with the important new requirements for lifecycle thinking. This was a suggestion for Hydram to provide information to customers regarding the carbon emissions associated with its products, as well as disposal and recycling arrangements.

Words of advice

The interviewees thought that the changes to 14001 would help to democratise environmental management. 'It can only bring benefits in encouraging more people to become involved in environmental management, not only in Skanska UK but also in our supply chain,' says Sagar.

Robertson adds: 'The main benefit for our company has been the expansion of the group of people who consider the environment, from one environmental manager to all the key decision makers. This has been cascaded down to everyone who can have an impact or influence, however small. This can only help to have a positive impact on the environment.'

Tinker offers the following advice for others transitioning to 14001: 2015: 'Make sure that you have good leadership and commitment; embed the EMS into your organisation – people and processes; and ensure that people are clear about their roles and responsibilities.'

Robertson says: 'I think the external auditors are slightly unsure, so the best idea is to do it now, before they become more familiar with the new standard. Start at the top by discussing the environmental aspects of the business plan with the directors and creating a SWOT/context analysis. Give yourselves plenty of time and use the opportunity to promote the environment, especially to people who influence environmental performance, such as those in purchasing and tendering.'

Next steps

None of the early adopters saw achieving the revised standard as the end point for their EMS. 'There are still lots of things that we want to do,' says MacNeill. 'After we achieved 14001: 2015, we developed a forecasting system for environmental objectives, which uses environmental information gathered from hundreds of locations in the business, such as stations and depots. Next, we will be integrating our system with health and safety. We are also hoping to do a lot of work towards improving biodiversity.'

Skanska UK is looking to further improvements by making its management system, called 'Our way of working', more user friendly. 'We will be making changes to it on the intranet, by subdividing it into the different phases of the project, with the relevant processes



and procedures assembled under each stage,' says Sagar. 'Another priority is to digitise more forms and documents for use on iPads and link them into BIM [building information modelling]. Skanska UK is also now advising other parts of the Swedish-owned company on their transition to 14001: 2015.'

Tinker says: 'We would like to improve our programme on climate change adaptation and business continuity, working with the head of business continuity. We will continually review our energy, carbon and travel performance and continue to deliver on our challenging action plans to meet our targets. We would also like to expand our work on embedding sustainability into the curriculum as this contributes to students' employability.'

Common themes

The interviews with the early adopters reveal some common themes in the transition to 14001: 2015. All did research into the new requirements and carried out a gap analysis. This found they had either intentionally, or unintentionally, already made progress on one or more of the new requirements before making the necessary changes to their systems; and agreed that the changes brought benefits to their organisation by integrating environmental considerations into a wider-range of business processes than previously and drawing on the expertise of more individuals.

Differences were also apparent. For example, the new lifecycle thinking requirements were paramount for those with a high degree of control over the design of their products or services.

Every organisation's 14001: 2015 journey will be different, but hopefully they will all lead to benefits for both organisations and the environment.

Marek Bidwell, CEnv, is director of Bidwell Management Systems and a visiting lecturer in environmental management at Newcastle University. He is author of *Making the Transition to ISO 14001: 2015 – from Compliance to Opportunity*. Throughout the rest of the year, he will be interviewing representatives from organisations that have successfully made the transition. If you would like to contribute, email marek@bms-services.com. The results of his research will be published online at bit.ly/2a4pt4D.

'Making the transition to ISO 14001', the **IEMA-approved one-day course**, aims to help individuals with responsibility for implementing or maintaining an environmental management system based on 14001 to adapt to the revised standard. Participants receive insights from IEMA on the new standard and the IEMA EMS gap analysis tool, and learn how to identify and plan actions so that their organisation can conform to the new requirements. A list of providers running the course can be found in the June issue of *the environmentalist*.

Audit findings: a summary

Organisation	Length of audit	Number of staff	Audit findings associated with the new requirements of ISO 14001: 2015
Hydram Engineering	Three days	250	One observation: <ul style="list-style-type: none"> ■ A suggestion to provide information to customers regarding the carbon emissions associated with products, as well as their disposal/recycling arrangements.
Skanska UK	12 days	5,400	Two corrective actions: <ul style="list-style-type: none"> ■ When visiting a particular project, the assessor found that the risk and opportunity assessments were not in the same format as the business risk and opportunity assessment. ■ Environmental objectives were not fully documented for a specific project (covering what, by whom, and when).
Northern	Two days	4,900	Two corrective actions: <ul style="list-style-type: none"> ■ A requirement to add a commitment to 'protection of the environment' to the policy. The previous wording was 'enhancement of the environment'. ■ The audit programme did not include all new elements of the standard so had to be extended.
Manchester Metropolitan University	Five days	4,000	Two corrective actions: <ul style="list-style-type: none"> ■ The 'root cause analysis' carried out for nonconformities was not documented. ■ The internal audit compliance findings did not link back to the register of legislation (associated with the new requirements for 'maintaining knowledge of compliance status' under 'evaluation of compliance').

Under surveillance

Monitoring emissions to air and water is key to complying with environmental permits. **the environmentalist** looks at recent developments, including the possible implications of Brexit

Legislation, standards and technology are vital players in the effective monitoring of emissions to air, water and land.

The decision of UK voters to reject continuing EU membership could have implications for all of these, among them permit conditions for installations covered by the Industrial Emissions Directive (IED), which recast seven directives, including the one on integrated pollution prevention and control (IPPC). The conditions refer to 'best available techniques' (BAT) for the site or installation and the measures to be followed to prevent or minimise emissions and their impact on the environment. BAT conclusions – which are mandatory in the permitting process and derogations harder to obtain – cover associated monitoring and reference documents, commonly known as BREFs. These may contain emission limits (BAT AELs) that operators must comply with.

Standards, though voluntary, could also be affected by the UK leaving the EU. These set best practice and ensure the quality of monitoring equipment and systems. Advances in software, including the emergence of apps and technology such as miniature sensors, fuel the development of new equipment (see p23) but regulation, much of it derived from Brussels, also drives system innovation.

Brexit effect?

Dave Curtis, director at the Source Testing Association (STA), which represents more than 200 organisations, ranging from process operators, regulators, and equipment suppliers to test laboratories, says Brexit and its implications for monitoring industrial emissions has been a topic of conversation, including in meetings with the Environment Agency. But the consensus is business as usual. 'The view is that we continue to comply as long as the UK is a member of the EU,' he says.

Nonetheless, it is a European Commission-led system, the Sevilla process, that produces BREFs. Lawyers at Clifford Chance say that, post Brexit, the government could revert to the cost-benefit model that operated under the UK integrated permitting regime before the IPPC Directive (now part of the IED) was enacted. 'Given that BREFs would no longer formally apply, the UK might also have to design a whole new set of technical guidance,' they warn.

Curtis believes it is unlikely that the UK will develop its own set of BREFs, not least because Defra and the Environment Agency do not have the resources to do so: 'The majority of BREFs are complete and I would expect people in the UK to keep using them.'



Indeed, most BREFs have been or are being finalised. The implementing decision establishing the BAT conclusions for the non-ferrous metals industry (2016/1032) and the wastewater and waste gas treatment/management systems in the chemical sector (2016/902) were published in the *Official Journal of the European Union* in June. The draft BREF on large combustion plants (LCP) was issued on 28 June; comment must be in by 23 September. Meanwhile, work on the revised BREF on waste incineration is expected to be complete next year.

Currently, 31 BREFs (plus two reference documents) have been developed under the IPPC Directive and the IED, ranging from ceramic manufacturing to the production wood-based panelling. BREFs are legally binding under the IED. The Seville-based, European IPPC Bureau (EIPPCB), which co-ordinates work on generating a BREF, says the development of the documents at EU level is considered to be an efficient exercise because, in their absence, every member state would have to conduct one.

