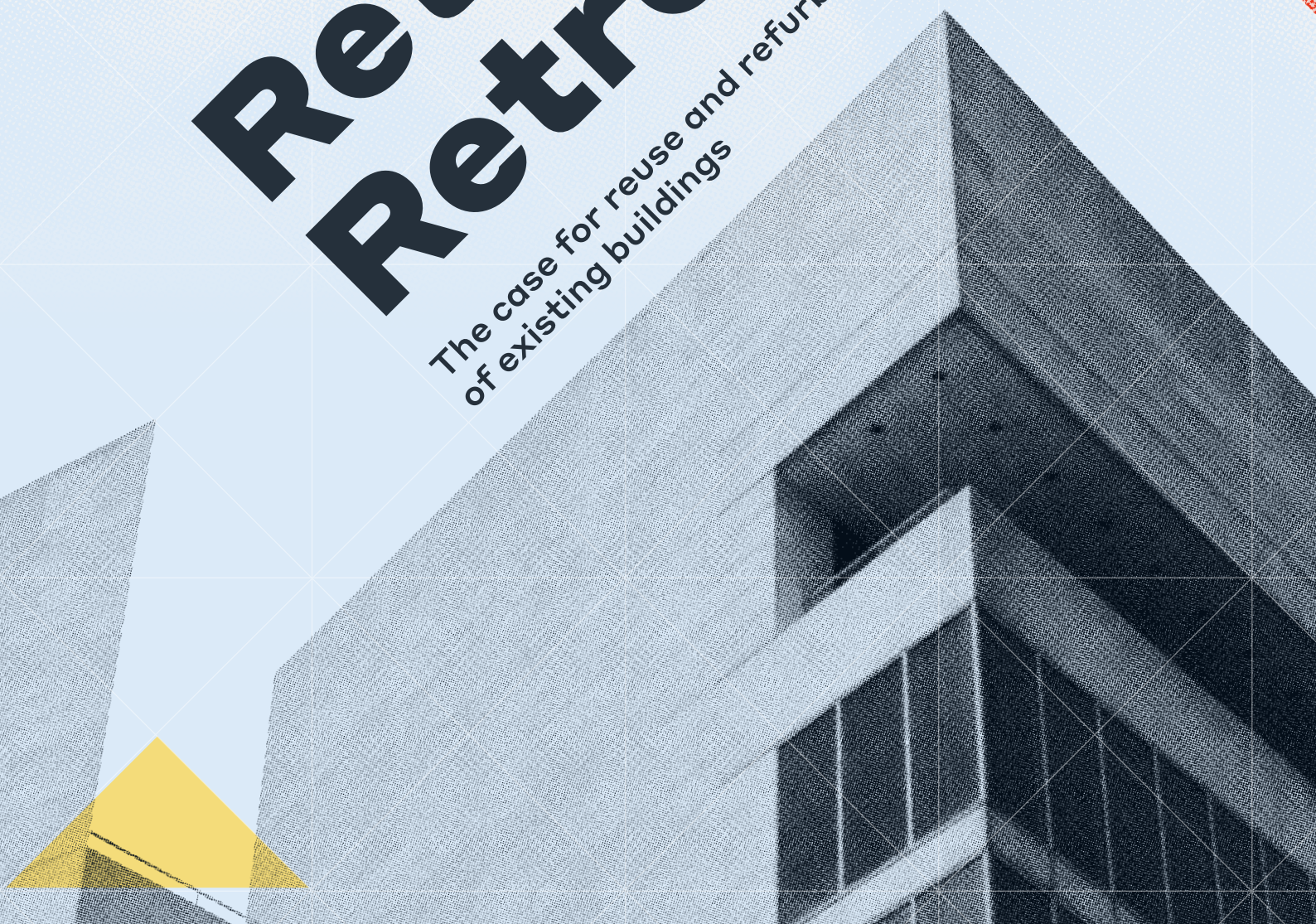
Rethink Retrofit

The case for reuse and refurbishment of existing buildings



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About the survey

The insights in this report are based on a survey of 103 UK architects, property developers, and public and private-sector building administrators, completed between September and October 2019. The survey was carried out by Longitude on behalf of WSP.

Foreword

Climate change and its effects on our physical environment cannot be ignored. With 277 of the UK's 408 local authorities having declared a climate emergency, it is now at the top of our political and business agendas[1].

There's a lot for us all to talk about.

In the built environment, we know existing homes and offices are a major source of emissions. But they're also valuable assets.

If we want to achieve a more responsible, climate-friendly society, demolishing properties and replacing them with more sustainable ones doesn't add up. It's not cost-effective, and doesn't fit with our aspirations to nurture a circular economy that minimises the impact of building materials and construction processes on the environment.

So, how do we lower the environmental impact of our buildings and enhance our cities in a sustainable way? Clearly, something needs to change.

This report shares research from the industry which suggests the answer may be to work with what's already there – using retrofit building techniques.

Retrofitting is about adding new technology or features to older systems. It can include the refurbishment and transformation of existing systems or structures – including our range of buildings.

Britain's streets are already a vibrant tapestry of old and new. Retrofit may be the next chapter in our rich cultural history of architectural innovation. Old or under-used buildings can be transformed by cutting-edge solutions, into Future Ready developments, which help us meet our climate change responsibilities.

Our research shows there may be wider benefits to retrofitting buildings too. A high-quality retrofit makeover – that includes insulation, renewable energy and internet-connected devices – can cut costs and improve people's wellbeing. It can save space in our overcrowded city centres by solving the need for new buildings – and even help tackle the rising problem of loneliness by offering residents proximity to public transport, amenities and social spaces.

Businesses stand to benefit from greater flexibility and customisation in their workspaces. This can often be achieved in existing buildings using smart digital technology alongside creative modular fit-outs that deliver a high degree of control and personalisation.

Focusing on existing properties doesn't necessarily mean being less creative or cutting edge in terms of design. In our view, retrofit gives architects and engineers freedom to adapt structures to meet evolving needs, retaining the best of the old and integrating it with the best of the new.

At WSP we believe that for societies to thrive, we must hold ourselves accountable for tomorrow and seek out innovative solutions to the challenges the future will bring.

The case for retrofit is clear - this report provides insight into current thinking in the field, from growing innovation, to the design and policy challenges we face to make it reality.

We look forward to working with colleagues throughout the industry to take the first steps towards preserving and enhancing our buildings together, for a brighter, more environmentally friendly future.

Nick Offer,
Head of Building Services, WSP UK

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Introduction

Our evolving UK streets and towns often evoke a fascinating past. Rather than letting their heritage fade in the face of today's demands, we can breathe new life into existing buildings for a new, cleaner, more sustainable age with modern technology and new materials.

Some of the most interesting buildings are those that have been re-used and re-imagined. Done well, this preserves heritage features, expressing these alongside modern retrofitting. It means working in sympathy with existing structures to adapt and create new use.

In the UK and beyond, the need to address the part our buildings will play in achieving sustainability targets is becoming more pressing. A mindset of preservation is replacing a 'throw-away' culture.

