

September 2020

Building Future Skills

The Demand for Skills in Ireland's
Built Environment Sector to 2030



National Skills Council



Expert Group on
Future Skills Needs

> Table of Contents

Acknowledgements	v
Introduction to the Expert Group on Future Skills Needs	vi
Foreword	vii
Executive Summary	x
1 Introduction	1
1.1 The Rationale of the Study	3
1.2 Why focus on the Construction/Built Environment Sector?	3
1.3 Methodology	4
1.4 Scope of the Evaluation	4
1.5 Structure of the Report	5
2 Understanding the Sector	6
2.1 Definition of Construction/Built Environment	8
2.2 Built Environment Enterprise Data	9
2.3 Construction Enterprises by Size	9
2.4 Built Environment Output	14
2.5 Built Environment Gross Added Value (GVA)	16
2.6 Conclusion	17
3 Understanding the Skills	18
3.1 Introduction	19
3.2 Industry Employment	20
3.3 Age Profile	21
3.4 Women in the Built Environment sector	22
3.5 Identification of Key Occupations	23
3.5.1 Core Skills of the Built Environment Sector	25
3.5.2 Niche Skills of the Built Environment Sector	26
3.6 Emerging Occupations	28
3.6.1 Emerging Skills within Occupations	30
3.7 Skills Shortages	31
3.8 Conclusion	35
4 Learning from the Past	36
4.1 Introduction	37
4.2 Measures to Boost Skills Supply	37
4.2.1 Apprenticeships	38
4.2.2 Higher Education Courses	39
4.2.3 Industry Attractiveness: Career Pathways	39
4.2.4 Industry Attractiveness: Opportunities for women	41
4.2.5 Migration	42
4.3 Measures to Align Training Provision with Industry Needs	43
4.3.1 Review of Built Environment Skills Needs	43
4.3.2 Increase Industry Participation in Skills Planning	45
4.4 Measures to Diversify Trade	46
4.5 Measures to Boost Productivity and Innovation	46
4.5.1 Innovation in Management	47
4.5.2 Digitalisation	47
4.6 Conclusion	48

5	Preparing for the Future	49
5.1	Introduction to the “PESTLE” Approach	51
5.2	Political	52
5.3	Economic Drivers of Built Environment Skills	56
5.4	Social Drivers of Built Environment Skills	59
5.5	Technology Drivers of Built Environment Skills Change	63
5.6	Legal Drivers of Built Environment Skills Change	67
5.7	Environmental Drivers of Built Environment Skills Change	69
5.8	Perspectives from Industry	72
5.9	Conclusion	75
6	Measuring the Skills Gap	76
6.1	Introduction	78
6.2	Labour Demand	78
6.3	Skills Demand	80
6.4	Skills Supply	83
6.4.1	Existing Workforce	83
6.4.2	Craft apprenticeship training	91
6.4.3	Higher Education Supply	94
6.4.4	Unskilled/Semi-Skill Labour	96
6.5	Annual Requirements	97
6.6	Skills Supply – Perspective from Industry Interviews	100
6.7	Conclusion	101
7	Closing the Skills Gap	102
7.1	Introduction	103
7.2	Overview of International responses to Construction Sector Skills Challenges and Opportunities	103
7.2.1	New Zealand	103
7.2.2	Singapore	105
7.2.3	United Kingdom	107
7.3	Workshops	110
7.4	Stakeholder and Enterprise Interviews	113
7.5	Summary of Feedback	115
7.6	Conclusion	117
8	Recommendations	118
Appendix I.	Terms of Reference for Study	134
Appendix II.	Members of the Steering Group	140
Appendix III.	Members of the Expert Group on Future Skills Needs	141
Appendix IV.	Glossary of Terms	142

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Special thanks are also due to the many industry executives, academics and staff at expert organisations and State agencies who gave their valuable time and insights through interviews and at workshops.

The Expert Group on Future Skills Needs would also like to acknowledge the high quality and expertise of AECOM Ireland Limited whose work included the literature review, the undertaking of consultations and workshops with companies, organisations and key informants, and the modelling of the skills demand forecasts contained in the report, as well as the integration of the various research elements into the final report.

> Introduction to the Expert Group on Future Skills Needs

The Expert Group on Future Skills Needs (EGFSN) advises the Irish Government on the current and future skills needs of the economy and on other labour market issues that impact on Ireland's enterprise and employment growth. It has a central role in ensuring that labour market needs for skilled workers are anticipated and met.

Specifically, the EGFSN:

- Carries out research, analysis and horizon scanning in relation to emerging skills requirements at thematic and sectoral levels. Steering Groups comprising of experts from relevant enterprise sectors and the education and training sector may oversee sectoral research studies to be undertaken or commissioned by the EGFSN. Drawing on statistical input and analysis from the SLMRU and consultation with the enterprise/education experts as part of the study, draft reports setting out the projected needs are prepared by the EGFSN.
- Engages with the HEA, SOLAS, QQI, the Regional Education Fora, education and training providers in the course of its research.
- Engage with DES, HEA, SOLAS and other relevant bodies to produce agreed action plans to address the skills needs identified.
- Submits the findings of its research and agreed Action Plans to the National Skills Council prior to publication.
- Disseminates its findings to the Regional Skills Fora and other relevant groups.

The Enterprise Strategy, Competitiveness and Evaluations Division within the Department of Enterprise, Trade and Employment provides the EGFSN with research and analysis support.

> Foreword

This Expert Group on Future Skills Needs report seeks to support the Built Environment sector in delivering on its critical role in meeting housing, infrastructural and climate change mitigation needs across Ireland over the coming decade.



Prior to the emergence of the Covid-19 pandemic, the Built Environment sector had recovered strongly from the downturn it suffered during the global financial crisis of 2008-10. An even higher demand for its services in the coming years was anticipated through the implementation of national policies such as the *Project Ireland 2040*, *Action Plan on Housing and Homelessness*, and the *Climate Action Plan*, as well as broader private sector construction activity in the context of strong growth across the Irish economy. While many uncertainties are still associated with the impact of Covid-19 on Ireland's economy, the needs set out in these national strategies - for housing and infrastructural development, as well as retrofitting and built environment energy efficiency - will be critical throughout the coming decade and impose consistent demands on the Built Environment sector and its pool of skills.

This is in a context where the sector has found it challenging to attract a pipeline, and a level and diversity, of talent consistent with the demands it faces. The legacy of the 2008-10 downturn is still keenly felt in terms of enterprise structure, employer recruitment and investment in, and facilitation of, workforce development, as well as structural gaps at middle and senior management level. Efforts to address productivity shortfalls through the integration of new technologies and the built environment's role in climate change will also require the embedding of new competencies across built environment education and training programmes. The reskilling and upskilling of the existing workforce will also be necessary to ensure a more digitalised, efficient and climate neutral built environment sector.

Building Future Skills, the development of which involved comprehensive engagement with Irish built environment stakeholders, as well as insights drawn from the international experience of the sector, analyses the following: the current structure of the Irish sector; its skills base; existing education and training and labour supply interventions; international best practice in Built Environment skills development; and a range of broader issues related to the enhancement of skills development.

On the basis of this analysis, as well as a quantitative occupational forecast of future skills needs within the sector, this report makes nine overarching recommendations, with further detailed sub-recommendations, for the development of the skills required to deliver on critical housing, infrastructural and energy efficiency needs over the next ten years. I would urge the National Skills Council, as well as built environment stakeholders across the public and private sectors, to consider these recommendations and facilitate their implementation.

On behalf of the EGFSN I would like to thank all of the contributors to this report who so generously gave of their time and expertise. I would also like to express my thanks to the members of the project Steering Group, in particular its chair, Caroline Spillane, for their insights and support in finalising the report. Finally, I wish to acknowledge the EGFSN Secretariat, based in the Department of Enterprise, Trade and Employment, for managing and leading this study to a successful conclusion.

Tony Donohoe

Chairman

Expert Group on Future Skills Needs

> Built Environment Skills in a Nutshell



205,400

EMPLOYED IN BUILT ENVIRONMENT SECTOR AT THE END OF 2019

INCLUDES THOSE WORKING IN COMPANIES SPECIALISING IN:
CONSTRUCTION, ARCHITECTURE
ENGINEERING SERVICES AND UTILITIES



13

CORE OCCUPATIONS



17

NICHE OCCUPATIONS



20

GROWING IN IMPORTANCE



LABOUR NEEDS LINKED TO POPULATION AND PRODUCTIVITY GROWTH



INDUSTRY GROWTH AND EMPLOYMENT IS HIGHLY VOLATILE

CORE OCCUPATIONS INCLUDE

CARPENTERS AND JOINERS

12,630

ELECTRICAL AND ELECTRICAL FITTERS

10,985

ELEMENTARY CONSTRUCTION OPERATIVES

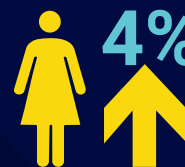
9,708

CONSTRUCTION AND BUILDING TRADES N.E.C

7,826

PLUMBERS AND BUILDING TRADES N.E.C

7,245



4%

OF EMPLOYEES IN CORE OR NICHE OCCUPATIONS ARE WOMEN



CURRENT EMPLOYMENT LEVELS ARE SUSTAINABLE ACCORDING TO 2030 ESTIMATES



ADDITIONAL EMPLOYMENT IS NEEDED IN THE SHORT-TERM

> Executive Summary

The built environment sector involves a diverse range of activities along a chain from planning to completing and maintaining or renovating built structures and infrastructural developments. Jobs and occupations range from planners, architects and engineers, to construction firms, tradespeople, specialist utility providers, retrofitters, technicians, ecologists, landscapers and specialised supporting staff in legal and administrative capacities. It is also very diverse in terms of the size and scale of companies within the sector. While there is a high rate of self-employment and micro-enterprises, particularly among skilled tradespeople, these companies tend to be less productive (in Gross Value Added terms) and less profitable than larger construction enterprises.

This range of activities means that a large variety of skills are required within the built environment sector, many of which are very specific to the sector. Built environment occupations can be split into two categories: 'core' and 'niche' occupations. Core occupations make up the majority of frontline staff, while niche occupations consist of those with more specialised trade, support and managerial skills. Overall, this study has identified thirteen core occupations, which make up 55 per cent of employment in the sector and includes occupations such as carpenters, electricians and architects. There are seventeen niche occupations, which make up 10 per cent of employment in the sector and include floorers, roofers and crane operators. The remaining 35 per cent comprise of more general occupations which support the activities of the sector, such as accountants or administrative support staff. A further range of emerging occupations have also been identified which, although small, have exhibited large growth in recent years.

The built environment sector is highly cyclical, and employment in the sector fell significantly following the late-2000s recession. In the years that followed, many workers left the sector due to unemployment, emigration, retirement, or leakage to other sectors. With a limited number of new entrants over this period, many occupations faced skills shortages as the economy recovered. Other structural factors, such as the ageing of the workforce, particularly amongst tradespeople and the very low rate of female participation in the industry, present challenges in terms of addressing skills shortages.

Several measures that were undertaken in the past were identified, aimed at either boosting skills supply, aligning training provision with industry needs, diversifying trade, or boosting productivity and innovation. The effectiveness of such measures was considered in the recommendations made as part of this study.

The skills requirements over the next decade will be influenced by the future outlook for the industry. This report brings together perspectives from a series of interviews and workshops with sector enterprises and key stakeholders, which were undertaken between January and April 2020- but largely prior to the lockdown measures introduced in the Irish economy in response to the Covid-19 pandemic in late March 2020. It was found that the overall ten-year outlook is largely driven by

political and economic factors. As a highly cyclical industry, the built environment sector is subject to fluctuations in the economic cycle, meaning that public investment was viewed as an important stabiliser for construction demand and employment. Although national policies such as Project Ireland 2040 and the Climate Action Plan are seen to provide increased certainty by outlining the priorities and a pipeline of work for public sector and retrofit investment, economic factors and the cyclical nature of the industry continue to overshadow this future outlook. The impact of COVID-19 on the sector and the economy will only add to this uncertainty.

In terms of the skills that will be required in the next decade, many are the same as those required now in 2020. However, changing technological and environmental factors, such as the increasing importance of Building Information Modelling (BIM) techniques and recent regulations around Nearly Zero-Energy Buildings (NZEB), create a need for additional upskilling and retraining in order to allow the sector to respond to these trends. The transformation of the sector away from physical labour will continue, although the perception of the industry as being physically demanding is considered a deterrent for attracting new entrants into the sector. This study repeatedly uncovered a perspective that the image of the sector needs to be altered. Although this will not happen in a short timeframe, it is imperative to ensure greater participation of women in the industry and to highlight the opportunities that the sector offers, in terms of building a sustainable future.

There is an increasing emphasis on infrastructure in the narratives of future scenarios – particularly water and digital infrastructure, and a number of projects to complete the road network infrastructure, but with an increased emphasis on commuter infrastructure. There is a discernible shift in attention to mitigating the effects of climate change, with a particular focus on the built environment, on power generation and the energy use in the built environment. Advances to date integrating technology and sustainability are considered relatively small. These incremental steps will likely accelerate over the next ten years as a response to energy use and the imperative to adapt to changing climate conditions. It is not clear whether this will be evolution or revolution, the continuation of gradual long-term changes or a step-wise reform of current practice.

Given this changing environment, there are challenges in preparing accurate forecasts for the built environment sector. The approach of this study was to undertake a thorough analysis of past trends, identify a number of important factors that have an impact on how the future looks for the sector while assessing the levels of uncertainty about the assumptions or perspectives on what the next decade will hold. Thereafter, high medium and low scenarios for the future of the sector were generated, using econometric modelling. As with any scenario modelling, it is acknowledged that these are at best 'informed estimates' of the skills requirements in the sector, and are contingent upon a set of assumptions about the future which it is impossible to verify. Also acknowledged are the many known-unknowns that will impact the sector, for example, COVID-19 and its impact on the level and demand and mix for built environment activities across the private and public sectors. However, the modelling confirms that population changes are highly correlated with demand in the built environment sector.

Three scenarios were developed for built environment sector employment until 2030 using low, central and high population projections. These sector forecasts are shown in Table 1 below, along with actual employment data from the fourth quarter of 2019.

Table 1: Built Environment Employment 2019 with 2030 Estimates				
	December 2019	Central Forecast	Upper Bound	Lower Bound
Built Environment Employment	205,400	202,943	281,060	124,795
Percentage of total labour force	9%	7.5%	10%	4.5%

Up until 2020, there was strong growth in the sector, with high levels of demand and construction tender price inflation. Based on the long-term central growth scenario, it appears that current levels of employment and entry into the industry are largely satisfactory. This is caveated by the cyclical nature of the industry, which can lead to extreme fluctuations in employment at any given point in time based on the underlying economy.

Based on the three growth scenarios and taking into account employment attrition rates within the sector, the estimates for annual new entrants with 'core' and 'niche' skills for built environment occupations are shown in Tables 2 and 3. Although the overall central estimate figures for the numbers that would be employed in the sector in 2030 are not significantly greater than the figures employed currently in 2020, the outlook from within the industry itself on its ability to meet this level of employment is pessimistic – particularly with the challenges of attracting new entrants into trades, and given that the changes in contracting and procurement do not incentivise or facilitate firms to take on apprentices.


Table 2: Estimates of Annual Requirements to 2030 of New Entrants with 'Core' Skills

Classification	Occupation	Central Forecast	High Population Growth	Low Population Growth
Core Built Environment Skills	Carpenters and joiners	482	1,430	-194
	Electricians and electrical fitters	419	1,244	-169
	Elementary construction occupations	497	1,459	-22
	Construction and building trades n.e.c.	268	799	-151
	Plumbers, heating and ventilating engineers	243	724	-145
	Architects	260	730	-77
	Painters and decorators	195	579	-93
	Civil engineers	210	587	-42
	Production managers and directors in construction	134	378	-61
	Plasterers	115	343	-68
	Construction operatives n.e.c.	178	523	-3
	Bricklayers and masons	125	373	-55
	Mobile machine drivers and operatives n.e.c.	151	440	33
	Core Skill Subtotal		3,278	9,610


Table 3: Estimates of Annual Requirements to 2030 of New Entrants with 'Niche' Skills

Classification	Occupation	Central Forecast	High Population Growth	Low Population Growth
Niche Built Environment Skills	Floorers and Wall Tilers	80	237	-34
	Construction and Building Trades Supervisors	79	232	-15
	Architectural and Town Planning Technicians	79	219	-1
	Refuse and Salvage Occupations	42	126	-35
	Roofers, Roof Tilers and Slaters	38	114	-29
	Glaziers, Window Fabricators and Fitters	71	207	8
	Construction Project Managers	38	106	-22
	Air-Conditioning and Refrigeration Engineers	36	107	3
	Energy Plant Operatives	23	68	-9
	Waste Disposal and Environmental Services	19	53	-9
	Water and Sewerage Plant Operatives	23	68	-3
	Pipe Fitters	18	55	-7
	Chartered Architectural Technologists	13	37	-9
	Crane Drivers	16	47	3
	Niche Skill Subtotal		575	1676
Subtotal	Core & Niche Skill Subtotal	3,853	11,285	-1,206


In order to address the skills demand issues identified in this report, nine priority actions have been recommended in total, which are for the consideration of built environment stakeholders- across industry, education and training providers and government- as they seek to plan for the required quality and necessary quantity of built environment skills in the coming years, in line with broader private sector activity and national ambitions around housing, infrastructural development and climate change mitigation. These are:



1. A coordinated Campaign from Industry, with support from education and training providers and Government, to promote careers in the Built Environment Sector



2. Examine the scope for reforms to Built Environment education, training and qualifications (including apprenticeship)



3. Aligning skills within the Built Environment sector with technological change



4. Developing the skills to enhance the sector's contribution towards climate change mitigation



5. Development and increased engagement with entrepreneurial and management skills training



6. Place the Construction Industry Register Ireland on a statutory footing



7. Assess the merits of developing a "Skills Passport" for Built Environment activities, to facilitate the recognition of skills or competencies



8. Explore the use of the Procurement Process to stimulate skills development



9. Engage in ongoing monitoring and evaluation of the demand for Built Environment sector skills

1

Introduction

Building Future Skills outlines the demands this sector will face for its services and skills over the next ten years around housing, infrastructural development, retrofitting and built environment energy efficiency.

> Introduction

This report presents the findings of research and demand forecasts into the skills requirements of the built environment sector over the next decade. The term 'built environment' is used, rather than 'construction'. There is a nuanced difference between how the construction industry is defined in official statistics, where construction is narrowly defined and excludes activities such as architectural, engineering and other professional services that provide design, inspection and other key activities for construction projects. This report adopts a broader definition of construction activities, and hence the use of the term 'built environment'.

1.1 The Rationale of the Study

The purpose of this report is to ensure that the labour market needs of the built environment sector are met for the period 2020-2030. The Expert Group on Future Skills Needs delivers this through:

- Skills foresight and benchmarking
- Strategic advice on building skills through education and training
- Data collection and analysis on demand and supply of skilled labour
- Influencing and monitoring implementation.

Framed by national strategies such as the *Action Plan for Housing and Homelessness, Project Ireland 2040*, and the built environment elements of the *Climate Action Plan 2019*, the objectives of this study are twofold:

- To identify the nature and quantity of the scale of the skills needs of the Construction Sector to 2030. This includes the development of construction skills demand forecasts based on several assumptions, including assumptions related to enhancing the sector's productivity and environmental sustainability, as well as the realisation of the targets set out in prevailing national strategies; and
- Develop a suite of recommendations that can be drawn upon to ensure that the future skills needs of the Construction sector are fully addressed by stakeholders through the education and training system and any other relevant sources of skills supply.

1.2 Why focus on the Construction/Built Environment Sector?

The Irish property bubble collapsed in 2008. This collapse exposed structural imbalances in the Irish economy. Specifically, the failure highlighted an overreliance on construction activity for economic growth. Employment in construction peaked at 240,000 in 2007 and declined by 66% to a low of 81,300 employed in 2012. Overall employment in the economy declined by 15% over the same period, highlighting the exposure of the construction sector at the time, and how it was comparatively adversely affected. The construction sector's share of total employment declined from 11% to 4% during this time.

Growth resumed in the Irish economy in 2012. Between then and 2019, the economy displayed an unbroken run of employment growth and productivity gains. Overall employment grew by 23% between the second quarters of 2012 and 2019. Construction sector employment grew by 80% over the same period, albeit off of a low base. Construction sector employment remains 60% below peak employment at 144,000 in the fourth quarter of 2019.

At the time that this study was initiated, the Irish economy was at or near the peak of its economic cycle, at a seasonally adjusted employment rate of 4.8% as of October 2019; the lowest unemployment rate observed since January 2007. Significant pressure therefore existed for the construction sector to rapidly expand output to meet targets in terms of housing and infrastructure delivery. Furthermore, while delivering these targets, the industry must adapt to new ways of working arising from technological innovation and minimise its impact on the environment.