These documents take several years to finalise and tend to be lengthy. The BREFs for the production of cement, lime and magnesium oxide and the production of pulp, paper and board run to 506 and 906 pages respectively, while the draft document for waste treatment stretches to 1,030 pages.

BREFs are used by competent authorities in member states, such as the Environment Agency in the UK, to determine operating permits for installations that represent a significant pollution risk. These include information on monitoring. Environmental permitting regulations refer to BAT conclusions and BREFs, and require the regulator to ensure that it takes into account developments in best available techniques and new or updated BAT conclusions when setting permit conditions.

One facet of the BREFs process that could suffer from Brexit is the role and influence of UK experts. For

each BREF, the EIPPCB sets up a technical working group (TWG) to exchange information on BATs. Each TWG consists of technical experts representing member states, industries, non-governmental organisations (NGOs) that promote environmental protection and the representatives of the European Commission. To participate in the information exchange, members must be nominated according to their technical, economic, environmental and regulatory expertise, especially in permitting or inspecting industrial installations. Also important is their ability to bring to the table the BREF end-user perspective.

The group usually consists of between 40 and 100 experts, and their work generally lasts up to three years. Marianne Wenning, director for quality of life, water and air at DG Environment, reported last year that the TWG for the LCP BREF review comprised 270 experts, 580 plant level questionnaires, reports and site visits, and 8,500 comments on the first draft, which was published in 2013. UK involvement has been extensive: 500 comments have been contributed to the original 'wish list', data has come from about 40 plants, and representatives of Sepa and energy companies, among others, have also provided input.

BAT conclusions are based on techniques already used by the relevant sector, such as the mechanical and biological treatment of rubbish in the waste industry. The BREF documents also refer to emerging techniques that, if commercially developed, could provide the same or higher general level of protection of the environment and more cost savings than prevailing BATs. These novel methods may eventually become BATs themselves.

UK involvement in the Sevilla process after Brexit would be curtailed and its influence diminished. This would be the case even if the UK joins the European Economic Area.



Directives such as the IED would continue to apply, but the UK would have little influence over new rules. Business organisations, including BDI in Germany, want changes to the BREF process but Brexit could exclude the UK from talks.

Setting standards

The Environment Agency's Monitoring Certification Scheme (MCERTS) provides guidelines on the standards site operators need to meet to monitor processes that affect the environment and ensure compliance with EU legislation. The scheme covers monitoring equipment and competence of staff.

Most of the requirements under MCERTS comply with European or international standards. For example, the performance standards, test procedures and general requirements for CEMs comply with CEN standard EN 15267. CEN is the European Committee for Standardization and it is mandatory for European member states to adopt its standards and to withdraw any of their own that conflict.

Brexit may have implications for the development of standards. CEN and CENELEC (the European Committee for Electrotechnical Standardization) bring together the standards agencies of 33 countries and work with the commission to ensure benchmarks correspond with EU legislation. BSI, the British standards organisation, is a full member of CEN and CENELEC. It has stressed that while negotiations on the UK's future relationship with the EU continue it is business as usual, including all aspects of its standards making, policy and strategy work. 'BSI's ambition is that the UK should continue to participate in the European standardisation system,' it said in a statement. 'We are confident that a UK exit from the EU will not affect BSI's membership of ISO [International Organization for Standardization], IEC [International Electrotechnical Commission] and ETSI [European Telecommunications Standards Institute].'

Brexit may have implications for the development of standards, although BSI is aiming to remain in CEN

In a post-referendum webinar, BSI director of standards Scott Steedman confirmed that the body did not expect its relationship with its European partners to change in the short term. 'UK experts have input into European standards and have a say into which international ones are adopted by CEN and CENELEC. This will remain the case,' he said. His colleague, national and European policy manager Richard Collin, reported that more than 500 UK experts were either committee chairs or convenors of working groups.





Reciprocity of market access across 33 CEN countries frees UK industry from unnecessary trading burdens

Curtis points out that a country can be a member of CEN without being in the EU. As well as the national standardisation bodies in the 28 EU countries, CEN members include Macedonia, Turkey and the three countries in the European Free Trade Association (EFTA): Iceland, Norway and Switzerland. Collin says BSI will remain in CEN and CENELEC should the UK join the EEA or EFTA. If the UK were to default to World Trade Organization rules, changes to CEN/CENELEC statutes would probably be necessary to allow BSI to remain a member of both bodies. 'Much will depend on the political settlement,' says Steedman, emphasising that BSI has no plans to bring back British standards that have been supplanted by European ones.

A complete departure from the EU would put at risk UK input into the development of standards for emissions monitoring equipment. One such advance is the proposed CEN standard for predictive emission monitoring systems (PEMS), which are used primarily to determine NO_x emissions from combustion processes. Representatives from a number of European countries, including the UK, are drafting it. BSI has asked working group chairs and convenors to report any problems they encounter.

Going it alone

China and India are the emerging – and potentially big – markets for suppliers of emissions monitoring testing services and equipment, says Curtis. Indeed, the STA is helping officials in India compile guidance notes. However, a complete break from the EU would be risky for UK firms, although most UK-based suppliers of emissions monitoring equipment and services are now owned by multinationals.

In the BSI webinar, Steedman warned that any divergence from single market standards would add to industry costs. 'Reciprocity of market access across 33 countries frees UK industry from unnecessary trading burdens,' he said.

Changing technology

The Environment Agency's Monitoring Certification Scheme (MCERTS) ensures equipment is of the required standard to comply with legislation and warns process operators on what to avoid when buying systems. CSA Group operates the MCERTS scheme on behalf of the agency. The Deeside-based company maintains a register of all MCERTS products for:

- continuous emission monitoring systems (CEMS);
- continuous ambient air monitoring systems (CAMS);
- CAMS and MCERTS for UK particulate matter (Defra approval);
- indicative ambient particulate monitors; portable emission monitoring systems;
- continuous water monitoring systems; part 1 – automatic water sampling equipment; part 2 – online analysers; and part 3 – water flowmeters;
- portable water monitoring equipment; and
- environmental data management software.

CSA told *the environmentalist* in August that 198 products had received MCERTS over the past 12 months and that the average number of certifications in each of the past three years was 183. These figures indicate the scale of innovation in the sector.

Most of the progress in emissions monitoring equipment are in computerisation and data gathering, says Dave Curtis at the Source Testing Association. Many changes are in response to regulatory demands or to address specific problems. Delegates at the emissions monitoring conference CEM 2016 in Lisbon in May were told that the proposed PEMS standard (see main article) would be important for regulatory emissions reporting in Europe. Rick Hackney, principal performance engineer at Siemens Industrial Turbomachinery, said a regulatory framework had been in place in the US for many years, where PEMS was widely used. However, its principles are now being adopted in the UK.

Siemens is trialling a prototype PEMS system alongside a CEMS at a National Grid site to assess its suitability in predicting nitrogen oxide and carbon monoxide over a range of operating and ambient conditions, comparing them with actual values taken by a dedicated CEMS. Hackney said the minimum expectation was that the prototype PEMS should deliver results in line with the requirements for CEMS in annex 5 Pt III of the Industrial Emissions Directive.

Australian company Ecotech announced in March the launch of its direct nitrogen dioxide (NO₂) analyser. It described the cavity-attenuated phase shift technology in the Serinus 60 as a 'game changer' and said concern about poor air quality in cities had shifted attention to monitoring NO₂ pollution. 'Never has measurement of NO₂ been more important, or higher on the agenda, for environmental protection,' said managing director Nicholas Dal Sasso. 'NO₂ is one of the four criteria gases that must be monitored and measured worldwide, precisely because of its harmful nature.'