We're excited about the potential for retrofit building techniques to help – and keen to understand the wider industry's view on this. The thoughts of UK architects and property developers, as well as public and private sector experts are captured in this report. The findings in this report set the scene for where we all believe we need to go and is intended to be a first step in our journey towards better buildings.

The results show that professionals in the building sector believe existing and emerging technologies will deliver exciting benefits across a number of dimensions, as part of retrofit projects. An outline of these can be seen opposite.

Together, the impact of these benefits could be significant – to the people we know, places we live and the world around us.

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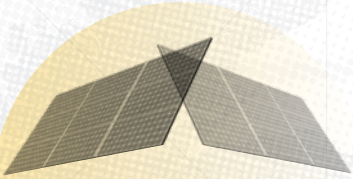
Digital technologies and platforms will help control how buildings operate, so they that constantly balance the changing demands of occupants.



Advancements in generating electricity supply from solar power are set to result in lower energy costs and zero carbon emissions.

Smart building systems and the Internet of Things (IoT) – will continue to add further efficiencies to existing assets by empowering occupants to save energy by monitoring their usage in real time – for example, allowing them to only heat or light spaces they're in.

Smart building technologies in the workplace promise to create a highly personalised and interactive environment, providing benefits for health and productivity.

Retrofit-led redevelopments may boost socio-economic outcomes.

Integration with smart grids and renewables means that our retrofitted buildings can take their unneeded energy for storage or even sell it back into the energy supply.

Regenerating heritage buildings can support 'placemaking' – socially conscious planning and design of public spaces – and also help foster a sense of community.

Building on spaces with existing social infrastructure and amenities is, of course, convenient for communities but can improve their wellbeing.

01
Building legacies

WSP welcomes the government's commitment to reaching net zero carbon emissions by 2050. But, the fact that 80% of the buildings required in 30 years' time have already been built[2], means we must examine where energy is being expended most intensively – in the existing stock of underperforming buildings.

Reducing building emissions will require an ambitious national retrofit campaign – as well as energy efficiency improvements, including upgrades to insulation and thermal performance; better electrical and heating appliances; and more effective building management systems.

Heating alone accounts for 10% of the UK's carbon footprint[3], owing to heavy reliance on fossil fuels, in particular natural gas.

Leonie Cooper, London Assembly Member for Merton and Wandsworth, believes there are two critical aspects to making buildings more energy-efficient; "In retrofit projects, we should first try to make buildings better insulated and, second, ensure that we're moving away from fossil-fuel-focused heating to either zero-carbon or low-carbon heating systems, be that solar generation or heat pumps."

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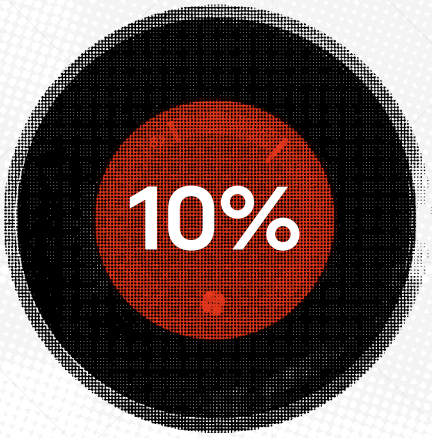

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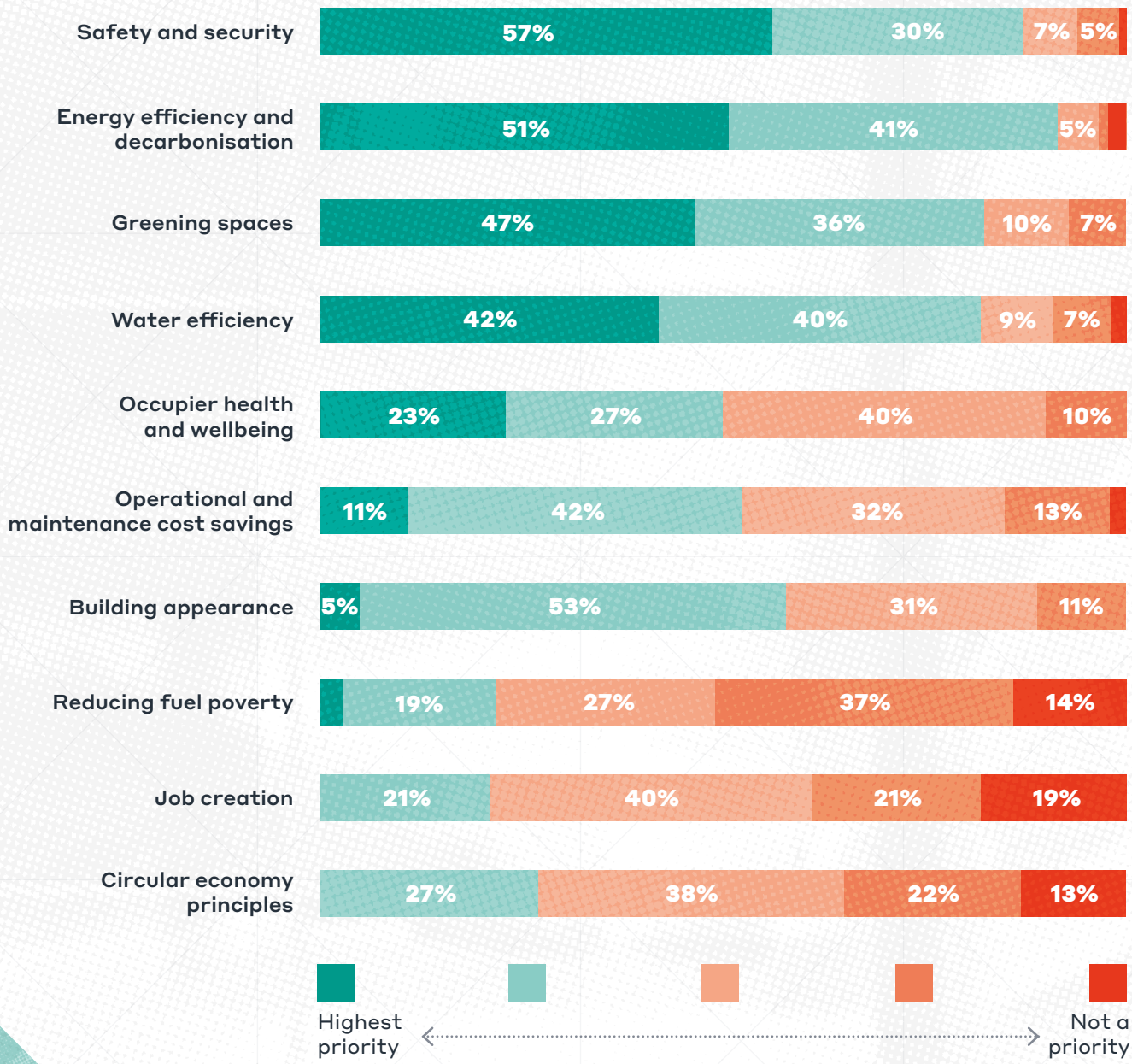
fig 1

When considering a building refurbishment or retrofitting project, how important are the following outcomes?



