

TRANSFORM

Environment ●
Economy ●
Society ●

FOR ENVIRONMENT AND SUSTAINABILITY PROFESSIONALS

October 2017

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CO₂unting carbon

Fixing land use accounting rules
to tackle national emission
reduction targets

PLUS

Comeback whales Richard Sabin on inspiring future generations
Get smart How technology can manage and monitor your utilities
Pushing boundaries Planning to secure UN sustainability goals

IEMA

Transforming the world
to sustainability

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TIM BALCON, CEO OF IEMA

A refreshing perspective

I regularly hear from our members that being an organisation's lone environment and sustainability professional is a tricky place to be. I'm sure you wouldn't expect IEMA's technical experts to encounter this, and largely they do benefit from working with colleagues who understand the nature of their work. However, we are at our best when we all keep learning about what you do every day.

Last month, I, along with around one third of the IEMA team, completed the new five-day IEMA Foundation Certificate in Environmental Management course. I wanted everyone in IEMA to take the Foundation Certificate. They're marketers, finance staff, sales managers, or (in my case) gas engineer turned CEO. Given that we all work at IEMA, my team were already knowledgeable about environment and sustainability principles. But being sympathetic to our purpose isn't enough; I want my team to contribute to the development of IEMA, not just leave it to the environment and sustainability professionals.

During the course, I enjoyed listening to my team debate varying perspectives and learning points. I realised quite early on that what they were learning about was really nudging the team to think differently. It gave them new knowledge plus permission to challenge and embrace new ideas. So as well as upskilling our team, and investing in our people, we've also changed mindsets and empowered people with knowledge and permission to use it.

Since the training, I've really noticed that team members are approaching projects differently, building in environment and sustainability at the design stage, and the language they previously knew as technical terminology has new relevance.

I'm also very glad to say everyone who took the course passed, and all are very proud of their new AIEMA status. The rest of my team will complete the training before the end of this year, and I can't wait to see how much of a difference this will make.

I am really interested to hear about ways in which you have engaged your colleagues to think more about sustainability. After all, we all learn from each other in this profession.



IEMA Transforming the world to sustainability

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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ROUNDUP

ENVIRONMENT &
SUSTAINABILITY
NEWS AND VIEWS

LOW-CARBON POWER

Wind energy prices hit record low

The price paid for electricity from offshore wind farms has dropped by more than 50% in under five years, according to new government figures.

This makes offshore wind the lowest cost option for large-scale, low-carbon power, with increases in turbine efficiency and blade sizes largely responsible.

Greenpeace said government support and home-grown innovation had placed the UK as the number one country for installed capacity, delivering thousands of jobs in the process.

"We are about to witness a revolution in UK energy," said Greenpeace UK's head of energy, Hannah Martin.

"The government needs to seize the opportunities of this great deal, which they themselves have helped to create."

The Department for Business, Energy and Industrial Strategy said the cost of government subsidies for new offshore wind projects had halved since 2015 as a result of its latest competitive auction for renewable technology contracts.

Subsequently, wind farms generating electricity from 2022-23 will be able to do so with subsidies as low as £57.5/MWh, compared with the £92.5/MWh subsidies secured by the Hinkley Point C nuclear plant.

There were 11 new energy projects that successfully secured contracts at the auction, and these are expected to generate enough electricity to power approximately 3.6 million homes.

The minister for energy and industry, Richard Harris, said: "The offshore wind sector alone will invest £17.5bn in the

UK up to 2021, and thousands of new jobs in British businesses will be created by these projects."

Wind turbine capacity has more than doubled since 2007, with the 8MW generation consisting of 260ft blades, spanning an area the size of the London Eye, and capable of powering a home for 24 hours with a single rotation.

This capacity is expected to double again by the mid-2020s, with the construction of wind farms now possible in just two to three years, minimising the risk of cost overruns, and ensuring quick adoption of technological advances.

"The spectacular fall in the costs of offshore wind shows that investing in renewable energy will benefit our consumers and our economy," said RenewableUK chief executive Hugh McNeal.

The government says this investment will help the UK to meet its climate targets as well as supporting jobs, with low-carbon businesses now having a combined turnover of £43bn, employing 234,000 people.





SHORTCUTS

Insurance protection gap

The frequency of severe weather events is increasing, and, with almost 50% of economic losses sustained by natural disasters unprotected last year in the US, the country's recent hurricanes have bought the insurance protection gap under the spotlight.

Estimates by AIR Worldwide suggest the insured losses incurred by Hurricane Irma could be as high as \$32bn-\$50bn, while the exposure value along the gulf coast up to Tampa is estimated at \$1trn. The industry is still assessing the final bill of Hurricane Harvey, which could be \$70bn, according to the chief executive of Hiscox, compared with the \$82bn of insured losses Hurricane Katrina inflicted in 2005.

"Hurricane Harvey had devastating consequences, and many losses are uninsured, leaving the government, and therefore taxpayers, to pick up most of the bill," Eric Andersen, CEO at reinsurance firm Aon Benfield, said. "The frequency of severe weather-related losses is increasing, and there needs to be a significant step-up in the efforts made to address the protection gap evident globally."



Irma

Strength: Category 5 storm, winds up to 160mph

Death toll: US: to date 36, Caribbean:

to date 38, but expected to rise.

Destruction: Quarter of houses in Florida Keys said to be destroyed, with half the population without power. Caribbean islands reporting up to 90% of structures damaged, with thousands left homeless.



Harvey

Strength: Category 4 storm, winds up to 155mph

Death toll: 82
Destruction:

Approximately 94,000 homes damaged, around one million cars wrecked, and an estimated 450,000 people in need of emergency assistance.

BUSINESS

Most influential firms opposing climate policy

Some 35 of the world's 50 most influential companies shaping climate and energy policy are actively lobbying against decarbonisation plans, a new report from InfluenceMap reveals.

These include organisations in the fossil fuel value chain, heavy energy users, and electric utilities with vast amounts of coal generating capacity.

The report measures firms' stance on climate policy, lobbying activity and overall economic clout to determine their 'Carbon Policy Footprint', rather than just greenhouse gas emissions. Koch Industries, Southern Company and ExxonMobil were found to be the worst offenders, while Apple, Unilever and IKEA were identified as the best performers.

Although just 15 of the top 50 companies are pushing for ambitious

green policy agendas, the research shows that the amount of pro-climate companies has expanded noticeably in the past two years.

This trend is expected to continue as more large corporations around the world try to influence government policy in a way that helps them meet their own decarbonisation goals effectively.

"The data shows the climate policy agenda, in terms of corporate influencing, is being driven by a small number of massive global corporations," InfluenceMap's executive director, Dylan Tanner, said.

"It also shows a group of powerful of companies in the tech, consumer goods and utilities sectors increasingly pushing for policy to implement the Paris Climate Agreement."

CARBON REDUCTION

UK decarbonising at fastest rate in G20

The UK economy's carbon intensity fell by 7.7% last year – almost three times the global average of 2.6% and greater than any other country in the G20.

This was largely owing to a decline in coal consumption, which halved last year, improving energy efficiency and moderate economic growth, according to a report by PwC.

It also shows the UK leads the G20 in having the highest decarbonisation rate since 2000, falling by 3.7% each year – significantly better than the average reductions needed by countries to meet their Paris Climate Agreement targets.

PwC's director of climate change, Jonathan Grant, said: "The UK led the world in the industrial revolution and is

now leading the low-carbon revolution."

Britain has experienced a 13% reduction in total energy consumption this century, owing to a combination of efficiency improvements and a structural shift away from heavy industry. In this time, renewable energy has more than tripled, the economy has grown by more than 31%, while coal now represents just 7% of the country's total energy consumption, down from 23% in 2012.

The minister of state for climate change and industry, Claire Perry, said: "This report highlights the results of our efforts to phase out dirty coal power while investing in renewable technologies."

WORKING TOGETHER

Leading in knowledge, experience and influence

IEMA awards FIEMA status to the following individuals and congratulates them on their success

IEMA has revealed the names of almost 30 new Fellows who have achieved FIEMA status via the new nominations route to Fellow membership, which was activated in July. This new cohort now joins our existing network of influential Fellows – the world's foremost community of leaders and advocates for sustainable business.

As the ultimate destination on the IEMA membership journey, Fellow is reserved for those who demonstrate significant knowledge, experience, influence and leadership in sustainability. Now, for the first time, future Fellows can be nominated by peers as well as applying direct.

In July, IEMA nominated a first list of achievers, leaders and innovators, which was considered by a specially created Fellows Appointments Committee. Many were full members who were recognised as being ready for Fellowship, plus a small number of business and sustainability leaders from outside our membership.

Tim Balcon, CEO of IEMA, said he is excited to welcome this new generation of Fellow members, and see them take up their positions as ambassadors for sustainability. "The long list of contributions, achievements and innovations generated by this group is beyond impressive – it's staggering. I'm looking forward to working with our new and long-serving Fellows to channel their influence into the membership and the profession."

A further group of members and other leaders was nominated for Fellow membership in August, and they will be considered by the Fellows Appointments Committee later this month.

➤ **Find out more about Fellow membership and how to apply or nominate at www.iema.net/membership/fellow-membership/**

➤ **List correct as of 11 September. Further appointments will be announced soon**



MARTIN BAXTER

IEMA calls for scrutiny

As MPs begin to debate the landmark EU (Withdrawal) Bill, IEMA and other professional bodies have called for meaningful parliamentary scrutiny of environmental policies and laws.

We support the government's commitment to "be the first generation to leave the environment in a better state than it inherited" and welcome environment secretary Michael Gove's ambition for a "green Brexit". However, we are concerned the Bill fails to adequately provide for parliamentary scrutiny of the raft of changes required to make environmental laws function. We are similarly concerned that it will not ensure that the fundamental principles which underpin decades of environmental improvement are protected, or provide a meaningful framework for independent scrutiny of future government performance on the environment. It is also important that devolved administrations should not be constrained from pursuing ambitious environmental policies and targets of their own as a result of the powers the Bill creates.

