ENGINEERS IRELAND

Engineering 2022

A barometer of the profession in Ireland

A community of creative professionals delivering sustainable solutions for society

www.engineersireland.ie

Foreword

I am delighted to present Engineering 2022 – A barometer of the profession in Ireland, which Engineers Ireland has compiled on an annual basis for the last five years.

Engineering encompasses every aspect of our modern world from designing and manufacturing the microscopic chips that power our mobile phones to planning and building the infrastructure that will provide Ireland with renewable, sustainable energy and help us to meet our net-zero greenhouse gas emissions target by 2050.

To meet these challenges we need a talented, diverse, and vibrant engineering profession that is recognised and trusted by our policy makers and by society as a whole. Thankfully this report shows that the engineering profession in Ireland is in rude health, despite the upheaval of the global pandemic, which we are only just starting to emerge from.

Ireland's economy and society has weathered the Covid-19 storm very well by international standards. The success of Irish engineering and technology sustained our economy and far more importantly, contributed to saving lives, whether it was through the flair of our bio medical engineers working on ventilators and testing kits that were exported across the world or our computer and software engineers that developed the Covid-19 contact tracing app. This Irish app proved to be best in class internationally and was subsequently adopted by many organisations and governments across the world including the New Zealand government.

It is no accident that the barometer report shows that 95% of people in Ireland view engineers as "Highly Competent", a ranking second only to doctors, or that 80% view engineering as "a rewarding career choice for young people".

I hope this report will highlight the importance of engineers to our society and stimulate an informed discussion on the development of the profession. Engineers have always been critical to Ireland's past success, and they will be key to meeting our present and future challenges.

Caroline Spillane
Director General
March 2022

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Engineers Ireland Advocacy

National Recovery: Almost uniquely in Europe, Ireland's economy continued to grow throughout the pandemic, due in no small part to the strength of our manufacturing, process, and technology sectors. As we emerge from Covid-19 our members' skills will continue to be core to delivering a sustainable, green and digital recovery across all aspects of our society and realising the ambition of Project Ireland 2040.

The Big Challenge – Sustainability: Engineers Ireland, collaborating with others, is a definitive voice on sustainable engineering solutions. Our members are encouraged to keep sustainability at the heart of their roles.

Engineering a Digital Future, Now: Engineers Ireland is a go-to organisation in ensuring the future workforce has the necessary digitalisation skills to succeed.

Standards Protect Society: Engineers Ireland is passionate about ensuring that the quality of standards that impact our lives, is first class. We actively encourage members' participation in the continuous maintenance, development, and implementation of these standards.

Introduction

This is the fifth in the series of Engineering reports, the barometer on the engineering profession in Ireland. This report is predominantly based on the results of data collected through a survey of our members with 2,260 responses and a public poll of 1000 respondents, carried out by Behaviour & Attitudes. Previous reports presented indicators of engineering employment, perspectives and education based on bespoke research and publicly accessible data. Due to Covid-19 limited data was available in 2020/2021, but as we move into a post pandemic world, data is becoming more available.

The purpose of Engineering 2022 is to measure, analyse and learn from trends in engineering employment and the perception of engineering in Ireland. The member survey and public poll were carried out in January and February 2022.

The analysis focuses on changes to engineers' employment over the past year and on engineers' perspectives on the profession. These results are filtered by respondents' experience, gender, job position, work location, engineering discipline and sector. Due to limitations of the sample, some broad categories are used, e.g. location (provinces, Cork, Dublin, overseas) and broad engineering disciplines and sectors. The concluding section of the report summarises some key trends and lessons for the engineering profession in Ireland.

Before delving into this information, it is useful to consider some broader economic, social and political developments.

National recovery from the Covid-19 pandemic

As we move out of restrictions created by the pandemic, it is important to reflect on the losses of the pandemic, but also on the lessons learned through the pandemic and capitalise on the opportunities that have arisen from it. Remote working has been proven to be effective for many over the past two years, and a hybrid working model across many industries is likely to continue, with people in the office as needed or in the office two or three days a week. This level of flexibility will facilitate work in varied locations and enable industry to access larger talent pools.

Infrastructure in Ireland

Ireland's overall infrastructure needs to be upgraded to meet present and future challenges. Ireland's economy has been growing rapidly over the past decade, but its physical infrastructure has fallen behind the growing requirements of a green and digital future. This is particularly evident in housing and energy infrastructure.

Education and Skills

Engineering is vital to the growth of Ireland's economy, and currently there is a shortage of engineers. More engineers must be trained through our education system, but to do this, action must be undertaken at an early age to inspire children to get involved in STEM subjects. Extra places must be provided in engineering programmes and alternative paths via apprenticeships must be encouraged. We must also make attracting overseas talent as frictionless as possible. Visa and work permit application processes should be streamlined and resourced to match best in class international standards.

The Climate Crisis

At the COP 26 climate conference held in Scotland in 2021, it was agreed that the climate is changing at an unprecedented pace due to human activity. Over 90% of world GDP is now covered by net zero commitments. Over 150 countries have put forward new 2030 emissions targets (NDCs). Meaningful action is needed at all levels from Government to individuals. The pandemic has demonstrated that major societal change is possible when the reason for action is clearly understood.

Employment

1. Engineering employment

Looking ahead to 2022

2021 was a challenging year for all due to the uncertainty created by Covid-19. However, engineers and engineering organisations across the various economic sectors demonstrated great resilience throughout the year. The results of the 2022 Barometer report show the profession remained robust in remuneration, job opportunities and outlook, with recruitment opportunities for engineers, based mostly in Dublin and Cork, remaining strong. Engineering directors and managers were confident about growth in their organisations in 2022 with 81% planning to recruit engineers.

It is this resilience that places engineering in a key position to support our national economy and society in a post Brexit, post Covid-19 world, and to address the sustainability goals set by our Government. Some benefits have emerged from the pandemic, in terms of improved remote working and reduced commuter travel. Engineers across all sectors will now have the opportunity to capitalise on these benefits.

Hybrid working in the engineering industry

To gauge the movement of engineering careers towards a hybrid working model, respondents in our member survey were asked 'how many days per week did they work before the pandemic and how many days they would prefer to work in each location?'

The results of our survey show that before the pandemic, more than half of our members worked in the office five days a week, and almost a quarter would spend one day a week on site.

Table 1 Engineers' working location before March 2020

Days	Before March 2020 - in the office	Before March 2020 - at home	Before March 2020 - on site / other
5	58%	4%	14%
4	17%	1%	3%
3	10%	2%	4%
2	5%	4%	9%
1	3%	10%	23%

During the height of the pandemic, only 13% of respondents remained 5 days a week in the office, compared to 58% before the pandemic. On-site presence was more consistent, reflecting the relatively hands on (and often outdoors) nature of that work.

Table 2 Engineers' working location since March 2020

Days	Since March 2020 - in the office	Since March 2020 - at home	Since March 2020 - on site / other
5	13%	37%	10%
4	6%	13%	3%
3	11%	13%	4%
2	12%	13%	7%
1	11%	8%	21%

Our members were also asked in a post-pandemic world, what their preference would be for working in a hybrid model. It can be seen that engineers want to take advantage of the benefits of remote working, and operate a split between, office, home, and site. (see Table 3 overleaf)

Table 3 Engineers' preferred working locations post-pandemic

Days	Post-pandemic preference - in the office	Post-pandemic preference - at home	Post-pandemic preference - on site / other
5	11%	9%	7%
4	8%	10%	3%
3	21%	25%	6%
2	29%	28%	9%
1	16%	13%	30%

This trend of two or three days a week in the office with one day on site and the remainder at home appears to be the preference for the future. These results align with other survey studies undertaken on hybrid working and the effect of the pandemic on office culture, such as the work done by Gartner, a US insight organisation, who in 2020 performed a HR employee survey showing 80% of respondents indicated they wanted to continue to work from home for at least part of their week. According to the 2021 Digital Worker Experience Survey, 40% of workers would prefer to work from a combination of locations, rather than exclusively working at a corporate office or from home (1). The Irish Government, following a period of consultation, has now published the Right to Request Remote Working Bill 2022, which is currently being considered by the Oireachtas.

