

CIBSE

JOURNAL



The official magazine of the Chartered Institution of Building Services Engineers

February 2016

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**CAREERS
SPECIAL**

INTO THE SPOTLIGHT

**Building services salary survey reveals big pay rises
as skills shortage puts engineers centre stage**

Driving change

Engineers' knowledge key
to low carbon future

Bright lights

Young professionals take on
London's latest landmarks

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Most wanted

This is a good time to be a building services engineer. The demand for their services is at fever pitch, and salaries are growing to reflect the fact demand is outstripping supply. The Hays Salary Guide reveals pay across all building services roles went up by 5% in the year to September 2015, and the salaries of intermediate M&E design engineers jumped by more than 7.5%. The shortage of good engineers in the marketplace means that candidates with the right skills could walk into a recruitment agency and have the pick of up to 20 roles (see page 9).

Pay increases for existing senior engineers account for some of the rises as companies end salary freezes in light of growth in the construction sector since 2013. If firms are going to honour big design contracts, they must offer incentives to retain experienced engineers to lead these projects.

Of course, people don't come into the industry just because of good remuneration, they're also attracted by the opportunity to make a difference. Our feature on page 4 highlights how engineers' contribution will be essential if nations are to meet commitments spelled out at last year's climate change conference in Paris.

For young engineers, the work available in the sector is rich and varied. We focus on two up-and-coming engineers at ChapmanBDSP and Aecom, who had the privilege of working on two iconic London schemes – 20 Fenchurch Street and Southbank Place. These are not straightforward projects and the myriad skills of engineers will be called upon if we are to integrate sustainable new buildings into our crowded cities successfully.

Alex Smith, editor
asmith@cibsejournal.com

**CONTENTS****04 RISING TO THE CHALLENGE**

Profiles of three environmental engineers who are on the front line in the fight against climate change

09 BANKABLE STARS

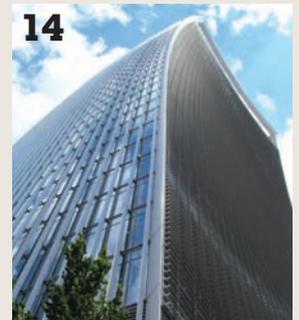
Our exclusive Hays Salary Guide reveals some rises of more than 7% for building services engineers

13 DIRECTORY

Directory of education and training providers

14 WALKING TALL

Two young engineers share their experiences of working on buildings designed by some of the biggest names in architecture



Welcome from CIBSE

CIBSE wants to attract as many people into the building services industry as possible, and show them what an exciting and innovative profession it can be to work in.

By producing this guide, we hope to encourage students to consider building services engineering as a serious option for their future.

Building services engineers are at the forefront of developing environmentally friendly, high-performing buildings. The career is diverse and exciting, covering everything from initial building

design to final operation, heating and ventilation systems, lighting design and building façades.

Building services engineers graduating today will be developing the buildings of the future and shaping the world we will live in.

As part of CIBSE's commitment to nurturing engineering talent, we give all full-time engineering students free CIBSE membership for the duration of their course; a small fee is payable for those studying on a part-time basis. As a member you can gain

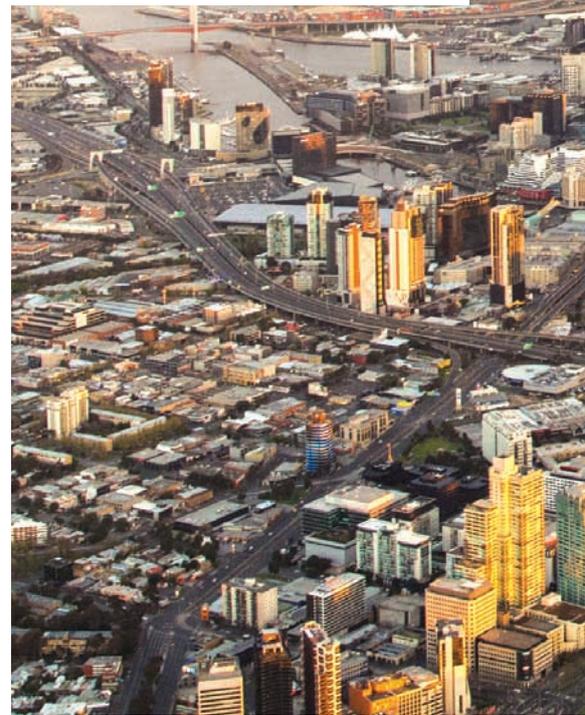
access to the huge resource which is our CIBSE Knowledge Portal, and the wealth of information it offers.

CIBSE's student initiative is designed to give engineering students access to CIBSE's vast vault of knowledge as well as first-class help and guidance throughout their studies, and onto the first steps of their professional engineering careers.

If you'd like more information about choosing a career in building services, and routes into the industry, please visit our website www.cibse.org

RISING TO THE CHALLENGE

Building services engineers are on the front line of the fight against climate change, and their expertise is crucial if the global carbon targets agreed in Paris are to be achieved. **Roxane McMeeken** looks at opportunities in the industry and profiles three engineers who are making a difference



OPPORTUNITIES

Building services cover a wide-ranging brief

- Management of the environmental performance of buildings throughout their life-cycles – the ‘cradle to grave’ approach
- Collaboration with world-leading clients, architects, interior designers, structural engineers and more
- Opportunities to work all over the world
- A role at the heart of construction projects – becoming even more integral because of the growing importance of energy efficiency
- A front-line place in the ongoing battle against global climate change
- Exciting projects, such as stadiums, skyscrapers, science laboratories, music venues, schools in developing countries, multinationals’ headquarters, hospitals, art galleries and museums
- Working with cutting-edge and rapidly changing technology, including building information modelling
- Membership of CIBSE – a highly respected and agenda-setting body.

The buildings and construction sector is responsible for almost one-third of global CO₂ emissions, according to the United Nations Framework Convention on Climate Change (UNFCCC). For this reason, the battle to achieve many of the aspirations set out at the UNFCCC’s recent international climate change talks in Paris, COP21, will be fought out in the built-environment sector.

So if you want to tackle climate change, this is the industry to join. Philippe Honnorat, head of building services at global engineering giant WSP Parsons Brinckerhoff, says: ‘At COP21, countries pulled together to form policies, but it will be engineers that put those policies into practice.’

