The Institution of Engineering and Technology

Part of our IET COP series

IET international green skills 2023 survey

Exploring engineering employers' skills needs in the battle against climate change.

YouGov®

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Contents

The *IET international green skills 2023 survey* is published by the Institution of Engineering and Technology (IET). Please note that the views expressed in this publication are not necessarily those of the IET.

The Institution of Engineering and Technology

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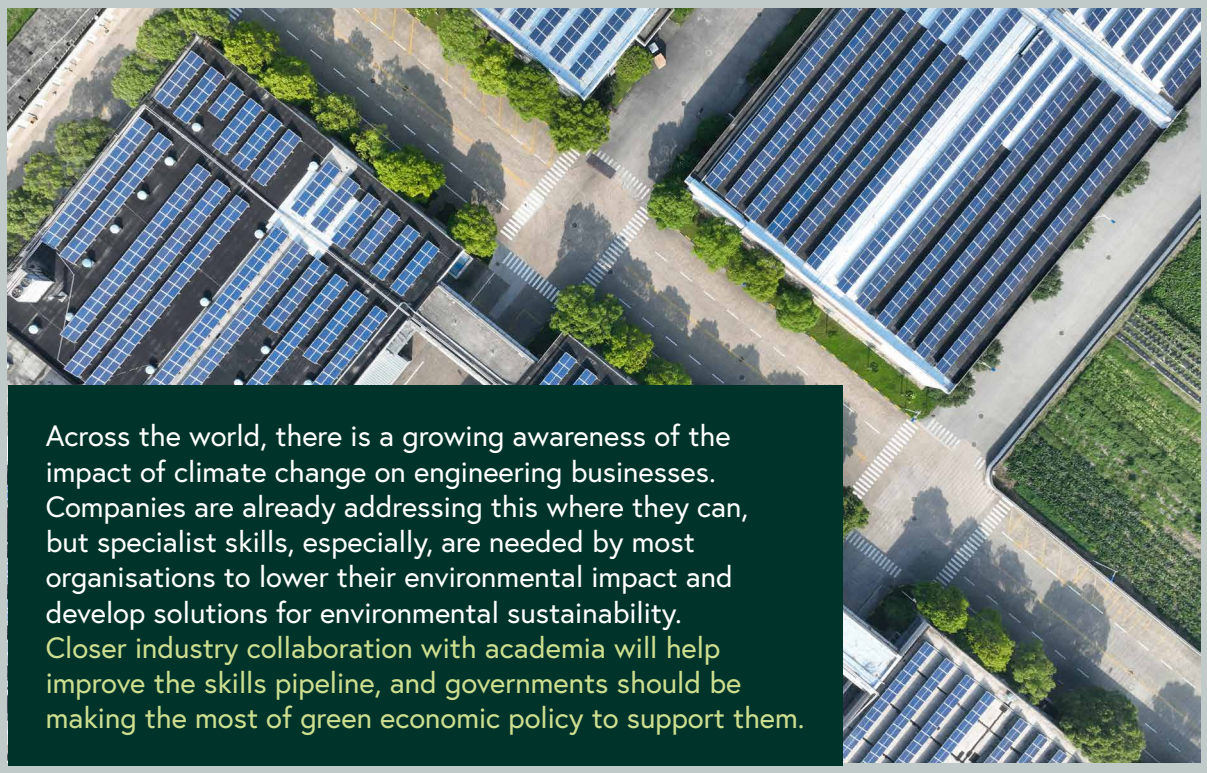
1. Executive summary



Across the world, there is a growing awareness of the impact of climate change on engineering businesses. Companies are already addressing this where they can, but specialist skills, especially, are needed by most organisations to lower their environmental impact and develop solutions for environmental sustainability. Closer industry collaboration with academia will help improve the skills pipeline, and governments should be making the most of green economic policy to support them.

There are tremendous levels of trepidation about the impact of climate change on engineering employers, with a minimum of 65% of those surveyed stating they are concerned. This is felt most keenly across countries surveyed in the global south. The impact is seen across supply chains, with price increases across the board, and some goods and services becoming unavailable.

This has led to greater concern over the skills that organisations are missing to be truly resilient to climate change, with only 4% or less, of nearly every country surveyed, saying that they have all the skills they need. However, although resilience may be seen as low, many organisations do believe that their workforce is agile enough to adapt their skillsets to new technologies and ways of working. It is specialist environmental skills that are often found most lacking, but there is also an interesting conflict around the role that leadership plays. A lack of leadership skills was identified as the one of the most common barriers for organisations in meeting net zero in seven out of the ten countries.

To combat the concern around the impacts of climate change, companies have overwhelmingly made both organisational and technological changes within the last three years to lower their environmental impact, with 98% and 99% of Chinese respondents saying they have made changes respectively. The majority of businesses surveyed also state that they currently have a sustainability strategy. Again, this is tempered by a lack of confidence that they have all the skills needed to deliver it, with gaps seen mostly around specialist environmental or sustainability skills.

The majority of countries surveyed feel that their education system prepares young people well to enter the workforce, (with the exception of the UK), but closer collaboration between academia and industry is seen as key to ensuring more high-quality engineering and technology candidates for industry.

At a country-wide level, the majority of employers surveyed in each country believe that new building and construction materials (such as solar panels) are the most important technology to help their country meet its net zero targets, although the area that they are most likely to think that their country has enough skills in is renewable energy generation. Conversely, it is sustainable aviation that they feel overall least confident that their country has the skills to realise. To help meet national net zero targets, respondents feel that their governments should be focusing their policies on economic development and industrial strategy.

2. Summary

Fewer than 5% of companies across 8 countries say they have all the skills to be resilient to climate change, only the UK and Australia sit above this at 10% and 7%. Resilience is especially low in Malaysia and China, where only 1% think they have all of the skills they need.

A lack of skills is the biggest barrier to reaching net zero. It is the most common answer to appear in the top three responses of each country. A lack of knowledge or skills within management to adapt to greener processes is the most common concern, followed by a lack of knowledge or skills in the workforce to adapt to greener processes.

Regardless of their concerns over the impact of climate change, at least two thirds of organisations in each country surveyed have a sustainability strategy. The most common drivers for having a sustainability strategy are pressure from governments (regulations), ESG requirements, customer pressure, and organisational adaptation and resilience.

Industry and academia collaboration is key to delivering graduates with the skills employers need. Engineering employers surveyed in the UK, Germany, India, China, Australia and Saudi Arabia think university level education can be improved by closer collaboration between industry and higher education bodies.

Economic development is the key to supporting industry to meet net zero. The best way that governments across the regions surveyed could improve their support of the engineering industry is to improve their policies for the green economy (Malaysia, India and Brazil) and industrial strategy (UK, Egypt and USA), in order to meet net zero.

3. Recommendations

Key finding	Recommendation
Fewer than 5% of companies across 8 countries say they have the skills to be resilient to climate change.	**Businesses:** Prioritise training and upskilling for employees that focuses on resilience skills, particularly around innovative thinking and problem solving. **Governments:** Raise awareness of the potential impacts of climate change on businesses and provide resources to help them increase their resilience, to ensure business continuity despite these impacts.
A lack of skills is the most common barrier to reaching net zero for engineering employers.	**Businesses:** Include sustainability content and themes across leadership programmes, to encourage strategic thinking within those responsible for forming sustainability strategies.
Industry and academia collaboration is key to delivering graduates with the skills employers need.	**Businesses and Academic Institutions:** Facilitate connections and opportunities between universities and employers. Make existing pathways clear and help universities to create new ones where possible. Maximise the opportunities for students to interact with businesses throughout their degrees.
Economic development is the key to supporting industry to meet net zero.	**Governments:** Create and promote green policies that support those at the forefront of climate change in the engineering industry to encourage innovation and drive change. Consistency is key to reassuring business and encouraging investment.