The growing use of smart devices has prompted the development of monitoring apps. In June, Finnish company Gasmet announced that its app gas monitoring was available free on both iOS and Android smartphones. It contains a link to a library of information on more than 500 compounds. A dew point calculator predicts water and sulphuric acid concentrations provided by the user, helping stack testers and process engineers prevent problems relating to sample condensation.

Antti Heikkilä, export manager at Gasmet Europe, says the app provides users of the firm's FTIR analysers with fast access to commonly requested information. It can also be used in emissions monitoring, regardless of the analyser.

Tackling foul play

Rosa Richards reports on how to ensure water sensors are kept clean from fouling and remain monitoring effectively

Sensors are the 'eyes and ears' of industry to check that processes are running smoothly and efficiently. Many industries – among them water, power, oil and gas, and food and beverage – use sensors to routinely monitor water, wastewater and effluent. The reasons for monitoring include process control, quality control and environmental management, as well as regulatory compliance.

In the past, sensor stability was the biggest issue affecting the accuracy and reliability of monitoring data, and the equipment had to be recalibrated regularly. Nowadays, fouling by organisms or inert materials is the biggest hindrance to obtaining long-term, reliable data.

Sensors are affected over time by fouling and there are different ways to combat this but the best methods will depend on their application. This may be in surface water or drinking water, seawater, wastewater or effluent. With the correct specification, installation and maintenance, water sensors can monitor effectively for many years.

Significant challenge

Biofouling is a significant challenge to obtaining reliable long-term water monitoring data and disrupts industrial processes if feedback from sensors is critical to controlling the process efficiently. Wesley Irving, instrument engineer at the Environment Agency, outlines the main issues: 'In a river estuary, the environment is ever-changing, giving rise to a wide range of fouling, which leads to impaired data quality. Biofouling can be the most difficult for probe manufacturers to address, as the fauna and flora in an estuary are adapted to the harsh conditions and extremely resilient.'

'Effective handling of biofouling is important to us as it leads to longer and more cost-effective deployments, and also lowers the cost of ownership of sondes [multiple sensors bundled together]. Long-term datasets allow the agency to see subtle shifts in the environment that may cause concerns in the future.'

Thousands of aquatic organisms cause biofouling. The progression of biofouling follows an established pattern in seawater, but the initial stages are the same in freshwater (see panel, p26). Sensors suffer from biofouling from minutes to months after deployment (industrial activities are affected later on). The rate and extent of biofouling will depend on the monitoring site. Warm, marine waters are ideal environments for biofouling, where organisms will quickly colonise the surfaces of sensors and hinder their functioning.

Inert materials, including sewage sludge, sediments and rags or other rubbish in wastewater, can also cause fouling. Paul Norman, an engineer at measurement instruments business Partech, says fouling is a barrier to obtaining good monitoring data from sensors. 'One particular challenge is the heavy fouling present in the clay mining industry. The settlement tanks in this industry are some of the harshest fouling applications we encounter. One client needed to monitor water quality in their settlement tank but their monitoring probes became silted up rapidly to the extent where the probe could not function at all.'

Partech's solution was to deploy a retractable probe in the china clay quarry sludge settlement tank.

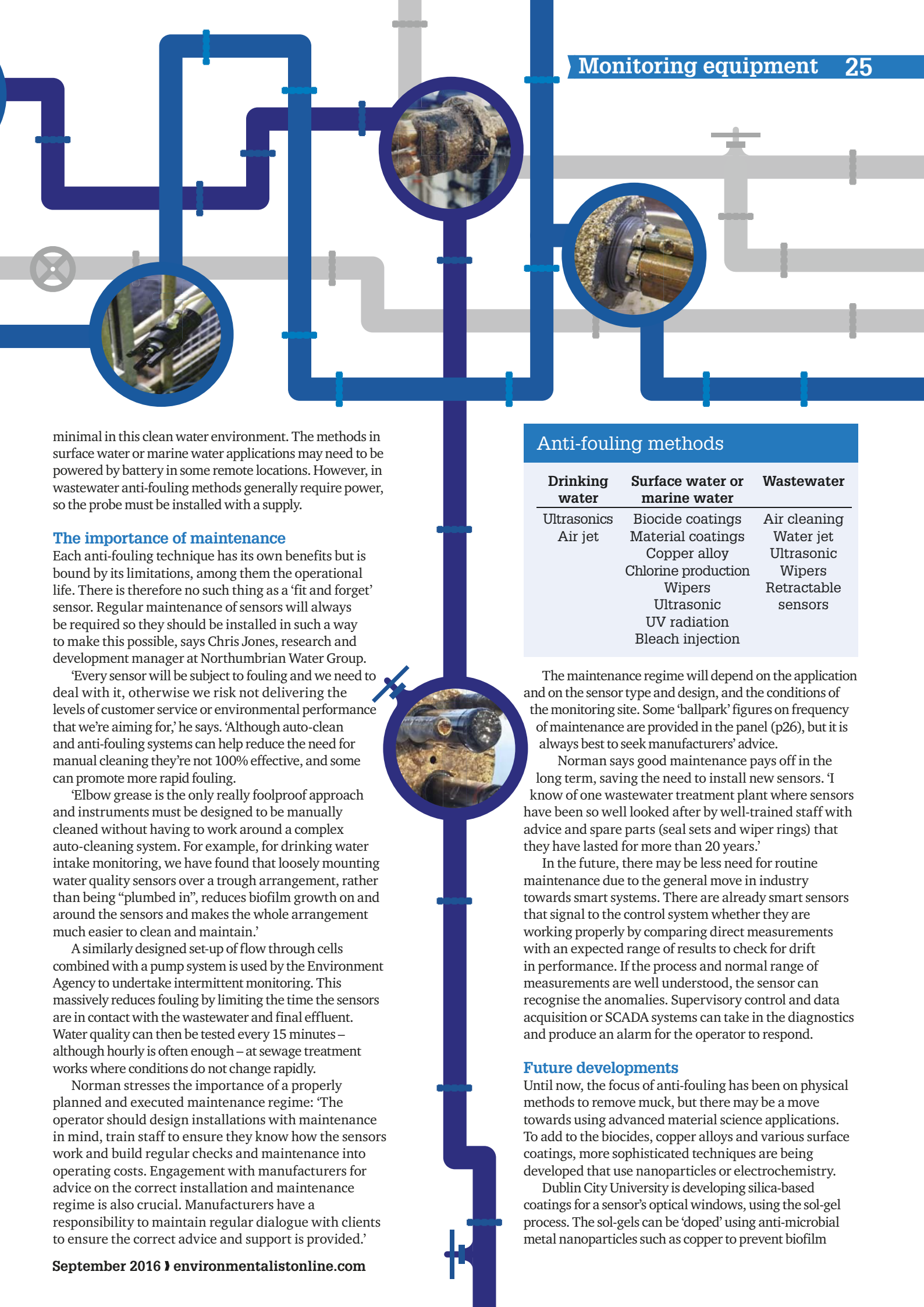
Anti-fouling methods

Fouling can be limited by using anti-fouling surfaces. The design of the sensor probe is central to preventing fouling, as are the coatings applied to their surfaces. These could take the form of a bleach that is injected onto the surface or the use of copper alloy (copper has natural anti-microbial properties). However, these coatings and even the copper alloy will degrade over time.