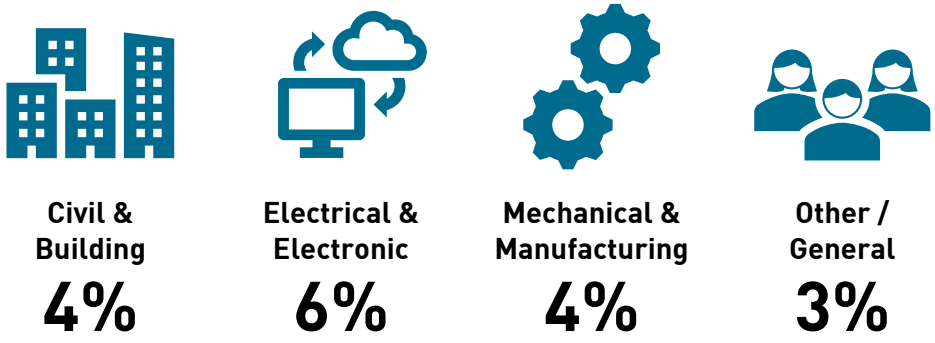


Figure 1 Before March 2020, five days working at home by discipline

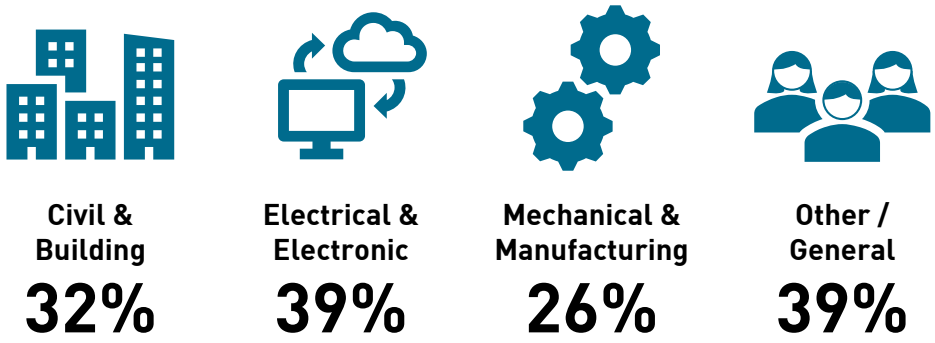


Figure 2 Since March 2020, five days working at home by discipline

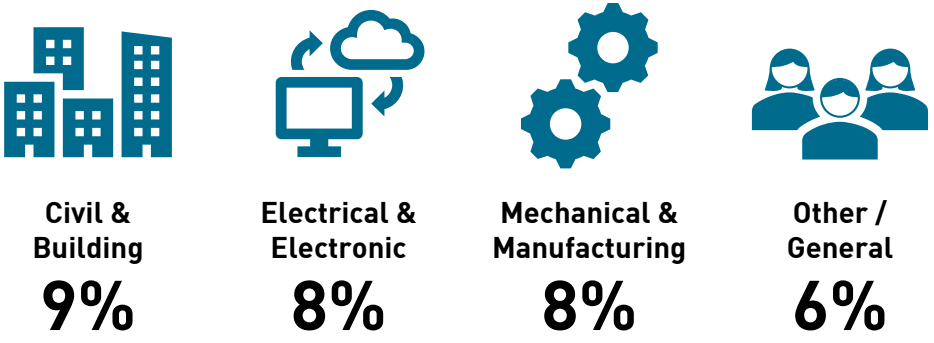


Figure 3 Post-pandemic, five days working at home by discipline

Salary changes

Each year, Engineers Ireland undertakes a member salary survey. This presents up-to-date information on the salary levels and employment benefits received by engineers employed in Ireland. Salary increases were reported for 2021 by 79% of our members, with 17% receiving a salary increase of 10% or higher.

Experience is the strongest predictor of salary, therefore the number of years of experience is used to disaggregate salaries in the tables which follow. This number of years' experience is based on the number of years since graduation with the primary engineering qualification.

Younger engineers reported strong increases in salary over the past year: two-thirds of engineers with 3-5 years' experience received a raise of more than 5%. Achieving promotion to a more senior position, entering management, and supervising more staff all typically result in a larger salary.

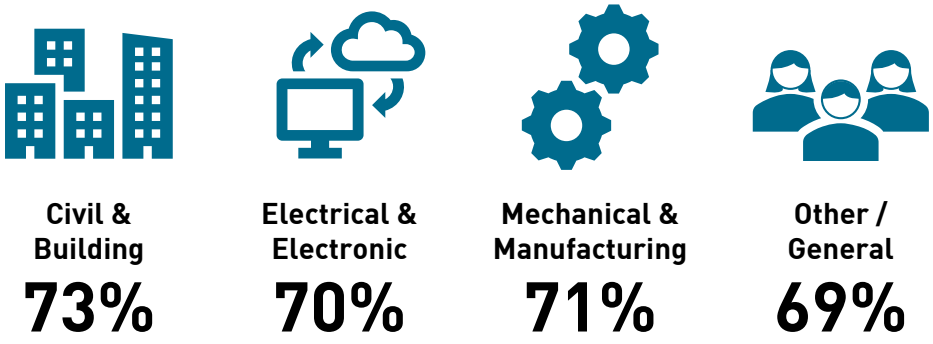


Figure 4 Any increase in salary by discipline of engineering

Experience

€33,000 Median salary, Engineer with 1-2 years' experience

Salary change in the past year

68% Engineers with 3-5 years' experience received a pay increase of more than 5% in the past year

Professional title

€78,500 Median salary, Chartered Engineer with 16-20 years' experience

Number of staff supervised

€120,000 Median salary, Engineer with 30+ years' experience and supervising 20+ staff

Table 4 Reported change in salary in the past year

Experience	Decrease	No change	< 2.5% increase	2.5-5% increase	> 5% increase	Any increase
1-2 years	0%	48%	7%	5%	21%	19%
3-5 years	1%	11%	9%	11%	31%	37%
6-10 years	2%	14%	14%	18%	24%	27%
11-15 years	1%	14%	22%	26%	18%	19%
16-20 years	2%	19%	29%	24%	18%	9%
21-25 years	1%	20%	34%	27%	9%	9%
26-30 years	1%	23%	37%	25%	6%	9%
>30 years	4%	24%	44%	15%	8%	6%

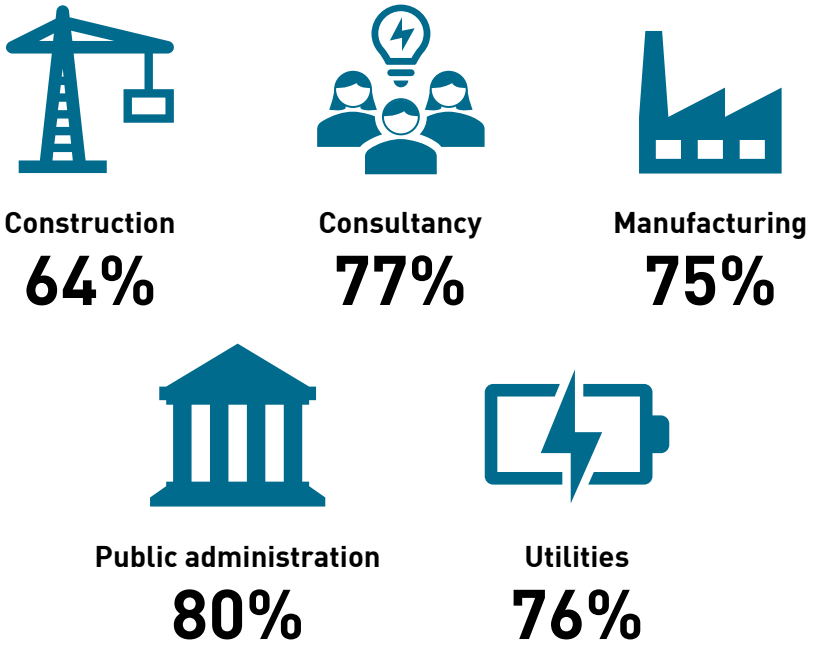


Figure 5 Any increase in salary by engineering sector

The Engineers Ireland Salary Survey 2022 report is an exclusive Engineers Ireland member benefit, available to download from www.engineersireland.ie. This report includes detailed analysis of salaries and other benefits (pensions, bonuses etc.) according to engineering discipline, sector, position, location and more.

Table 5 Median salary by years of experience and professional title

Experience	Member	Chartered Engineer (CEng)	Fellow (FIEI)
1-2 years	€33,000	-	-
3-5 years	€41,750	-	-
6-10 years	€50,000	€60,000	-
11-15 years	€62,250	€66,500	-
16-20 years	€68,000	€78,500	-
21-25 years	€84,000	€84,000	€100,000
26-30 years	€80,000	€90,000	€105,000
→30 years	€92,000	€100,000	€120,000

Note: The median is the number in the middle when a list of numbers is sorted from lowest to highest. Half of all engineers earn more than the median salary; half of all engineers earn less than the median salary.

A graduate engineer can expect to earn €33,000, rising to approximately €65,000 with 11-15 years of experience. Remuneration levels rise more-or-less consistently with experience and most engineers with more than 30 years of experience earn more than €100,000. Engineers Ireland awards professional titles such as 'Chartered Engineer' and 'Fellow', recognising the career progression, ethical standards and achievements of our members.

The value of these professional titles is recognised through increased remuneration.

A Chartered Engineer can expect to earn €5,000-€10,000 per year more than an engineer without a professional title with the same number of years of experience. While the typical engineer with 6-10 years' experience without a professional title earns €50,000, a Chartered Engineer who graduates in the same year typically earns €60,000. With more than 20 years' experience, Chartered Engineers who become Fellows of Engineers Ireland can expect to earn an additional €15,000 per year.