4. Approach and analysis

Approach and respondent profile

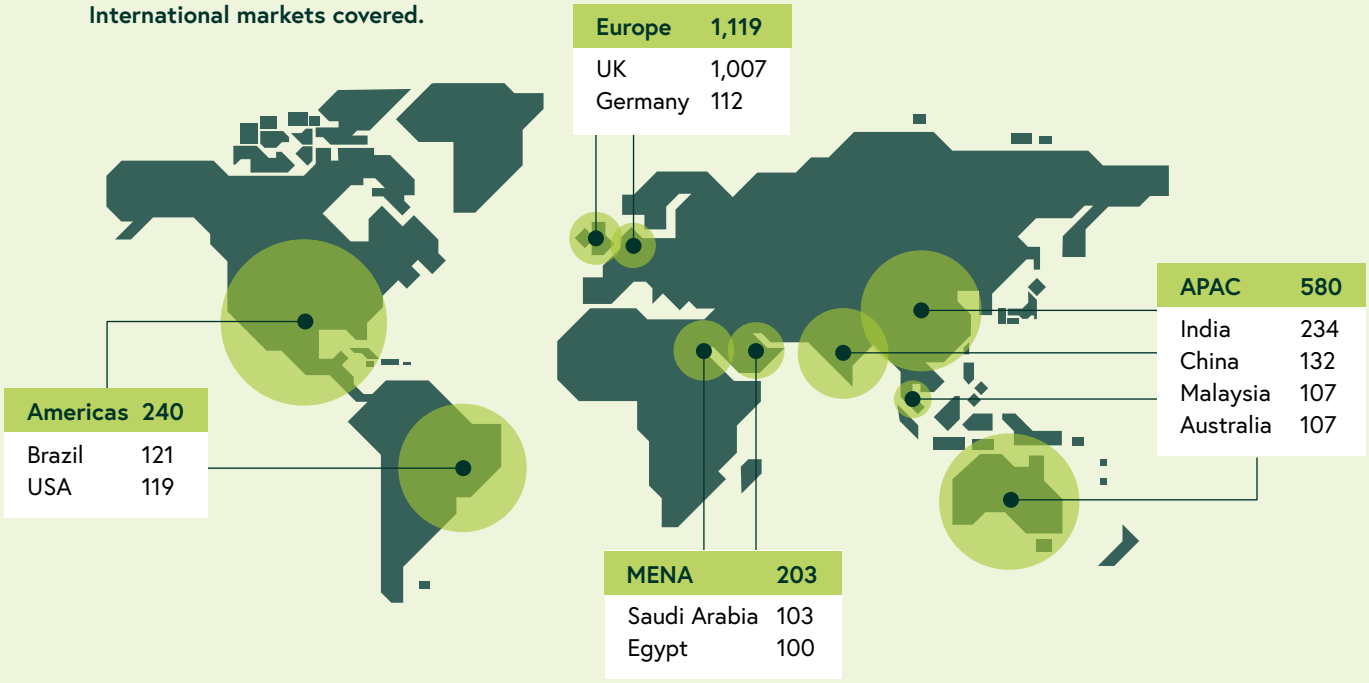
The IET commissioned the independent research agency YouGov to deliver this research with employers of engineering and technology staff across 10 international markets covering all four geographical areas (Europe, Americas, APAC and MENA). In total 2,142 respondents from engineering employers completed the survey. All professionals who responded on behalf of the organisation they work for had managerial responsibility.

For an employer to be eligible to take part in this research they had to have at least one engineering or technology employee. There was no upper limit on the number of employees and the research includes views from organisations with few employees through to those who employ thousands.

The focus of the research was to explore the current priorities and challenges around climate change, what sustainability skills are needed in the near future, and how employers are responding to needing these skills. YouGov worked with the IET to develop a survey, which was delivered to senior decision makers in engineering employers through an online mode. The fieldwork was conducted online between 17 August and 10 September 2023.

The markets and achieved sample sizes are shown below:

International markets covered.



Guidance on analysis

The data in this report represents the views of a sample of employers who employ at least one engineering and technology employee in the markets listed. Throughout the report, the results at the total sample level are described using the term 'engineering employers'.

In the UK, employers had to have at least six staff in the UK and the final achieved sample has been weighted to be representative of UK engineering employers by size and region.

In international markets, the sample is not matched to the demographic make-up of the relevant employer population. Therefore, the data is not representative of the engineering population in each market and should be interpreted as the views of the employers who responded to the survey.

A number of industries are covered by the sample however the views of these individual industries should be interpreted as the views of the employers that responded to this survey. The achieved samples are not necessarily representative of the wider employer population in those industries.

5. Reactions to climate change - resilience and agility of workforce

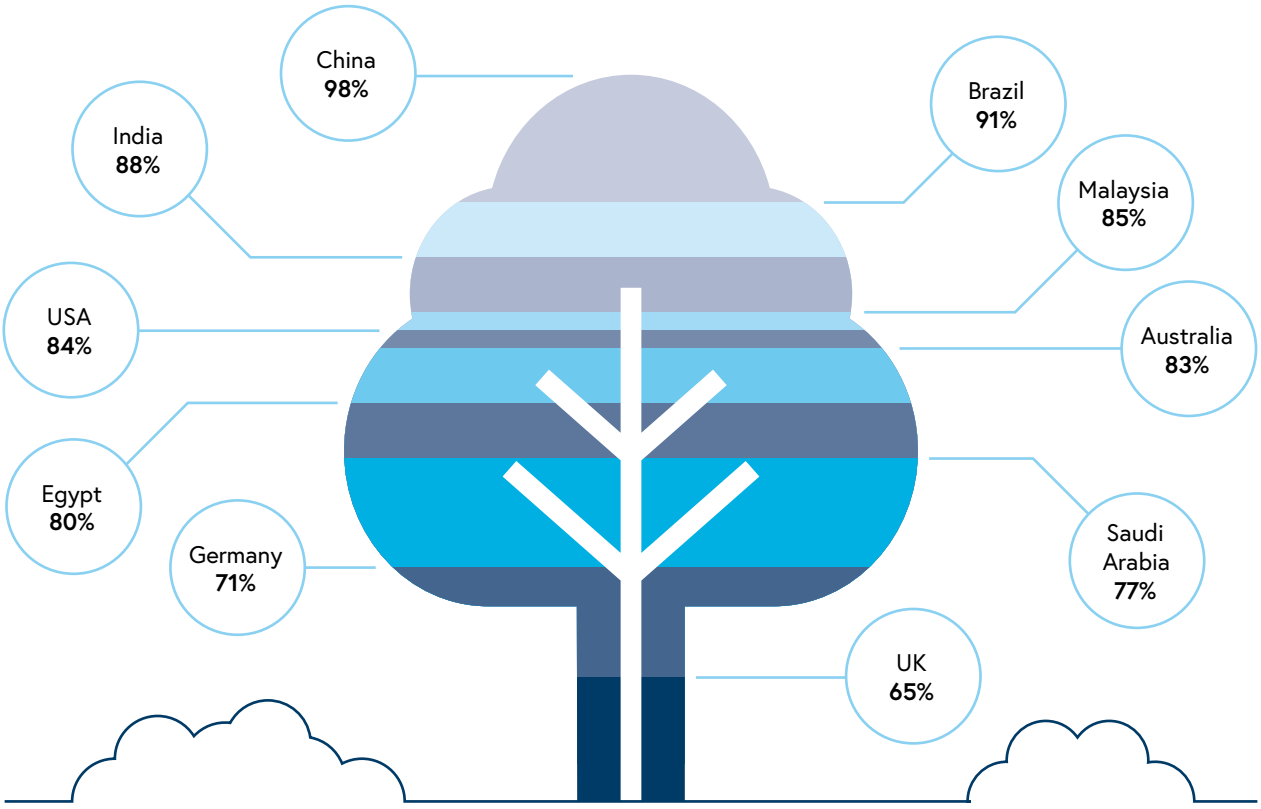
Climate change is a huge worry to engineering organisations the world over

In the UK, 65% of respondents say they are 'concerned' or 'very concerned', about the impact of climate change on their engineering businesses, which is by far the lowest response.[1]

When this comes to countries surveyed in the global south, this increases dramatically, rising to 98% of respondents in China and 91% in Brazil sharing that concern, and India and Malaysia close behind.