Through this study the EGFSN is aiming to assist the Government in ensuring that the targets in the 'National Development Plan 2018-2027', 'Rebuilding Ireland - Government Action Plan for Housing and Homelessness' and the retrofitting targets for the built environment in the Climate Action Plan are not constrained by labour supply and skills shortages up to 2030. Delivering the policy objectives is contingent on private-sector investment. Therefore the perspectives of firms in the built environment industry are needed to inform the feasibility of attaining the policy objectives and identifying constraints or enablers for the labour market.

1.3 Methodology

This study was conducted using a combination of primary and secondary sources, using both quantitative and qualitative data. In summary, these include:

- **20 Interviews with key informants** to gather the views of crucial government and non-government stakeholders
- **40 Interviews with built environment enterprises** to obtain the opinions of industry
- **2 Validation Workshops** attended by academics, policymakers and industry professionals in Dublin and Cork **to confirm the study's findings**
- **Analysis of census data** on industry performance and occupations
- **Development of an econometric model to forecast future skills needs**

1.4 Scope of the Evaluation

This report aims to deliver a set of recommendations to rectify labour supply and skills shortfalls in the Irish built environment sector for the period 2020-2030 while taking into account the economic context of the Irish economy. Recommendations are aligned with the EGFSN's remit and are limited to:

- Higher Education and Further Education and Training
- Upskilling/Reskilling

- Professional Development
- Net Migration
- Alternative Supply.

The report utilises macroeconomic and labour market data from the period 2010-2020 to support the development of construction labour forecasts for the period 2020-2030. Qualitative research also informed recommendations through a review of previous policy and consultation with built environment enterprises and key informants from the public sector and industry.

1.5 Structure of the Report

The report is structured in the following format:

- **Section 2 – Understanding the Sector:** To define what the built environment sector encompasses, its size and identify critical themes such as firm composition, productivity and volatility.
- **Section 3 – Understanding the Skills:** To contextualise the size of the industry in terms of employment. Provide a breakdown and specify what the occupations of workers in the built environment sector are. Rank skills according to their importance and how specific they are to the built environment sector, i.e. are they transferrable to other sectors.
- **Section 4 – Learning from the Past:** To review previous construction skills initiatives conducted during the period 2008-2019.
- **Section 5 – Preparing for the Future:** to identify and describe the main drivers for change for the period 2020-2030 and their knock-on impacts for skills. Explore what the future could look like while reflecting engagement with stakeholders and industry.
- **Section 6 – Quantifying the Skills Gap:** Assessing the current structure and supply of skills for the built environment sector, distinguishing between upskilling within the existing workforce, new entrants to the sector through the Education and Training System and entrants to the sector who do not need formal training.
- **Section 7 – Closing the Skills Gap:** To assess how public policy can be used to overcome skills gaps in the built environment sector.
- **Section 8 – Conclusions and Recommendations:** To summarise the conclusions of the report and present several recommendations to rectify skills gaps in the built environment sector.

2

Understanding the Sector

The Built Environment sector is critical to delivering Ireland's priorities for housing, infrastructure and supporting climate change mitigation.

> Understanding the Sector

2.1 Definition of Construction/Built Environment

The Nomenclature statistique des activités économiques dans la Communauté européenne (abbreviated to NACE) is a classification structure used to identify economic activity by sector in the European Community. It was developed for reporting purposes, based upon where each firm/business derives revenue. In NACE, the construction sector is composed of three subsectors:

- Construction of buildings - development of residential and non-residential buildings
- Civil engineering - construction of roads, railways and water projects
- Specialised Construction Activities – for example, demolition, site preparation, plastering.

This definition of the construction sector is specific to the activity of construction, excluding companies which are vertically integrated into the industry but do not participate in the actual construction. This definition is often misinterpreted to have a broader meaning but excludes firms who provide inputs for the construction sector in terms of goods and services.

The definition of construction is more than a semantic issue, as it means that architectural and engineering firms who provide design, technical testing and analysis services on a consulting basis do not feature in construction sector statistics. Nor does this definition include firms who manufacture goods for the construction sector or engage in off-site construction. Finally, this definition of the construction sector does not include firms who have a significant construction component, but whose revenues derive primarily from the distribution or sale of utilities, for example, Irish Water or ESB Networks.

For this study, the definition of construction was broadened to include those who provide inputs into the industry. The ability to expand this definition is constrained by the availability of detailed statistics provided by the Central Statistics Office (CSO). The focus of the study was expanded to include significant utility companies. However, it cannot be expanded to include those who engage in off-site construction or consulting services to the construction sector. To reflect this expansion of scope, the expanded construction sector shall be referred to the built environment sector throughout this report. The term built environment is also more relevant as society adapts to climate change and a lower-carbon economy. Given that buildings and construction activities are responsible for 39% of all carbon emissions globally¹, it is not just the construction activities that require the greater application of sustainability principles, but their operation: the energy use of the final product is also essential. This move to whole life consideration of the built environment extends the focus away exclusively from construction activity, acknowledging the importance of design while forcing consideration of the existing infrastructure and building stock.

¹ United Nations Environment. 2017 Global Status Report

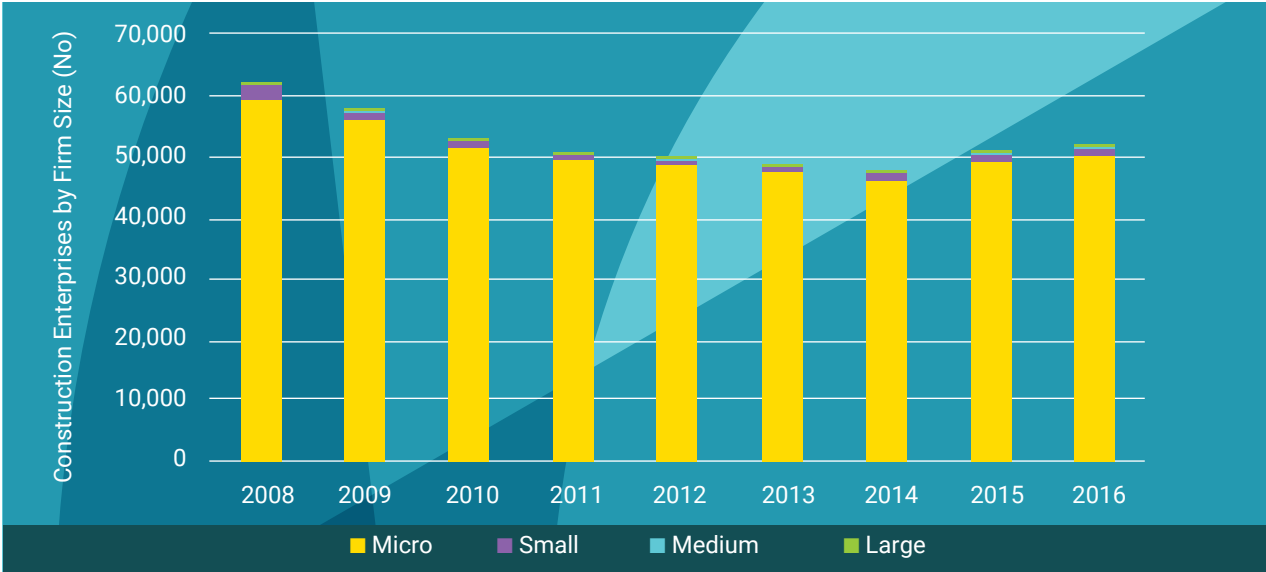
2.2 Built Environment Enterprise Data

In the following sub-section, company-level data is examined to understand the impacts of firms' size and activity on performance and structure. Firm-level data is not consistently available across subsectors, and therefore, this section focuses only on built environment firms for which detailed information was available. Firm-level data is not available for Architectural firms nor for a full precis of utility companies.

2.3 Construction Enterprises by Size

Most construction companies (97%, or 49,968 out of 51,568) are micro-enterprises (employing between 0 and 9 people). Small Enterprises (employing between 10 and 49 employees) account for nearly 3% of firms (1,454). Less than 0.03% of construction firms are medium-enterprises (employing between 50 and 250 people) and a smaller proportion again, only 26 firms, are classified as large (employing more than 250 people). See Figure 2.1.

Figure 2.1: Construction Enterprises by Firm Size, 2008 - 2016



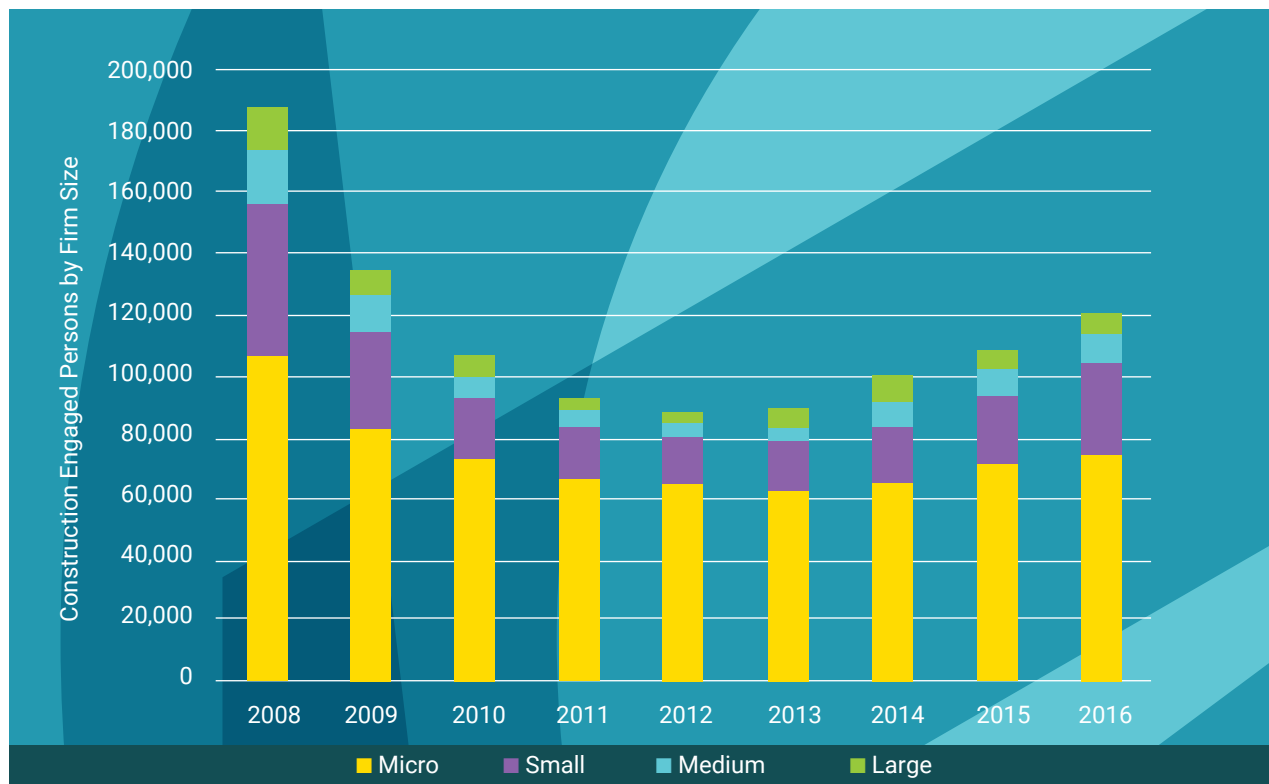
Source CSO 2018

The activities of the company appear to be the largest determinant of size: Civil engineering companies employ 5.46 people on average, whereas Specialised construction firms (often self-employed tradespeople) employ 1.44.

These figures indicate that the industry is highly fragmented and that only a small number of firms can access sizeable contracts without subcontracting arrangements. It also highlights the extensive range of skills that are required by these smaller sized firms, which become essential for continuing business. Not only are core craft and trade skills required, but each small firm require financial, business and legal literacy and competencies. Employees require business and negotiation skills within the industry such that they can manage and govern their contracts/subcontracts.

Enterprise figures put construction employment at 85,000. Despite accounting for 97% of companies, only 47% of the workforce is employed in micro-enterprises. Companies employing more than 50 people account for 21% of the workforce, despite accounting for less than 0.3% of firms. These figures, however, ignore the 35,385 persons engaged in construction who do not receive a regular income but who are compensated from profits. These engaged persons account for a substantial part of the construction sector workforce (35,385 or 29% in 2018), and nearly all of whom work in micro-enterprises (99.7%). The number of people 'engaged' is shown in Figure 2.2.

Figure 2.2: Persons 'Engaged' in Construction Enterprises by Firm Size, 2008 - 2016



Source CSO 2018

Construction wages by firm size data show that micro firms pay, on average, higher wages; €58,000 per annum in 2016. Small firms have an average annual salary of €33,000, medium firms €37,000 and large firms €45,000 per annum average. The industry structure can explain high levels of remuneration in micro firms. Of the micro-enterprises, 'specialised construction' companies were the smallest on average with 1.44 employees in 2016. These firms are more likely to hire craftspeople such as carpenters and roofers, who would expect to earn a higher wage². However, no data is available to confirm this composition.

Construction firms engaged in 'civil engineering' are by far the largest in the sector employing 5.46 people on average. Logically, this makes sense and civil engineering projects tend to be much larger than most domestic or commercial projects, and will, therefore, require more labour to complete. As less than 3% of construction firms employ ten staff or more, this implies that civil engineering firms account for a significant portion of 'Small', 'Medium' and 'Large' firms.

² The Sectoral Employment Order Construction Sector, in effect from 1st October 2019 details construction workers pay. See <https://www.workplacerelations.ie/>

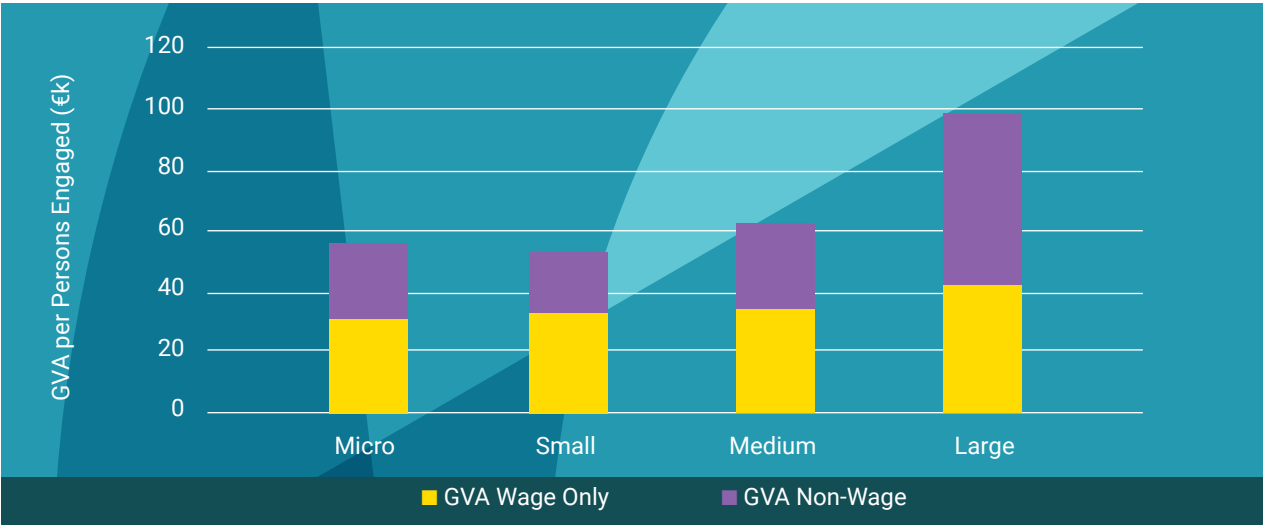
Subcontracting of specialised skills is a feature of the industry. If a significant portion of skilled trades is self-employed, the rest of the sector must hold a disproportionately high number of unskilled and professional employees to balance this displacement. As skilled trades are so specialised, they are likely hired on a job-by-job basis as they do not necessarily have to possess the diversity of skills to provide end-to-end support. This assessment is validated in technical data collected from the CSO and analysed in Section 3.

Civil engineering firms, by their size, are more likely to be specialised and hire niche staff to fulfil specialist roles. They would also require a large number of construction and vehicle operators to engage in those scaled works. Civil engineering firms who are not involved in on-site construction are classified separately under Architectural and Engineering Service activities.

Firms involved in the construction of buildings are much more difficult to classify as there is a great diversity across these firms, depending on a commercial or residential focus, and the size of the projects or developments that are the focus of their work. For this reason, it is challenging to comment on firm composition and skills as it is very much a mixed bag. Again, this is borne out in occupation data which demonstrates a great variety of occupations in these firms.

Employee remuneration in the construction sector is skewed by the number of working proprietors in micro-enterprises who do not receive a regular wage³. They are likely compensated for their efforts through profit. As stated before, Gross Value Added (GVA) is a measure of the profits, rents, interests and salaries earned by a company. GVA primarily consists of profits and wages for most industries; this is also true of Construction firms, although a detailed breakdown is not available. An analysis of GVA by firm size and persons engaged (including the self-employed) is available in Figure 2.3. This is separated into wage and non-wage GVA, to reflect the proportion of self-employed.

Figure 2.3: Construction Sector GVA per Persons Engaged by Firm Size, 2016



Source: (CSO, 2018)

³ Working Proprietors (Proprietors and family members); included here are those proprietors, partners, etc and members of their families who regularly in the firm and **are not paid a definite wage or salary**. Working Proprietors is not a full count of self-employed individuals as some self-employed receive a wage and are returned via annual employment returns and are included in the Employees calculation. (CSO, 2017)

GVA per person engaged for micro-enterprises is slightly lower than wage compensation per employee (€55,000 versus €58,000 per annum, in 2016). This is a surprising finding, showing that wages are higher than the productivity per person in these micro-enterprises. This is not the case for any other category. It is not clear what is driving this differential, favouring the employee over the self-employed. It could be driven by several factors including wage pressures, geographical distribution, unwinding of companies, underreporting of revenues or due to the presence of poorly performing self-employed. What is clear is that GVA per employee increases with firm size, whereby large firms record GVA of €98,000 per employee in 2016 and small firms record GVA of €52,000 per employee. Small firms underperform against micro firms (€55,000 compared to €52,000), but sample size differences likely drive this. Smaller firms are more likely to be 'Specialised Construction' firms where margins are higher for skilled work.

There is a significant productivity gap between large and micro firms, where large firms produce 76% more GVA per person engaged. The reason this gap exists is possibly more important than its existence. While the wage per person engaged increases from €31,154 per person to €45,340 per person from micro to large firms, the micro firm wages are understated by the presence of working proprietors who compensate themselves from profits, and not a salaried wage. Profits from large firms, by contrast, will be more mobile and may be repatriated out of the country if the company is a multinational. The scale of the productivity gap between medium (50-249 employees) and large firms (over 250 employees) is disconcerting. The GVA difference is driven by profit, where wages for large firms are on average 22% higher, while profits are 114% higher when compared against medium-sized firms. There are several possible explanations of why these firms are so profitable:

- Labour Intensity (distorting the denominator) of each activity
- Distortions caused by subcontracting
- Base erosion and profit shifting activities by multinational companies⁴
- Differences in samples
- Elevated profits may reflect genuine economies of scale

Construction Enterprises by Sub-Sector

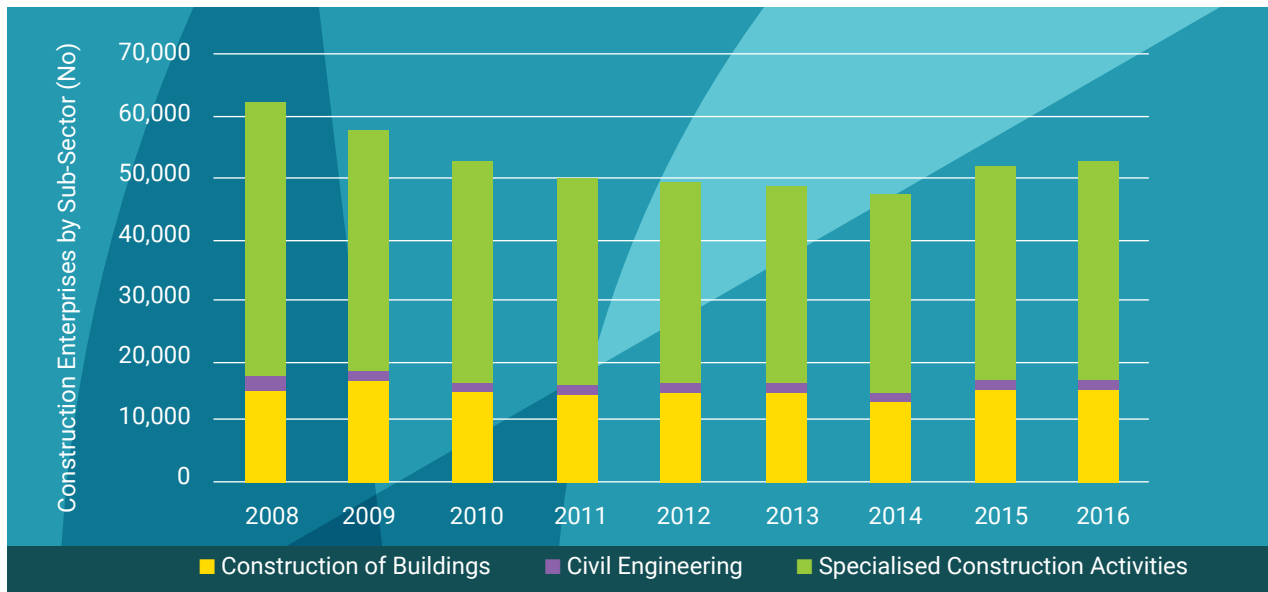
There were 51,568 construction enterprises in Ireland in 2016 (CSO, 2018). A breakdown of these firms by sub-sector is available in Figure 2.4. The majority, nearly 70% of these enterprises were engaged in 'Specialised construction activities, which include:

- Demolition and site preparation
- Electrical, plumbing and other construction installation activities
- Building completion and finishing such as plastering, joinery, painting, glazing
- Other specialised construction activities such as roofing.