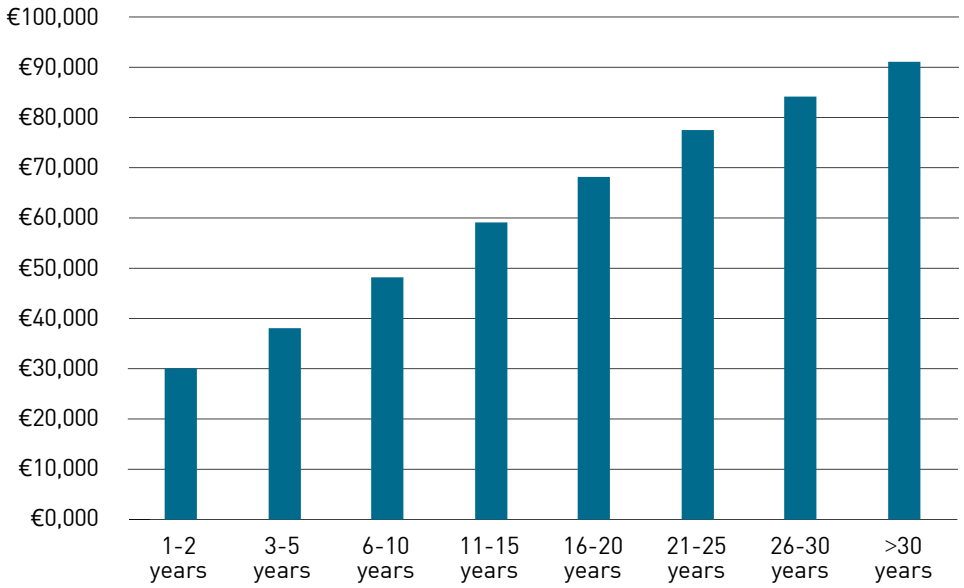


Figure 6 Median salary by experience

Job opportunities

To better understand perspectives on the jobs market, members were asked whether they agree with the statement 'there are plenty of job opportunities in the engineering sector in Ireland'. This question was also posed in member surveys over the previous four years. In 2022, 84% agreed that there are plenty of job opportunities, an increase of 17 percentage points on last year. This is the highest level recorded by Engineers Ireland in the past five years. This highlights the growing recovery and optimism regarding engineering job opportunities as we move into a post-pandemic period.

The public was also asked in our poll if they agreed with the statement 'There are plenty of job opportunities in the Engineering Sector in Ireland' with 72% agreeing, up 13% from the previous poll in 2020.

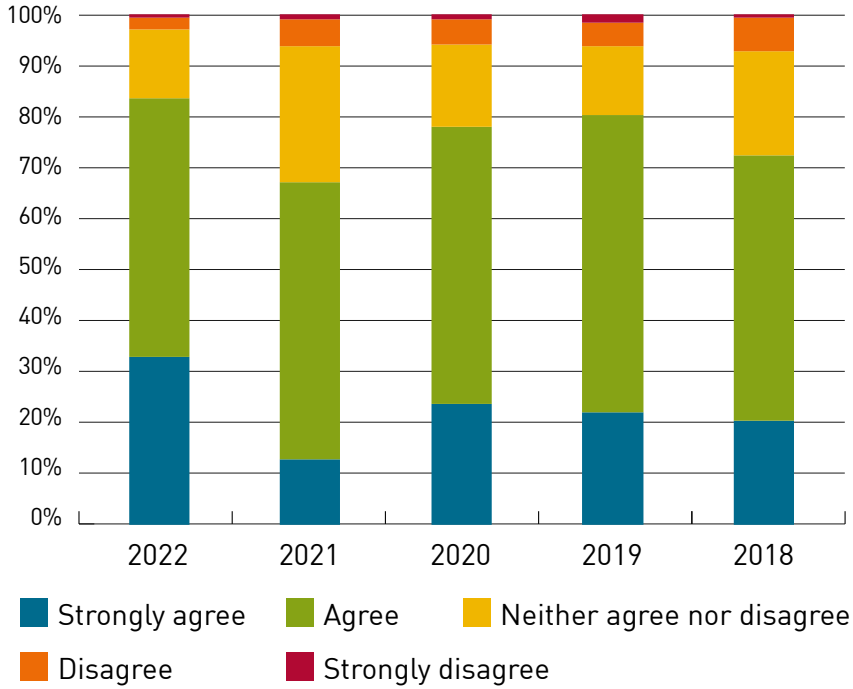


Figure 7 There are 'plenty of jobs in engineering' according to engineers

Table 6 Breakdown on response that there are 'plenty of jobs in engineering'

	Agree	Disagree	Neither
Survey year			
2022	84%	3%	13%
2021	67%	6%	26%
2020	78%	6%	16%
2019	80%	6%	13%
2018	73%	7%	20%
Experience			
1-2 years	82%	5%	12%
3-5 years	92%	1%	8%
6-10 years	85%	4%	11%
11-15 years	83%	3%	14%
16-20 years	84%	3%	13%
21-25 years	81%	2%	16%
26-30 years	87%	1%	12%
>30 years	77%	5%	18%
Gender			
Female	80%	4%	16%
Male	84%	3%	13%

The opinion that there are plenty of job opportunities is strongest among electrical and electronic engineers, mechanical and manufacturing engineers, and respondents based in Cork and in Dublin.