A probe can be designed to be streamlined to prevent ragging, or it may have a wire mesh over the sensor to allow water to flow. Although a mesh may help keep the sensor head clean, it provides a surface for colonisation and build-up of solid matter so it must be cleaned regularly. Other methods include production of chlorine on the surface of the sensor – for example, using electro-chlorination to produce chlorine from seawater or incorporating an LED to generate UV radiation to prevent biofilms forming. Production of chlorine can result in trapped bubbles of gas, which must be wiped away from the sensor. UV radiation works by disrupting DNA, but LEDs need to be replaced regularly, despite the constantly improving technology.

Fouling can be removed using mechanical or chemical methods. These include: mechanical cleaning with wipers or brushes; retractable sensors; air or water cleaning using jets blowing across the sensor head; or ultrasonic cleaning. Although effective, these methods can damage the sensor over time. Chemicals can be used to clean sensors automatically (with a wash wired in) or manually but there are issues with health and safety and disposal of the wastewater.

The anti-fouling methods mentioned are suitable and effective in the correct applications only (see panel, p25). Anti-fouling techniques in drinking water are limited because they must not affect quality, but fouling will be



minimal in this clean water environment. The methods in surface water or marine water applications may need to be powered by battery in some remote locations. However, in wastewater anti-fouling methods generally require power, so the probe must be installed with a supply.

The importance of maintenance

Each anti-fouling technique has its own benefits but is bound by its limitations, among them the operational life. There is therefore no such thing as a 'fit and forget' sensor. Regular maintenance of sensors will always be required so they should be installed in such a way to make this possible, says Chris Jones, research and development manager at Northumbrian Water Group.

'Every sensor will be subject to fouling and we need to deal with it, otherwise we risk not delivering the levels of customer service or environmental performance that we're aiming for,' he says. 'Although auto-clean and anti-fouling systems can help reduce the need for manual cleaning they're not 100% effective, and some can promote more rapid fouling.'

'Elbow grease is the only really foolproof approach and instruments must be designed to be manually cleaned without having to work around a complex auto-cleaning system. For example, for drinking water intake monitoring, we have found that loosely mounting water quality sensors over a trough arrangement, rather than being "plumbed in", reduces biofilm growth on and around the sensors and makes the whole arrangement much easier to clean and maintain.'

A similarly designed set-up of flow through cells combined with a pump system is used by the Environment Agency to undertake intermittent monitoring. This massively reduces fouling by limiting the time the sensors are in contact with the wastewater and final effluent. Water quality can then be tested every 15 minutes – although hourly is often enough – at sewage treatment works where conditions do not change rapidly.

Norman stresses the importance of a properly planned and executed maintenance regime: 'The operator should design installations with maintenance in mind, train staff to ensure they know how the sensors work and build regular checks and maintenance into operating costs. Engagement with manufacturers for advice on the correct installation and maintenance regime is also crucial. Manufacturers have a responsibility to maintain regular dialogue with clients to ensure the correct advice and support is provided.'

Anti-fouling methods

Drinking water	Surface water or marine water	Wastewater
Ultrasonics	Biocide coatings	Air cleaning
Air jet	Material coatings	Water jet
	Copper alloy	Ultrasonic
	Chlorine production	Wipers
	Wipers	Retractable sensors
	Ultrasonic	
	UV radiation	
	Bleach injection	

The maintenance regime will depend on the application and on the sensor type and design, and the conditions of the monitoring site. Some 'ballpark' figures on frequency of maintenance are provided in the panel (p26), but it is always best to seek manufacturers' advice.

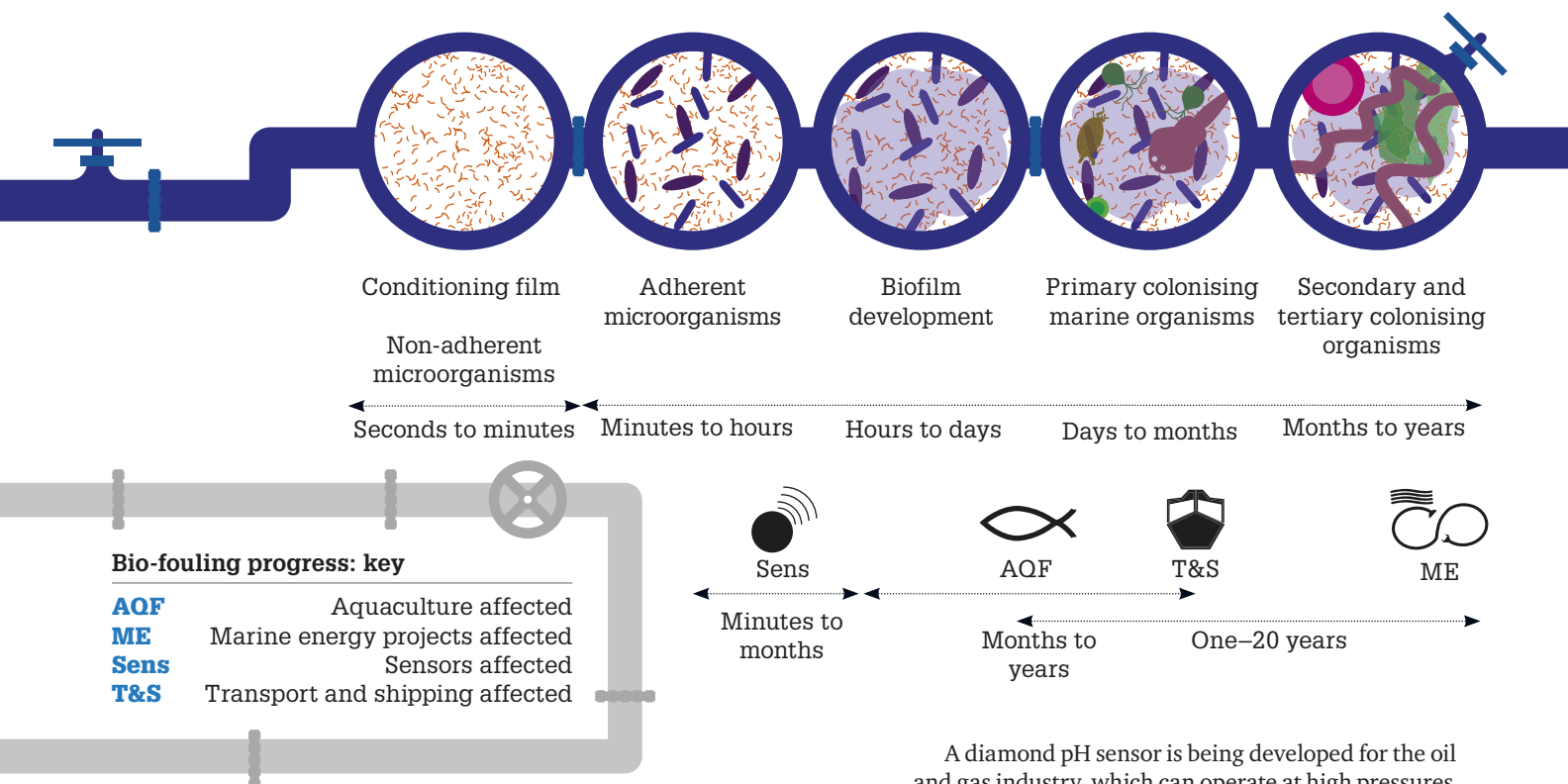
Norman says good maintenance pays off in the long term, saving the need to install new sensors. 'I know of one wastewater treatment plant where sensors have been so well looked after by well-trained staff with advice and spare parts (seal sets and wiper rings) that they have lasted for more than 20 years.'

In the future, there may be less need for routine maintenance due to the general move in industry towards smart systems. There are already smart sensors that signal to the control system whether they are working properly by comparing direct measurements with an expected range of results to check for drift in performance. If the process and normal range of measurements are well understood, the sensor can recognise the anomalies. Supervisory control and data acquisition or SCADA systems can take in the diagnostics and produce an alarm for the operator to respond.