Why building services?

The UNFCCC says buildings and construction are responsible for 30% of global carbon emissions, and this figure could hit 50% by 2050. So COP21, in December, looked at how the built environment can contribute to the conference’s goal of limiting global temperature rise to 2°C. COP21 Buildings Day set out high-level aspirations, including: collaboration to improve the scale and efficiency of initiatives; increasing the efficiency of building systems and envelopes; mainstreaming low greenhouse gas emissions materials; and lowering the emissions of new and existing buildings.

Much of this boils down to improving building services systems, such as cooling, heating, lifts, lighting, plumbing and ventilation, that consume energy and water. So the people who design these are on the front line of the fight against climate change. What’s more, building services is becoming ever-more innovative, as the built environment strives to reduce its impact, and the industry becomes increasingly digitised.

Ryan Rodrigues, an electrical engineering consultant at Hurleypalmerflatt, says: ‘COP21 has helped to show the importance of what building services engineers do. Our role is to ensure buildings are as energy efficient as possible and every bit of difference each of us can make adds up.’

There are several areas in which building services engineers can have a powerful



NILS VERSEMANN / SHUTTERSTOCK

Dwight Wilson

As digital engineering manager at Imtech, Dwight Wilson is developing processes and technologies that allow the company to integrate



building information modelling (BIM) into everything it does. Wilson also sits on the Construction Industry Council's BIM 2050 group, which is driving take-up of the technology throughout the sector.

Wilson says: 'Through BIM, all the different companies working on a project exchange information because they all work on the shared digital model. This sweeps away potentially adversarial relationships between firms and gets everyone collaborating towards shared objectives.' This opens up new possibilities for innovation and energy efficiency: 'You can predict the energy used to construct, run and even demolish a building, so you start to achieve much more efficient buildings,' Wilson adds.

'Those of us working in BIM have a real sense of being in a community, because we are all trying to be progressive. By 2050, working digitally will be standard. It'll be like word processing is today. It's exciting to be involved in bringing about this change.'

impact, Rodrigues says. 'Some of the most effective fixes are installing LED [low energy] lighting.' Motion and light-level detectors can be added to ensure lights only come on when needed. In some cases, promoting a design that maximises natural light can slash the energy bill. Heating and cooling requirements can also be balanced and rationalised, starting with installing insulation to reduce the need for electrically powered temperature-control systems.

The next fundamental job is to study how and when the building will be used, and then to adjust the size of the electrical plant to match. 'Plant runs at its most efficient when 100% of it is being used,' says Rodrigues. 'If you have, say, an oversized air conditioning system running at 30%, that will be really inefficient.' As Honnorat puts it: 'You don't

buy a Maserati if you mainly drive around London; you buy an electric car.'

Buildings can be designed to be super-sustainable but, if they are not used as intended, planned energy savings can be lost. Clare Wildfire, technical director at global engineering and development consultancy Mott MacDonald, says building services engineers have an increasing role to play in educating occupiers: 'Often, new buildings have complex systems and controls to minimise energy and water consumption, and – if end-users are unsure of how to work the technology – there is a tendency to just leave everything on, which can reverse what the systems are supposed to achieve.'

Building services engineers are also increasingly involved in more experimental solutions. Susie Diamond, partner at Inklings

Building services is becoming ever-more innovative, as the built environment strives to reduce its impact and the industry becomes increasingly digitised

▶ and vice-chair of the CIBSE Resilient Cities Group, says: 'One exciting new area is "green infrastructure", which uses plants to help regulate atmospheric conditions, reducing the need for artificial means. A "living wall" in an atrium could generate oxygen during the day, reducing the need for fresh air to be pushed in by electrically powered fans.'

The idea can also be applied at city level, where adding greenery is believed not only to benefit the local climate, but also to improve the health, wellbeing and perhaps even productivity of the inhabitants.

'While reducing energy is a critical goal, decarbonising the energy we do use is also vital,' says Susan Hone-Brookes, environmental leader, Laing O'Rourke. 'Adopting and understanding the correct deployment of renewable and emerging technologies – such as wind, solar, biomass and fuel-power cells – will be critical in delivering the cities of the future.'

It is down to building services engineers to make this happen at the level of individual buildings. They will also have to implement more experimental solutions, such as nuclear fusion. Different from fission, which is widely used, fusion is said to be so potent that it would allow the atoms in a single glass of water to power a city for a year.

Building services engineers are making significant strides in reducing the energy consumption of buildings. As a result, 'a new focus is growing around the energy that goes into the materials and products used in their construction', says Hone-Brookes. Building services engineers can make a difference in this area, she adds, 'by designing buildings that use responsibly sourced really low carbon materials, made using low carbon techniques, and which involve the minimum amount of time to transport to the site'.

Cities and resilience

Tackling climate change is not only a matter of reducing the resources we use, however. 'It's also about adapting to the change,' says Polly Turton, climate change and adaptation consultant at engineering consultant Arup. This means designing a built environment that can withstand warmer temperatures, stronger storms and rising sea levels.

Arup has exemplified this approach with its work on 100 City Road, a development in London comprising a 16-storey office building and five lower-rise, new-build and refurbished buildings, offering a mix of facilities. Arup analysed the future climate-change risks facing the development and identified 10 adaptation options. These

included relaxing thermal comfort criteria. 'We need to redefine our definition of comfort in offices, as well as some of our cultural norms,' says Turton. So we can expect to dress less traditionally at work, to wear clothes to keep warmer or cooler, and to reduce our reliance on electrical systems for cooling and heating offices.

To be as resilient as possible to climate change, an approach is required that 'looks beyond individual buildings and addresses their wider context, including the infrastructure around them', says Turton. This is the focus of the CIBSE Resilient Cities Group, with which Turton is involved. Resilience, she says, is about ensuring that the urban environment promotes the health and wellbeing of residents, supports the economy and society, and is robust in terms of leadership, strategy, systems and services.

At city level, building services engineers can create economies of scale to preserve energy and water. Installing district energy systems will make the most effective use of energy across multiple types of buildings. For instance, waste heat from offices can be used to warm homes and swimming pools.

James Bourne

During his career in building services, James Bourne has worked on airport towers, gas turbines, a new army base in Iraq and security-sensitive telecoms tunnels beneath



London. He has also run his own business and is now head of a multidisciplinary practice in Colchester, part of Atkins.

