

# Delivering **STEM Skills** for the economy

## Also this issue:

- Gender disparity in Engineering
- Digital Skills Gap Concern in Schools
- STEM to STEAM: Art is key to building a strong economy



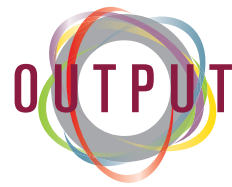
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ORGANISED BY:



EUA President  
**Elaine Lancaster**  
(Groupe Atlantic - UK & ROI Division)

EUA Vice President/Treasurer  
**Helen Bray** (SGN)

Chief Executive  
**Mike Foster**

HHIC Director  
**Stewart Clements**

ICOM Director  
**Ross Anderson**

Editor/enquiries  
**Caroline Haine** [caroline@eua.org.uk](mailto:caroline@eua.org.uk)

Energy and Utilities Alliance (EUA)  
Camden House, Warwick Road  
Kenilworth, Warwickshire CV8 1TH

A company limited by guarantee and registered in England.  
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Design and Publishing: [www.mhgraphics.net](http://www.mhgraphics.net)

WELCOME

Welcome

Over the past two decades, Government has been concerned with improving STEM skills in the UK workforce to achieve higher productivity and economic growth. But research by STEM Learning this year found that 89% of STEM businesses struggle to recruit, with a current shortfall of 173,000 skilled workers costing UK businesses an estimated £1.5bn a year in recruitment. With growing competitiveness for jobs and the implications of Brexit on the labour market, things are set to get tougher.

A National Audit Office report and Public Accounts Committee inquiry highlight a consistent participation gap in terms of gender in STEM subjects and occupations. Despite some successful initiatives taking place, STEM skills shortages remain and this issue we consider the problems and potential opportunities for improvement.

Our Leading Voice is Helen Bray, EUA Vice President and Director of Stakeholder Relations for SGN. On STEM shortages she says we need to be thinking outside traditional approaches in order to attract a broader range of young people.

Finally, we hope you find the 'Engagement Matters' article of interest. Keeping a close eye on policy developments, opportunities and threats is essential to our member's day to day business activity and this article gives insight into how EUA's External Affairs work supports this.

We are extremely grateful to all our contributors for helping to pull together this issue. Hope you enjoy the read.



**Caroline Haine,**  
Editor, OUTPUT

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Utility Networks News

“A greener, cleaner, smarter Britain”

Gary Cottrell, Smart Meter Lead

Smart Energy GB has launched a high profile advertising campaign over the summer using celebrities Kirsty Allsopp, Phil Spencer and Susan Calman to encourage British consumers to embrace smart meters.

With the strapline ‘If every household in Great Britain got a smart meter, we could save enough energy to power



Susan Calman, Phil Spencer and Kirsty Allsopp, pictured at Merry Hill Centre, near Birmingham

Aberdeen, Cardiff and Manchester for a year, they are taking to the road to inspire smart meter take up.

At each stop on the tour, the roadshow will educate people on the savings possible with a smart meter.

As the front end of the smart meter campaign increases momentum, behind the scenes the story is a little different as still the wait goes on for a reliable DCC system to connect SMETS2 meters to. DCC is experiencing significant issues with getting the main system to run reliably and consistently and

I see several incident reports every day issued by DCC relating to communication failures or basic message handling.

It is likely the deadline for installing SMETS1 meters will be extended by at least two months, increasing the number of meters that are not interoperable or interchangeable being installed and adding extra cost for suppliers to properly monitor energy usage at the customers home, causing uncertainty for both energy suppliers and installer. Despite all of the above BEIS is still talking about a 2020 deadline which is looking increasingly unlikely to achieve.

CATAPULT with the Catapults

Further to previous collaboration with The Manufacturing Technology Centre (part of the Advanced Manufacturing Catapult), EUA has been progressing a series of engagement activities with some of the other Catapults (Innovate UK).

Following attendance at an Energy Systems Catapult event in February, Isaac Occhipinti (EUA Head of External Affairs) and Peter Day met with their Head of Stakeholder Management to raise awareness of EUA and discuss how we might collaborate. Meetings also took place with The Transport and Offshore Renewable Energy Catapults which may realise some value to EUA.



Peter Day, NEEG Manager

# Leading industry speakers address members

A packed Network Equipment & Engineering Group (NEEG) meeting in July heard from three leading industry speakers.

Carly Gilchrist, Asset Director at Fulcrum gave an insight to the role of Independent Networks and how they operate in the UK energy market along with an outline of Fulcrum’s asset adoption

offerings as an IGT, IDNO and Meter Asset Manager (MAM). **Annabel West, Head of Engineering Policy, SGN** briefed attendees on how they are improving business focus through technology and the way SGN are using innovative techniques to improve performance and enhance customer satisfaction. **Dr Malcolm Howe, Chair of BSI Committee GSE/33 Gas Infrastructure** provided an update on the work of the committee which is responsible for the

UK input into CEN/TC234, gas supply and for standards on gas supply, including installation, distribution, transmission, storage and measurement.

He shared a European insight on gas quality and decarbonisation standards and how legislation and standards are processed on a European platform.

# Independent Chair appointed

Roddy Monroe has been appointed as the independent Gas Storage Operators Group (GSOG) Chair.



Roddy has been working hard to raise the profile of the group by setting up a series of meetings from an agreed list of stakeholders with several having already taken place. On 1st May Roddy, together with a selection of group members, met with Dan Monzani (Director, Energy Security, Networks & Markets at BEIS) and members of his team, including Dave Buttery, a new appointee for the gas sector. The meeting went well with acknowledgement from BEIS that things have changed in the sector in recent years, particularly with the closure of Rough. They will meet with GSOG on an annual basis or more frequently should the need arise.

Following on from this were meetings with Cathryn Scott of OFGEM focussing on Security of Supply and David O’Neill also

from OFGEM, looking at charging and the potential implications to gas storage operators of National Grid’s transmission charging review.

Catherine and her team recognised that Ofgem cannot be complacent about energy security and confirmed they are working with BEIS on the next steps following the March security of gas supply workshop. David said Ofgem recognised the need to avoid disproportional impacts resulting from any change to the charging review and would be undertaking an Impact Assessment in the Autumn and have put this work out to tender. They will give a ‘minded to’ decision

in Q4 along with their Impact Assessment. Ofgem is also looking closely at EU compliance as this is critical.

A BEIS interactive ‘Gas Storage Teach-In’ is confirmed for 3rd September with Dave Buttery and his team and a meeting with Chris Shaw of the BEIS Select Committee could also take place during September. It’s hoped this meeting will encourage a gas storage review to take place.

Also, to help raise the profile of the group, Roddy has presented to the All Party Parliamentary Group on energy costs.