Another concern relates to the status of international environmental agreements that the UK and EU are parties to, as in a recent report from the UK Environmental Law Association. Wording in the Withdrawal Bill is opaque on whether all of these agreements will be rolled over. This is partly owing to the complexity of their implementation, arising from the three ways in which the UK as an EU member state becomes party to an international agreement as they can be ratified directly by the UK or the EU, or through joint UK/EU ratification. It is vital that government clarifies its position on international agreements and makes appropriate provision for full UK ratification and implementation. This is evidenced by a recent IEMA survey, where members were clear the UK must implement all international environmental agreements ratified by the UK and EU.

MARTIN BAXTER chief policy adviser at IEMA @mbaxteriema

MEMBERSHIP

Update your details

Autumn is a good time to check your membership record is up to date. When IEMA has details of your current role and employer, contact information and mailing preferences, it means you get the right updates at the right time. It also ensures your renewal prompts reach you first time, without delay.

Take five minutes during October to log into the MyIEMA section of iema.net and check your details. If anything needs updating, it's quick, easy and instant to make any changes.



CALL FOR CANDIDATES

Join the Professional Standards Committee

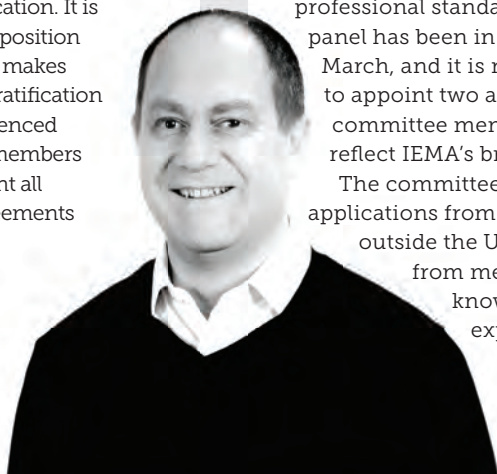
Earlier this year, IEMA set out to refresh its Professional Standards Committee to ensure continued safeguarding of professional standards. The new panel has been in place since March, and it is now looking to appoint two additional committee members to fully reflect IEMA's broad scope.

The committee is seeking applications from members outside the UK, as well as from members with knowledge and experience

of social sustainability principles and any members from an awarding body and/or professional assessment background.

► **If you are interested in joining the committee and can demonstrate that you meet the role requirements, please contact IEMA's head of professional standards Claire Kirk at c.kirk@iema.net by 16 October.**

A candidate pack is available from www.iema.net/about-us/vacancies



IEMA GROUPS:

GESA IA IA: GCHIA FUTURES REGIONS

NETWORKS



GESA

GESA springs to life

On the 25 May, there was a formal launch of the new Specialist Network for Global Environment and Social Assessment practitioners: GESA. Organised by the GESA National Steering Group, and hosted at WSP's offices in Chancery Lane, London, the session marked the first seminar in this exciting technical area.

The session was well attended, with a full house of guests including members from consultancy, project developers and investors. The session was facilitated by Josh Fothergill, while Debbie Cousins of the EBRD, the chair of GESA, made the initial address. This was followed by a panel of guest speakers, including Hannah Mills from Mott MacDonald, Rob Adamczyk and Rachelle Marburg from the EBRD, Max Griffin from UK Export Finance, Alastair Billington from ERM, Neal Barker from WSP and Ben Cave from BCA.

The speakers covered a wide variety of topics, from human rights, biodiversity and health appraisal, land acquisition and resettlement best practice, through to a funder's perspective on international environment and social management, alongside case studies on GESA in practice. The audience were engaged, providing insight into GESA in practice and the key expectations on areas of future focus.

Delegates were asked about their perceptions of challenges and opportunities in the area, and suggestions for the focus of the GESA network. Key theme areas included commentary about the ESIA process, post-investment environmental and social monitoring. GESA welcomes experienced practitioners to support professional development to the next generation through a programme of activities – do get involved!

IEMA FUTURES

What would your sustainable city look like?

More than half of the world's population now live in cities, and this will rise to two-thirds by 2050. How will cities – their services, infrastructure, governance, natural capital – meet the demands of so many? The stakes are high, and we must take the time right now to take a look at how cities need to adapt.

IEMA Futures, the national IEMA network for young environment and sustainability change agents, is hosting a Sustainable Cities event at Leeds University, open to all young people interested in building a sustainable future.

Speakers include: **Andy Gouldson**, professor of environmental policy, Leeds University, and **Sandra Norval**, managing director, Catalicity.

When: 12 October 2017, 5pm-7pm

Where: School of Earth and Environment, The University of Leeds, Leeds LS2 9JT

➤ **Book your place: iema.net/events**

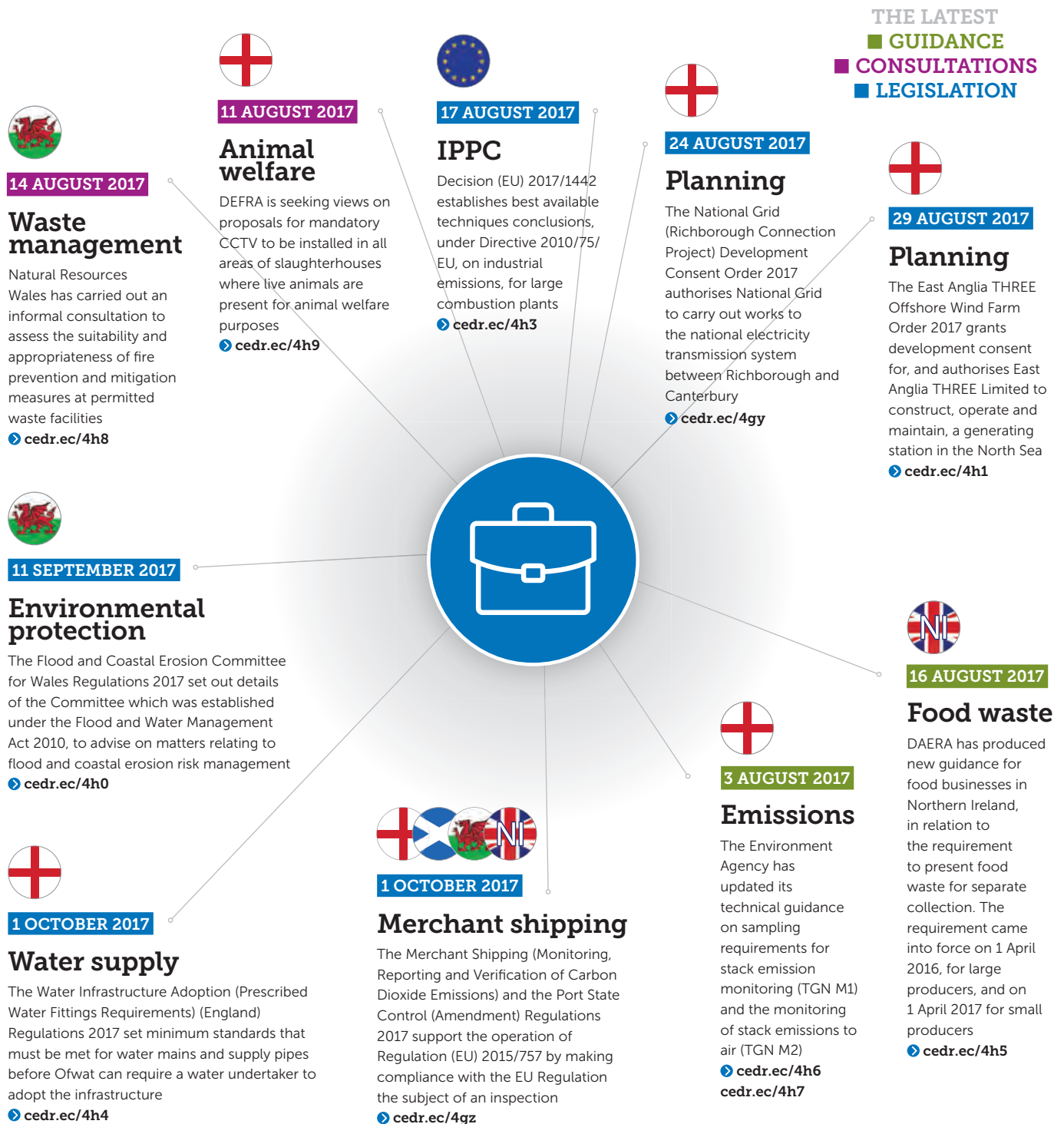


WELCOME TO NETWORK NEWS

The networks are all about members. They are a place where members can show their passion and can work together to discuss, debate, and influence decisions. From regional issues to global concerns, the pages of this magazine are an opportunity to use your voice and share your views. Each month the networks will provide an update on their activities.

➤ For further information, visit: www.iema.net/engage/networks/

NEW REGULATIONS



INCOURT

POLLUTION

South West Water fined £142,000 for environmental offences

Following a trend of water utilities suffering large penalties, South West Water Ltd has been handed a £142,000 fine for breaching its environmental permits.

The offences were committed across two sites in Praze-an-Beeble, Cornwall, and Denbury, Devon, where the company allowed inadequately treated effluent to enter nearby watercourses.

Strict limits are set on effluent discharged from sewage treatment works to ensure they don't adversely affect receiving watercourses. The provisions of the permit in Denbury allowed for no more than two exceedances in any 12 months. Four samples were taken in this time period and found to be breaching limits.

In Praze-an-Beeble, the amount of ammonia exceeded the allowed amount on occasions in April, May and August 2016. Furthermore, the

Environment Agency also found that the site was not maintained to a suitable standard.

Mark Pilcher, of the Environment Agency, said: "Water companies must ensure effluent is treated to a sufficiently high standard to protect the environment. Regular maintenance of sewage treatment works helps with the early detection of faults and allows repairs to be made

in good time before treatment deteriorates to the point where a site breaches its permit."

South West Water was ordered to pay a total of £142,534 after pleading guilty to three charges of breaching the Environmental Permitting Regulations 2010.