All this began with an apprenticeship as an electrical engineer, aged 17. Bourne says: 'I worked while doing day release at college and qualified as an electrician in my early 20s.' After working on site, he moved into project management before launching his own company. 'We provided electrical testing and design to local authorities and contractors.'

He was later recruited by Atkins as a building services team leader, and was sponsored to do first a degree, and then an MSc, in building services design, and to become chartered with CIBSE.

Today, Bourne's focus is on interdisciplinary collaboration. 'The sooner we are involved in a project, and the more closely we work with other disciplines – ideally on a shared BIM model – the bigger the impact we can have on a building's heating and ventilation requirements.'



Ryan Rodrigues

London-based electrical engineering consultant Ryan Rodrigues was crowned CIBSE Graduate of the Year in 2015. He achieved his Bachelor's degree before joining Hurleypalmerflatt (HPF), and then completing his Master's, which was part-sponsored by HPF.



Rodrigues' specialism is lighting. He says: 'There are so many mechanisms you can specify to improve the energy efficiency of buildings, but one of the most effective is in lighting, through LED [low energy] lighting, lighting control systems and renewable energy. LED lighting is probably the most powerful, because it tends to reduce the energy used for lighting by 30-40%.'

The challenge is to convince developers to pay the extra costs of LED lighting. If the developer will also be the occupier, this is an easy case to argue. 'They will recover their capital costs through cheaper running costs in around four years,' says Rodrigues. If the developer is selling the building, the case can still be made: 'They can market the buildings as having lower energy bills and contributing to companies' efforts to do their bit for the environment.'

More than a half of the world's population are now urban dwellers, according to the United Nations, and 66% of us will live in a city by 2050. To position the built environment to address climate change will require building services engineers to work closely with other construction disciplines. This is because each discipline makes decisions that impact on the energy efficiency and climate risk of a building, says Wildfire. 'We need to work with clients and architects at the inception of projects to ensure the building's overall design reduces the requirements on its cooling and heating plant,' she says. 'This could mean ensuring that the building is orientated to minimise solar gain, or steering the design away from a fully glazed façade.'

This need for collaboration is being supported by growing digitisation within the industry. Building information modelling (BIM) allows all members of a project team to work on a shared 3D model of the project. This helps the various disciplines to 'see' each other's work, opening up new potential for efficient and complementary designs and construction processes, as well as vastly improved clash detection.

As the industry moves to implement the aspirations of COP21, however, it will face challenges. 'It will be difficult for a single stakeholder to implement the changes needed, so we will need a coordinated effort by city mayors, the private sector, academia and civil society,' says Turton. The key, she adds, will be identifying 'win-win solutions', such as a more comfortable built environment that not only saves energy, but also promotes health and wellbeing.

A key battle for building services engineers will be persuading developers to invest in greener buildings, even when they are not going to be the occupier. Wildfire says: 'You have to translate the need for resilience and sustainability into commercial terms. Our role is to make arguments, such as buildings that use less power will reduce the demand on the power network - which, in turn, reduces the likelihood of blackouts and the risk to business continuity.'

As building services engineers begin turning the aspirations of COP21 into reality, the road will not be easy. However, the discipline promises to provide meaningful and interesting career opportunities. 

At city level, adding greenery is believed not only to benefit the local climate, but also to improve the health and wellbeing of the inhabitants

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– Kayley Lockhead, ACIBSE IEng, UK



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BANKABLE STARS

Building services engineers are currently the most sought-after professionals in construction, with the latest Hays Salary Guide revealing inflation-busting wage rises of more than 7%. **Roxane McMeeken** asks whether firms can afford the sharp jump in pay

‘We are finding it hard to recruit the right skills. When we do find someone we want to hire, they often come back to us saying they’ve had a counter-offer. We try to beat it – depending on the case – but we won’t be pressurised every time,’ says Jay Amin, head of human resources at Hurleypalmerflatt.

It’s a statement that seems to reflect the fraught recruitment experiences of most building services engineering firms.

The competition for building services engineers has been at fever pitch for 18 months. Salary rises for this group have far outstripped the average rise for all professionals, and a candidate walking into a recruitment agency with the right skills could find 20 roles to apply for.

Demand shows little sign of cooling off in the year ahead, but can salaries keep increasing at the same rate – especially while the fees earned by companies in the sector continue to remain little changed? And aside from money, what else can employers do to recruit and retain staff in this particularly bruising battle for talent?

20 jobs per candidate

According to the latest salary guide and survey of employers and candidates, compiled by recruitment agent Hays exclusively for CIBSE, the average pay increase across all building services roles during the 12 months to September 2015 was 5%. This is higher than the growth of 2.3% seen over the same period in the UK average salary across all professions. Building

Consultant: director

| | Typical 2016 | Min 2016 | Max 2016 |
|--------------------------------------|----------------|----------------|----------------|
| London | £85,000 | £80,000 | £100,000 |
| South West | £55,000 | £52,000 | £65,000 |
| South East | £67,000 | £62,000 | £72,000 |
| Wales | £53,000 | £52,000 | £57,000 |
| East of England | £61,000 | £50,000 | £70,000 |
| West Midlands | £60,000 | £55,000 | £65,000 |
| East Midlands | £57,500 | £55,000 | £65,000 |
| North West | £60,000 | £50,000 | £65,000 |
| Yorkshire & the Humber | £50,000 | £42,000 | £54,000 |
| Northern Ireland | £60,000 | £45,000 | £70,000 |
| North East | £50,000 | £42,000 | £54,000 |
| Scotland | £55,000 | £50,000 | £60,000 |
| National average | £59,458 | £52,917 | £66,417 |
| % increase year on year 4.62% | | | |

SHUTTERSTOCK/DENIS MAKARENKO

services also beat the average pay rise seen in the wider construction and property sector of 3.6%.

For some building services roles, Hays identified even stronger uplifts in salaries. Intermediate design engineers (mechanical and electrical) saw the highest growth within consulting roles, with a national average salary increase of 7.57%. On the contracting side, senior contract managers enjoyed the highest increases, with a national average rise of 8.34%.

While Hays records salaries for new appointments, its survey of employers revealed that there have been widespread pay rises for existing staff members, with 69% of employers enjoying increased salaries in the past 12 months. Those interviewed for this feature suggested that the degree of pay rises for existing staff members more or less matches those of new recruits.