Further stakeholder meetings will take place throughout the remainder of 2018 with all members being offered the opportunity to attend.

# EUA welcomes Craig Biffen to the team

Craig joined EUA in June. He has worked in both the public and private sectors and most recently he has delivered three European Commission projects across the West Midlands. This included advice and guidance to UK citizens on European issues, working

with schools, colleges and universities and helping companies expand and develop their export strategies.

Craig’s focus at EUA will be on secretariat work for the Utility Networks Division - GSOG

and GSOG Technical Groups, Smart Metering Groups, new Division British Energy Efficiency Federation (BEEF) and partner organisation Association of Manufacturers of Power generating Systems (AMPS).



# HHIC News



Steve Sutton,  
Technical Manager, HHIC

## Hydraulic balancing - the next stage of home heating efficiency

**A**pril saw Boiler Plus come into effect, and whilst the industry adjusts to the new standards, the Heating and Hotwater Industry Council (HHIC) is continuing its work towards cleaner and smarter home heating with one of the focuses being on system balancing.

We believe it's time now, to consider the development of a plan to encourage hydraulic balancing, and include it with new boiler installations as expected boiler installation practice. This isn't about adding burden but about raising standards.

Hydraulic balancing, or system balancing as I'll call it from now on (for simplicity), was actually considered in the Boiler Plus policy document. In fact there was a whole section on 'System balancing'.

Why? Well, the Boiler Plus consultation, which over 750 installers responded to,

revealed that 'some installers do not have a common understanding of system balancing, with only 18 per cent claiming to undertake it as a standard practice. Although Boiler Plus did not include mandatory system balancing, the policy document did state that *'It is likely that we may seek to enforce hydraulic balancing at a future date and installers who are not currently familiar with this practice are advised to take appropriate action to address this skills gap.'*

So to support installers with this expected next step, HHIC has produced a "consumer guide to balancing the central heating system". We know that some installers have concerns over competing with others who may not quote according to the regulations in order to win business. It is important that the wider industry supports installers with this challenge. One way this can be done is through consumer awareness.

Whilst the practice of bleeding radiators is relatively well known, many consumers are unaware of the merits of balancing heating systems. In fact, some consumers unintentionally, unbalance their heating systems. Borne out of the mistaken belief it will give their properties more heat, households may open both radiator valves fully, the result being that the

radiators nearest the boiler or pump (circulator) take the bulk of the hot water flow, leaving other radiators with little flow resulting in low room temperatures.

As manufacturers continue to pursue their goal of making heating systems more efficient, in order to achieve optimum consumer comfort, we must remember that the heating system itself has to be installed and commissioned correctly to ensure that it works as per the design specification.

Today, condensing boilers, boiler modulation, pump modulation, intelligent energy saving controls and passive flue gas heat recovery all enable us to achieve the aforementioned goals relating to comfort and energy efficiency. Irrespective of these technologies, correct installation, commissioning, and maintenance of the heating system itself is still a key part of the process.

System balancing is an expected practice. Consumers should expect their installer to undertake this, and installers should expect the wider industry to help consumers understand it.

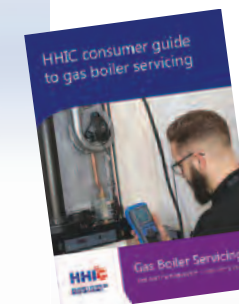


You can download the consumer guide to balancing the central heating system on our website [www.hhic.org.uk/resources](http://www.hhic.org.uk/resources)

## HHIC supporting installers with series of informative guides

**T**o help assist the circa 125,000 registered gas engineers, educate consumers and understand new policy, HHIC has launched a series of useful installer and consumer guides.

The first guide, published in January, covers weather compensation - a suitable measure for the legally binding changes outlined in Boiler Plus, which can be used to describe any control functions which adjust internal temperatures based on the weather outside, ensuring homes are heating adequately.



In February HHIC, in conjunction with the wider industry, produced a first of its kind, consumer guide, detailing what homeowners can expect when having their gas boiler serviced by a Gas Safe registered engineer.

The guide lays out agreed industry best-practice and aims to educate consumers on the standards they should expect. It also details a list of the steps engineers should take when they visit a customer's home and lays out a new, 10-point HHIC Customer Service Charter.

To mark the new Boiler Plus legislation coming into practice HHIC launched a Consumer guide in April, on changes to new boiler installations in England. Questions arose from industry surrounding the qualifying technologies, and how they can help consumers decide what will suit their lifestyle and home best, which the guide helps to answer.



April also saw the launch of the HHIC consumer guide to balancing the central heating system. Hydraulic balancing is an expected practice. Consumers should expect their installer to undertake this. However, this practice is not currently enforced. The guide not only outlines the importance of balanced heating systems to consumers but also provides installers with a resource to distribute.

Last up for April was a consumer guide to water treatment, to assist the installer when educating customers on how to maintain their central heating system. The document details the important role that water treatment can play in ensuring a central heating system performs as expected, and continues to do so.



In June, HHIC launched additional guidance for installers on Boiler Plus. This document is intended to assist with the interpretation of additional measures required, as outlined in the Boiler Plus policy document. For each measure, guidance on the technology is given and an interpretation of the standard provided to help with understanding and compliance.

The guides can be viewed and/or downloaded via our website [www.hhic.org.uk/resources](http://www.hhic.org.uk/resources). HHIC has already started work on the next set of guides. If you would like HHIC to consider a topic, please get in touch [stewart@hhic.org.uk](mailto:stewart@hhic.org.uk)



# A whole new gas industry - Hydrogen appliances

Steve Sutton, Technical Manager, HHIC

**C**lean and renewable energy has come a long way over the last few decades. The UK recently experienced its first full day of energy with no contribution from coal since the industrial revolution, while globally, 26 percent of all energy is on track to be generated by renewable sources by 2020.

While access to low-emission electricity has improved, the decarbonisation of heating systems is still developing. Heating and cooling of buildings and in industrial activities accounts for almost half of all energy demands in the EU, and decarbonised heat is rising up the agenda.