01
Building legacies

The environmental agenda appears to be increasingly on the minds of building professionals. More than half (51%) of respondents to our survey say they consider energy efficiency and decarbonisation as the most important outcomes for retrofit projects. Only safety and security ranked higher, at 57% (see Figure 1).

However, good intentions need to translate into positive outcomes on the ground. Just 15% of respondents to our survey rated the average energy efficiency in their retrofitted buildings over the last five years as a 'good improvement' – and a mere 4% saw very high improvements (see Figure 2).

This may point to inadequate guidance for retrofit projects, as well as a widely observed 'energy gap' between the energy performance anticipated at design stage and how buildings actually perform in use.

Buildings can be like complex, living organisms. Taking a holistic approach to the design and implementation of a retrofit that factors in all environmental considerations gives us the best chance of achieving net zero carbon. Architects and developers need to know about the range of materials and energy efficient systems available, and how these can reinforce one another when implemented strategically.

It's a lesson many practitioners still need to learn, says Nick Offer, Head of Building Services at WSP: "We seal our buildings up, instead of letting them breathe, then design systems to cool spaces down. We live in a temperate climate with an outside temperature of 17-18°C for much of the year. Applying an element of mixed-mode ventilation would be more suitable. We need to think differently about how we're using energy."

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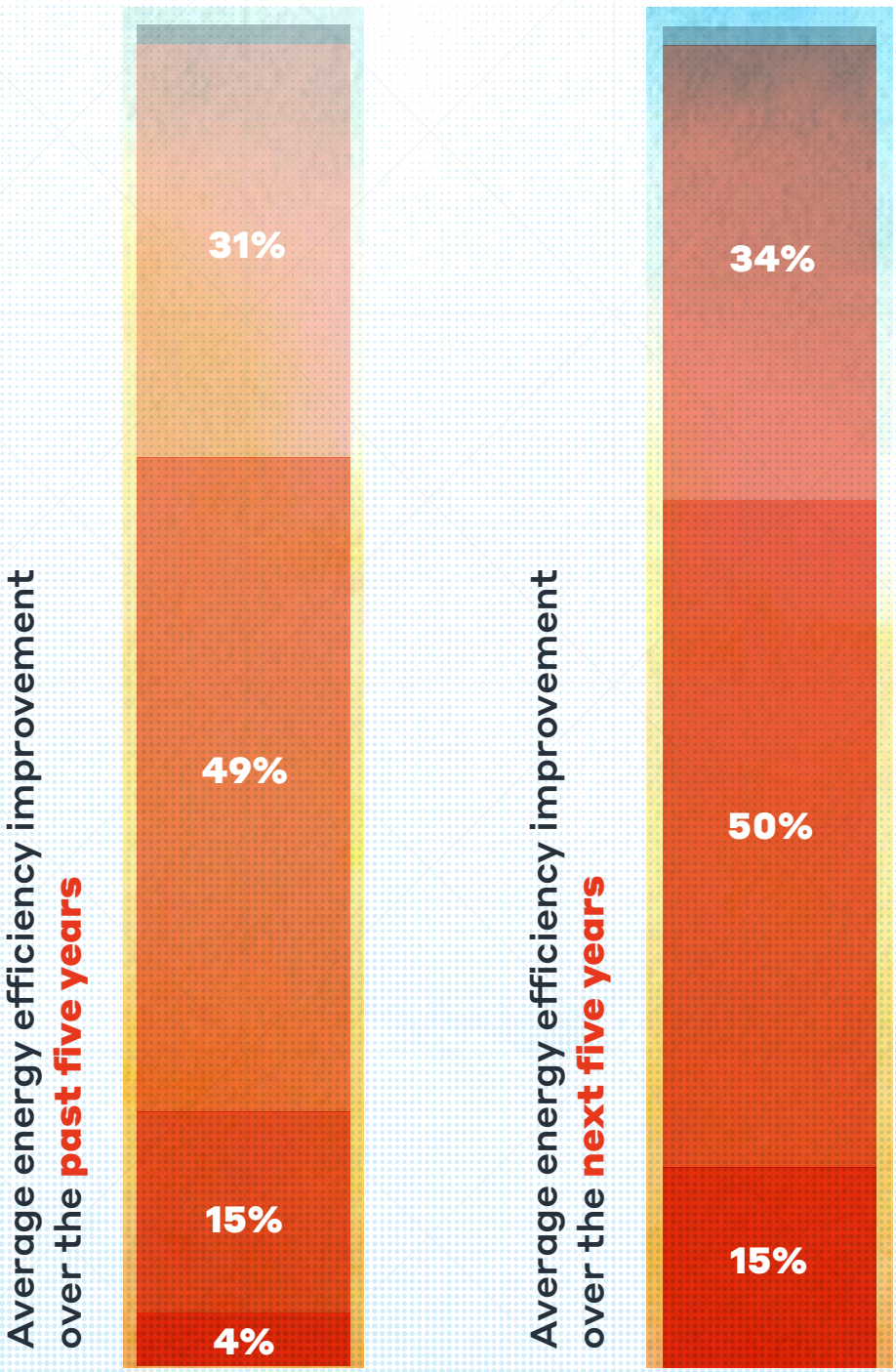
fig 2

How would you rate the average energy efficiency improvement that you have seen or have achieved/could expect to achieve by retrofitting a building or buildings over the past five/next five years?



Looking good – renewable energy

We live in an age of rapid technological advancement, and most survey respondents believe innovative technologies will deliver the biggest efficiency gains on retrofit projects in the near term.

The biggest performance gains over the next two years are expected to come from renewable energy – in particular solar power (48%), followed by IoT (44%), then smart devices (41%) *(see Figure 3)*.

Renewable energy, soon to be supported by storage technologies at scale, will significantly cut carbon emissions.

On top of this, digitalised energy systems look set to allow customers greater control over their energy use – to the point where efficiencies can result in a surplus of energy. In our survey, 50% of building professionals believe that net-zero carbon buildings will soon be able to generate income by selling excess energy.

There are high hopes for the government's new smart export guarantee[4]. Having come into force 01 January 2020, the guarantee rewards such 'prosumers' by paying them to feed electricity back into the national grid.

However, the intermittent nature of renewable energy generation – such as solar power – underlines the need for energy storage solutions designed to make power available at any time of day.

Around half (51%) of survey respondents believe innovation in renewable power generation and storage could lead to more successful retrofit projects *(see Figure 4 on page 13)*.

There are also aesthetic concerns that need to be addressed – especially for heritage buildings. Solar installations are often unpopular with planners, especially in conservation areas, but new technology has the potential to work around this issue.

"It's now possible to retrofit buildings with in-roof systems of solar panels, so that the actual tiles of the building are also the solar panels," explains Leonie Cooper. "This means you can't really see that there's been an installation on the roof. Solutions like this have to be the way forward."