The water company, speaking through its spokesperson, accepted responsibility, apologised for the offences and informed the media of investments made since the incidences to improve the works and further investments to refurbish the sites.

"Regular maintenance helps with early detection"

Strict limits are set on effluent from sewage treatment works



OTHER NEWS

EA introduces body cameras

The Environment Agency (EA) has launched a six-month trial in the North East to equip officers with body-worn cameras.

The first trial of its kind within the organisation aims to improve the safety of its enforcement officers, who are often exposed to anti-social behaviour, threats and assaults when inspecting poorly performing sites, illegal and regulated waste sites and during incident response. The scheme comes after an EA employee, ex-police officer Paul Whitehill, was threatened on an illegal waste site during a routine visit. He said that the police force works on a daily basis with body cameras, which are proven to be effective and have prevented threatening situations from escalating.

EA waste enforcement officers encounter aggressive behaviour on a regular basis. Since 2001, they have successfully prosecuted 59 cases of obstruction, hostility or threatening behaviour, 22 of which were in the North East.

Rachael Caldwell from EA's Waste and Enforcement Department said: "The safety of our staff is paramount. They are well trained in dealing with hostile situations, and we take any threat against them very seriously. But our preference is to prevent hostility in the first place."

CASE LAW

Environmental information appeal rejected

An appeal against the decision of the Upper Tribunal disputing the extent of "environmental information" in the Environmental Information Regulations 2004 (EIR) has been dismissed, in the case of Department for Business, Energy and Industrial Strategy v Information Commissioner and another.

Mr Alex Henney requested information from, what was at the time, the Department for

Energy and Climate Change in a Project Assessment Review about the communications and data component of the UK government's Smart Meter Programme as "environmental information". The Upper Tribunal held that the information requested was "environmental information".

The argument between the parties in this appeal was about when and whether information on a measure, which does not in itself

affect the state of the elements of the environment or the factors referred to specifically in the EIR, can be information "on" another measure that does.

Lord Justice Beatson made reference to Directive 2003/4/EC on public access to environmental information, under which the EIR was made. This sets out the requirement that citizens have access to information to enable them to participate

in environmental decision-making more effectively, and the contribution of access to a greater awareness of environmental matters and, eventually, to a better environment.

It was concluded that among other things the "very broad language" used in Directive 2003/4/EC indicated that the information in question would be "environmental information" under the EIR, and the appeal was dismissed.

POLLUTION

The problem with plastic

The quantity of debris in oceans worldwide is increasing, with more than eight million metric tonnes of plastic estimated to enter our oceans each year. Plastic litter is believed to have directly affected some 267 species worldwide, including 86% of all sea turtle species, 44% of all seabird species and 43% of all marine mammals.

In addition, microplastics and toxic chemicals released over years of decay in the sea are ingested by various types of marine life that subsequently enter the food chain, and so directly affect human health.

With only a third of UK consumers' plastic packaging recycled, significantly less than other countries, there are now increased efforts to raise public awareness.

PHOTOGRAPHY: GETTY







IEMA's head of training and development, **Emma Bellingham**, tells *Transform* more about the environmental management courses on offer, what they entail, and who should apply

Q How new are these courses?

A The Certificate in Environmental Management is a brand-new course, and the foundation certificate was launched in January this year. After having a number of people go through the foundation course, we listened to their feedback, reviewed and refreshed the content, and believe it is now ready for market and at the right level.

Q Who should apply?

A There are a variety of different people who could go on the foundation course. It is aimed at people who are interested in sustainability and environmental management. They might have been given some responsibility in that area, but are just starting out; it is their first step. The certificate would suit people who have been working in their field for a few years and are in operational roles. It involves looking at case studies and seeing how people can really apply their knowledge in the workplace.

Q How did you design them?

A All our courses are built on our skills map framework. We have spoken to employers and universities to build it, so we know everything that goes on the course is what employers want, and we are covering the breadth of the environmental and sustainability agenda.

Q What will having one of these qualifications tell employers?

A With the foundation certificate, employers will know the candidate

has good basic knowledge and skills of environment management systems. The Certificate in Environmental Management guarantees excellent, in-depth knowledge of environment management systems. The candidate will have been assessed on how to apply that, so will have practical knowledge as well.

Q How are the courses delivered?

A We have a number of different providers – some offer online e-learning; some deliver it face-to-face; and some a combination. It is very flexible. We have training partners all over the UK that can deliver face-to-face. But with the Certificate in Environmental Management, we encourage learners to take a blended approach, doing some online, as three weeks is obviously quite a long time to be sat in a classroom. Learners can also choose to spread the course over a six-to-nine-month period, doing one module every three months.

Q Are the courses only for people in the UK?

A These are global qualifications, and we have had some international candidates who have successfully completed the courses and exam – delivery can be via e-learning or face-to-face if they want it. We have also recently sent our foundation course to be reviewed in the Middle East, so we can get more feedback from an international stance and perspective. 

➤ Find out more at iema.net/training



WHY IS THIS COURSE FOR YOU?

IEMA FOUNDATION CERTIFICATE IN ENVIRONMENTAL MANAGEMENT

For learners:

- A globally recognised qualification key to professional environmental knowledge and practice
- Learn about the 'bigger picture' environmental issues and how they link to challenges organisations face
- Get practical guidance, tips and tools to make efficiencies and improvements.

For employers:

- Support staff to contribute to corporate environmental targets, save money and build a strong reputation
- Staff are equipped to understand compliance requirements and carry out the right diligence checks.

Facts:

- Benchmarked at Regulated Qualifications Framework (RQF) Level 3
- Taught over five days (40 hours)
- Results in Associate membership of IEMA and the recognised AIEMA suffix.

IEMA CERTIFICATE IN ENVIRONMENTAL MANAGEMENT

For learners:

- Boost knowledge and practise how to drive high-performance environmental management
- Cover a range of topics, from fundamental principles to environmental management systems such as ISO 14001
- Leave fully enabled to develop, implement and interpret business improvement programmes.

For employers:

- See immediate and long-term business benefits by empowering your staff to cut costs and manage risk
- Take your business beyond compliance – engage with regulators and understand the agenda.

Facts:

- Benchmarked at RQF Level 5
- Taught over 15 days (120 hours)
- Results in Practitioner membership of IEMA and the in-demand PIEMA suffix.

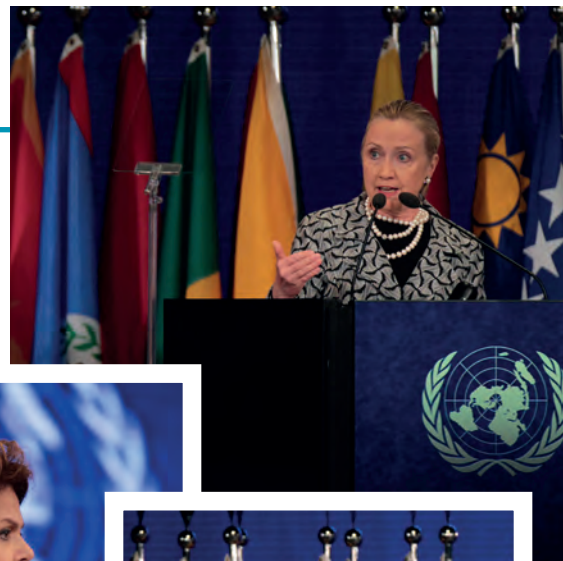
Twenty-five years ago, the momentous 1992 United Nations Conference on Environment and Development – popularly known as the Rio Earth Summit – took place. The conference was a watershed moment for global acceptance that an international, strategic approach to environmental governance was needed. Also in 1992, the British Standards Institution (BSI) launched the world's first environmental management standard.

Known as BS 7750 Specification for Environmental Management Systems, the original standard had a simple but novel aim: to provide a template for organisations of all shapes and sizes to improve their environmental performance. The success of this pioneering British Standard led to the creation of the global standard ISO 14001 in 1996, exporting the principles outlined in the original standard to a global audience.

The journey of standards development is always one of continual adaptation. In 2015, ISO 14001 was thoroughly revised to bring it up to date with current thinking that an environmental management system standard must be incorporated into an organisation's wider management structure: in other words, environmental leadership and objectives should be at the heart of its overall strategy and objectives.

ISO 14001 continues to help organisations to better identify – and reduce or remove – their environmental impacts and improve their overall environmental performance by looking at processes across the whole operation. A root-and-branch approach enables decision-makers to identify gaps in effectiveness, improving efficiency in day-to-day operations – a win-win for both the environment and the bottom line.

Helping organisations meet regulatory requirements, and assisting with the development and implementation of routine improvements to productivity, continues to form the basis of ISO 14001. When a company benefits from improved environmental policies and efficiencies, improvements are passed onto the customer and the wider public. The international standard acknowledges that no two organisations are identical. An environmental management standard should be relevant and accessible for all.



Standard bearer

A quarter of a century after the British Standards Institution launched the world's first environmental management standard, the now global ISO 14001 remains a bedrock of common-sense guidance.

David Fatscher reports

ISO 14001 also helps register the needs of interested parties and the 'context' in which the organisation operates.

Reputational management remains an ever-growing concern, and ISO 14001 provides a template for maximising environmental management – as well as mitigating any risks. The economic and environmental benefits of widespread adoption of an environmental management standard are unequivocal: reduced costs, improved productivity and resilience.

More than 17,000 organisations in the UK and 340,000 worldwide are now certified to ISO 14001. The key to its enduring success is its suitability for operations of all shapes and sizes, irrespective of sector, and its relevance to both products and services. From small stationery suppliers to international vehicle manufacturers, universities to recycling centres, ISO 14001 is a bedrock of common-sense guidance.

Twenty-five years ago, the UK led the world in developing an environmental management standard and a proven and powerful tool for business improvement. Here's to the next 25 years of enabling organisations to grow more sustainably.

DAVID FATSCHER is head of market development for sustainability at BSI



Hope springs eternal

The Natural History Museum's curator of marine mammals, **Richard Sabin**, tells Chris Seekings about the institution's latest star attraction and his optimism that it will inspire future generations to conserve our natural world



In times of heightened interest in climate change and sustainability, the Natural History Museum thought it appropriate to make a statement on its own commitment to tackling the challenges of today.

