The Institution of Engineering and Technology

# IET skills for net zero and a green recovery

## 2020 survey

Examining the engineering skills needed to meet net zero.

In partnership with:

YouGov

theiet.org/skills

The IET skills for net zero and a green recovery is published by the Institution of Engineering and Technology (IET).

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# Contents

# 1. Executive summary

We carry out an annual skills survey of engineering employers in the UK. In 2020 we focused on the skills requirements for delivering the UK Government's net-zero target by 2050, the subsequent impacts of COVID-19 on engineering employers, difficulties in recruiting engineers, and employer perceptions of the engineering skills gap.

In 2020 we've focused our research findings around the skills requirements for delivering the UK Government's net-zero target by 2050, which was enshrined in law in June 2019.

The responsibility to drastically reduce our impact on the climate falls on us all, but engineering has an important role to play. Responses from our survey highlighted that engineering employers take this responsibility seriously. Half of those questioned already have a sustainability strategy in place, however less than one in ten have all the skills their strategy needs to achieve its goals.

In the following report we've broken down the results of our survey into six categories, exploring the current skills challenges employers are facing, their movement towards increased sustainability and how they can respond to future challenges by building skills for a green recovery. Off the back of our survey results, we've also highlighted key action areas that could help employers meet these goals.

### This survey covers:

- Business views on climate change
- Strategies to achieve sustainability
- Reaching sustainability: the future
- The business context
- Current workforce needs
- Recruitment difficulties

This report is based on research we commissioned, conducted in partnership with YouGov in summer 2020.

Please note that the views expressed in this publication are not necessarily those of the IET. It is not intended to be a guidance note with a specified set of recommendations or actions but rather seeks to add understanding and debate around the topic.

## Business views on climate change

There is a consensus that **the world's climate is changing** as a **result of human activity.**

**Engineering employers** see **national governments** as having the **most responsibility** to tackle climate change, followed by **business and industry.**

**80%**

of employers **are aware** of the UK's **net zero by 2050** target.

A small majority believe net zero by 2050 is **achievable for their business**, but employers are **less assured** of the UK's overall success.

Achievable for own organisation **53%**

Achievable for UK **37%**

## Strategies to achieve sustainability

**Half** of engineering employers have a **sustainability strategy.**

**Eight in ten employers** are doing activities to **lower their environmental impact.**

Using new, greener technologies **43%**

Adapting existing technologies **33%**

**Financial incentives** to adapt/purchase technologies would **motivate over half of employers** to lower their impact.

**Less than one in ten** employers have **all the skills** their strategy needs.

**60%** will **upskill** employees.

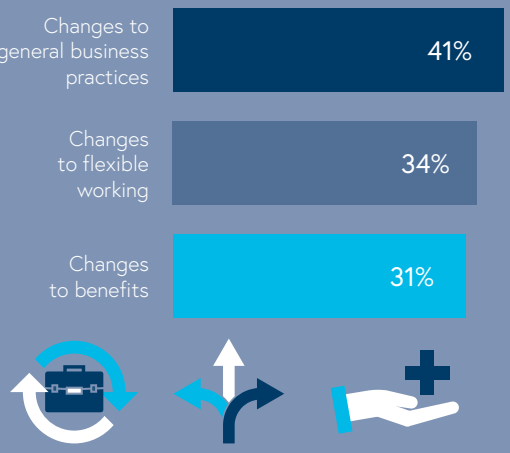
**38%** will **hire** for skills.

**Costs** are the **main barrier** to lowering environmental impact.

**Increased** operating costs **31%**

**Initial investment** costs **30%**

**Top three workforce impacts** from environmentally friendly challenges:




## Reaching sustainability

**One in five have not introduced** any technological change to **lower their environmental impact** over the past five years.

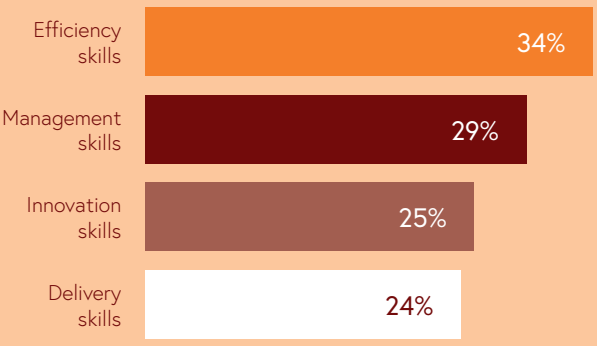
**Flexible working** is the most **common area** of organisational change to lower environmental impacts.

**28%** will **improve** flexible working arrangements.

**27%** will **introduce** flexible working.

A **quarter do not** engage with **schools, colleges or universities.**

A **third** will **train staff** in **efficiency skills** to help **lower environmental impacts.**




Most employers think key priorities for the UK education system are:

**60%** More opportunities for young people to acquire relevant **work experience.**

**58%** Increased **engagement** with businesses.

**41%** say that **time is the biggest barrier** to encourage greater **engagement with education.**

## The business context

**60%** of employers have **furloughed staff through the Job Retention Scheme**, making it the **most commonly taken workforce measure** in response to the impact of **COVID-19**.

**34%** have or **plan to make redundancies** as a **result of COVID-19.**

Twelve months ago, the **top priority** was **increasing profitability (50%)**. This priority is **also expected in twelve months' time (57%)**.

**55%** report that COVID-19 will result in **permanent redundancies** for up to **10%** of their workforce.

However, in current times, the most **key priorities** are the **wellbeing of their staff** and **dealing with economic changes/uncertainty.**


## Current workforce needs

**33%** of **engineering employers** report that their **UK workforce is mostly high** or **intermediate-skilled (30%)**. A **smaller proportion** say their work-force is mostly **low-skilled (14%).**

**25% vs 35%**

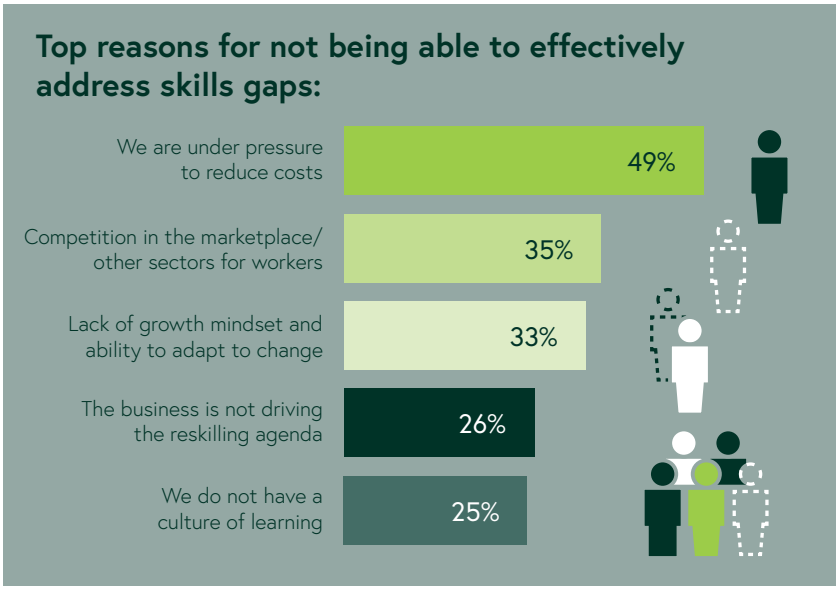
**A quarter say their headcount has increased** over the past 12 months, but **a larger proportion report that it has decreased.**

**47%** of engineering employers report currently having difficulties with the skills available to them through **recruitment** and their **internal workforce (46%)** ...however, in **five years' time,** smaller proportions expect to have **difficulty with external recruitment (38%)** or **internal skills gaps (34%).**

**21%** **who respond to skills gaps** say their organisation is completely able to **effectively address these gaps, but the majority (63%)** think they can address them **only to some extent.**

**47%** of employers often **upskill/retrain existing employees** when faced with **skills gaps** in their workforce **or hire new people** with those skills **(44%)**.

## Top reasons for not being able to effectively address skills gaps:

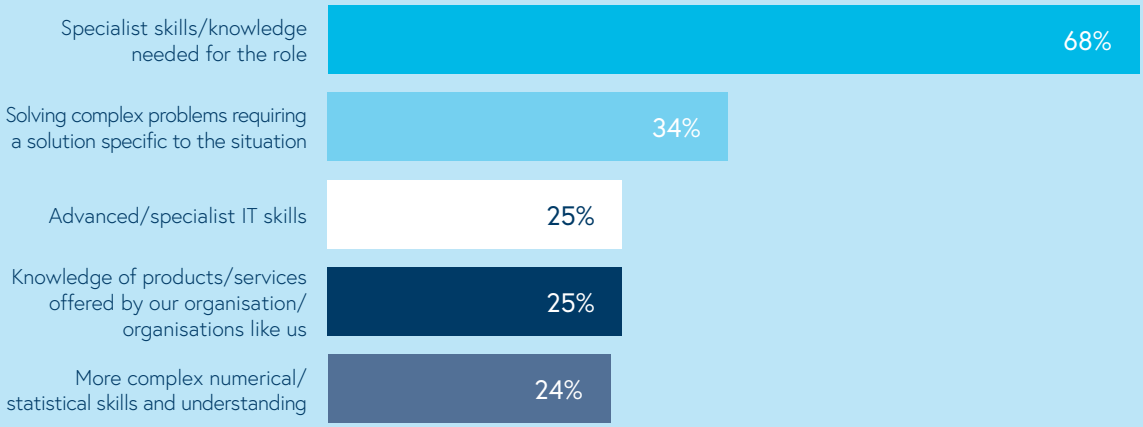



**53%**

of employers say it is in engineering where they are most often **experiencing the greatest skills gap.**

## Recruitment difficulties

### The top five types of technical skill lacking in applicants:




### When recruiting...

**engineering employers most commonly cite** that the **soft skills lacking** are **team working** or **leadership and management skills.**

**48%**

of **applicants lacking the required technical skills** is the **main area of difficulty** for employers.

### University graduates

are more likely **to NOT understand the realities of work** in their industry **than technicians or apprentices.**

# 2. Recommendations

Engineering employers understand their responsibility to tackle climate change and are taking steps to improve sustainability. However, a number of challenges continue to hold them back.

This includes finding job applicants with the necessary technical skills and an understanding of the realities of work in their industry. This is particularly an issue when it comes to new graduates.

Based on the results of this survey, we have highlighted the following key action areas:

## Education

### 1. Collaborate to improve work-readiness of new recruits.

Industry and educators, including universities, further education (FE) colleges and schools, should work together to improve work-readiness and equip young people with the skills needed to tackle complex multi-disciplinary activities. This includes non-technical skills such as teamwork, communications and project management.

**58% of engineering employers said the UK education system should prioritise increased engagement with businesses.**

### 2. Improve the understanding of the net-zero challenge.

Industry and educators should work together to ensure that young people have a good understanding of the importance of sustainability and the issues around it, in addition to how it needs to be related to the development of new processes and products that will ultimately benefit society.

### 3. Provide meaningful and valuable work experience.

Industry and educators should strive to offer hands-on work experience and placements wherever possible. This will help inspire young people and give them the opportunity to put their learning into context.

**60% of engineering employers think the UK education system should prioritise more opportunities for relevant work experience.**

### 4. Encourage greater opportunities in small and medium-sized enterprises (SMEs).

Government and large corporates should help SMEs to provide work experience and placements. This will enable young people to gain an all-round understanding of sustainable development across the supply chain, and experience of business development and entrepreneurship.

**Half of micro (51%) and small (48%) engineering employers cite lack of time/resources as a barrier to engaging with the education system.**

## Government and policy

### 5. Promote a green post-pandemic recovery.

Economic uncertainty leads employers to re-evaluate their priorities, but this should be taken as an opportunity to support businesses towards a green recovery, with the intention of a more sustainable and stable future. Industry, government and academia need to collaborate to identify the essential skills required to deliver net-zero targets and provide a workforce that's fit for purpose.

**88% of engineering employers with a sustainability strategy say their business needs new skills to deliver.**

**Of those, 38% will hire new employees with the necessary skills, while 32% will hire apprentices/graduates to train them up.**

### 6. Provide certainty by long-term planning.

It's essential that government provides long-term planning and guarantees investment in these skills through future governments. Industry must have the confidence to invest in infrastructure and skills in order to work on major projects.

**57% say financial incentives for new greener technologies would encourage their business to do more to lower its environmental impact.**

**49% of those who aren't able to fill skills gaps cite pressure to reduce costs.**

### 7. Support innovation and drive down costs.

Government, industry and academia must continue to support innovation in the field of science and engineering to ensure that not only technology, but also skills and innovative ways of working, can continue to provide improvements in efficiency and cost.

**Three in ten engineering employers cite increased operating (31%) or investment (30%) costs as a barrier to lowering their environmental impact.**

## Skills

### 8. Build a more flexible and agile workforce.

As sustainability goals will need to be reached, it's even more important for workforces to be flexible and agile in order to effectively innovate and deliver in increasingly complex systems.

**32% of respondents have already encouraged remote working to lower their business' environmental impact. Over a quarter intend to introduce (27%) or improve (28%) these arrangements.**

### 9. Ensure vital specialist skills aren't overlooked.

Specialist skills are crucial in delivering the sustainability agenda. Therefore, industry must prioritise reskilling and upskilling its existing workforce. It should work more closely with schools, colleges and universities to address future needs, providing input into the design of course content.

**48% of engineering employers report that applicants lacking the necessary technical skills is a difficulty they face when recruiting, with 68% going onto say it's specialist skills/knowledge needed for the role that's most lacking.**

### 10. Communicate the importance of engineering skills that address climate change.

Net zero can only be achieved if there's an appreciation by everyone in society, particularly young people, of the role engineering and technology will play in reaching this goal. It's therefore essential that the general public is engaged effectively and are supportive of the skills needed to achieve net zero.

# 3. Introduction and methodology

As the coronavirus pandemic continues to drastically affect societies around the world, governments are facing the twin challenge of revitalising economies while recovering from the impacts of the virus and the economic shutdowns it triggered.

**The UK and other world governments will introduce recovery packages to boost economic growth. The nature and focus on these strategies and stimulus packages will have a highly significant impact on the UK's future prosperity, including its potential to meet its legally mandated net-zero emissions obligation.**

The Confederation of British Industry (CBI) has argued that the tools needed to achieve net zero can also help the UK economy get back on its feet, and tackle challenges like unemployment and lagging productivity.[1]

The global economic downturn has resulted in improvements to air quality and reductions in carbon emissions. This has brought the challenge of responding to climate change into sharp focus. Former and current Bank of England governors Mark Carney and Andrew Bailey have jointly said that we have a "once-in-a-lifetime opportunity" to rebuild the economy and prepare for the shock of climate change.[2]

In this context, the UK's target to achieve net-zero emissions by 2050 remains a vital objective. This report explores the views of engineering employers on how they can respond to current labour market and economic challenges while building a greener future for their businesses and subsequent generations.

## 3.1 Approach and respondent profile

**We commissioned YouGov to deliver this research with UK employers of engineering and technology staff. For an employer to be eligible to take part in this research they had to have a minimum of six employees and employ at least one engineering or technology staff member. There was no upper limit on the number of employees and the research includes views from businesses with 1,000+ staff.**

The focus of this research was to explore the current skills challenges employers are facing, employers' movement towards increased sustainability and how they can respond to future challenges by building skills for a green recovery.

We worked with YouGov to develop a survey, which was delivered to senior decision makers in engineering businesses online. The fieldwork was conducted between 7 August and 16 September 2020. All respondents were drawn from the YouGov panel of over 1.8m people in the UK.

In total, 1,010 senior decision makers from engineering employers completed the survey. The employers chosen to take part in the research were identified through an agreed list of standard industrial classifications. See Appendix A for the Standard Industrial Classification (SIC) definitions used.

All professionals who responded on behalf of the organisation they work for had managerial responsibility. The final sample was weighted to be representative of engineering employers by size and region. The sample provided coverage across the following target sectors, size of business and nation.

1 https://www.cbi.org.uk/articles/green-recovery-priorities-following-coronavirus
2 https://www.theguardian.com/commentisfree/2020/jun/05/world-climate-breakdown-pandemic#maincontent

**Figure 1:** Breakdown of achieved sample by industry, business size and nation

| | Unweighted base | Weighted base |
|---|---|---|
| **Industry** | | |
| IT and communications | 146 | 168 |
| Transport | 64 | 78 |
| Construction | 222 | 227 |
| Electrical and electronics | 80 | 61 |
| Aerospace and defence | 35 | 48 |
| Manufacture | 381 | 346 |
| Energy | 28 | 29 |
| Other | 54 | 53 |
| **Size** | | |
| Micro (6-9) | 91 | 57 |
| Small (10-49) | 354 | 237 |
| Medium (50-249) | 285 | 173 |
| Large (250+) | 280 | 543 |
| **Nation** | | |
| England | 874 | 896 |
| Scotland | 79 | 63 |
| Wales | 43 | 32 |
| Northern Ireland | 14 | 20 |

To supplement the survey findings, five in-depth telephone interviews of 45 minutes in length were undertaken with selected employers between 28 September and 2 October. All participants were recruited through the quantitative survey. All of the respondents were selected to have decision-making responsibilities in a range of business sizes, all operating within the energy sector. A core aim of the interviews was to explore the responses from the survey in more depth, and to bring the quantitative findings to life through quotes and case studies.

## 3.2 Guidance on analysis

**The data in this report represents the views of a sample of employers with at least one engineering and technology employee in the UK. The sample's demographic make-up closely matches that of the UK employer population by business size and location (region). Therefore, when looking at data at the total population level, inferences can be made that the views of the sample collected here represent the views of the wider employer population.**

Throughout the report, the results at the total sample level are described using the term 'engineering employers'.

A number of industries are covered by the sample, but the views of these individual industries should be interpreted as the views of the employers that responded. The achieved samples aren't necessarily representative of the wider employer population in those industries. A number of industries have response numbers under 100. In particular, the responses from the energy and aerospace and defence industries should be treated with caution.

Within this report, we analyse differences between the different groups in our sample. All reported differences have been tested for statistical significance to the 95% confidence level. Any figures based on fewer than 30 responses are too small to be considered statistically reliable. These have only been included for illustrative purposes and are marked.

# 4. Section 1 – Business views on climate change

## In this section we explore:

- Engineering employers' perceptions on climate change and who has the most responsibility to tackle it.
- Beliefs on whether net zero is achievable by individual businesses and the UK as a whole.

## 4.1 Perceptions of climate change

There is a consensus amongst engineering employers that the world's climate is changing as a result of human activity. However, those in the aerospace and defence industry are most likely to think the world's changing climate is not a result of human activity.