One popular solution is switching the heating network from natural gas to

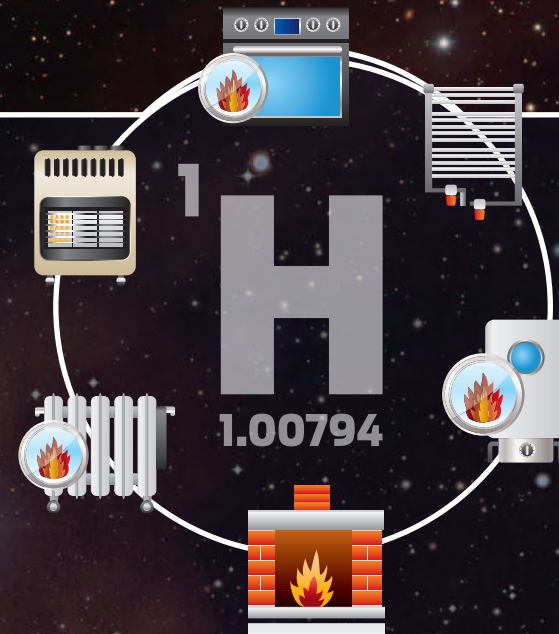
hydrogen. The main reason hydrogen is being considered as an alternative fuel is its green credentials. When burned, hydrogen produces no CO<sub>2</sub> emissions, creating just water vapour and heat. Hydrogen also contains a large amount of energy, making it relatively efficient.

The majority of domestic heating systems use natural gas – in the UK over 85 percent of homes use it – and using the current national gas distribution network to decarbonise heat makes a lot of sense. There are a number of trial projects underway to examine the potential of hydrogen as a replacement for natural gas. Northern Gas Networks are pioneering H<sub>2</sub>1, a project which would see the city of Leeds gas network entirely converted to hydrogen. The Liverpool-Manchester Hydrogen Cluster project is a study to introduce hydrogen into the gas

network in the Liverpool-Manchester area.

Of specific interest to HHIC and its members, the Department for Business, Energy and Industrial Strategy (BEIS) published an 'Appraisal of domestic hydrogen appliances' in April, a study that explores the engineering challenges of developing domestic gas boilers, cookers and fires that can run on 100 percent hydrogen. This report forms the basis of a £25m Government *Hydrogen for Heat Project* (Hy4Heat), a feasibility study into converting a small village to hydrogen for cooking and heating.

The HY4Heat study includes the development of gas fires, boilers and cookers that will run on hydrogen, as well as a review of the suitability of the gas meter and pipe work already installed in



the home for use with hydrogen gas. Initial findings indicate that it will not be possible to convert the appliances that we already have in the home and a new "hydrogen ready" appliance will need to be developed by manufacturers.

The potential of using hydrogen is only just beginning to be realised. As a greater focus falls on decarbonisation of the gas distribution network in particular, it seems certain that hydrogen will have an important part to play.

## Characteristics

Hydrogen gas has different characteristics to natural gas. For example; a higher flame speed and a larger flammability range. It is therefore likely that the burner designs will operate at a higher temperature than natural gas which can increase the surface temperature of the burner or the components inside the flame such as thermocouples. The current sensing technology used for igniting and controlling boilers will not work with hydrogen and so new technology will need to be developed.

## Visibility

As we know, natural gas burns with a blue flame under complete combustion and more yellow flames for gas fires are preferred. Hydrogen normally burns with a pale blue flame that is difficult to see in daylight and is recognised as a significant problem for the safety of gas engineers as they will not be immediately aware of the combustion taking place and visual checks for cookers fires and boilers during servicing would pose an issue.

## Detection

In its natural form, natural gas used in the UK today is odourless, colourless and tasteless. A non-toxic aroma such as Mercaptan, is added to natural gas and this contains sulphur, which provides the odour we recognise. However, sulphur based odorants have a detrimental effect on the catalyst used in fuel cells which could be used to supply both heat and electricity via a hydrogen network. Part of the Hy4Heat project will be to review the additives for smell and vision that will be required.

## Hydrogen for heat challenges



## Designing hotwater systems for Heat Networks

HWA News

**T**he industry and indeed the world develops at a challenging pace, and it can be hard to keep up, whilst maintaining an in-depth level of knowledge across the board.

To assist the heating and hot water engineer, and system designers; the Hot Water Association, HWA, has produced a design guide for an area of the industry which is still something of an unknown quantity in the UK today - Heat Networks. The guide was written by HWA member; Ian Robinson, Technical Manager, Special Applications, Baxi Heating UK Ltd.

Hot water storage based solutions in heat networks have been used for decades and have many benefits over systems utilising instantaneous hot water technologies. The 'HWA Design Guide for Stored Hot Water Solutions in Heat Networks 2018' provides design guidance and advice for engineers who are looking to specify stored hot water solutions working within a heat network. As heat networks can range from a couple of dwellings running off a central heat source to larger district heating systems that feed thousands of consumers, it is important to note that there is no "one fits all" design solution.

In recent times there has been a drive in the heat network industry to promote the benefits of generating hot water instantaneously whilst underestimating the benefits of the stored hot water solution. The design guide aims to offer



stored domestic hot water solutions due consideration within the design and planning processes.

Although not exhaustive, the guide looks at the different stored hot water solutions that are available. It lists the merits of heat networks with stored hot water solutions and sets out design guidelines for systems that incorporate stored hot water within each dwelling.

The design guide does not aim to provide a specification for manufacturers to design and produce to, but does set out applications advice to systems designers which will enable them to incorporate stored hot water solutions within their heat network design, and sets out a procedure which takes the designer through the process of sizing the fundamental parts of a heat network that incorporates stored hot water in each dwelling.

The HWA believes that this guide will become a useful tool for heat network designers and engineers. The 'HWA Design Guide for Stored Hot Water Solutions in Heat Networks 2018' can be found on the website [www.hotwater.org.uk/resources](http://www.hotwater.org.uk/resources)





# Facing up to skills shortages

Our industry continues to face skills shortages and this situation is likely to become even more serious in the light of future developments. Ross Anderson of ICOM considers some of the actions that might help to alleviate the situation

Unfortunately, it seems that skills shortages have become the norm for the building services industry, despite the best efforts of companies in the sector - not least ICOM members. However, it would be wrong for us to simply sit back with a 'c'est la vie' attitude, we need to be more proactive in encouraging young people to join and excel in our industry. Despite the fact that our sector is better at investing in training than many other industries, we still face shortages.

This issue isn't confined to the building services industry, engineering in general or indeed the wider construction sector. There has been a marked decline in applications for apprenticeships across most sectors, despite Government initiatives to encourage more vocational training.

However, the potential impact on the UK economy of a lack of skilled engineers is likely to be more serious than a shortage of, say, pedicurists or hair stylists. And it will certainly be damaging to the engineering companies that need those skills to deliver their products and services.

Looking ahead, this situation might well be exacerbated by changes that are already in the 'pipeline' through planned initiatives to meet the UK's carbon reduction

commitments. Energy systems are becoming more complex due to the integration of traditional and new technologies, particularly renewable energy sources, and this is creating a demand for wider skill-sets, especially in the areas of technology integration and control.