The result? A stunning 25.2 metre real blue whale skeleton taking centre stage in the museum's Hintze Hall, suspended from the ceiling to allow visitors to gaze at and walk beneath the largest creature ever to have lived.

This might not seem immediately relevant to the challenges we currently face, but the blue whale was hunted to the brink of extinction in the 20th century and

was one of the first species that humans decided to save on a global scale.

As such, the skeleton was named 'Hope' – a symbol of humanity's power to shape a sustainable future – with the museum's marine mammals curator and whale expert Richard Sabin instrumental in selecting the specimen and overseeing its successful unveiling. So who better to interview about the museum's role in conservation?

A rousing reception

Speaking to Sabin also holds personal significance for me, as my grandfather studied whales and dolphins while working at the Natural History Museum for 40 years.

The day I catch up with Sabin, during what has been a busy media campaign, marks the 25th anniversary of the curator joining the museum. After expressing my gratitude to him, and revealing how happy my grandfather would have been to see the skeleton taking centre stage, it was also nice to hear that his books and research are still referred to today.

I begin the interview by asking what the public reaction has been like.

"Hope has been incredibly well received," he says. "It is amazing how people react when they see this enormous skeleton above them with such dynamism and fluidity in its posture."





Some critics were sceptical about Hope replacing Dippy, the much-loved *Diplodocus* dinosaur skeleton. But Sabin believes it fits perfectly with the brief to encourage discussion of biodiversity, sustainability and evolution. "Those critics have been silenced," he says. "The public reaction has been superb, and we have had praise from NGOs, museums, scientists and research colleagues from around the world saying we have done the right thing and made the right choice."

Sabin explains how he wanted people to be able to appreciate the sheer size of these mammals, and to be reminded that they are still out there living in our oceans. "However, they have a very marginal position in terms of their numbers," he says, "even though we have managed to protect them from commercial exploitation and have increased numbers."

Sabin is referring to the International Whaling Commission's decision to enforce a ban on commercial whaling in the 1980s, after the blue whale population fell from around 250,000 in the 1800s, to as few as 400 in 1966. There are now approximately 20,000 blue whales alive today, with the moratorium responsible for bringing numbers up to the levels necessary for a viable population.

"That is an example of how international collaboration and co-operation can be

"It's an example of how international collaboration and cooperation can be used to conserve marine life"

used to conserve marine life," Sabin says. "With Hope, we wanted a model that would help people recognise that, when we work together internationally and put these conservation measures in place, animals and ecosystems can recover."

Sabin goes on to explain how other issues have now taken prominence, such as ocean acidification, the effects of climate change, marine pollutants like plastics in the ocean and anthropogenic noise. "These things are in the public mindset now, and are being reported much more directly and frequently than before, which is good, but as to what we are doing about them – well it has been a kind of patchy response."

Polluting plastics

Earlier this year, scientists found more than 30 plastic bags and other non-biodegradable waste inside a Cuvier's beaked whale off the coast of Norway. Just months later, experts removed four kilos of plastic from an animal of the same species after it washed up on the Isle of Skye. Around the same time, an international

study revealed that eight million metric tonnes of plastic entered the ocean in 2010; an issue that Sabin agrees must be tackled urgently.

"We can't keep using the ocean as a dumping ground, deliberately or passively," he says. "We have to be aware of how our actions, day-to-day living and agricultural effluence can result in plastic entering water courses, which eventually end up in the ocean."

The Department for Environment, Food & Rural Affairs said last year that England's plastic bag usage dropped 85% after the government introduced a 5p charge at retailers to help remove litter and protect wildlife. I tell Sabin of further plans to limit the UK's pollution levels, with analysis by the Green Alliance showing how the introduction of a deposit return scheme for beverage containers could cut the amount of plastic litter entering the oceans by a third.

"That is a superb example of taking an issue and turning it into something that can be quantified and broadly understood by the public," he tells me. "I think it is

fantastic how countries like the UK have taken the issue of supermarket carrier bags, brought in a charge, and made it into an issue that people really respond to."

It is this sort of response that gives Sabin optimism for the future, saying that the internet and TV programmes have greatly increased the amount of information available to people. "Generally speaking, we are dealing with a very educated – or, at least, better informed – population than when I was a child. The fact that these issues are being discussed around the water cooler is great."

Although Sabin admits these are small steps, he argues that it is vital everybody takes responsibility in tackling global problems. "It might seem that these issues are so large, so huge, that people wonder how changing what they do can make a difference," he continues. "We need to help them feel that they can make a difference, because often they can."

The great unknown

Sabin agrees that the effects of climate change are having just as much, if not more of an impact on our oceans as they are on land, and encourages people to limit their carbon emissions. Human activity is thought to have had a directly negative impact on marine life, with a recent study revealing that the hunting and killing of larger species in the oceans has resulted in an "unprecedented extinction of sealife, unlike any in the fossil record".

However, with oceans taking up 70% of the earth, and 90% remaining unexplored, Sabin acknowledges that it is not clear how human actions will affect our waters' ecosystems in years to come.

"It is such a difficult environment in which to study organisms," he explains. "You really have to go to great extremes to gather the data you need. It takes a long time to get that information and put it into a broader context. And, at this stage, we do not fully comprehend what the effects of our impact will be."

So Sabin is keen to highlight how the work of museums will inform the policy decisions of future generations, stressing the importance of forming a time series. Scientists from all over the world visit the

Natural History Museum to see its research collection of some 4,000 cetaceans, of which the earliest specimens date back to the 18th century. "With the collections we hold, data collected from marine mammals in the wild today can be compared with data from those same species, from the same locations, but going back in time," he explains. "Research colleagues are then able to publish critical data, which is submitted to conservation bodies and governments to help them inform decisions about the natural world."

Sabin went on to outline the amount of work done at the Natural History Museum, where hundreds of scientists work behind the scenes on important topical issues, trying to position the institution as a "natural history museum of the future".

A new Hope

He tells me how important it is for the scientific community to continue the work of others, highlighting how my grandfather's research has been an important reference for him. "Building on the work of our predecessors is the way it goes, and, hopefully, at the end of my

career, someone will build on the work I have done," he says.

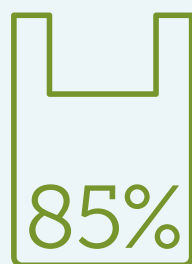
It is these younger generations that Hope is intended to inspire, with Sabin admitting that he felt a huge amount of responsibility overseeing the months of work that went into presenting the skeleton. The unveiling took him back to his childhood years.

"It is really difficult to describe the amount of emotion that I felt," he says. "I was thinking back to my 10-year-old self, when I first visited the museum on a school trip in 1976, seeing the skeleton in its original position in the Whale Hall. I was stunned and amazed at the size of this thing, and wanted to know more."

This was a life-changing moment for Sabin, who hopes that others will have a similar experience, potentially inspiring the next generation of scientists to help conserve the natural world.

"It is about really capturing the minds and imaginations of young visitors, inspiring them to get involved in science, and making people realise that science is for everyone, that it is accessible, and that we can all take part." 

KEEPING COUNT



The amount that England's plastic bag usage dropped after the introduction of a 5p charge



million metric tonnes of plastic entered the ocean in 2010

20,000



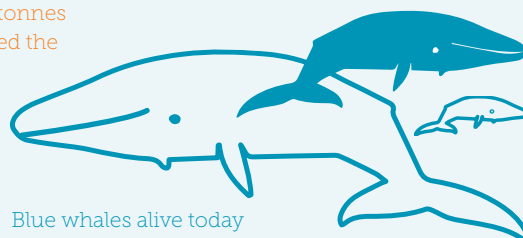
of the world's oceans remaining unexplored



4,000



marine mammals make up the Natural History Museum's collection



Blue whales alive today

National emission reduction targets should cover all human-induced emissions from a country – but they do not. Some emissions are excluded by so-called carbon accounting rules, notably those from agriculture, forestry and other land use (AFOLU). While there are historical reasons for this anomaly, it really must stop. Countries should account comprehensively for what the atmosphere sees from land use if we are to make best use of this key sector in tackling climate change.

Currently, there are opportunities to fix the land use accounting rules. Globally, all types of accounting rules are being negotiated as part of the Paris Agreement's rule book, due to be agreed at the end of 2018. In the EU, land use accounting is part of the 2030 climate and energy package, with a key decision due to be made by the European Council this October.

Before going into the details and evolution of accounting rules, it is worth emphasising the vital part that AFOLU can and must play in reaching the Paris Agreement's goal of keeping global temperature rise to 1.5°C. Land-based vegetation is one of only two natural systems that actively remove carbon dioxide from the atmosphere, together with the oceans. We will need to conserve and enhance natural sinks and reservoirs of greenhouse gases, such as forests, if we are to get anywhere near the 1.5°C goal. Yet we are far from attaining net removals of greenhouse gases at present. The UN's climate science body, the Intergovernmental Panel on Climate Change (IPCC), estimates that 24% of all human-induced emissions come from AFOLU; their main sources are shown in the bar chart (opposite).

There is clearly a long way to go to attain net removals of carbon dioxide. Hiding emissions behind faulty accountancy rules is not the way to do it.

The international debate about how to include emissions and removals from land use in carbon reduction targets has a long history. It began in the run-up to the Kyoto Protocol in 1997. At that time, the subject was called land use, land use change

and forestry (LULUCF) and there was a lot of discussion about whether to include it in the protocol targets at all.

Quantification of most emissions outside heavy industry and power stations was then pretty unreliable, and uncertainties were often large. Estimating emissions from factory chimneys or vehicle tail pipes was much easier than gauging emissions and removals from large diffuse areas, such as agriculture or forestry. Many countries proposed that emissions from unreliable sources should be excluded from national targets, arguing that only those emissions that could be reliably estimated should be included. They also maintained that the imperative in tackling climate change was to cut emissions from energy first, because that was by far the largest source of emissions, and to perhaps include land use later. In addition, there was widespread concern about including agriculture in targets because many felt that it might hinder food security. Some still use these arguments today.