**Figure 2:** Understanding of climate change, by sector

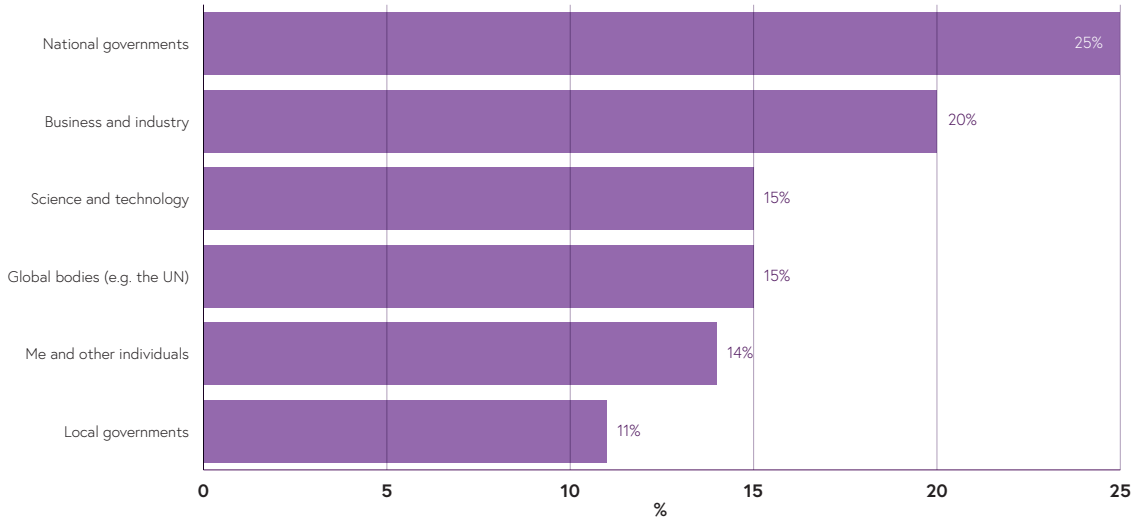
| | All | IT and communications | Transport | Construction | Electrical and electronics | Aerospace and defence | Manufacture | Energy* | Other engineering related activities |
|---|---|---|---|---|---|---|---|---|---|
| The world's climate is changing as a result of human activity | 76% | 79% | 71% | 79% | 82% | 65% | 76% | 83% | 72% |
| The world's climate is changing but NOT because of human activity | 18% | 16% | 20% | 15% | 11% | **35%** | 18% | 17% | 23% |
| The world's climate is NOT changing | 1% | 0% | 1% | 1% | 2% | 0% | 1% | 0% | 0% |
| Not sure | 5% | 5% | 8% | 5% | 6% | 0% | 5% | 0% | 5% |
| Unweighted base | 1010 | 146 | 64 | 222 | 80 | 35 | 381 | 28 | 54 |

**Q: On the subject of climate change, do you think:**
*(Figures in bold are statistically significantly higher than average based on a 95% confidence level. *Caution, low base size)*

Engineering employers think national governments have the highest responsibility to address climate change, for example making changes to prevent it from getting worse, but name business and industry as the second most responsible body. This highlights the need for government policy and business to work in partnership to address climate change.

> The first thing we'd want is for a coordinated action plan to happen, so we don't have to go to multiple departments and get multiple answers for the same questions. I think that's the first thing; joint, common thinking.
>
> **Senior Manager in Business Development and Operations, Medium Size Business, Energy**

**Figure 3:** Proportion of responsibility to address climate change




**Q: How much responsibility do you think each of the following have for addressing climate change?** *(Base size: all 1,010 respondents)*

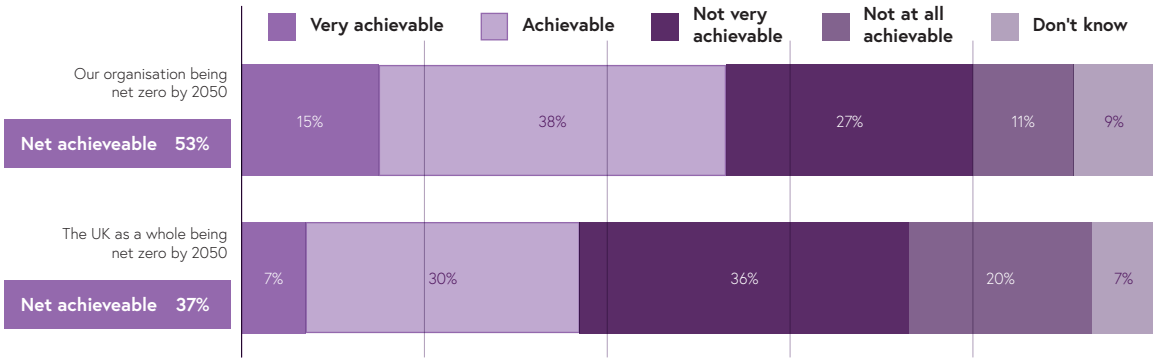
## 4.2 Awareness of UK Government ambitions

In June 2019, the UK Government introduced a target to reduce the UK's greenhouse gas emissions by 100% before 2050. Some emissions can remain if they are balanced by schemes to offset an equivalent amount of greenhouse gases from the atmosphere to a point where effective emissions are zero.

The vast majority of engineering employers are aware of this target (85%) and around half (53%) think it is achievable for their organisation to achieve net zero by 2050. However, they are less assured of the UK's overall success in meeting this target.

> Bluntly, under the current rate of progress, the current infrastructure and the current policy, the chances of achieving it are zero [for the UK]. Because we don't do manufacturing, [for us] it's much easier, I won't say we are net zero, but we are closer to the target because most of our emissions come from travel.
>
> **Senior Manager in Business Development and Operations, Medium Size Business, Energy**

**Figure 4:** Rating of how achievable net zero is for their organisation and UK as a whole




**Q: How achievable, if at all, do you think each of the following scenarios are?**
*(Base size: all 1,010 respondents)*

Employers' understanding of how achievable net zero by 2050 is for their business varies, with those in IT and communications most likely to report the target is achievable (69%). Employers in aerospace and defence are the most likely to report that the target is not achievable – a majority said net zero by 2050 was not achievable for their organisation (58%).

**Figure 5:** Rating of how achievable net zero is for their organisation and UK as a whole, by size and sector

| | | Size | | | | Sector | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All | 6 to 9 employees | 10 to 49 employees | 50 to 249 employees | 250+ employees | IT and communications | Transport | Construction | Electrical and electronics | Aerospace and defence | Manufacture | Energy* | Other engineering related activities |
| Net: achievable | 53% | 47% | 53% | 49% | 55% | **69%** | 48% | 56% | 62% | 35% | 46% | 43% | 48% |
| Net: not achievable | 38% | 34% | 37% | 41% | 37% | 21% | 43% | 38% | 24% | **58%** | **43%** | 36% | 43% |
| Unweighted base | 1010 | 91 | 354 | 285 | 280 | 146 | 64 | 222 | 80 | 35 | 381 | 28 | 54 |

**Q: How achievable, if at all, do you think each of the following scenarios are?**
*(Figures in bold are statistically significantly higher than average based on a 95% confidence level. *Caution, low base)*

# 5. Section 2 – Strategies to achieve sustainability

### In this section we explore:

- Which engineering employers have sustainability strategies.
- What organisations are doing to lower their environmental impact, and the barriers they face.
- The skills needed to deliver organisations' sustainability strategies.

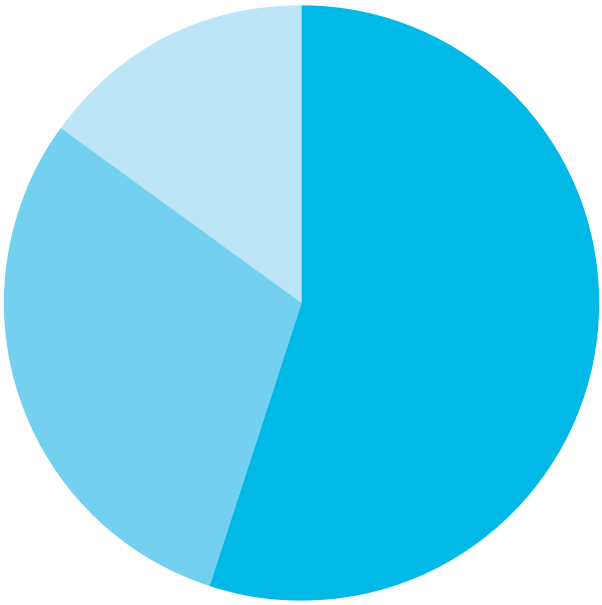
## 5.1 Corporate strategies

A small majority of engineering employers (55%) have a sustainability strategy; one that has specific activities and goals to lower their organisation's environmental impact. Of those with a sustainability strategy, two thirds (67%) say it's integrated into their overall business strategy.

> The net zero by 2050 affects us quite greatly because of the type of business we're in, but we're measuring our environmental impact and we do have a strategy for it. We're working towards it and it's a journey that we are bringing our staff on as well. I don't have any concerns from a strategic point of view about my company's ability to do it, I think we can act very quickly on it if we wanted to.
>
> **HR Manager, Small Sized Business, Utility Company**

**Figure 6:** Has a sustainability strategy?

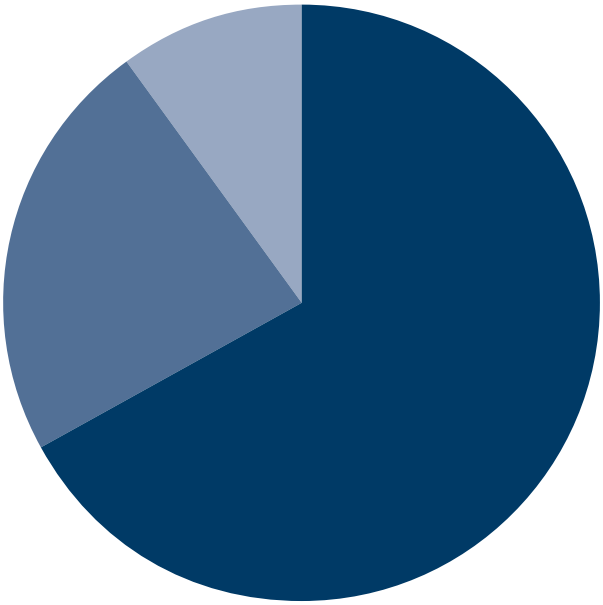
| | |
|---|---|
| Yes, it does | 55% |
| No, it doesn't | 30% |
| Don't know | 15% |



**Q: Does your organisation have a sustainability strategy?**
*(Base size: all 1,010 respondents)*

**Figure 7:** Sustainability strategy is integrated or separate to business strategy

| | |
|---|---|
| Integrated | 67% |
| Separate | 23% |
| Don't know | 10% |



**Q: Is your sustainability strategy separate to the organisation's business strategy or integrated into the business strategy?**
*(Base size: all respondents with a sustainability strategy – 457 respondents)*

Large engineering employers (250+ employees) are most likely to have a sustainability strategy, with the majority of micro (6 to 9 employees) and small (10 to 49 employees) saying their organisation doesn't have a sustainability strategy.

**Figure 8:** Whether organisation has a sustainability strategy or not, by size and sector

| | | Size | | | | Sector | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All | 6 to 9 employees | 10 to 49 employees | 50 to 249 employees | 250+ employees | IT and communications | Transport | Construction | Electrical and electronics | Aerospace and defence | Manufacture | Energy* | Other engineering related activities |
| Has sustainability strategy | 55% | 29% | 31% | 44% | **71%** | 54% | 62% | **61%** | 41% | 60% | 53% | 52% | 47% |
| No sustainability strategy | 30% | **54%** | **52%** | **38%** | 15% | 26% | 27% | 25% | 40% | 27% | 34% | 22% | 37% |
| Don't know | 15% | 17% | 18% | 18% | 13% | **21%** | 11% | 14% | 19% | 12% | 14% | 26% | 16% |
| Unweighted base | 1010 | 91 | 354 | 285 | 280 | 146 | 64 | 222 | 80 | 35 | 381 | 28 | 54 |

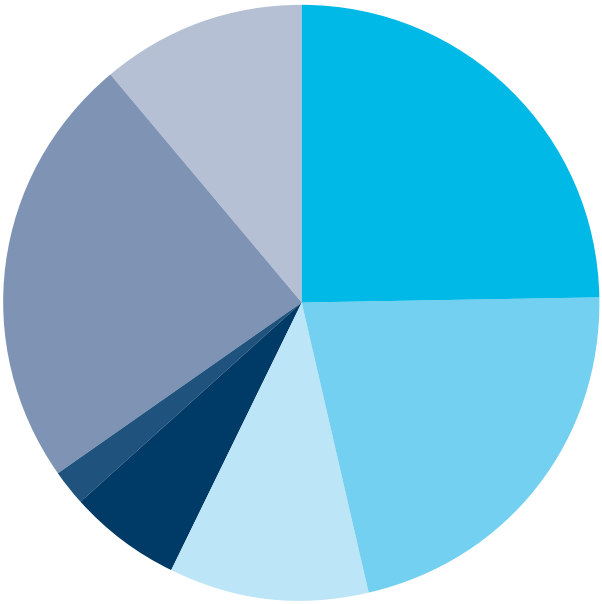
**Q: Does your organisation have a sustainability strategy?**
*(Figures in bold are statistically significantly higher than average based on a 95% confidence level. *Caution, low base)*

A quarter of engineering employers with a sustainability strategy say the time horizon on that strategy is earlier than 2030 (25%). Only 2% say the time horizon is after 2050, but a quarter are unsure of the time horizon on their strategy (24%) and one in ten say there is no time horizon (11%).

> Some of our [power] plants are meant to be $CO_2$ neutral by 2025, but it depends on the age of the plants. However, there is a target on all our plants to reduce by 15% each year.
>
> **Maintenance Section Head, Medium Sized Business, Utility Company**

**Figure 9:** Time horizon for organisation's sustainability strategy

| | |
|---|---|
| Earlier than 2030 | 25% |
| 2030 | 22% |
| 2040 | 11% |
| 2050 | 6% |
| After 2050 | 2% |
| Don't know | 24% |
| No time horizon | 11% |



**Q: What is the time horizon on your sustainability strategy?**
*(Base size: all with a sustainability strategy – 457 respondents)*

## 5.2 Targeted actions

All engineering employers were asked what their organisation is doing to lower their environmental impact – positively, eight in ten are doing some type of activity (79%). Employers who don't have a formal strategy are still conscious of their sustainability, with six in ten reporting some type of activity to lower their environmental impact (62%).

**Figure 10:** Whether organisation is taking action to lower environment impact or not, by size, sector, and sustainability strategy

| | | Size | | | | Sector | | | | | | | | Sustainability strategy | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All | 6 to 9 employees | 10 to 49 employees | 50 to 249 employees | 250+ employees | IT and communications | Transport | Construction | Electrical and electronics | Aerospace and defence | Manufacture | Energy* | Other engineering related activities | Yes | No |
| NET: Any activity | 79% | 62% | 67% | 77% | **86%** | 80% | 82% | 75% | 78% | 71% | 80% | 81% | 77% | **94%** | 62% |
| No activity | 12% | **30%** | **22%** | 13% | 5% | 11% | 10% | 11% | 11% | 16% | 12% | 8% | 16% | 1% | **31%** |
| Don't know | 10% | 7% | 12% | 11% | 9% | 10% | 8% | **14%** | 11% | 13% | 8% | 11% | 6% | 5% | 7% |
| Unweighted base | 1010 | 91 | 354 | 285 | 280 | 146 | 64 | 222 | 80 | 35 | 381 | 28 | 54 | 457 | 391 |

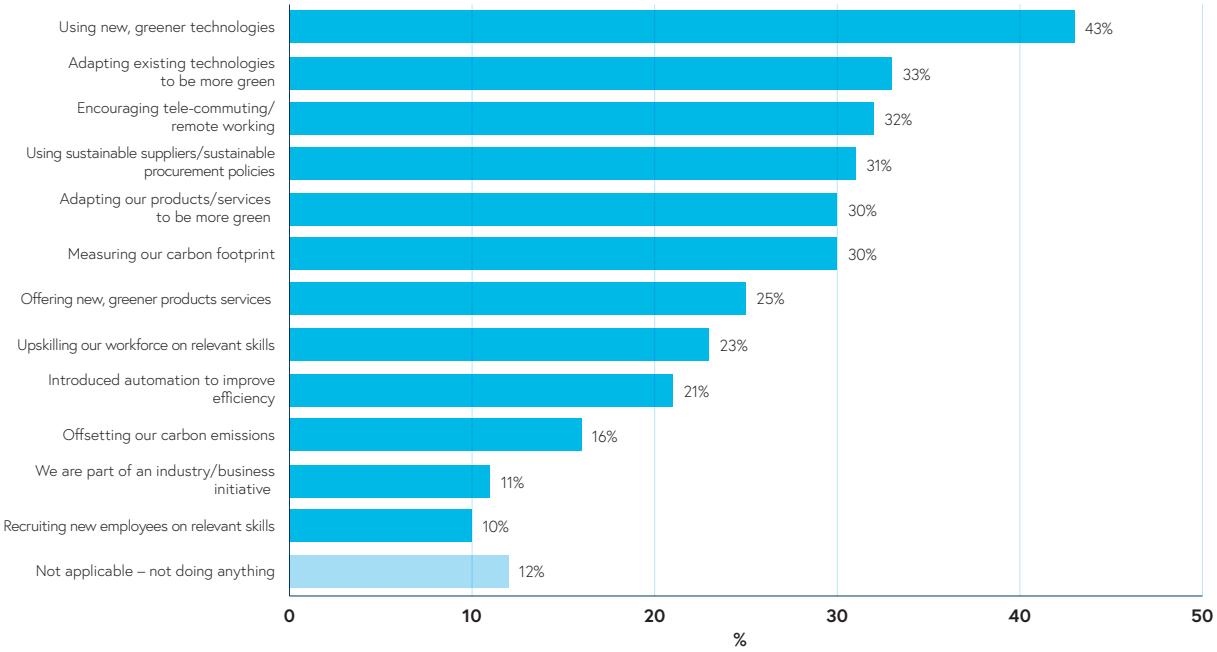
**Q: Which, if any, of the following is your organisation doing to lower its environmental impact?**
*(Figures in bold are statistically significantly higher than average based on a 95% confidence level. *Caution, low base)*

The most common activities undertaken by engineering employers to lower their environmental impact is using new, greener technologies (43%). This is followed by adapting their existing technologies (33%).

Around a quarter of engineering employers are upskilling their workforce with relevant skills (23%), while one in ten are recruiting new employees (10%).

> "We had fossil power plants we shut. We still use gas, but we've moved to solar power plants, we're going into research for tidal power, there's a lot going on. We cycle, we recycle, we cut down on the amount of waste we produce, when we buy something, we look at what's biodegradable, we look at the source, we don't just buy what's cheap."
>
> **Maintenance Section Head, Medium Sized Business, Utility Company**

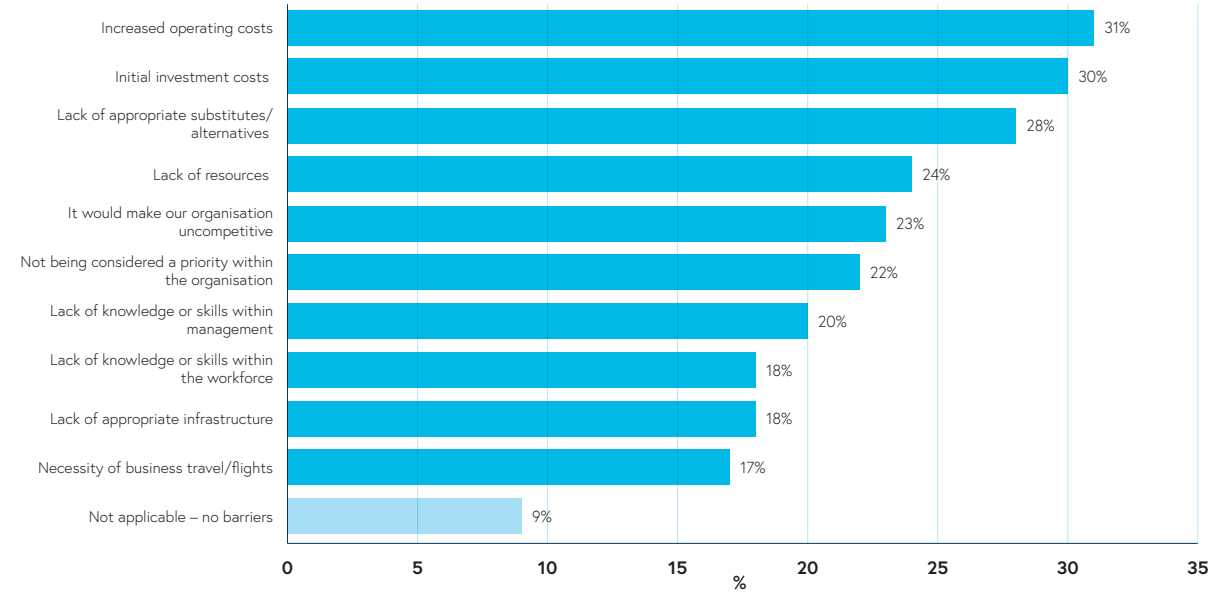
**Figure 11:** Actions being done to lower environmental impact




**Q: Which, if any, of the following is your organisation doing to lower its environmental impact?**
*(Base size: all 1,010 respondents)*

Costs are the main barrier to engineering employers lowering their environmental impact, with three in ten citing either increased operating costs (31%) or initial investment costs (30%). A fifth say that their organisation lacks skills in either management (20%) or the workforce (18%) to do so. There's no standout barrier to implementing activities to lower environmental impact, indicating that for many there will be a range of challenges to overcome.