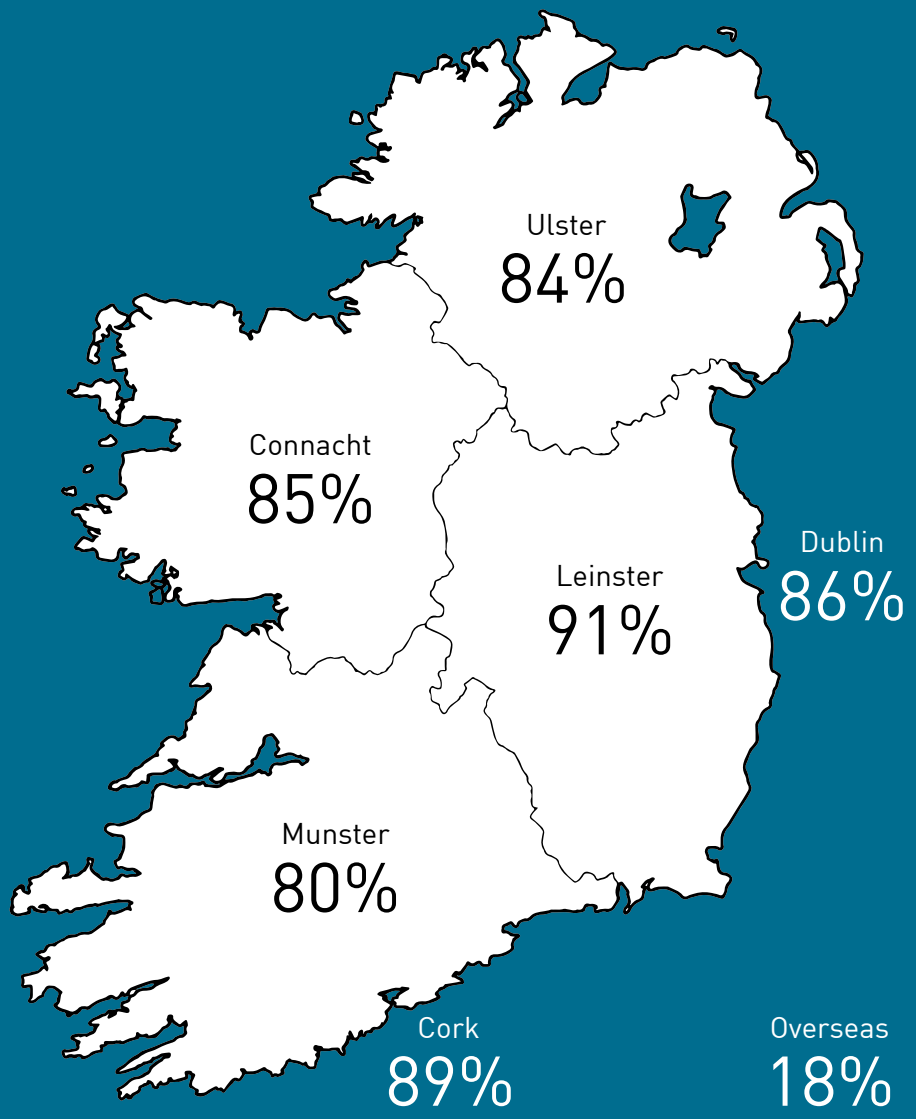


Figure 8 Agreement that there are 'plenty of jobs in engineering' by location

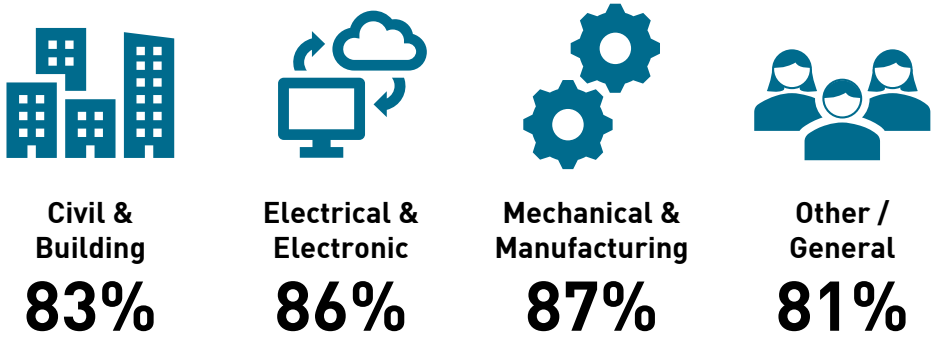


Figure 9 Agreement that there are 'plenty of jobs in engineering' by discipline

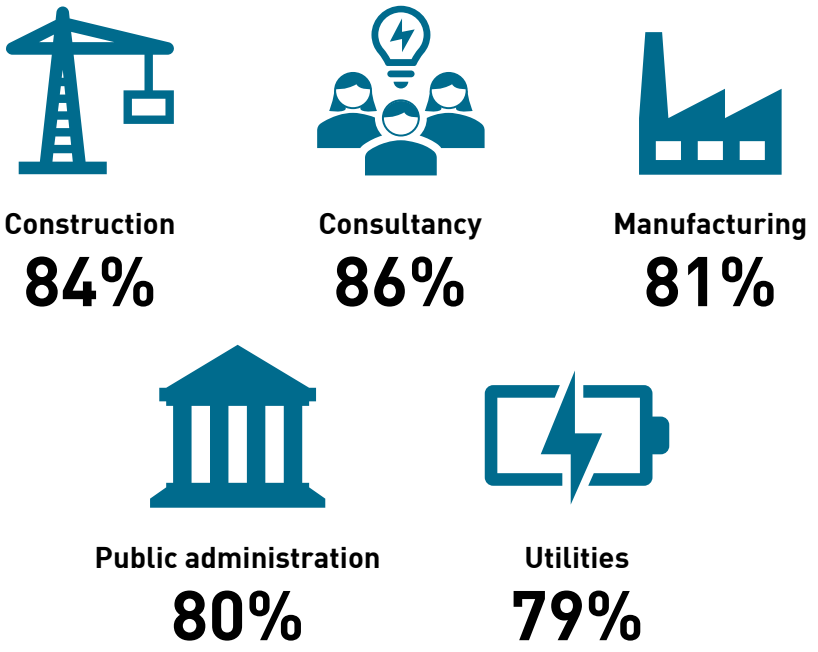


Figure 10 Agreement that there are 'plenty of jobs in engineering' by sector

Perspectives

2. Engineering perspectives

Public perception of engineering and comparison with Engineers Ireland members' perspectives

In January 2022, Engineers Ireland commissioned Behaviour & Attitudes to undertake a poll with 1,000 members of the public and representative of the Irish population aged 16 years old and over. The poll offers insight on the general perception of engineering. This poll is done yearly, but was not undertaken in 2021 due to the pandemic. The poll used the same methodology as in previous years, which enables direct comparisons. The following section of the report analyses the public's perspectives on aspects of the engineering profession.

The public was asked 'Highly competent professionals need to be able to apply expertise in their daily work. Which of the following professions do you consider to be highly competent?'

Table 7 Public opinion competent professionals

All Adults	Highly Competent
Doctors	96%
Engineers	95%
Teachers	91%
Judges	81%
The Gardaí	75%
Civil Servants	70%
Trade Union Officials	64%
Business Leaders	75%
Journalists	65%
Politicians	47%

At 95% the public demonstrate an extremely high opinion of engineers' competence, second only to doctors.

The public was also asked 'How would you assess the need to prioritise spending on the various sectors of infrastructure in Ireland? Please use a scale from 1 to 5 where 1 means very low priority and 5 means very high priority.' The public response mirrors the engineering response on the state of infrastructure in Ireland. While all sectors of infrastructure were seen as priority areas for spending, housing at 89% was clearly identified as the highest priority, followed by energy and transport.

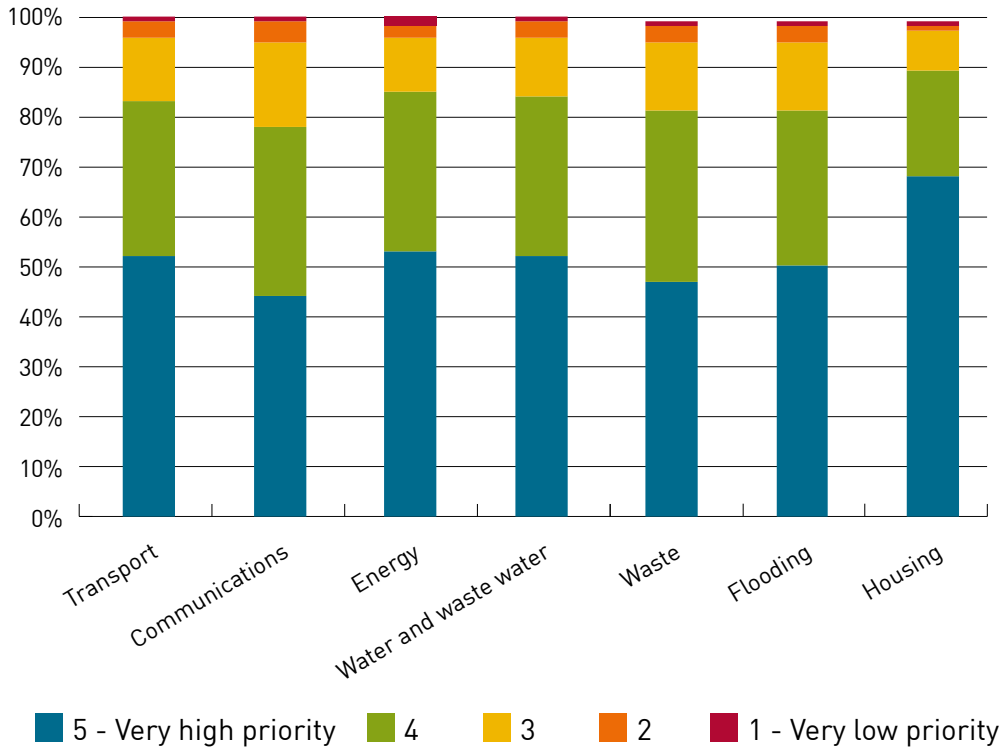


Figure 11 Public opinion on infrastructure priorities in Ireland

Engineering infrastructure in Ireland

To identify the condition and capacity of infrastructure in Ireland our members were asked if they agreed with the statement: 'Ireland's infrastructure is in good condition with capacity for future development'. 51% of our members disagreed with this statement indicating that there is a need to improve infrastructure in Ireland.

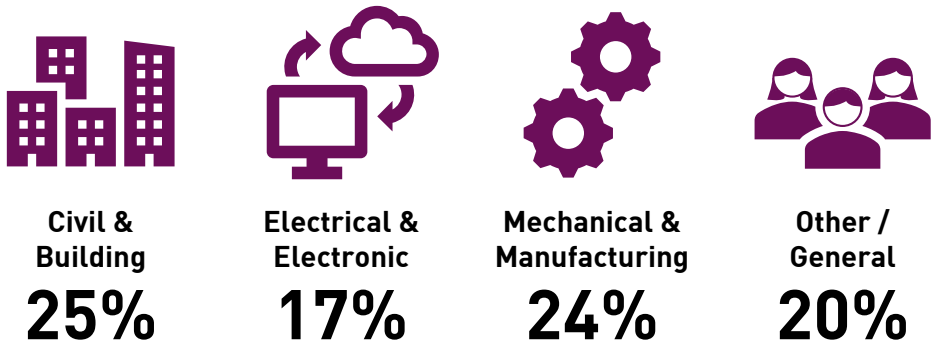


Figure 12 Agreement that 'Ireland's infrastructure is in good condition with capacity for future development' by discipline

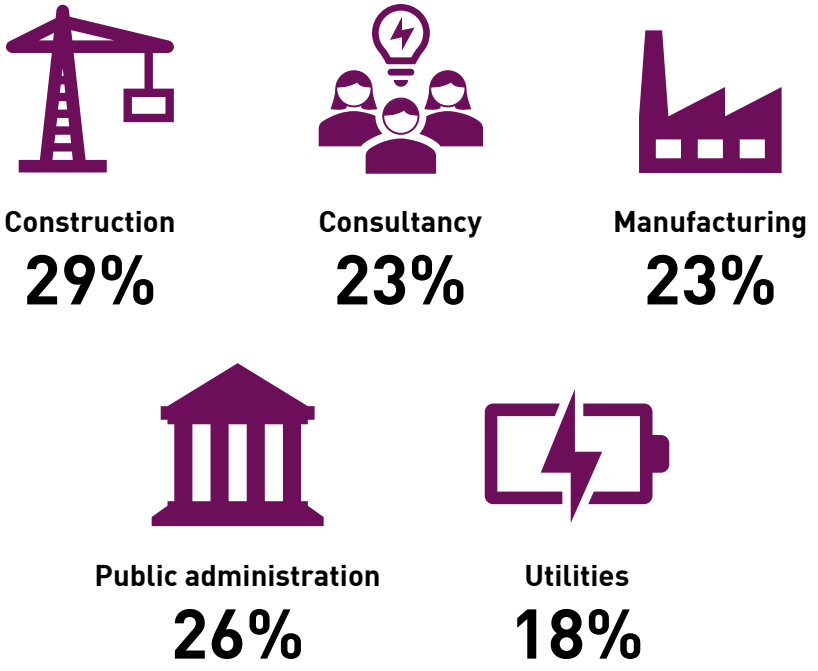


Figure 13 Agreement that 'Ireland's infrastructure is in good condition with capacity for future development' by engineering sector

To identify which areas of infrastructure that require the most attention, members were asked 'How would you grade the condition and capacity of infrastructure in Ireland in the following sectors?'