'Construction of Buildings' accounted for many of the remaining firms (27%), while 'Civil Engineering' firms are a minority (3%).

⁴ Elevated GDPs and by extension GVAs are often indicative of Base Erosion and Profit Shifting activities by MNC's (Zoromé, 2007)

Figure 2.4: Construction Enterprises by Construction Sub-Sector, 2008 - 2016



Source: (CSO, 2018)

Based on this classification, it is unsurprising that many skilled tradespeople work on specialised construction activities. The remaining two subsectors are more likely to utilise more general labour for civil engineering, commercial and non-commercial construction including houses.

There is a significant difference in construction employment figures depending on the metric adopted – either ‘employment’ or ‘persons engaged’. Employees are those who receive a wage or salary in exchange for work. Persons engaged include employees but additionally include proprietors or family members who work in the business - the self-employed. The distinction is important to note, given that there may be a higher number of hours worked (above the full-time average equivalent rate) for self-employed construction workers (notwithstanding the Sectoral Employment Order for the Construction Sector which came into effect in October 2019).

The self-employed accounted for 29% of the 120,000 persons engaged in 2018. The proportion of the workforce who were self-employed increased throughout the recession, peaking at 38% in 2012. This indicates that firms reduced in size faster than they folded. Self-employment is not evenly spread across the sector. Forty-five per cent of ‘specialised construction’ employees were self-employed, whereas 20% of ‘construction of buildings’ workers and 7% of civil engineering workers were self-employed.

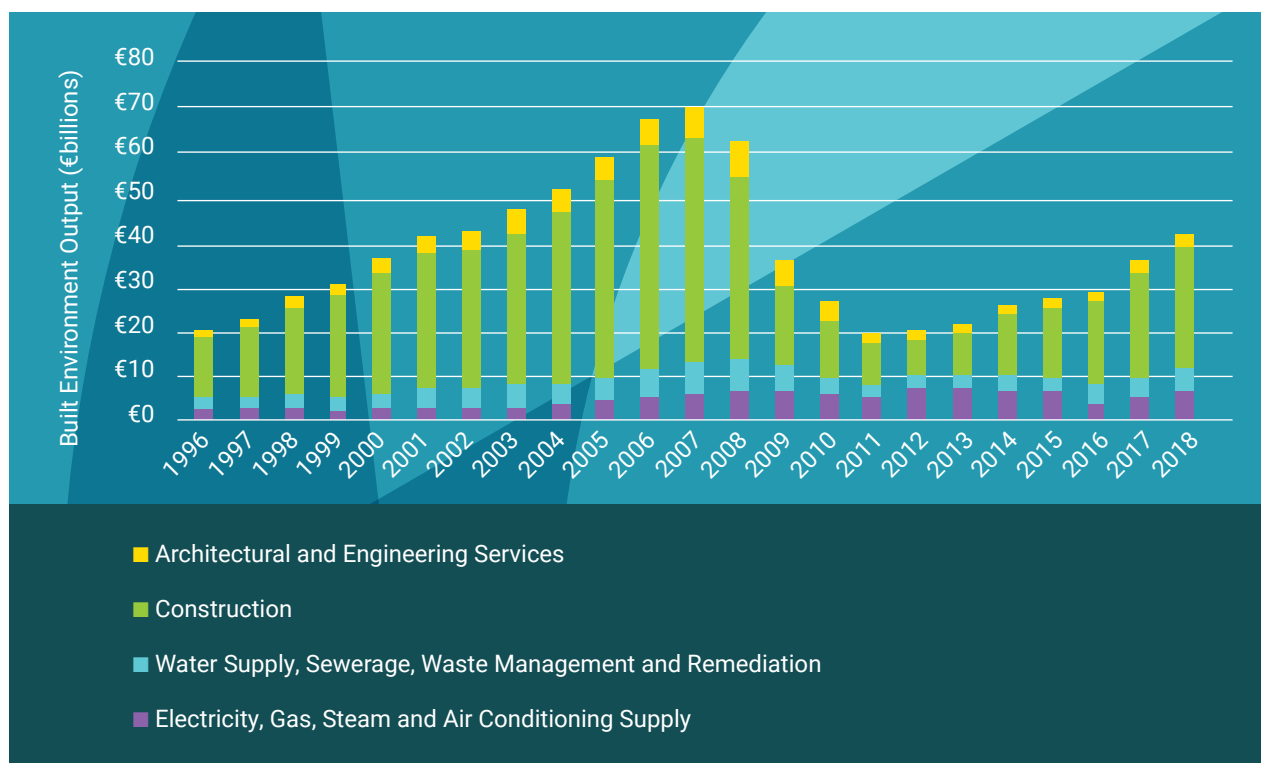
‘Specialised construction firms’ tend to be small, and employ 1.4 people on average. Employment in these firms is dominated by skilled craftspeople such as carpenters or plumbers. As these firms are small, they most likely offer a single specialised service, e.g. carpentry, and bolster their working capacity with apprentices. ‘Civil engineering’ companies were by far the largest, employing 5.5 persons on average per business. By comparison, ‘Construction of Buildings’ enterprises engaged 1.8 persons per firm.

In terms of employee numbers, enterprises involved in the ‘Construction of Buildings’ are 44% smaller on average in 2016 than they were in 2008. By contrast, firms engaged in ‘Civil Engineering’ and ‘Specialised Construction’ firms contracted by 18% and 25% respectively over the same period. Both ‘Construction of Buildings’ and ‘Specialised Construction’ firms grew at a similar rate over the period 2012-2016 (circa 40% in terms of persons engaged). By contrast, Civil Engineering firms have lagged at 26% growth over the same period potentially indicating that investment in infrastructure was slower to recover than commercial demand.

The following section expands on construction sector analysis, while also including the architectural and engineering services and utilities, as data was available on this built environment sector output.

2.4 Built Environment Output

Figure 2.5: Built Environment Output 1996-2018, 2016 €billion



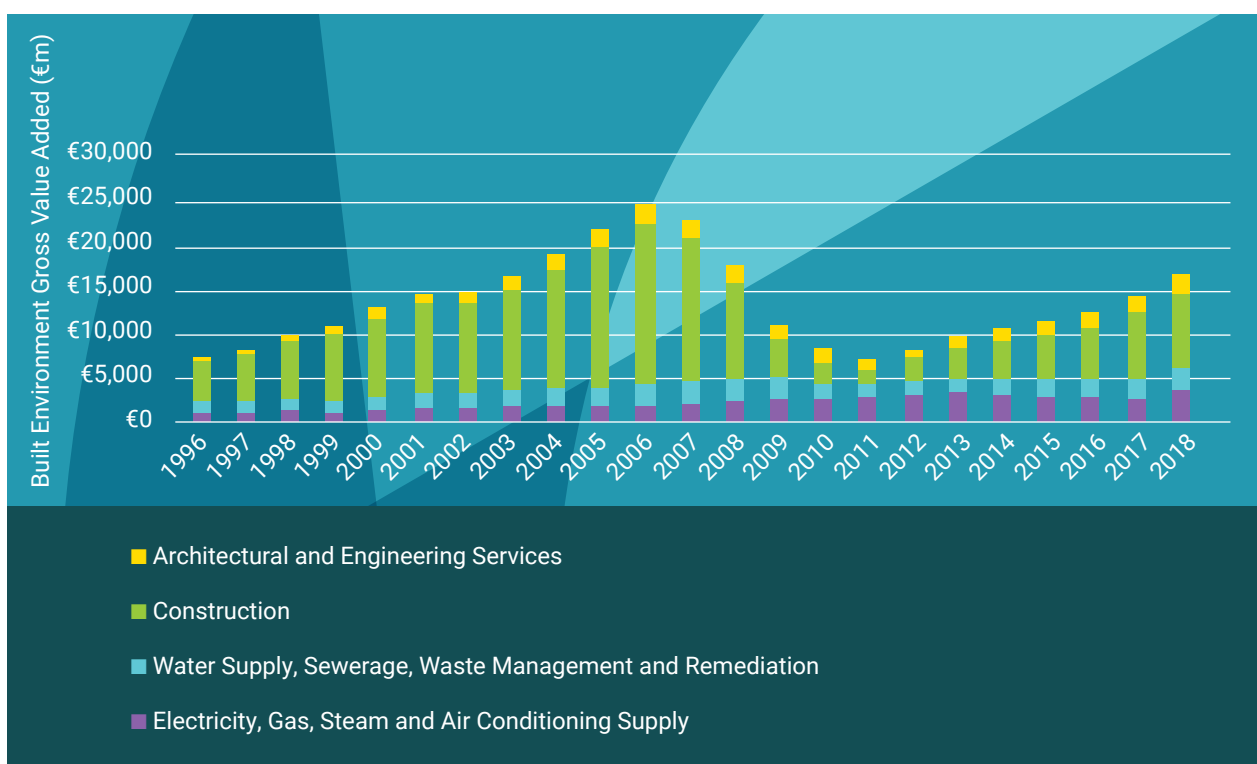
The scale of the built environment sector can be measured using an output indicator, which is the conventional measure of industrial production. Output is the monetary value of all goods or services produced by an industry in a given year. It is measured annually by CSO as part of the official National Accounts statistics (using income and expenditure surveys). Output allows a comparison of activities between sectors, showing the relative size of economic activity. The built environment sector was responsible for €42 billion of Ireland’s total output in 2018. Although substantial, this is lower than the peak in output in the built environment sector in 2007, which totalled €70 billion (both figures in constant 2016 prices). Figure 2.5 shows output of the built environment sector between 1996 and 2018. Construction activity dominates the built environment sector (denoted in green in Figure 2.5), accounting for 64% of the built environment output in 2018. It is noteworthy that it was construction activity that had most volatility over this time series.

Output in construction activities incorporates both activities on new buildings and also repair, maintenance and improvement activities, which was estimated to account for 26% of the value of construction activity output in 2017, down from 34.5% of the proportion of construction activity in 2014 (CIF, 2018).

2.5 Built Environment Gross Added Value (GVA)

While a useful measure of economic activity, output double counts the use of intermediate resources throughout the value chain of an economy, particularly where goods purchased from one company are used in processes to make a higher value item (e.g. the final price of a house sale is recorded in output, while separately the values of architects and engineering services are added up, and the value of construction company services). To avoid double-counting, a measure called Gross Value Added is used as another indicator for economic activity (Figure 2.6)

Figure 2.6: Built Environment Gross Value Added (GVA) 1996-2018, 2016 Prices



Source: CSO, 2020

Gross Value Added is calculated as the sum of output minus intermediate costs (or non-labour costs) and is often used as a proxy measure for productivity. GVA for the built environment sector totalled €16.8 billion in 2018 or 40% of total output for the sector. Construction GVA was far lower when compared to the other subsectors constituting a GVA proportion of 31% of total production value. By comparison, Architectural and Engineering firms' GVA was 70% of output. Utility companies (power and water) had GVA as a proportion of their output of 53% and 50% respectively. This shows that construction firms have more 'intermediate consumption' in comparison to the other firms that make up the built environment sector, which is unsurprising given the length of the supply chain within many construction activities, or the interdependent supply contracts that are necessary to build an asset.

Both Utilities and Architectural and Engineering Services companies demonstrated significant GVA increases over the period 1996 to 2018. Architectural and Engineering Services companies, in particular, had shown considerable improvements since 2003 (when GVA only comprised 28% of output). Construction companies' GVA share of output consistently lagged over the same period.

An interesting finding regarding construction sector productivity is the difference in productivity by the size of the firm. Figure 2.3 above showed the construction industry firm's GVA per person engaged by firm size in 2016. The micro firms (which include many self-employed tradespeople) had a slightly higher GVA per person engaged than small firms (employing 10-25 people). Medium-sized firms had higher GVA per person, just over €60,000. The greatest differential in GVA per person is evident in large construction firms, indicating higher productivity levels in larger firms (over 250 people), with a value of just under €100,000. This trend was confirmed qualitatively through the interviews with micro and small firms, who speculated that there would be further concentration of the industry in larger firms in the next decade. The productivity gap between the large construction firms and others will likely drive this trend. It is essential for consideration of local and regional development, and considerations of whether profits and wages get reinvested into the local economy.

The reasons for construction firms' lack of productivity growth (assuming GVA as a proxy) is discussed extensively in all countries, with limited conclusive evidence of why this trend is emerging.

Some insights from this data are that elevated levels of profit may reflect genuine differences in productivity. These may be due to relative differences in the sample- for example, civil engineering companies are larger, but they may also be more profitable. Sector data indicates this is showing that on average the GVA of firms engaged in the construction of buildings and civil engineering have much greater productivity levels than those involved in specialised construction activities (€79,000 versus €47,000 per person engaged). Further investigation would require analysing the factor inputs used by each firm – exploring the relative labour/mechanised intensity of each activity and the distribution of profits from subcontracting, and consideration of whether there is evidence of profit shifting activities by large international firms operating in Ireland.

2.6 Conclusion

This section has provided an overview of the built environment sector, which includes companies engaged in construction activities (such as buildings construction, civil engineering, and specialised construction activities), significant utility companies, and architectural and engineering services. While the sector represents a sizeable proportion of Ireland's output, its productivity, as represented by Gross Value-Added, is lower in comparison to other industries, particularly for the construction sub-sector.

The Sector is dominated by micro-enterprises (companies employing between 0 and 9 people, with progressively lower numbers of small (10-49), medium (50-249) and large (250+) companies. There are also a large number of self-employed people engaged with the sector, mostly in construction activities. The high rate of self-employment is partly linked to the cyclical nature of the sector, with self-employment peaking in 2012 amid the late-2000s recession, before falling back slightly. There is evidence of large

proportions of self-employment across the sector. Overall the evidence of a 'flat' organisational structure across the construction sector has implications for the transfer of skills 'on the job', or within the sector, as it reduces the education and skills transfer that can formally happen on site.

Wages are higher in micro-enterprises compared to the rest of the sector, which is likely explained by the predominance of specialised tradespeople, such as carpenters or roofers, among micro-enterprises. However, these firms are significantly less productive and profitable than larger companies. There are several potential explanations for this, such as varying labour intensities between activities, distortions caused by sub-contracting, or base erosion and profit-shifting activities by multi-national companies.

The next section of the report will explore the skills that are utilised within the sector and provide a system of ranking these skills to determine which are crucial to the growth of the industry up to 2030.

3

Understanding the Skills

This sector has a diverse workforce including those working in construction, architecture, engineering and utilities.

> Understanding the Skills

3.1 Introduction

'Skill' is defined as the capability of a person to undertake a given set of tasks, which requires the use of knowledge and dexterity or coordination to undertake physical tasks. A skillset is an attribute of an individual person. Different occupations require different skillsets, and industry sectors use a range of skillsets in conducting their work.

This section of the report focuses on occupation data. Occupations describe what type of work a person does to earn a living, irrespective of the place in which or the purpose for which it is performed. The nature of the industry, business or service in which the person is working has no bearing upon the classification of the occupation, e.g. a chef or cook could work in the construction industry. However, typically they would be expected to work in the accommodation and foodservice sector. Occupations can give insights into the skills or qualifications most likely used in different industry sectors. Occupational data is sourced from Census data, which gives the occupation for usual residents aged 16 and over and in employment, which is subsequently categorised into coded occupations.

The focus on built environment-related occupations is appropriate because Ireland's education and training systems are based on developing skills in professions and trades, and are not tied to particular industries. People with built environment-related skills can find employment in several other industries, depending on opportunities within the economy and market conditions.

For context, this section of the report outlines the total sum of the employment in the built environment sector, and its subcomponents, using the quarterly Labour Force Survey. This data does not give insight into skills and occupations but is important background data to understand the number of people working in different industry sectors. It will then discuss how occupation data was analysed, determining which skills are relevant and why. Crucially, it will also be identified whether the built environment sector competes internally (with built environment companies), or externally (other industries/sectors) for these skills.

3.2 Industry Employment

As of the final quarter (Q4) in 2019, built environment sector employment totalled 205,400 people, and accounted for 9% of national employment, as shown in Figure 3.1 (CSO 2020, Labour Force Survey). This is considerably below the third quarter 2007 peak of 304,500 people employed (then constituting 14% of national employment), but considerably above the first quarter 2013 low of 128,700 employed, (which was 7% of total employment).

From the 2013 low point, the built environment sector has grown by approximately 57% or 7% per annum. Much of this growth is driven by the cyclical nature of the construction sector. Double-digit year-on-year employment growth occurred for much of the period between 2015 to 2018.

Employment in Architectural and Engineering Services experienced a boom in terms of jobs resulting from a renewed demand for construction. Thirty-four thousand people were employed in this sub-sector by the fourth quarter of 2019, which was slightly down from 2017 to 2018 levels when the peak of 43,200 people were employed (this was the record peak in numbers employed for this sub-sector). The contraction of Architectural and Engineering Services may indicate a real decline in demand for these services, increased competition for talent with other sectors, or may simply be a statistical anomaly due to the sample size used by the CSO.

Employment in the utility companies totalled 24,300 in the fourth quarter of 2019. Analysis of the employment trend reveals that numbers employed in the sector remained relatively constant over the time period, indicating that it may not be as prone to the boom/bust cycle as either construction or architectural and engineering services. In the aftermath of the global financial crisis, the sector only began to shed jobs from 2010 but entered a recovery phase by 2012. The robust nature of employment in these companies suggests that the demand for water, gas, power and waste services is quite stable.