Fair measurement

After four years of tortuous negotiations, LULUCF accounting rules were agreed in Marrakesh in 2001. They applied only to developed countries in the Kyoto Protocol and they were complicated. On the final evening, I asked a minister how things were going as he emerged from the negotiating room. "I have no idea," he said. "It is like fighting in a fog and the civil servants have all of the weapons." Many others felt the same.

The most harmful features of the Kyoto land use rules were that accounting was voluntary both for agricultural activities and for forest management and, in addition, the term 'forest management' was poorly defined. The reason why accounting was voluntary rather than mandatory had its origins in the fact that the uncertainties on emission estimates were high in almost all LULUCF categories. However, because countries did not have to account, there was no incentive to improve reliability, and so data quality usually remained poor. Worse, voluntary accounting tempted countries to account for things

John Lanchbery believes there are real opportunities to fix the land use accounting rules in tackling national emission reduction targets

CO₂counting carbon

that gave them credits (emission reductions or removals) and not things that gave them debits (emission increases). By not defining forest management more precisely, it was left open to countries to choose what a 'managed forest' was. So Russia, with by far the largest forest in the world, decided that it was all managed, which it clearly is not. Other countries did the same.

The Kyoto LULUCF rules were revisited in 2008 with the aim of improving them for the second period of the protocol starting in 2013. After another four-year negotiating period, another complex set of rules emerged. Accounting remained optional for agricultural activities but, critically, accounting for forest management (by far the largest category) was made mandatory. This should have been a big step forward, but it was undermined by a new mechanism called a projected reference level.

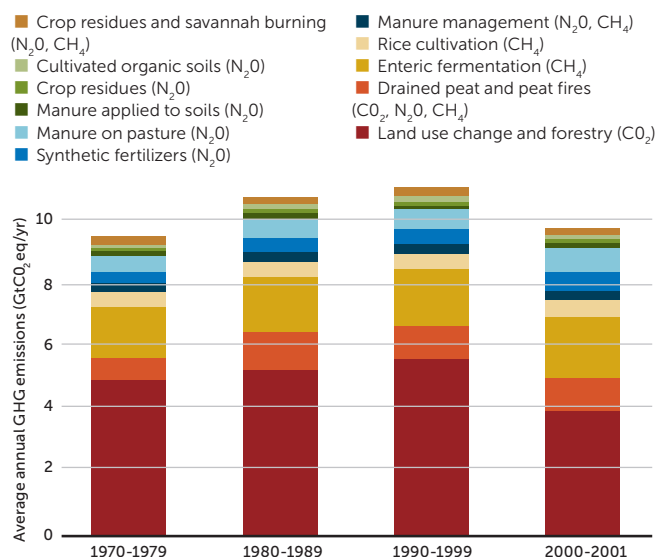
For all other emissions, countries account against a so-called base year, traditionally 1990; so a target is often set as an emission reduction from 1990. In forest management, a 'business as usual projection' is made, which includes policy assumptions like increased logging. Anything below the reference level is not accounted for, which means that countries can, and do, legally hide their emissions from forestry.

If this reasoning was applied to the energy sector, then a country that had a policy to build 100 new, huge, coal-fired power stations would not have to account for any of its emissions. Dismayed by this trick, Brazil (backed by all other developing countries) capped the amount of removals that developed countries could claim at 3% of their total emissions.

Although the EU played an important part in negotiating the UN accounting rules for land use, it made them better within the EU by agreeing that accounting for all agricultural activities should be mandatory rather than voluntary after 2020. However, it did not include LULUCF in its 2020 climate and energy package. It has now decided to include a limited amount of LULUCF in the so-called Effort Sharing Regulation, which is part of its 2030 climate and energy package. So far, the European Parliament has voted to limit the amount of LULUCF credits to 28 million tonnes per year, which is quite small in the context of the overall package.

Seeing the wood for the trees

A key decision is likely to be made by the European Council of Ministers in October this year, when member states will try to agree on a way forward on forest management accounting. Eight countries, including Germany, Italy and the UK, have



Climate Change 2014, Mitigation, Agriculture, Forestry and Other Land Use (AFOLU), p820, IPCC, 2014

proposed that policy assumptions should not be included in reference levels and that "forest reference levels of member states must be based on historic and verifiable data". If this is agreed it would be a huge step forwards. Unfortunately, other countries with large forest areas, including Finland, Sweden and Austria, want to carry on as before.

Work on the Paris Agreement's accountancy rules only began last May in Bonn. Unlike the Kyoto rules, these will apply to all countries, not just developed ones, and so will probably be 'guidance' rather than legally binding rules. Nevertheless, there does seem to be a desire for common guidance, if only to be able to compare national efforts. Given their previous rejection of business-as-usual reference levels for forest management, it seems likely that the

developing countries will push for something more honest. One way forward, at least for forests, would be to use a historical reference level. This would employ a base period of several years, to iron out annual variability. It has the huge advantage that it is already used by many developing countries for forest projects. 

JOHN LANCHBERRY is principal climate change adviser at RSPB

Local solutions to GLOBAL problems

Pushing the boundaries of geotechnical science and practice to secure the UN's sustainability goals, says **Changiz Roohnavaz**

Environmentalists would not usually associate oil and gas exploration with sustainability, but, given that the UK and other European countries are increasingly relying on importing supplies, we need to ensure production is carried out in ways that minimise risks to the environment. In fact, we aim to go further and use projects to help deliver the social sustainability agenda.

According to the International Energy Agency, demand for gas will grow by 1.6% a year over the next five years, with consumption reaching almost 4,000 billion cubic metres (bcm) by 2022, up from 3,630 bcm in 2016. In its 2016 World Energy Outlook, the agency forecast that if signatory countries to the Paris Climate Agreement upheld their pledges, gas demand by 2040 would be 50% higher. The UK consumed 67 bcm in 2015, with the fuel used in 80% of homes, mainly for heat. With supplies from the North and Irish seas depleting fast, the country is importing more. It is a similar picture in the rest of western Europe.

To meet growing demand, the oil

and gas industry faces the constant challenge of locating new resources, often in remote corners of the developing world. Firms operate under fixed-period concessions, which creates huge time pressures as revenue only starts being generated when production gets under way. This puts exploration on the critical path. But host countries are now challenging oil and gas firms to apply a more sustainable approach.

Innovative and unorthodox

Projects in central Asia and the Middle East demonstrate what can be achieved when sustainability issues are considered early on and could provide a model to achieve some UN sustainability goals.

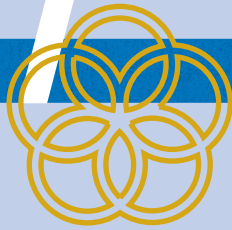
In both cases, large onshore processing and exploration facilities had to be established. Typically, these comprise large heavily loaded platforms, extensive earthwork structures, internal and external roads and drainage systems, office and accommodation units. Construction tends to use large volumes of imported aggregates, steel and cement. The projects in the Middle East were in remote locations and hard

to access. The easiest to reach was 30km across virgin desert from the nearest highway and other sites were more than 70km into the wilderness. The challenge of hauling materials was enormous; thousands of lorry journeys covering hundreds of kilometres, resulting in huge costs and carbon emissions.

Establishing each site resulted in large volumes of excavated soil and rock, which is normally discarded. But we set out to understand the engineering properties of site-won materials that enabled reuse in earthwork structures. At each site, our approach enabled the reuse of approximately 100,000 cu m of material. This eliminated the need to import an equivalent volume of aggregate and transport it in lorries across the desert. The environmental benefits of reusing site-won materials were obvious in terms of fewer lorry movements (10,000 per site), but it also enabled faster construction – reducing the time taken to build each exploration platform by 25%.

An innovative engineering solution also saved on importing and transporting materials to a site in central Asia, located south of the River Ural. Soil underlying the site and the surrounding area was initially not considered usable because it would potentially collapse when wet – something that climate change would make increasingly likely. But stabilising the material enabled potential reuse of huge amounts of excavated material, reducing the time taken to

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construct the facility. Sub-zero temperatures (averaging -15°C) and spring thaw flooding, as well as poor transport infrastructure, also made reusing onsite material an attractive option in terms of speeding up construction.

In both locations, there were concerns about the ability of local contractors to deliver large infrastructure projects in these remote settings. Usually, international firms and expertise would be hired to build the infrastructure. This has huge cost, carbon and programme implications.

The first step was to assess what was available locally, using a specially developed sustainability management and resource training diagnostic tool. It identifies where the skills gaps are, before developing a strategy to deliver the facilities using as much local labour and industry as possible. Elevating the skills base was essential, so knowledge transfer underpins the approach and involves on-the-job training and improving the skills of local contractors. The approach for the project in the Middle East also benefited from specifying which excavation techniques and construction plant to use in different ground conditions.

Enhancing the capabilities of firms created local jobs and a new skills base for future projects. Local companies were encouraged to embed new skills as widely as possible across their business, rather than having them rest in the hands of the few who initially learn them.

Involvement in drilling and field testing by local companies in the project in central Asia was 50% higher compared with early phases of the development. This resulted in 20,000 additional hours of work by local teams, and local contractors' share of laboratory testing increased by 65%.

UN goals

The 17 UN sustainability goals (SDGs) were adopted in 2015 and are a universal call to action over 15 years to end poverty, protect the planet and ensure that people enjoy peace and prosperity. The approach adopted helps to achieve some of the objectives.



Goal 12 is focused on ensuring sustainable consumption and production patterns, and its associated 2030 targets include: the sustainable management and efficient use of natural resources; and a substantial reduction in waste generation through prevention, reduction, recycling and reuse.

Upskilling the local workforce also supports goal 8, which centres on delivering inclusive and sustainable economic growth, employment and decent work, as well as goal 4 and promotion of lifelong learning. The education goal calls for a substantial increase by 2030 in the number of youths and adults who have relevant skills, including technical and vocational skills. The local firms building the processing and exploration infrastructure were encouraged to embed new skills in these regions, where unemployment among the adult population is often high

"The first step was to address what was available locally"

and frequently even higher among those aged 15 to 24.