ChapmanBDSP, for example, confirmed it had increased salaries in 2014 by an average of 6%, excluding promotions. The firms we

spoke to also agreed that senior engineers were most sought-after, as well as all those with experience of building information modelling (BIM) – the former as a result of a long-term skills gap, and the latter down to a lack of experts in relatively new – but increasingly in-demand – 3D-modelling technology.

The demand for talent is, in large part, being spurred by the increase in activity. Recently released construction output figures from Markit/CIPS showed that, in October, the construction sector saw its fastest increase in new work for 12 months.

While output slowed somewhat in November, the survey recorded a return to growth in December, with commercial construction leading the bounce and hitting a 14-month high. Richard Gelder, UK director, property and built environment, at Hays, says: ‘The recovery phase from late 2013 to early 2015 meant firms experienced a sudden rise in workload, so employers had to start building teams.’

Consultant: associate

| | Typical 2016 | Min 2016 | Max 2016 |
|-------------------------------|----------------|----------------|----------------|
| London | £68,000 | £60,000 | £75,000 |
| South West | £51,000 | £48,000 | £60,000 |
| South East | £56,000 | £52,000 | £60,000 |
| Wales | £50,500 | £40,000 | £52,000 |
| East of England | £51,000 | £50,000 | £65,000 |
| West Midlands | £50,000 | £48,000 | £55,000 |
| East Midlands | £50,500 | £50,000 | £55,000 |
| North West | £50,000 | £45,000 | £55,000 |
| Yorkshire & the Humber | £45,000 | £42,000 | £48,000 |
| Northern Ireland | £50,000 | £45,000 | £55,000 |
| North East | £42,000 | £38,000 | £45,000 |
| Scotland | £50,000 | £50,000 | £55,000 |
| National average | £51,167 | £47,333 | £56,667 |
| % increase year on year 5.50% | | | |

Consultant: senior design engineer (M&E)

| | Typical 2016 | Min 2016 | Max 2016 |
|-------------------------------|----------------|----------------|----------------|
| London | £55,000 | £50,000 | £65,000 |
| South West | £45,000 | £40,000 | £50,000 |
| South East | £51,000 | £45,000 | £55,000 |
| Wales | £43,500 | £38,000 | £45,000 |
| East of England | £45,000 | £34,000 | £55,000 |
| West Midlands | £42,000 | £38,000 | £45,000 |
| East Midlands | £43,000 | £40,000 | £50,000 |
| North West | £43,000 | £38,000 | £48,000 |
| Yorkshire & the Humber | £40,000 | £38,000 | £45,000 |
| Northern Ireland | £38,000 | £35,000 | £44,000 |
| North East | £43,000 | £40,000 | £45,000 |
| Scotland | £44,000 | £40,000 | £45,000 |
| National average | £44,375 | £39,667 | £49,333 |
| % increase year on year 4.62% | | | |

Consultant: Revit/BIM technician

| | Typical 2016 | Min 2016 | Max 2016 |
|-------------------------------|----------------|----------------|----------------|
| London | £41,000 | £40,000 | £55,000 |
| South West | £35,000 | £30,000 | £40,000 |
| South East | £38,000 | £35,000 | £42,000 |
| Wales | £34,000 | £30,000 | £35,000 |
| East of England | £30,000 | £28,000 | £37,000 |
| West Midlands | £29,000 | £26,000 | £34,000 |
| East Midlands | £29,000 | £25,000 | £35,000 |
| North West | £34,000 | £28,000 | £36,000 |
| Yorkshire & the Humber | £32,000 | £28,000 | £35,000 |
| Northern Ireland | £24,000 | £22,000 | £28,000 |
| North East | £32,000 | £28,000 | £35,000 |
| Scotland | £25,000 | £23,000 | £30,000 |
| National average | £31,917 | £28,583 | £36,833 |
| % increase year on year 5.80% | | | |

Consultant: intermediate design engineer (M&E)

| | Typical 2016 | Min 2016 | Max 2016 |
|-------------------------------|----------------|----------------|----------------|
| London | £38,000 | £32,000 | £40,000 |
| South West | £35,000 | £30,000 | £40,000 |
| South East | £32,000 | £30,000 | £35,000 |
| Wales | £34,000 | £28,000 | £35,000 |
| East of England | £35,000 | £30,000 | £40,000 |
| West Midlands | £28,000 | £25,000 | £32,000 |
| East Midlands | £31,000 | £30,000 | £38,000 |
| North West | £32,000 | £28,000 | £35,000 |
| Yorkshire & the Humber | £25,000 | £22,000 | £28,000 |
| Northern Ireland | £25,000 | £23,000 | £28,000 |
| North East | £29,500 | £28,000 | £32,000 |
| Scotland | £32,000 | £30,000 | £38,000 |
| National average | £31,375 | £28,000 | £35,083 |
| % increase year on year 7.57% | | | |

Consultant: junior design engineer (M&E)

| | Typical 2016 | Min 2016 | Max 2016 |
|-------------------------------|----------------|----------------|----------------|
| London | £28,000 | £24,000 | £30,000 |
| South West | £25,000 | £24,000 | £28,000 |
| South East | £28,000 | £26,000 | £32,000 |
| Wales | £23,500 | £22,000 | £25,000 |
| East of England | £23,000 | £17,500 | £25,000 |
| West Midlands | £21,000 | £18,000 | £22,000 |
| East Midlands | £24,000 | £20,000 | £25,000 |
| North West | £23,000 | £21,000 | £25,000 |
| Yorkshire & the Humber | £20,000 | £18,000 | £24,000 |
| Northern Ireland | £23,000 | £20,000 | £24,000 |
| North East | £21,000 | £18,000 | £24,000 |
| Scotland | £25,000 | £22,000 | £28,000 |
| National average | £23,708 | £20,875 | £26,000 |
| % increase year on year 3.64% | | | |

Contractor: senior contracts manager

| | Typical 2016 | Min 2016 | Max 2016 |
|-------------------------------|----------------|----------------|----------------|
| London | £60,000 | £50,000 | £70,000 |
| South West | £45,000 | £45,000 | £50,000 |
| South East | £55,000 | £50,000 | £60,000 |
| Wales | £46,000 | £40,000 | £50,000 |
| East of England | £49,000 | £45,000 | £58,000 |
| West Midlands | £48,500 | £40,000 | £55,000 |
| East Midlands | £44,000 | £43,000 | £55,000 |
| North West | £43,000 | £40,000 | £50,000 |
| Yorkshire & the Humber | £37,000 | £34,000 | £43,500 |
| Northern Ireland | £42,000 | £38,000 | £45,000 |
| North East | £38,500 | £30,000 | £45,000 |
| Scotland | £44,000 | £38,000 | £47,000 |
| National average | £46,000 | £41,083 | £52,375 |
| % increase year on year 8.34% | | | |

But building teams has not been easy. Gelder says that, in building services, 'there are probably 10 to 15 jobs per candidate on average. It varies; mechanical design engineers might have 10 jobs, but a Revit [BIM] specialist could have 20'.