Future developments

Until now, the focus of anti-fouling has been on physical methods to remove muck, but there may be a move towards using advanced material science applications. To add to the biocides, copper alloys and various surface coatings, more sophisticated techniques are being developed that use nanoparticles or electrochemistry.

Dublin City University is developing silica-based coatings for a sensor's optical windows, using the sol-gel process. The sol-gels can be 'doped' using anti-microbial metal nanoparticles such as copper to prevent biofilm



growth. An added benefit is that the final coating is anti-corrosive. Sol-gels have also been used to produce self-cleaning solar panels and even waterproof fabrics.

Warwick University is working on highly durable synthetic diamond electrodes. These have great potential due to the intrinsic properties of diamond, which has a high thermal conductivity and is resistant to corrosion or abrasion, making it fairly resistant to fouling. 'Man-made' diamonds can be doped with boron to make them conductive, and can be surrounded by insulation. UV light can then be applied through the back face of the diamond to provide an optical sensor, while the front face in contact with the solution hosts the anti-fouling properties. A pure diamond electrode can hydrolyse water to produce hydroxyl radicals, which will oxidise anything in contact and can kill biofilms.

A diamond pH sensor is being developed for the oil and gas industry, which can operate at high pressures and temperatures and can withstand cleaning using bleach or wipers due to its resistance to corrosion or abrasion. Man-made diamond is tenable in terms of price and becomes cheaper with mass production.

However, there is no magic solution to biofouling, notes Darren Hanson, general manager at Xylem Analytics UK. 'The combination of anti-fouling measures chosen will depend on the location, power availability and nature of monitoring required – be that in freshwater, seawater, drinking water or wastewater. There are off-the-shelf sensors available but the best solution is to discuss your needs with a supplier directly to gain expert advice.'

Rosa Richards is an independent environmental consultant specialising in water policy and monitoring. She is also a freelance science writer, programme manager of the Sensors for Water Interest Group (SWIG), and distance learning tutor for integrated environmental management at the University of Bath.

Anti-fouling maintenance programme

Deployment	Sensor type/design	Frequency of maintenance	Points to note
Surface water, that is rivers and lakes Upland rivers (high water quality, clear water)	NH3 Other sensors, such as DO, turbidity	Four weeks to two months Three months	Recalibration is usually needed after four weeks to address drift in readings. Sometimes this can be extended to two months depending on conditions. In clear waters, biofouling is minimal.
Estuaries	NH3	Four to eight weeks	See above, anti-fouling methods become more important for longer deployment.
Coastal water	Wiper mechanism	Four times a year	As long as good anti-biofouling measures, such as wipers, are installed.
Drinking water	Wiper mechanism	More than three years	Low rate of fouling. Wipers and seal set replaced.
Wastewater	Wiper mechanism	Every two to three years	Based on self-clean every six to eight hours. Wipers and seal set replaced.
Septic tank/ Aeration tank	Wiper mechanism	Every four to five months	Based on self-clean every hour. Very high rate of fouling. Wipers and seal set replaced.



Protecting the Earth's life-support systems

Penny Walker looks at how firms are working to mitigate and adapt to climate change, and to protect land-based ecosystems in part four of our series on the UN goals

13 CLIMATE ACTION



Climate action

Increasingly businesses are focused on reducing their own greenhouse-gas (GHG) emissions. At the climate change summit in Paris last December, 114 companies pledged to reduce these in line with the goal of keeping the global temperature rise below 2°C – the threshold that most scientists agree would trigger abrupt climate change.

More than 170 companies, including H&M, Renault and Société Générale, have joined the Science Based Targets initiative, set up by WWF, CDP, the World Resources Institute (WRI) and UN Global Compact to encourage businesses to cut emissions. By July, 18 had set targets consistent with the Paris temperature cap.

This action chimes with the 13th UN sustainable development goal (SDG) and the need to take urgent action to combat climate change and its impacts. Targets focus on resilience and adaptation as well as mitigation, support to developing countries, education and awareness and ensuring governmental processes take account of climate change.

Reducing emissions

Video calling and e-communications are seen as effective ways to reduce the impacts of paper manufacturing and travel, but datacentres use huge amounts of energy to run and cool servers. Technology companies are addressing this by investing in renewable energy to power datacentres. In 2015, Apple announced plans to invest €1.7bn in two European datacentres powered by renewables. Planning permission is being sought in Ireland, while construction on a centre in Denmark is expected to start this year. Meanwhile, Samsung is helping its

customers use less energy, with a 42% improvement in product power efficiency across its range since 2008: smart TVs have made 44% energy savings and air conditioners are 75% more efficient.

Individual professionals are taking action to cut their emissions, with symbolic as well as practical impacts. To help achieve this, since October 2015 academics in 12 countries have been petitioning universities and professional bodies to reduce flying to attend conferences.

Adaptation, risk and resilience

Adaptation and resilience are increasingly important. According to the independent Committee on Climate Change, UK annual non-residential costs from flooding stand at around £800m and are expected to be £1bn by the 2050s. It also forecast that, in the 2040s, half of all summers would be as hot as that in 2003, when temperatures across Europe soared and caused business losses of almost £500m.

Customers and employees may be affected by extreme weather and supply chains may be cut. Zurich Insurance Group established its global flood resilience programme in 2013 to share its skills and experience with wider society. Linda Freiner, group head of corporate responsibility, says: 'Risk management is something we have expertise in, and we are at the front line in seeing the impacts of extreme weather and changes in climate patterns.' Her advice to companies is to begin with a systematic risk assessment, encompassing short- and long-term exposures and the effects floods and other extreme weather would have on their business. Look beyond your own locations, into your supply chain, and the impact on employees and customers.

Money and climate action

Many investors, including the Environment Agency Pension Fund (EAPF), have signed up to the Montréal Carbon Pledge, committing to measure and publicly disclose the carbon footprint of their investment portfolios each year. The EAPF has gone even further. Faith Ward, chief responsible investment officer and a PIEMA, says the body believes that considering climate risk forms part of its legal duties in managing the fund. In October 2015, the EAPF set goals to

decarbonise the fund: disinvesting from coal (by 90%), oil and gas (by 50%); investing in climate mitigation (15% of the fund); and actively engaging with others in the investment industry to support progress to a low-carbon economy. The fund is two-thirds towards its coal target, and ahead on oil and gas.

‘Ask yourself what your own pension fund is doing to manage climate risk,’ says Ward. ‘It’s about looking at resilience in supply chains and positive investment in companies providing solutions, not just focusing on a few fossil fuel companies. You may well be able to help in applying your skills and knowledge to assist those managing funds.’

The financial context for climate action is hugely influenced by what the government does. Increasingly, the lobbying voice of mainstream corporations backs more action. Some companies have spoken out, supporting the Fossil Fuel Subsidy Reform Communiqué, which in November 2015 called on the international community to increase efforts to phase out subsidies to fossil fuels. Aviva’s group chief executive officer, Mark Wilson, who signed the communiqué on behalf of the insurance firm, said: ‘Climate change is arguably the world’s most critical contemporary market failure. It has significant consequences for people, the planet and the profitability of a broad range of companies – including insurers. Fossil fuel subsidies fan the flames of this market failure. We believe the subsidies should be phased out as soon as possible.’

Making a start

Emissions

- The Greenhouse Gas Protocol – helps to measure and report on greenhouse-gas emissions (ghgprotocol.org).
- Reducing academia’s carbon footprint (flyingless.org).
- Inspiring businesses to set greenhouse gas emission reduction targets in line with climate science (sciencebasedtargets.org).