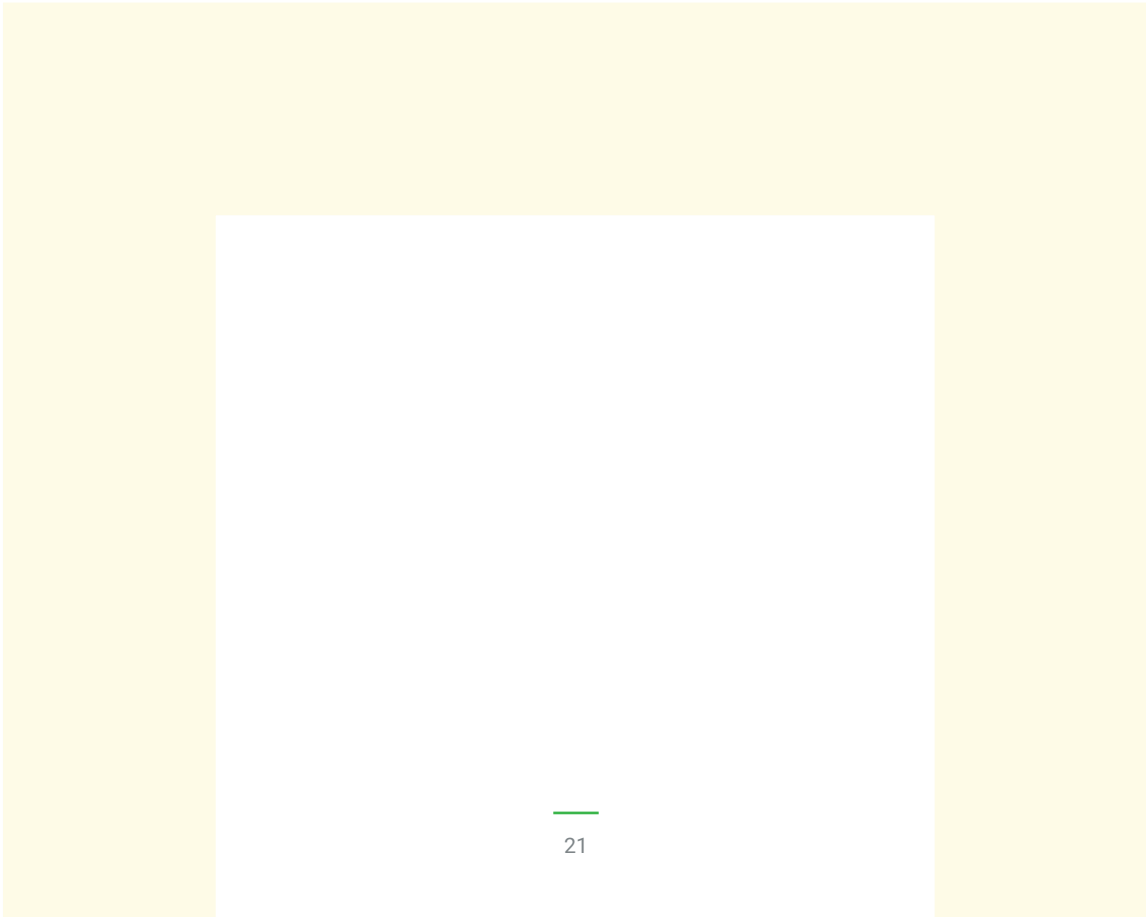
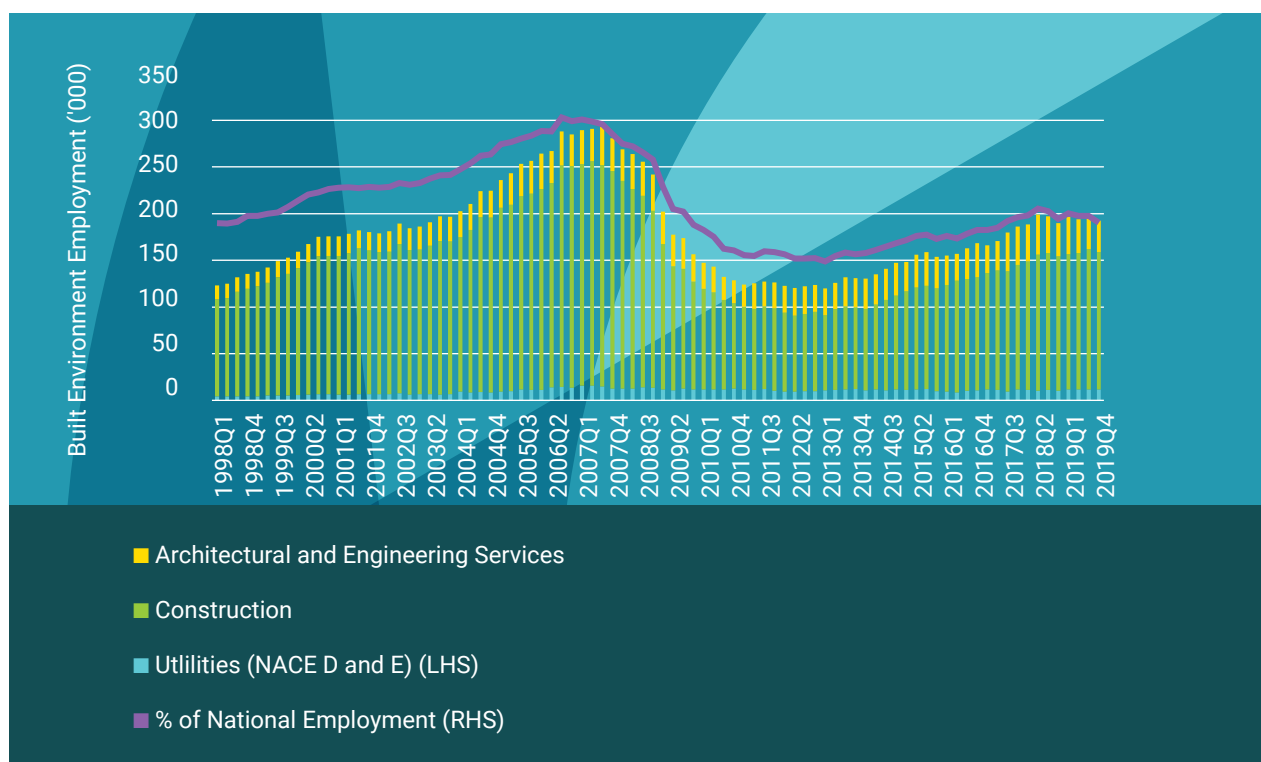


Figure 3.1: Built Environment Sector Employment, Q1 2000 – Q4 2019



Source: (CSO, 2020) Labour Force Survey

Note: 'Water Collection, Treatment and Supply' figures were missing from specific years due to a low number of observations. Missing observations were replaced by estimates to avoid disruption of the trend.

3.3 Age Profile

Understanding the age profile of people employed in any occupation is essential in the context of analysing the skills pipeline for the built environment sector. An ageing workforce in any particular sector signifies a lack of appeal to younger people and may highlight the future shortage of supply of labour to that occupation or sector. If age gaps within specific industries are such that a large number of skilled individuals are approaching retirement, remedial action may be required to ensure the continuity of the workforce.

Age information for specific occupations is constrained to the use of census data. Limited information is available from the census, but this information is highly aggregated and can only be used indicatively. Some highlights from this data are summarised. It is evident that the age profile of specific groups reflects the entry requirements for the role - based upon age or seniority, for example, corporate managers or chief executive officers tend to have a few years' experience in another role, while researchers tend to start working in their mid-to-late twenties once they have completed a PhD.

There was a decline in the participation rate of 25-34-year-olds in the labour market generally. This is concerning for all industries (not only the built environment) as it indicates impediments or barriers for new entrants, which will be felt within the medium to long term if replacement of retiring/exiting workers from the sector is not addressed. Those aged 25-34 are more likely to be mobile, having completed education

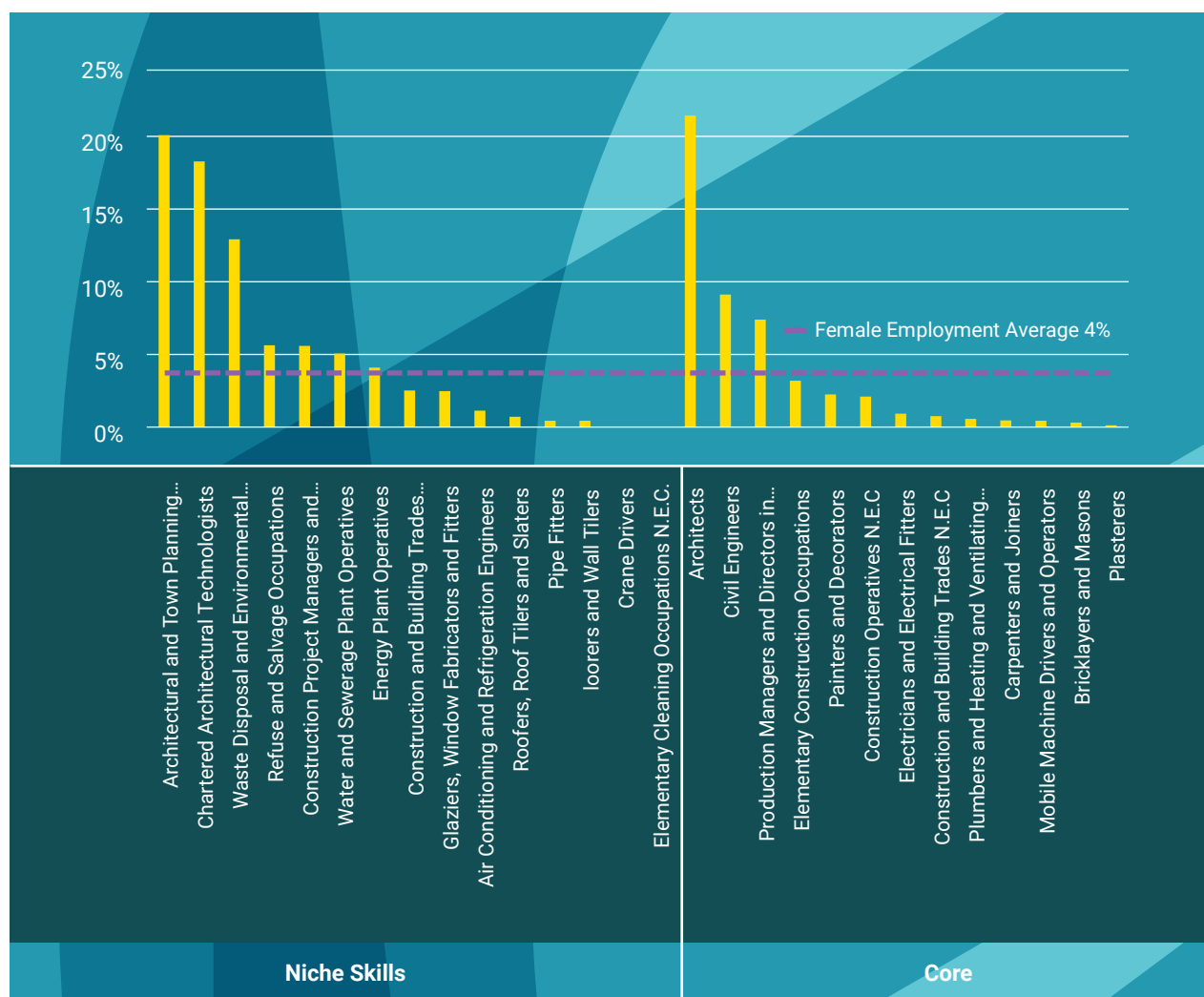
and not yet being socially or economically tied to a particular place – and hence having possibly emigrated after the effect of the global financial crisis in Ireland. This has significant implications for the analysis of skills and skills leakage from the economy. A second important observation from the analysis of age is that two occupation groups which have seen significant ageing are ‘Skilled Construction and Building Trades’.

3.4 Women in the Built Environment sector

A key challenge for the built environment sector is the low participation rate of women in the sector overall, and the further segregation or exclusion of women in many of its occupations. Occupational data was analysed according to gender using the census data, to provide insight into participation rates for the sector. It was not possible to obtain gender participation figures broken down by occupation and industry, so the subsequent analysis assumes that participation rates for males and females at the professional level are replicated across sectors.

As of 2016, 47% of all employed in the economy were women. None of the 30 core or niche built environment occupations had participation rates near this level. The highest rate of female participation recorded across all 30 core or niche occupations was 21% for architects (2,431).

Figure 3.2: Women in Built Environment Sector Occupations – 2016



Source: Census 2016 (CSO, 2020)

Overall, women accounted for only 4% of those employed in the built environment occupations. There is a clear split in female participation between industries requiring formal qualifications and those that do not.

Female participation in Architecture, Town Planning, Civil Engineering, and Production Manager positions all have relatively high levels of female participation, which was maintained or increased between 2011 and 2016. These figures are still low in a national context, but very high in an industry context.

What is most stark is that there are low levels of female participation amongst the majority of core construction occupations (see section 3.5), which account for 65% of all employment in the sector. This imbalance is particularly pronounced in manual occupations whether unskilled, semi-skilled or skilled trades. Female employment accounts for less than 1% of total employment across seven of the core occupations, six of which require craft apprenticeship qualifications. Low participation in niche skilled occupations is less concerning when observing the problem from an industry level or in terms of the overall (low) magnitude of both men and women employed in these occupations; as these occupations are considerably smaller in terms of overall employment, but it is still concerning to have such low participation rates for women.

The analysis suggests that craft apprenticeship occupations in the built environment sector are less desirable to women, compared to other professions in the built environment sector with third-level qualifications. However, more importantly, the built environment sector is severely lacking female participation. Gender stigmas appear to be less pronounced in office-based/professional occupations.

3.5 Identification of Key Occupations

Occupation data is available from the 2011 and 2016 Censuses. Occupations associated with the industrial sector are given (cross-tabulated) in the Census data and provide the most detailed picture of what people are employed to do. Occupation data associated with the Built Environment sector reveals that 146,005 people were employed in 2016. Labour Force Survey data suggests that total employment has since grown to 205,400 (approximately 40% growth).

Census data divides the workforce into 327 occupations, based upon seniority, education and skills. Each of these occupations may contain several specific job titles. These occupations are by no means dispersed equally across the economy, and particular skills often cluster in industries. This study used census data to interrogate the concentration of skills in the Built Environment sector.

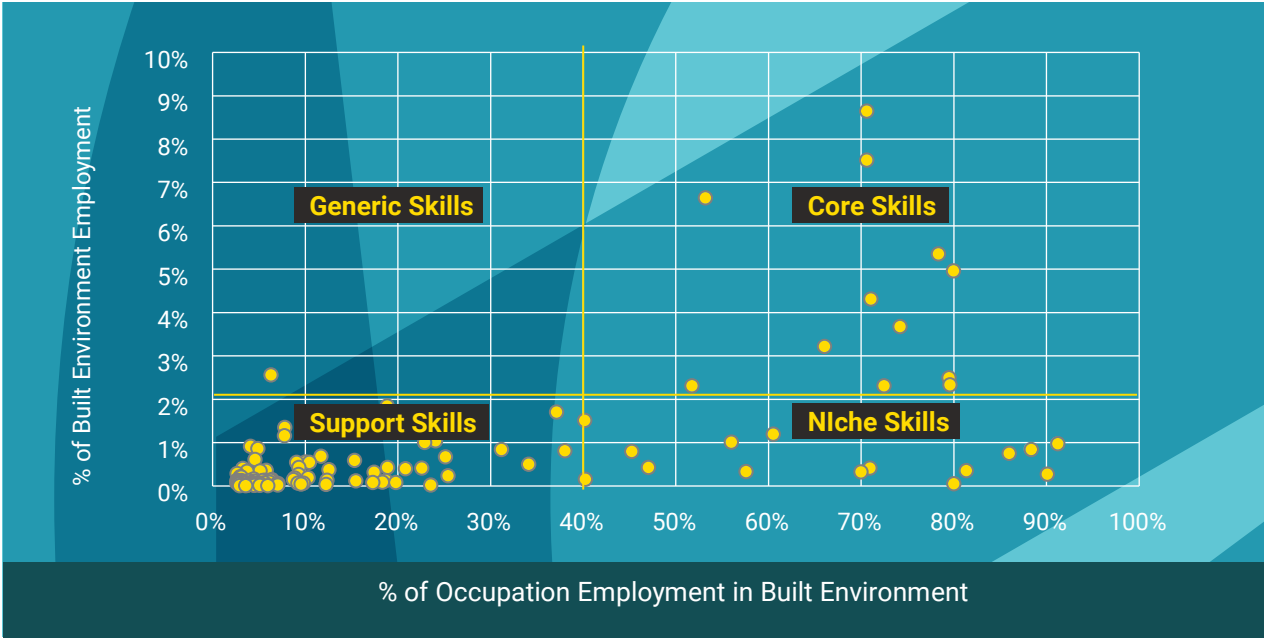
According to the analysis, 183 of the 327 occupations – or 56% - ‘feature’ within the built environment sector. By feature, this means that at least one person in each occupation works within built environment sectors. To target the analysis on only the most relevant occupations, each occupation was classified according to two criteria:

- Prevalence: How common an occupation is in Built Environment firms (frequency)
- Specificity: How unique an occupation is to the Built Environment sector (absence in other sectors)

By classifying occupations in this manner, there is scope for identifying if an occupation is common or specialised/context-specific in the Built Environment Sector and if it is unique to the Built Environment Sector, or used more broadly. A plot of this information is shown in Figure 3.3. The specificity of occupation to the built environment sector is presented on the x-axis. Where occupations exceed 40% on the x-axis, they are considered concentrated within the built environment sector.

The prevalence of an occupation within the built environment sector is shown on the y-axis. A prevalence threshold of 2% divides the graph along the y-axis. Occupations above this threshold account for at least 1 in 50 of all jobs in the sector and a significant source of employment in that sector.

Figure 3.3: Plot of Skill Prevalence and Specificity in the Built Environment Sector, Census 2016



Source: Census 2016 (CSO, 2020)

Note: Figures for individual occupations may not total correctly for all categories due to the suppression of occupations with six employees or less for each industry. The impacts of this suppression are minor.

Using the prevalence-specificity classification, thirty critical occupations for the built environment sector were identified. These occupations account for a further 9% of built environment employment.

Thirteen of these occupations are ‘Core Built Environment Skills’ whereby they are specific to the Built Environment Sector and account for a significant portion of the workforce. Core Construction Skills as a classification include trades such as electricians and carpenters. These occupations are elaborated in section 3.5.1.

A further seventeen occupations were identified and classified as ‘Niche Built Environment Skills’. These are specific to the Built Environment Sector but make up a much smaller portion of the workforce. These Niche Built Environment Sector Skills include roofers, roof tilers and slater or water and sewage plant operatives.

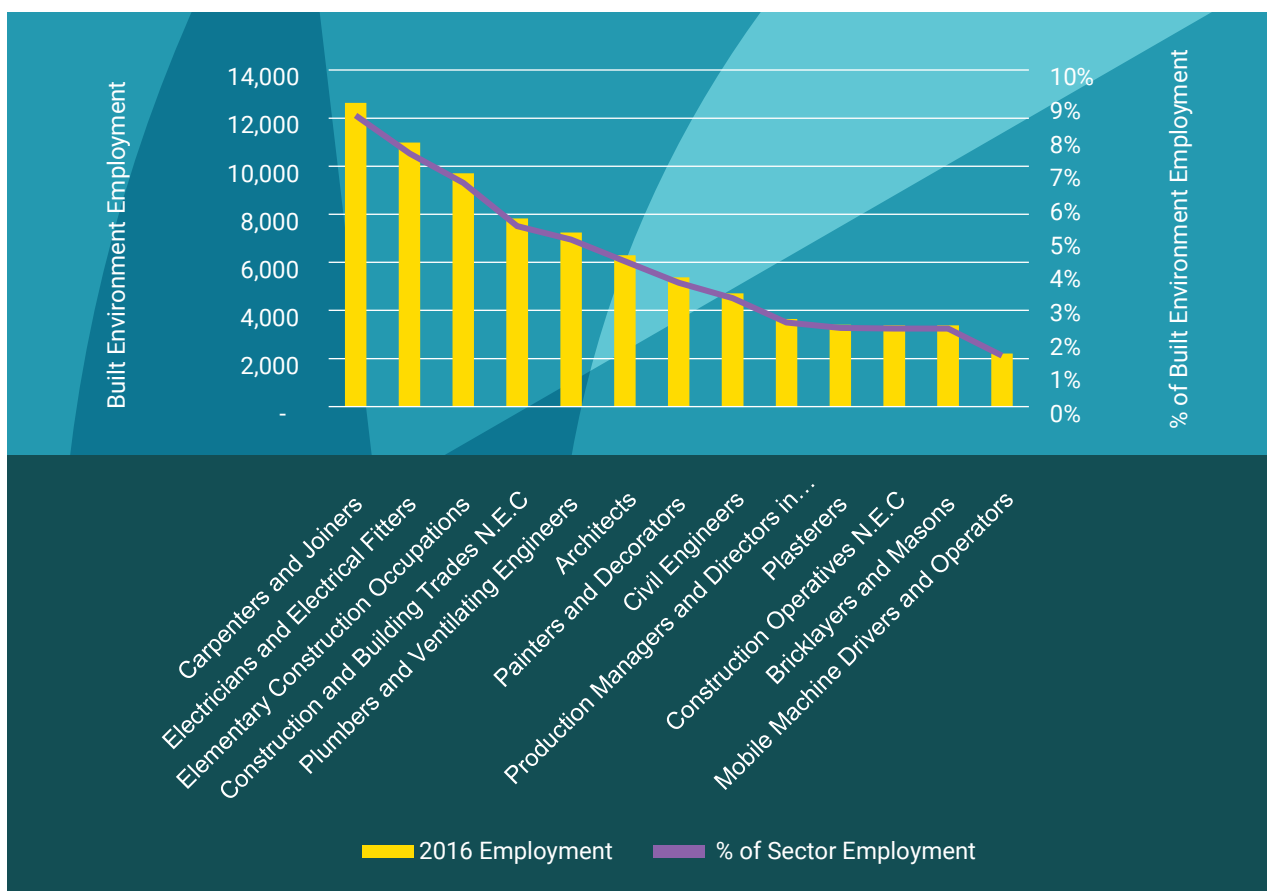
Aside from these thirty critical occupations, a further 155 occupations remain. These occupations are not specific to the Built Environment sector and are typically support occupations, usually in administrative back-office roles. In some cases these occupations can be unique to a situation; often they are statistical anomalies arising from the Census classifications. In any case, their inclusion in this study would detract from the focus of the research. In total, these 155 occupations account for 35% of employment in the Built Environment Sector. They account for 0.02% of sectoral employment on average.

The next two subsections will identify the 'Core' and 'Niche' Built Environment Skills in descending order of employment numbers, using Census 2016 data. The description of each occupation is clarified, and the associated qualification for each occupation is identified.

3.5.1 Core Skills of the Built Environment Sector

This section concerns the thirteen 'Core Skills' in the built environment sector as identified using 2016 Census data. As stated in the previous section, these skills make up 55% of all employment in the sector. They are of critical importance to the completion of everyday tasks in the Built Environment sub-sectors.