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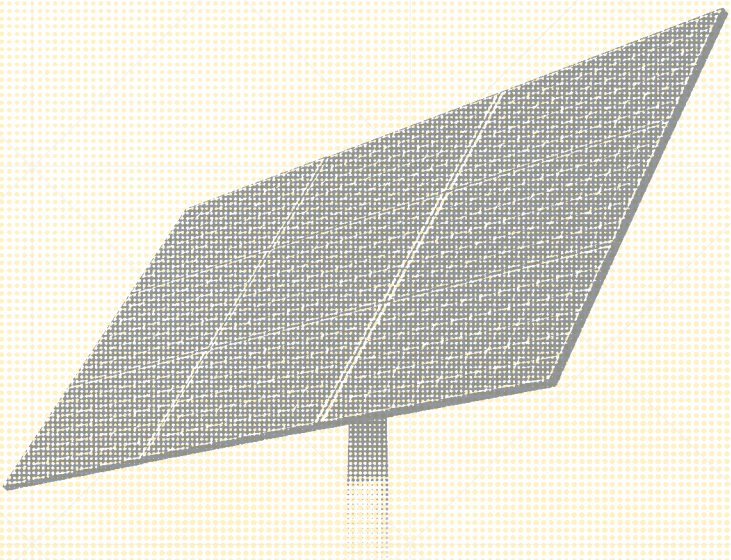

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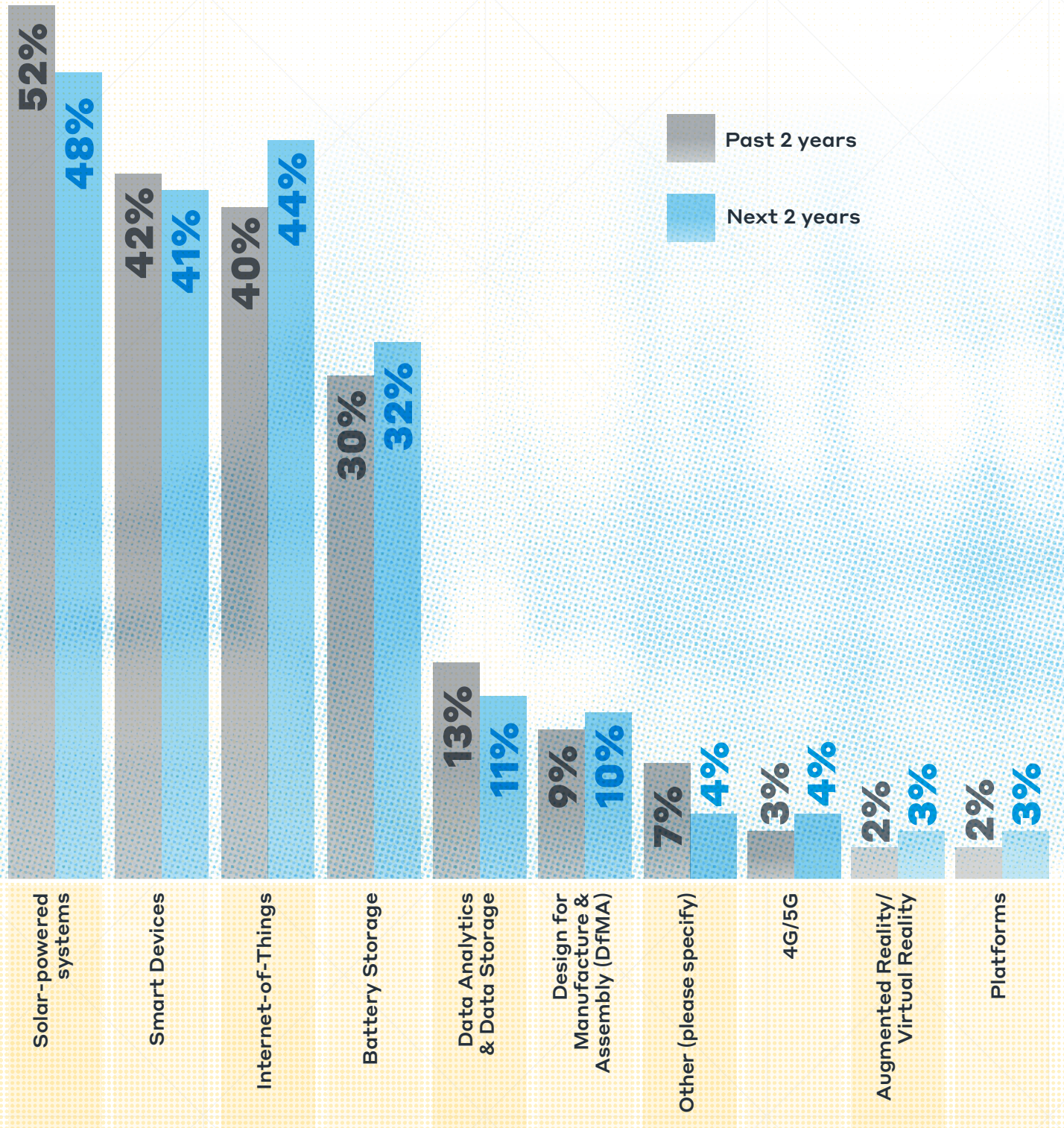
fig 3

Which technologies do you think have contributed the most to enhancing the performance of buildings in the past 2 years?



Racing towards net zero carbon

Tightening regulation is a necessary step on the path towards achieving net zero carbon – and our survey respondents are largely supportive of the UK Government's direction of travel: 65% say they believe incremental policy to increase energy efficiency in buildings is sufficient to meet the 2050 target.

However, a recent inquiry led by the Business, Energy and Industrial Strategy Committee – a select committee of the House of Commons – found the rate of installation of efficiency measures in UK buildings under government schemes has plummeted by 95% since 2012[5].

"I think the policies are firm enough. Whether the mechanism and the incentives, and the support to allow the reconfiguration of existing stock are in place, I doubt that very much," comments Leonie Cooper.

The majority of survey respondents (82%) strongly or moderately agree that more public-private partnerships are required to encourage large-scale retrofit projects. A further 85% say there's not enough legislation in their region pushing people to invest in retrofit projects.

Some experts, such as environmental think tank Green Alliance[6], have criticised the UK's 'piecemeal' approach to building guidelines and believe a national programme of 'deep' whole-house retrofits – similar to the Energiesprong approach pioneered in the Netherlands[7] – is the only way to deliver the targeted carbon cuts.

Tougher regulation in other sectors could support the decarbonisation of buildings, says Nick Offer; "I would be excited to see legislation pushed harder to encourage electric vehicles and ensure that pollution is taken out of London in the charging zone. Then, we could open the windows and ventilate our buildings. This would reduce our reliance on air conditioning – and the associated energy consumption. I've been hoping for some of these things for the last 10-15 years, but maybe we're getting closer now."

"I think the policies are firm enough. Whether the mechanism and the incentives, and the support to allow the reconfiguration of existing stock are in place, I doubt that very much."