This dramatic supply and demand scenario is not down to rising workloads alone. Off the record, some employers told *CIBSE Journal* that they believe recruitment agents have been 'stoking' wage rises. However, Gelder denies this. 'We are not the ones paying the salaries,' he says.

He attributes the situation, in part, to a chronic lack of skills. 'Even during the recession there was a shortage of skills in building services. The market has never really had an excess. Yes, people were laid off in the recession, but I believe more people retired and fewer entered the industry.'

In addition, the recent salary rises have also 'corrected' pay levels to counter the wage freezes and salary cuts seen during the seven-year downturn. Jerry Lehane,

ChapmanBDSP's managing director, says: 'We had a few years without pay rises, so we increased salaries partly to adjust for that.'

Yet, over the past 18 months, building services firms have found that even their newly pumped-up salaries are insufficient to lure candidates. Many we interviewed report



BRENDER/ONDON / SHUTTERSTOCK

that it has become routine for a candidate about to sign a contract to reveal they have been made a counter-offer by either their existing employer or a rival recruiter. Lehane says that in this scenario, there are two choices: 'You can either try to compete with the silly salaries being offered or walk away. But those firms that choose to compete know that, as consultants, our largest overhead is salaries and we all earn roughly the same sorts of fees - so people can't be employing all their staff on these inflated salaries.'

Strategic hires

Indeed, with fees showing little sign of rising anywhere near as dramatically as salaries, the rates at which pay has been increasing looks unlikely to continue this year. Gelder says: 'In 2016, we will see the rate of growth slow down. I expect building services salaries to rise on average nationally by 2.5% to 3%.'

Another factor behind this looming change in the recruitment market, Gelder says, is that 'those who really wanted to move have moved and people have grown the bulk of their teams. Most employers now need just one or two people, so recruitment in 2016 will be about strategic hires or replacing someone'.

But it will be no easier to fill these vacancies. 'Employers are resigned to it taking six months to fill a role,' Gelder says. This headache is set to affect the majority of employers too. Hays's survey of firms found that 71% expect activity levels to rise over the next 12 months and 82% plan to recruit.

If major salary rises are not in the pipeline, how else will firms attract candidates and retain their best people? Philippe Honnorat, head of building services at global WSP Parsons Brinckerhoff, believes the emphasis will now shift to bonuses - especially as

Consultant: CAD technician

| | Typical 2016 | Min 2016 | Max 2016 |
|--------------------------------------|----------------|----------------|----------------|
| London | £34,000 | £30,000 | £38,000 |
| South West | £28,000 | £25,000 | £30,000 |
| South East | £31,000 | £28,000 | £34,000 |
| Wales | £27,500 | £23,000 | £28,000 |
| East of England | £28,000 | £25,000 | £37,000 |
| West Midlands | £26,000 | £23,000 | £30,000 |
| East Midlands | £27,500 | £25,000 | £30,000 |
| North West | £26,000 | £23,000 | £30,000 |
| Yorkshire & the Humber | £25,000 | £22,000 | £28,000 |
| Northern Ireland | £20,000 | £18,000 | £23,000 |
| North East | £24,000 | £21,000 | £25,000 |
| Scotland | £21,000 | £20,000 | £25,000 |
| National average | £26,500 | £23,583 | £29,833 |
| % increase year on year 6.71% | | | |

Contractor: director

| | Typical 2016 | Min 2016 | Max 2016 |
|--------------------------------------|----------------|----------------|----------------|
| London | £85,000 | £70,000 | £100,000 |
| South West | £55,000 | £50,000 | £58,000 |
| South East | £67,000 | £60,000 | £75,000 |
| Wales | £53,500 | £52,000 | £60,000 |
| East of England | £55,000 | £50,000 | £70,000 |
| West Midlands | £58,000 | £55,000 | £70,000 |
| East Midlands | £52,000 | £47,000 | £57,000 |
| North West | £55,000 | £50,000 | £60,000 |
| Yorkshire & the Humber | £56,000 | £55,000 | £60,000 |
| Northern Ireland | £60,000 | £50,000 | £75,000 |
| North East | £52,000 | £48,000 | £60,000 |
| Scotland | £50,000 | £45,000 | £55,000 |
| National average | £58,208 | £52,667 | £66,667 |
| % increase year on year 5.00% | | | |

Contractor: contract quantity surveyor

| | Typical 2016 | Min 2016 | Max 2016 |
|--------------------------------------|----------------|----------------|----------------|
| London | £55,000 | £45,000 | £75,000 |
| South West | £40,000 | £38,000 | £45,000 |
| South East | £53,000 | £50,000 | £65,000 |
| Wales | £38,500 | £34,000 | £44,000 |
| East of England | £37,500 | £30,000 | £40,000 |
| West Midlands | £38,000 | £33,000 | £40,000 |
| East Midlands | £40,000 | £40,000 | £45,000 |
| North West | £38,000 | £38,000 | £42,000 |
| Yorkshire & the Humber | £35,000 | £30,000 | £40,000 |
| Northern Ireland | £35,000 | £31,000 | £38,000 |
| North East | £36,500 | £32,000 | £42,000 |
| Scotland | £40,000 | £35,000 | £42,000 |
| National average | £40,542 | £36,333 | £46,500 |
| % increase year on year 5.30% | | | |



Survey highlights

More than two thirds (69%) of employers increased salaries in the 12 months to September 2015, and nearly the same number (68%) expect salaries to increase again during the following 12 months.

Despite salary increases, 59% of employees say they are unhappy with their salary. Just 36% asked for a pay rise in the past year and, of those, only 45% were successful in their request.

Nearly two-thirds (64%) of employees anticipate moving jobs in the next 12 months.