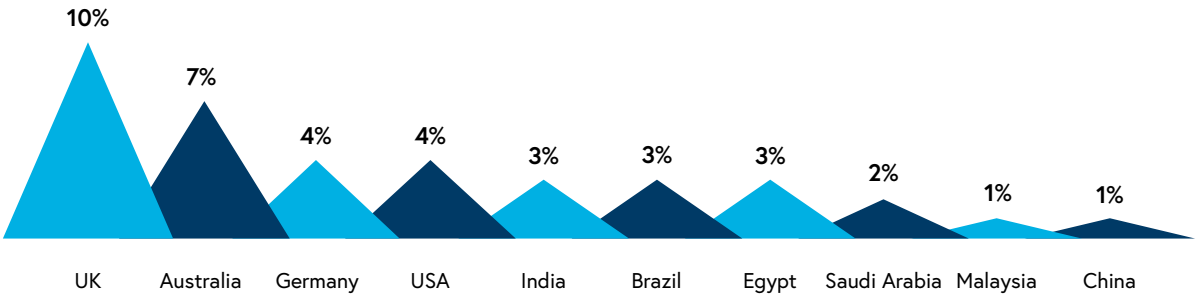
Perhaps in relation to this level of concern, we see that these countries are among the least likely to think that their organisations have all of the skills that they need to be resilient against the impacts of climate change, a sentiment also shared by Saudi Arabia and Egypt.[2] In fact, only 4% or fewer of nearly all countries surveyed think their organisations have all of the skills to be resilient to climate change. Only the UK and Australia are above this figure (10% and 7% respectively).

Figure 1 - Q26: 'How concerned, if at all, are you abut the impact of climate change on your business?' Net 'concerned' responses. Base: all.



[1] Q26. How concerned, if at all, are you about the impact of climate change on your business in the future? See Table 1 for full breakdown.
[2] Q27. Which, if any of the following skills do you think your organisation needs to be resilient against any impacts of climate change? Please select all that apply. See Table 2 for full breakdown.

Figure 2 - Q27: 'Which, if any of the following skills do you think your organisation needs to be resilient against any impacts of climate change?' Responses of 'Not applicable, my organisation has all the necessary skills'. Base: all.



In terms of the skills that organisations think they need for resilience, there are very different approaches from each country. Nearly half of those surveyed in Malaysia say that solving complex problems is an issue, whereas China is more than twice as likely to say that they need digital skills to be resilient than the UK. Technical/ engineering skills was the most popular choice in Egypt, while Saudi Arabia and Germany both had whole systems thinking as their top answer.

Numbers aside, this tells us that opinions are divided on how to achieve resilience to climate change, and no country sees one skill set in particular as the 'silver bullet'.

However, it isn't all bad news. Although, generally, confidence is low on the resilience front, companies surveyed do feel, by and large, that their workforces are agile, able to apply their existing skill sets to new situations and adapt to new technologies.[3] This is least true in the UK, where nearly 30% of employers feel that their workforce is *not* agile enough, at least double the majority of nearly all other surveyed countries.

Reactions in supply chains

89% or more organisations surveyed have also seen reactions to climate change within their supply chains (except for in the UK), with increased costs being the most common reaction.[4]

This reflects their higher concern about the impact of climate change on their organisation. Almost all of engineering employers surveyed in China have seen a supply chain reaction due to climate change. This includes using different suppliers and having partners stop selling goods and services that they previously used.

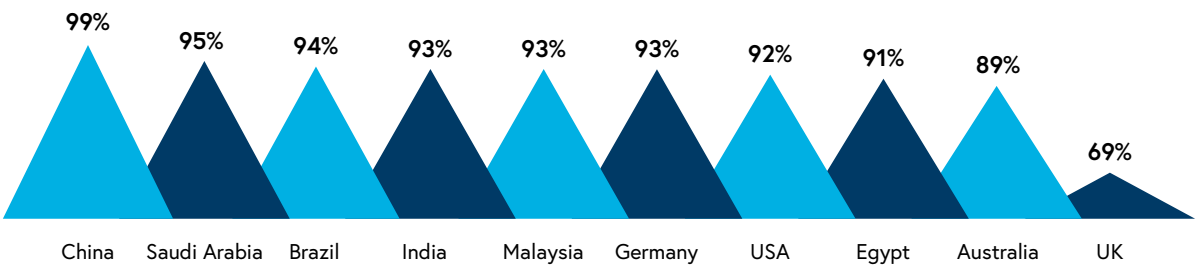
93% of German organisations say they are still seeing a reaction within their supply chains. It is unclear what the motivation behind these decisions is, given that German respondents showed the second lowest level of concern about the impacts of climate change.

What we are learning

There are emerging correlations between how concerned respondents in different countries are about the effects of climate change on their business, the associated reactions in their supply chains, and their feelings toward their engineering employees' agility levels and skills for resilience.

The outliers here seem to be the organisations surveyed in Europe: in the UK and Germany, who have the lowest levels of concern about climate change. The UK, especially, seems if not complacent, then at least at risk of it, with the lowest overall level of concern, the lowest responses seen within their supply chains and the most confidence in their workforce to be resilient. Germany on the other hand, has high confidence in their agility but not in their resilience.

Figure 3 - Q28. 'In which, if any, of the following ways have you seen your supply chain reacting to climate change?' Net: Seen a reaction to climate change in supply chain responses. Base: all.



[3] Q29. Is your engineering workforce agile enough to adapt to the impacts of climate change? See Table 3 for full breakdown.
[4] Q28. In which, if any, of the following ways have you seen your supply chain reacting to climate change? Please select all that apply. See Table 4 for full breakdown.

6. Barriers to net zero and the skills needed to overcome them

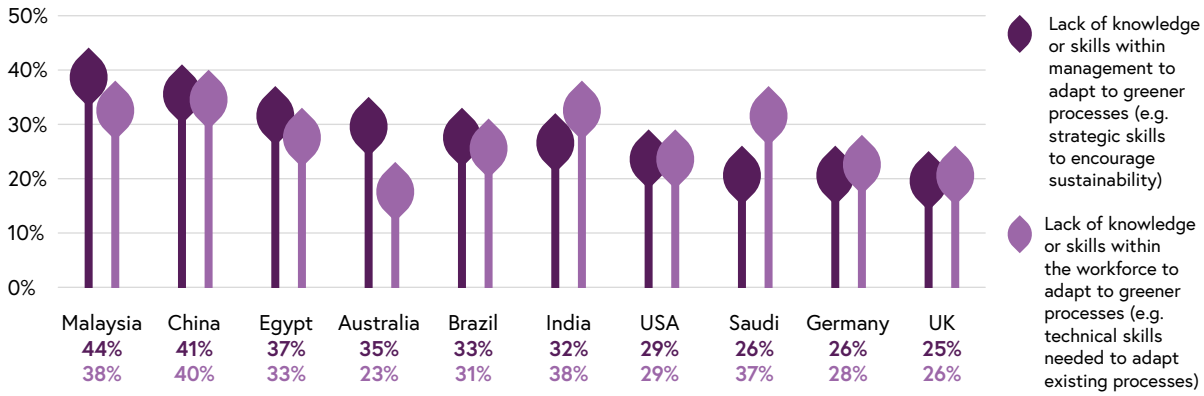
A lack of skills is the biggest barrier to meeting net zero

When asked what was preventing their organisation from becoming net zero, a lack of some sort of skills was among the top three responses for each country except the UK. India and Saudi Arabia's top responses were a lack of knowledge or skills within their workforce to adapt to greener processes. Malaysia, Australia, Brazil and Egypt selected a lack of knowledge or skills within management. The USA jointly picked both as their most common answer.[5]

This is especially interesting when compared to respondents' feelings around leadership for delivering their sustainability strategies, as leadership and management were not generally seen as skills that were especially missing in any country. Leadership and management is also less likely to be selected for where the biggest skills gaps occur across different levels of an organisation, as for each country this occurs across the most skilled roles instead. (This is either at the professional level or technician and skilled craft level).[6]

However, in relation to sustainability strategies, leadership was framed as the ability to implement changes, whereas when looking at barriers to net zero, we asked if they have the leadership with the strategic skills needed to encourage sustainability within their organisation.