There is also a possibility that in the next couple of decades we are likely to see a switch from natural gas to hydrogen, a move that certainly seems to have backing at Government level. Those readers old enough to remember the conversion from coal gas to natural gas in the 1970s will recall what a massive undertaking this was and the demand for skilled labour it created.

Moreover, whereas in the past we have been able to 'top up' skills shortages by employing people from other European countries, this may not be so straightforward after Brexit. We certainly need to prepare for the worst, even while hoping for the best.

## Perception

Clearly, one of the key barriers to engineering apprenticeships is the perception of what an engineer does - the 'grease monkey' image still prevails in many minds. This, then, is where we need to focus our efforts as an industry - as individual companies and through trade bodies such as ICOM and the EUA.

In terms of addressing this situation, we need to emphasise the key role that new technologies now play in building services and the fact that there are many opportunities that don't involve 'getting your hands dirty'.

For instance, the demand for more sophisticated and complex controls and enhanced communication between different types of plant and equipment through the 'Internet of Things' is creating a huge demand for technicians with skills in computing and communications technologies. Yet young people who already have those skills, or want to develop them, are more likely to be attracted to the large 'tech' companies like Google and Facebook than to a manufacturer or installer of building services equipment.

At the same time, there will be potential apprentices who enjoy 'getting stuck in' and creating or fixing something - and we can certainly cater for their preferences as well!

It is also worth emphasising the law of supply and demand and the benefits this brings to apprentices. Apprentices coming into the engineering sector can expect a good salary and excellent career prospects because they are in such high demand. This is quite a contrast to some other sectors where school leavers are expected to take on internships with little or no pay and with no guarantee of a job at the end.

Indeed, the benefits of engineering apprenticeships have been amply demonstrated by the ICOM Apprentice of the Year programme, with all of our winners and runners-up going on to rewarding careers.

There is no doubt in my mind that we, as an industry, have a great deal to offer to anyone who wants to join us. The challenge is making those people aware of just what they are missing out on.



# Duty differential, it's taxing!

Out and about with **Rob Fello**



Over the last four months I have met with around a hundred Members of Parliament and Peers as well as organisations on behalf of NGVN. Included in the list of MPs are current Government ministers and their Opposition shadows as well as Chairs and prominent members of Parliamentary Select Committees. At this year's Autumn Statement we will see whether the hours of conversations have paid off and if the Chancellor leaves the differential between the duty on gas and diesel unchanged (or widens it).

The response has been fantastic. Some MPs have already written to the Chancellor, another MP has written to the Secretary of State for the Environment, Michael Gove MP, pointing out the benefits of biogas-fuelled trucks, whilst others restricted by their high-profile role are having quiet conversations on our behalf.

During August I will be sending written parliamentary questions to those who have asked for them. These can be tabled during Recess to keep our quest on the agenda both for the MPs themselves but importantly in the minds of the Government ministers having to sign the answers.

In September the Road Haulage Association are hosting a roundtable event for the NGVN with small and medium sized hauliers to enable us to hear the concerns and wishes of the industry and also enable us to dispel myths that have grown up around gas-fuelled trucks. Also that month Neil Parish MP, the Chair of the DEFRA Select Committee has offered to host an informal meeting to enable dialogue and information exchange about the NGVN and what gas-fuelled vehicles can offer.

Finally, many MPs have agreed to take part in a Westminster Hall Parliamentary debate and I am working towards such an event in the

weeks leading up to that critical Autumn Statement. This should allow a final flurry and positive publicity before the Chancellor stands at the despatch box.

*Robert Fello FCILT runs a lobbying and campaigning businesses. He is a former Member of Parliament who established and chaired the Parliamentary Freight Transport Group as well as being a prominent member of the Transport Select Committee. In Government he was a Parliamentary Private Secretary to four Secretaries of State (Defence, Communities & Local Government, Without Portfolio, and the Lord Chancellor) and was a Shadow Justice Minister.*

# The economic case for duty differential report commissioned

Fuel duty rates in the UK have remained unchanged since 2011. In the 2013 Autumn Statement, the Government announced a commitment to maintain the duty differential between diesel and natural gas until at least 2024, with a review in the 2018 Budget. This review is therefore expected in this November's Budget.



NGVN has commissioned Frontier Economics to carry out an independent economic analysis of the case for maintaining, and potentially extending, the commitment to keep the duty differential between natural gas and diesel for HGVs. This will be used to strengthen our case to Government in the weeks leading up to the Autumn statement.



## President's Column

# Keeping up with the millennials



**A**s you may have noticed, millennials are everywhere. Generation Y, the group of people born after 1980 and before 2000, monopolise much of the cultural conversation and in fact now represent about 35 per cent of the global workforce.

By comparison, Generation X represents 33 per cent of the workforce, followed by Baby Boomers, currently estimated to represent 25 per cent of all workers - but expected to drop significantly over the coming years as they age out of the workforce - and Generation Z are just starting out!

Growing up with tech at their fingertips and never having known a world before the internet, the millennial generation has come fully into its own.

This is bringing new challenges to organisations like mine in terms of recruitment, as millennials, with their careers now reaching a peak, are increasingly moving into management and leadership roles. They are the target audience for a lot of businesses and to successfully attract Generation Y workers, it is important for today's leaders to understand this market.

I am always interested to read more about how companies might channel their efforts. Even before they enter the recruitment process, the literature tells us, these tech savvy workers have already done their research on social media, review sites and combed career content on websites. This requires businesses to think carefully about recruitment and understand what makes Generation Y workers tick and how to attract and engage them.

Standing out from the competition is imperative. Career sites need to be mobile

friendly and social media presence active and current.

People want to work with people, therefore current workers should be front and centre. Real stories from real people can help when attracting Generation Y workers. Videos and other online content are a great way to capture and convey what the employee experience is like at a company.

According to the research, a primary driver for Generation Y workers when considering employers is opportunities for career development and growth. By highlighting career paths, internal mobility and journeys real employees have taken can tangibly show commitment to development and long term career destinations.

Furthermore prospective employees, especially women, are seeking out employers with a strong record on equality and diversity.

There's another principal driver for Generation Y candidates and that's work life balance. Flexible working and work-from-home opportunities play a major role in an employee's decision to take a job. Workplaces need to consider being as transparent and flexible as possible.

A fun and social work environment is important. It doesn't mean the whole culture has to change to accommodate millennials but identifying individuals who 'fit' will help them thrive.

It might be time to rethink the traditional CV. They are limited in scope, showing only what a candidate has done. Knowing what they're capable of in the long term is far more important consideration than any short term need.

And job descriptions are a great way to find out who might fit a specific set of basic qualifications or preferred requirements, but

are inherently limiting in scope to only one job, not long term potential or cultural fit. The advice is to look beyond the traditional, standard practice in recruitment programmes.