Transport

Communications

Energy

Water and waste water

Waste

Flooding

Housing

Infrastructure overall

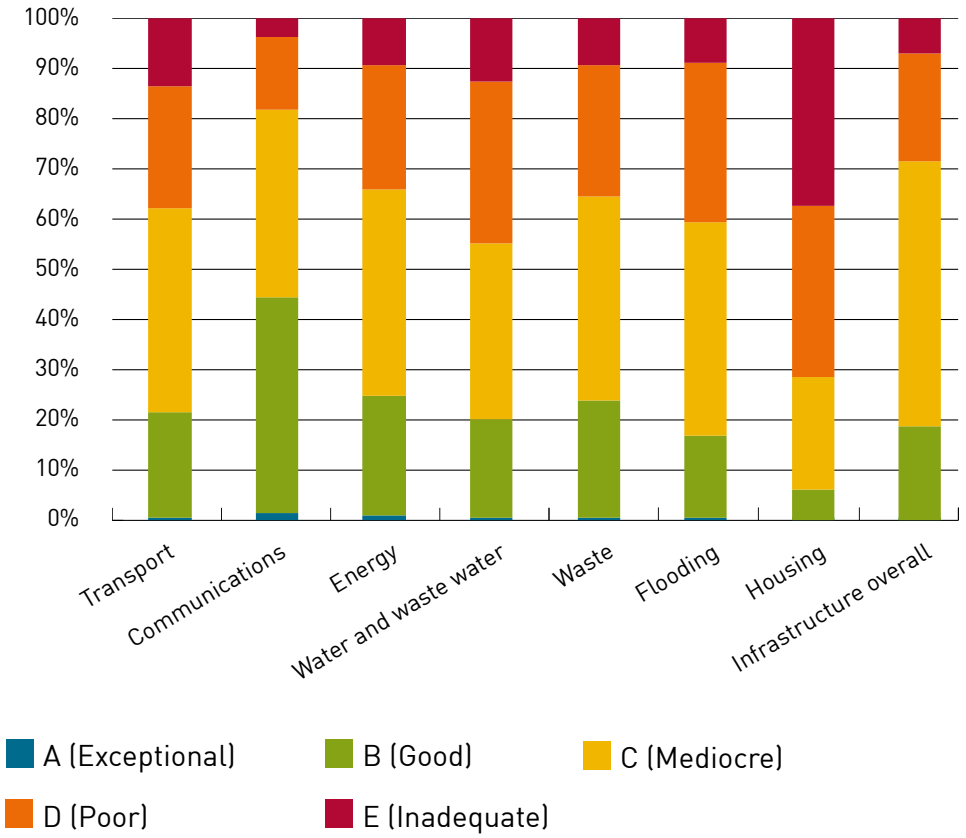


Figure 14 Engineers assessment of Ireland's infrastructure

This shows that 43% of our members believe communication infrastructure in Ireland is in good condition. Only 6% believe Ireland's housing infrastructure is in good condition, and 37% grade it as inadequate.

Digital trends during the Covid-19 pandemic have made it easier to access education and training

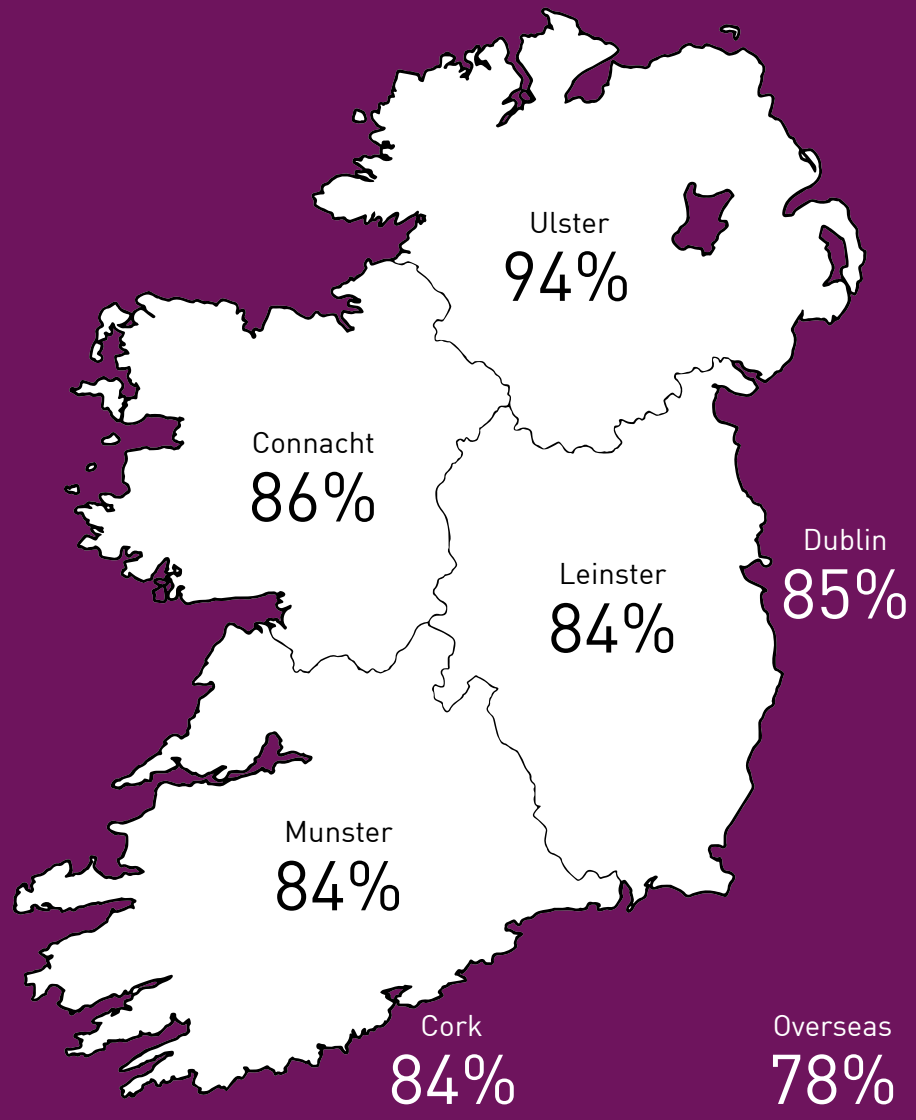
To understand how the pandemic has affected the use of digital tools, members were asked if they agreed with the statement 'digital trends during the Covid-19 pandemic have made it easier to access education and training'. The majority agree with this statement at 84%. Females agree with this more at 90%. Ulster shows the highest level of agreement with this statement at 94%.

Table 8 Breakdown on access to education and training has become easier

	Agree	Disagree	Neither
Experience			
1-2 years	82%	4%	14%
3-5 years	86%	2%	12%
6-10 years	86%	4%	11%
11-15 years	84%	2%	14%
16-20 years	85%	3%	13%
21-25 years	85%	3%	12%
26-30 years	82%	3%	15%
>30 years	81%	3%	15%
Gender			
Female	90%	2%	8%
Male	83%	3%	14%

Access to online training and education improve opportunities for people in more remote locations and people with disabilities. As can be seen by location all regions of Ireland agree that the pandemic has made it easier to access education and training, notably in Ulster with 94% agreement.

Figure 15 Agreement that Digital trends during the Covid-19 pandemic have made it easier to access education and training by location



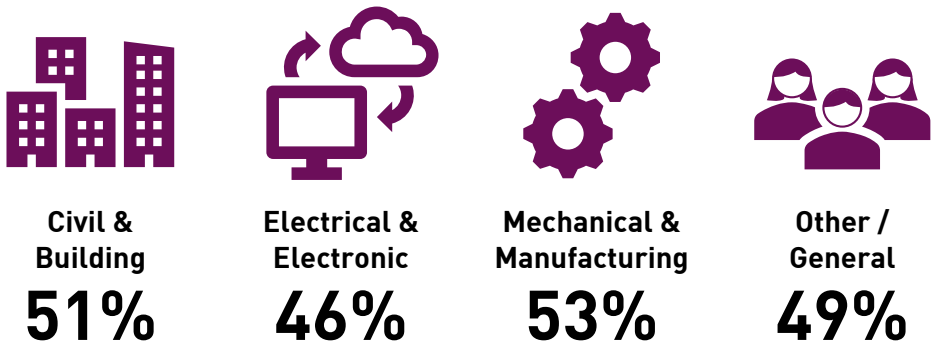
Career progression unaffected by Covid-19

In the previous 2021 Barometer Report, there was a lot of concern that Covid-19 would stall career progression. That concern has largely dissipated. In 2022 members were asked if they felt 'My career stalled as a result of the Covid-19 pandemic'. With 62% of members asked disagreeing with this statement, the impact of the pandemic has not been as bad as previously feared. The engineering sector has continued to grow through the pandemic.

Table 9 Breakdown on career stalled due to Covid-19

	Agree	Disagree	Neither
Experience			
1-2 years	11%	63%	26%
3-5 years	16%	57%	27%
6-10 years	17%	61%	22%
11-15 years	9%	67%	24%
16-20 years	11%	62%	28%
21-25 years	16%	56%	29%
26-30 years	10%	66%	23%
>30 years	10%	61%	29%
Gender			
Female	10%	62%	28%
Male	13%	62%	25%

Figure 16 Disagreement that 'career has stalled as a result of Covid-19 Pandemic' by discipline



Engineering as a career

To benchmark views on engineering as a career, our members were asked whether they agree with the statement 'engineering is a rewarding career choice for young people'. 77% of members agreed that engineering is a rewarding career, a figure which was also reflected in our public poll, where 80% agreed with the statement.