Resilience

- For UK-based assets and suppliers, the evidence report of the Climate Change Risk Assessment 2017 (bit.ly/29ASGWk). It covers priorities for the next five years.

Finances

- Montréal Carbon Pledge (montrealpledge.org).
- Friends of Fossil Fuel Subsidy Reform Communiqué (fffsr.org).



Life on land

The goal is to protect, restore and promote sustainable use of terrestrial ecosystems, manage forests sustainably, combat desertification, and halt and reverse land degradation, and halt biodiversity loss.

Targets relate to ecosystems ranging from mountains, drylands, forests and deserts to wetlands. The goal also covers endangered species and poaching, and invasive alien species. On the governance side, targets have been set for fairly sharing the benefits of using genetic resources, and to mobilise the financial resources and improve planning and poverty-reduction strategies so that these take account of ecosystem and biodiversity values.

Protecting ecosystems

Companies in the cocoa supply chain have been making moves to protect biodiversity in this way. One of these is Mondelez, the world’s largest chocolate producer, whose brands include Cadbury’s Dairy Milk and Oreo. In partnership with the UN and the government of Côte d’Ivoire, Mondelez is working with up to 26,000 smallholder farmers to help meet the country’s ambitious target of zero net deforestation from cocoa growing through its Cocoa Life programme.

Jonathan Horrell, international director of sustainability at Mondelez, says: ‘Farmers are trained on good agricultural and environmental practices. This is critical

to increase their productivity on the same area of land and reduces the incentive to clear rainforest for other uses.

‘Further, together with UNDP and the Forestry Commission, we have provided 787,000 economic tree seedlings to more than 9,600 cocoa farmers since 2014. Planting shade trees achieves farm income diversification and helps to conserve biodiversity.’

Nestlé is also changing practices to secure long-term supplies of cocoa and protect ecosystems through its Cocoa Plan. The target, set in 2010, is for no deforestation in the company’s supply chains by 2020. Farmers’ incomes are being raised through higher-yielding cocoa plants and training. In Ecuador, farmers are being supported to diversify into agritourism alongside cocoa production.

Nestlé is part of the Initiative for Sustainable Landscapes, convened by the IDH, a sustainable trade collaboration based in the Netherlands. Action by individual smallholders, government bodies and multinationals is needed to protect ecosystems through collaboration at the landscape level. Pollinators, rivers and soil do not recognise the boundaries of supply chains.

Cocoa is not the only ‘soft commodity’ that depends on healthy, functioning ecosystems. In 2010, the board of the Consumer Goods Forum, whose members encompass retailers and manufacturers, passed a resolution to achieve zero net deforestation by 2020, with a particular focus on palm oil, soy, beef, paper and pulp.

In the finance sector, businesses are developing products to support investment in conservation and income streams for people through sustainable use of resources. Fabian Huwyler, a member of the sustainability affairs team at Credit Suisse, describes how the company's products, such as Nature Conservation Notes, can help: 'They allow investors to support nature conservation in developing countries and economic development for their local communities through the conservation-related revenues, like the sale of sustainable commodities or ecotourism, generated by the financed projects.'

There are sector-wide initiatives too. The Soft Commodities Compact, for example, aims to finance the transformation of supply chains so that companies can meet their zero net deforestation targets.

Goal 15 also covers individual species and organisms, such as those poached from the wild and trafficked. United for Wildlife is a coalition of conservation organisations convened by the Royal Foundation. In March 2016, companies in the transport and logistics sector (including China Shipping Company, Dubai-based ports operator DP World, Stena Line UK and Qantas) signed the Buckingham Palace Declaration to crack down on the illegal wildlife trade. The declaration is open to additional signatories from the transport and logistics sector.

Penny Walker is an independent sustainable development consultant. penny-walker.co.uk; @penny_walker_sd.

Making a start

The Natural Capital Protocol offers a standardised way of identifying, measuring and giving a value to the impacts an organisation or supply chain has on natural capital, and how it depends on biodiversity and ecosystems services, such as flood defence, climate regulation, pollination and recreation (bit.ly/29MRq4Q). The protocol was launched in July 2016.

A corporate ecosystems services review is another approach to understanding dependencies and impacts. Developed by the World Resources Institute, the WBCSD and others, and tested by firms including paint and chemicals business AkzoNobel, Dubai-based ports operator DP World, Swiss agribusiness Syngenta and mining firm Rio Tinto, the tool has been used by an estimated 300 companies since 2008 (bit.ly/2bxOXOv).

Looking specifically at biodiversity offsetting, Forest Trends' Business and Biodiversity Offsets Programme aims to test and monitor the use of the standard (bit.ly/2buRkgC). It is a global collaboration between more than 75 companies (such as cement business Cemex, energy firm Électricité de France and consultancy Arup), financial institutions (such as the European Bank for Reconstruction and Development), government agencies (including Defra) and civil society organisations.

Organisations operating initiatives include:

- Consumer Goods Forum (bit.ly/2aWmI5J).
- Initiative for Sustainable Landscapes (bit.ly/2b0UYyC).
- Banking Environment Initiative (bit.ly/1l01Gsb).
- United for Wildlife (unitedforwildlife.org).



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Supporting Trade Associations





Refreshing the

Heineken claims to have developed the world's first large-scale, zero-carbon brewery at Göss. David Burrows reports from the site in Austria

Chatting over a drink in the Austrian town of Göss, Michael Dickstein admits the concept of a zero-carbon beer may not resonate with most customers. His marketing team has told him as much: sustainability messages might sway just 5–10% of consumers into buying one brand over another. Despite this seemingly low figure, their relevance remains pertinent.

'If we thought it was too early to approach customers with these messages we wouldn't have linked our brands with [the green agenda],' says Dickstein, director of sustainability at Heineken, the world's third largest brewer. 'Environmental sustainability is high on the global agenda, but it's also what our consumers expect from us.'

Indeed, research conducted last year among 30,000 consumers in 60 countries by global information business Nielsen backs this up. Fully 45% said knowing the products they bought came from a company known for being environmentally friendly either 'very heavily' or 'heavily' influenced their purchasing decisions. Some 51% of millennials said they checked packaging for sustainability claims before making a purchase.

Brewed by the sun

Heineken has already been tapping into these trends using its Brewed by the Sun campaign. This covers drinks produced using solar energy, including Birra Moretti in Italy, which carry the strapline to prove it. Focusing on energy rather than carbon makes sense: it's more relevant to consumers and one step ahead of the competition, says Dickstein.

According to a report published last year by the Joint Research Centre (JRC), the European Commission's science and knowledge service, renewables accounted for just 7% of the energy used in the food and beverage sector in 2013 compared with 15% in the overall energy mix. 'Many [food and drinks companies] are still hooked on fossil fuels,' the JRC concluded.

Heineken is already the world's largest user of solar energy in beer production, with major installations in Singapore, the Netherlands, Italy and the UK, where its Tadcaster brewery has had more than 4,000 panels (876MW a year) installed.

Now it has bigger plans. The company is aiming to cut carbon emissions by 40% by 2020. The target, set per hectolitre of beer produced, is against a 2008 baseline. By last year it had already achieved 36%. In absolute terms, emissions fell 8% between 2008 and 2015, a figure that is notable only when set against the 43% rise in production (Heineken brewed 188.1 million hectolitres of beer last year, a hectolitre being 100 litres). There is more work to do if the company wants to keep increasing volume and decreasing carbon simultaneously. This is where the project at Göss comes in as other breweries embrace a range of renewable technologies and energy efficiency initiatives to reach the bar set there.