Leonie Cooper,
London Assembly Member
for Merton and Wandsworth

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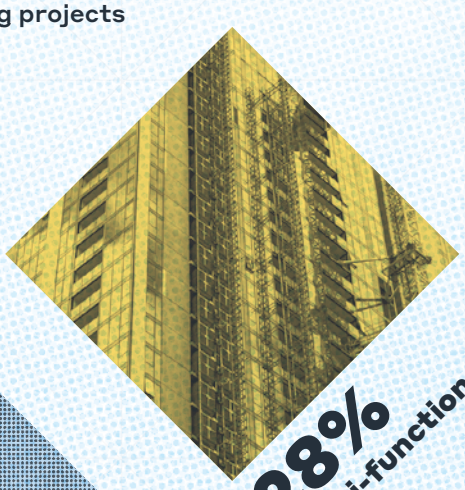
fig 4

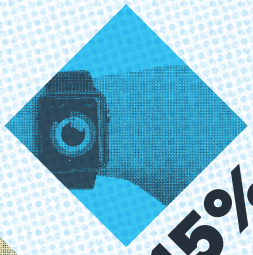
In which two of these areas would more innovation mean more success for refurbishment or retrofitting projects

51% Renewable power generation and storage



28% Multi-functional façades

14% Fit out materials and furnishings

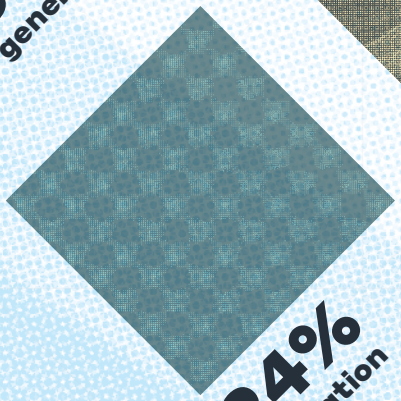


15% Tech and Smart technologies

20% Building management systems

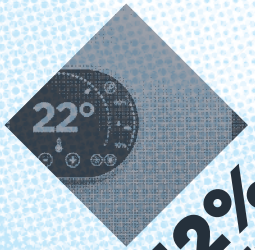
5% Lighting

24% Flexible-use spaces



24% Insulation

7% Indoor air quality



12% Heating

02
Smart buildings, at your service

The art of a good retrofit, like blending solar panels with roof tiles (see Section One), lies in successfully integrating technology into a building's day-to-day performance.

While the building should retain its sense of place and links to its heritage, conditions inside should conform to the highest standards of living and working. A successful retrofit does this seamlessly, so you don't notice it.

"Building services need to be as operationally discreet as possible," says Nick Offer at WSP. "A lot of thought must go into them: the lighting needs to be good, the wireless systems and power distribution need to work, and the building should be energy efficient – all while being easy to navigate and visually appealing. When a building is comfortable and easy to use, you don't hear anyone mention the building services."

More than a third of respondents (36%) say a personalised or interactive environment – for example lighting and temperature controls – is important in a retrofit (see Figure 5).

"It will be the smart buildings elements and how we use them that will transform the sector," Offer continues. "The equipment manufacturers will adapt their devices to include built-in intelligence and we'll be able to access and run our buildings in a very different way. In effect, we want the building to act like a butler, an efficient and discreet servant for our everyday needs."

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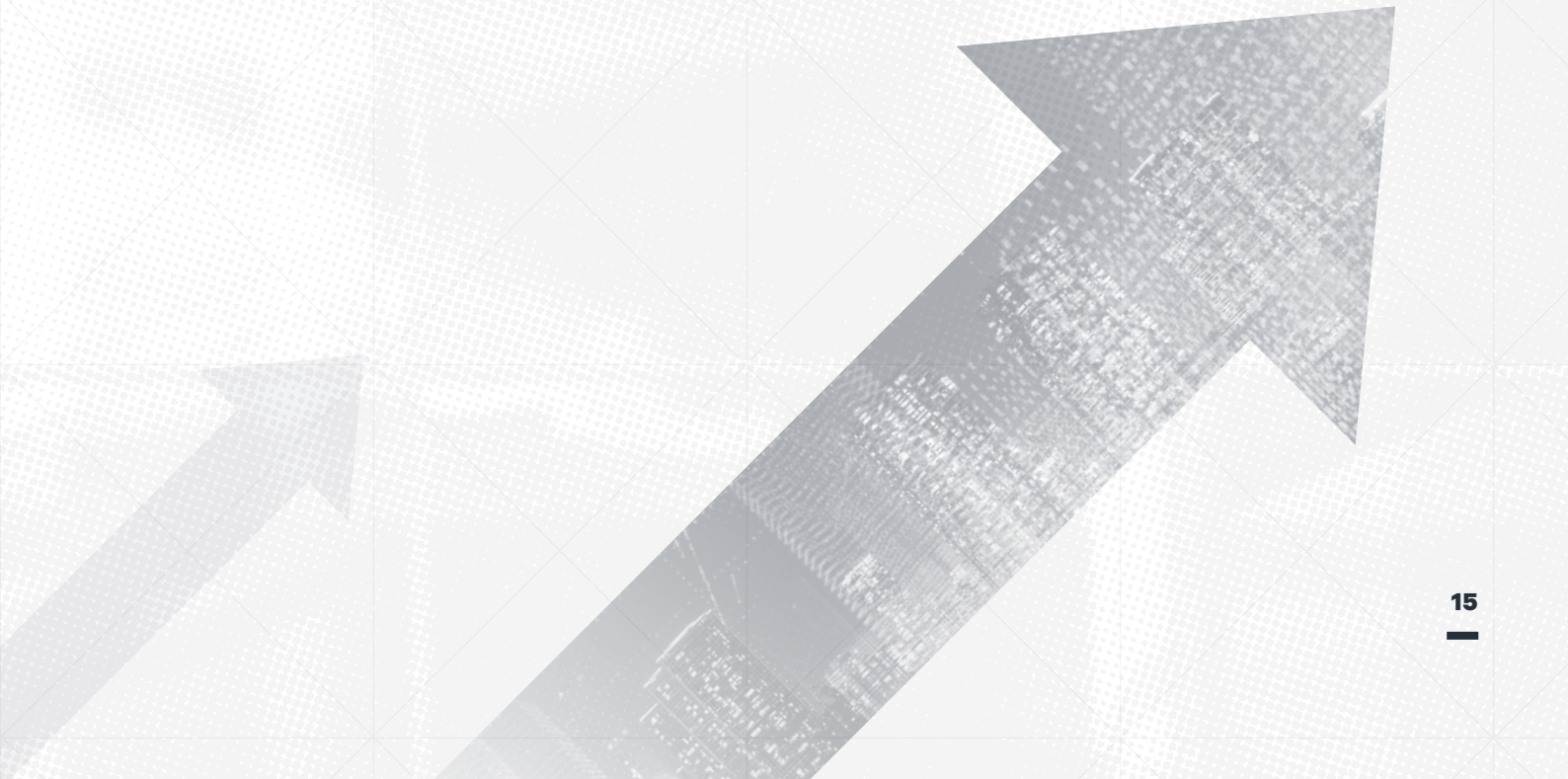
Rise of 'webtech'

Smart systems for things like lighting and heating are underpinned by technology such as IoT devices, new communications protocols and digital platforms. They will both deliver operational benefits and empower occupants by giving them greater freedom and control over their environments. As existing buildings start to understand their inhabitants, they'll be able to adapt how they're operating in real-time. Office workers can use smartphone apps to control local lighting and temperature. Data generated by sensors can tell them the location of the nearest free desk or room. In the future, a building could even recognise individual workers – and adjust its systems to suit their preferences as they move around it.