Figure 4 - Q24: 'What, if any, of the following are barriers to your organisation becoming net zero?' A comparison of answers 'Lack of knowledge or skills within the workforce' and 'Lack of knowledge or skills within management' Base: all.



Companies are less likely to consider a lack of resources, such as employee time, as a barrier to achieve net zero, as this was the option least likely or second least likely, to be selected by every country. Worries that their organisation would become uncompetitive, potentially due to having to increase prices, for example, is not as big a barrier in comparison to others listed for most markets. This was true everywhere except for Germany, where this was the third mostly commonly selected option.

Raising questions

This suggests that the leadership skills gap is more likely to be perceived at an innovation and strategy level, rather than management and execution. What skills might need developing to close this gap within leadership roles?

[5] Q24. What, if any, of the following are barriers to your organisation becoming net zero? See Table 5 for full breakdown.
[6] Q10. In which level of your organisation do you find the biggest skills gap? See Table 6 for full breakdown.

Business priorities aligned to net zero

Developing solutions/technologies for environmental sustainability and lowering environmental impact were not the most commonly selected responses for any country when asked what their business priorities are.

Figure 5 - Q1: 'Which, if any, of the following are currently key priorities for your organisation?' Top priority for each country. Base: all.

Engineering companies are more likely to be prioritising adapting to new technologies, increasing their productivity and upskilling/reskilling current staff than concentrating on sustainability and their environmental impact.[7]

Of the organisations who do have lowering their business's environmental impact or developing solutions for environmental sustainability as a business priority, there are big differences between each country's perception of whether they have the skills in place to meet them. For example, 90% of those surveyed in China are confident that they have all or most of the skills needed to lower their environmental impact, whereas nearly half (48%) of those in Germany think they only have some or none of the skills.[8]

Of the skills most needed to lower their environmental impact, develop solutions for environmental sustainability and adapt to new technologies, respondents in the USA consistently had whole systems thinking as their top or jointly top selected answer. Many other countries commonly selected specialist environmental skills in order to lower their impact or develop solutions and were split on the skills they think they need to adapt to new technologies.[9]

What we are learning

Skills are a key requirement for engineering organisations to meet net zero. Better strategic leadership would help with this, but companies are also seeing different factors play a part, such as increased operating costs or high levels of initial investment being perceived as needed in order to achieve their goals.

Although specific sustainability factors are not necessarily among the highest business priorities in many countries, they are on company radars, and there is a high level of awareness over the skills still needed to meet these priorities.

[7] Q1. Which, if any, of the following are currently key priorities for your organisation? Please select all that apply. See Table 7 for full breakdown.
[8] Q4. You said the below is currently a priority for your organisation. To what extent do you think your organisation has the skills in each of these areas needed to meet this priority? See Table 8 for full breakdown.
[9] Q5. You mentioned that your organisation doesn't have all the skills to lower your organisation's environmental impact... Q6. You mentioned that your organisation doesn't have all the skills to develop solutions/technologies for environmental sustainability... Q7. You mentioned that your organisation doesn't have all the skills to adapt to new technologies... What skills do you think are still missing in order to meet these priorities? See Tables 9, 10 & 11 for full breakdown.

7. Sustainability strategies and the skills needed to deliver them

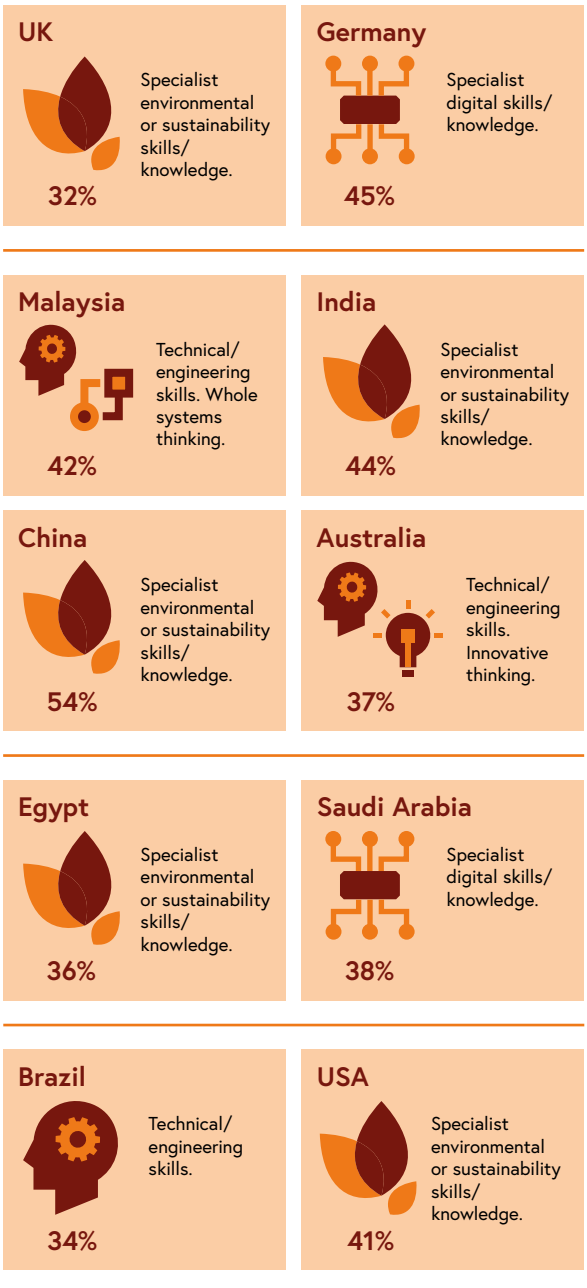
At least two thirds of organisations in each country surveyed have a sustainability strategy.[9]

This is regardless of their level of concern about climate change. However, under 15% of those with a strategy think that their organisation has the skills needed to meet it. In fact, only one 1% of respondents in Egypt and 2% in India and China think that they have all the skills.[10]

Half of the countries surveyed had specialist environmental/sustainability skills or knowledge as the most common skill needed to deliver a sustainability strategy. Other top answers from each country include technical or engineering skills, specialist digital skills, innovative thinking and whole systems thinking.

Again, it's clear from the answers received that each country has different ideas of what skills they need to deliver their sustainability strategies. There is no clear, single route or answer. This could also be because the reasons for organisations' sustainability strategies also differ. China, for example, is significantly more likely to select gaining an environmental qualification as an aim of their sustainability strategy than any other country. Many others have meeting regulations for new markets or making their organisation more appealing to customers among their most common responses.[11]

Figure 6 - Q20. 'Thinking about your organisation's ability to meet its sustainability strategy. Which, if any of the following skills do you think your organisation is missing?' Top answer from each country. Base: Organisation has a sustainability strategy.



[9] Q17. Does your organisation have a sustainability strategy? See Table 12 for full details.
[10] Q20. Now thinking about your organisation's ability to meet it's sustainability strategy specifically. Which, if any of the following skills do you think your organisation is missing? Please select all that apply. See Table 13 for full details.
[11] Q18. You told us you have a sustainability strategy. Which, if any, of the following are the aim(s) of your strategy? See Table 14 for full details.