**Figure 12:** Barriers to lowering environmental impact

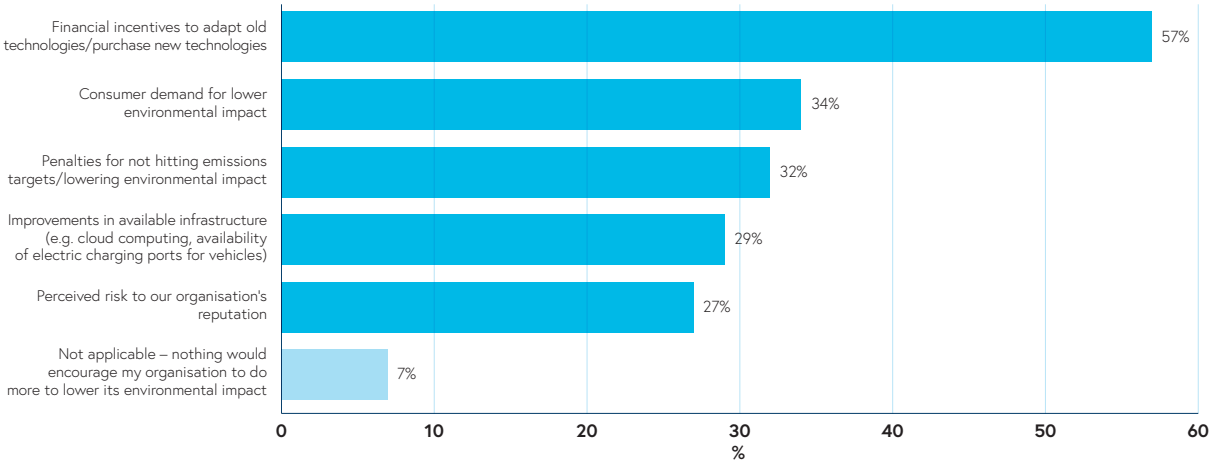



**Q: What, if any, of the following are barriers to your organisation lowering its environmental impact?**
*(Base size: all 1,010 respondents)*

Many engineering employers say that financial incentives to purchase new technology or adapt older technologies would encourage their organisation to lower its environmental impact (57%). A third cited consumer demand (34%) or penalties for missing targets (32%).

> I think the solutions that are required have very high upfront costs and the only way they can get people to engage with things like renewable energy is to create some sort of subsidy, but also long-term policies. I think neither of the two are present right now.
>
> **Senior Manager in Business Development and Operations, Medium Size Business, Energy**

**Figure 13:** What would encourage organisations to do more to lower their environmental impact?




**Q: What, if anything, would encourage your organisation to do more to lower its environmental impact?**
*(Base size: all 1,010 respondents)*

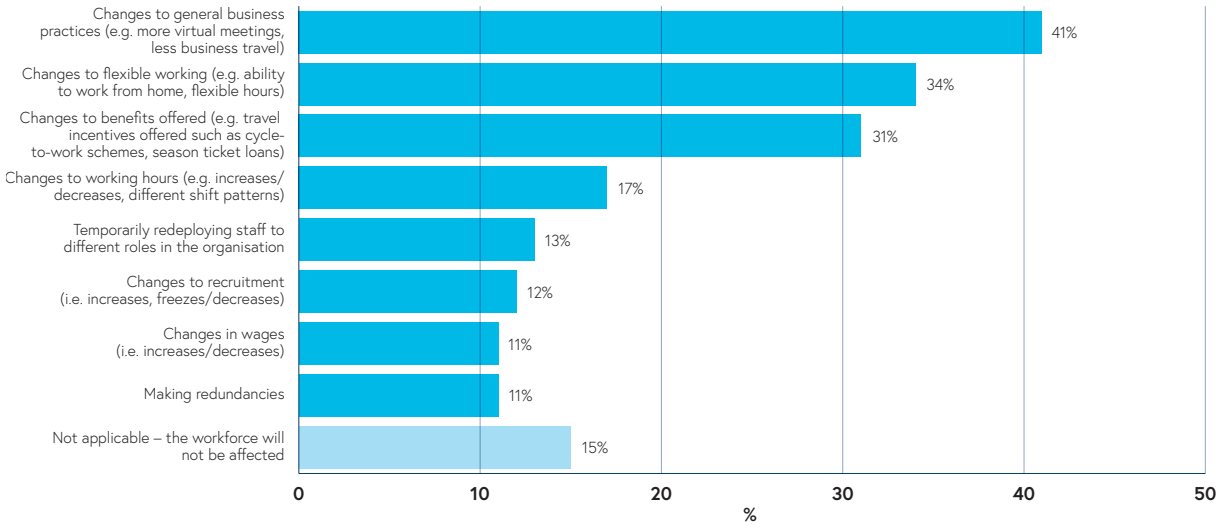
## 5.3 Skills needed to deliver sustainability

**Engineering employers acknowledge that changes to lower their environmental impact will have workforce impacts. Only one in seven don't think this will be the case (15%).**

The most commonly expected change to general business practices is business travel or virtual meetings (41%), followed by flexible working changes (34%) and changes to benefits offered (31%).

> We're looking to install an electric car charger for our office to encourage those who require a car for work to go electric. We're also encouraging our team to use different technologies to conduct meetings without using transport, going paperless, having sensor lights, we have recycling throughout the entire office and we run incentives with our team.
>
> **HR Manager, Small Sized Business, Utility Company**

**Figure 14:** Workforce impacts of lowering environmental impact




**Q: In which, if any, of the following ways will your workforce be affected by changes your organisation is making to lower its environmental impact?**
*(Base size: all taking action to lower environmental impact – 749 respondents)*

Large businesses with 250 or more employees are more likely than average to say that they will change the benefits they offer (36%), change working hours (20%), temporarily redeploy staff (16%), or change recruitment (14%). Employers in IT and communications are more likely than average to change flexible working practices (42%) or wages (20%), while construction employers are more likely to temporarily redeploy staff (21%).

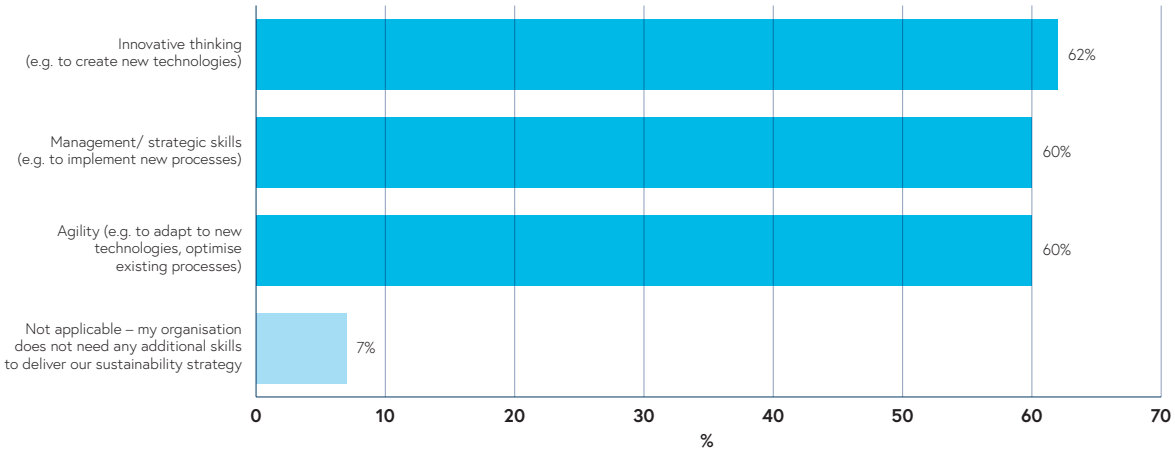
**Figure 15:** Workforce impacts of lowering environmental impact, by size and sector

| | | Size | | | | Sector | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All | 6 to 9 employees | 10 to 49 employees | 50 to 249 employees | 250+ employees | IT and communications | Transport | Construction | Electrical and electronics | Aerospace and defence* | Manufacture | Energy* | Other engineering related activities |
| Changes to general business practices | 41% | 33% | 45% | 42% | 40% | 42% | 23% | 45% | 52% | 38% | 41% | 53% | 36% |
| Changes to flexible working | 34% | 28% | 34% | 34% | 35% | **42%** | 34% | 38% | 43% | 49% | 26% | 34% | 31% |
| Changes to benefits offered | 31% | 21% | 23% | 26% | **36%** | 35% | 24% | 35% | 15% | 45% | 28% | 42% | 26% |
| Changes to working hours | 17% | 9% | 14% | 12% | **20%** | 17% | 16% | 22% | 18% | **32%** | 15% | 11% | 4% |
| Temporarily redeploying staff | 13% | 7% | 7% | 11% | **16%** | 10% | 8% | **21%** | 1% | 11% | 13% | 15% | 11% |
| Changes to recruitment | 12% | 9% | 8% | 10% | **14%** | 15% | 15% | 11% | 11% | 0% | 13% | 20% | 3% |
| Changes in wages | 11% | 5% | 7% | 12% | 13% | **20%** | 10% | 13% | 12% | 5% | 8% | 18% | 1% |
| Making redundancies | 11% | 6% | 8% | 10% | 12% | 13% | 15% | 11% | 3% | 12% | 9% | **31%** | 9% |
| Not applicable – the workforce will not be affected | 15% | **33%** | 18% | 15% | 13% | 8% | 16% | 18% | 17% | 2% | 15% | 11% | **35%** |
| Unweighted N | 749 | 57 | 237 | 216 | 239 | 109 | 49 | 159 | 61 | 23 | 291 | 21 | 36 |

**Q: In which, if any, of the following ways will your workforce be affected by changes your organisation is making to lower its environmental impact?**
*(Figures in bold are statistically significantly higher than average based on a 95% confidence level. *Caution, low base)*

Implementing sustainability strategies within organisations requires new skills, and fewer than one in 10 engineering employers with a strategy think their organisation has all the skills they need (7%). Employers are divided as to what type of skills their organisation will need in order to deliver the sustainability strategy, with equal proportions citing the need for innovative thinking (62%), management strategic skills (60%), and agility skills (60%).

**Figure 16:** Skills needed to deliver organisation's sustainability strategy

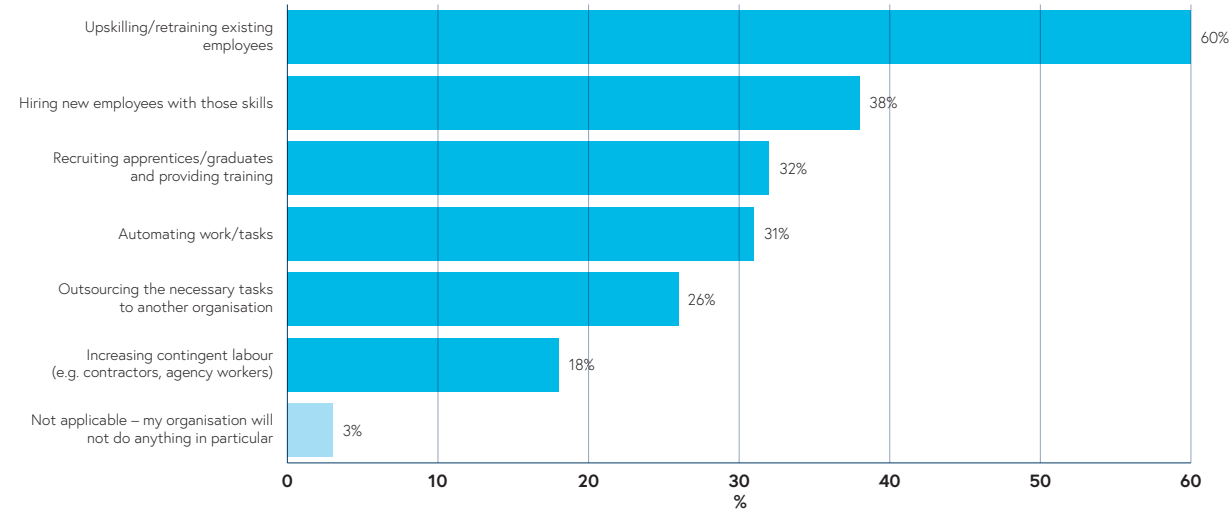



**Q: You said your organisation has a sustainability strategy. What additional skills do you think your organisation will need to deliver your strategy?**
*(Base size: all with a sustainability strategy – 457 respondents)*

The majority of engineering employers who need skills to deliver their sustainability strategy say they will upskill/retrain existing employees (60%), while just under two fifths think their organisation will hire new employees who have the necessary skills (38%). Under a third will automate tasks within their organisation (31%).

> "We spend a lot of money and time on environmental training: what to do if they see hazards, what to do if things don't look right, how to deal with a situation. It's just culture, communication and ownership."
>
> **Maintenance Section Head, Medium Sized Business, Utility Company**

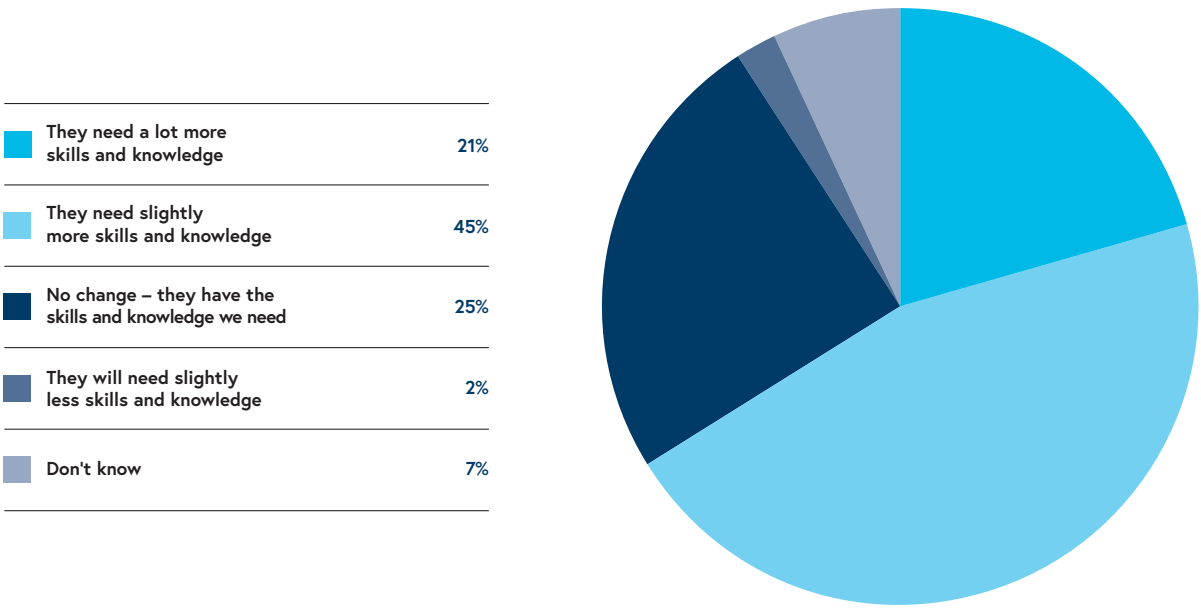
**Figure 17:** How organisation are/will respond to their need for skills




**Q: Thinking about the skills your organisation will need to deliver your sustainability strategy, how is/will your organisation respond to needing these skills in your workforce?**
*(Base size: all whose organisation needs skills to deliver sustainability strategy – 395 respondents)*

When thinking specifically about their engineering and technical staff, two thirds of employers believe they will need more skills and knowledge to respond to the changes being made to lower their business' environmental impact (66%). A quarter of employers say their engineering and technical staff have the skills they need (25%) and 2% say they will need less skills and knowledge.

**Figure 18:** Changes to skills and knowledge of engineering/technical staff




**Q: Thinking specifically about engineering or technical staff your organisation employs, how do you think their skill levels will need to respond to changes your organisation is making to lower its environmental impact?**
*(Base size: all taking action to lower environmental impact – 749 respondents)*

Large businesses with 250 or more employees and businesses that employ apprentices are more likely than average to say their engineers/technical staff will need more skills and knowledge to respond to changes they are making to lower their environmental impact (71% each). Small and micro businesses are the most likely to say their engineers/technicians won't need to change their skill levels.

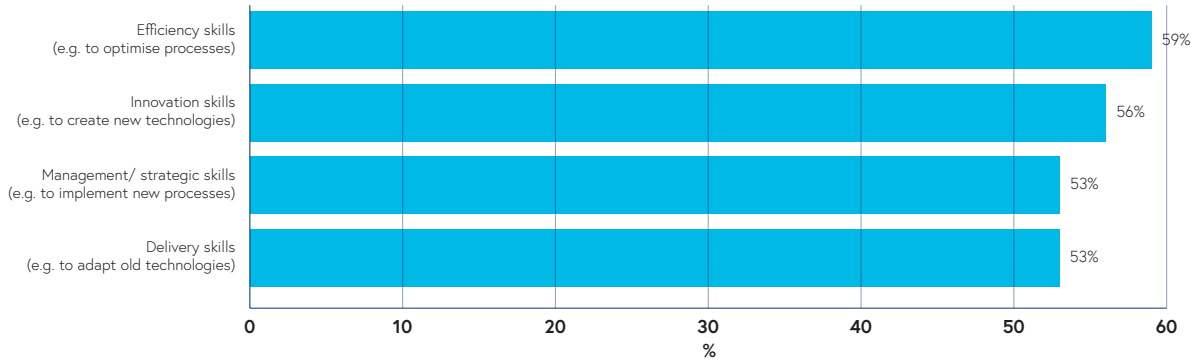
**Figure 19:** Changes to skills and knowledge of engineering/ technical staff, by size, sector, and engineering levels employed

| | | Size | | | | Sector | | | | | | | | Engineering levels employed | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All | 6 to 9 employees | 10 to 49 employees | 50 to 249 employees | 250+ employees | IT and communications | Transport | Construction | Electrical and electronics | Aerospace and defence* | Manufacture | Energy* | Other engineering related activities | HND/ Degree level | Technicians | Apprentices |
| Net: need more skills and knowledge | 66% | 54% | 56% | 66% | 71% | 58% | 72% | 71% | 62% | 72% | 67% | 49% | 71% | 66% | 67% | 71% |
| No change | 25% | **42%** | **33%** | 24% | 21% | 31% | 19% | 24% | 27% | 18% | 22% | **48%** | 25% | 25% | 25% | 22% |
| Net: need less skills and knowledge | 2% | 0% | 1% | 2% | 2% | 1% | 0% | 2% | 2% | 0% | 3% | 0% | 3% | 2% | 2% | 1% |
| Don't know | 7% | 3% | 10% | 8% | 6% | 10% | 9% | 3% | 9% | 10% | 8% | 2% | 1% | 7% | 7% | 7% |
| Unweighted base | 749 | 57 | 237 | 216 | 239 | 109 | 49 | 159 | 61 | 23 | 291 | 21 | 36 | 656 | 655 | 497 |

**Q: Thinking specifically about engineering or technical staff your organisation employs, how do you think their skill levels will need to respond to changes your organisation is making to lower its environmental impact?**
*(Figures in bold are statistically significantly higher than average based on a 95% confidence level. *Caution, low base)*

Employers whose engineering/technical staff do need additional skills as a result of changes to lower the organisation's environmental impact are divided about what skills their staff need. Roughly equal proportions report needing each type of skill they were questioned about, from efficiency (59%), and innovation skills (56%) through to management (53%) and delivery skills (53%).