Future legislation will support the transition to these smart systems. The EU Energy Performance of Buildings Directive is due to be implemented into UK legislation via Energy Performance Certificates in March 2020[8]. This puts a strong emphasis on smart-building automation and control to cut greenhouse gas emissions, that goes beyond the current focus on building fabric.

"We're just beginning to experience the true impact of advanced technologies in the built environment. These technologies show promising signs of being an active enabler for retrofit – allowing existing buildings to perform as well as or better than a new build."

Matthew Marson,
Head of Smart Places, WSP



Buildings as biological systems

How retrofit projects are designed, the quality of light and ventilation and the materials used can all improve the wellbeing of those using the resulting buildings.

For example, a retrofit design strategy that focuses on superior insulation, ventilation with heat recovery and has a breathable design, can significantly improve the quality of the interior environment of a building – and consequently, the wellbeing of its occupants, who enjoy warmer and better ventilated buildings. Meanwhile, advanced mechanical ventilation with heat recovery systems (MVHR) increase air flow and reduce the quantity of airborne organisms such as bacteria – which can also help prevent illness.

Our survey reveals 67% of sector professionals are confident their retrofit projects have significantly improved occupants' wellbeing.

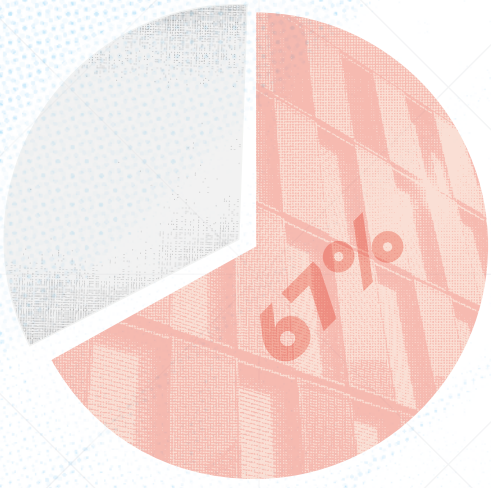
However, only 23% consider occupier health and wellbeing the main priority for retrofits, placing it in the middle of the range of desired outcomes (see Figure 1, page 07).

Studies have shown that attractive views and use of natural materials can create a sense of good health and wellbeing[9]. When exposed to these improvements, workers exhibit fewer signs of stress – including reduced levels of frustration, increased patience and overall satisfaction. Better access to daylight can produce similar effects and circadian lighting systems – which control colour and intensity, matching them to the body's natural rhythms and preferences – are increasingly finding their way into offices.

It's encouraging to learn that natural materials and furnishings with low toxicity have also been linked to improvements in air quality[10].

Over half (58%) of respondents agree that using more natural materials in a building refurbishment will become more popular in the future owing to a measurable impact on wellbeing (figure not depicted).

This awareness is increasing among building professionals, who now believe retrofits benefit from 'fabric first' improvements. These consider the nature of a building's fabric before seeking to optimise mechanical and electrical systems.



67% of sector professionals are confident their retrofit projects have significantly improved occupants' wellbeing.

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"In the future, we will eradicate the toxic materials of the past and introduce more natural, regenerative materials," explains Anna Woodeson, Director of LTS Architects. "It is almost like looking at the biology of a building. When we add new materials into old buildings, we come to understand that many existing buildings have a kind of breathable façade and this gives us a better appreciation of natural building products."

There are also economic incentives to design buildings that promote human health and wellbeing. A modest improvement to an employee's productivity, when scaled up to an entire workforce, could have financial benefits that far outweigh the capital costs of construction.

Some 55% of survey respondents agree that the improved operational efficiency and increased productivity of occupants justifies the money needed for refurbishment, versus 25% who disagree (figure not depicted).

There are also economic incentives to design buildings that promote human health and wellbeing. A modest improvement to an employee's productivity, when scaled up to an entire workforce, could have financial benefits that far outweigh the capital costs of construction.

03
Evolving communities

No building exists in isolation. A more strategic retrofit approach should encompass the future of a development, a neighbourhood, town or city, to help entire communities evolve, adapt and thrive despite constant change.

Retrofit-led developments or regeneration projects that provide access to economic opportunities, such as good jobs or skills development, green spaces and amenities, are proven to create wider socio-economic benefits – including a sense of community and overall quality of life.

"To make retrofit successful we need to think about what the next generation actually want from their spaces", says Andrew Bickerdyke, Director, WSP, "How do they want to feel when they go to work each day and do the buildings they spend their time in live up to their values?"

Our research shows 62% of building sector professionals believe that proximity to public amenities is the key benefit of retrofitting buildings for the majority of occupants (see Figure 5).

Around half (49%) of professionals surveyed also say retrofitting buildings can strengthen the social fabric and commercial viability of a neighbourhood (figure not depicted).

"An understanding needs to develop that being local and authentic creates a much better society and much greater social and financial value," says Richard Upton, Chief Development Officer at U+I. "Yes, it takes more effort, but we need to create social cohesion: thoughtful, interesting places that are less susceptible to crime, and create a much greater sense of community and belonging."

Many designers and urban planners endorse the idea of placemaking – a multi-faceted approach to the planning, design and management of public spaces, which aims to capitalise on existing local assets, and aspirations to create places that promote health, happiness and wellbeing.

Rather than build from scratch, this creates an opportunity to retrofit underused spaces and buildings to enhance the urban experience, cutting carbon in the process.

Looking forward we could see emerging technologies and digital tools, such as sensor data and data from smartphones, that can give us deeper insights into how existing places are used, by whom, and the impact of new build or retrofit on communities.