Raising questions

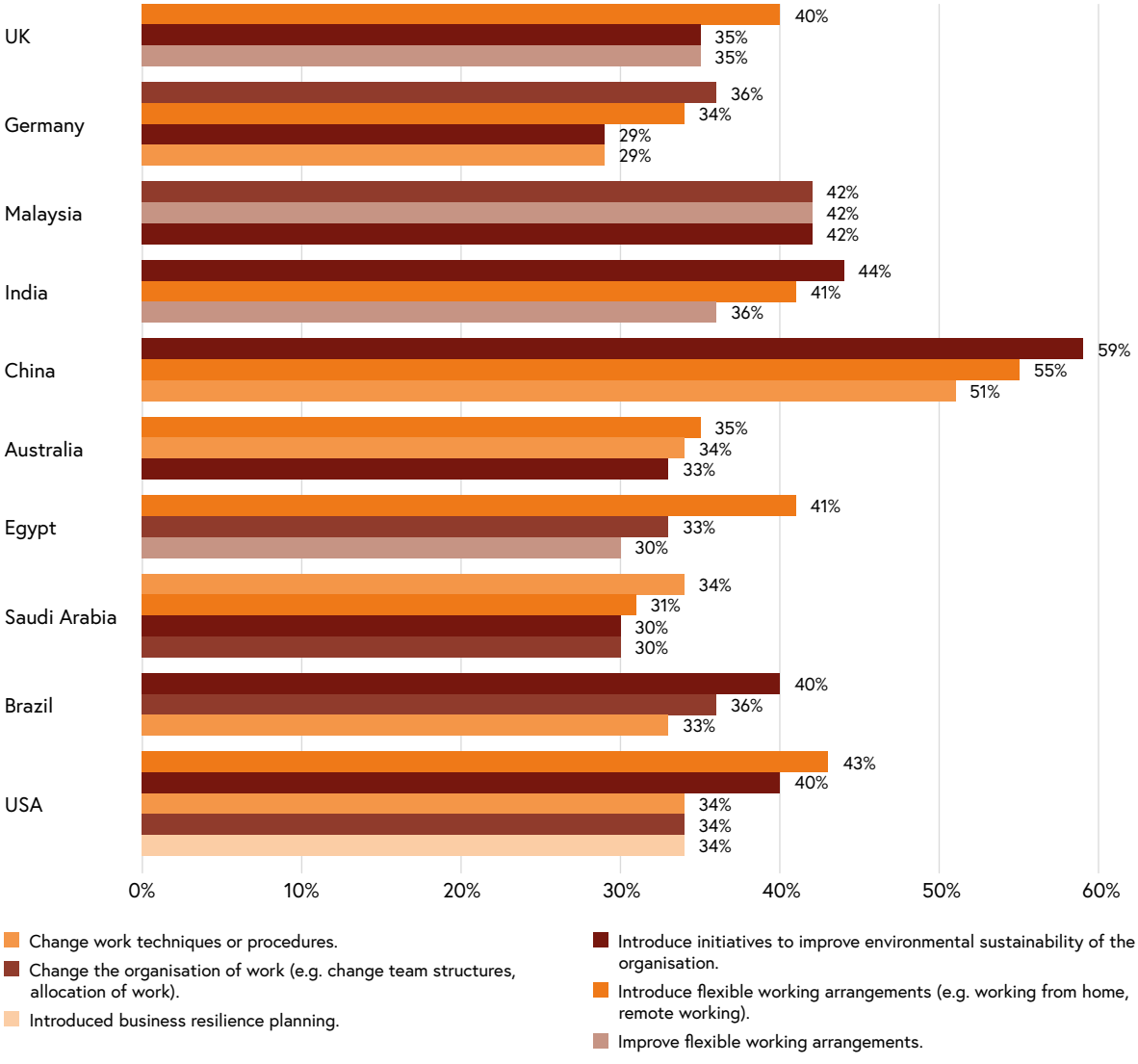
When drilling down into the drivers behind these strategies, the most common reasons stem from pressure from governments (regulations), ESG requirements, customer pressure and organisational adaptation and resilience. It will be interesting to see, over time, how the level of governmental pressure changes the focus of company sustainability strategies, and if other drivers gain in importance.

What has changed?

Nine in ten of those surveyed in every country, except the UK, have made organisational changes to lower their organisation's environmental impact, and 88% have also made technological changes. (The UK stands a little lower at 78% and 71% respectively).[12]

Every country surveyed, except Brazil, has started or improved flexible working arrangements, such as working from home, as one of their three most common efforts to lower their environmental impact. Companies in Malaysia and China are the most likely to have improved them. Of course, the impact of the Covid19 pandemic has also had a huge impact on the number of companies offering employees home-working opportunities, but only in Saudi Arabia did more than 25% of companies state that they have stopped this.

Figure 7 - Q22: 'In the last 3 years, which, if any, of the following organisational changes has your organisation implemented in order to lower its environmental impact?' Top 3 answers from each country. Base: all.



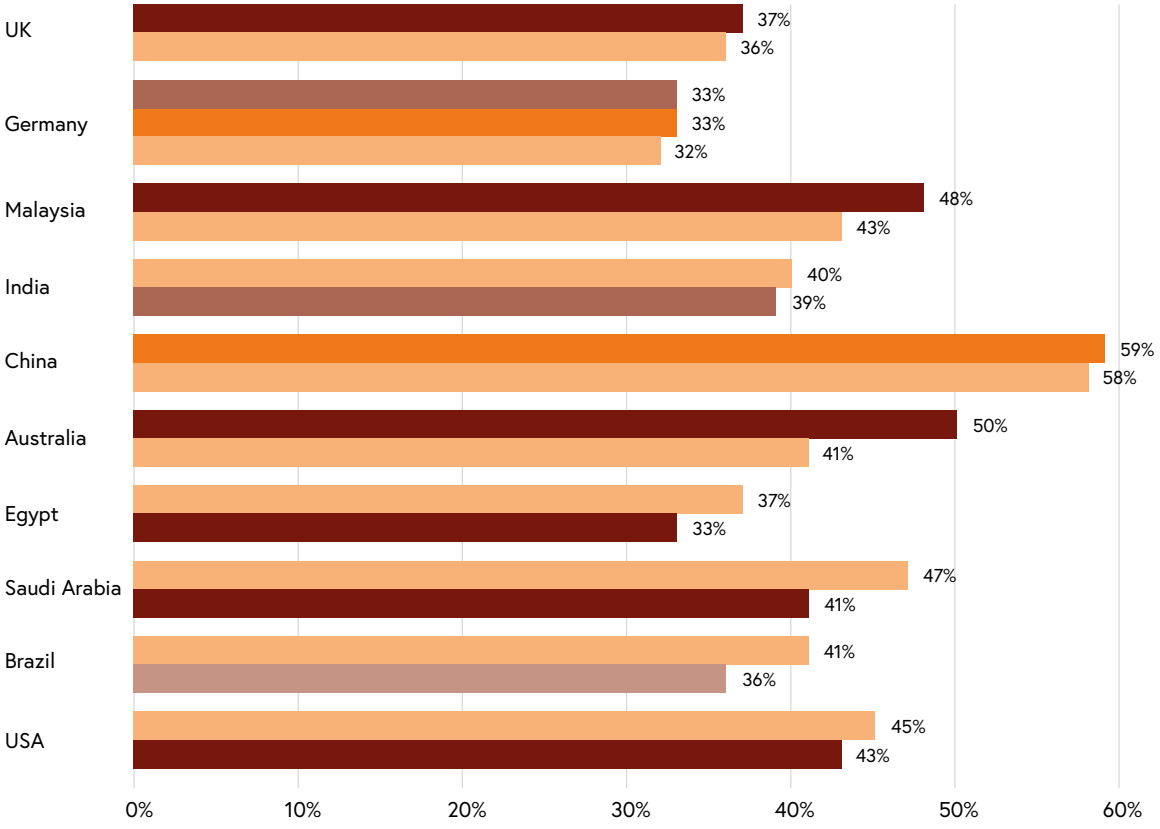
[12] Q22. In the last 3 years, which, if any, of the following organisational changes has your organisation implemented in order to lower its environmental impact? Please select all that apply. Q23. Still thinking about the last 3 years, which, if any, of the following technological changes has your organisation implemented in order to lower its environmental impact? Please select all that apply.
See Tables 15 & 16 for full breakdown.