In East Africa, a water abstraction scheme from Lake Albert for a new oil and gas processing facility 8km away raised environmental and socio-economic concerns. The original proposal involved building a pipeline that passed through densely vegetated ravines and down a cliff over 50m high before entering the lake via a jetty. The jetty would have restricted boat movements, severely hampering fishing activities that provided a livelihood for local communities. The pipeline would also have left an unsightly scar down the cliff face and harmed biodiversity.

After studying landform and geohazards, an alternative route was identified. Blending

the pipeline into the surrounding natural environment and removing the need for a jetty mitigated any adverse socio-economic impacts on local communities, prevented scarring of the landscape, and resulted in significant cost savings.

In North Africa, the framework was used to develop generic designs for oil and gas exploration platforms that replaced traditional reinforced concrete. The innovative design combined rockfill from project sites, high-density polyethylene liners and prefabricated steel cellars. This saved time and money and

will significantly improve the ease of decommissioning the plants.

The adoption of more sustainable solutions for constructing energy infrastructure in developing and remote regions may seem common sense, but it has often been hard fought. The nature of the oil and gas industry means such solutions are still seen as an exception rather than the rule.

If the UN SDGs stand any chance of being realised by 2030, such approaches need to become the norm, being adopted widely by other sectors such as mining and hydropower and embedded in the procurement process. 

CHANGIZ ROOHNAVAZ is a geotechnical adviser and project director at global consultancy Mott MacDonald



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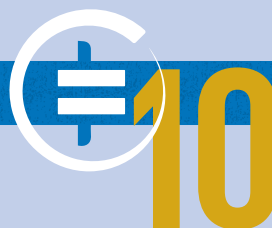
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Look smart



The Internet of Things and 'smart sensors' are industry buzzwords at the moment, but what do they mean for the monitoring and management of utilities use?

Rosa Richards reports

The Internet of Things

Industries and businesses could benefit significantly from the intelligence gained from use of the Internet of Things (IoT) by 2025 (\$4trn - \$11trn) according to analysis of more than 150 uses (McKinsey Global Institute, 2015).

Factories (1.2trn-3.7trn), work sites (0.2trn-0.9trn) and offices (0.1trn-0.2trn) are all predicted to benefit from a range of improvements in operations management, predictive maintenance, health and safety, organisational redesign, monitoring, augmented reality training and more.

Environmental managers will have the potential to achieve significant improvements in monitoring and control of raw materials, energy, water and heat use as a result of the IoT, generating not only savings but also potential income streams.

Sensors are the critical starting point or end point for IoT communications, as they generate the data that allows control decisions to be made. It is worth noting that utility companies have already been using the IoT, previously known as 'radio telemetry', for 20 years. There are some system issues such as interoperability and cyber security that must be overcome for the full potential of the IoT to be realised.

Energy management

There are multiple disruptive and augmentative factors affecting the utilities market, from smart grids to cognitive computing, and low-cost and smart sensors are playing a role in facilitating these.

Businesses may already be saving money by using strategies such as day-ahead optimisation to use power when it is cheap. Many businesses already generate their own renewable power (solar PV, wind turbines, hydro-electric or combined heat and power), which at present can only be used instantly or sold to the grid. Add in battery storage, and then a site will become a virtual power plant, with the ability to use energy onsite when it is needed and the choice to sell energy to the grid when prices are optimal at peak times.

In addition, there is the potential for electric vehicles to be used as backup power storage for the national grid if energy customers are willing to be flexible. These components make up a more distributed energy system as part of a smart grid with a more complex model of balancing and settlement for the energy companies to manage.

The University of Bristol has been increasing its fleet of internal electricity meters over the past five years, and is moving from a system that collated and provided the data overnight to live readings. It also receives data via its suppliers for both gas and electricity meters.

"There is no real substitute for having half-hourly data for energy management," says John Brenton, sustainability manager at the University of Bristol.

"Using our meters, we have been able to identify and investigate areas with high baseload, and look at where 24/7 services can be controlled better. Being able to discuss a consumption profile with a building user often leads to innovative solutions to longstanding problems. Also we have been able to check that supplies that are exposed to high time-of-day charges, such as the Distribution Use of System, are adequately controlled to reflect that."

All businesses (and households) must be 'offered' a smart (electricity) meter by 2020 as set out in the Smart Meter Bill, 2017. However, energy firms have indicated that completing the rollout of installation of smart meters by 2020 is unlikely, as it has been beset by challenges.

The Institute of Directors (IoD) has highlighted the spiralling costs of the rollout programme, which will be added to business and household bills, and called for the government to put the programme on hold. Other criticisms by the IoD are that the programme has failed to deliver interoperable meters for switching, is behind schedule, over budget and dependent upon out-of-date technology.

Water management

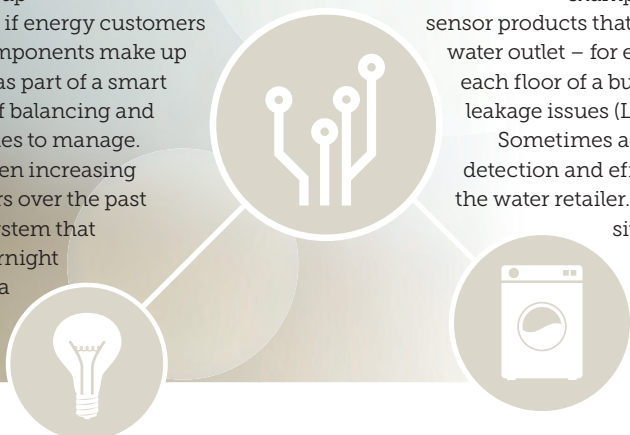
In the water sector, the non-domestic water retail market opened in April 2017. Not only will environmental or water managers be able to choose their water and sewerage services retailer but there are potential savings to be made for large water users from 'self supplying' – buying water directly from the wholesaler.

There are well-known benefits for large, multi-meter or multi-site users to have a consolidated bill (with a single pricing structure) to be able to compare water use over time and across sites directly and identify water consumption issues to take steps to improve water efficiency.

For example, non-domestic water consumption may be expected to be zero over weekends and bank holidays, so a higher than expected baseline indicates a leak on site caused by taps or showers for example, or from the plumbing. Leakage sensor products that measure consumption on every water outlet – for example, to monitor water usage on each floor of a building – are available to help identify leakage issues (LeakNet and LeakBot, for example).

Sometimes additional services such as leak detection and efficiency audits are provided by the water retailer. Other savings could be made by sites becoming more self-sufficient or autonomous in terms of undertaking their own greywater recycling, rainwater harvesting, local water abstraction or

There are multiple disruptive and augmentative factors affecting the utilities market



Meters are essential to monitor utility use

wastewater treatment onsite.

Savings from energy or water management would not be possible without the use of meters to monitor utility use. The design of water meters for example, has evolved significantly over time and is still advancing at a rapid pace, so much so that smart meters have become outdated before a rollout programme has been completed.

Water meters have improved from the days of 'dumb meters' visually read by a meter reader, to 'automated meter reading' meters read by a meter reader walking past, to the latest 'advanced metering infrastructure' smart meters currently being rolled out across London, which transmit data autonomously.

"Smart meters have really revolutionised data collection and analysis of usage data for the benefit of our customers – for example, to aid leakage detection," explains Yvonne Ryan, head of smart technology development at Thames Water. "Because smart water meters proactively transmit data to a secure database at regular intervals, customers can now view an accurate timeline of their water usage online. The next generation of smart meters will improve upon this with a built-in analytical ability to identify issues in water consumption and flag them to customers."

Thames Water is currently working with a supplier designing the next generation of smart water meters.

Looking ahead...

Cognitive computing technologies such as machine learning could lead to advancements that we can barely imagine today. By combining technologies and services, smart technologies can be developed that use artificial intelligence to predict what customers will need based on their consumption patterns before they are even aware themselves.

Artificial intelligence for pattern recognition can be already be built into smart sensors, with environmental compliance thresholds entered by the operator so that an alarm is raised when a set threshold is reached. This enables the operator to take remedial action if needed. The next step, which not everyone is willing to take, is to give the sensor the ability to directly issue restorative actions.

The IoT has enabled new business models to flourish. Building on the predictive functions of smart devices, an 'ecosystem' of service providers might in the future provide value to customers ('prosumers') based on their shared data and chosen priorities. Insurance products could be coupled with utility providers. This will enable business customers to save resources and time.

Machine learning
could lead to
advancements
we can barely
imagine



Future developments in sensors for the IoT will be driven by the need for lower power and longer battery-life, improved networking capability through embedded transmitters or receivers and the ability to process or store large amounts of short bursts or long streams of real-time data – that is, 'big data'. Such developments will be aided by advancements in miniaturisation (like lab on a chip technology) and hybridisation.

For example, a microfluidic droplet nitrate sensor is under development at the University of Southampton, using low-cost components. This sensor miniaturises the process of detecting the presence and amount of nitrate (NO_3) and nitrite (NO_2) in a water sample, self-calibrates and can be used for real-time monitoring in the field.

It could be used by industry to measure background levels of pollution in waterbodies adjacent to sites. Adrian Nightingale, research fellow at the University of Southampton, says: "The microfluidic sensor platform we have designed can, in principle, be adapted to detect and measure any chemical analyte for which an assay exists in scientific literature."

The sensor has low power consumption and uses small amounts of reagent, and can take measurements at high frequencies, even 30 times a minute if needed. Power use is 0.75W and 3.6 μl reagent used per measurement. The sensors are being further developed for commercialisation in collaboration with university spin-out company SouthWestSensor. The technology has so far been applied to measuring the dynamic variation of nitrate in a tidal river over the tidal cycles, and the university is now looking for partners to help them validate the technology in other environments and with other target analytes. [1](#)

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Why we need a clean growth plan... now

Paul McNamee investigates the repercussions of the UK's failure to come up with a policy to meet the fourth, let alone the fifth, carbon budget

While the UK government has set ambitious targets and taken a prominent role in international climate leadership, by ratifying the Paris Agreement and announcing the phase out of coal-fired power, at home there has been a notable lack of policy to match these aspirations.