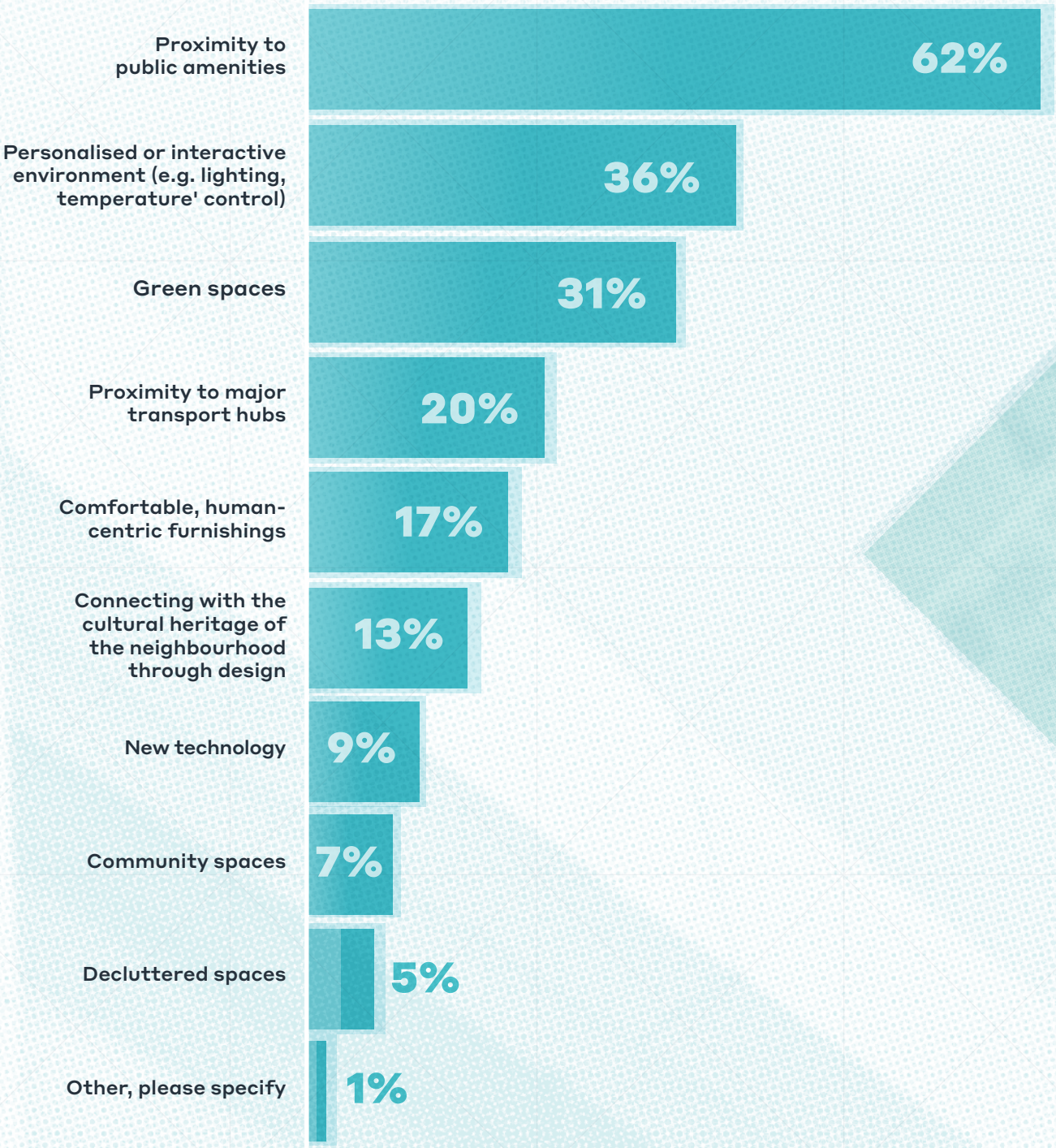
We can learn a lot from heritage buildings that have been shown to reinforce people's connection with 'place' and the history of the area, while also encouraging new investment. For example, retrofitting buildings that were once vessels for industry, such as factories and warehouses, can act as a jumpstart, reinvigorating them – and people's response to them.

"An understanding needs to develop that being local and authentic creates a much better society and much greater social and financial value. Yes, it takes more effort, but we need to create social cohesion."

Richard Upton,
Chief Development Officer, U+I

fig 5

What do you think are the key aspects of a building that occupants value the most?



The Old Vinyl Factory redevelopment in Hayes, West London, is one inspiring example. The 18-acre record plant, where EMI pressed ground-breaking records by The Beatles and Pink Floyd, is currently being reimagined as part of a mix of office buildings, new homes, restaurants, shops, a cinema, a live music venue and more. The original art deco building offers key benefits, including generous provision of workspace and daylight.

"This approach celebrates buildings, using them as a confidence tool in an area that had become one of the most deprived wards in London. It's a magic trick. You're essentially farming the nutrients of architectural history and retelling the narrative in a contemporary way," says Upton.

That view is supported by recent research from Historic England[11], the government's statutory adviser on the historic environment, which documented the positive effect of heritage-led regeneration on human wellbeing, particularly in disadvantaged areas.

"In the monarchy of placemaking, heritage is probably king," adds Upton. "Heritage buildings go one step further than things like public art by defining aspects of socio-economic history and the confidence that once existed in an area. There are thousands of examples that can be replicated. You almost certainly have a better-than-average chance of increasing rent and value if you have a development that includes some element of heritage," he concludes.

London versus the rest of the UK

Survey respondents whose businesses operate primarily in London (40% of total respondents) appear to be more optimistic about the benefits of retrofitting.

The results show that London-based professionals feel more strongly about the potential for retrofitted buildings to underpin the wellbeing of communities. One in five strongly agree that retrofit creates inclusive cities that are better for the environment and communities, compared to fewer than one in ten across the other UK regions. There is a slight uptick in overall agreement with that statement (57% versus 51%) for the rest of the UK.

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Conclusion

It's time to open a new chapter in UK construction. The buildings we have are here to stay – so let's be ambitious and thrust retrofit to the forefront of our thinking: it is cost-effective, creative and energy efficient.

Future generations will thank us for the positive effects that high-standard retrofit buildings have on health and wellbeing, not to mention their contribution to emissions reductions. Retrofit-led developments or regeneration projects have the potential to create wider socio-economic benefits, including a sense of community and an enhanced quality of life.

The momentum behind sustainability and circular economy principles is increasing, both in construction and in society. It's time to recognise the advantages of upgrading existing buildings to achieve optimal building performance.

The end goal is in sight. The sector can end its 'throw-away' culture of demolish and build again, and join ranks in the urgent call to action for climate change mitigation.

"We can't just knock down our UK cities and create new space and new buildings," says Nick Offer at WSP. "Most buildings in London, for example, will be here for decades, if not centuries, to come. We have to get better at refurbishing and reusing them, to create worthwhile buildings for the future. It's no longer a matter of if, but a matter of when."

Key things to consider for your next retrofit project:

1. Explore your options for refurbishment and reuse – a lack of planning can lead to loss of sense of place and missed heritage opportunities.
2. Seek efficiency gains from the Internet-of-Things and smart devices – taking a holistic approach to design and the implementation of technology will maximise energy efficiency, productivity and occupant wellbeing.
3. Take advantage of declining cost and greater government support to implement renewable sources of energy generation and monitor the development of complementary storage technology.
4. Come and speak to our WSP experts about how and why retrofitting could be the way forward for your next project.

"Most buildings in London, will be here for decades, if not centuries, to come. We have to get better at refurbishing and reusing them, to create worthwhile buildings for the future. It's no longer a matter of if, but a matter of when."

Nick Offer,
Head of Building Services, WSP UK

Heritage is king

Q&A.

Richard Upton
Chief Development Officer, U+I

Heritage is the crown jewel of placemaking, argues Richard Upton, Chief Development Officer of property development company, U+I. Re-energising the history of a place in regeneration projects brings huge benefits for communities, property investors and developers, says Upton, who is also a commissioner for Historic England.

Why should we care about reviving buildings in their historical context?

Within a regeneration project in any town or city, it is the heritage that is usually the king of placemaking. Public art can secure a similar level of personal connection with a place, but heritage buildings go one step further, in that they can define a socioeconomic history and represent a confidence that once existed in an area. Regeneration, as opposed to development, has a wider societal scope and objective to include that sense of wellbeing and socioeconomic growth in an area – which, by definition, is instilling confidence.

We regenerated the old vinyl factory in Hayes, which was the centre of record-pressing worldwide in the 1930s, as well as an innovation hub for everything to do with music. The buildings there were grand statements of confidence in industry, and they had progressive conditions for workers, something that hadn't been often seen in Victorian English architectural tradition.