Some 58% of employees feel there is scope for career progression within their current organisation.

The benefits rated most important to building services professionals when considering a new role were:

- More than 25 days annual leave and flexible working (both rated a priority by 44% of employees)
- An above-statutory pension contribution (36%)
- A company car or car allowance (28%).

Contractor: project manager

| | Typical 2016 | Min 2016 | Max 2016 |
|-------------------------------|----------------|----------------|----------------|
| London | £60,000 | £50,000 | £65,000 |
| South West | £45,000 | £40,000 | £45,000 |
| South East | £55,000 | £50,000 | £60,000 |
| Wales | £40,000 | £37,000 | £42,000 |
| East of England | £45,000 | £38,000 | £55,000 |
| West Midlands | £42,000 | £35,000 | £50,000 |
| East Midlands | £43,000 | £40,000 | £46,000 |
| North West | £42,500 | £40,000 | £50,000 |
| Yorkshire & the Humber | £43,000 | £40,000 | £57,000 |
| Northern Ireland | £35,000 | £33,000 | £36,000 |
| North East | £42,500 | £40,000 | £50,000 |
| Scotland | £40,000 | £38,000 | £47,000 |
| National average | £44,417 | £40,083 | £50,250 |
| % increase year on year 4.92% | | | |

Contractor: project engineer

| | Typical 2016 | Min 2016 | Max 2016 |
|-------------------------------|----------------|----------------|----------------|
| London | £44,000 | £35,000 | £50,000 |
| South West | £35,000 | £35,000 | £45,000 |
| South East | £36,000 | £32,000 | £40,000 |
| Wales | £34,000 | £28,000 | £35,000 |
| East of England | £35,000 | £30,000 | £40,000 |
| West Midlands | £36,000 | £30,000 | £40,000 |
| East Midlands | £34,500 | £30,000 | £38,000 |
| North West | £35,000 | £32,000 | £38,000 |
| Yorkshire & the Humber | £32,000 | £30,000 | £40,000 |
| Northern Ireland | £30,000 | £28,000 | £33,000 |
| North East | £31,000 | £27,500 | £35,750 |
| Scotland | £36,000 | £29,000 | £37,000 |
| National average | £34,875 | £30,542 | £39,313 |
| % increase year on year 7.00% | | | |

Contractor: CAD technician

| | Typical 2016 | Min 2016 | Max 2016 |
|-------------------------------|----------------|----------------|----------------|
| London | £36,000 | £30,000 | £45,000 |
| South West | £28,000 | £25,000 | £30,000 |
| South East | £31,000 | £28,000 | £35,000 |
| Wales | £26,500 | £24,000 | £34,000 |
| East of England | £24,000 | £22,000 | £26,000 |
| West Midlands | £26,000 | £22,000 | £32,000 |
| East Midlands | £27,500 | £25,000 | £30,000 |
| North West | £26,000 | £23,000 | £30,000 |
| Yorkshire & the Humber | £24,000 | £21,000 | £26,500 |
| Northern Ireland | £25,000 | £22,000 | £26,500 |
| North East | £26,500 | £22,000 | £25,000 |
| Scotland | £21,000 | £18,000 | £22,000 |
| National average | £26,792 | £23,500 | £30,167 |
| % increase year on year 4.89% | | | |

Contractor: estimator

| | Typical 2016 | Min 2016 | Max 2016 |
|-------------------------------|----------------|----------------|----------------|
| London | £50,000 | £45,000 | £60,000 |
| South West | £38,000 | £35,000 | £45,000 |
| South East | £49,000 | £45,000 | £55,000 |
| Wales | £35,000 | £30,000 | £37,000 |
| East of England | £40,000 | £32,000 | £45,000 |
| West Midlands | £38,000 | £28,000 | £40,000 |
| East Midlands | £40,000 | £35,000 | £45,000 |
| North West | £36,000 | £35,000 | £42,000 |
| Yorkshire & the Humber | £33,000 | £25,000 | £35,000 |
| Northern Ireland | £31,000 | £30,000 | £36,000 |
| North East | £35,000 | £29,000 | £36,750 |
| Scotland | £35,000 | £30,000 | £38,000 |
| National average | £38,333 | £33,250 | £42,896 |
| % increase year on year 5.62% | | | |

The skills shortage will remain a challenge for all building services companies into 2016 and beyond

relatively low fees drive companies to produce more with less resource. 'Those that deliver projects efficiently will be rewarded with bonuses, within the constraints of fees that have not budgeted all that much.'

Benefits are unlikely to be a major differentiator for a candidate choosing between firms. Gelder says: 'In 2014 we saw a dash to add benefits like health cover and cycle-to-work schemes. Now they are in place widely and any employer not offering decent benefits will look a bit lacking.' Hurleypalmerflatt, for example, added income protection in 2014.

With benefits covered, Gelder says building services employers should now 'work on their vision', by which he means developing an image of the company to project to candidates. 'The vision is developed from asking what is special about working for the company, whether the office is attractive and what the culture is like.'

He advises firms to cultivate their image, not just in job descriptions and what is said in

interviews, but also through the 'physical signs you get from an interview - whether the boss came to meet you during the interview, who you were greeted by in reception, and how long you had to wait'.

Honnorat believes that this is a key recruitment-and-retention tool for WSP. 'We have an entrepreneurial approach. People are given a lot of freedom to pursue clients and develop services, as long as it fits our overall strategy, and our people like that. This has resulted in us recruiting candidates from firms they wanted to leave because of a 'command and control' type culture.'

Growing your own talent is a tried and tested method. Gelder believes building services firms are - admirably - 'busting a gut' to bring in graduates and apprentices, and all those we interviewed had well-established graduate schemes, with many introducing apprenticeships too. Hoare Lea launched such a scheme in 2012.

Paul Tymkow, the firm's director of learning and knowledge, says: 'We felt we needed more breadth in our intake, and to catch people earlier - there is a lot of competition for graduates.'

But Gelder warns that it will take time for these programmes to have an impact. 'This is oil tanker stuff.' It will be three to five years before the current intake moves into roles with a considerable degree of responsibility.

And how to retain this new blood? Hurleypalmerflatt's Gifted and Talented scheme is a succession-planning strategy that aims to both retain and push its best people. Amin says: 'We have chosen individuals at different levels of seniority, who are keen to be promoted, and we are working with them to help them get there. They are being measured against key performance indicators and reviewed every six months, as well as receiving training in skills such as presentation, contract negotiations and people and commercial management.'