The cohort of members with the highest level of agreement was those with 1-2 years of experience. Male engineers are more likely to agree that engineering is a rewarding career choice for young people.

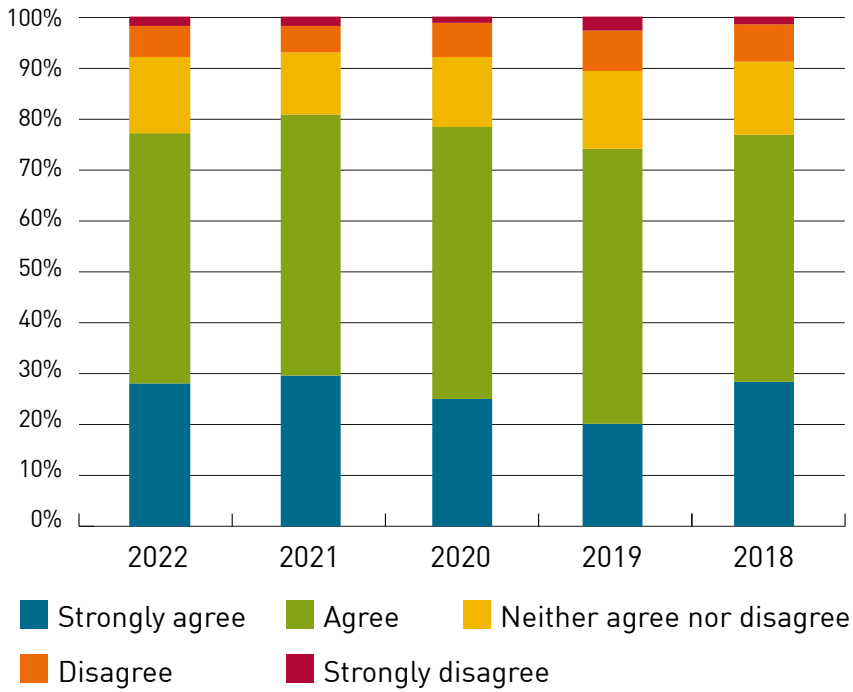


Figure 17 Engineering is a rewarding career choice for young people according to engineers

Table 10 Reported opinion that 'engineering is a rewarding career for young people'

	Agree	Disagree	Neither
Survey year			
2022	77%	8%	15%
2021	81%	7%	12%
2020	78%	8%	14%
2019	74%	11%	15%
2018	77%	9%	14%
Experience			
1-2 years	87%	1%	10%
3-5 years	76%	10%	14%
6-10 years	66%	11%	23%
11-15 years	73%	10%	17%
16-20 years	75%	8%	17%
21-25 years	84%	6%	10%
26-30 years	87%	1%	12%
>30 years	83%	7%	10%
Gender			
Female	74%	12%	15%
Male	83%	3%	14%

Engineering is more likely to be viewed as a rewarding career by mechanical and manufacturing engineers, electrical and electronic engineers, those working in manufacturing and utilities, and members based overseas and in Leinster.

Figure 18 Agreement that 'engineering is a rewarding career' by location

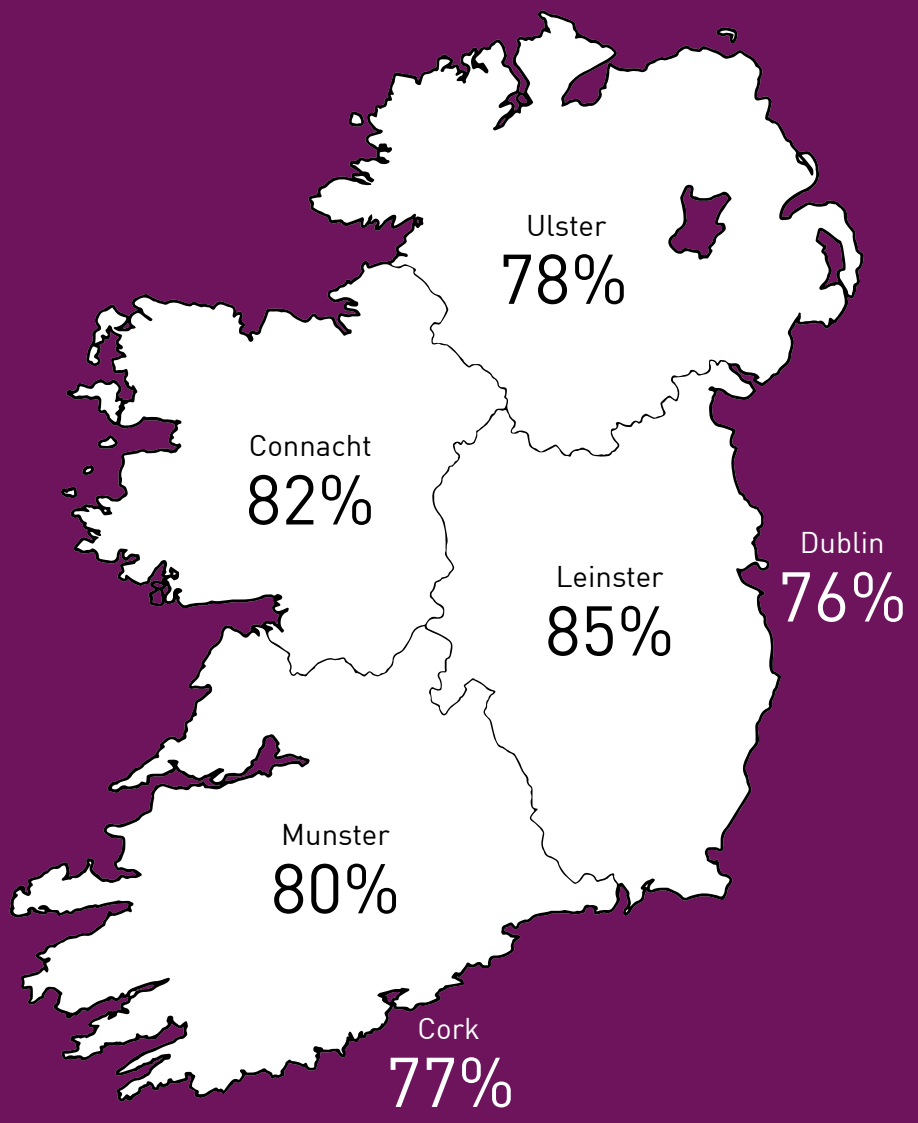


Figure 19 Agreement that 'engineering is a rewarding career' by discipline

Civil & Building
75%

Electrical & Electronic
83%

Mechanical & Manufacturing
86%

Other / General
85%

Figure 20 Agreement that 'engineering is a rewarding career' by sector

Construction
80%

Consultancy
74%

Manufacturing
86%

Public administration
78%

Utilities
86%

Does the engineering sector provide equal opportunities for men and women?

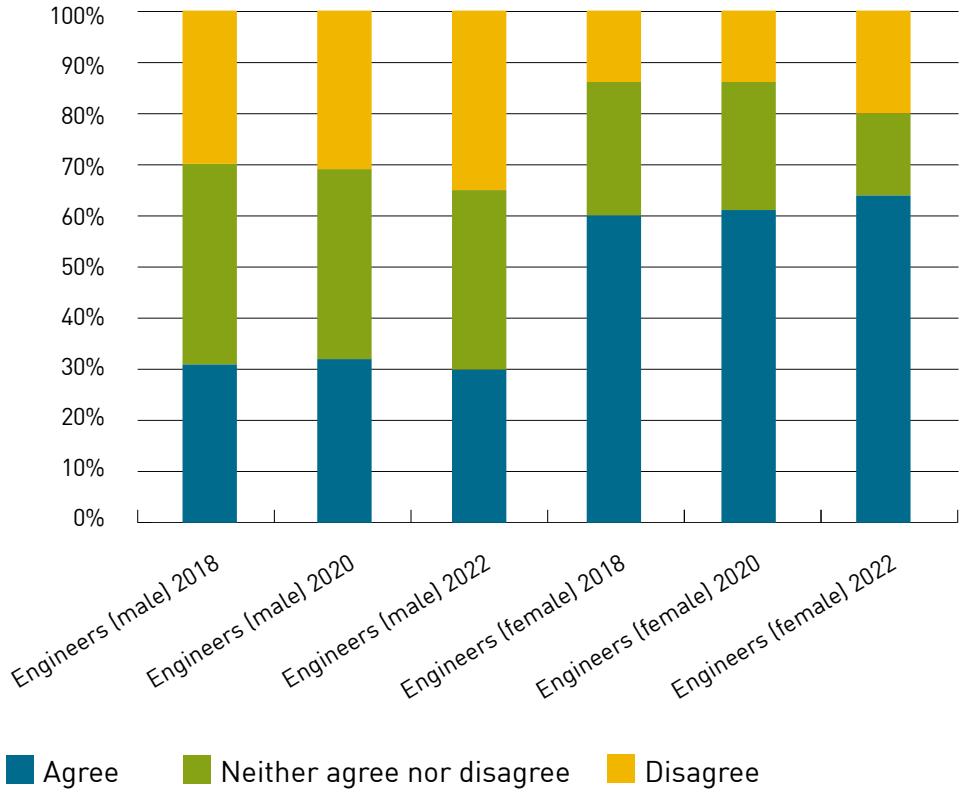
Historically there has been a large gender gap in engineering. Engineers Ireland asked the public, 'Engineering is a highly technical discipline which offers a diverse range of career choices. Do you think the profession offers better career opportunities to Men, Women, Does not matter'.