Within the energy sector we know there is a significant gender split, with 81 per cent of the workforce being male. There clearly needs to be an increasing focus on equality and diversity in companies and industry as a whole. The Energy and Utilities sector is traditionally male dominated and this is something industry will have to strive to combat in coming years.

A recent study found that girls with top science GCSE's are deterred from study at higher level, due to low confidence and boys dominance. It noted that while girls have long outperformed boys at GCSE level, fewer girls go on to take maths and physics at A-level, and fewer continue with those subjects at a higher education level. This reduces the number of candidates for recruiters and means girls are missing on potentially higher paid careers. I am certain this starts early on and encouraging STEM education and careers in schools is crucial.

There are clearly some serious challenges for today's leaders. In my role as EUA President I will be focussing on some of these issues, talking to members and asking them to share ideas relating to their own recruitment practices and the specific challenges they are facing. It is crucial we widen the talent pool in our industry through gender and diversity. I look forward to speaking to you soon.

*Dr Elaine Lancaster is Chief Technical Officer at Groupe Atlantic - UK & ROI Division and leads all UK R&D in domestic and commercial gas boilers, water heaters, heating controls and connectivity across all brands. Elaine graduated with a PhD in Metallurgy and Materials Science in 1996 and has worked in the steel industry (5 years) and heating industry. Elaine became EUA President at the AGM in May 2018.*

# Delivering STEM Skills for the economy



Over the past two decades, Government has been concerned with improving Science, Technology, Engineering and Maths (STEM) skills in the UK workforce to achieve higher productivity and economic growth.

But, research by STEM Learning this year found that 89 per cent of STEM businesses struggle to recruit, with a current shortfall of 173,000 skilled workers costing UK businesses an estimated £1.5bn a year in recruitment.

According to a report by the National Audit Office and an inquiry by the Public Accounts Committee\*. Despite some successful initiatives to address STEM skills shortages there remain problems. There is a consistent participation gap in terms of gender: in 2016/17, women made up only 9.4 per cent of A Level examination entries in computing, 21.2 per cent in physics, and 39 per cent in mathematics, and just 8 per cent of starts on STEM apprenticeship courses.

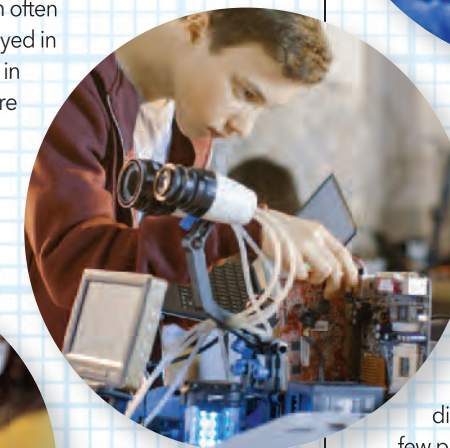


According to longitudinal research, of the 75,000 people who graduated with a STEM degree in 2016, only around 24 per cent were known to be working in a STEM occupation within six months.

Exit from the European Union too holds a lot of unknowns and could affect the availability in the workforce of people with the requisite STEM skills.

Current estimates of the STEM skills problem vary widely and typically focus on individual sections of the workforce making it difficult to accurately quantify the full extent. Existing evidence indicates that there is a STEM skills mismatch rather than a simple shortage.

The NAO's research shows particular shortages of STEM skills at technician level, but an oversupply in other areas, such as biological science graduates, who are then often underemployed in an economy in which they are not in high demand.



The NAO report identifies an urgent need for the Department for Education and the Department for Business, Energy & Industrial Strategy to coordinate plans and set out what they are trying to achieve. A more precise understanding of the challenge would allow the Departments to better target and prioritise their efforts to deliver a co-ordinated plan for achieving it.

What is clear is that a unified STEM skills programme is required in the UK. A historic lack of coordination across Government creates a risk that the overall approach is not



coherent. Schools, individual organisations, wider stakeholders, businesses and industry sectors need to be working to a clear plan otherwise individual initiatives intended to boost STEM skills, might not add up to a straightforward enough direction of travel. Over the next few pages we consider some of the issues and review one initiative that is underway to tackle the problem in engineering.

**“ 89 per cent of STEM businesses struggle to recruit, with a current shortfall of 173,000 skilled workers ”**

\*Delivering STEM skills for the economy, Jan 2018 [www.nao.org.uk](http://www.nao.org.uk)





# Gender disparity in engineering

The latest research in the EngineeringUK briefing *Gender disparity in engineering*, examines female underrepresentation in the engineering industry where women make up just 12 per cent of the workforce. This disparity, the report says, is largely due to girls dropping out of the educational pipeline at every decision point, despite generally performing better than boys in STEM (science, technology, engineering and maths) subjects at school.

Britain's record on employing female engineers remains the worst in Europe, with Latvia, Cyprus and Bulgaria, where about 30 per cent of the engineering workforce are women, and Sweden (26 per cent) and Italy (20 per cent) all having far better records.

Only per cent of girls aged 11 to 14 think they could become an engineer if they want to, compared to 72 per cent of boys. This drops to 53 per cent in the 16 to 19 age range, where only a quarter of girls say they would ever consider a career in engineering.

Evidence shows gender differences in understanding of and interest in engineering as well as perceptions of self-efficacy and identity are likely to be key factors when making subject and career choices. Girls are not only less knowledgeable about

engineering and how to become an engineer, but also less likely to seek careers advice from others.

EngineeringUK CEO, Mark Titterton, said: 'The gender imbalance in engineering means we are missing out on great talent which, given the shortfalls that our latest research highlights, it can ill afford to do. Equally, women are also generally missing out on really exciting and impactful careers in engineering and contributing solutions to some of society's biggest challenges. This needs to change and for that to happen we need to do more to show girls, at the earliest age possible, what modern engineering is all about and how they can follow what they love through these kind of careers.'

We know that participating in hands-on activities and speaking to an engineer have a positive impact on young people's knowledge of engineering jobs and that is particularly true for girls. We want to build on that with sustained outreach and engagement activity, together with supporting communications campaigns, to inspire the next generation of girls to become engineers. Gender disparity in engineering builds on the data and analysis contained within the Engineering UK 2018 state of engineering report and gives an overview of female progression along the



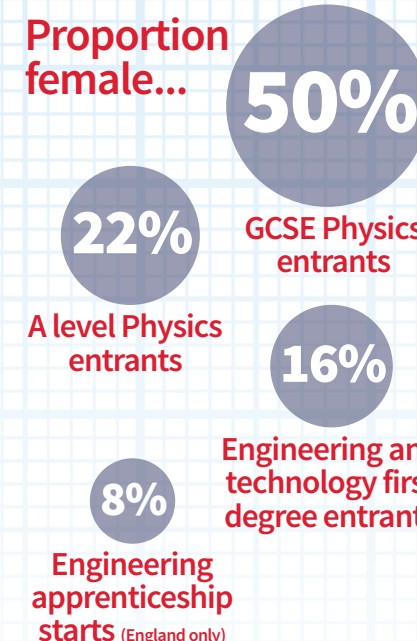
**Bridging the UK gender gap in work has the potential to add £150 billion to GDP forecasts by 2025**

STEM skills pipeline through education as well as women in the engineering workforce. It examines the underlying reasons for female underrepresentation and looks at both the business case for and the barriers to getting more women in the industry.