**Figure 20:** Skills needed by engineering/technical staff as a result of changes to lower environmental impact




**Q: You mentioned that engineering and technical staff who are affected by changes to lower the organisation's environmental impact need more skills and knowledge. What skills/knowledge do they need?**
*(Base size: all whose engineering/ technical staff need more skills – 473 respondents)*

Large businesses with 250+ employees are more likely than average to say their engineering/technical staff need innovation (59%) or delivery skills (57%). Employers in IT and communications cite needing management/ strategic skills (65%), while those in construction need both management/strategic (63%) and delivery skills (63%). Those who employ degree-level engineers say their staff need innovation skills (59%), while those who employ apprentices say they need both innovation (59%) and efficiency skills (62%).

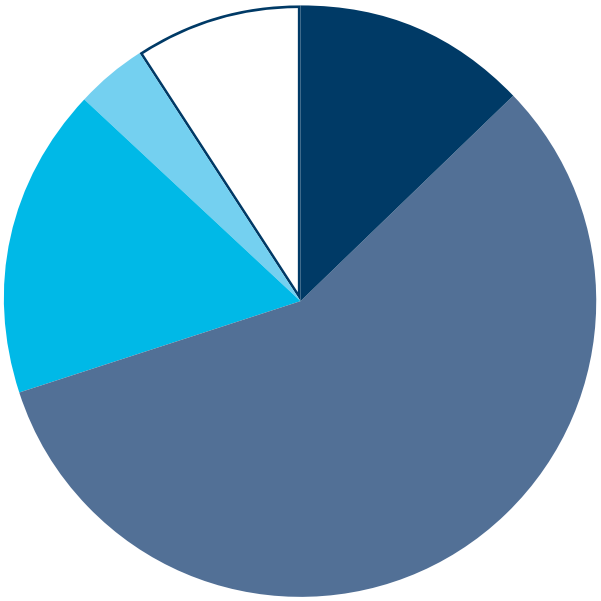
**Figure 21:** Skills needed by engineering/technical staff as a result of changes to lower environmental impact, by size, sector, and engineering levels employed

| | | Size | | | | Sector | | | | | | | | Engineering levels employed | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All | 6 to 9 employees | 10 to 49 employees | 50 to 249 employees | 250+ employees | IT and communications | Transport | Construction | Electrical and electronics | Aerospace and defence* | Manufacture | Energy* | Other engineering related activities* | HND/ Degree level | Technicians | Apprentices |
| Innovation skills | 56% | 49% | 47% | 52% | **59%** | 64% | 48% | 54% | 47% | 51% | 57% | 81% | 46% | **59%** | 56% | **59%** |
| Delivery skills | 53% | 36% | 40% | 53% | **57%** | 45% | 47% | **63%** | 31% | 36% | 54% | 44% | 68% | 53% | 53% | 51% |
| Efficiency skills | 59% | 47% | 61% | 61% | 59% | 52% | 56% | 55% | 63% | 70% | 59% | 77% | **87%** | 59% | 60% | **62%** |
| Management/ strategic skills | 53% | 50% | 50% | 52% | 53% | **65%** | 35% | **63%** | 58% | 40% | 47% | 45% | 48% | 52% | 53% | 53% |
| Unweighted N | 473 | 33 | 132 | 141 | 167 | 50 | 35 | 112 | 37 | 17 | 190 | 10 | 22 | 410 | 416 | 337 |

**Q: You mentioned that engineering and technical staff who are affected by changes to lower the organisation's environmental impact need more skills and knowledge. What skills/ knowledge do they need?**
*(Figures in bold are statistically significantly higher than average based on a 95% confidence level. *Caution, low base)*

**Figure 22:** Levels of competence

| | |
|---|---|
| Fully competent | 13% |
| Fairly competent | 57% |
| Not very competent | 17% |
| Not competent at all | 4% |
| Don't know | 9% |
| Net: not competent | 21% |
| Net: competent | 70% |



**Q: To what extent, if at all, do you think staff in your organisation have the competence needed to lower the organisation's environmental impact?**
*(Base size: all respondents – 1,010)*

Engineering employers in construction are more likely than average to say their staff have the competence needed to lower their organisation's environmental impact (76%), while those in manufacturing are more likely to say their staff are not competent (27%). By competence we mean having the skills, knowledge, and experience necessary to implement successful solutions in a particular context.

**Figure 23:** Levels of competence, by size, sector, and engineering levels employed

| | | Size | | | | Sector | | | | | | | | Engineering levels employed | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | All | 6 to 9 employees | 10 to 49 employees | 50 to 249 employees | 250+ employees | IT and communications | Transport | Construction | Electrical and electronics | Aerospace and defence | Manufacture | Energy* | Other engineering related activities | HND/ Degree level | Technicians | Apprentices |
| Net: competent | 70% | 77% | 66% | 64% | 73% | 74% | 65% | **76%** | 73% | 67% | 65% | 87% | 64% | 72% | 70% | 73% |
| Net: not competent | 21% | 17% | 25% | 26% | 19% | 16% | 23% | 17% | 19% | 21% | **27%** | 9% | 29% | 20% | 21% | 19% |
| Don't know | 9% | 6% | 9% | 9% | 8% | 10% | 12% | 6% | 8% | 12% | 9% | 4% | 7% | 9% | 8% | 8% |
| Unweighted N | 1010 | 91 | 354 | 285 | 280 | 146 | 64 | 222 | 80 | 35 | 381 | 28 | 54 | 863 | 867 | 627 |

**Q: To what extent, if at all, do you think staff in your organisation have the competence needed to lower the organisation's environmental impact?**
*(Figures in bold are statistically significantly higher than average based on a 95% confidence level. *Caution, low base)*

# 6. Section 3 – Reaching sustainability: the future

## In this section we explore:

- Introducing technological change to lower environmental impact.
- How employers are upskilling staff to meet sustainability goals.
- How business and education should work together to deliver change.

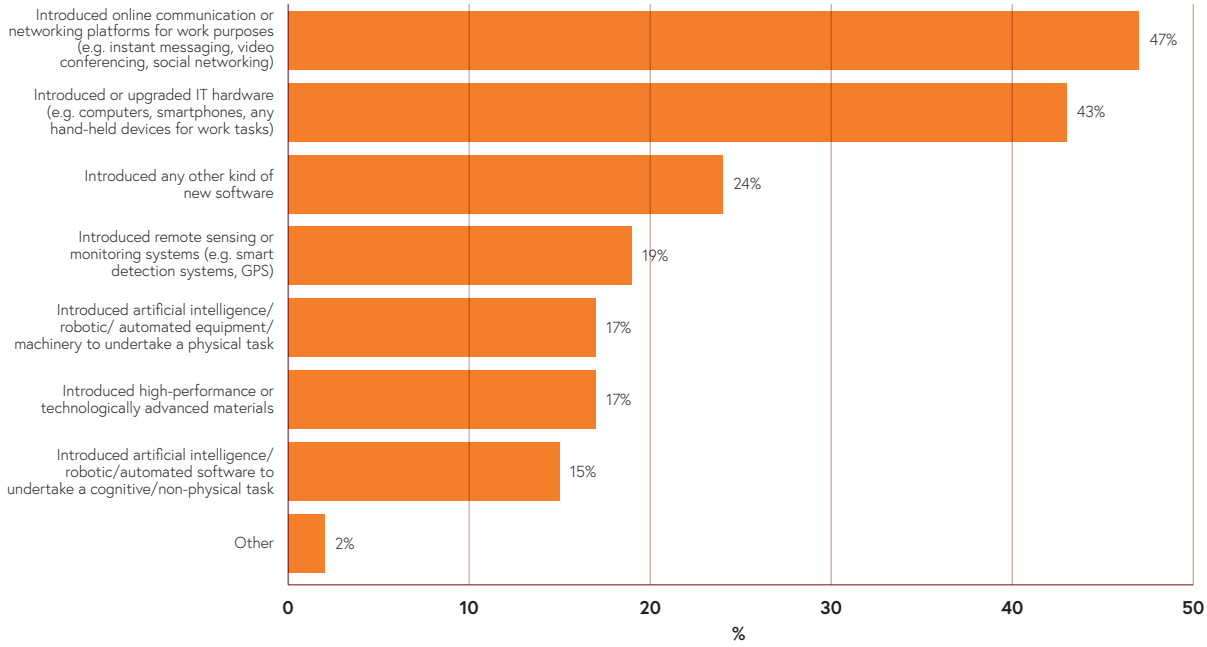
## 6.1 Technological change

**One in five (19%) engineering employers haven't introduced any technological change in order to lower their environmental impact over the past five years. Smaller employers (27%) were much more likely not to have introduced any technological change (12%).**

For each of the different types of technology that employers could introduce – excluding upgrading IT hardware – large businesses were more likely than SMEs to have introduced each of them.

Across all engineering employers, the most common form of technology introduced to lower their environmental impact has been online communication platforms (47%).

**Figure 24:** Technological change introduced over the past five years to lower employers' environmental impact

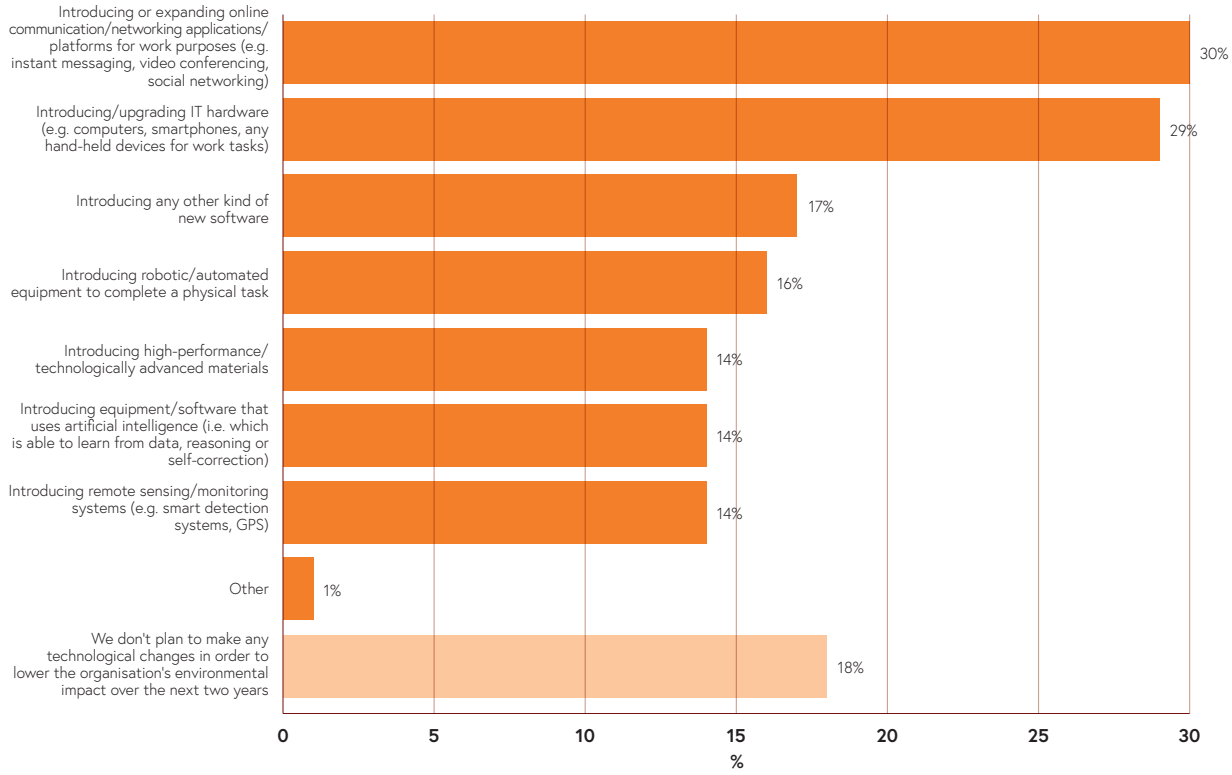



**Q: Over the past five years (since August 2015), has your organisation introduced any of the following technological changes in order to lower its environmental impact?**
*(Base size: all respondents – 1,010)*

Looking to the future, a similar pattern emerges to which types of technological change has previously been introduced. In the next two years, three in 10 engineering employers plan to introduce or expand online communication platforms (30%) or introduce/upgrade IT hardware (29%) to reduce their environmental impact.

A fifth or less plan to introduce any of the other types of technological change listed in Figure 24 in order to lower environmental impact.

**Figure 25:** Technological change that is planned to be introduced over the next two years to lower employers' environmental impact




**Q: Over the next two years (up to August 2022), does your organisation plan to make any of the following technological changes in order to lower its environmental impact?**
*(Base size: all respondents – 1,010)*

> We are doing some small initiatives within the building, we've implemented a cycle to work scheme, have recycling for batteries and old computers, and we're working with charities. I think this is a global effort and it will take some time to make everybody aware and change the behaviour for employees to be greener.
>
> **Technology Officer, Large Sized Business, Technology Services**

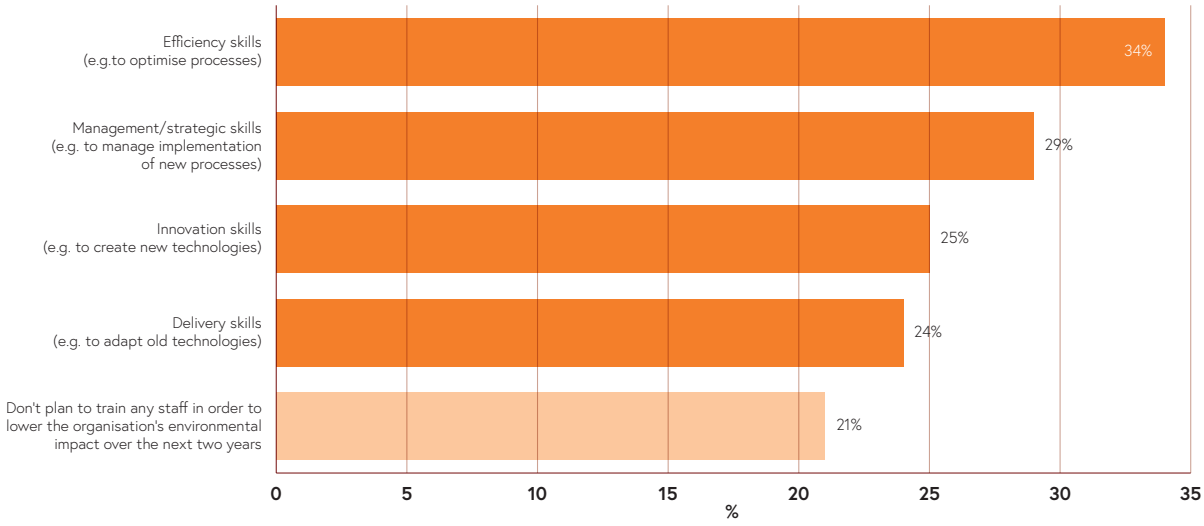
## 6.2 People and organisational change

**With regards to the current workforce, a third (34%) of engineering employers plan to train their workforce in efficiency skills to optimise processes as a way of lowering their organisation's environmental impact.**

Engineering employers based in London are more likely to say they will train staff in efficiency skills, with 46% reporting this. In fact, employers in London are more likely than those in other parts of the UK to train their workforce to lower their environmental impact. Overall, 68% of London engineering employers say that they will train staff in some way compared with 51% of engineering employers overall.

Engineering employers in the IT and communications sector were more likely than average to seek to train staff in innovation skills to lower their organisation's environmental impact (37%).

**Figure 26:** Workforce upskilling planned for the next two years to lower employers' environmental impact



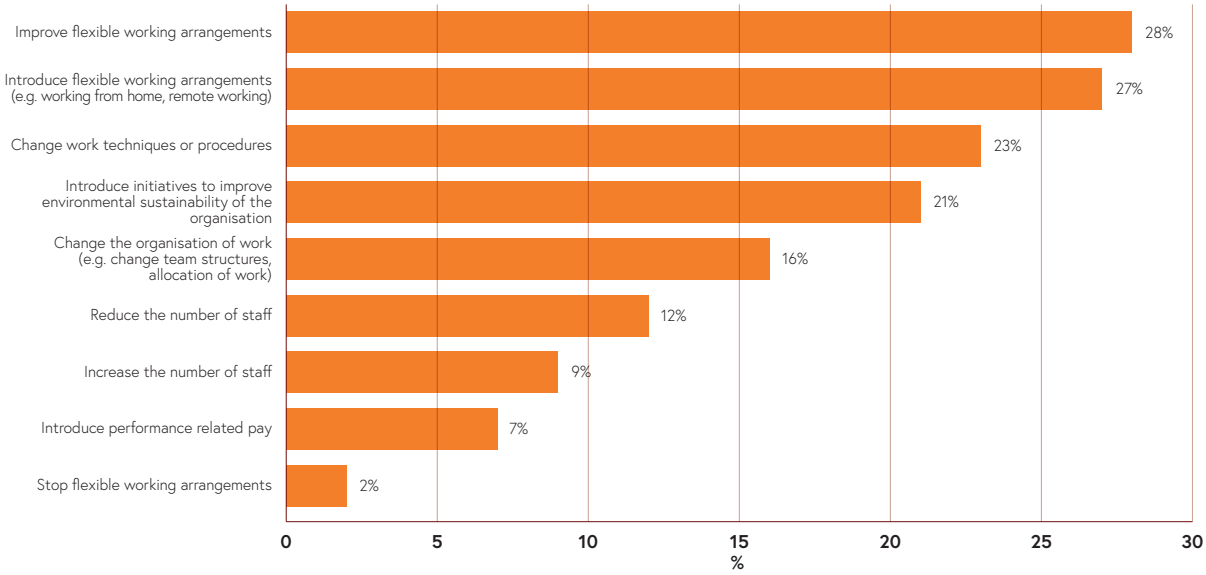

**Q: Over the next two years (up to August 2022), does your organisation plan to train staff in any of the following in order to lower its environmental impact?**
*(Base size: all respondents – 1,010)*

Over the next two years, the most common planned organisational change to lower environmental impact is flexible working. Over a quarter of engineering employers will either improve their flexible working arrangements (28%) or introduce flexible working arrangements (27%).

Engineering employers in the IT and communications sector are most likely to be planning to move to greater levels of flexible working, with 41% of engineering employers in that sector reporting they plan to introduce flexible working arrangements.