Most significant is the absence of policy outlining how we will meet the fifth carbon budget (setting targets for 2028-32), which was set more than a year ago. In fact, a report earlier this year from the government's own Committee on Climate Change says we won't even meet the fourth carbon budget for 2023-27.

This doesn't just affect the nation's ability to reduce its emissions – it is also creating uncertainty for business and investors. At a time when the UK is establishing itself as a world leader in the low-carbon industry, this is worrying. Certainty is needed for such sectors, which are creating jobs in areas that have traditionally suffered from high unemployment, as well as growing expertise and services that can be exported worldwide.

The clean growth plan, overdue by more than a year, will be responsible for addressing the effects already being felt by certain industries as a result of this lack of clarity.

Green Alliance's recent report, published with CAFOD, Christian Aid, Greenpeace, RSPB and WWF, highlighted that, without intervention, investment in

renewables is projected to drop 95% by 2021. Energy saved by government housing

efficiency schemes dropped by almost 90% in 2012-13, with no improvement since then.

And while we might think we're doing quite well in the electric vehicle market, these made up only 1.4% of UK new vehicle sales in 2016, with 181 charging points per million people, whereas electric vehicles represent 29% of all new sales in Norway, which has 1,571 charging points per million people.

Easy wins

The government clean growth plan needs to be ambitious enough to address these issues and set a strong framework. Some initial 'easy wins' will be to follow through on its previous investment in renewables and continue support with an additional £1.7 billion between 2020 and 2025. Renewable energy sources are now cheaper than fossil fuels and the Treasury should give manufacturers in the renewable industry the certainty to invest in supply chains for the long term.

Another aim should be to reintroduce a standard for zero-carbon homes by 2020 and improve the energy efficiency of existing stock to EPC C by 2035.

As far as electric vehicles go, the government could go further. To be world leaders in this area, the UK's 2040 target should be brought forward a decade to 2030 and should sit alongside vehicle efficiency targets. A plan for charging infrastructure is needed to give investors and consumers confidence.

If after over a year of waiting, the clean growth plan doesn't start to address these issues with an ambitious framework, strong policies, and immediate action on energy, housing and transport, it will be a disappointment. The plan needs to be more than just words; government needs to start setting out its actions. 

PAUL MCNAMEE joined Green Alliance in June 2016 as the head of politics, leading Green Alliance's Political Leadership theme. He manages the Climate Leadership Programme for MPs and joint advocacy work with the major green NGOs.

THIS MONTH WE ASK...

Should
genetic
engineering
be used as
a tool for
conservation?



Let us know at iema-editor@redactive.co.uk if you have any questions you want answering in a future issue

The big question



CLARE OXBORROW

Senior food and farming campaigner, Friends of the Earth

"No: GM is clunky and outdated"

The use of genetic modification (GM) may appear to be an attractive tool, but lessons from its use in farming suggest we shouldn't hold our breath.

GM has had a fair run in agriculture. Over the past 30-plus years much has been promised, and vast amounts have been spent, yet only two simple modifications have been achieved commercially in crop plants – herbicide tolerance and insect resistance. These have caused huge problems for farmers and ecosystems – for example, from resistant weeds emerging that require the use of more chemical herbicides to control them. More useful and complex modifications like drought and salt tolerance and nitrogen fixation, though long awaited and researched, have still failed to materialise commercially.

Releasing GM plants and animals into the environment is a risk. There will always be uncertainty over the long-term impacts on wild populations and their wider ecosystems. Insect-resistant cotton seemed to provide a sustainable solution to the problem of cotton bollworm, but after only a few generations, problems emerged with secondary pests – thriving because their predators have been controlled by the insecticide produced by the GM plants.

There is a critical role for good science in conservation. But GM is a clunky and outdated technique unlikely to play a significant role. We shouldn't get distracted by the lure of a techno-fix.



THOMAS MALONEY

Director of conservation science, Revive and Restore

"Yes: to complement, not replace key tenets"

Conservationists have been cognisant of managing the genetic condition of wildlife for generations. Efforts to restore bottlenecked wildlife species have required careful tracking of the pedigree of captive-bred individuals or translocation of distant individuals. These efforts are arguably a form of genetic engineering. In the US, the California Condor recovery programme is making great strides in managing the population genetics of the species as it has recovered from 23 individuals to over 400 today.

Medical and agricultural advances offer transformational tools. Intractable diseases like Chytrid fungus, threatening amphibians, and white-nose syndrome in bats may necessitate genetic engineering solutions. Bioengineering offers applications with invasive pests, disease resistance, facilitated adaptation to climate change, and synthetic alternatives to wildlife products.

In a time when the threats have never been greater and tools more powerful, the fundamental tenets of conservation still apply. Habitat, ecological processes and environmental health are critical. Biotech can complement but not replace these core necessities of a functioning biosphere. Indeed, the power of these tools compels a responsible, deliberate and open consideration of implications. But, given the scale of humanity's impact, perhaps the question is: "Can conservation afford to not use new genetic engineering tools that could save our wildlife?"



DR HELEN WALLACE

Executive director, GeneWatch UK

"No: de-extinction is hype, not reality"

The idea of 'de-extinction', using cloning and genetically engineered eggs, is hype, not reality. The very high failure rates in pregnancies using cloned or genetically engineered eggs in mammals, and other technical difficulties in birds, make rescuing near-extinct species using this technology unlikely. Without the right habitats and the ability to produce sufficient numbers of animals with high genetic variability – unlikely, given the limited DNA from extinct species that is available – this idea makes no sense.

Releasing large numbers of sterile organisms can crash a population, and might affect invasive species, at least temporarily. However, truly sterile organisms that do not evolve resistance are unlikely to be achievable through genetic engineering. Impacts when released into the environment may be negative as a result of the need for repeated mass releases of harmful organisms, or as a result of ecosystem responses over time. If population suppression is successful, this is likely to be temporary, and could also lead to harmful surges in competitor species.

'Gene drive', which in theory could spread genetically engineered traits, such as sterility or disease resistance, is highly speculative and would pose even greater risks. This means trying to engineer whole ecosystems, with consequences which are not fully understood. Far from being the answer to conservation issues, genetic engineering is a distraction that could divert scarce funding.

CONNECT

SOCIAL AND COMMUNITY NEWS FROM IEMA



The Islamic Reporting Initiative (IRI Reporting Standard), founded by IEMA Strategic Advisory Council member Daan Elffers, has received an award at the annual Global Islamic Finance Awards held this year in Astana, Kazakhstan. The IRI was credited "for its remarkable efforts to progress the effective implementation of sustainability and CSR in member states of the Organisation of Islamic Co-operation (OIC) - including through Western organisations with operations in these countries".

With 57 member states, the OIC is the world's second-largest inter-governmental organisation after the UN.

The event was attended by the president and prime minister of Kazakhstan, Central Bank governors, government ministers, business executives and diplomats from all around the world. As the Foundation for the IRI is based in the Netherlands, the award was received on its behalf by Dutch ambassador Dirk Jan Kop.

The IRI is an independent not-for-profit organisation leading the

creation of the world's first reporting standard for sustainability and CSR, across all business sectors, based on Islamic values and principles.

Commended by the OIC and the UN Global Compact (of which the IRI is a signatory), and with members in more than 50 countries, the IRI held an inaugural roundtable discussion at COP 22, hosted by Morocco's minister of environment, herself a member of the IRI Advisory Council.

By making sustainability and CSR culturally relevant, the IRI aspires to effectively accelerate the uptake of sustainability and CSR and systemically advance the implementation of the UN's Sustainable Development Goals through nearly a quarter of the world's population with custodianship for vast reserves of natural resources.

◆ **The IRI welcomes all IEMA members and affiliates to become involved in the development of the IRI standard, which is expected to be launched in late 2018.**

For more information please email: info@islamicreporting.org



"Really enjoyed @aiemanet @IEMA_Transform magazine 👍 really interesting, particularly #extremeweather which highlights need for #resilience"

@GraemeHannahBRE



"I need to go back to some deeper articles but overall, love it! Bright, fresh, provocative – very much a members+ magazine. Great job!" ❤️

@Catalacity

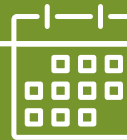
WEBINARS

10 OCT

Organisational capability: driving sustainability skills in your organisation

Transforming the world to sustainability requires organisational leadership, skilled professionals and a desire for change. For your business to compete in a sustainable economy, you'll need sustainability skills at every level, from the leadership team to those at operational level. Join our upcoming webinar to see practical examples of how this has been done in practice, and find out how IEMA can help you to deliver this in your organisation.

◆ To book: bit.ly/2x4Hoqz



WHAT'S ON THIS MONTH

iema.net/events

10-12 OCT

UK Construction Week

The UK's largest gathering of contractors, clients, architects, manufacturers, SMEs and developers returns to the NEC Birmingham. The event celebrates this exciting and dynamic industry, and will be a place to network, debate, discover innovation and celebrate excellence.

11 OCT

IEMA Skills and Sustainable Infrastructure Conference

The UK is within a new golden age of infrastructure, with over half a trillion pounds of investment in new and upgraded energy, rail, sewerage, flood risk management, aviation and road projects all being progressed. But how will this affect the infrastructure upon which our future sustainable (or unsustainable) economy and society is built? How can we integrate environment and sustainability into all future developments?

Join industry leaders at your free-to-attend conference, where we'll launch IEMA's latest research report on the role that sustainability skills are playing in enabling the 'UK's Golden Age of Infrastructure'.

12 OCT

The Big Green Event 2017

This free-to-attend Expo caters for organisations looking for efficiencies and cost-savings in energy, recycling, waste and general environmental management.