Figure 3.4: Core Skills of Built Environment Sector, 2016



Source: Census 2016 (CSO, 2020)

A description of all thirteen occupations and any associated entry-level qualifications are available in the appendices of this document.

Given that these are core occupations for the built environment sector, the training needs of these occupations are considered of the utmost importance to ensure there is an adequate supply of qualified individuals for the sector. Of the thirteen core occupations identified:

- Six are associated with trainee or craft apprenticeship qualifications
- Four require no formal qualification for entry
- Two require a specific third-level qualification
- One typically requires a third-level qualification but is unspecified

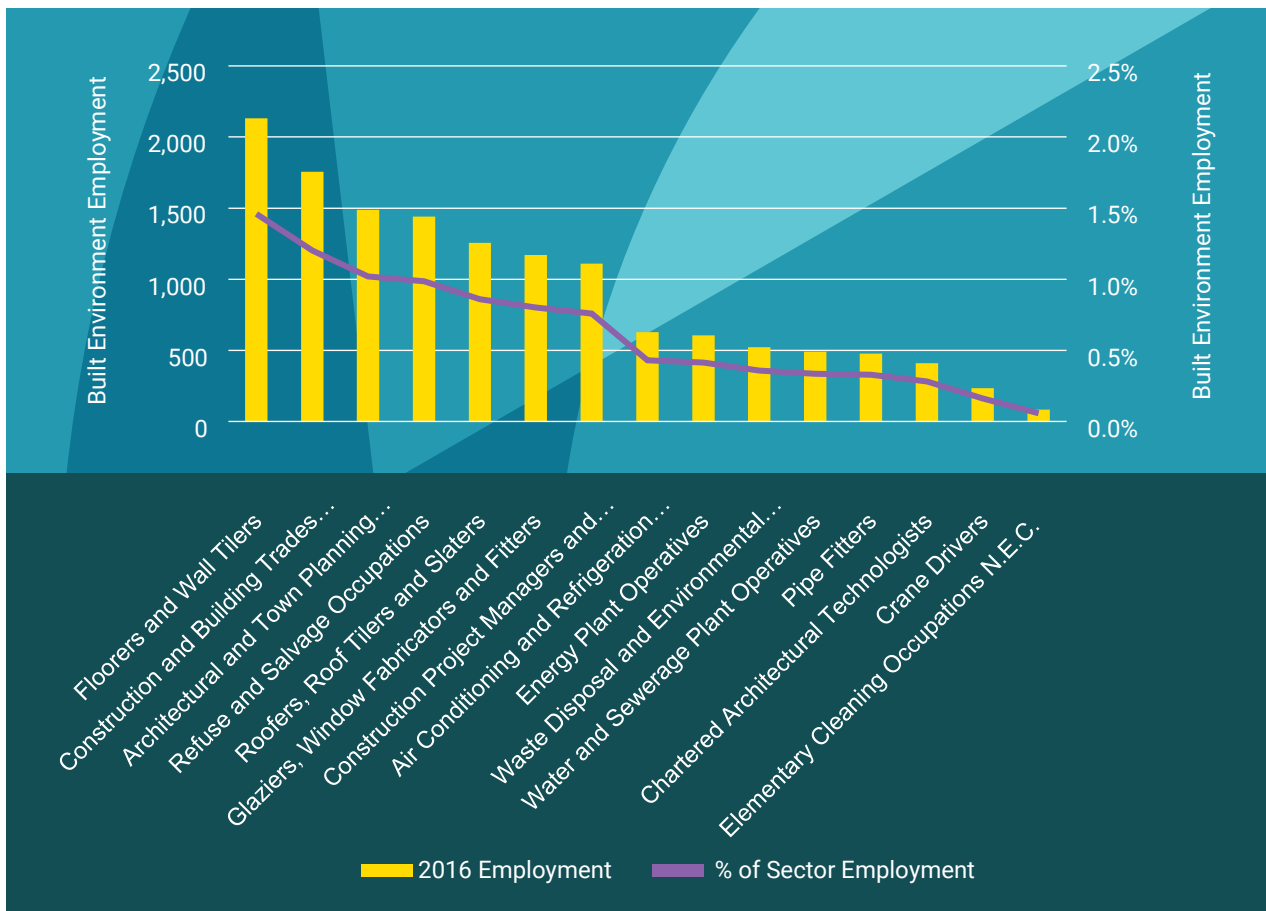
This analysis, and the matching of qualifications to work at these occupations, highlights the reliance on and reinforces the importance of the craft apprenticeship system to any recommendations made for the sector. Also, as these occupations employ significant numbers of workers in the sector, it is unlikely that immigration can be relied upon to resolve any shortages. Migration may, however, play a role in mitigating any frictional shortfalls.

This analysis suggests that any policy solutions seeking to address future shortages for these occupations should focus on achieving a stable domestic supply, and decreasing the labour intensity of these activities through mechanisation or the adoption of new processes.

3.5.2 Niche Skills of the Built Environment Sector

This section concerns the seventeen Niche Skills in the Built Environment Sector as identified through 2016 Census data. As stated in the initial analysis, these skills make up 35% of all employment in the sector collectively. Individually, these occupations employ much smaller numbers when compared to the Core Skills, but are still extremely concentrated in the built environment sector. These skills, therefore, often relate to more context-specific construction skills or supporting trades.

Figure 3.5: Niche Skills of Built Environment Sector, 2016



Source: (CSO, 2020)

A description of all seventeen occupations, along with an identification of entry-level qualifications for each of these examples have been provided in the appendices of this document. Each occupation may encompass several specific sub-classifications where particular skills may be identified.

It should be noted that employment information is only available for 15 of the 17 occupations. This is because the CSO has merged the three occupations of Architectural and Town Planning Technicians with Quantity Surveyors and Chartered Surveyors. As these figures have not been disaggregated, the forecast of future skills needs will also aggregate these occupations as a group.

For the Niche Skills associated with the Built Environment sector, it is essential to note that:

- Six of the occupations are associated with craft apprenticeship or trainee programmes
- Five require no formal qualification
- Four require formal education

Two do not require a specific formal qualification. Still, it is expected that most occupation holders will possess either an academic qualification or craft apprenticeship.

Interrogating the qualifications and skills associated with each niche occupation highlights again the importance of the craft apprenticeship system to any recommendations made. As these occupations employ significantly smaller numbers when compared to the core industries, sourcing the skills from overseas could be an option to remedy shortages effectively. Although it would be preferable to develop a stable domestic supply for these niche skills, it may not be practical for extremely specialised occupations (low economies of scale in training), where sourcing qualified individuals from the European or global labour market may be more efficient, and using international training centres for such training/skills development.

3.6 Emerging Occupations

The initial analysis of skills in the built environment sector consists of snapshots taken from the 2011 and 2016 census data. Since 2016 the sector has evolved and will continue to grow in terms of what skills are required for the sector, and those that are in high demand. There are changes in technologies and processes, requiring new skills to replace older skills. While it is impossible to forecast completely new skills, it is possible to trace emerging occupations and analyse the skills associated with these types of jobs. It is also vital to assess skills that are declining in importance over time - displaced by technology or process changes.

To complete the understanding of occupations that are growing in importance, the twenty fastest-growing occupations in the built environment sector between 2011 and 2016 are graphed in Figure 3.6. To improve the reliability of results, all occupations with less than 200 people employed in 2016 are excluded. The omission ensures that the identification of major growth occupations is not distorted by data anomalies arising from industry classifications, e.g. identifying farmers as a significant growth occupation in the built environment sector. The threshold of 200 was chosen after an initial review of the dataset, as a large number of these high-growth low-employment occupations related to general office-based activities.

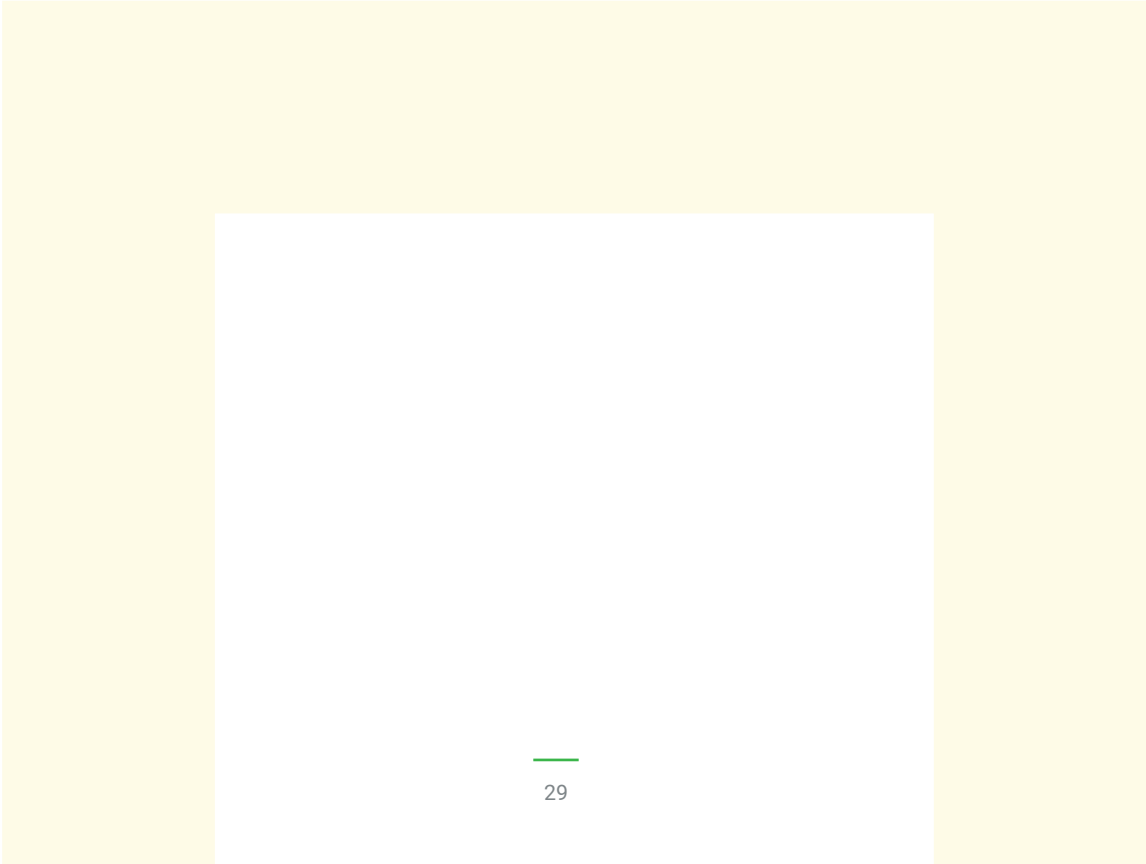
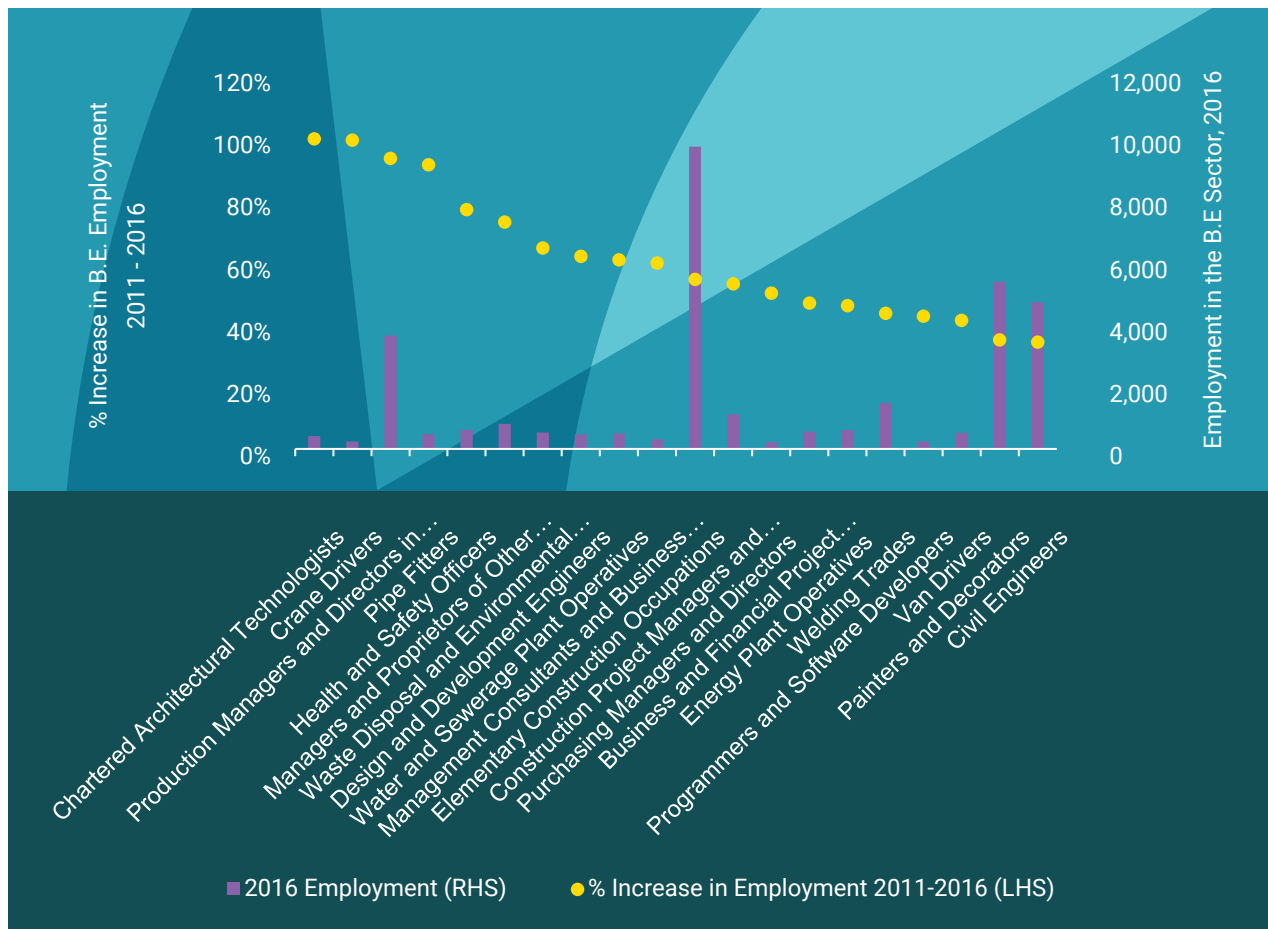


Figure 3.6: Emerging Occupations in the Built Environment Sector, 2011 - 2016



Source: Analysis of (CSO, 2020)

Of the top 20 fastest growing occupations, four were identified previously as ‘Core Skills’ of the built environment sector (brackets denote the numbers employed by occupation):

- Elementary Construction Occupations
- Painters and Decorators
- Civil Engineers
- Production Managers and Directors in Construction

A further seven were identified as ‘Niche Skills’ of the built environment sector:

- Chartered Architectural Technologists⁵
- Crane Drivers
- Pipe Fitters
- Waste Disposal and Environmental Services Managers
- Water and Sewerage Plant Operatives
- Construction Project Managers and Related Professional
- Energy Plant Operatives

⁵ To note- while this is the occupational SOC-code used by the Central Statistics Office, no ‘Charter of Architectural Technologists’ exists in Ireland. Individuals using the title ‘Chartered Architectural Technologist’ in Ireland are members of a UK professional body. The Royal Institute of Architects in Ireland has a membership class ‘Architectural Technologist’ who has a recognised qualification accredited by the RIAI or equivalent and practical experience. Membership of either professional body is not necessary to practice as an architectural technologist in Ireland. All references to ‘Chartered Architectural Technologist’ throughout this report should therefore be read as ‘Architectural Technologist’.

The remaining nine occupations are not traditionally considered built environment skills. These skills could be indicative of changes in how the sector is functioning, and the numbers of people employed in these occupations could be tracked using 2021 Census data. These nine occupations represent less than 4% of total industry employment. The majority of qualified persons in these occupations operate in other industries. The construction sector can, therefore, target staff in these sectors to fulfil its needs. The nine major growth occupations are:

- Health and Safety Officers
- Managers and Proprietors of Other Services
- Design and Development Engineers
- Management Consultants and Business Analysts
- Purchasing Managers and Directors
- Business and Financial Project Managers Professionals
- Welding Trades including Steel Erectors
- Programmers and Software Development Professionals
- Van Drivers

A description of the top twenty growth occupations and their associated entry-level qualifications are presented in the appendices of this document.

3.6.1 Emerging Skills within Occupations

Every occupation has different skills required for that work, which also changes as a worker progresses through their career or given the number of years of experience in that occupation. The skillsets and techniques used within the built environment sector have changed considerably over time. As tools and technologies evolve, so does the knowledge associated with the appropriateness of their use. The number of building materials that have been invented or proposed for use on buildings in the last 200 years has multiplied and with it the complexity of the building task and the skills needed to negotiate that complexity. There is an expectation within each occupation that industry training keeps pace with the changes within the industry itself. The techniques and technology deployed within the built environment sector shifted dramatically from 'traditional' methods used at the time that the oldest functioning buildings were constructed, to increased mechanisation and machinery reducing the labour to the capital ratio used in building, to an increase in the diversity of materials used in construction, allowing for innovation in design, and increasingly now to the use of digital information systems such as Building Information Modelling to ensure the transfer of knowledge across the sector.

It is not always possible to determine the changes in skills that are required for different occupations. However, given the change in building techniques, the change in materials used and the increased use of technology in buildings and infrastructure, there is a vast range of skills required within built environment occupations. While this report does not set out to analyse skillsets granularly by occupation, the limitations of using occupation as a proxy for skills are acknowledged. It does not capture embodied knowledge that is associated with particular skills, nor the range of skills within each occupation. This latter point is

essential for the built environment sector given the variety and complexity of building tasks that are undertaken across the sector, and that will be expected from the sector in the near future. These themes are discussed further in Section 5, given that Project Ireland 2040, the Climate Action Plan and the Action Plan for Housing and Homelessness will significantly influence how the built environment sector operates while determining what activities will be undertaken in the next decade. The emerging skills required for the sector may not necessarily be new.

3.7 Skills Shortages

Shortage indicators are available for built environment occupations from the National Skills Bulletin 2019 at an aggregated level (SOLAS, 2019). SOLAS provides valuable insight into skills mismatch across all sectors, so provides an overview at the occupational level for the entire Irish labour market, not just the built environment. SOLAS's analysis is based on data held within the National Skills Database, continual monitoring of the labour market, and is augmented by ongoing dialogue with firms and industry regarding the sourcing of skills.