Technological changes can be as important as organisational ones to lower environmental impact. It goes hand in hand with homeworking, that one of the most commonly selected technological changes in each country was to introduce or expand online communication or networking applications. Most countries are also likely to be upgrading their IT hardware.

Increased use of Artificial Intelligence (AI) appears in the top three most selected changes made in Germany, India, China, Australia and the USA, but other newer technologies such as 5G appear to have had a much lower take up so far.

These statistics demonstrate that even if lowering their environmental impact has not been a business priority, it is still something being considered by the majority of organisations.

Figure 8 - Q23: 'Which, if any, of the following technological changes has your organisation implemented over the last 3 years in order to lower its environmental impact?' Top 2 answers from each country. Base: all.



What we are learning

Engineering organisations across each country surveyed are making efforts to improve their sustainability credentials. The majority of organisations have made some kind of changes to lower their impact, and many of them have a sustainability strategy.

Once again, it is China that appears to be leading in each area, with 98% of those surveyed having a strategy, 98% having made organisational changes and 99% having made technological ones. Closing the skills gaps identified in the previous section of this report will be vital to the success of these initiatives, for all countries.

[12] Q22. In the last 3 years, which, if any, of the following organisational changes has your organisation implemented in order to lower its environmental impact? Please select all that apply. Q23. Still thinking about the last 3 years, which, if any, of the following technological changes has your organisation implemented in order to lower its environmental impact? Please select all that apply. See Tables 15 & 16 for full breakdown.

8. The workforce pipeline

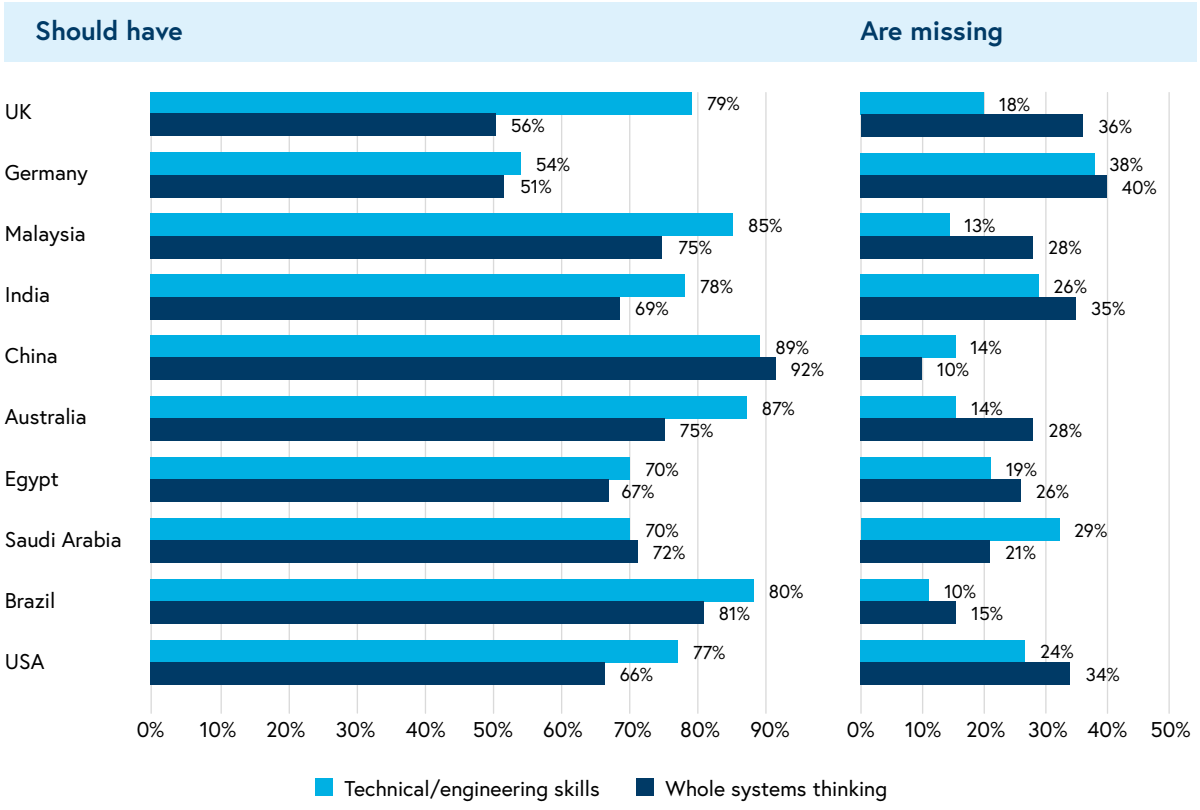
Mindset and different ways of thinking are seen to be as important as traditional skills when it comes to preparing young people to enter the workforce.

Most countries surveyed selected technical and engineering skills as their top answer to what they expect new entrants to the workforce to have, but for those that didn't, it was innovative thinking (Saudi Arabia), an agile mindset (Brazil) and whole systems thinking (China) which had the most responses. However, technical skills were less likely to be selected as 'are missing' compared with the mindset-related answers.[13]

This echoes what we saw earlier regarding the skills that countries feel they are missing in order to be resilient to climate change. Other than specialist environmental or sustainability skills, it was the softer, mindset related skills that were most likely to appear in countries' top three selections.[14]

Regardless of specific missing skills, the UK is the only market where respondents feel that the education system does not prepare its young people well for work in their industry, with just 35% of respondents saying it does[15]. This is far lower than all other countries, (the next lowest being Malaysia at 65%). At the other end of the scale, Chinese respondents have the most confidence in their education system, at 95%, and among the lowest numbers missing key skills as they enter the workforce.

Figures 9 & 10 - Q13: 'Which, if any, of the following skills do you think people entering the workforce: should have/are missing?' A comparison between answers 'technical/engineering skills' and 'whole systems thinking'. Base: all.



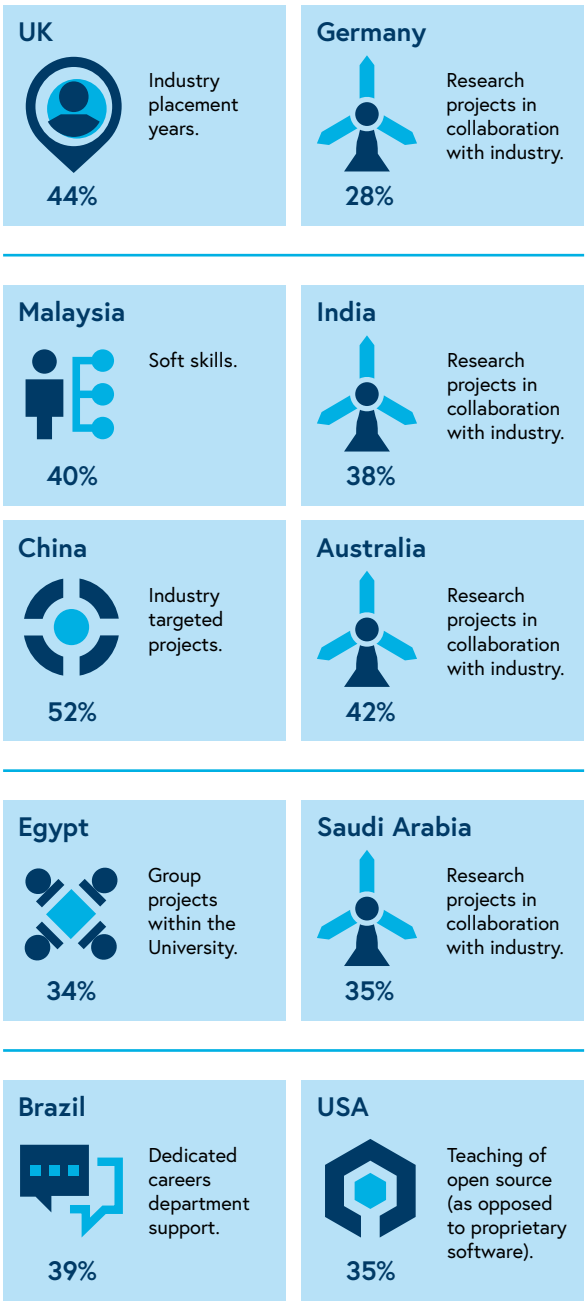
[13] Q13. Thinking about the skills people entering the engineering workforce have... Which, if any, of the following skills do you think people... Should have/are missing? Please select all that apply. See Table 17 for full details.
[14] Q27. Which, if any of the following skills do you think your organisation needs to be resilient against any impacts of climate change? Please select all that apply. See Table 2 for full details.
[15] Q15. How well, if at all, do you think the country's education system prepares young people to work in your industry? See Table 18 for full details.