Table 11 Engineering offers better career opportunities for:

	%
Men	24
Women	2
Does not matter	74

The results of this question are encouraging with 74% of the public believing gender does not matter for career opportunities in engineering. A similar question has been posed in the members survey each year. Members were asked if they agreed with the statement: 'The engineering sector has better opportunities for men than for women'. Overall, 34% agree with this statement, with 33% disagreeing, and the remainder neither agreeing or disagreeing. However, when this was broken down by gender there is a noticeable difference with 64% of female engineers agreeing that there are better opportunities for men. This difference in opinion between genders is reflected in previous years also.

Figure 21 Do you agree with the statement: The engineering sector has better opportunities for men than it does for women by gender




Education

3. Engineering education

Leaving Certificate

Data obtained from the SEC (State Examinations Commission), shows that the number of students sitting exams in STEM subjects at higher level increased by 5% (Table 12), while the overall number of students sitting the Leaving Certificate decreased by 4%. Compared to 2020, there were strong increases in the number of students taking higher level subjects related to engineering and construction, including mathematics (+2396), construction studies (+556), physics (+178) and technology (+111). As the number of students studying STEM subjects at higher level in recent years increased, there were corresponding decreases at ordinary level (Table 13).

101,306 Leaving Certificate higher level STEM sittings

*Note: The Leaving Certificate subject 'engineering' is the study of a range of mechanical engineering materials, processes and technological applications. It is not a requirement for entry to engineering at third level, which is much broader in scope.

Table 12 Number of students sitting Higher level STEM subjects for the Leaving Certificate

Subject	2017	2018	2019	2020	2021	Year-on-year	5 year trend
Biology	26,684	26,543	27,063	29,575	30,677	4%	+22%
Mathematics	16,395	16,837	18,153	20,522	22,918	12%	+51%
Chemistry	8,162	7,943	8,244	8,689	8,794	1%	+15%
Construction Studies	7,451	7,105	7,896	8,568	9,124	6%	+29%
Agricultural Science	6,376	6,543	6,605	7,371	7,553	2%	+20%
Physics	6,271	6,258	6,583	7,032	7,210	3%	+20%
Engineering*	4,586	4,668	4,765	5,327	5,555	4%	+24%
Design & Communication	4,445	4,480	4,566	4,721	5,010	6%	+15%
Applied Mathematics	1,869	1,826	1,988	2,115	2,276	8%	+19%
Technology	1,367	1,430	1,685	1,696	1,807	7%	+45%
Physics & Chemistry	481	415	464	461	382	-17%	-13%
Total STEM sittings	84,087	84,048	88,012	96,077	101,306	+5%	+27%

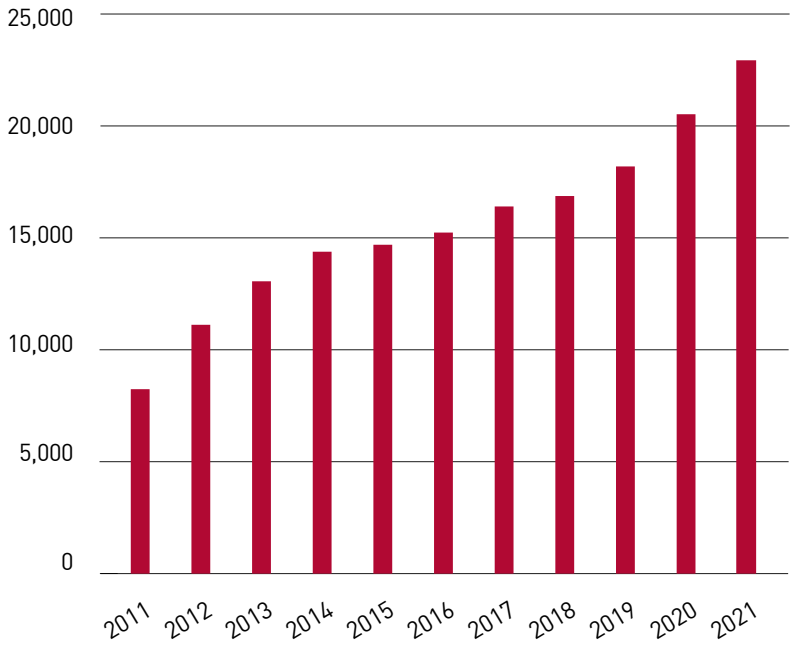


Figure 22 Number of students sitting higher level mathematics for the Leaving Certificate

The take-up of higher-level maths continues to go from strength to strength; the number of students taking this paper has increased to 22,918, an increase of 12% on 2020 and more than double (178%) since 2011 (Figure 22). Today, 41% of mathematics students take the subject at higher level, up from 18% in 2011.

Table 13 Number of students sitting ordinary level STEM subjects for the Leaving Certificate

Subject	2017	2018	2019	2020	2021	Year-on-year	5 year trend
Mathematics	32,334	31,336	31,474	33,862	32,320	-5%	-1%
Biology	7,608	7,006	7,046	5,270	4,211	-20%	-53%
Physics	1,314	1,277	1,359	1,060	778	-27%	-56%
Chemistry	1,306	1,224	1,262	966	857	-11%	-40%
Construction Studies	1,299	1,143	1,114	1,144	1,003	-12%	-32%
Agricultural Science	1,284	1,237	1,140	1,130	915	-19%	-44%
Design & Communication	1,130	913	1,025	926	856	-8%	-27%
Engineering	689	586	650	779	691	-11%	-22%
Technology	160	104	176	161	153	-5%	-11%
Physics & Chemistry	110	103	74	69	57	-17%	-59%
Applied Mathematics	100	128	116	67	40	-40%	-77%
Total STEM sittings	47,334	45,057	45,436	45,434	41,881	-8%	-17%

Third level education

Engineering is a core discipline in many of our Higher Education Institutions in Ireland. In 2022 the CAO has 213 engineering related courses listed in Ireland (2). Just over 58% of the courses are set at level 8 courses, and the remainder split over level 6 and 7. This shows that engineering is a highly skilled profession with required expertise on multiple levels.

HEA (Higher Education Authority) data (3) shows that in 2020 there were 245,663 students in third level education in Ireland, with 11% of that total studying engineering, manufacturing and construction programmes at 27,882. See table 14 below for broad fields of study.

Table 14 HEA data of broad fields of study in Ireland

	New entrants	Part time	Existing	Total
Engineering, manufacturing and construction*	11%	13%	11%	11%
Agriculture, forestry, fisheries and veterinary	2%	0%	2%	2%
Arts and humanities	21%	6%	16%	15%
Business, administration and law	19%	28%	19%	21%
Education	5%	11%	6%	7%
Generic programmes and qualifications	1%	3%	1%	1%
Health and welfare	15%	17%	18%	17%
Information and communications technologies	6%	6%	7%	6%
Natural sciences, mathematics and statistics	11%	5%	11%	10%
Services	4%	5%	4%	4%
Social sciences, journalism and information	6%	5%	6%	6%

*Note: The category 'engineering, manufacturing and construction' is a broad category including numerous courses, some of which may not be eligible for Engineers Ireland membership.

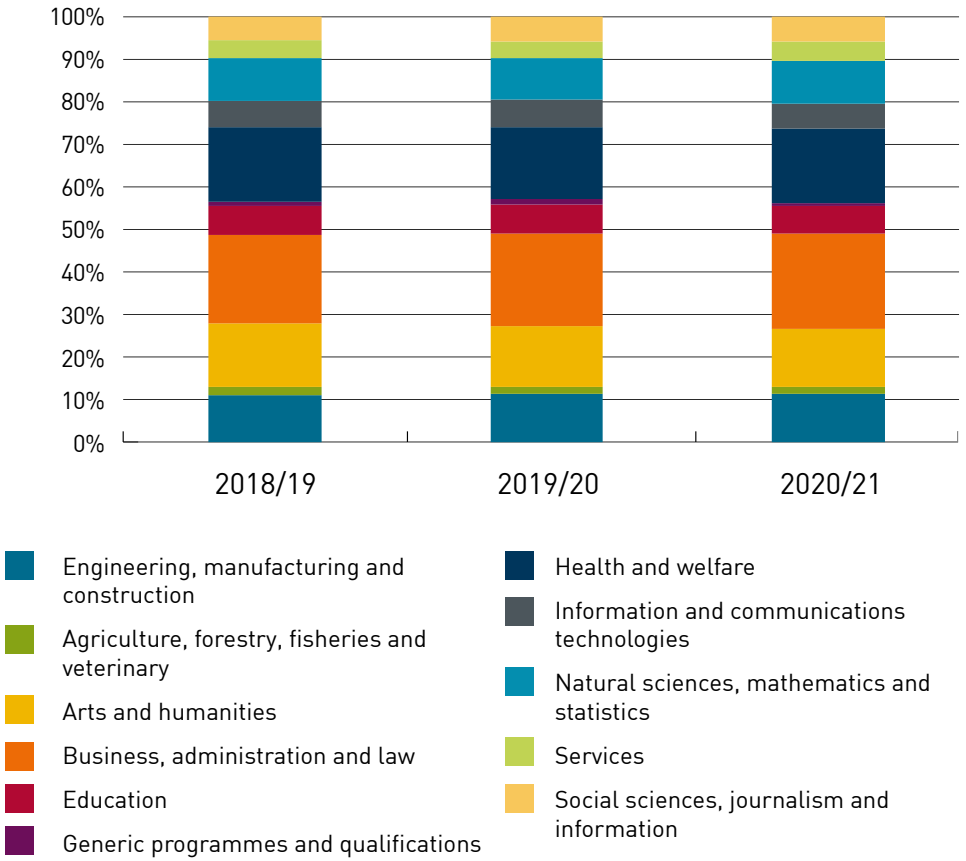


Figure 23 Student data of broad field of study breakdown

Engineers Ireland is actively involved with Higher Education Institutions all over Ireland, with almost 7,000 student members spread throughout the island of Ireland.