The *Gender disparity in engineering* report contains inputs from Cummins, UCL and the Royal Academy of Engineering and is available to download here [www.engineeringuk.com/gender](http://www.engineeringuk.com/gender).



**“ In 2015/16, just 16 per cent of first degree entrants into engineering and technology were female. This makes it a subject area with one of the lowest proportions of first degree entrants who were women, second only to computer science ”**



## Digital skills gap concern in schools

There is new evidence that fewer children are getting the digital skills that employers and the Government say are vital. Computing, as a subject, was introduced into the curriculum in England in 2014. In 2017 67,000 students sat the Computer Science GCSE. This is in addition to the 59,000 who sat ICT (Information and Communication Technology); a qualification being ended this summer. However, the BCS - Chartered Institute of IT - warns the number studying for a computing qualification could halve by 2020. If that happens, it will have severe implications for the economy and leave children ill-equipped for the digital revolution.

The annual Computing Education Report from the University of Roehampton looks at how many pupils achieved GCSE and A-level computing qualifications in 2017. There are some positive numbers in the report - increasing numbers of schools are offering computer science at GCSE (52.5 per cent) and A level (36.2 per cent), and so now there's a good chance that a student will find CS on offer at their school. However, relatively few students choose to take the subject: at GCSE, only 11.9 per cent, and at A level, just 2.7 per cent.

The gender mix identified in the report also starkly shows the need to engage more girls in the subject. Since 2014, 30,000 fewer girls have

got a computing qualification by the age of 16. ICT is being phased out of the curriculum and disappears after this summer as an exam subject, being replaced at GCSE and A-level by the far more challenging computer science. The report says this subject is proving very hard - both for the students and for the schools which need to find the staff to teach it.

There is also concern that budgetary pressures will affect the ability of sixth form colleges to continue offering A-level computer science. Most of them have so few students taking the subject that they are below the minimum viable class size set by the Department for Education. The authors of the report call for ICT to be retained as an alternative so computing does not become exclusive. The overemphasis on computer science runs the risk that fewer students, particularly girls, will study any digital qualification at school.

What is most clear from the report is that despite much good work to date, there is an indisputable lack of young people with the work ready digital and computing skills that our economy needs. It's clear that action needs to be taken.



**“ Just 12 per cent of those working in engineering occupations were women compared with 47 per cent of the overall UK workforce ”**





**T**here is a growing movement, mostly originating in the United States, that STEM needs to be expanded to STEAM – adding the Arts to science, technology, engineering and maths. The thinking is that arts education is key to creativity, which in turn fosters innovation – a critical component of areas such as technology and science.

## STEAM is essential because...



Training in art education builds essential interpretative skills.

When STEM is combined with the arts through mutually reinforced objectives, a student's learning in both areas deepens considerably.

Plus, studying the arts has also contributed to development in:

- Critical thinking and problem solving
- Creativity and innovation
- Social and cross cultural skills
- Flexibility and adaptability

There are numerous inventions that would not have existed without the melding of science, technology and art: camouflage was invented by American painter Abbott Thayer; the pacemaker was based on a musical metronome; and medical stents and vehicle airbags were inspired by Japanese origami. Steve Jobs once told the New York Times, "The Macintosh turned out so well because the people working on it were musicians, artists, poets and historians who also happened to be excellent computer scientists." What set Apple apart was that the best ideas emerged from the intersection of technology and the humanities.

Championing the movement to forge links between the arts, science and technology is Rhode Island School of Design (RISD), in the US. They have developed a useful map which identifies local STEAM champions globally, and there are currently 104 organisations and individuals in the UK, including Birmingham City University, University of Chichester, Kielder Observatory and Derby Silk Mill (see <http://map.stemtosteam.org/> to view the map)

The objectives of the STEAM movement as outlined by RISD are to:

- Transform research policy to place Art and

### Design at the centre of STEM

- Encourage wider integration of Art and Design into the education system
- Influence employers to hire artists and designers to drive innovation

They also outline the wider benefits of a focus on STEAM as:

- Encourages natural curiosity
- Exposes students to the creative process
- Offers meaningful collaboration
- Increases critical thinking
- Provides a unique way to problem-solve
- Gives all students hands-on learning experiences
- Encourages girls to explore STEM fields
- Shows students a different way to value the arts

The "A" in STEAM is so important in education as art and design can bring STEM to life, the movement highlights. Those studying just science and maths can gain a narrow and closely prescribed way of thinking. Good science and maths is also centred on creativity, but the danger is that all that is encouraged and assessed is an ability to follow the taught curriculum. People who think for themselves, ask difficult

questions, generate new ideas, and can imagine how things might go wrong, are essential to our future.

Engineers who come up with new innovations need much more than maths, engineering, and technological skills. They also use design-thinking, creativity, communication, and artistic skills to bring innovations to fruition. Today's Google workers aren't just software engineers or coders sitting in front of computer monitors. They're design-thinkers, really creative individuals, working collaboratively in open workspaces, sharing ideas globally with other thinkers. Today's trailblazers are communicators who design, craft, experiment, and pioneer.

Businesses need true creativity if they are to grow and develop in the future. Innovation in science, technology and engineering requires the influence of art and design with its own unique problem-solving skills, entrepreneurial spirit and understanding of the user experience. Companies need to start looking for more creative talent and demanding focus on STEAM in the education system from policymakers.



# Engagement

## MATTERS

Isaac Occhipinti,  
Head of External  
Affairs

## An insight into EUA's External Affairs activity

**E**ngaging with external stakeholders is more important than ever. Keeping a close eye on policy developments, opportunities and threats is essential and matters to all organisations both large and small, commercial or not for profit.

Political processes are constantly evolving both nationally and at EU level and EUA's aim is to provide a trusted industry voice on behalf of members to help contribute towards better policy outcomes.

A common question asked of EUA is how we interact with politicians and policy makers, how the process works and what activities we undertake day to day.