When asked where technology and engineering education at a university level needs to improve in order to provide more high-quality candidates for industry, nearly every country's top three most selected answers included collaboration of some kind with industry.[16]

Raising questions

Industry collaboration with academia is a topic that comes up a lot in the work that the IET does, especially in conversations around preparing young people for the realities of the workplace. It is clear, here, that this collaboration is seen as key to developing the skills needed by companies at the beginning of an individual's career.
What we don't know for sure, is whether this collaboration is also seen as a way to develop the soft-skills and required mindsets that will enable young people entering the workplace to help their companies be more resilient to challenges such as the impact of climate change.

Figure 11 - Q16: 'Where, if anywhere, does technology and engineering education at a university level need to improve in order to provide more high-quality engineering and technology candidates for the industry?' Top answer from each country. Base: all.



[16] Q16. Where, if anywhere, does technology and engineering education at a university level need to improve in order to provide more high-quality engineering and technology candidates for the industry? Please select all that apply. See Table 19 for full details.

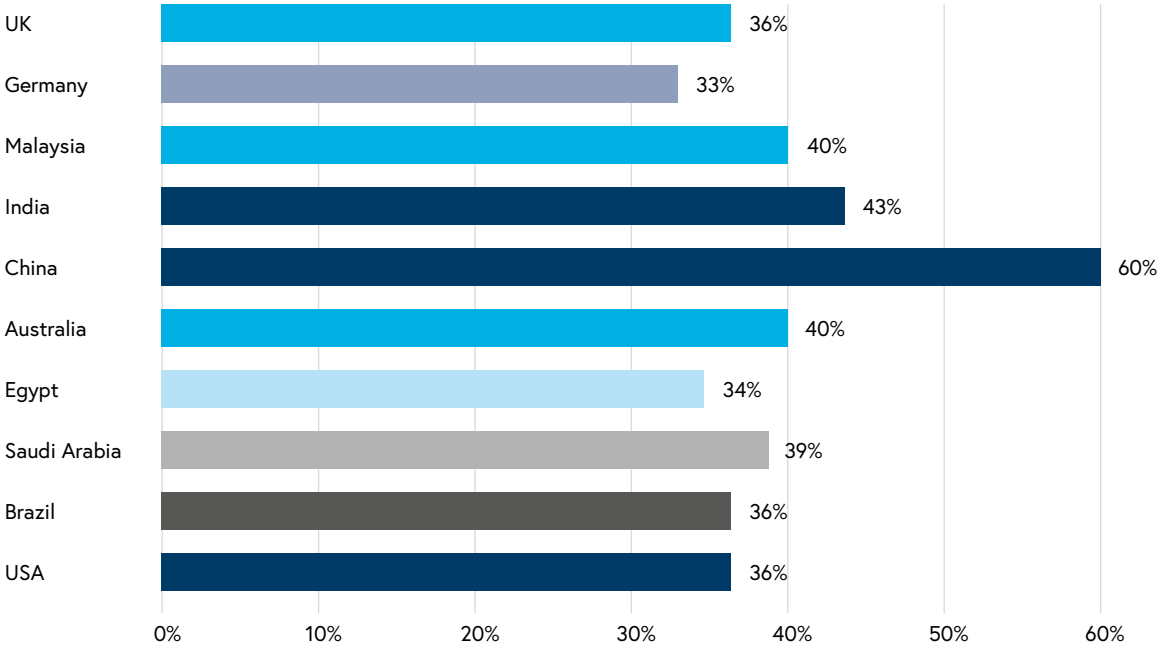
Recruitment challenges

Getting skills into their organisation is not just a challenge companies face when looking at new entrants to the workforce. At most, only 12% of companies surveyed stated they *do not* struggle to find skills within the external labour market when trying to recruit. In many countries, this was down to 6% or under.[17]

Again, we see a commonality between technical and mindset related skills coming through as the hardest to recruit for, with the most commonly selected skills that countries struggle to find being technical or engineering skills (UK, Malaysia and Australia) and solving complex problems (India, China and USA).

The most common method used to respond to these challenges is to upskill and retrain existing employees, with respondents in eight out of ten countries selecting this answer the most. The USA, however, is more likely to continue looking to hire these skills externally (domestically), and Germany's top selected answer was to increase contingent labour.[18]

Figure 12 - Q9: 'In general, which, if any, of the following skills do you struggle to find within the external labour market when you try and recruit?' Top answer from each country. Base: all.

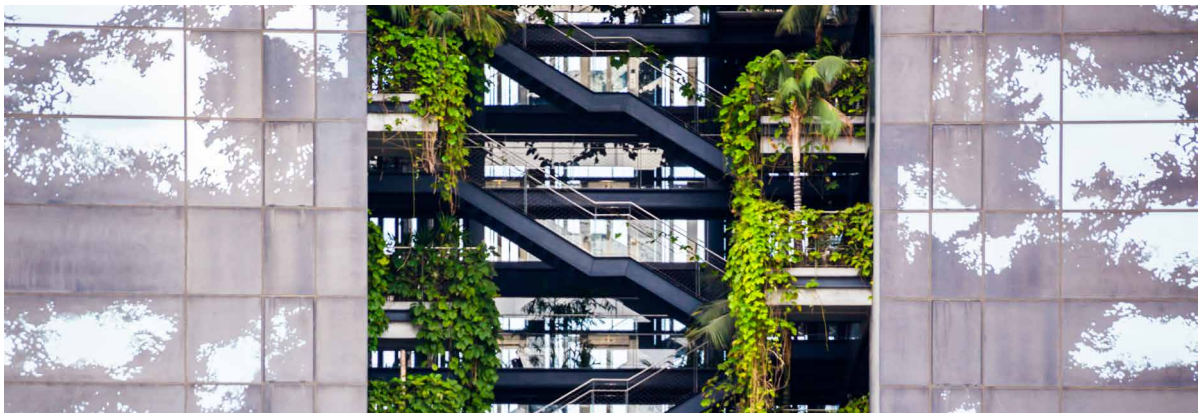


What we are learning

Engineering employers value softer skills such as having an agile mindset, whole systems thinking and the ability to solve complex problems when looking to recruit new employees at any stage of their career. These are also among the most common answers that countries selected around the skills they think are most needed to deliver a sustainability strategy. Of course, technical engineering skills and specialist environmental skills are also highly valued, but we can see that a more rounded approach to skills prioritisation is becoming common, and this is reflected in the skills expected from new entrants to the workforce.

[17] Q9. In general, which, if any, of the following skills do you struggle to find within the external labour market when you try and recruit? See Table 20 for full details.
[18] Q11. How is/ will your organisation respond to these skills gaps? See Table 21 for full details.