QUOTE UNQUOTE

"The new cover format is looking great. Clean text especially incorporating the "three pillars of sustainability" and clearly identifying its intended audience, playful Transform logo with loading 'T' and 'M' flowing from one side of the cover to the other, dramatic colourful graphics and insight on the articles within. Look forward to receiving my copy in the post tomorrow"

ANDREW MARLOW,
CENV MIEMA

"The new look IEMA Transform magazine is excellent and packed full of updates and articles, a very interesting and enjoyable read indeed."

SHARON LASHLEY, PIEMA, DIPRSA

"Love the new magazine. Much more readable. good job 👍"

AMBER LAIGH

"So excited to receive IEMA's new format 'Transform' magazine that I got the train into the office rather than cycle so I can have a good look through"

JASON LIGHT

Just got new @IEMA Transform looks fresh & fascinating @iemanet
@CarbonAcademy

25 OCT

How to identify and integrate future megatrends into your environmental systems

We know the world will soon be very different from today. From future energy prices to changing customer demand, from heavier rainfall, to a trend towards innovative and flexible solutions; understanding and acting on medium- to long-term trends is key for all organisations. This IEMA webinar, delivered in partnership with WSP, will help you understand how to map, manage and mitigate the impacts of megatrends on your business.

➡ To book: bit.ly/2h5KHrG

31 OCT

One year on: exploring the progress of the Natural Capital Protocol

Since the protocol's release in July 2016, thousands of organisations have begun to seriously assess their relationships with nature and natural systems. Join Mark Gough, executive director of the Natural Capital Coalition, to explore their progress during its first year of implementation, and gain an insight into how businesses across different sectors, and geographies are adding business value by applying the NCP.

➡ To book: bit.ly/2xmKir6



Why did you become an environment and sustainability professional?

My personal interest is in the environment and politics. I find it fascinating and intriguing how laws and policies are intensely influenced by institutions or people in authority.

What was your first job in this field?

In Lagos, after graduating, my mother asked me to join her engineering consulting firm. I was hesitant, but my experience there opened lots of doors.

What does your current role involve?

Primarily, building my new consulting

firm and at the same time providing exceptional service to clients.

How has your role progressed over the past few years?

I have moved from being an employee to freelancing while raising a family, and I am now running my own consulting firm. The learning curve can be fast if you are fully determined, or steep, if you factor in other personal circumstances. It is all about how you strike a balance between career goals, family life and personal wellbeing.

What's the best part of your work?

In one word –evolving. I have worked in four countries, and while the laws are different concerning EIA, the underpinning principles are the same. It's made my job very interesting. This is where I put my value in – I see the differences and incorporate best practice in the projects I handle. I enjoy meeting people, writing, research and making clients happy.

What's the hardest part?

Meeting and handling people of different backgrounds and cultures. I have found this the most challenging, yet, at the same time, the most interesting factor of my work. It is an important skill that I want to improve. As a technical person with an academic training, it is easy to inadvertently neglect the importance of the relationships.

What was the last development event you attended?

I attend conferences and exhibits in the region. In the future, I want to attend a course on improving my soft skills.

What did you bring back to your job?

Aside from new contacts, I see what is currently being offered in the market and



CAREER PROFILE

Agnes Astolfi PIEMA

Founder/publisher at SustainableOman

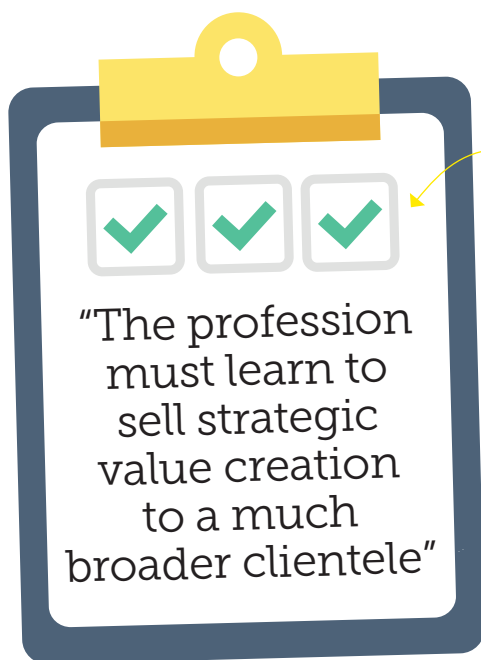
align it with the services I am offering. This prepares my firm to diversify services in the future.

What are the most important skill(s) for your job?

Technical background and competence. It is very important in my field that I am professionally adept and to understand that all projects are unique. There is no 'copy and paste' in the work I do, otherwise, it would be monotonous and unfulfilling. Other important skills include strategic planning, **project management** and systems thinking.

Where do you see the profession going?

The field of environment and sustainability will always be evolving. The profession should not just sell 'green' or 'sustainability' labels, it must learn to sell strategic value creation to a much broader clientele, both private and public. There are several drivers of



market change that have already made an impact on business. Now, in my career, change management skills and soft skills such as communication, facilitation and networking are key. I would also like to see the outcomes of my consulting engagement. I want to measure that change in the projects I have handled.

Where would you like to be in five years' time?

Expanding my company with full-time employees, and hopefully to grow further in the Middle East, where I work.

What advice would you give to someone entering the profession?

To expose themselves to a variety of subjects and disciplines as far as environment and sustainability is concerned and to make time to carve out space for things that interest them. This will help them realise which area they want to specialise in and to build on that. Interest should always be at the core of everything we do. It is good to have a mentor and champion in your career, so make the most of it if you're lucky enough to work with someone you admire. And of course, as Steve Jobs said, "stay foolish, stay hungry".

If you had to describe yourself in three words, what would they be?

Positively quixotic, thoughtful and an achiever.

What motivates you?

My ambition is to make an impact, however trivial, both for my industry and personally.

What would be your personal motto?

Do what matters.

Greatest risk you have ever taken?

Starting my own firm.

If you could go back in history, who would you like to meet?

Steve Jobs for being a visionary, and Mahatma Gandhi for his self-discipline. 



Visit www.iema-transform.net for the full member profile

LATEST MEMBER UPGRADES

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Adrian Carter, Akzonobel Packaging Coatings Ltd

Alan Whitehouse, Police and Crime Commissioner For West Midlands

Brian Chaplin, Cummins

Brinley Hewitt-Thomas, Tata Steel UK Limited

Chris Beddoes, Suez

Chris Edwards, Suez

Christina Giles, Cummins

Claire O'Neill, A Greener Festival

Daniel Canning, Ricardo UK

Daniel Pitcher, Carnell group

Emma Hill, CH & CO Ltd

Enrico Fornasero, Sedalcol UK Ltd

Glen Bevis, Keller Limited

Heather Pippin, Compass (AD) UK LTD

Janice Williams, AXA UK

Jon Wright, Icen Projects Ltd

Jonathan Paul, CF Fertilisers UK Limited

Kathryne Lakin, GKN Aerospace

Katrina Christopoulos, ISS World

Services – Barclays Account

Lee Ambler, Newcastle College

Lisa Brewster, HW Architectural Ltd

Lise-Marie Chamoux, Flowserve Pumps Ltd

Lucy Windler, Hugo Boss

Michael Laverick, HMY UK Innovation In Retail Ltd

Paul Shrimpton, Owen Mumford

Robert David Thomas, Siemens C/O

Hemsley Fraser

Robert Slack, Rathbone

Ron Lowton

Roy Ingram, VolkerFitzpatrick Ltd

Stephen Nuttall, TMS Europe Ltd

Sue Lannen, Newcastle College

Thomas Hardinges, BP Global

William Faas, Getting Greener Consulting

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Andrew Murray

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Dominic Harris

Gian Ellis, GLE Environmental

Jennifer King, Starc Ltd

Joseph Somerville, RSK Group Plc

Keith Finlay, CloudApps Ltd.

Lee Houghton, Premier Foods

Natalie Gilbert, Cathedral leasing Ltd T/A Cathedral Hygiene

Ryan Blakeley, Ove Arup and Partners Ltd

Stephanie Rooke, Viridor

Tom Sengalama, United Nations

Ufuoma Ilaya, Biogen (UK) Ltd

William Orriss, Interchange

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Babatunde Agoro, Hoare Lea

Claire Fundrey, Keltbray Group

Claire Hayter, Environment Agency

Emily Ghedia, URS Infrastructure & Environment UK Limited

Helen Craven, Royal HaskoningDHV

Ian Fuller, Kier Ltd

Jennifer Louise Cottrell, Keltbray Group

Lynn Richards, Nottinghamshire

Healthcare NHS Foundation Trust

Martin Crow, Hanson UK

Martin Gregson, Siemens Rail

Electrification

Octavia Neeves, Network Rail

Rachel Drabble, Capita Property & Infrastructure

Shamir Ghumra

Thomas King, Magnox Ltd

Tom Day, Valero Energy Ltd

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Sustainability Consultants

Anne-Marie Warris, Ecoreflect

Charles Haime, WSP Parsons

Brinckerhoff

Fiona Ball, British Sky Broadcasting (BSkyB)

Frances Leedham, Land Rover

Gareth Stace, EEF Ltd

Graeme Collinson, Siemens Plc

Harry Sealy, CH2M International (B.V)

Ian Hill, BT (British Telecom) Plc

Inder Poonaji

Johannes Beneke, Qatar Airways

Jonathan C Garrett, Prudential

Jonathan Foot, EDF Energy

Liz Rogers, BP Global

Louise Perry, Carillion Plc

Martin Broderick, The Planning Inspectorate

Mat Roberts, Interserve Ltd

Nigel Marsh, Rolls Royce Plc

Penny Walker, Verlander Walker Ltd

Philip Cumming, Marks and Spencer Plc

Shaun McCarthy, Action Sustainability

Susan Ford, BP Exploration Operating Company Ltd

Thomas Knowland, Leeds City Council

Toby Robins, Office Club Ltd

Prof Ali Nasser Hassan, Sultanate of Oman

Amber Harrison, SITA

Eileen Donnelly, The Co-operative Bank

Dr Michelle Tilley, EDF Energy

Prof Steve Halls, Oman Ministry of Environment and Climate Affairs