There are other tactics for building and maintaining teams, of course, such as loyalty bonuses, and the smartest firms are likely to use a range of them. Even so, the skills shortage will remain a challenge for all building services companies into 2016 and beyond. As a result, success will likely depend - as Honnorat suggests - on how efficient companies can be with limited staff. In which case, the move towards greater use of BIM, including the technology's ability to take on the more mundane tasks performed by building services engineers, cannot go fast enough. 



Cardiff University

Address: Cardiff School of Engineering, Queen's Buildings, The Parade, Cardiff, CF24 3AA

Website: www.cardiff.ac.uk/engin

Telephone: 029 2087 0050

Contact: Sunny Deng, admissions office

Email: engineering-pg@cardiff.ac.uk

Courses offered: MSc in Manufacturing Engineering, Innovation and Management; MSc Structural Engineering; MSc Civil Engineering; MSc Civil and Geo-environmental Engineering; MSc Civil and Water Engineering; MSc Sustainable Energy and Environment; MSc Professional Engineering (Distance Learning); MSc Advanced Mechanical Engineering; MSc Electrical Energy Systems; MSc Wireless and Microwave Engineering.



Leeds College of Building

Address: North Street, Leeds, LS2 7QT

Website: www.lcb.ac.uk

Telephone: 01132 226003

Contact: Higher Education Department

Email: info@lcb.ac.uk

Courses offered: As specialists in construction education and training, the college offers complete progression routes, from entry level to senior management and design, including: Level 3 diplomas, subsidiary diplomas and advanced apprenticeships; Level 4 HNC; and Level 5 HND and higher apprenticeships. Full-time, part-time, day release and distance learning study options available.



Heriot-Watt University

Address: School of Energy, Geoscience, Infrastructure and Society, Edinburgh Campus, Edinburgh, EH14 4AS

Website: www.hw.ac.uk/egis

Telephone: 0131 451 8363

Contact: EGIS School Office

Email: egis-enquiries@hw.ac.uk

Distance Learning: All MSc courses are available via independent distance learning (IDL). Contact: EGIS-idl-enquiries@hw.ac.uk

Courses offered: **CIBSE and EI accredited:** BEng (Hons)/MEng Architectural Engineering; BEng (Hons)/MEng Architectural Engineering with International Studies; MSc Architectural Engineering; MSc Sustainable Building Design.

RICS and CIOB accredited: MSc Building Conservation (Technology & Management); MSc Construction Project Management.

EI accredited: MSc Carbon & Energy Management.

RICS accredited: MSc Quantity Surveying; MSc Real Estate & Planning; MSc Real Estate Management & Development; MSc Real Estate Investment & Finance; and MSc Sustainable Urban Management.



Loughborough University

Address: School of Civil and Building Engineering, Loughborough University, Loughborough, Leicestershire LE11 3TU

Website: www.lboro.ac.uk/civil

Telephone: 01509 228529

Contact: Pam Allen

Email: p.j.allen@lboro.ac.uk

Courses offered: **CIBSE and EI accredited:** MSc Low Carbon Building Design and Modelling; MSc Low Energy Building Services Engineering.

JBM accredited for 'further learning' and CIWEM

accredited: Water and Environmental Management; Water and Waste Engineering; and Infrastructure in Emergencies.

JBM, RICS and CIOB accredited: MSc Construction Management; and MSc Construction Project Management.

Other Master's course: MRes Energy Demand Studies.



Northumbria University, Newcastle

Address: Sutherland Building, Newcastle upon Tyne, NE1 8ST

Website: www.northumbria.ac.uk

Contact: Admissions Team

Email: course.enquiries@northumbria.ac.uk

Telephone: 0191 349 5600

Courses offered: Full-time – BEng (Hons) Mechanical and Architectural Engineering; MEng (Hons) Mechanical and Architectural Engineering. Part-time – BEng (Hons) Building Services Engineering; MEng (Hons) Building Services Engineering.



University of Ulster

Address: Shore Road, Newtownabbey, Northern Ireland, BT37 0QB

Website: study.ulster.ac.uk

Telephone: 028 9036 6521

Contact: Faculty Office

Email: adbe@ulster.ac.uk

Courses offered: **CIBSE accredited:** BEng (Hons) Architectural Engineering (full- and part-time); MSc Fire Safety Engineering (full and part-time); MSc Renewable Energy and Energy Management (part-time and distance learning).

WALKING TALL

A career in building services engineering offers an opportunity to work on buildings designed by some of the biggest names in architecture. **Roxane McMeeken** speaks to two young engineers who have each worked on prominent London schemes



Alex Beeslee, intermediate mechanical engineer, ChapmanBDSP 20 Fenchurch Street (aka 'the Walkie-Talkie')

A bold new skyscraper on London's skyline was one of the first projects Alex Beeslee worked on after graduating. Nicknamed 'the Walkie-Talkie' because of its distinctive shape, the striking 20 Fenchurch Street office building, in the City, was designed by world-renowned architect Rafael Viñoly – not a bad project for your CV just three years after finishing university.

'It's a great buzz to have been involved in working on such a landmark. If you're coming into London by train, you can point it out and say: "I worked on that",' says Beeslee.

Beeslee is an intermediate mechanical engineer for ChapmanBDSP, which advised on 20 Fenchurch Street's base build, and provided building services engineering to two of the companies that moved into the development. Having graduated from the University of Leicester with a BA in mechanical engineering, he entered ChapmanBDSP's graduate scheme, and has been in the firm's mechanical engineering team ever since.

On 20 Fenchurch Street, Beeslee joined the project during the latter stages – known as fit-out – which involves designing and constructing the interior of the building

according to the requirements of its future occupiers. Part of this involves installing building services, the systems – such as lighting, lifts, heating, cooling, plumbing and ventilation – that make the building work.

Beeslee's role was to work with senior engineers in designing systems to provide comfort cooling and fresh air to a number of floors. He says: 'It was a real eye-opener to get exposed to such a major project so early on in my career. It was a fast-moving project, involving top companies, and I learned a lot, very quickly.'

'Because the project was so high-profile, everything was being done to the highest standards, so it was a great grounding in how things should be done.'