According to the 2019 National Skills Bulletin 11 occupations relevant to the Built Environment, and which span both 'core' and 'niche' skills, were identified as being in short supply in 2019. These are detailed by broader occupational Group in Table 3.1 (as shown by a traffic light system- red for the existence of specific shortages within a broader occupational group, and green for no shortages within a specific group). The final column of Table 3.1 details the specific occupations that are in short supply, namely:

- Civil Engineers
- Construction Project Managers
- Quantity Surveyors
- Carpenters
- Glaziers
- Steel Erectors/fixers
- Curtain Wallers
- Scaffolders
- Pipe Layers
- Electricians
- Construction Site Drivers

Table 3.1: Shortage Indicators for 'Skills' of the Built Environment Sector

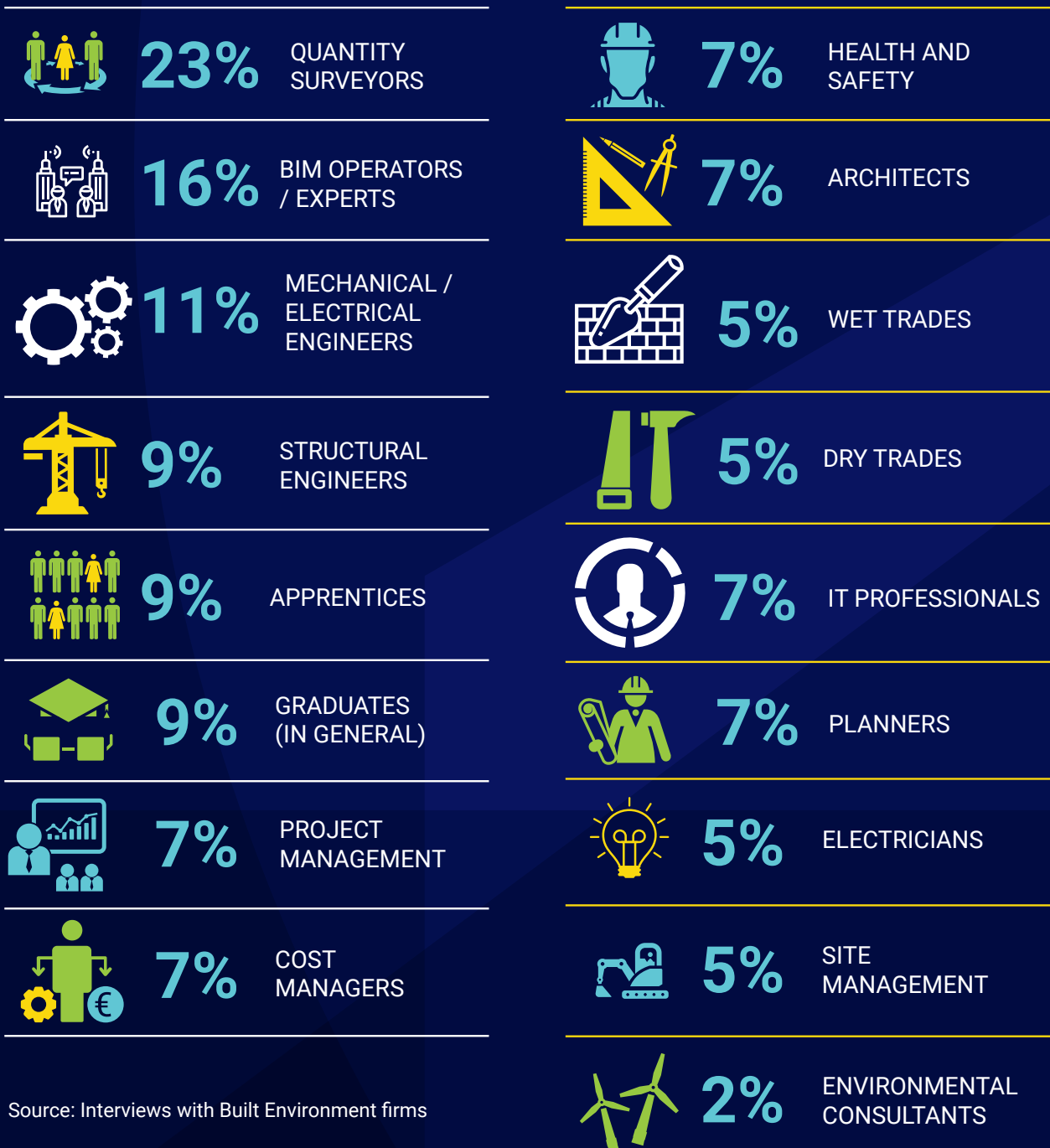
Broad Occupational Group	Shortage indicator	Occupation Shortage details
Civil engineers and Construction Project Managers	●	- Civil Engineers - Construction Project Managers
Architects and Town Planners, Architectural Technologists and Surveyors	●	- Quantity Surveyors
Bricklayers and Plasterers	●	
Plumbers	●	
Carpenters and joiners	●	- Carpenters
Painters and Decorators	●	
Other Construction Trades	●	- Glaziers Steel Erectors/fixers Curtain Wallers
Construction Operatives and Elementary	●	- Scaffolders Pipe Layers
Electrical and Electronics Trades etc	●	- Electricians
Mobile Machine Drivers and operatives	●	- Construction Site Drivers

Source: National Skills Bulletin (SOLAS, 2019)

Few definitive themes can be derived from this information, other than that shortages are being recorded in particular in occupations involved at planning, or in the early stages of construction. Ultimately many of these shortages are frictional due to the rapid growth in construction activity. There is evidence of poor uptake of built environment-related craft apprenticeships and spare capacity in many Higher Education courses, indicating barriers to new entrants to the sector.

In terms of the perspective of the built environment industry (from the 40 interviews that were undertaken), the top three roles that respondents found most difficult to recruit were Quantity Surveyors, BIM Operators/Experts and Mechanical or Electrical Engineers (Figure 3.7). In the case of Mechanical and Electrical engineers, demand for these roles within Built Environment activities is expected to increase with technological and environmental trends; indeed, according to Engineers Ireland, Electrical and Electronic and Mechanical and Manufacturing accounted for 83% of the demand for engineering skills within the Construction sector in 2019. When the tradespeople are grouped together (wet trades, dry trades and electricians), they account for 15% of roles that are difficult to recruit. Overall, one third (32%) of the firms interviewed stated that it was harder to recruit people into their firms in the last year, while one fifth (18%) expressed that they found it easier to recruit during that time, while half (50%) of firms stated that they found no change in their ability to recruit in the last year. For the micro firms that were interviewed (self employed), none of the interviewees expressed an interest in hiring someone else.

Figure 3.7: Specific roles that industry has difficulty in recruiting (2020).



Source: Interviews with Built Environment firms

3.8 Conclusion

This section has examined in greater detail the skills required by the built environment sector in Ireland, as well as issues surrounding skills shortages.

Employment in the built environment sector in Ireland is quite cyclical: falling sharply during the late-2000s recession and increasing again as the economy has recovered. The main exception to this has been utilities, where employment has remained steady over time. While employment has recovered partially since 2007, the industry still suffers from the underrepresentation of women and people between the ages of 25 and 35.

Skills in the built environment sector were classified by their 'prevalence' (how frequently they feature in the sector) and 'specificity' (how concentrated they are in the sector). Occupations that are highly prevalent and specific to the sector, such as carpenters and electricians, are the 'core skills', and these represent a significant proportion of overall employment. 'Niche skills' are those that do not necessarily account for a large proportion of overall construction employment, but are highly-specific to the sector, such as tilers or crane operators. The craft apprenticeship system is the main route of entry to most of these types of occupations; reinforcing the importance of craft apprenticeships in providing a steady supply of essential skills to the construction sector.

However, 11 occupations were identified as currently facing a skills shortage. Shortages have been identified in particular for occupations involved at planning or in the early stages of construction. Ultimately, many of these shortages are frictional due to the industry's rapid growth in recent years. However, there is evidence that poor uptake of construction-related courses and craft apprenticeships may be related to a broader perception that the built environment is an unreliable sector for developing a career in, a perception that has not subsided following the economic crash of the late-2000s.

4

Learning from the Past

> Learning from the Past

4.1 Introduction

In preparation for this project, the EGFSN assessed the strategies adopted for future skills needs of the construction sector in the decade following the 2008 downturn.⁶ As planning for future skills needs is a continuous process that requires monitoring, validation and re-evaluation, it is crucial to take stock of measures that were adopted to plan for future workforce needs. This chapter summarises the central policy interventions and strategies adopted for the construction sector over the past decade and provides an essential context for the recommendations made on the future of built environment skills to 2030. It also acknowledges the considerable work that was undertaken to date on future skills needs (skills governance and building blocks in labour market intelligence) and provides insight into potential interventions in preparation for the coming decade.

This chapter summarises the recommendations, chronicling the implemented measures that resulted. The previous section identified thirty critical occupations for the built environment sector. Twelve of these occupations require a specific craft apprenticeship or trainee qualification. Six occupations required a specific third-level qualification. Overall, this means education and training completion data should indicate the availability of appropriately educated individuals for eighteen of the critical occupations of the built environment sector.

The remaining twelve occupations do not require any specific qualification; these are either unskilled workers or those who may need a generic third-level qualification. Entry into these occupations is less restrictive and selective in comparison to the eighteen, which require a specific qualification. Barriers for entry into these roles are more likely to be linked to perception and conditions such as pay.

The EGFSN review identified four classifications of recommendations that were made between 2008 and 2018. These were recommendations to:

- Boost skills supply
- Align training provision with industry needs
- Export trade diversification
- Boost productivity and innovation.
- Each classification of recommendations is discussed.

4.2 Measures to Boost Skills Supply

The recommendations to boost skills supply targeted interventions regarding craft apprenticeships, third level courses and changing the perception of the attractiveness of the industry for new entrants and also with a focus on attracting women into the sector.

⁶ EGFSN, (2019) Skills for the Construction Sector: Assessment of 2008-2018 Strategies. Expert Group on Future Skills Needs

4.2.1 Apprenticeships

As the previous chapter identified, apprenticeships are the primary source of skilled labour in the built environment sector. They are a form of blended classroom and practical learning. The majority of these apprenticeships are accredited at Level 6 of the National Framework of Qualifications. Apprenticeships require the apprentice/trainee to spend several phases with an educational organisation and with qualified employer or sponsor.

The Construction Industry Federation stressed the need for reform of the craft apprenticeship process to make it more flexible to employers. This cost element is an essential consideration as craft apprenticeship uptake is a function of employer recruitment and learner interest.

Table 4.1: Implemented Measure 1 – Shared Apprenticeship Scheme

Situation: The Construction Industry Federation (CIF) identified that construction firms were acting in a financially conservative manner in the aftermath of the global financial crisis. Firms were reluctant to employ apprentices due to uncertainty regarding the pipeline of work.

Task: CIF advocated for a shared apprentice programme to reduce the financial risks to firms making them more likely to take on apprentices as an industry.

Action: The pilot set up in the South East Branch of CIF in 2015. CIF members created co-ops where several construction companies collaboratively provided training for new apprentices throughout the industry. Apprentices were able to move between companies to ensure continuity of engagement and training.

Result: A decision was taken to extend this scheme nationally. No information is available to date on the uptake of this measure.

Table 4.2: Implemented Measure 2 – ApprenticeJobs.ie

Situation: There was a lack of visibility for a school leaver seeking to connect with craft apprenticeship opportunities. A need to rectify visibility issues was identified.

Task: A website was established to increase the visibility of craft apprenticeships to school leavers and connect them to vacancies.

Action: CIF members approved by SOLAS to employ apprentices were allowed to advertise vacancies online free of charge.

Result: The original portal apprentices.ie has been replaced by apprenticeshipjobs.ie- a Generation Apprenticeship approved portal that extends beyond the original CIF portal and therefore construction specific craft apprenticeships.

Additional measures regarding craft apprenticeships were considered but not implemented. Ó Murchada and Murphy (2018) identified, from employer survey data, that financial burden is the cause of common issues faced by employers to invest in training and craft apprenticeship. Several interventions were suggested, such as:

- Waive national training fund levies for firms who engage in craft apprenticeships
- Government subsidisation of craft apprenticeship trainees, where occupational shortages exist
- PRSI exemption for firms employing apprentices in trades where deficits were observed.

The above suggestions are rational from an employer's/firm's perspective, as firms seek to maximise profit. There is evidence that the industry does not generate significant profit margins either due to high costs or low remuneration for services, possibly both. Nonetheless, the appetite for employer recruitment may act as a constraint on craft apprenticeship uptake.

There were many reasons that such suggestions were not implemented; such as they gave preferential treatment to one sector (construction) and the existing high levels of subsidisation for craft apprenticeships relative to other apprenticeships.

A more nuanced intervention/strategy is therefore required. The Ó Murchada and Murphy (2018) report identified the financial costs of training as the primary concern. If this is the case, then the reform of how craft apprenticeships are delivered to reduce costs would be an appropriate step. To ensure effective change to the process, employers would need to identify what aspects of craft apprenticeships are most costly and discuss solutions.

4.2.2 Higher Education Courses

Higher education courses are required for a significant proportion of built environment jobs. Higher education qualifications are entry-level requirements for six critical built environment positions. Certification generally corresponds to Level 7 or 8 of the National Framework of Qualifications. Primarily learning takes place in the classroom but often involves work experience as part of obtaining a higher qualification. In many cases, employees that require higher qualifications are encouraged to obtain a postgraduate qualification and engage in continued professional development.

No specific measures to boost skills supply to third-level built environment courses were identified. Most actions to increase supply to higher level courses were focused on pre-entry promotional campaigns associated with the attractiveness of the industry.

4.2.3 Industry Attractiveness: Career Pathways

Aside from specific shortages of qualified individuals associated with craft apprenticeships or third level education system, there are general issues with the perception of the industry and its attractiveness as a viable sector for career progression. Significant focus was placed upon this perception of attractiveness, between 2008 and 2018.

- Several media campaigns were suggested by relevant organisations, including:
- Target young people for careers in the construction sector (CIF, 2017) and (IBEC, 2018)
- Communicate the industry's ability to shape society and deliver world-class projects (CIF, 2017)
- Promote health and safety standards (CIF, 2017)

CIF advocated for a collaborative forum involving all stakeholders to market construction as a viable career option in a coordinated manner. None of these measures has been implemented as of yet. Two examples of actions which were taken include the Ireland Skills Live Event and the Generation Apprenticeship Promotional Campaign.

Table 4.3: Implemented Measure 3 – Ireland Skills Live Event

Situation: Ireland Skills Live is an annual event sponsored by industry to address negative perceptions that students, parents, teachers and career guidance counsellors may have about apprenticeships as a career pathway.

Task: Ireland Skills Live exposes attendees to competitions and demonstrations by apprentices and trainees. Construction employers showcase a range of jobs they currently have to offer.

Action: Coordination of construction industry careers event. Construction employers showcased a range of jobs they currently have on offer. Potential entrants got an opportunity to gauge their interest in construction skills and attend panel discussions with industry leaders.

Result: Ireland Skills Live was held in 2019 and attracted 12,500 visitors. The event, which was substantially state funded, also received some industry funding, including from the construction industry.

Table 4.4: Implemented Measure 4 – Generation Apprenticeship Promotional Campaign

Situation: Overarching public and private sector apprenticeship promotional campaign

Task: Generation Apprenticeship is a combination of a promotional campaign and competition which showcases careers and skills of Irish apprentices.

Action: The targeted employers, prospective apprentices, schools and guidance counsellors with information booklets. Materials were also used at high profile events, meetings with employer groups and in traditional and social media.

Result: No information is available on the effectiveness of the measure in terms of its impact on perceptions.

Also, several initiatives have been launched by various industry organisations. Examples of such actions include:

- Work Placement Initiative launched by CIF in 2016 which allows members to offer work placements to local transition year students and is supported by the Institute of Guidance Counsellors
- WorkXperience Platform allows CIF members to advertise their willingness to take on work placement students. The programme is targeted at 16-19 years olds
- ‘Building Your Career Initiative’ is an event which allows second-level students to learn more about construction career opportunities as well as educational pathways
- STEPs Outreach Programme operated by Engineers Ireland, promoting the interest and awareness of engineering more generally for school students. This incorporates several sub-strands.

Overall, there appears to be significant activity amongst different subsectors in promoting the industry. A greater need for coordination to direct this activity effectively, and to ensure that messaging is consistent, was identified. Many of these activities outlined above may be described as promotion aiming to attract new entrants to the industry. However, there appears to be less of a focus on changing the industry to address the underlying concerns associated with working in the industry.

4.2.4 Industry Attractiveness: Opportunities for women

Gender diversity is seen as one of the critical challenges for the Construction/built environment sector in terms of ensuring that the sector has an adequate supply of labour. Currently, the industry is dominated by male participation (96%), thereby, primarily drawing its supply from just over half of the workforce. Overall female employment makes up 4% of key and niche employment. Low levels of female participation are pronounced in craft apprenticeship-based industries linked to construction. Targets have been set to increase female participation:

- CIF has set an industry target for the construction sector to increase female workforce participation to 25% by 2030 (CIF, 2018)
- SOLAS is seeking to encourage female participation in trades which have less than 20% females (0.3% of craft apprenticeship registrations for eight programmes were female) (SOLAS, 2018)

Many organisations host events around International Women’s Day and CIF recommended several actions for industry and companies to support its objectives:

- National multi-annual awareness campaign to highlighted gender balance as a priority
- Promote the construction industry as a critical priority
- Promote the industry as a vital destination for women
- Structured outreach to primary and post-primary schools including open days and site visits
- Educate career guidance teachers and students about opportunities available to men and women
- Introduction of gender-inclusive recruitment policies
- Staff training on gender bias
- Mentoring programmes for female employees

Many of these actions aim to attract women to the industry. More information is required to understand what proportion or cohort of women are interested in joining the industry at present and in determining why they have chosen other career paths. Once these mechanisms are followed, the industry must seek to change its practices to facilitate more women in the workplace. Retention of women in the sector is considered a priority. Rather than simply aiming to reach proportionate participation rates for both men and women, it is recognised that more support is needed for women in the industry undergoing life changes – especially when pregnant and post-birth.

4.2.5 Migration

The global workforce refers to the relatively recent historical trend (from the mid-twentieth century – although Ireland has a long historical tradition of out-migration) of cross-border movement of labour. As a developed country, the choice of migration of construction skills to and from Ireland are based mainly on work opportunities (as opposed to other countries, where escaping poverty and conflict may be the determining factor). Given that construction activities correlate to the business cycle, the movement of labour into and out of the built environment sector is relatively fluid – that is, transversal skills between occupations and across political/geographical borders.

Migration policy primarily focused on the Irish diaspora due to the numbers of experienced workers who left Ireland in the aftermath of the global financial crisis. Many of the workers emigrated over this period went to Australia, Canada, the United States, New Zealand and the United Arab Emirates.

Table 4.5: Implemented Measure 5 – CIF Diaspora Recruitment campaign

Situation: Over 100,000 construction workers are believed to have emigrated after the 2008 financial crisis.

Task: In 2016 the CIF engaged in a recruitment drive to attract back skilled Construction personnel within the Irish Diaspora

Action: Several initiatives arose from this recruitment campaign, including the establishment of cifjobs.ie as part of an effort to target the diaspora workforce to fill available and emerging jobs. CIF also partnered with several organisations to inform migrants of the career opportunities in Ireland. The communication provided the information required when returning to Ireland and even the first steps they could take to secure employment.

Result: The numbers of ‘returners’ was limited. Of those who have returned, the reasons have been primarily personal/family related rather than professional. CIF reported that several barriers existed for those seeking to immigrate including recognition of overseas qualifications, licenses and expertise, the volatility of the Irish construction industry. The Interdepartmental Committee on the Irish Abroad is trying to take action on a number of these issues.

Amendments were made to Employment Permit eligibility rules in April 2019 to broaden the list of construction-related occupations eligible for work permits. At a high level, several professional construction skills such as quantity surveyors and civil engineers were added to the critical list. In contrast, several skilled construction occupations were removed from the ineligible occupations list. Three hundred and seventy two employment permits were granted or built environment occupations in the 2019 year. This is very low in the context of overall employment in the sector.

4.3 Measures to Align Training Provision with Industry Needs

Ensuring that there is not only an adequate supply of, but that the workforce is equipped with the right skills is critical to the future performance of the sector. Measures to ensure that the industry is receiving the right skills are split into two categories:

- Review of Built Environment Skills Needs
- Increase Industry Participation in Skills Planning

4.3.1 Review of Built Environment Skills Needs

In the aftermath of the global financial crisis, considerable attention was given to the effects on the construction sector. Forfás undertook an analysis and made recommendations for the sector in 2013 in a report entitled 'Construction Sector – Outlook to 2015'. The recommendations from this report formed the basis for the overarching 'Construction 2020 Government Plan', published in 2014.

A meta-analysis and skills demand forecast was undertaken jointly by CIF and DKM in 2016, with support from the Skills and Labour Market Research Unit in SOLAS, published in a report entitled 'Demand for Construction Skill in Construction to 2020'.

Simultaneously, significant attention was given to climate change adaptation, the sustainability and green agenda in the built environment sector. The Build Up Skills Ireland (Intelligent Energy Europe, 2012) aimed to increase energy retrofitting activities. The Qualibuild initiative was established to implement the Build Up Skills Roadmap, but this has been discontinued. The sustainability agenda in construction is also driven by the Irish Green Building Council (IGBC). Additional training courses are delivered through the Education and Training Boards.

Table 4.6: Implemented Measure 6 – Irish Green Building Council

Situation: Climate change is changing how the industry is functioning and what is required of it. There is an increased demand for energy-saving solutions which has created opportunities in energy retrofitting. This market is in the early stages of development, and there is a need to plan for this growing market.

Task: There was a perceived need to provide leadership for sustainability in the built environment sector. The IGBC was identified as an organisation to provide this leadership.

Action: IGBC hosts green building event and education modules for the industry. The IGBC encourages the development of sustainable building tools, e.g. Environmental Product Declarations Platform. The Build Up Skills project (EU funded) enabled the development of a renovation strategy for Ireland

Result: In 2018, six hundred and ninety-five built environment workers were provided training in Near Zero Energy Building standards, and other green building certifications through training courses and webinars.

Table 4.7: Implemented Measure 7 – Centre of Excellence for Nearly Zero Energy Building skills

Situation: Near Zero Energy Building standards have been mandated in Ireland, but industry participants need to understand what these building standards mean for them and how they can comply.

Task: Training courses were needed to translate new building requirements into industry practice. NZEB training began in 2018.

Action: A “Centre of Excellence for Green Building Skills” was established through Waterford and Wexford Education and Training Board. A one-day NZEB Fundamental Awareness Training hosted over 500 industry participants in 2019.

Result: The impact of these arrangements are unclear, but the centre expects to increase training capacity to 750 people in 2020 (this may be impacted by COVID-19). Between November 2018, when training began, up to the end of February 2020, 607 people received training.