> At the moment people are working from home, it might continue for the next six months or over that, we will see how things go because working from home is also working well for the employees and for the employer. This way, we might not need to have an electric charging point if there is nobody coming to the office.
>
> **Technology Officer, Large Sized Business, Technology Services**

**Figure 27:** Organisational changes planned for the next two years to lower employers' environmental impact

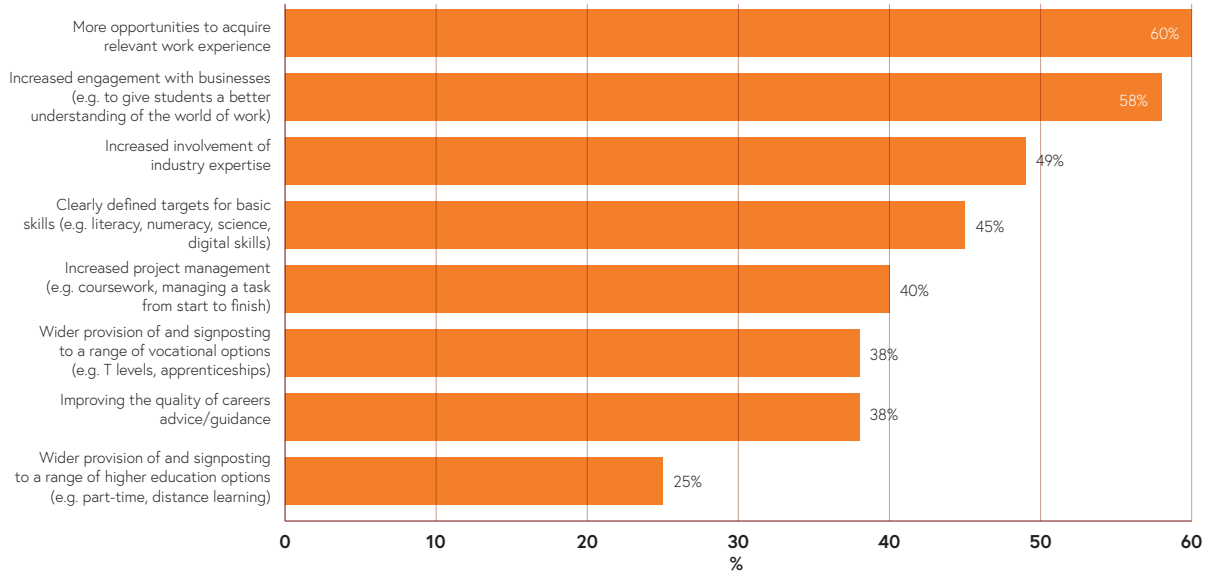



**Q: Over the next two years (up to August 2022), does your organisation plan to make any of the following organisational changes in order to lower its environmental impact?**
*(Base size: all respondents – 1,010)*

## 6.3 How business and education can deliver change

The majority of engineering employers see the key priorities for the education system as more opportunities for young people to acquire relevant work experience (60%) and for there to be increased engagement with businesses (58%). Half (49%) of engineering employers also want to see increased involvement of industry expertise as a priority for the UK education system.

**Figure 28:** Key priorities for the UK education system

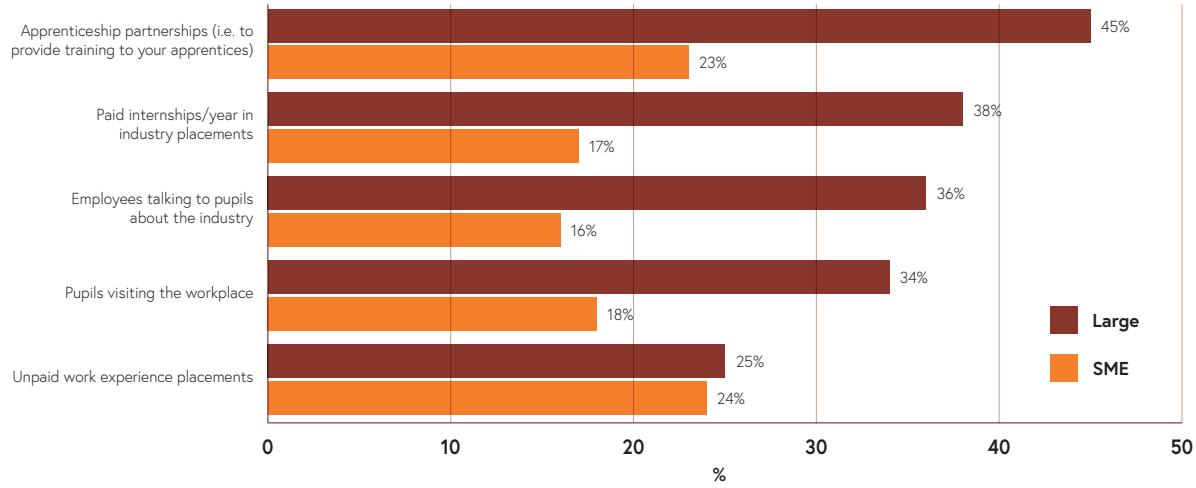



**Q: Over the next two years (up to August 2022), does your organisation plan to make any of the following organisational changes in order to lower its environmental impact?**
*(Base size: all respondents – 1,010)*

A mismatch exists between the desire from engineering employers for increased employer engagement and the amount of employer engagement with the education system. A quarter (25%) of engineering employers don't have any collaboration with schools, colleges or universities.

Where engineering employers do engage with the education system, this is most commonly by offering apprenticeship partnerships (35%), paid internships (28%), employees talking about their industry (27%) or pupils visiting the workplace (26%). As Figure 29 shows, larger engineering employers support the wider industry by engaging much more in the education system.

**Figure 29:** Top five ways in which large and SME employers engage in the UK education system




**Q: Which, if any, of the following does your organisation currently do with schools, colleges, or universities?**
*(Base size: all respondents – 1,010)*

> We take part in local schools, well we did before [COVID-19], we talk to them about engineering and we do mock interviews to try to prepare them, we invite schools for trips around the plants so they can see what a working environment is. We take graduates from universities in placements in different levels throughout the company, we try to make it open and honest and try to invite people in.
>
> **Maintenance Section Head, Medium sized business, Utility company**

The biggest barrier to overcome is the lack of time and resources that employers have to engage with education. Four in 10 (41%) engineering employers report time/ resources as a barrier, and this is an even more common barrier for micro (51%) and small employers (48%).

# 7. Section 4 – The business context

## In this section we explore:

- The impact of COVID-19 on engineering employers.
- Changing business priorities.

## 7.1 Impacts of COVID-19

**At the point in time when fieldwork was conducted for this survey, more than half (60%) of engineering employers had furloughed staff through the UK Government's Coronavirus Job Retention Scheme. This makes it the most commonly taken workforce measure in response to the impact of COVID-19.**

Official government statistics from the same time period show that the level of uptake of the scheme by engineering employers is on par with that of the UK economy as a whole (60% uptake)[3].

The coronavirus pandemic has had an impact upon employment and pay in the engineering sector. Other common actions that engineering employers have taken in response to the impact of coronavirus were freezing recruitment (41%), making redundancies (34%) and delaying planned wage increases (34%).

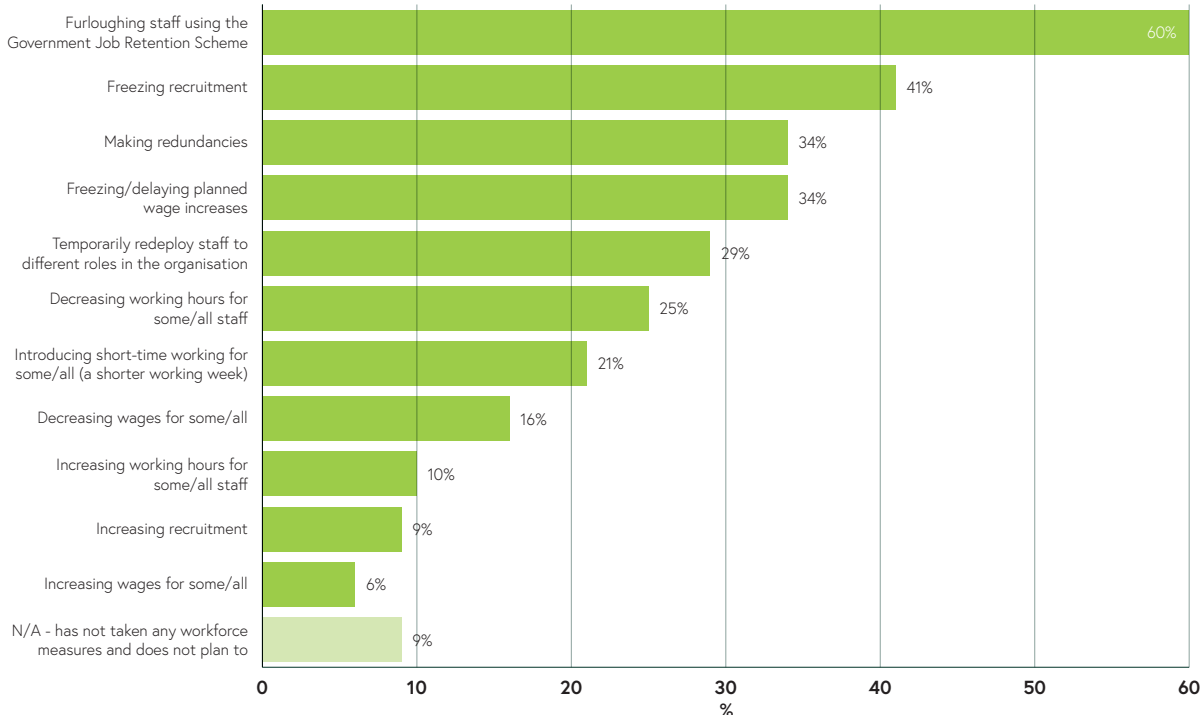
Research recently conducted by YouGov for the Chartered Institute of Personnel and Development, featured in the Summer 2020 Labour Market Outlook report[4], evidences that these were actions taken at roughly the same rate by organisations across the UK economy as a whole. When the survey was conducted in June/July 2020, 42% of UK employers reported having frozen recruitment, while 33% stated they had frozen or delayed pay increases.

Large organisations are more likely than SMEs to have frozen recruitment (47% compared with 34%), while SMEs took advantage of the Job Retention Scheme more often (65% compared with 56%). Notably, micro employers are those who most often say they have not taken any workforce measures in response to the impact of COVID-19 and have no plans of doing so (20%). This could be an indication of lesser capability to do so, but potentially also lesser need.

Engineering employers in the construction industry (26%) are most likely to have decreased wages for some or all staff.

3 https://www.gov.uk/government/publications/coronavirus-job-retention-scheme-statistics-august-2020/coronavirus-job-retention-scheme-statistics-august-2020
4 https://www.cipd.co.uk/Images/8040-lmo-summer-report-web-2_tcm18-82560.pdf

**Figure 30:** Workforce measures organisation has taken or is planning to take in response to the impact of COVID-19

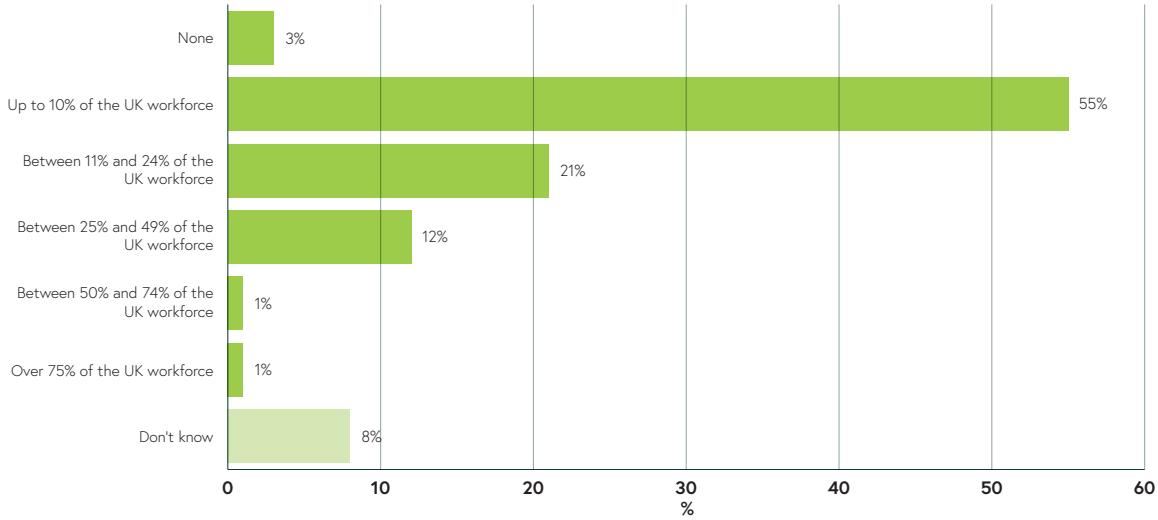



**Q: Which, if any, of the following workforce measures has your organisation taken or is planning to take in response to the impact of COVID-19?**
*(Base size: all respondents – 1,010)*

> There was a financial impact, there was reduced pay for everyone, we also postponed our bonus scheme, ended our work with some of the contractors and put some staff on furlough.
>
> **Technology Officer, Large Sized Business, Technology Services**

Among engineering employers who have or are planning to make redundancies as a result of the impact of COVID-19, the majority (55%) report that this will result in permanent redundancies for up to 10% of their workforce. A fifth (21%) say that between 11% and 24% will be made redundant, while 12% say this will be the case for between 25% and 49% of their workforce. Only one percent say that more than half will be made permanently redundant.

**Figure 31:** Level of permanent redundancies organisation already made or is planning to make in response to the impact of COVID-19




**Q: What level of permanent redundancies, if any, has your organisation already made or is planning to make in response to the impact of COVID-19?**
*(Base size: all who have or are planning to make redundancies as a result of COVID-19 – 342 respondents)*

## 7.2 Previous, current and future business priorities

**Engineering employers' current priorities are somewhat different to those they had 12 months ago or expect to have in 12 months' time. A year ago, their top priority overall was increasing profitability (50%). This is also the priority they expect to be most important one year from now (57%). However, in the current economic climate, engineering employers indicate that their key priorities are the wellbeing of their staff (68%) and dealing with economic changes/uncertainty (68%). By a small margin, increasing profitability (66%) is currently of secondary importance.**

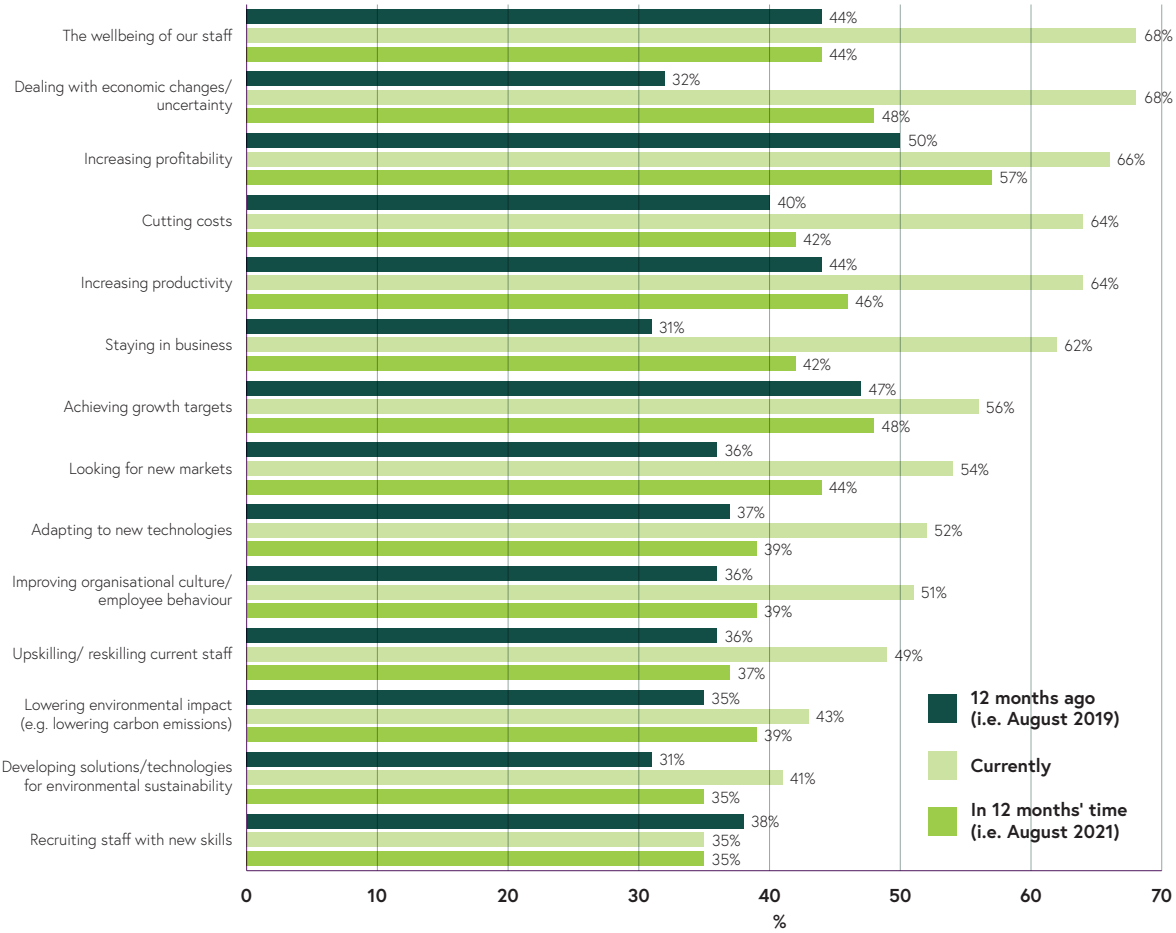
Recruiting staff with new skills is currently the lowest priority for engineering employers (35%) and this continues to be the case in their expectations for one year from now (35%). Twelve months ago, however, recruiting staff with new skills featured somewhat higher in employers' priority ranking (38%).

Findings presented earlier in this report evidence that only a minority of engineering employers believe they have all the skills they need to deliver their organisation's sustainability strategy. When acknowledging the fact that recruiting staff with new skills has been deprioritised, it is important to consider the impact this will have on the recruitment of these green skills and in turn furthering sustainability.

In the current times, SMEs appear to have somewhat different priorities to large organisations, with larger employers having a much stronger focus on future sustainability. Large organisations are more likely to report that a number of forward-looking actions are key priorities, including lowering environment impact (54% compared with 32%), developing solutions/technologies for environmental sustainability (51% compared with 28%) and adapting to new technologies (58% compared with 44%). SMEs, meanwhile, are more likely to say that one of their key priorities is staying in business (67% compared with 58%).

Looking ahead, engineering employers working in IT and communications are more likely than average to say that they expect some of their key priorities in 12 months' time to be adapting to new technologies (52%), upskilling/reskilling current staff (46%) and recruiting staff with new skills (45%).

**Figure 30:** Organisation's key priorities 12 months ago, currently and in 12 months' time




**Q: Which, if any, of the following were/are key priorities for your organisation 12 months ago, currently, and in 12 months' time?**
*(Base size: all respondents – 1,010)*

# 8. Section 5 – Current workforce needs

## In this section we explore:

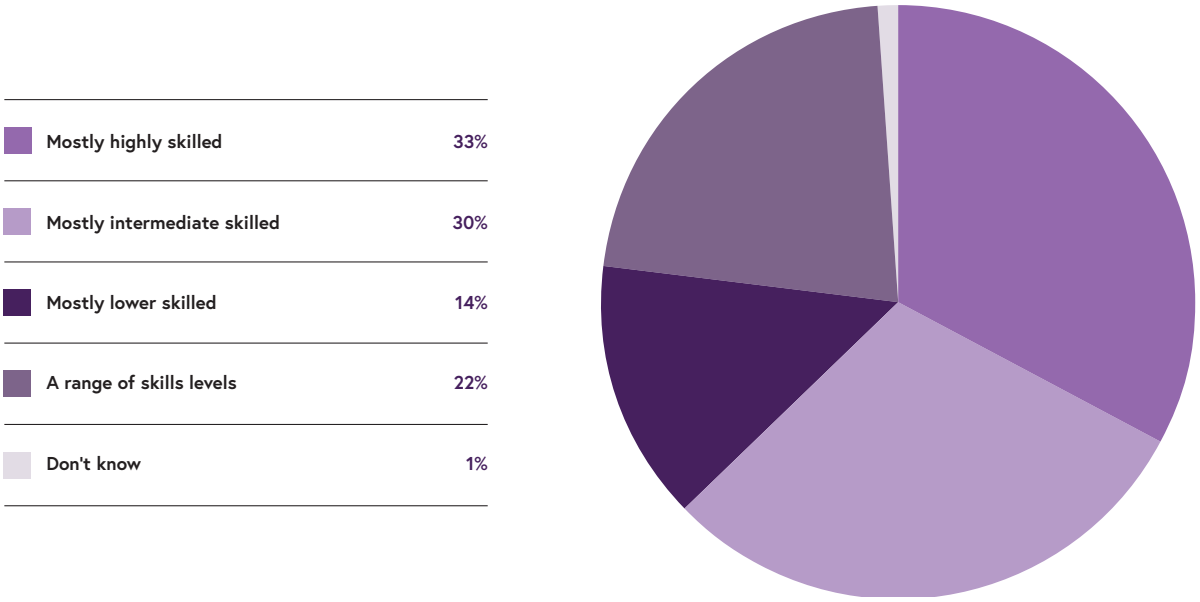
- The workforce profile of UK engineering employers.
- How organisations are responding to continued skills shortages.
- The extent to which engineering employers believe their skills shortages can be addressed.