The most exciting aspect of the project, for Beeslee, was that all the construction disciplines, from different companies, had to work together. 'It was amazing to see how the design progressed through input from all the disciplines, highlighting any problems that needed sorting out and adapting one element to accommodate another.'

The key challenge for ChapmanBDSP's work on the higher floors was the fact that the building narrows near the top. 'The building's shape means that, the higher you go, the more beams you have getting in the way of building services. Of course, beams have to take priority – they are, after all, holding up the building! So we had to work around them.'

This required an even greater degree of collaboration with other disciplines, such as architects, structural engineers and specialist contractors. 'I found that the key was being as



6 I found the key was being as open as possible, so – if there was a problem – you would address it together

open as possible, so – if there was a problem with an element – you would call the person you were designing it with and address it together,' says Beeslee.

Such collaborative working is increasingly being facilitated in the construction industry by the use of cutting-edge, shared 3D models of projects. The approach, known as building information modelling (BIM), allows people in different locations to work together on a shared digital design.

Beeslee, who has recently received training in BIM, says: 'It makes the process of coordinating the design flow so much smoother. The digitisation of the industry is very exciting'

Beeslee chose building services during his degree course after spending a month in the university's environmental buildings services department. He says: 'The impact that building services engineers can have on



DAVID BURROWS / SHUTTERSTOCK

Beeslee worked on the 'Walkie-Talkie' after graduating

sustainability is what drew me to the discipline. So far, I am pleased with my choice, because pretty much every building designed now features carbon-reduction technology.'

Since the Walkie-Talkie, Beeslee has continued to be involved with high-profile projects at ChapmanBDSP and is currently working for Great Portland Estates.

'Building services has been an incredibly fulfilling career so far,' he says. 'Completing projects is very satisfying and you are challenged every day because each project is different.'



Ella Pope, mechanical engineer, Aecom, Southbank Place

Ella Pope is working on an exciting project on London's Southbank to transform the Shell Centre Tower and its surrounding area into a new development, comprising eight buildings,

called Southbank Place. The existing tower is being retained as the centrepiece of the scheme, featuring homes, offices and shops, as well as landscaped open space – all on the doorstep of the London Eye.

Pope says: 'It's brilliant to be on a large scheme in the heart of London. I am part of a large team and it's really rewarding for us all to see the buildings coming together.'

Pope is a mechanical engineer at Aecom, where she has just completed the graduate scheme. She joined the firm after completing a BEng in architectural environmental engineering at the University of Nottingham, a building services-orientated degree course.

Aecom's role is to design the building services infrastructure serving the whole site – located in the giant basement of the former Shell Centre – as well as for two of the buildings 10 and 17 storeys high. Pope has carried out mechanical engineering on both aspects of Aecom's role, and led the coordination of electrical and mechanical services in the basement with the rest of the building and with other services, such as public health.

Pope says: 'The key challenge is the sheer size of the infrastructure needed to serve the eight buildings, and fitting it all into a basement that previously served only the Shell Centre. It requires intense coordination between all the services being installed.' For example, the site requires 12MW of heating and 15MW of cooling. This compares with the 5kW needed to heat the average home.

Aecom's job is further complicated by the fact that each of the eight buildings is being designed by a different architectural practice. As a result, Pope says: 'Another huge amount of coordination between different firms is needed.'

Thankfully, the entire Southbank Place is being designed in BIM. This makes it one of the largest commercial projects in the UK to be designed and constructed digitally.

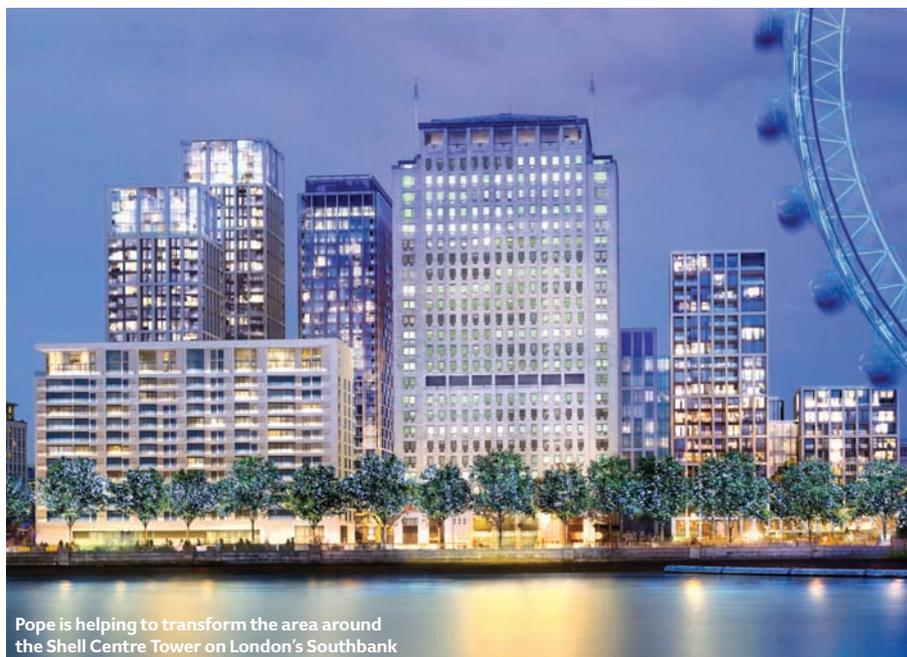
Pope says that working in BIM is not necessarily easy: 'It presents you with challenges because you design in a greater level of detail, but it makes your life easier because you can see more of what's going on in the building.'

The benefits of BIM are undeniable, Pope says. 'General coordination is better and you can see opportunities in 3D that you simply wouldn't in 2D.'

'An example would be a really tight corridor. The 3D model shows you that the corridor is next to a plantroom with spare capacity, so you can move some of what's in the corridor into the plantroom.'

Pope says she loves the unexpected obstacles that the project can throw up. 'It's challenging every day because construction is happening on site right now, so if a problem crops up you have to think of a solution on the spot.'

She adds: 'Knowing that you are part of a process where a building will get built is really satisfying. I think building services is one of the most rewarding areas of engineering.'



Pope is helping to transform the area around the Shell Centre Tower on London's Southbank

CUNDALL

ENGINEERING EXCELLENCE

Chengdu Creative Centre, Chengdu, China © Broadway Malyan

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