That approach – celebrating the buildings, using them as a confidence-building tool in an area that had become one of the most deprived wards in London – was a magic trick. There's plenty of research, by Historic England and elsewhere, that the 'wellbeing effect' of heritage-led regeneration, particularly in disadvantaged areas, is considerable. You're farming the great nutrients that are already in the soil of the architecture in existing buildings. You're re-telling their narrative in a contemporary way.

What socioeconomic value can be derived from retrofitting historic buildings?

The real value in a heritage-led regeneration project only becomes evident three to five years after completion, once the old and new have begun to settle down together. As exemplified in King's Cross this summer: if you just walk through, you see the old and the new, when combined thoughtfully, can make an engaging place from the point of view of a property investor or developer.

You almost certainly will have a better-than-average increase in rent and value in a development that includes some element of heritage. For every £1 that you spend on heritage-led regeneration, there's a return of £1.60. Any of the data for listed retail offices or industrial property show total returns on investment equal to or higher than non-listed counterparts. So, there is increasing evidence that the value growth of well restored heritage-led buildings has a greater level of return over 5-, 10- and 30-year periods, according to data collected by Historic England.

We're going to create social cohesion: thoughtful, interesting places, which are less susceptible to crime, and create a much greater sense of community and belonging.

From a social perspective, well how many holidays have you been on when you've walked into a Phoenician square or a historic building like The Piece Hall in Halifax, and you go, "Wow!" And the 'wow' is an endorphin release. It makes sense to try to create a wow, or a feeling of wellbeing, and certainly to make a connection between a place and a person.

What are the challenges particular to developing historical buildings?

It's difficult, for sure. If it's not a partnership, and you need to buy something in the open marketplace, you very rarely have the chance to do all of the technical analysis, intrusive surveys and other things that are usually necessary.

Because you are working with something old, you may not have the benefit of having all the information readily available; then, the assessment of risk and reward is very difficult. So, often, buildings are bought based on the incorrect assumptions, and great compromises need to be made. People have lost an awful lot of money because they have got their assumptions wrong, and sometimes the market doesn't price risk properly. It's a risk-based business already and adding another level of risk is not everyone's cup of tea.

Do you think property development as an industry will begin to emphasise the historical connections to places to a greater extent in the future?

Most developers are smash and grab. Go in, build, exit stage left. I am really looking forward to a cultural shift in the property industry. We might be on the cusp of having a response to that aspect of globalisation where you get homogenous buildings that could be anywhere, the same Starbucks in every high street.

I'm really hoping that an understanding will develop that being local and very authentic, creates a much better society and much greater social and financial value. Yes, it takes more effort, but we're going to create social cohesion: thoughtful, interesting places, which are less susceptible to crime, and create a much greater sense of community and belonging. Heritage has a very strong part to play in that, because that's the fabric and the confidence of the past, and a good place to start for the future.

For every £1 that you spend on heritage-led regeneration, there's a return of £1.60.

A comeback for nature

Q&A.
Anna Woodeson
Director, LTS Architects

The architectural community is starting to catch on to how important it is to integrate sustainability principles into their work, says Anna Woodeson, Director at LTS Architects in London, who has more than 20 years of experience in green initiatives and building refurbishments. Here, she shares her insights into changes affecting the profession, including the new technologies at the disposal of architects to improve the environmental impact of buildings, and other innovations set to excite the market.

What is the main driver for your clients to commission a retrofit project on a building?
The first thing that comes to mind is cost. It's usually cheaper to retrofit an existing building than to knock it down and build a new one. An even greater and more interesting incentive is to retain the history and the identity of a building. Then, of course, there is the environmental aspect; but, although this is significant from our perspective, it is not such a big consideration for clients yet.

The UK's environmental policy has ambitious targets for emissions reduction. What could be done to achieve greater efficiency in the building sector?
In order to, as a minimum, achieve 100% emissions reduction by 2050, in line with recent legislation, we need to do better. For retrofit projects, that means we need stricter performance and use standards. It is absolutely critical to have legislation that ties into the performance of the building in use. We desperately need ambitious targets set within building regulations that will get us to zero emissions quickly.

And CO^2 emission factors need to be updated at least every couple of years to consider the changing power generation mix. Our legislation has been static for too long, which means that the wrong decisions are being made about which energy strategy to adopt.

Do you think there is sufficient awareness of sustainability principles in buildings?
The local authorities are probably a bit more enlightened, but, even across the public sector, there are vast differences between clients. I don't know how many clients we've worked with who really understand the link between the circular economy and building construction. I think that we're a little way off introducing that concept into mainstream public understanding.

I appreciate that awareness is also improving among architects, but I think there are still many who almost feel scared talking about sustainability. It's an uncomfortable place for them, because they feel that they don't know a lot about it or don't understand the breadth of the subject. For example, some want to point out recycling bins rather than realising how their design experience has enormously reduced the embodied carbon within their building.

For some reason, sustainability has become compartmentalised. There are sustainability experts, and then there are architects who think that this is not necessarily their role or their remit. But it absolutely is within their world and their remit.

It is absolutely critical to have legislation that ties into the performance of the building in use.

What are the most effective tools to address the environmental and sustainability aspects in a retrofit project?
If we talk about carbon, for example, we're still lacking a quick and easy way for architects – not engineers – to model embodied carbon so it can inform our design decisions. There are lots of possibilities that we're testing, but none that we have fixed on. There is also a gap in the market in the building physics world. Engineers can use advanced software like IES Virtual Environment but, for architects, there is only more basic software for such modelling. Something in between what engineers and architects are using at the moment would be useful for us, so we can be modelling accurately from the start of the design process.

With a retrofit, it is almost like looking at the biology of a building. Using natural building materials helps to ensure its inherent qualities like breathability are maintained.

Which technologies are currently exciting architects and enabling more environmentally positive designs?
There is some really interesting research being done into new materials. Our team have found people looking at using mycelium, which is part of a fungus, to build sustainable furniture! Wouldn't it be interesting to expand the choice of grown building products and also extend the use of known products like timber, cork and bamboo? There has already been a lot of press recently about use of cork in buildings which is really encouraging.

In the future, there will be more exciting discoveries and we can start chucking away our toxic materials of the past and introduce more natural, regenerative materials. With a retrofit, it is almost like looking at the biology of a building. When adding materials into existing buildings, it is so important to understand the inherent qualities of the existing building. The façade may be breathable, for example, so the specification of materials is critical to maintain this.

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Footnotes

1. *https://www.climateemergency.uk/blog/list-of-councils/ as of October 31, 2019*
2. *https://www.ukgbc.org/climate-change/*
3. *https://www.ukgbc.org/climate-change/*
4. *https://www.ofgem.gov.uk/environmental-programmes/smart-export-guarantee-seg/about-smart-export-guarantee-seg*
5. *https://www.parliament.uk/business/committees/committees-a-z/commons-select/business-energy-industrial-strategy/news-parliament-2017/energy-efficiency-report-published-17-19/*
6. *https://energiesprong.org/green-alliance-champions-the-uk-to-go-dutch-with-the-energiesprong-approach/*
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