## 8.1 Workforce profile

Roughly equal proportions of engineering employers report that their UK workforce is mostly high-skilled (33%) or mostly intermediate-skilled (30%). Conversely, less than half of these proportions say that their workforce is made up of mostly lower skilled staff (14%). For a fifth of employers (22%), they employ a range of skill levels.

Those in the IT and communications industry are most likely to employ mostly high-skilled staff (60%). Meanwhile, employers in the transport sector are most likely to have a workforce made up of mostly lower skilled employees (30%).

**Figure 33:** General skills profile of UK workforce



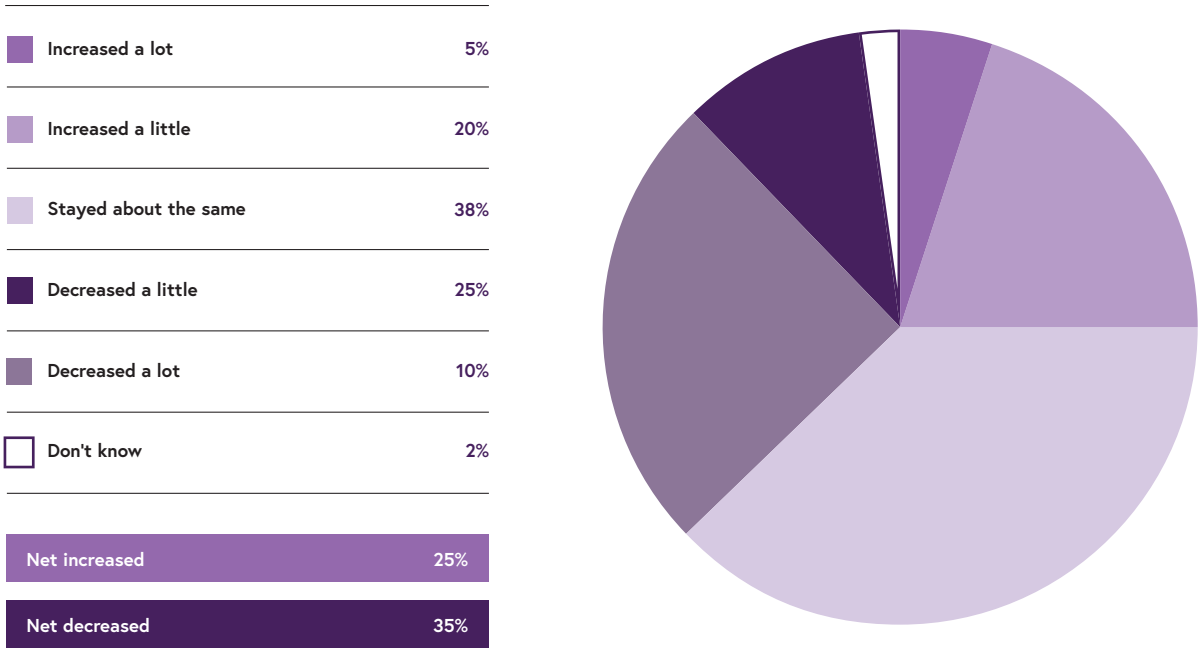

**Q: What is the general skills profile of your UK staff?**
*(Base size: all respondents – 1,010)*

Overall, a third (35%) of engineering employers say that their headcount has decreased over the past 12 months. A smaller proportion (25%) report that it has increased. Meanwhile, another 38% say that it has stayed about the same.

More than half of micro employers (56%) report that their headcount has stayed about the same over the past year, making them much more likely to say so than medium (33%) and large (33%) organisations.

Notably, employers in the IT and communications industry are most likely to report growth through an increase in headcount over the past 12 months (41%).

**Figure 34:** Change in organisation's headcount over last 12 months.




**Q: Has your UK organisation's headcount increased, decreased, or stayed about the same over the last 12 months?**
*(Base size: all respondents – 1,010)*

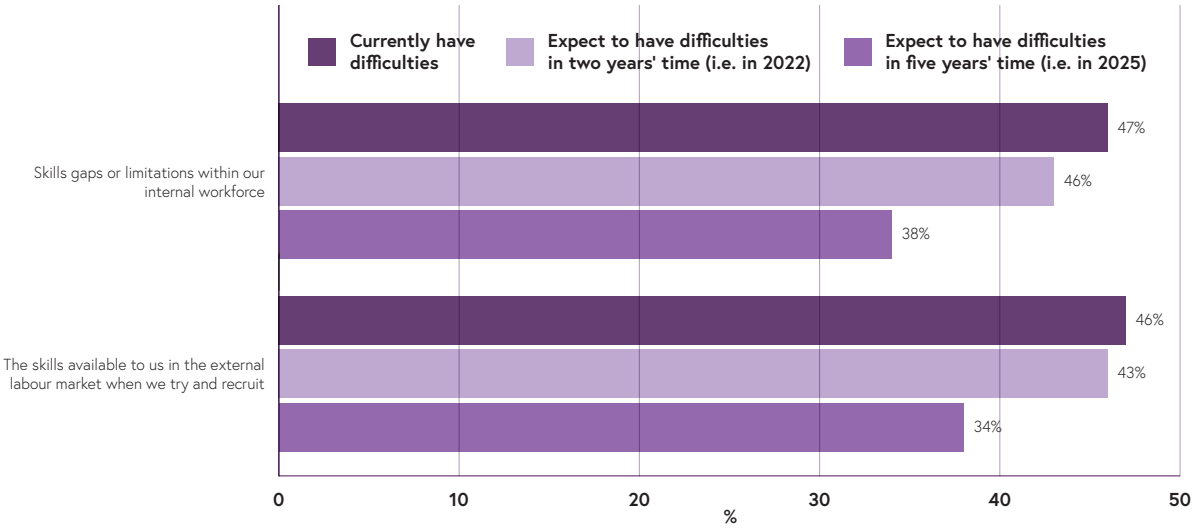
## 8.2 Skills shortages

**Nearly half of engineering employers report currently having difficulties with the skills available to them in the external labour market (47%) as well as skills gaps or limitations within their internal workforce (46%).**

Employers in the IT and communications industry, those most likely to have increased headcount over the past 12 months, most often report that they're currently having difficulties related to skills gaps or limitations within their workforce (60%). However, they don't stand out as much against the other industries when it comes to the proportion who say they're having challenges with the skills available to them through recruitment (55%). This indicates that these difficulties are more consistent across the board.

Thinking ahead to two years from now, very similar proportions of engineering employers expect they'll be facing these difficulties. However, when looking five years into the future, engineering employers find it harder to predict what problems they'll have, with much higher levels of uncertainty reported, resulting in smaller proportions who can say they expect to have difficulty with internal skills gaps (34%) or external skills recruitment (38%).

**Figure 35:** Organisation currently has difficulties/expect they will do

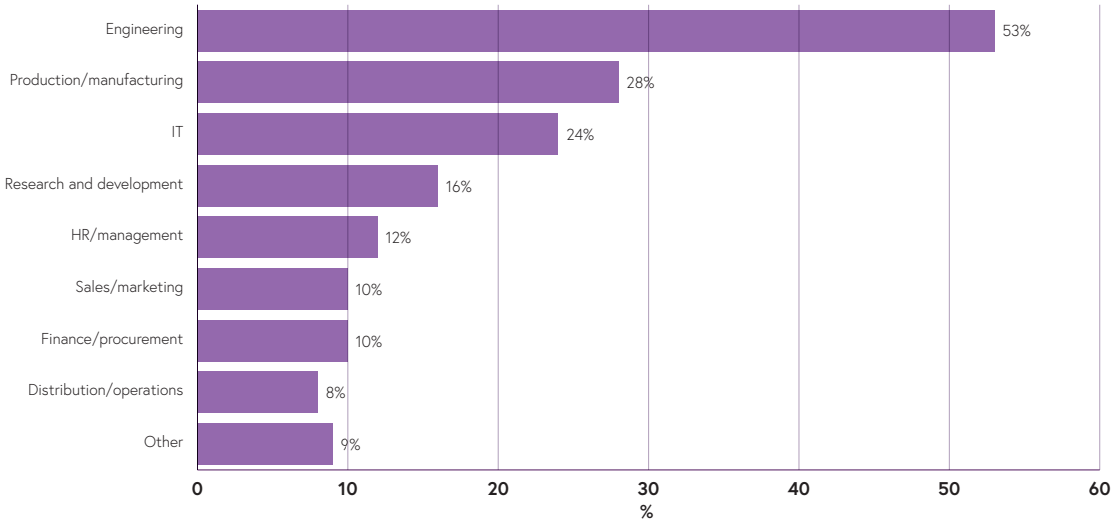



**Q: Do you currently, or expect in two or five years' time, to have any difficulties in either of the following?**
*(Base size: all respondents – 1,010)*

Among engineering employers currently experiencing a skills gap or limitations in their internal workforce, it's by far in engineering where they're seeing the greatest skills gap, with one in two (53%) reporting this. Secondarily, roughly a quarter are experiencing skills gaps in production/manufacturing (28%) and IT (24%).

It's less common for engineering employers to report experiencing skills gaps in corporate functions such as HR/management (12%), sales/marketing (10%), finance/procurement (10%) or distribution/operations (8%).

**Figure 36:** Areas with greatest skills gap(s) in organisation's internal workforce




**Q: In which areas of your organisation are you seeing the greatest skills gap?**
*(Base size: all with an internal skills gap – 443 respondents)*

## 8.3 Responding to skills shortages

**When faced with skills gaps in their workforce, engineering employers most often upskill/ retrain existing employees (47%) or hire new employees with those skills (44%). It's somewhat less common for them to recruit apprentices/ graduates and provide training, although this is still an action taken by roughly a third (32%).**

Employers are less likely to increase contingent labour (25%) or outsource to another organisation (25%) in the face of skills gaps. Automating work/tasks is also a less popular solution (12%).

Notably, upskilling and retraining existing employees could be highly important for advancing green recovery. As evidenced earlier in the report, this course of action is seen by engineering employers as the primary way they'll develop the skills needed to deliver their sustainability strategy, with expectations for a particular focus on efficiency skills. These green skills are expected to be sourced, to a somewhat lesser extent, through hiring new employees or automating tasks.

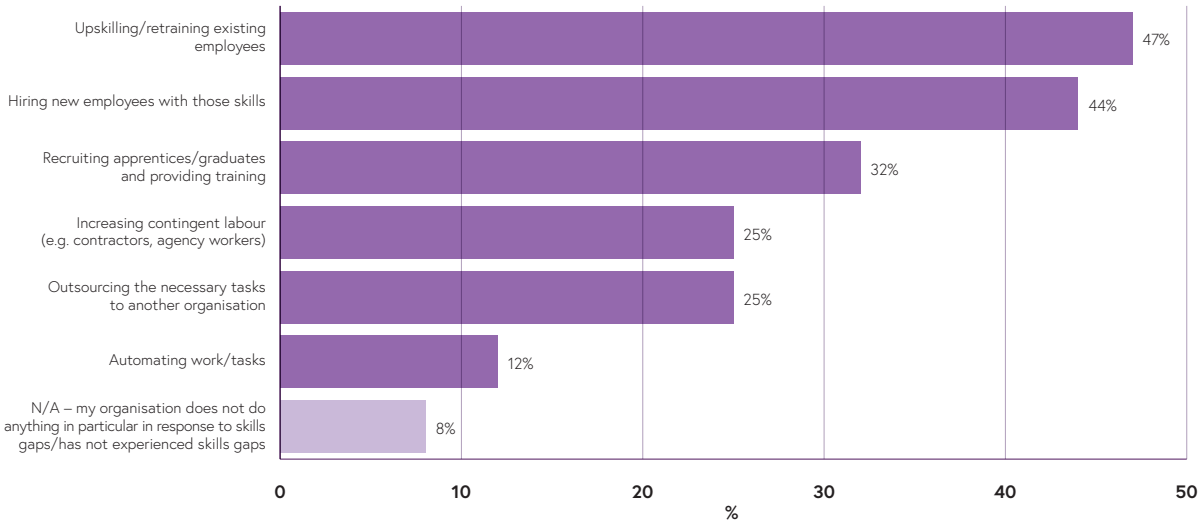
Although SMEs and large organisations are equally likely to upskill/retrain existing staff when faced with skills gaps (47% and 48% respectively), large organisations are more commonly taking various other actions including increasing contingent labour (30% compared with 19%) and automating work/tasks (15% compared with 9%).

SMEs report not experiencing skills gaps or not doing anything in particular in response them more often than large organisations. Importantly, this could be an indication of resource constraints since roughly two in five SMEs previously state that they do in fact have difficulties with the skills available through the external market (44%) and within their internal workforce (42%). These proportions aren't vastly different for large organisations (50% and 51% respectively), who've found themselves more able to take actions in response.

Employers in the IT and communications industry are more likely than others to automate work/tasks (23%).

> “We would always look to do succession planning and we have something called a step up programme, so we're looking to bring those people on into managerial roles or into more senior roles from within. That's something that as a company we're really passionate about. However, if we're moving into a new business stream, then we would look to recruit and bring that skill in, but then with the vision that ultimately you'd be looking to train in-house to have those lines of succession internally.”
>
> **HR Manager, Small Sized Business, Utility Company**

**Figure 37:** How organisation typically responds when faced with skills gaps

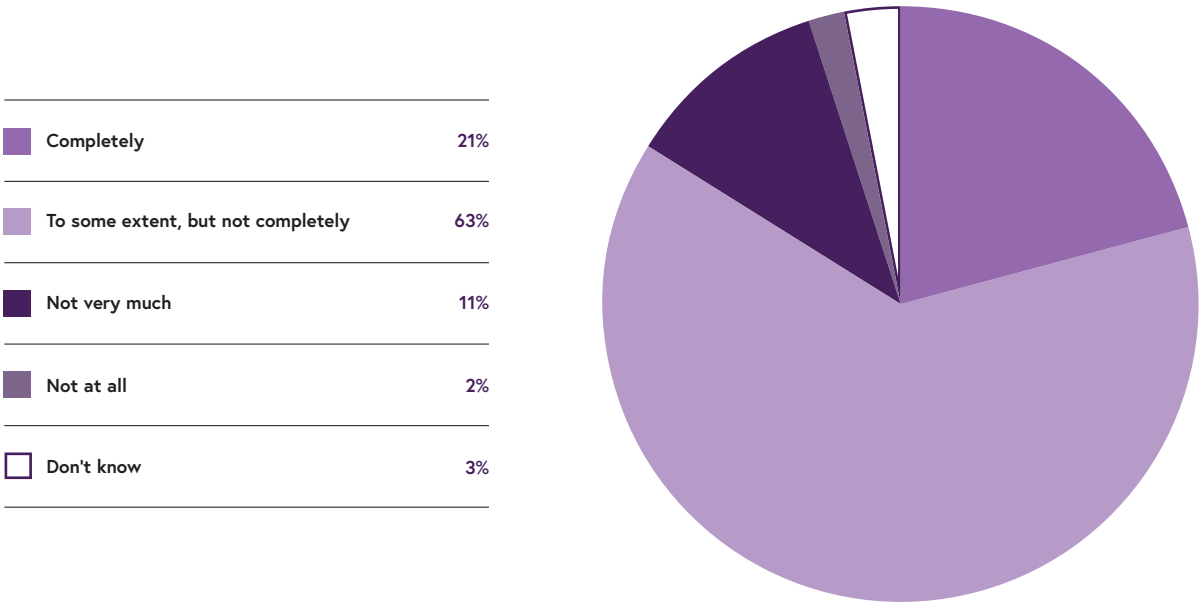



**Q: How does your organisation typically respond when faced with skills gaps in your workforce?**
*(Base size: all respondents – 1,010)*

One in five (21%) engineering employers who respond to skills gaps in some way say that their organisation is completely able to effectively address these gaps. The majority (63%) however, think their organisation can address them to some extent, but not completely. Subsequently, smaller proportions say their organisation can effectively address their skills gaps by not very much (11%) or not at all (2%).

These findings are relatively consistent across engineering employers of various sizes and industries. However, the results show that the IT and communications industry is more likely than the construction sector to be fully able to effectively address these gaps (29% compared with 17%).

**Figure 38:** Extent to which organisation can effectively address skills gaps




**Q: To what extent, if at all, do you think your organisation is able to effectively address the skills gaps you have identified?**
*(Base size: all whose organisation responds to skills gaps – 871 respondents)*

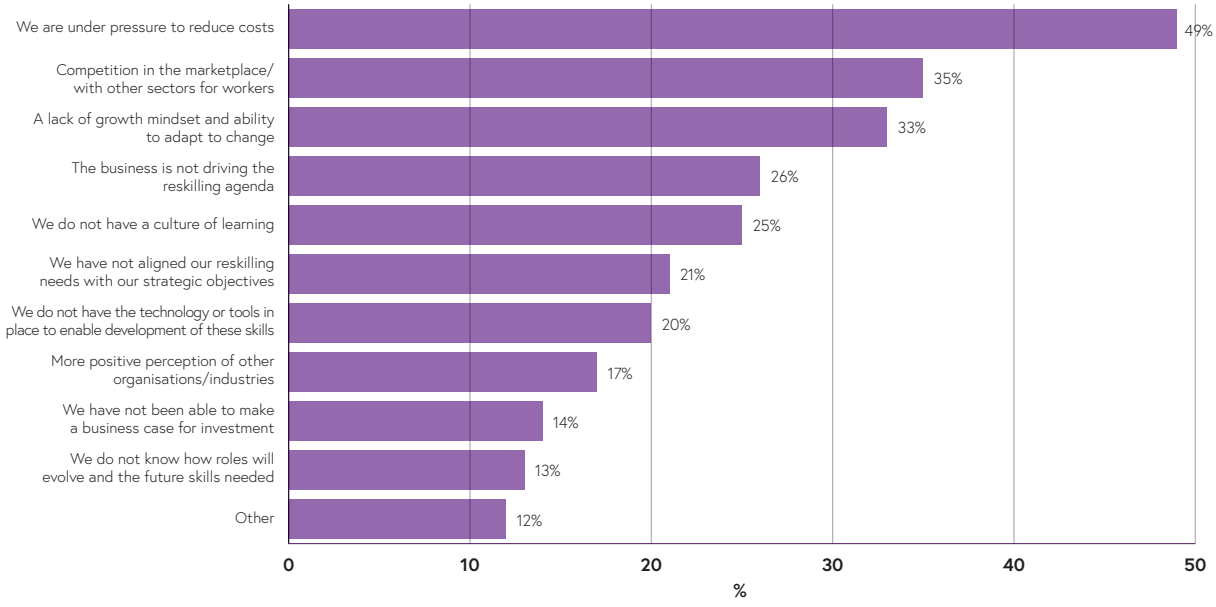
Among the minority of engineering employers whose organisations are not very or not at all able to address their skills gaps effectively, the most common reason is that they're under pressure to reduce costs (49%). Other key reasons are competition in the marketplace or other sectors for workers (35%), and a lack of growth mindset and ability to adapt to change (33%).