Table 4.8: Implemented Measure 8 – Reno-NUC

Situation: The work completed by the Irish Green Building Council and Limerick Institute of Technology (LIT) as part of the Build Up Skills and Qualibuild projects showed that a lack of skills at all levels of the supply chain could significantly jeopardise large scale deep energy renovation in Ireland

Task: The encouragement and facilitation of upskilling in energy renovation was required for construction workers and building professionals.

Action: Ireland’s National Renovation Upskilling Committee (Reno-NUC) was launched in February 2019. Reno-NUC was formed as a recommendation of the Sustainable Energy Authority of Ireland funded ECCoPro project. High-level strategic and policy input to support large scale upskilling of building professionals and construction workers in energy renovation in Ireland was initiated. The primary aims were to contribute to the development of a roadmap to launch a user-friendly holistic energy efficiency accreditation system for building professionals and construction workers and to oversee the development of an online self-assessment tool for building professionals and construction workers to help them identify their training needs and a pathway to acquire these skills.

Result: Collaboration between IGBC and SEAI. Publication of a set of recommendations for a user-friendly holistic energy efficiency accreditation for building professionals (2018). A review of knowledge and upskilling required for construction professionals when undertaking large scale deep renovation (2017) identifying not only the technical skills, but ‘soft skills’ (communication, customer care and psychology), and ‘multidisciplinary skills’ (collaboration skills)

4.3.2 Increase Industry Participation in Skills Planning

Several strategies have recommended the establishment of public and private sector groups to provide oversight of the development of construction skills. A public sector focussed Construction Sector Group (CSG) was established in 2014 to drive the implementation of the now lapsed Construction 2020 strategy; this was concerned with the broader construction agenda, rather than having a dedicated focus on skills development. Similarly, a new Construction Sector Group, composed of both public and private sector construction stakeholders, has meanwhile been established to facilitate the delivery of Project Ireland 2040. This group has, however, includes a focus on increasing the skills supply of the built environment sector as part of its work programme.

Table 4.9: Implemented Measure 9 – Construction Sector Group

Situation: Under Project Ireland 2040, the Construction Sector Group was established.

Task: Ensure regular and open dialogue between Government and industry on how best to achieve and maintain a sustainable and innovative construction sector positioned to deliver Project Ireland 2040.

Action: Its membership includes Government Departments and agencies, the critical Construction industry organisations, and the Irish Congress of Trade Unions. As well as improving productivity, environmental sustainability, and the modernisation of public works delivery, its remit includes a focus on ‘the supply of necessary skills and measures enhancing capacity (including the potential use of overseas contractors)’.

Result: Increased collaboration between industry and government. The undertaking of a study on productivity in the Irish construction sector.

CIF called for the establishment of a 'Construction Skills Forum'. The forum would monitor and address barriers to education and training. It is reasoned that greater employer involvement in the development of training will reduce skills mismatches arising from schooling. Such a forum has not been established to date. The construction industry currently communicates construction skills needs through engagement with:

- The network of nine Regional Skills Fora
- The annual call for Springboard+
- Relevant Skillnet Ireland Training Networks.

4.4 Measures to Diversify Trade

The built environment sector is concentrated on the domestic economy, with limited export of these services globally. It is desirable from a strategic growth perspective for companies to diversify their services to external markets. Diversification into overseas markets decreases the exposure of firms to the Irish market. It can improve the performance of firms domestically.

Promotion activities dominate measures to increase the export of Irish built environment sector overseas. Enterprise Ireland is the primary source of support for companies seeking to internationalise (c.750 firms across the Built Environment enterprise base), and provides several supports including:

- Trade events
- Organised buyers visits
- Market study visits
- Workshops on key target markets
- Developing market actions and planning client management development support

There are also several programmes indirectly benefiting Irish built environment firms, such as those encouraging greater engagement with graduate mobility programmes to facilitate internationalisation.

4.5 Measures to Boost Productivity and Innovation

Globally the built environment sector has suffered from weak productivity growth for years. Ireland's labour productivity in the construction sector was 24% below the European average in 2015 and ranked fourteenth in the Euro area⁷. In order to resolve the productivity conundrum, public policy has placed a premium on innovation as a means of boosting profitability. The innovation agenda has focused on transformative technologies with the potential to change how the industry operates broadly. These are innovation in management and digitalisation of processes.

⁷ Department of Public Expenditure and Reform, 2019. Project Ireland 2040 BUILD Construction Sector Performance and Prospects

4.5.1 Innovation in Management

Management practices in the built environment sector were traditionally weak. However, Forfás and Construction 2020 highlighted the relationship between management practice and firm performance. Actions were undertaken to promote the availability of existing leadership development courses which included:

- Skillnet Ireland’s Management Development Provision
- Enterprise Ireland’s Management4Growth programme
- Enterprise Ireland’s Leadership4Growth programme

There was no articulation of the measures taken to boost the participation of construction management in these courses. The numbers involved in Enterprise Ireland’s programmes were low, but it should be noted that the firms that Enterprise Ireland work with are only a small proportion of the companies in the built environment sector. Not all built environment services are traded internationally (export market).

4.5.2 Digitalisation

The digitalisation of the built environment sector has been a priority for several years as a means of boosting productivity. Digitalisation is the technological disruption of the built environment sector using computers and its technological offshoots, chief amongst them Building Information Modelling (BIM), but also including:

- Virtual, Augmented or Mixed Reality
- Mobile Technology
- Smart Sensors
- Drones

The government in the United Kingdom has endeavoured to promote the digitalisation agenda with built environment firms for many years, mandating the use of BIM in public capital programmes and promoting its uptake. In Ireland, the Construction IT Alliance (CitA, 2017) identified that the Irish Government is placing a growing amount of emphasis on BIM use. Enterprise Ireland contributed to the proliferation of BIM through facilitating the establishment of the National BIM Council, composed of public and private stakeholders. The National BIM Council developed a Roadmap to Digital Transition for Ireland’s Construction Sector 2018-2021 for the roll-out of BIM. The Construction Sector Group is implementing this roadmap and if approved, will deliver a BIM Centre of Excellence, as envisaged in the Roadmap, through the establishment of a Build Digital Project, to help drive the uptake of BIM across the sector.

Table 4.10: Implemented Measure 9 – Enterprise Ireland’s BIM-Enable and BIM Implement

Situation: Construction was slow to adopt technological innovation. This hesitance is considered as a contributing factor to slow productivity growth.

Task: Accelerate the adoption of BIM by the Built Environment Sector.

Action: BIM Enable and BIM Implement may be viewed as two stages of a single programme. BIM Enable is exploratory. It helps companies determine how they can apply BIM in their business and plan a roadmap to Level 2 BIM proficiency. BIM Implement provides support in the application of BIM through training.

Result: The efficacy of these programmes are not stated, but the majority of participants are at BIM Level 1 or 2.

Table 4.11: Implemented Measure 10 – Construction R&D Forum

Situation: Built Environment productivity is low. One of the hypotheses put forward for low productivity growth is the low level of R&D investment in the sector. It is believed that by boosting the R&D investment in the area will also increase productivity.

Task: Increase productivity and competitiveness of Irish Built Environment firms through Research and Development

Action: Identify sectoral and client innovation needs. Map R&D at academic institutions to innovation needs. Develop a thematic research agenda. Potentially establish a designated centre for Built Environment R&D.

Result: No outcome measures as of yet.

4.6 Conclusion

The EGFSN’s assessment catalogued a vast array of construction sector policy measures from the period 2008 to 2018. Recommendations and actions fell across four main themes: (1) Boost skills supply; (2) Align training provision with industry needs; (3) Export trade diversification; and (4) Boost productivity and innovation

The number of measures proposed or enacted shows that there is a significant drive to improve sectoral outcomes. However, there is a need to become more targeted in interventions. Many of the actions undertaken did not specify an outcome. There is a need to improve the monitoring and evaluation of activities going forward. Improved monitoring and evaluation will help policy-makers to assess what measures are having the desired impact, identify if the responses are efficient enough to continue, and allocate funding effectively.

5

Preparing for the Future

The Sector faces a number of challenges:

- Attracting a high-level, diverse talent pool consistent with the demands it faces*
- Legacy issues such as enterprise structure, employer recruitment and investment and structural workforce gaps*
- Embedding new competencies in the workforce, to facilitate the integration of new technologies, address productivity shortfalls, and support climate action through greater energy efficiency*

> Preparing for the Future

5.1 Introduction to the “PESTLE” Approach

There is a high level of labour mobility across countries for workers with built environment sector skills. Globalisation processes also influence changes to technology and innovation in the built environment sector. As a small, open market economy, Ireland’s development was primarily influenced by global trade and markets in recent decades. Changes in the international economy are a ‘double-edged sword’ for Ireland’s built environment industry, providing opportunities for growth as well as threats to established businesses who fail to keep up with these trends. This emphasises reskilling and upskilling, which should also be balanced with maintaining skills for the maintenance of traditional/vernacular buildings. As a response, there is a requirement on labour policy to remain proactive and identify early signs of change in order to give the Irish built environment labour market time to adapt to these changes.

As part of this study, the EGFSN engaged in horizon scanning through a “PESTLE” framework: the process of identifying early signs of development through the systematic examination of potential threats and opportunities. While undertaken before the Covid pandemic had made itself felt on the Irish economy, and while it is acknowledged that the pandemic will impact on the Built Environment sector, in the longer term many of the issues facing the sector- in particular the demands around housing, infrastrural development and climate change mitigation- will be consistent over the next decade. The regional development objectives implicit within Project Ireland 2040 in particular will support the moves towards greater remote working that have arisen from the Covid pandemic.

The PESTLE framework is used to assess external drivers for change. PESTLE splits the external environment into six factors:

- **Political:** Politics, approach to intervention in the economic functioning of society and the influence of policy.
- **Economic:** Goods, services, exchange, labour market, international trade are affected by economic factors. Any business, product or service will be affected by general economic factors.
- **Social:** Underlying structure and networks within society and how this affects outcomes. Can be linked to demographics (age, sex) and social norms (how people interact).
- **Technological:** Influence of technology on inputs, processes and outputs. Often concerns digital technology, i.e. applications, websites and similar projects, but also more traditional forms of technology linked to manufacturing, distribution or communications.
- **Legal:** How regulations or laws affect business, ideas or concepts. This can sometimes overlap with Political factors. Regulations located here are often more focused on the well-being of consumers or society rather than the agencies they are crafted by.
- **Environment:** Ecological factors relating to how the physical environment is affected.

While there is overlap between each category in the PESTLE framework, the main drivers in each category were set out – identifying both global and domestic drivers from the literature review process, and presenting perspectives from the interviews with Irish enterprises and stakeholders on each driver.

This section draws heavily from the Key Informant interviews undertaken between February and April 2020, and the interviews of built environment enterprises – for which 40 interviews were undertaken in total, across a broad range of firms operating in the built environment sector, and ranging in size from large companies and contractors to medium-sized businesses, to small micro-enterprises and sole traders.

5.2 Political

Global political drivers of changes to built environment skills

Public expenditure decisions have an impact on the skills requirements in the built environment sector. The projects that governments choose to spend money on will influence the total number of workers needed in the industry as well as the types of workers needed. Government priorities can change over time and may not always accord with the current skills mix in the industry. From reviewing emerging international literature on future skills demand, it became apparent that the political or ideological approach taken in each country influences planning and intervention in the labour market.

Increasingly, there is a consensus emerging that life-cycle skill formation is essential, and that early intervention or influencing strategies increase skill levels, even prompting discussion of professional development in early childhood programmes⁸. However, much of the focus on the appropriate age to target the development of skills for the built environment sector still focuses on late teen and early adult vocational education and training in most OECD countries. There is an emphasis across all industries on lifelong learning, and for the built environment sector, the challenge is how to develop the skills of the existing workforce continually.

There is also an emerging ‘integrative’ approach to future skills, which emphasises broad sets of future skills that are required beyond any particular sector. This is particularly evident in initiatives such as the United States’ Occupational Information Network (O*Net)⁹, but also across the OECD’s programmes such as the Programme for the International Assessment of Adult Competencies and the ILO’s Skills For Employment.

This is important for the built environment sector, as it highlights the importance of basic skills and competencies, along with a range of skills and literacy that are increasingly required for all jobs (e.g. adapting to the digitalisation of processes). While the pedagogy is changing toward acknowledgement of universal sets of skills to accompany the specific skills required by particular occupations (for example integrating digital literacy for built environment professionals, through the use of BIM), the political focus or impetus on construction and built environment skills development is inextricably linked to economic indicators, such as low productivity targets^{10, 11}.

⁸ Sheridan, S., Pope Edwards, C. Marvin, C. and Knoche, L. Professional Development in Early Childhood Programs: Process Issues and Research Needs. Early Education and Development Vol 20,2009

⁹ <https://www.onetcenter.org/>

¹⁰ OECD and ILO, Better Use of Skills in the Workplace – Why it matters for productivity and local jobs.

McKinsey Global Institute, 2017. Reinventing construction: A route to higher productivity

Domestic political drivers of changes to built environment skills

The political ecosystem of delivering construction training, education and skills in Ireland has involved a mix of educational and training agencies since the 1930s:

Historically, the training of built environment craft workers was carried out through apprenticeships within formalised trade guilds. In 1931 the Apprenticeship Act was introduced to regulate training in the crafts. However, the only trade in the construction industry that was designated at that period was that of the house painters and decorators.

The 1931 act was replaced in 1959 by the Apprenticeship Act, which set up AnCO to take responsibility for training, including apprenticeships. In 1965, that “the trade of building and construction” became a designated trade under the act, with apprenticeships brought under the responsibility of AnCO.

In 1987 the Labour Services Act replaced AnCO with a new FÁS, which was replaced in turn by SOLAS in 2013. Under the present system, the responsibility for a great deal of training rests with sixteen regionally-based Education Training Boards. This includes the provision of craft apprenticeship training, though SOLAS has the overall responsibility for the nationally-based oversight and coordination of craft apprenticeships.¹²

In recent years, the Irish Government implemented policies aimed at increasing the supply of housing in the state, both private and public, which are additional political drivers affecting the demand for skills in the built environment sector. From 2015 the measures included changes to planning guidelines on apartments, Ireland Strategic Investment Fund (ISIF) support for housing delivery, measures to maximise strategic development zones and the requirement for high-density development in some locations.¹³ The government has also committed to several large infrastructure projects through the Project Ireland 2040 which includes the National Planning Framework to 2040 and the National Development Plan 2018-2027 which will similarly increase the demand for workers in this sector.

MBIE, 2013. New Zealand Sectors Report: Construction. New Zealand Government. Ministry for Business Innovation and Employment
The Australia Institute, 2014. Productivity in the Construction Industry. Technical Brief no 33. David Richardson

¹¹ The Work Foundation and City and Guilds, 2018. Constructing the Future: How the skills needed for success in the workplace are changing

¹² Department of Education and Skills, 2013. Review of Apprenticeship Training in Ireland.

Molloy & Associates, 2015. Research on the Irish labour market in construction conservation. Report prepared for the Heritage Council of Ireland

¹³ Construction Industry Federation, 2017. Demand for Construction Skill in Construction to 2020. Report prepared by DKM Consultants

Project Ireland 2040

The National Development Plan 2018-2027, part of Project Ireland 2040, envisages increased public and private home building from current levels. It also earmarks money for urban regeneration schemes. Specifically, the plan aims to double housing output from 2016/17 levels to between 30,000 and 35,000 new homes per year. Also, the plan includes:

- Bringing 112,000 social housing homes into use by 2027, maintaining increased outputs under 'Rebuilding Ireland'
- Providing €2 billion Urban Regeneration and Development Fund (URDF) funding for Cork, Limerick, Dublin, Waterford, Galway
- A National Regeneration and Development and Regeneration agency to release strategically-located landbanks

A package of strategic public-owned sites to be developed for public housing purposes but with a mix of private housing and affordable homes.

In addition to the skills required for the increase in residential construction envisaged by the National Development Plan, the plan also includes funding for other significant capital investments. The Plan includes €116 billion over the ten years, €91 billion of which is Exchequer funding and €25 billion is from Semi-State Companies. The Government has committed to increasing public capital investment to approximately 4% of GNI* and then maintaining investment at this level over the remaining period of the National Development Plan. There are currently four infrastructure projects with an estimated project cost of over €1 billion. These are:

- MetroLink
- The national children's hospital
- Water Supply Project
- National Broadband Plan

Both the Climate Action Plan (discussed further in section 5.7) and the National Development Plan contain ambitious investment priorities that will affect the demand for built environment skills. As a result of these Plans, there is now a significant investment in large infrastructure projects and within the residential market. Given that there is a transferable built environment workforce that operates across infrastructural, commercial and residential projects for many sectors, a particular project may compete for the skilled workforce within this pool.

Stakeholder's perspectives on political drivers of change

Consultations with critical stakeholders specifically highlighted the following perspectives on issues related to political drivers of change:

- **The significance of policy and the political system to the built environment sector:** The State makes policy and regulations the sector must abide by, and is a significant source of demand for its services. Stakeholders expressed a desire for certainty and stability from the State; an uncertain political environment acted as an impediment to investment and skills development.
- **The development of Project Ireland 2040 is an overall positive step for the Irish economy and built environment sector:** With the sector's growth closely aligned to the broader macro-economic cycle, a steady level of government investment provides the sector with stability and enhances its ability to forward plan.
- **A perception and concern that planned Project Ireland 2040 expenditure/projects are backloaded towards its later years, with a relative lack of shovel ready projects in the first half of the plan:** Stakeholders expressed concerns that an uneven spread of projects/expenditure would lead to sudden increases in demand for labour and skills in its later years, and exacerbate the effects of future labour shortages in terms of cost and time increases. Some expressed a desire for increased spending in the plan's earlier years.
- **Changing political priorities, revisions to Project Ireland 2040 and lack of Government multi-annual budgeting are viewed as other sources of uncertainty:** All may pose additional risks to the implementation of Project Ireland 2040, with shifting plans and priorities viewed as making skills planning difficult for the sector.
- **Lack of coordination in the development and implementation of policy is another potential source of uncertainty for the sector:** The built environment sector is affected by policy and regulation from a range of public bodies, with different mandates and different policy priorities. Some stakeholders felt a lack of policymaker coordination in the timing of policy/regulatory changes and congruence of policy goals creates uncertainty and delays in construction investment.
- **The current housing shortage in Ireland is seen as driving growth for the sector at present:** Many firms see residential development as a lucrative market, which is likely to drive demand for environmental specialists due to low energy housing requirements. The pharmaceutical sector, commercial spaces/buildings for international corporations and the public sector are also identified by firms as growth markets. Respondents argued developments for international companies are required throughout the country in towns and urban locations, and not exclusively in the existing cities.

5.3 Economic Drivers of Built Environment Skills

The economic drivers of change in the built environment sector are closely linked to political drivers of increasing productivity within the built environment sector.

The economic drivers for matching skills with demand in the construction sector centre on the intrinsic link between the construction activity and the macro economy, and the joint policy goal of continued economic growth while ensuring economic stability. The built environment sector is subject to procyclical fluctuations, shifting between periods of accelerated growth in output and periods of stagnation or contraction. Governments attempt to provide overall macroeconomic stability.

The built environment sector is exposed to timing constraints, with the lead time into many significant construction projects extending. This increases the exposure of the industry to uncertainty. The increasing global division of labour and the high demand internationally for skilled construction workers further amplifies the skills shortages in the built environment sector.

The issue of low labour productivity growth in the construction industry is well documented in most OECD countries¹⁴ and is a significant policy focus. The focus on future skills needs for the built environment sector shifts to skills needed to increase productivity and skills required to replace or complement labour (e.g. machinery and digitalisation). For the built environment sector, this is linked to technological advances, as discussed in Section 5.5.

The Government of Ireland's Build Report (2019) noted an increasing level of investment and output from both the public and the private sector in terms of infrastructure and housing. However, the report also pointed to elevated tender inflation in the non-residential sector, and subdued levels of construction training and education and employment in the industry; below the EU average at a time of close to full employment in the economy. Combined with stagnant productivity growth in the sector since 2000, these factors pointed towards a growing capacity constraint in the industry.¹⁵

Domestic Economic Drivers of Change

Information concerning the Irish economy is vital to understand the Built Environment sector's performance to date and to provide insight as to how the sector will perform in the future:

- **Economic Growth:** Over the seven years 2012-2018, the Irish economy grew by 83% in terms of real Gross Domestic Product. GDP measures are recognised as unreliable for the Irish economy and tend to grossly overstate economic activity in the State due to the distortive impact of multi-national corporations.¹⁶ In response to the irregularity of GDP measures, the Irish Central Bank adopted the use of Gross National Income (GNI*) which removes a significant portion of these irregularities to obtain a

¹⁴ Farmer Review, 2016. The Farmer Review of the UK construction labour model *Modernise or die: time to decide the industry's future*, October 2016

¹⁵ Government of Ireland, 2019. Project Ireland 2040 Build: Construction Sector Performance and Prospects 2019.