The last question is fairly straightforward to answer. EUA now covers a broad spectrum, from boilers and hot water cylinders to pipes, gas storage and gas vehicles, we represent a large subset of the energy world. There are always a number of consultations and inquiries being held on areas our members are interested in. For example in May we had a call for evidence on the future of heat, three clean air consultations, two from Wales and one for the UK, an inquiry into Carbon Capture and Storage and one on Smart Appliances.

This requires the EUA Policy Team to analyse the questions, of which there can be anything from 10 to 50. The team then determine which can be answered in

house and which will require additional members input. In house responses typically require desk research and knowledge from our own experts such as from the technical teams in UN and HHIC.

For member input we will ask members directly, normally the request is for case studies and actual performance data for products or components. Member input into this process is vital as it adds significant weight to our arguments.

One of the key challenges we face is proving the statements that we make. For example on heating we know that decarbonised gas is the logical future. However, we need to prove that it is both





achievable and practical. We also have to argue that the alternative, in this case electrification, is both expensive and impractical. Case studies from members who are developing and selling products is particularly valuable here as it adds evidence from the field to our own theoretical arguments. These provide Government with the information on which they then make policy decisions.

Alongside our day to day work on consultations and helping with member enquiries for statistics and information, we actively engage with MPs and Government. The main reason for this is to help educate them on energy world facts.

Despite energy being deemed an important issue and energy bills being a constant in the news, knowledge about the complexities of the energy world is unfortunately low amongst parliamentarians. This can mean that sometimes parliament doesn't fully scrutinise energy policy when it comes to the house which leads to less effective policy. The Green Deal is the most obvious example of this. Because of a lack of understanding of what the Green Deal was actually proposing, MPs did not do enough to prevent its poor implementation and it was allowed to pass without some of the loop holes and issues being checked.

We believe that it is vital to engage with as many MPs as possible to try and inform them of the issues the energy world is facing, how this could affect their constituents now and in the future.

Currently we predominantly engage with them on the future of gas. We want to make sure that all MPs know that using decarbonised gas is the best and least disruptive way to decarbonise heat and heavy goods transport. To do this we inform them of what the alternatives would mean for their constituents, additional costs and measures and how it could affect energy bills. We also talk to them about the opportunities for the UK and how we will become a leader in decarbonisation technology.

We believe that we are making good progress. The Minister of State for

Energy and Clean Growth, Claire Perry recently said during a debate:

*"I accept that renewable energy without the necessary level of battery, solid state or liquid storage will not keep the lights on and give us the hot showers we want, which is why I am such a proponent of gas, particularly clean gas, in the system in future."*

This has been reiterated in subsequent press statements.

The Labour Energy Shadow Minister, Alan Whitehead has also publicly supported the move to green gas and hydrogen.

This is not a one off task. Not only do MPs change frequently, especially recently, but they have numerous other interests and challenges to tackle, some local, some national. Energy does not always top that list, especially locally. So EUA is regularly finding ways to remind MPs about the issues we care about, either through writing letters, sponsoring events, being active on social media or arranging breakfast briefings. The main challenge is to ensure our message is always finding a way to reach MPs.

Direct engagement is only one way to reach MPs. Another and potentially more effective way is to help other organisations write reports, either through sponsorship or by participating in the round tables and interviews for them. We have worked with a number of organisations in writing reports, the aim being to create a reference library of independent literature that helps EUA support the view that decarbonising gas is a key way to meet our UK decarbonisation goals. We have worked with Carbon Connect, Institute of Public Policy Research (IPPR), Respublica, Policy Exchange, the Energy Research Partnership and many others.

EUA believes that adding to the literature base is a key way to help support our overall position that the UK has to decarbonise gas, through green gas and hydrogen in order to meet our 2050 decarbonisation goals. It is the role of the EUA's policy team to ensure that MPs and policy makers agree.



Who's Who ?  
EUA External Affairs Team



Isaac  
Occhipinti  
Head of External Affairs



Edmund  
Abbs-Brown  
Parliamentary Officer



Sunny Parekh  
EUA Economist



Laurah  
Hutchinson Strain  
Head of Media

The Prime Minister's Cabinet is made up of senior members of Government. Every week during Parliament, members of the Cabinet meet to discuss the most important issues for Government. Ministers are chosen by the Prime Minister from the members of the House of Commons and House of Lords and are responsible for the actions, successes and failures of their departments.

Departments and their agencies are responsible for putting Government policy into practice. The Civil Service does the practical and administrative work of Government. Around half of all civil servants provide services direct to the public, including: paying benefits and pensions, running employment services, staffing prisons, issuing driving licences.

How does Parliament work

Parliament is made up of three central elements: the House of Commons, the House of Lords and the Monarchy. The main business of Parliament takes place in the two Houses. Generally the decisions made in one House have to be approved by the other. The House of Commons and the House of Lords use similar methods of scrutiny, although the procedures vary. The principal methods are questioning Government ministers, debating and the investigative work of committees. Parliament is there to represent citizen's interests and make sure they are taken into account by the Government. The Government cannot make new laws or raise new taxes without Parliament's agreement.

House of Commons

The House of Commons is the publicly elected chamber of Parliament. Members of the Commons debate the big political issues of the day and proposals for new laws. The UK public elects 650 MPs to represent their interests and concerns. MPs divide their time between Westminster and the area they represent (constituency).

House of Lords

The House of Lords is independent from, and complements the work of, the elected House of Commons. The Lords shares the task of making and shaping laws and checking and challenging the work of the Government. Those who sit in the House of Lords are not elected or paid. There are currently around 750 members, known as Lords or Peers with four types of member: Life Peers, Law Lords, Bishops and Hereditary Peers (who have inherited their title through their family). The majority of Lords are Life Peers, chosen because of the work they have done outside of Parliament. Lords can belong to a political party and some are chosen by the Government to work and represent one of their departments. Some Lords prefer to be independent and are known as Crossbenchers.

Much of the work of the House of Commons and the House of Lords takes place in committees, made up of around 10 to 50 MPs or Lords. These committees examine issues in detail, from Government policy and proposed new laws, to wider topics like the economy. The Government issues responses to most committee reports.

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EUA produce a weekly Political Monitoring service delivered directly to you inbox every Monday morning which covers:

- Political activity summary
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Contact [edmund@eua.org.uk](mailto:edmund@eua.org.uk) to be added to this mailing list





# Leading Voice

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## In this issue we talk to Helen Bray Director of Stakeholder Relations for SGN

**H**elen Bray's remit covers stakeholder engagement, customer experience, corporate communications, public affairs and business transformation. She joined SGN in January 2017.