Reasons tied to business planning appear to be less important, with smaller proportions citing not being able to make a business case for investment (14%) or not knowing how roles will evolve and the future skills needed (13%).

As stated previously, the majority of employers think their engineering and technical staff will need more skills and knowledge to respond to the changes being made to lower their environmental impact. Therefore, it will be highly important for these engineering employers to be able to effectively address their skills gaps.

> "When we have a gap, we try first to train our people because it's much easier to train people who have knowledge of the product or have knowledge of the technology. But sometimes some of the staff members don't want to change and sometimes it's also easier to get someone who already has knowledge in big data as it can take up to two years to get someone up to speed."
>
> **Technology Officer, Large Sized Business, Technology Services**

**Figure 39:** Reasons why organisation is not able to address their skills gaps




**Q: Why do you think your organisation isn't able to address the skills gaps you have identified?**
*(Base size: all whose organisations are not very/not at all able to address skills gaps – 119 respondents)*

# 9. Section 6 – Recruitment difficulties

## In this section we explore:

- Areas of difficulty when recruiting.
- The main technical skills job applicants lack.
- Engineering employers' perceptions of new entrants.

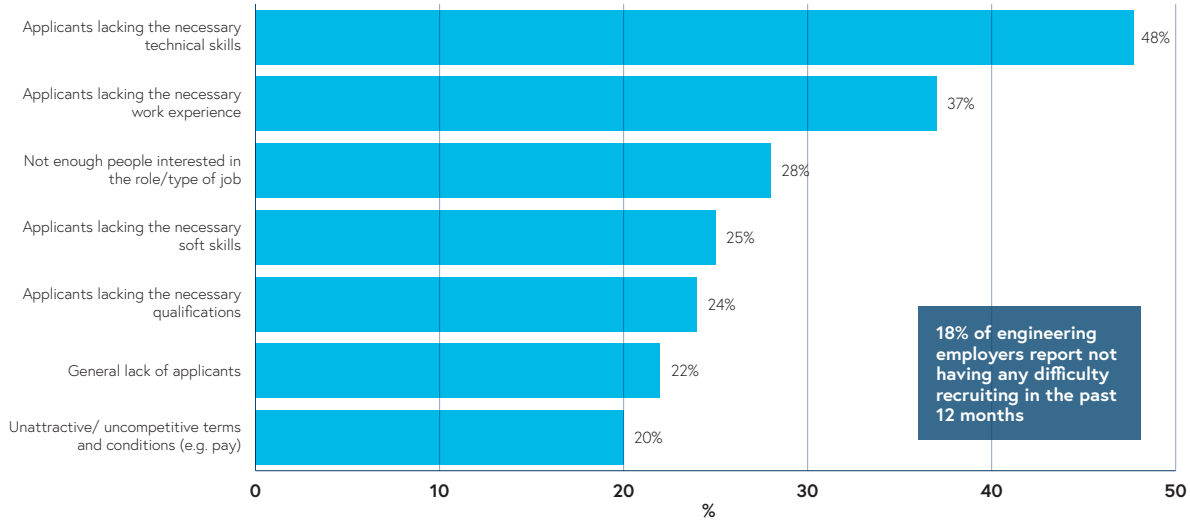
## 9.1 Areas of difficulty

**To deliver on the net-zero challenge it's important that engineering employers have the right skills in their businesses. Currently, the standout recruitment issue for engineering employers is applicants lacking the required technical skills, with close to half (48%) reporting this. Four in ten (37%) engineering employers also feel that recruitment is difficult because applicants don't have the necessary work experience.**

Engineering employers in the construction industry are more likely to feel that applicants lack the necessary qualifications (32%).

It's important to note that a fifth of engineering employers (18%) don't have any difficulty recruiting, with micro employers most likely to have no difficulty (37%). This compares to just 12% and 17% of medium and large engineering employers.

**Figure 40:** Areas of difficulty when recruiting




**Q: Thinking generally about your recruiting for your organisation, which, if any, of the following difficulties has your organisation experienced in the last 12 months?**
*(Base size: all respondents – 1,010)*

The majority of engineering employers who feel applicants lack the necessary technical skills (68%) think that it's specialist skills or knowledge that's most likely to be lacking.

The other key area of concern is that applicants lack complex problem-solving skills specific to situations they might face. A third (34%) of respondents reference this as a technical skill that is lacking.

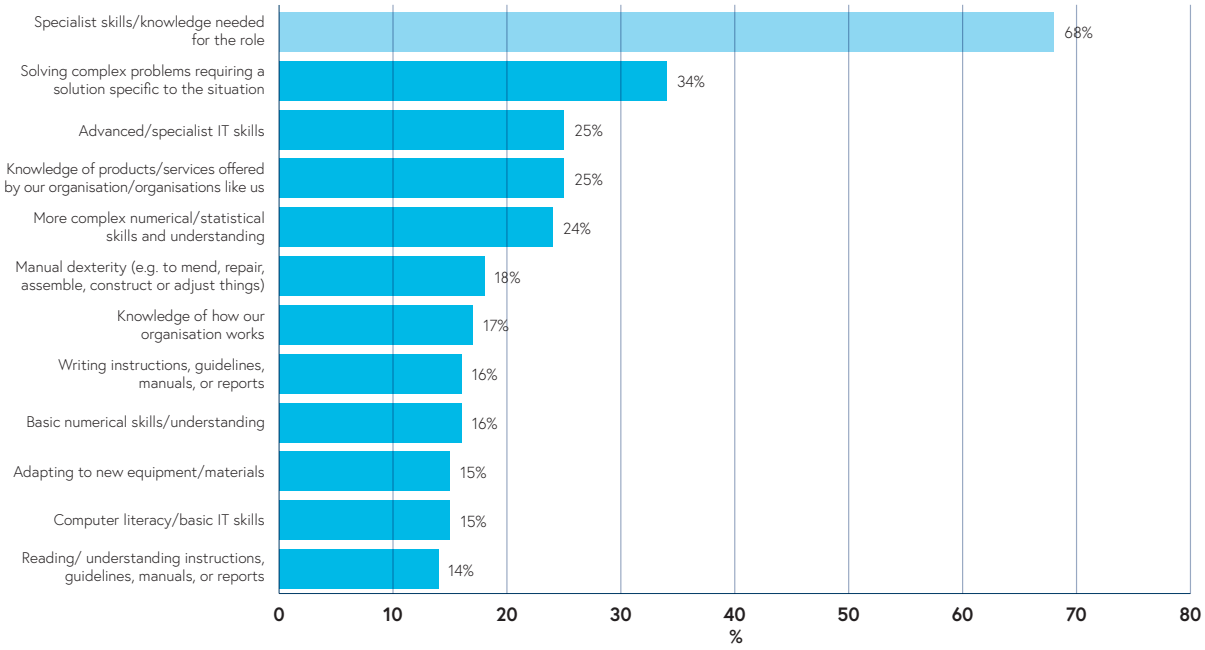
> We're looking for staff who have engineering degrees and technological skills like AI and it's very hard to find at the moment, and anything related to data transformation. It's very difficult to find the right applicants, it's a very competitive market for these skills, loads of companies are trying to get big data staff, you only get four or five candidates for a position, we have a very limited amount of CVs coming through.
>
> **Technology Officer, Large Sized Business, Technology Services**

> When we look at replacing people, I think it's going to be quite difficult because there's a shortage of skills in the engineering area, especially the higher skilled. I've interviewed people a lot, it's difficult to get the right skills without the right training which obviously is quite expensive, or very expensive I would say.
>
> **Maintenance Section Head, Medium Sized Business, Utility Company**

Although skills such as manual dexterity were mentioned by only a fifth of engineering employers, those organisations in the electrical and electronics sector (37%) and the manufacturing sector (28%) were more likely to report that applicants lack these skills.

Specialist sector-specific skills are also lacking in the IT and communications sector, where 64% of employers who felt applicants lacked technical skills said those skills were related to advanced/specialist IT skills.

**Figure 41:** Types of technical skill lacking



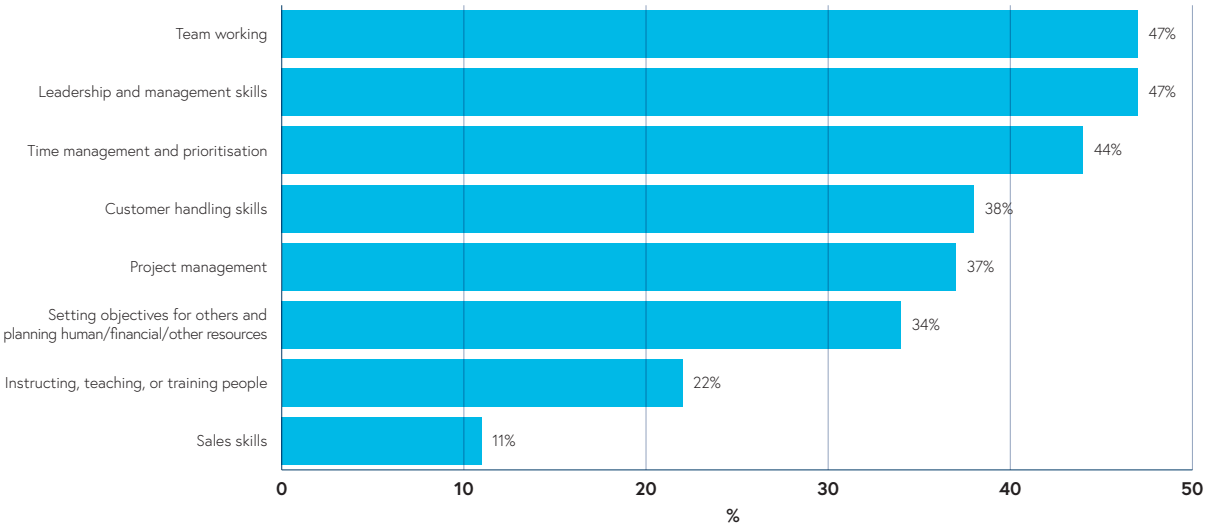

**Q: You mentioned that some applicants lacked necessary technical skills. Which, if any, of the following skills were they lacking?**
*(Base size: all respondents who felt applicants lack the necessary technical skills – 487 respondents)*

> For my team it's mainly technicians. I'm looking at their level of knowledge, mechanical skills, electrical skills and instrumentation skills. And also their ability to find diagnostics, logical thinking, ownership of the job.
>
> **Maintenance Section Head, Medium Sized Business, Utility Company**

Engineering employers are more likely to report that a wider range of soft skills are lacking in applicants that may hamper their ability to meet future sustainability challenges. Close to half (47%) of those who felt applicants lack the necessary soft skills report that these are related to team working, or leadership and management skills. A further 44% report time management and prioritisation as an issue. Customer handling (38%) and project management skills (37%) are also mentioned by four in ten.

> The first thing I would say is engineering skills, but they also lack people skills, sometimes business is all about making connections with people. The interns and apprentices will sometimes go by the book and they won't understand what the person wants.
>
> **Technology Officer, Large Sized Business, Technology Services**

**Figure 42:** Types of soft skills lacking




**Q: You mentioned that some applicants lacked necessary soft skills. Which, if any, of the following skills were they lacking?**
*(Base size: all respondents who felt applicants lack the necessary soft skills – 233 respondents)*

## 9.2 Perceptions of new entrants

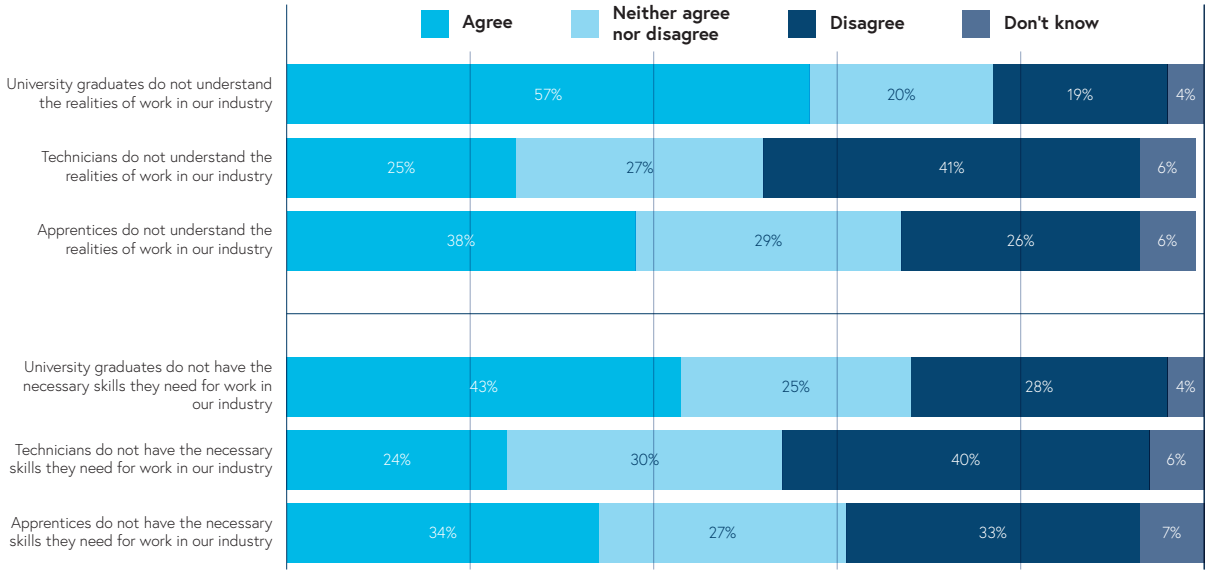
**The quality of young people entering the engineering sector is important to meeting future sustainability targets. Currently, engineering employers feel that university graduates are less likely to understand the realities of work in their industry than technicians or apprentices.**

Engineering employers are also more likely to question whether university graduates have the necessary skills needed to work in their industry (43% agreeing that they don't have them). However, there are also concerns over the apprentices that enter the engineering industry. Over a third (38%) of employers agree that apprentices don't understand the realities of work in their industry, and that apprentices don't have the necessary technical skills (34%).

Employers in the transport sector are more likely to question whether graduates have the right skills to work in their industry, with 61% in agreement that graduates don't have the necessary skills.

> "I think the biggest problem we had is that people came from universities and the first three years they had to learn skills they should've learnt in universities or in college. Even very basic skills, like modelling in Excel, working in Access, stuff like that. Quite technical skills, but for analysis. I was shocked that some people coming from universities have no knowledge whatsoever about programmes like Access."
>
> **Senior Manager in Business Development and Operations, Medium Size Business, Energy**

**Figure 43:** Perceptions of new entrants




**Q: To what extent, if at all, do you agree or disagree with each of the following statements?**
*(Base size: all respondents – 1,010)*

# 10. Conclusion

Engineering employers are in agreement that the world's climate is changing and their business practices are being adapted to keep pace. The vast majority of engineering employers are aware of the UK Government's net-zero target and around half think that their organisation can achieve net zero by 2050. However, they're less assured of the UK's overall success in meeting this goal. So, how do we achieve net zero and a sustainable future? After looking at business views, strategies, workforce needs, and recruitment difficulties, actions within education, Government, policy, and skills are needed.

## Skills

**To achieve sustainability, new skills are needed to implement sustainability strategies and activities, but there's limited upskilling or focused recruitment to get these new skills into businesses. Less than one in ten engineering employers with a sustainability strategy think their organisation has all the skills they need.**

Employers are also divided on what type of skills their organisation will need to deliver their sustainability strategy, with equal proportions citing the need for innovative thinking, management/strategic skills and agility skills. To address this issue, the importance of engineering skills that address climate change must be highlighted. By building a more flexible and agile workforce, we can promote innovation and delivery.

When thinking specifically about their engineering and technical staff, two thirds of employers think they will need more skills and knowledge to respond to the changes their organisation is making to lower its environmental impact. Specialists skills are vital when delivering the sustainability agenda. Industry must priortise reskilling and upskilling the current workforce by working more closely with schools, colleges, and universities. Input from industry about course content can better prepare graduates and provide them with the required skills that are needed.

## Education

In planning for future generations to enter the engineering profession, most engineering employers see more opportunities for young people to acquire relevant work experience and for increased engagement with businesses as the key priorities for the UK education system. However, a mismatch exists between the desire from engineering employers for increased employer engagement to help young people obtain relevant work experience and the amount of employer engagement with the education system.

A quarter of engineering employers don't engage with schools, colleges or universities. The lack of engagement with the education system increases as the size of the engineering employer decreases. To tackle this challenge, industry and educators need to offer hands-on experience and placements where possible. This can create a positive experience for young people and allow them to apply their skills in the workforce.

## Government and policy

Wider economic pressures have also made engineering employers reprioritise, with the wellbeing of staff and dealing with economic uncertainty now being the top priorities. In this context, it's unsurprising that in 2020, lowering an organisation's environmental impact and developing solutions/technologies for environmental sustainability were somewhat lower priorities. However, this allows for an opportunity to promote a green post-pandemic recovery. Governments should support businesses by providing long-term planning and investment to encourage a more sustainable and stable future.

There is always an opportunity to do more to reach net zero, but some engineering employers aren't changing to respond to the sustainability challenges they face. One in five engineering employers haven't introduced any technological change in order to lower their environmental impact over the past five years. The majority of engineering employers say that financial incentives to purchase new technology or adapt older technologies would encourage their organisation to lower its environmental impact. Government, industry and academia must continue to support innovation in the field of science and engineering while driving down costs.

Overall, industry, government and academia need to collaborate to identify the essential skills required to deliver net-zero targets and provide a workforce that's fit for purpose. By improving the understanding of the net-zero challenge we face, we will be able to create work ready new recruits that understand the importance of sustainability and the issues around it. Encouragement from government, industry and academia will help businesses reach net-zero goals, equip young people with the right skills, and decrease our current recruitment difficulties.

# 11. Case study one

**Senior Manager in Business Development and Operations, Small Size Business (50 to 99 employees), Energy**

## Role and business

The company he works for offers consultancy, business and professional services in the energy industry.

He has decision making responsibilities in business development and operations. Circa 25% of their employees are highly skilled, engineering staff. Although COVID-19 has had a negative impact on their turnover, the salaries and job security of their staff has not been affected yet.

> Probably around 25% are engineers, I'm an engineer myself so I'm part of that. It's about a quarter of us, because of the nature of the services we provide.

> Roughly 3/4 of people are salary employed, so even if we decrease hours, we don't decrease wages, so around 70% have been relatively insulated to date, because some of the work has still continued.

## Workforce needs and recruitment difficulties

As highly skilled employees in middle and senior roles are retiring, a skills gap is created in their internal workforce, with graduates and apprentices not having the qualification and experiences needed.

The biggest skills gap is in engineering skills and in people skills (e.g. client handling). A source of frustration is that universities don't engage with the industry when they design the courses, which leads to graduates who don't have the skills the industry needs. The skills missing are primarily technical: modelling in Excel, working in Access etc.

> We are not doing this because we are Mother Theresa, to be quite honest. The reason we are doing this is three-fold: first of all, because customers are now demanding it. Secondly, there is a cost benefit to it, quite luckily. Yes, initially there is a cost too it, but over a period of time I think it definitely gets cheaper. And finally, when investors look at us, the focus on environmental, social and governance has become a pretty big issue, so we can't pretend that it doesn't exist.

## Sustainability strategy and skills for delivering net zero

Given they only provide consultancy services, their net-zero strategy concerns mainly their work travel and office practices.

Their sustainability strategy will be formalised in the new financial year (April 2021) and he is confident about their ability to reach net zero by 2050. The company is motivated by demands for sustainable practices from customers and investors, as well the long-term costs benefits.