Spent grain

The first thing a visitor to Göss notices when looking for renewables is the lack of solar panels: the 1,500m² solar plant generates just 3–5% of the site's thermal energy requirements. The imposing new fermentation tank for spent grain makes up for this. It is the 'Bentley' of biogas plants, according to Hrvoje Milošević, regional sales manager at Bioenergy International (BDI), the company that installed it.


It is the first biogas plant of its kind, but it did not come easy. The main challenge, says Milošević, was to adapt the technology to the brewery's 'five days on, two days off' production schedule; but the firm came up with a solution that shoots down the oft-cited criticism that renewables are inflexible.

The plant, which has been running since October 2015, takes all the organic waste from the brewery. The lion's share of this is spent grain, which used to be stored and then sold or given free to local farms as






beer industry




livestock feed. Now the waste is fed through a hydrolysis tank into the digester to produce heat for the brewery's boilers, as well as steam to clean returned bottles.

Every hectolitre of beer leaves 20 kg of surplus yeast and spent grain, enough to produce 75Nm³ (norm-cubicmetres) of biomethane. With 18,000 tonnes of organic material to play with, there is plenty of waste to supply half the Göss brewery's heat requirements. If production capacity increases from the 1.4 million bottles of Gösser beer produced daily, the plant will devour the additional waste.


Financial outlay



With its big investment in biogas, Heineken is playing the long game – the return on investment for a biogas plant at a Heineken brewery in Greece was four years. It helps to have the financial department on side when shopping for new technology, but the board has bought into the ethos. Heineken's finance team took three days to calculate the savings produced by company's energy and water reductions, and came up with €71.1m (£60.3m) since 2009. Most of these, however, are due to incremental improvements in the supply chain rather than revolutionary steps, Dickstein says. This is also the case in Göss. Electricity from hydropower is standard in Austria, and that, allied to a range of energy efficiency measures, have helped to cut energy use by around 30% in the past ten years.



One of these is an innovative wort (malt sugars) boiling system, which dramatically enhances the evaporation efficiency. The bitterness units, thermal load and amount of coagulable nitrogen (which correlates to the foam stability of the beer) all remain constant and maintain the taste. 'Whatever we do, the final product can't change,' says Andreas Werner, the Göss site's brew master. He has spent ten years or so pushing his bosses to invest in measures that would turn Göss into a state-of-the-art, zero-carbon brewery without affecting the quality or price of the product (see panel, p32).



Werner says his ideas have been received with an 'open ear', but he always has to prove that the cost of production will not increase as a result. This ties in with the Nielsen research findings which suggested consumers, especially younger ones, would pay more for greener brands, but one that is sustainable and costs the same is a win-win.

Coming first

The pioneers of sustainable business are always striving to be first, and this is what drives new technology and helps to reset the bar ever higher. Heineken is no different. The zero-carbon beers should put Göss, a town in the state of Styria, on the map, at least in sustainability circles. 'What we have achieved here, as well as through our growing family of Brewed by the Sun brands, shows we now walk the talk,' Dickstein says.

Heineken's company-wide sustainability strategy provides not just savings but shelter from looming risks, including energy cost and availability, water scarcity and new regulations – such as the revised Renewable Energy Directive, which may be implemented to help hit emissions targets in line with last year's Paris agreement.

This future-proofing has caught the eye of investors, with interest increasing in what Heineken is doing to improve its sustainability. Dickstein himself admits to having gone from a relative nobody in the world of sustainable business to speaking at more than 40 conferences last year. 'We want Göss to be the role model for breweries around the world,' he says.

Going further

The biogas plant at Göss is something that the company's other breweries will be looking at closely; after all, every one of them has spent grain to deal with. There are huge gains to be made. A look at the breakdown of Heineken's environmental performance last year shows that it sent more than 2.7 million tonnes of waste into the animal feed chain compared with just 43,000 tonnes that were fermented into biogas.

The company's Tadcaster and Manchester plants in the UK already operate anaerobic digestion plants – the latter is now one of the top five performing Heineken breweries globally, having cut energy use by 27% since 2014. Heineken describes its approach to energy use in the UK as one of 'continuous improvement'. The speed of this may, however, depend on changes to national and European renewable energy and waste policies. There is uncertainty around these after the UK referendum and it is far from clear whether the new government will get behind the green agenda or look to dilute laws. One of Decc's final moves was to cut some of the Renewable Heat Incentive tariffs, a decision that was poorly received by industry.

Brew master and carbon maestro



The Austrian town of Göss has been synonymous with beer since the year 960. Nuns ran the local production in the monastery during the middle ages before the modern brewery was founded in 1860. Today it is run by brew master Andreas Werner, who has almost single-handedly driven down the site's carbon footprint from 3,000 tonnes a year to nothing.

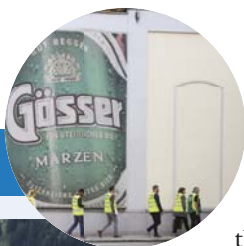
The beer industry will not be free from fossil fuels overnight, he says, but the ten-year project at Göss shows what can be achieved.

The Göss brewery in numbers:

- founded in 1860;
- produces 1.4 million bottles of zero-carbon beer daily using various renewable technology and energy efficiency techniques;
- 2003 – overhaul of the site's energy systems begins, led by brew master Andreas Werner;
- 100% of its electricity consumption is from hydropower sources; and
- energy efficiency measures include reuse of 90% of waste heat.

Heat comes
from a number
of sources

- 35% from a neighbouring sawmill
- 50% from biogas generated from spent grain
- 10% from biogas created from wastewater
- 3–5% from solar



Policy support is one thing, but local backing cannot be forgotten. Werner and BDI admit the residents of Göss had concerns about the biodigestors, mostly in relation to extra traffic and odour. Walking around the huge tanks, one might expect there to be a stench – but a closed system ensures nothing escapes.

The fermenter is an impressive and replicable technology for Heineken. It is not the only energy technology being used at the Göss brewery, however. The town's sawmill, Mayr-Melnhof, burns bark and sawdust to produce electricity, but it was producing more thermal energy than it needed, something that came to Werner's attention. Now the excess is fed into the Göss plant for use in brewing, cleaning and pasteurising.

It is simple, yet effective: 35% of the brewery's heat energy comes along the 700 m pipeline between the two local businesses; the mill, meanwhile, has an additional income stream and cuts its waste. 'If we had a sawmill next to every one of our breweries it would make life much easier,' admits Heineken global manager for utilities Kalpesh Tejani.

Alas, that is not the case. But the partnership shows the benefits of unconventional thinking when seeking to improve energy efficiency. It is another piece in the jigsaw that has helped take Göss from pumping out 3,000 tonnes of carbon emissions a year to zero.

That Göss is a zero-carbon rather than carbon-neutral brewery is an interesting aside. Heineken toyed with the idea of marketing it as the latter but felt that suggested a level of offsetting. 'The point is that the brewery at Göss does not release any carbon dioxide emissions into the atmosphere,' a spokesperson confirms.

Consumers may not care to concern themselves with the nuances of carbon terminology. Even carbon as a concept is abstract, admits Dickstein, which is why the company has so far honed in on energy in its campaigns.

Brewed by the Sun is a message consumers can succumb to, he says.

Heineken is involved in the European Commission's project to standardise product environmental footprints. This follows research showing that there are more than 400 environmental labels on the market and more than 60 'leading methods' to calculate carbon footprints (see *the environmentalist*, August, pp21–24). Does this mean that drinkers can look forward to raising their glasses to a zero-carbon pint?

Not yet, but as Heineken's Europe president Stefan Orłowski put it recently: 'We are constantly looking at ways to make our sustainability story relevant to consumers through our brands.' As one of the top five most effective advertisers in the world, according to advertising agency Warc, if any firm can sell the idea, Heineken can.