### Career to date. What's been the most important lesson learned?

There is a well-known quote attributed to Jack Welch 'If the rate of change on the outside exceeds the rate of change on the inside, the end is near' which really resonates with me. I've worked across a range of different industries, oil, food, health, publishing, and although the speed of change has varied, a good radar has been essential to keep up with current and future changes on the way.

That's one of the reasons I enjoy doing what I do - much of my role is about bringing input from



the outside world into SGN. Making sure we are thinking about what our customers want from us, working with stakeholders and my colleagues across the business to solve common challenges.

### What does your background bring to your current role?

I've been lucky enough to work in different countries and cultures as well as in the public and private sector. In my early career, negotiating contracts in West Africa I was frequently navigating my way through very unfamiliar situations - I needed to be able to solve problems and think quickly - useful skills for later jobs as well as for family life!

My role at SGN is all about customers and stakeholders, working with all our teams across

the business. Our people work hard to understand what is important to customers and then improve what we do, making decisions that produce better joint outcomes for stakeholders and our business.

It's important that we can balance the needs of different and varied communities and tailor our approach to groups who may be harder to reach.

### What do you feel has been your greatest achievement (Career or otherwise)?

The achievements I feel happiest about probably couldn't be described as great. I'm happy that I've finally mastered my basic piano scales. And that I plucked up enough courage to take my motorbike off road in Morocco. Great fun.

### How would you describe your leadership style? What do you do differently and bring to the organisation?

My favourite model of leadership was developed by Kouzes and Posner in 'The Leadership Challenge', and I've tried over the years to follow it. They developed their model from observing the traits of successful leaders, and the fact that it is evidence-based appeals to the scientist in me. The Leadership Challenge says that leaders should do five things - model the way, inspire a shared vision, challenge the process, enable others to act and encourage the heart.

I can't say that I do all five all the time, but I find it helpful to have a mental framework to aspire to.



The element of leadership that I enjoy most is to inspire a shared vision. I often talk about 'joining the dots'. Within all large organisations there are a huge number of things to get done - initiatives, projects, goals, changes to make, targets to hit, outputs to achieve. The leadership team can help everyone across the business by painting a clear picture of the future, explaining what's really important and helping people to see how their efforts can help. And of course it's vital that the shared vision for an organisation is built on a good understanding of the outside world, the expectations of stakeholders and the pace of external change.

### How can we better attract young people into STEM careers and foster enthusiasm for science and engineering?

Engineering-based businesses provide interesting careers, but perhaps we need to think outside the traditional approach to STEM in order to attract a broader range of young people. If we want to attract more people to join our industry, perhaps there are lessons to be learned from other sectors. The technology sector has little difficulty in attracting the brightest young people to join - the opportunity to innovate, shape the future and drive change in society is a strong incentive. So, I have three questions. My first question to us all in STEM based businesses is to ask how we develop a truly innovative culture in our sector.

My second question for our educators in schools and universities is to ask how we can build



innovation and creativity into our approach to STEM. The US movement to combine the creative arts and humanities (A) with STEM talks about converting STEM to STEAM, using creativity to drive innovation. The current focus on designing around the user is an example of the way in which the creative arts are supporting the traditional engineering approach to provide new solutions. My theory - based on a non-representative sample of female friends and colleagues - is that a broader approach may also stimulate the interest of more women, particularly those who are innately curious and innovative.

My third question is for Government and policymakers. How can we combine creativity with STEM to drive innovation within industry, which will in turn drive a much-needed increase in the country's productivity. Perhaps Government-funded initiatives like Innovate UK's 'Women in Innovation' awards can help. This competition provides funding and mentoring support for women with innovative ideas. The programme recognises not just entrepreneurs but intrapreneurs - those who work inside larger businesses on innovative projects.

Individual companies can also do their bit to help broaden the range of those interested in a creative and innovative career in engineering. SGN has a long-term partnership with Solutions



for the Planet, a programme through which 2000+ students each year engage in STEM activities looking for creative solutions to sustainability and environmental issues. The programme's blend of creativity, innovation and STEM sparked a greater interest in STEM among three quarters of participants as reported in Solutions for the Planet's most recent evaluation.

And we have some great female role models spreading their knowledge and enthusiasm. For example this year, in celebration of International Women in Engineering Day 2018, SGN's Head of Engineering Policy Annabel West, and an all-female team from SGN invited children to make pigs fly by designing and testing pipeline pigs made of paper and straws. Ours was one of a number of activities - all hosted by female engineers - designed to showcase the exciting and unusual world of engineering at the Science Museum's festival.

I know many other companies are working on similar initiatives and I'd be interested to hear about what's happening and to discuss any ideas about how we could collaborate.

[Helen.bray@sgn.co.uk](mailto:Helen.bray@sgn.co.uk)





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ALH Systems Ltd  
AVK UK Limited  
Baker Hughes (a GE Company)  
BJIC Consulting  
Browne Jacobson  
Buss Metering Services Ltd  
Cadent  
Calvin Capital Ltd  
Cerro EMS  
Clancy Docwra Ltd  
CNG Services Ltd  
ControlPoint  
Crane Building Services & Utilities  
Develop Training Ltd



ADBA  
Air Liquide  
BOC  
British Compressed Gases Association (BCGA)  
Cadent  
Calor Gas Ltd  
CNG Fuels Ltd

CNG Services Ltd  
Element Energy  
Engie Urban Energy Group  
Gas Networks Ireland  
Gasrec  
Iveco Ltd  
National Grid Gas (Transmission) plc

National Grid Grain LNG Ltd  
Northern Gas Networks  
Sainsburys Supermarkets Ltd  
SGN  
UKOOG  
Wales & West Utilities



The logo for 'Gas twenty 18' is a large white teardrop shape containing the text 'Gas twenty 18' in a bold, sans-serif font. The background of the entire poster is a collage of images related to the gas industry, including a worker in a hard hat and safety vest, industrial pipes and valves, a gas flare, and a gas turbine.

# Gas twenty 18

**THE NEXT 50 YEARS**  
**WEDNESDAY 7 NOVEMBER 2018**

The National Space Centre, Exploration Way, Leicester, LE4 5NS

## How gas can support a low carbon future

There are a wealth of challenges facing the industry in the coming years with fast approaching carbon budgets, the 'energy trilemma' and significant political instability.

Gas can support a low carbon future not just in the energy sector, but in heat, transport and industry, and will play a crucial role in the overall energy mix.

From a view of the gas grid in 2068 and a look at what are our cities might do, to future scenarios for heating homes and developments in gas appliances, this event examines the challenges and opportunities our industry faces.

For sponsor, exhibiting or booking information please contact Natalie Burrows

[natalie@eua.org.uk](mailto:natalie@eua.org.uk) 01926 513741 or visit [www.eua.org.uk/gas-2018](http://www.eua.org.uk/gas-2018)