> The problem we have is that people who are in the middle level might want to retire early. And that's where we might have a skills gap, apprentices are still not fully qualified or don't really have the experience to replace them.

> Professors themselves don't get the industrial interaction, so it almost feels like you're doing your degree in a bubble, and then you are thrown from one bubble to another bubble and there is no connection between the two at all.

# 12. Case study two

**Maintenance Section Head, Medium Size Business (100 to 249 employees), Utility Company**

## Role and business

He oversees a team of 35 people across electrical, mechanical and instrumentation departments.

The business has eight sites throughout the UK and one in Germany. In his site, they employ 40 engineering staff, circa 30% of the workforce in his site is highly skilled. Due to the nature of the business, COVID-19 has not had an impact on their turnaround.

> For where I am, it's 40 people who work in engineering out of 106. I would say there's 20-30 who are highly skilled, about 30 who are intermediate, and the rest are lower skilled.

> Because it's a utility company, our revenue hasn't been hit, it's something that people need all the time. We didn't have to furlough anyone because we're a 24-hour business.

## Workforce needs and recruitment difficulties

He is expecting to see a skills gap in his internal workforce in circa five years, when his experienced staff will come to retirement.

He believes there is a shortage of engineering skills in the job market, and training new people takes time and financial resources. They hire both engineering graduates and apprentices – they are enrolled in an induction process and get offered a training package. The skills valued are technical skills, an ability to find diagnostics, logical thinking, ownership of the job and good team collaboration.

> We have a few people who are coming to retirement in the next five years and we will have a skills shortage then. When we'll be looking at replacing people, I think it's going to be quite difficult, because engineering, especially the higher skilled, it's a shortage of skills in that area.

> I'm looking for their level of knowledge and mechanical, electrical and instrumentation skills. Also, their ability to find diagnostics, logical thinking, ownership of the job and not being afraid to ask for help.

## Sustainability strategy and skills for delivering net zero

They have closed some of their fossil power plants and have moved to solar power plants; they are also looking into tidal power.

They aim to reduce their carbon emissions by 15% each year. Incentives include consumer demand, long term cost cutting and impact on the company's reputation. Barriers include lack of demand, shortage in green supplies and unfavourable weather.

> We have our own targets, we had fossil power plants we shut. We still use gas, but we've moved to solar power plants, we're going into research for tidal power, there is a lot going on. We cycle, we recycle, we cut down on the amount of waste we produce.

> The more we recycle the more it's good for us, it's good for PR, it's good for our image, and we want to do the right thing. We want to be clean, we want to say that we are the best company out there to reduce our impact on the environment.

# 13. Case study three

**Technology Officer, Large Size Business (over 1,000 employees), Technology Services**

## Role and business

He oversees technology acquisition, including green initiatives. His branch employs 250 employees, out of which 60% are technical staff, highly skilled in engineering software and computer technology.

COVID-19 has hampered their business, which led to a decrease in pay, freezing bonus schemes and ending contracts with several contractors.

> We have around 250 employees, some of them are contractors, and most of them are highly skilled in engineering software and computer technology. I would say 60% are technical staff.

> There was reduced pay for everyone and we also postponed our bonus scheme. We ended our work with some of the contractors and we put some of the staff on furlough.

## Workforce needs and recruitment difficulties

There is a shortage in the job market for technological skills (e.g. artificial intelligence, big data), with many companies competing for a small number of qualified candidates.

The company is willing to re-train current staff; however, it can take up to two years to get someone qualified. The people they employ are usually experienced staff however, they do occasionally hire interns.

> We are looking for staff who have engineering degrees and technological skills like AI and it's very hard to find at the moment, and anything related to data transformation. It's very difficult to find the right applicants, it's a very competitive market for these skills, loads of companies are trying to get big data staff, you only get 4/5 candidates for a position.

> When we recruit someone, we do what we call a mentoring programme, for six to eight weeks. We assign someone to teach them both the technical side and the admin things, usually someone from the same position or very similar.

## Sustainability strategy and skills for delivering net zero

Their HR department is encouraging employees to cycle to work, recycle batteries, donate old computers to charities etc.

The main driving force is demands for employees and candidates, who often enquire about sustainable practices in the company. An incentive would be government initiatives similar to the 'Cycle to Work' scheme.

> It's also coming from employees, it's something that employees are looking at more and more and in interviews sometimes they ask these kind of questions. It's driving engagement and retention of employees, because they see that the company cares about the environment.

> We have implemented a cycle to work scheme, we have recycling for batteries, for old computers, we are working with charities. I think this is a global effort and it will take some time to change everyone's behaviour.

# 14. Appendix A: Standard industrial classifications (SICs)

The following standard industrial classifications (SICs) show the range of employers that are included within the engineering footprint and were eligible to take part in this research.

## Energy

- **06100** Extraction of crude petroleum
- **06200** Extraction of natural gas
- **09100** Support activities for petroleum and natural gas mining
- **05101** Deep coal mines
- **05102** Open cast coal working
- **35110** Production of electricity
- **35120** Transmission of electricity
- **35130** Distribution of electricity
- **35210** Manufacture of gas
- **35220** Distribution of gaseous fuels through mains
- **35300** Steam and air conditioning supply

## IT and communications

- **18201** Reproduction of sound recording
- **18202** Reproduction of video recording
- **18203** Reproduction of computer media
- **58210** Publishing of computer games
- **58290** Other software publishing
- **59111** Motion picture production activities
- **59112** Video production activities
- **59113** Television programme production activities
- **59120** Motion picture, video and television programme post-production activities
- **59200** Sound recording and music publishing activities
- **61100** Wired telecommunications activities
- **61200** Wireless telecommunications activities
- **61300** Satellite telecommunications activities
- **61900** Other telecommunications activities
- **62011** Ready-made interactive leisure and entertainment software development
- **62012** Business and domestic software development
- **62020** Computer consultancy activities
- **62030** Computer facilities management activities
- **62090** Other information technology and computer service activities
- **63110** Data processing, hosting and related activities
- **63120** Web portals
- **95110** Repair of computers and peripheral equipment
- **95120** Repair of communication equipment

## Transport

- **28301** Manufacture of agricultural tractors
- **29100** Manufacture of motor vehicles
- **29201** Manufacture of bodies (coachwork) for motor vehicles (except caravans)
- **29202** Manufacture of trailers and semi-trailers
- **29203** Manufacture of caravans
- **29310** Manufacture of electrical and electronic equipment for motor vehicles
- **29320** Manufacture of other parts and accessories for motor vehicles and their engines
- **30110** Building of ships and floating structures
- **30120** Building of pleasure and sporting boats
- **30200** Manufacture of railway locomotives and rolling stock
- **30910** Manufacture of motorcycles
- **30920** Manufacture of bicycles and invalid carriages

- **N30990** Manufacture of other transport equipment not elsewhere classified (NEC)
- **51220** Space transport
- **33150** Repair and maintenance of ships and boats
- **33170** Repair and maintenance of other transport equipment
- **45200** Maintenance and repair of motor vehicles

## Built environment

- **41201** Construction of commercial buildings
- **41202** Construction of domestic buildings
- **42110** Construction of roads and motorways
- **42120** Construction of railways and underground railways
- **42130** Construction of bridges and tunnels
- **42210** Construction of utility projects for fluids
- **42220** Construction of utility projects for electricity and telecommunications
- **42910** Construction of water projects
- **42990** Construction of other civil engineering projects NEC
- **43110** Demolition
- **43120** Site preparation
- **43130** Test drilling and boring
- **43220** Plumbing, heat and air conditioning installation
- **43290** Other construction installation
- **43999** Other specialised construction activities NEC
- **71111** Architectural activities
- **71112** Urban planning and landscape architectural activities
- **74901** Environmental consulting activities
- **74902** Quantity surveying activities

## Aerospace

- **30300** Manufacture of air and spacecraft, and related machinery
- **33160** Repair and maintenance of aircraft and spacecraft

## Defence

- **84220** Defence activities
- **30400** Manufacture of military fighting vehicles
- **25400** Manufacture of weapons and ammunition

## Manufacturing

- **10130** Production of meat and poultry meat products
- **10200** Processing and preserving of fish, crustaceans and molluscs
- **10310** Processing and preserving of potatoes
- **10320** Manufacture of fruit and vegetable juice
- **10390** Other processing and preserving of fruit and vegetables
- **10410** Manufacture of oils and fats
- **10420** Manufacture of margarine and similar edible fats
- **10511** Liquid milk and cream production
- **10512** Butter and cheese production
- **10519** Manufacture of other milk products
- **10520** Manufacture of ice cream
- **10611** Grain milling
- **10612** Manufacture of breakfast cereals and cereals-based food
- **10620** Manufacture of starches and starch products
- **10710** Manufacture of bread; manufacture of fresh pastry goods and cakes
- **10720** Manufacture of rusks and biscuits; manufacture of preserved pastry goods and cakes
- **10730** Manufacture of macaroni, noodles, couscous and similar farinaceous products
- **10810** Manufacture of sugar
- **10821** Manufacture of cocoa and chocolate confectionery
- **10822** Manufacture of sugar confectionery
- **10831** Tea processing
- **10832** Production of coffee and coffee substitutes
- **10840** Manufacture of condiments and seasonings
- **10850** Manufacture of prepared meals and dishes
- **10860** Manufacture of homogenised food preparations and dietetic food
- **10890** Manufacture of other food products NEC
- **10910** Manufacture of prepared feeds for farm animals
- **10920** Manufacture of prepared pet foods
- **11010** Distilling, rectifying and blending of spirits
- **11020** Manufacture of wine from grape
- **11030** Manufacture of cider and other fruit wines
- **11040** Manufacture of other non-distilled fermented beverages
- **11050** Manufacture of beer

## Manufacturing

- **11060** Manufacture of malt
- **11070** Manufacture of soft drinks; production of mineral waters and other bottled waters
- **12000** Manufacture of tobacco products
- **13100** Preparation and spinning of textile fibres
- **13200** Weaving of textiles
- **13300** Finishing of textiles
- **13910** Manufacture of knitted and crocheted fabrics
- **13921** Manufacture of soft furnishings
- **13922** Manufacture of canvas goods, sacks etc.
- **13923** Manufacture of household textiles
- **13931** Manufacture of woven or tufted carpets and rugs
- **13939** Manufacture of other carpets and rugs
- **13940** Manufacture of cordage, rope, twine and netting
- **13950** Manufacture of non-wovens and articles made from non-wovens, except apparel
- **13960** Manufacture of other technical and industrial textiles
- **13990** Manufacture of other textiles NEC
- **14110** Manufacture of leather clothes
- **14120** Manufacture of workwear
- **14131** Manufacture of other men's outerwear
- **14132** Manufacture of other women's outerwear
- **14141** Manufacture of men's underwear
- **14142** Manufacture of women's underwear
- **14190** Manufacture of other wearing apparel and accessories NEC
- **14200** Manufacture of articles of fur
- **14310** Manufacture of knitted and crocheted hosiery
- **14390** Manufacture of other knitted and crocheted apparel
- **15110** Tanning and dressing of leather; dressing and dyeing of fur
- **15120** Manufacture of luggage, handbags etc, saddlery and harness
- **15200** Manufacture of footwear
- **16100** Sawmilling and planing of wood
- **16210** Manufacture of veneer sheets and wood-based panels
- **16220** Manufacture of assembled parquet floors
- **16230** Manufacture of other builders' carpentry and joinery
- **16240** Manufacture of wooden containers
- **16290** Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials
- **17110** Manufacture of pulp
- **17120** Manufacture of paper and paperboard
- **17211** Manufacture of corrugated paper and paperboard, sacks and bags
- **17219** Manufacture of other paper and paperboard containers
- **17220** Manufacture of household and sanitary goods and of toilet requisites
- **17230** Manufacture of paper stationery
- **17240** Manufacture of wallpaper
- **17290** Manufacture of other articles of paper and paperboard NEC
- **18110** Printing of newspapers
- **18121** Manufacture of printed labels
- **18129** Printing NEC
- **18130** Pre-press and pre-media services
- **18140** Binding and related services
- **19100** Manufacture of coke oven products
- **19201** Mineral oil refining
- **19209** Other treatment of petroleum products (excluding petrochemicals manufacture)
- **20110** Manufacture of industrial gases
- **20120** Manufacture of dyes and pigments
- **20130** Manufacture of other inorganic basic chemicals
- **20140** Manufacture of other organic basic chemicals
- **20150** Manufacture of fertilizers and nitrogen compounds
- **20160** Manufacture of plastics in primary forms
- **20170** Manufacture of synthetic rubber in primary forms
- **20200** Manufacture of pesticides and other agrochemical products
- **20301** Manufacture of paints, varnishes and similar coatings, mastics and sealants
- **20302** Manufacture of printing ink
- **20411** Manufacture of soap and detergents
- **20412** Manufacture of cleaning and polishing preparations
- **20420** Manufacture of perfumes and toilet preparations
- **20510** Manufacture of explosives
- **20520** Manufacture of glues
- **20530** Manufacture of essential oils
- **20590** Manufacture of other chemical products NEC
- **20600** Manufacture of manmade fibres
- **21100** Manufacture of basic pharmaceutical products
- **21200** Manufacture of pharmaceutical preparations
- **22110** Manufacture of rubber tyres and tubes; retreading and rebuilding of rubber tyres
- **22190** Manufacture of other rubber products
- **22210** Manufacture of plastic plates, sheets, tubes and profiles
- **22220** Manufacture of plastic packing goods
- **22230** Manufacture of builders' ware of plastic

## Manufacturing

- **22290** Manufacture of other plastic products
- **23110** Manufacture of flat glass
- **23120** Shaping and processing of flat glass
- **23130** Manufacture of hollow glass
- **23140** Manufacture of glass fibres
- **23190** Manufacture and processing of other glass, including technical glassware
- **23200** Manufacture of refractory products
- **23310** Manufacture of ceramic tiles and flags
- **23320** Manufacture of bricks, tiles and construction products in baked clay
- **23410** Manufacture of ceramic household and ornamental articles
- **23420** Manufacture of ceramic sanitary fixtures
- **23430** Manufacture of ceramic insulators and insulating fittings
- **23440** Manufacture of other technical ceramic products
- **23490** Manufacture of other ceramic products NEC
- **23510** Manufacture of cement
- **23520** Manufacture of lime and plaster
- **23610** Manufacture of concrete products for construction purposes
- **23620** Manufacture of plaster products for construction purposes
- **23630** Manufacture of ready-mixed concrete
- **23640** Manufacture of mortars
- **23650** Manufacture of fibre cement
- **23690** Manufacture of other articles of concrete, plaster and cement
- **23700** Cutting, shaping and finishing of stone
- **23910** Production of abrasive products
- **23990** Manufacture of other non-metallic mineral products NEC
- **24100** Manufacture of basic iron and steel and of ferro-alloys
- **24200** Manufacture of tubes, pipes, hollow profiles and related fittings, of steel
- **24310** Cold drawing of bars
- **24320** Cold rolling of narrow strip
- **24330** Cold forming or folding
- **24340** Cold drawing of wire
- **24410** Precious metals production
- **24420** Aluminium production
- **24430** Lead, zinc and tin production
- **24440** Copper production
- **24450** Other non-ferrous metal production
- **24460** Processing of nuclear fuel
- **24510** Casting of iron
- **24520** Casting of steel
- **24530** Casting of light metals
- **24540** Casting of other non-ferrous metals
- **25110** Manufacture of metal structures and parts of structures
- **25120** Manufacture of doors and windows of metal
- **25210** Manufacture of central heating radiators and boilers
- **25290** Manufacture of other tanks, reservoirs and containers of metal
- **25300** Manufacture of steam generators, except central heating hot water boilers
- **25500** Forging, pressing, stamping and roll-forming of metal; powder metallurgy
- **25610** Treatment and coating of metals
- **25620** Machining
- **25710** Manufacture of cutlery
- **25720** Manufacture of locks and hinges
- **25730** Manufacture of tools
- **25910** Manufacture of steel drums and similar containers
- **25920** Manufacture of light metal packaging
- **25930** Manufacture of wire products, chain and springs
- **25940** Manufacture of fasteners and screw machine products
- **25990** Manufacture of other fabricated metal products NEC
- **28110** Manufacture of engines and turbines, except aircraft, vehicle and cycle engines
- **28120** Manufacture of fluid power equipment
- **28131** Manufacture of pumps
- **28132** Manufacture of compressors
- **28140** Manufacture of taps and valves
- **28150** Manufacture of bearings, gears, gearing and driving elements
- **28210** Manufacture of ovens, furnaces and furnace burners
- **28220** Manufacture of lifting and handling equipment
- **28230** Manufacture of office machinery and equipment (except computers and peripheral equipment)
- **28240** Manufacture of power-driven hand tools
- **28250** Manufacture of non-domestic cooling and ventilation equipment
- **28290** Manufacture of other general-purpose machinery NEC
- **28302** Manufacture of agricultural and forestry machinery other than tractors
- **28410** Manufacture of metal forming machinery
- **28490** Manufacture of other machine tools NEC
- **28910** Manufacture of machinery for metallurgy
- **28921** Manufacture of machinery for mining
- **28922** Manufacture of earthmoving equipment

## Manufacturing

- **28923** Manufacture of equipment for concrete crushing and screening and roadworks
- **28930** Manufacture of machinery for food, beverage and tobacco processing
- **28940** Manufacture of machinery for textile, apparel and leather production
- **28950** Manufacture of machinery for paper and paperboard production
- **28960** Manufacture of plastics and rubber machinery
- **28990** Manufacture of other special-purpose machinery NEC
- **31010** Manufacture of office and shop furniture
- **31020** Manufacture of kitchen furniture
- **31030** Manufacture of mattresses
- **31090** Manufacture of other furniture
- **32110** Striking of coins
- **32130** Manufacture of imitation jewellery and related articles
- **32200** Manufacture of musical instruments
- **32300** Manufacture of sports goods
- **32401** Manufacture of professional and arcade games and toys
- **32409** Manufacture of other games and toys NEC
- **32500** Manufacture of medical and dental instruments and supplies
- **32910** Manufacture of brooms and brushes
- **32990** Other manufacturing NEC
- **33110** Repair of fabricated metal products
- **33120** Repair of machinery
- **33190** Repair of other equipment
- **33200** Installation of industrial machinery and equipment
- **71121** Engineering design activities for industrial process and production
- **71122** Engineering related scientific and technical consulting activities
- **71129** Other engineering activities
- **71200** Technical testing and analysis
- **72190** Other research and experimental development on natural sciences and engineering

## Other

- **01630** Post-harvest crop activities
- **01640** Seed processing for propagation
- **05200** Mining of lignite
- **07100** Mining of iron ores
- **07210** Mining of uranium and thorium ores
- **07290** Mining of other non-ferrous metal ores
- **08110** Quarrying of ornamental and building stone, limestone, gypsum, chalk and slate
- **08120** Operation of gravel and sand pits; mining of clays and kaolin
- **08910** Mining of chemical and fertilizer minerals
- **08930** Extraction of salt
- **08990** Other mining and quarrying NEC
- **09900** Support activities for other mining and quarrying
- **36000** Water collection, treatment and supply
- **37000** Sewerage
- **38210** Treatment and disposal of non-hazardous waste
- **38220** Treatment and disposal of hazardous waste
- **38310** Dismantling of wrecks
- **38320** Recovery of sorted materials
- **39000** Remediation activities and other waste management services
- **49500** Transport via pipeline
- **58110** Book publishing
- **58120** Publishing of directories and mailing lists
- **58130** Publishing of newspapers
- **58141** Publishing of learned journals
- **58142** Publishing of consumer and business journals and periodicals
- **58190** Other publishing activities
- **80200** Security systems service activities
- **95220** Repair of household appliances and home and garden equipment

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