Table 15 Higher Education Institutions with the largest numbers of Engineers Ireland student members

1	University College Dublin
2	University of Limerick
3	Trinity College Dublin
4	NUI Galway
5	Galway-Mayo IT
6	Technological University Dublin (TU Dublin)
7	Cork IT
8	Dublin City University
9	University College Cork
10	University of Ulster

Table 16 Engineers Ireland division of student members by gender

Male	79%
Female	20%
Other	1%

Third level engineering programmes have historically had limited gender diversity. This aligns with HEA data on graduating students, which shows 22-23% of graduating engineers are female.

Table 17 Graduating Engineers by gender

	2018	2019	2020
Female	22%	23%	23%
Male	78%	77%	77%
Other	0%	0%	1%

Promotion of STEM subjects

Engineers Ireland has been active in the promotion of STEM (Science, Technology, Engineering and Maths) for many years and is committed to developing an appreciation for STEM subjects amongst young people through our STEPS programme.

Engineers Ireland supports the ongoing work set out by the Department of Education in its STEM Education Implementation Plan 2022-2026. In response to a consultation on this plan held in January 2022, Engineers Ireland noted that the application of STEM impacts positively on every level of our society. Design–led engineering solutions benefit communities and families in every aspect of everyday life including health, leisure, work and transport. Engineering is a highly diversified profession with a wide range of specialisms emerging as new technologies, business models and engineering challenges develop.

Additionally the application of STEM is key to addressing the global challenges we face such as the climate crisis and biodiversity loss, and pandemics such as Covid 19. These challenges, however difficult, create opportunities for students, teachers and the wider public to consider and engage with STEM. To this end, Engineers Ireland would like to see learning environments, which embrace the complexity of such challenges, encourage critical thinking, and problem solving. Real-world applications of STEM should continue to be strongly encouraged in student learning and assessment, initial teacher education and in teachers'continuing professional development.


Engineers
Week

Engineering and Sustainability

4. Engineering and sustainability

In 2020, Engineers Ireland declared a Climate and Biodiversity Emergency and published a Sustainability Framework consisting of 16 actions under the headings Learn-Live-Lead-Link. Engineers Ireland is committed to addressing the climate emergency and has developed a Sustainability Plan. When members were asked 'Were you aware of Engineers Ireland's commitment to sustainability?', 55% of the members replied that they were already aware of Engineers Ireland's commitment to sustainability.

Engineers Ireland in parallel to the implementation of this Sustainability Plan has set up four cross sectoral working groups with our members focusing on key topics, including sustainability.

- Sustainability
- National recovery
- Standards
- Digital future

To achieve Ireland's carbon goals of a 51% reduction in the carbon budget by 2030 when compared to 2018, all engineers in Ireland will need to be aware of this commitment to sustainability, and major innovations will be required at all levels.

In our public poll, 72% of people agreed with the statement 'Engineers are critical to combating climate change and biodiversity loss'. This clearly shows that the public expect engineers to play a key role in tackling the Climate and Biodiversity Emergency.

Engineers Ireland's Sustainability Plan 2022-2023 was released 4 March 2022.

The report is available as a Engineers Ireland member benefit, available to download from www.engineersireland.ie

Table 18 Public opinion on statement that 'Engineers are critical to combating climate change and biodiversity loss'

	Agree	Disagree	Neither
Age			
16-24	74%	7%	19%
25-34	73%	5%	22%
35-49	73%	4%	24%
50-64	74%	5%	20%
65+	67%	6%	27%
Gender			
Female	70%	4%	26%
Male	74%	6%	19%
Location			
Dublin	73%	2%	25%
Leinster	71%	9%	20%
Munster	75%	4%	20%
Conn/Ulster	69%	5%	26%

Engineers Ireland asked a sample of our members 'What should Engineers Ireland focus our sustainability efforts on', with 872 open responses a word cloud was generated (Figure 25). This shows the two major areas of focus are energy and transport.

Figure 25 Word cloud of open responses on where Engineers Ireland should focus its sustainability effort

Conclusion

6. Conclusion

Engineering employment

Engineering has proven to be a robust profession throughout the pandemic and has continued to grow helping to sustain our economy and society.

Salaries have increased in all disciplines of engineering consistently each year. The number of years of experience is still the largest factor in terms of salary, with professional titles like CEng also being a significant marker. The largest salary increase is seen in those with 3-5 years of experience.

There are plenty of job opportunities in engineering in Ireland according to 84% of our members. This is the highest level ever recorded by Engineers Ireland, showing the strength of Ireland's engineering sectors post-pandemic.

Hybrid working has been demonstrated to be feasible for most engineers, due to the societal changes enforced by the pandemic. For the majority of engineers, the working week dropped from the standard 5 days a week in the office, to a fully remote environment. The general preference post-pandemic is for two or three days a week in the office, with one day working on site and the rest working from home. This flexibility will benefit work life balance and will also likely widen and deepen the talent pool for companies.

Engineering perspectives

Ireland's infrastructure overall needs improvement with opportunities to develop in many areas. When engineers were asked if they agreed with the statement that Ireland's infrastructure was in good condition, 51% disagreed. Housing was identified as a priority area by both engineers and the wider public.

Digital trends during the Covid-19 pandemic have made it easier to access education and training. The majority agree with this statement at 84%, and 90% of female engineers agree.

It was feared that the pandemic would stall careers but when asked the majority at 62% disagree with this statement, demonstrating the resilience of the engineering sector in Ireland.

The statement "Engineering is a rewarding career choice for young people" received 77% agreement from our members and 80% agreement from the public. This high level of agreement has been consistent over the past 5 years.

Historically there has been a large gender gap in engineering, but when asked in the public poll, 74% agreed that it doesn't matter if you are male or female regarding career opportunities in engineering. However, people working in engineering are more divided, with a third agreeing that men have better opportunities and a third disagreeing, with the last third undecided. When this response is broken down by gender, 64% of females believe men have better opportunities. Efforts must continue to increase diversity and reduce unconscious biases.

Public perception of engineering is very positive, with 95% of the public viewing engineers as "Highly Competent", second only to doctors.

Engineering education

Leaving certificate choices have shown a growing trend of engagement in STEM subjects over the past 5 years, increasing by 27%. Since 2011 there has been a 178% increase in students sitting higher level mathematics. This is very encouraging for the development of future engineers.

Engineers Ireland is actively engaged with our Higher Education Institutions with almost 7,000 student members.

To ensure strong future participation in STEM subjects Engineers Ireland takes action through advocacy campaigns such as the STEPS programme. This directly engages with about 150,000 young people each year. Engineers Ireland is also very supportive of the Department of Education's STEM Education Implementation Plan 2022-2026.

Engineering and sustainability

Engineers are critical to combating climate change and biodiversity loss according to 72% of the public. In 2020, Engineers Ireland declared a Climate and Biodiversity Emergency and generated a Sustainability Plan. This plan is focused around 4 key pillars, Learn-Live-Lead-Link. In parallel to this plan Engineers Ireland has set up four separate cross-sectoral groups with our members focusing on the topics of:

- Sustainability
- National recovery
- Standards protect Society
- Digital future

When our members were asked what key areas of focus Engineers Ireland should have when combatting the climate crisis, energy and transport were identified as the two most important areas.

5. References

1. Gartner. [Online] https://www.gartner.com/doc/reprints?id=1-26I099M5&ct=210614&st=sb.
2. CAO. [Online] http://www.cao.ie/courses.php?bb=courses.
3. Authority, Higher Education. [Online] https://hea.ie/statistics/data-for-download-and-visualisations/enrolments/2018-19-enrolment-data-pivot/.

Engineers Ireland member survey

The Engineers Ireland member survey was conducted online between 21 January – 8 February 2022. There were 2,260 responses, of which 87% were men and 13% were women. The breakdown of the sample according to experience was: 1-2 years (5%), 3-5 years (9%), 6-10 years (19%), 11-15 years (17%), 16-20 years (14%), 21-25 years (11%), 26-30 years (10%) and 30+ years (15%). The breakdown of the sample according to membership type / professional title was: untitled Member (49%), Chartered Engineer (42%), Fellow (5%) and other/student/non-member (4%). A full Engineers Ireland Salary Survey 2022 report is available to Engineers Ireland members and can be downloaded from the members' area of www.engineersireland.ie.

Public survey

The public survey was conducted face-to-face by Behaviour & Attitudes in early 2022. 1,000 adults (aged 16 and over), statistically representative of the adult population in Ireland (in terms of age, gender, region and socio-economic class), were polled at randomly chosen sampling points. For more information, see www.banda.ie/techniques/barometer/

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