9. Country readiness for net zero



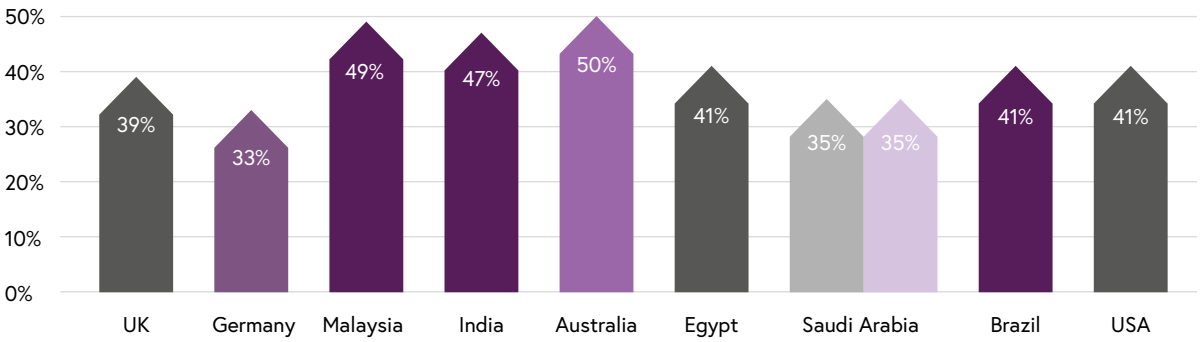
Economic development is the key to supporting industry to meet net zero

When asked where governments could focus on improving policies to support the engineering industry in their efforts to meet net zero, the most common top answers were to improve policies for the green economy (Malaysia, India and Brazil) or industrial strategy (UK, Egypt and USA).[18]

A few countries stand out in their responses to this question, with Malaysia the most likely of the markets surveyed to prioritise the education pipeline and promotion of green jobs. This reflects what we saw in Malaysia's attitude towards their education system, with the second lowest response to thinking it prepares young people well to enter industry.

India is the only country least likely to select 'funding for up-skilling/re-skilling' from its answers. As upskilling is the most common way that engineering employers plan to address skills gaps within their organisation[19], support from the government would be a key way to help engineering employers address this, something recognised by most other countries.

Figure 13 – Question 32: 'Where could your government focus on improving their policies to support the engineering industry in their efforts to meet net zero?' Most selected answer from each country. Base: all (except China).



- Industrial strategy: coordinating a range of policies to boost businesses and the economy.
- Promotion of 'green jobs': jobs related to activities and industries that reduce carbon emissions – examples include renewable energy engineers, retrofit engineers, nuclear engineers.
- Regionalisation/local strategies: policies that focus on local economic and societal development.
- Innovation funding investment into science and technology capacity/and or research and development.
- Funding for up/re-skilling: funding for employees to train-up their skill level in their current profession/funding to retrain into a different profession.
- The green economy: sectors of the economy that seek to reduce carbon emissions – for example, sustainable energy.

[18] Q32. Where could your government focus on improving their policies to support the engineering industry in their efforts to meet net zero? See Table 22 for full details – please note, this question was not asked in China.
[19] Q11. How is/will your organisation respond to these skills gaps? See Table 21 for full details.

New buildings and construction, and renewable energy generation are the most important areas to help countries meet their net zero targets

Six countries selected new buildings and construction, including materials and incorporating sustainable technologies (such as solar panels) as their most common answer when asked which area they thought was most important.[20] China, Brazil and the USA selected renewable energy generation. These are both fairly mature markets and technologies, especially when compared with others on the list (such as nuclear fusion). This may be because they are understood better, but also suggests that respondents feel that we have some of the most important technologies to address climate change already and aren't just relying on developments of new technologies in the future.

Respondents in many countries also think that their country has the skills needed to deliver on these areas[21]. Other areas that were selected the most when it comes to having the skills needed were manufacture of key technologies such as batteries (China), heating/cooling of buildings (Australia) and carbon capture, utilisation and storage (CCUS), (Germany). There is much agreement around the areas that respondents think their country does not have the skills needed too, with the most selected answer being zero emission aviation, followed by various nuclear technologies.

At a country level, those in Germany and Malaysia were most likely to think that they *do not* have the skills in the most areas, and respondents in China the mostly likely to think they *do*, despite having the least confidence that they have the skills to be resilient to climate change at an organisation level.

It is the more nascent technologies, and the ones proving harder to abate emissions from, that have the least confidence from respondents in terms of having the skills in their countries. These are the areas that will need large amounts of focus from academia, R&D departments and industry collaboration to solve, along with government incentives to accelerate development of solutions in order to produce them at scale.

Figure 14 – Q30: 'Which, if any, of the following areas do you think are the most important to help your country meet net zero targets?' and Q31: 'Of these areas, which, if any, do you think your country has the skills needed/does not have the skills?' Top response from each country. Base: all.

	Most important	Have skills	Do not have skills
UK	Heating/cooling of buildings (39%)	Renewable energy generation (63%)	Zero emission aviation (42%)
Germany	New buildings and construction (45%)	CCUS (46%)	Energy infrastructure (44%)
Malaysia	New buildings and construction (45%)	New buildings and construction (59%)	Modular nuclear reactors (44%)
India	New buildings and construction (40%)	Renewable energy generation (65%)	Zero emission aviation (36%)
China	Renewable energy generation (43%)	Manufacture of key technologies (batteries etc.) (84%)	Zero emission aviation/ Digital twins (22%/22%)
Australia	New buildings and construction (46%)	Heating/cooling of buildings (73%)	Zero emission aviation (35%)
Egypt	New buildings and construction (48%)	Renewable energy generation (44%)	Manufacture of key technologies (batteries etc.) (34%)
Saudi Arabia	New buildings and construction (50%)	New buildings and construction (62%)	Nuclear reactors/nuclear fusion (39%)
Brazil	Renewable energy generation (38%)	Renewable energy generation (75%)	Nuclear fusion (37%)
USA	Renewable energy generation (35%)	Heating/cooling of buildings (65%)	Green Hydrogen production (36%)

What we are learning

Overall, confidence that countries have the skills needed in areas or technologies that are key to achieving net zero targets is quite high. It is in the newer or less mature technologies where respondents were less likely to think their country has the skills to deliver. As respondents were all from industry, it is important for the future that these skills become more common over time, as solutions are developed, as it is engineers that will be responsible for delivering them. Governments need to support industry through economic policies that help them to develop solutions at scale.

[20] Q30. Which, if any, of the following areas do you think are the most important to help your country meet net zero targets? See Table 23 for full details.

[21] Q31. Thinking about the areas that could be used to meet net zero targets in your country, in which, if any of the following areas do you think your country... has the skills needed/does not have the skills needed? See Table 24 for full details.

10. About the IET

We are the IET – a charitable engineering institution with over **154,000 members** in **148 countries** – working to engineer a better world.

Our mission is to inspire, inform and influence the global engineering community to advance technology and innovation for the benefit of society.

As a diverse home across engineering and technology, we share knowledge that helps make better sense of the world in order to solve the challenges that matter. It is why we are uniquely placed to champion engineering.

We bring together engineers, technicians and practitioners from industry and business, from academia and research, and from government and the third sector. We are member-led, independent and impartial.

We cover engineering across industries from design and production, digital and energy to healthcare, transport and the built environment. Passionate about healthcare, we bring together expert practitioners from the healthcare industry, academia and third sector.

We champion engineers and technicians working in the sector by offering networking, volunteering and thought leadership opportunities. Together, we campaign on issues of the day around digital skills and provide policy input to government.

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The Institution of Engineering and Technology

Contact information

London, UK
T +44 (0)20 7344 8460
E faradaycentre@ietvenues.co.uk

Stevenage, UK
T +44 (0)1438 313311
E postmaster@theiet.org

Beijing, China*
T +86 10 6566 4687
E china@theiet.org
W theiet.org.cn

Hong Kong SAR
T +852 2521 2140
E infoAP@theiet.org

Bangalore, India
T +91 80 4089 2222
E india@theiet.in
W theiet.in

New Jersey, USA
T +1 (732) 321 5575
E ietusa@theiet.org
W americas.theiet.org

@TheIET theiet.org