David Burrows is a freelance writer, specialising in food and environmental policy; davidgburrows@yahoo.co.uk.



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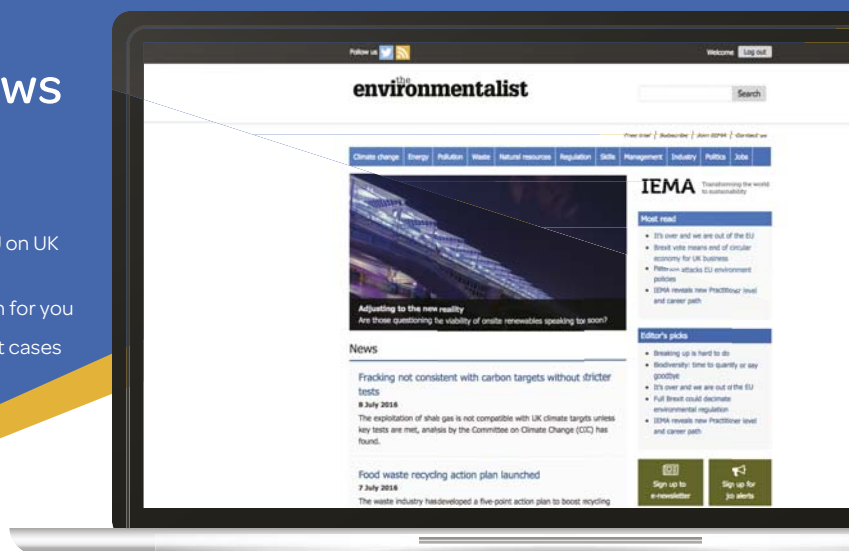
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More successful IEMA members

IEMA would like to congratulate the following members on recently upgrading their membership as part of their ongoing commitment to learning and professional development.

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(In August, Chris was incorrectly listed as a Full member. We apologise for this mistake and for any inconvenience caused.)

IEMA events

Date	Region/Time	Topic
8 Sep	Scotland	Transitioning Scottish EIA to the amended Directive 2014/52/EU
14 Sep	South East	Brexit – implications for environment and sustainability
15 Sep	East of England	Transition to ISO 14001: 2015; Brexit – implications for environment and sustainability
21 Sep	Wales	Social; Full member and CEnv mentor forum
21 Sep	South East	IEMA annual general meeting 2016 (London)
22 Sep	Scotland	Green tourism in Scotland
28 Sep	North West	Corporate sustainability trends
6 Oct	Scotland	Transition to ISO 14001: 2015
Webinars		
13 Sep	12.30–13.30 (BST)	ISO 14001 series update
21 Sep	12.30–13.30 (BST)	Progressing the circular economy in the UK – where is progress being made?
22 Sep	12.30–13.45 (BST)	Principles for achieving net gain biodiversity outcome from development

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An opportunity has arisen for an Environmental Advisor to join a leading energy and renewables company on an 18 month contract based on a major infrastructure and energy project. You will implement, manage and maintain the environmental management system to ISO 14001 standards and monitor and report on environmental KPIs. Suitable candidates will have environmental experience and be a member of IEMA.

IEMA 2016 Annual General Meeting

Company Name: The Institute of Environmental Management and Assessment

Company Number: 03690916

NOTICE IS HEREBY GIVEN that the 16th Annual General Meeting of the Institute of Environmental Management and Assessment ("IEMA") will be held at 17:30 on Wednesday 21st September 2016 at the Royal Institute of British Architects, 66 Portland Place, London W1B 1AD.

Ordinary Business:

1. To confirm the Minutes of the previous Meeting which was held on 26th August 2015
2. To confirm recently appointed Non-Executive Directors of IEMA
3. To receive and accept the Directors' Report and Accounts of the Institute for the financial year ending 31st December 2015
4. To re-appoint Streets LLP as Auditors of IEMA until the conclusion of the next general meeting at which accounts are laid
5. To authorise the Board to fix the remuneration of the Auditors

Special Business:

1. To consider a Special Resolution to change the Articles of Association to enable the reappointment of a Non-Executive Director for a third term of 3 years if so proposed by the Board at an Annual General meeting and if approved by Special Resolution at that meeting.

Specifically, that Article 17.3 of the Articles of Association of IEMA shall be amended to read:

"17.3 The Nomination Committee will recommend to the Board, Non-Executive Directors for an initial appointment of a term of 3 years (being the 36 month period commencing with effect from their appointment if appointed at an annual general meeting and if not the conclusion of the first annual general meeting following their appointment) and ending at the conclusion of the third annual general meeting following their appointment."

And that Article 17.4 of the Articles of Association of IEMA shall be amended to read:

"17.4 At the end of the Non-Executive Director's term (as described in article 17.3 above), the Non-Executive Director shall resign save that:

17.4.1. Any Non-Executive Director may seek reappointment to the Board for a second term of 3 years (as described in article 17.3 above), but at the end of any such second term, then subject to article 17.4.2, they shall cease to be eligible for reappointment to the Board for a period of 3 years.

17.4.2. The Board may propose to the annual general meeting at which an existing Non-Executive Director is due to resign following the conclusion of their second term, that, due to particular circumstances as determined by the Board, the relevant Non-Executive Director be reappointed for a third term (as described in article 17.3 above); if such proposal is approved by way of a Special Resolution of the members at such annual general meeting the relevant Non-Executive Director shall be reappointed for a third term of 3 years (as described in article 17.3 above) subject to 17.4.3, but in any event at the end of any such third term, then they shall cease to be eligible for reappointment to the Board for a period of 3 years.

17.4.3 The Board shall regularly review the particular circumstances in which article 17.4.2. has resulted in the reappointment of a Director for a third term of 3 years; if, at any point during the third term, the Board determines that the particular circumstances no longer apply the Board may invoke Clause 18.7 to remove the Director from office."

2. To consider a resolution to reappoint Diana Montgomery as a Non-Executive Director for a third term of 3 years subject to the provisions set out in the revised Articles of Association.

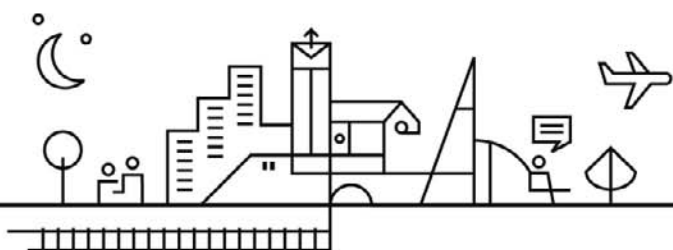
Martin Baxter, Company Secretary,
IEMA, City Office Park, Tritton Road, Lincoln, LN6 7AS, United Kingdom

Notes

Any Member will be entitled to speak on any matters arising out of the Directors' Report and Accounts, but no other business other than that given in the notice will be transacted at the meeting.

Every Member entitled to attend and vote at the meeting is entitled to appoint a proxy or proxies to attend and, on a poll, vote on his/ her behalf. A proxy must be a Member of IEMA. A template form for submitting proxy votes can be found on the IEMA Website www.iema.net/agm2016 and shows all the information that is required by IEMA in this circumstance. Completion and return of a form of proxy will not prevent a Member from attending and voting at the meeting in person should he/ she wish to do so. All proxies so appointed should be notified in writing, by no later than noon on Tuesday 20th September 2016, to the following name and address: Governance Officer, IEMA, City Office Park, Tritton Road, Lincoln, LN6 7AS, United Kingdom.

Go to www.iema.net/agm2016 for all documents and explanatory notes for the AGM.



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