¹⁶ Lane, P. and Milesi-Ferretti, G. 2017. International Financial Integration in the Aftermath of the Global Financial Crisis/ International Monetary Fund Working Paper.

more accurate reflection of real economic activity in the state.¹⁷ GNI* for the period 2012–2018 indicates much lower, but still extremely high, growth of 54% from 2012 to 2018 – or an annual average growth rate of 9% over that period.

- **Employment:** Notwithstanding the shortcomings of GDP as a reliable economic indicator and the modifications thereof to the GNI* indicator, the unemployment rate remains a suitable and reliable indicator for assessing changes to the Irish economy. Unemployment previously peaked at 16% in 2011 and was on a trajectory to dip to a low level of 4.5% in 2020, before the onset of the COVID-19 shock to the economy and society. Based on historical trends and data, an unemployment rate of between 4% to 4.5% generally signals the peak of its economic cycle. However, there may be potential to continue to increase the absolute size labour force even at these low levels of unemployment. For instance, those currently considered outside the labour force (i.e. not seeking work) may be attracted back into employment as current labour force participation is below historical norms.
- **Government Debt:** The indebtedness of the Irish economy since the Global Financial Crisis continues to be of concern for macroeconomic management and economic growth. Gross Government Debt carried by the Exchequer is €203bn in 2016 prices. Most accrued between 2008 and 2013, increasing by over 350% in real terms from €48bn in 2007. Despite net improvements in the Exchequer position over the period 2014 to 2018, this debt remains high. It is now likely to increase significantly due to the economic shutdown implemented to arrest the spread of COVID-19 and the subsequent recession that is predicted to follow from mid-2020.

Government debt is measured as a percentage of GDP to allow comparison between countries. In Ireland’s case, measuring debt as a percentage of GDP provides a distorted picture of Ireland’s debt position due to the exaggeration of real economic activity whereby debt only represents 64% of annual Irish production. GNI* provides a more accurate measure of Irish indebtedness at 104% of economic activity- making Ireland the fourteenth most indebted country in the world in 2019. Ireland is at an advantage that borrowing rates are historically low. Interest rates on Irish 10-year bonds are near 0%. In the short-run, this means that the government was able to lower the cost of servicing its debts and free up money for projects postponed during the period 2008-2013. In the medium to long term the indebtedness of the Irish economy would limit the government’s ability to fund expenditure deficits to stimulate the economy in the event of a downturn, meaning austerity measures would most likely be required. This is of particular concern as Ireland faces into an inevitable recession as a result of COVID-19.

- **Government Expenditure:** Government expenditure increased by 15% between 2014 and 2018 in real terms. In 2019, both the Parliamentary Budget Office and the Irish Fiscal Advisory Council raised concerns over expenditure increases in the public sector, criticising frequent current expenditure overruns over what had been budgeted. Significant increases in tax receipts over-and-above forecasts have not translated into significantly improved budget balances. While tax revenue increased by €10-€14 billion per annum between 2015 and 2018, the budget deficit only reduced by €3 billion during this period.

¹⁷ Factor Income on redomiciled Companies, Depreciation on R&D Service Imports and Trade in IP and Depreciation on Aircraft Leasing are excluded from standard measures of GNI. GNI is calculated in the same way as GDP but additionally includes net subsidies from the EU and Excludes Net Factor Income from the rest of the world. This does not exclude the impacts of Contract Manufacturing activities which are also a source of distortion in Ireland’s national accounts.

Most expenditure increases during this period were invested in current expenditure, rather than capital projects. This is of concern as they relied on highly-volatile revenue streams like Corporation Tax and Stamp Duty, to a lesser degree. As of 2018, Corporation Tax accounted for 14% of all tax revenues or €10.5bn per annum. While a relatively small proportion of overall tax revenue, Corporation Tax accounted for 26% of revenue growth between 2011 and 2018, increasing by 177% over the period. These increases are not sustainable as they derive from the activities of a small number of large multi-national companies that are highly mobile. Increases in Stamp Duty have mainly been driven by property price increases, particularly in Dublin. While these have grown at a similar rate as Corporation Tax, they come from a much lower base and therefore have had a smaller impact on the budgetary balance.

Stakeholder's Perspectives on Economic Drivers of Change

On economic drivers of change, stakeholders highlighted the following in the consultations undertaken for this study:

- **The cyclical nature of the built environment sector in Ireland:** Stakeholders attributed current problems facing the sector in terms of labour and skills shortages to the volatility of the past decade, in particular the contraction of public investment after the 2008 financial crash- this compounded the effect of the collapse of the private construction market in subsequent years. Many stakeholders noted the importance of a steady level of public investment to stabilise the sector during recessions when private sector demand is relatively low.
- **The collapse and subsequent stagnation of demand continue to have an impact on current labour and skills shortages:** Many workers made unemployed have not re-entered the industry, due to emigration, retirement or transfer to other industries, leading to a shortage of available workers; industry stakeholders note particular shortages of those in management positions with 10-15 years of experience. As a result, stakeholders have argued that the productive capacity of the industry has not recovered with the same speed as demand, and have observed trends that are indicative of labour shortages such as high levels of construction inflation, extended tender periods due to lack of bids, and delays in securing consultants for projects.
- **Reduced employer recruitment and increased incidence of self-employment and sub-contracting:** To stabilise their finances throughout the recession, many companies have failed to hire new entrants for an extended period. While not a new trend, stakeholders also noted higher levels of self-employment and sub-contracting since the economic crash. While this poses apparent issues in terms of job security and social welfare entitlements, some stakeholders questioned the effect of this on labour supply and the attractiveness of construction as a career.
- **A lack of education and training capacity to provide a steady supply of new labour during this period and perceptions around construction as a career:** Given the lack of demand and high cost of providing construction related courses, education providers initially shifted resources away from these courses and towards other sectors, making it difficult to ramp up capacity again. Issues around perceptions of construction as a career have also discouraged people from taking up construction related courses and craft apprenticeships.

Built environment firms offered the perspective that the volatility of the sector and perception of low wages impacts on its attractiveness, especially with graduate skills being in demand in more lucrative sectors such as IT. More emphasis also needs to be placed on vocational training and its alignment with Third level education institutions, to encourage schoolleavers to undertake craft apprenticeships. Measures are also needed to ensure employers are willing and able to employ apprentices, to create a necessary uplift in apprenticeship registrations.

- **Static productivity in comparison with other industries:** While this is not unique to Ireland and may simply reflect how construction is classified within national statistics, some stakeholders suggested that increased adoption of technologies such as BIM and off-site construction could have a positive effect on productivity and reduce the impact of labour shortages on the sector.

5.4 Social Drivers of Built Environment Skills

Global Social Drivers of Change

Demographic changes impact the construction sector in several ways:

- The age profile of the population and population growth can impact on overall demand for all types of construction. The age profile of the population and population growth can impact on the overall demand for all types of construction. If a population is growing, this leads to increased demand for housing and infrastructure. If the population is ageing, there may be future shortages in skilled labour¹⁸.
- The structure of the labour market, and in particular the gender participation rates within an economy, can also affect the supply of skills. This is particularly pronounced for the built environment sector globally.

Women and ethnic minorities are underrepresented in skilled built environment occupations in the EU, despite EU policies to overcome market segregation or an increase in labour market participation rates in the overall economy. A pattern of 'horizontal' and 'vertical' segregation is identified; the former referring to the exclusion of women from particular occupations, and the latter referring to the exclusion of women from particular positions in the job hierarchy as they progress through their career. This is borne out in a comparative study of five European countries (Italy, Spain, UK, Denmark and the Netherlands):

- Women working in construction were found predominantly in administrative jobs and, increasingly, in technical and managerial positions.
- There is some evidence of the emergence of niches for women in these more qualified positions such as in health and safety, human resources and management, environmental control and restoration work.
- In comparison, all the available evidence points to a negligible presence of women among manual and site workers in all five countries, broken only by very particular exceptions such as the painting trade in Denmark, where women accounted for approximately 25 per cent of the workforce.¹⁹

¹⁸ Jones, R and Seitani, H., 2019. Labour Market Reform in Japan to cope with a shrinking and ageing population. OECD Economics Department Working Papers no. 1568.

¹⁹ Byrne, J., Clarke, L. and van der Meer, M. 2005. Gender and ethnic minority exclusion from skilled occupations in construction: a Western European comparison. *Construction Management and Economics*, 23(10) pp. 1025-34.

In the United States, while the Bureau of Labour Statistics reports an overall female participation rate of about 9 per cent in the construction sector since 1996, the average participation rate for women in on-site trades or occupations was much lower, at between 1.9 and 3.7 per cent. Of forty trades listed under the construction and mining category, more than half did not include enough women to constitute a statistically significant percentage at all, including trades such as plasterers and stucco masons, iron and rebar workers and solar panel installers.²⁰

More generally the built environment industry faces challenges of transitioning young adults into the labour market itself, with particular difficulties relating to the perception of viable career pathways in the sector, with sector volatility, low pay and risk of health and safety hazards cited as barriers for the sector.²¹

Recognition and appreciation of the craft involved, or the high level of skill associated with, built environment occupations differ across countries. The medieval European guild system has mostly been replaced. However, countries such as Germany maintain recognition of master crafts (Meisterbrief), which retains a status and ability to train apprentices under the Crafts and Trades Regulation Code, and proffers an element of quality to occupations while ensuring a level of trust in the skills supplied. Retention of master crafts in Germany is facilitated by the education system, which is considered a 'dual training system' which results in approximately half of school leavers undergoing vocational training.²² The main characteristic of the dual system is a cooperation between mainly small and medium-sized companies and publicly funded vocational schools. This cooperation is regulated by law. Trainees in the dual system typically spend part of each week at a vocational school and the other part at a company. Dual training usually lasts two to three-and-a-half years.

The overall preferences of a society can influence the level of skills required in the built environment sector. This is particularly the case for materials used in the built environment, where there may be a reluctance to adopt new materials and innovations, with preferences toward traditional methods and vernacular design. The World Economic Forum considers that the construction industry is affected by megatrends in four domains: markets and customers, sustainability and resilience, society and workforce, and politics and regulation²³ (many of which are discussed in this PESTLE). It is important to note that the built environment sector in each country needs to identify and implement optimal responses to these megatrends – both concerning the opportunities they offer and for the challenges they pose.

²⁰ CPWR, 2018. The Construction Chart Book, 6th Edition. The Centre for Construction Research and Training.

²¹ CITB, 2017. Changing Perceptions: The growing appeal of a career in construction.

The Work Foundation & City and Guilds. 2018. Constructing the future: How the skills needed for success in the workplace are changing.

Farmer Review, 2016. The Farmer Review of the UK construction labour model *Modernise or die: time to decide the industry's future*, October 2016

Hassan, C., Basha, O. and Hanafi, W. 2007. Perception of building construction workers toward safety, health and environment. *Journal of Engineering Science and Technology*, 2(3) pp.271-279.

²² Federal Ministry of Education and Research, 2015. Report on Vocational Education and Training.

²³ World Economic Forum, 2016. Shaping the Future of Construction – a breakthrough in mindset and technology.

Domestic Social Drivers of Change

Although labour force participation rates in Ireland increased over the last number of years, employment in Ireland is skewed towards opportunities for those with higher education.²⁴ Despite the overall increase in employment, there continue to be essential skills and training gaps in the built environment sector:

- New craft apprenticeship registrations for certain skills in the construction industry are lagging compared to the overall change in employment. There were a total of 3,499 new construction apprentice registrations in 2019, representing an annual increase of 3 per cent.
- While this is a welcome increase in an industry with high demand, 2019 new apprentice registrations in bricklaying and plastering were at only 9 per cent and 11.6 per cent of their 2004 peaks respectively.²⁵
- Conversely, in 2017 craft apprenticeships in construction plant fitting and electrical were at 77 per cent and 94 per cent of the peak levels witnessed in 2006.

Part of this divergence in numbers of craft apprenticeships offered may represent the shift in focus of the sector from the residential building towards commercial, and the emergence of new technology. However, these very low levels of craft apprenticeships in bricklaying and plastering indicate likely shortages in this area going forward, assuming demand continues to grow.

In Ireland, after the global financial crisis, there was a decline in the number of employees in the Irish built environment sector. A significant number of workers from the sector emigrated, given the global skills shortages for the sector and opportunities that overseas markets present to skilled workers.²⁶ This decline can prove to have long term implications for the sector, as those who leave the jobs market or emigrate may be slow to come back, and in some cases will never re-join the market.

The gender imbalance in the built environment sector is acknowledged by the Irish built environment sector²⁷, and it is recognised that central to expanding the sector's workforce will be the ability to attract young and mature women alike who can bring dynamism and creativity to the job and forge a lifelong career in the industry:

- Historically the construction sector has remained male-dominated with only 6% of all workers being women, and only 1% of women in the industry working on-site.
- The majority of off-site female workers had jobs in administration or finance (88% of females employed in the sector).
- Both the horizontal and vertical segregation of the workforce was evident, with only 3% of women working at a managing director level for construction firms.

The three main reasons there are notably fewer women than men working in the construction sector is attributed to gender stereotyping, the sector not being viewed as attractive for women and the lack of female graduates.

²⁴ SOLAS, 2019. National Skills Bulletin 2019.

²⁵ Government of Ireland, 2019. Build: Construction Sector Performance and Prospects 2019.

²⁶ KPMG and Future Analytics, 2019. International Construction Industry Benchmarking Review. Report prepared for the Department of Public Expenditure and Reform.

²⁷ Construction Industry Federation, 2018. Women in the Construction Industry – accurate information is central to decision to all decision making. Report prepared for CIF by Accuracy Market Research.

Stakeholders' Perspectives on Social Drivers of Change

Stakeholders highlighted a number of social drivers, chiefly around the the perceptions and attitudes of workers, students and society towards the construction sector, and the effect of this on labour and skills shortages, during the consultations undertaken for this study:

- **A lack of students taking up construction related further and higher education courses:** This was identified as a key driver of labour and skills shortages, with most reasons centring on the perception of construction as a potential career. The collapse of the construction industry after 2008 led to a perception of the built environment sector as cyclical or unreliable, making students more reluctant to enter craft apprenticeships or choose construction related courses. Students also do not necessarily recognise the career progression paths that are potentially available. Several stakeholders argued the need for the industry to better showcase the range of career paths and skills that can be developed (e.g. business management) in order to improve the perception of construction as an industry in which career progression and development is typical.
- **Craft apprenticeships and the role of the education system:** Shortages of workers across all trades are expected by built environment firms, as not enough apprentices are being brought into the industry in recent years.
- Several respondents noted the length of craft apprenticeship courses can act as a barrier to their uptake. Others, however, noted that reducing their length may lead to changes in their National Framework of Qualifications level and that greater coordination between industry and educational authorities is needed before making significant changes.
- Craft apprenticeships do not receive the same priority of attention as the CAO system within secondary education and this has created an implicit perception among students and parents that craft apprenticeships are somehow less valuable than traditional higher education degrees. Greater efforts should be made to promote the merits of craft apprenticeships in their own right as a first option in deciding on a career. Craft apprenticeship training should also be recognised more as a progression route to third level.
- Curriculum design at second level does not facilitate pathways to craft apprenticeships. The promotion of the idea of “Learn While You Earn” and ensuring that the apprentice pay progression model is fully explained as an integral part of the pathway to qualification is important. Unions and employers are considered as having a significant role to play in this regard.
- Apprentices on a period of off the job training in third level institutions should enjoy the same benefits and discounts that third level students have e.g. access to gyms, discounted travel. Further financial disincentives for apprentices should be addressed, such as the continuation of the apprentice student charge, and disincentives for older people taking up craft apprenticeship training, or the living allowance for apprentices that have to travel to their ‘off-the-job’ training in colleges that are not close to where they live.
- **Recognition of skills within the Construction sector:** The potential for the creation of a statutory register of trained apprentices, along with a statutory skills passport, were identified as possible tools for strengthening the quality and reputation of trainees and qualified workers in the built environment sector, considered significant issues in the sector at the current time. Previous problems of misclassifying workers were identified, and a system is required to ensure that apprentices are supported fully in the pursuit of their qualification while being ensured decent employment after the completion of their craft apprenticeship training.

- **Low number of women in the Built Environment workforce:** Most stakeholders cited the low number of women in the Built Environment workforce, which exacerbates skills and labour shortages faced by the industry. Reasons given for their scarcity are the fewer opportunities for studying technology related subjects in all girls schools, and the need for greater flexibility in site management and practices to accommodate a more diverse range of lifestyles. Most stakeholders agreed the problem was self-reinforcing with low numbers of women contributing to the perception of construction as a male oriented industry. Many suggested that more targeted campaigns and policies are needed to encourage women to enter the industry and to eliminate this perception.
- **Lack of middle management with 10-15 years' experience:** Firms highlighted lack of experienced middle managers as a structural problem within the built environment labour market, due to the emigration of many in this category, with matching skills and expertise, after the global financial crisis. Gaps and challenges were also identified by firms in respect of senior members of the labour force, where employees may not have years of experience expected for that level due to unemployment rates during the recession.
- **Education system output and competition for skills:** Firms viewed the Irish education system as producing young people with the right skills to enter the sector, and that the system broadly caters for the needs of the market. Some stressed, however, that the labour market is competitive, with companies from other sectors providing competition to employ the best graduates. This is becoming more challenging with the dilution of engineering skills with new business lines (e.g. data analysis) and suggests either that the education system is not producing enough people with the right skills for the industry, or that the built environment sector is not attractive enough for young people. In general, the firms interviewed were satisfied that educational qualifications and credentials formalised entry-level skills. There was trust between the industry and education providers. However, frustrations were expressed regarding gaps in the education/training sector for certain niche modules.

5.5 Technology Drivers of Built Environment Skills Change

Global Technological Drivers

The pace of technological innovation is seen as an internal process of the modern economic system. New technologies are continually changing the way building and infrastructure is built across all countries. Changes to materials used for buildings precipitate changes to design. For example, the invention of structural steel and glass walls facilitated the construction of taller buildings, which were also enabled by the invention of electric elevators. The number of building materials that have been invented or proposed for use on buildings in the last 180 years has multiplied and with it the complexity of the building task and the skills needed to negotiate that complexity.²⁸ Changes in technology require a change in the skills needed to build, making it challenging for trainers and educational authorities to guarantee the competencies of those working within the industry concerning emerging technologies. The shift to new technology requires new skills, such as greater creativity and innovation, better communication and collaboration, and more interdisciplinary specialists.

²⁸ In 1842, the English architect and author of 'An Encyclopaedia of Architecture Historical, Theoretical and Practical' considered there were 12 materials that needed to be known to construct buildings, three of which were stone.

In most developed countries over the last 50 years, productivity in the built environment sector has been low in comparison to other industries (World Economic Forum, 2016)²⁹, raising questions about technology uptake across the industry. New technologies have the potential to be labour-saving and therefore improve productivity levels in the sector. However, as the industry changes it is acknowledged that a more comprehensive set of skills is required, including from different disciplines. For example, roofers increasingly require skills to fix solar panels, while plumbers require skills linked to alternative renewable energy sources.

The changing nature of how society builds results in new and emerging job roles related to operating new machinery, robotics engineers, assembly technicians, drone use, 3D visualisation and virtual reality. The skills needed for success in the workplace are changing, along with technological drivers. For the built environment industry, new technology offers both opportunities for efficiencies and challenges for upskilling. New technologies impact on traditional methods and the built environment sector globally finds itself balancing its training towards conventional or traditional skillsets associated with each occupation along with emerging skills related to changing technology.

Changes to technologies are classified according to four broad categories:³⁰

- Innovation relating to physical materials and tools used
- Technology linked to processes and operations
- Automation and big data resulting from business model innovations
- Organisation and culture.

New technologies improve different parts of the building process. As the structures themselves are becoming consistently more complex, it can lead to fragmentation in the use or adoption of emerging technologies.

Changes in technology associated with physical materials and tools include 3D printing, new materials and cladding systems. Off-site manufacturing of modular units is currently considered new technology for the industry³¹. However, this activity is generally classified as manufacturing in national statistics, rather than construction/built environment per se. It is a hybrid of factory operations and onsite construction. Development of off-site construction is considered very positively, as it has the potential for more significant productivity gains (albeit in the manufacturing sector, and not the built environment sector), is safer for workers and has the potential for achieving time savings.

The other major emerging technology for the built environment sector is the digitalisation of the industry through Building Information Modelling (BIM), and the collaboration of building professionals on a range of data in one single platform (Common Data Environment). Countries such as Denmark have mandated BIM in public procurement projects since 2007, and Australia has an initiative to enhance BIM technology adoption through a BIM Advisory Board:

²⁹ World Economic Forum, 2016. Shaping the Future of Construction A Breakthrough in Mindset and Technology Prepared in collaboration with The Boston Consulting Group May 2016

³⁰ The Work Foundation & City and Guilds. 2018. Constructing the future: How the skills needed for success in the workplace are changing.

³¹ Ginigaddara, B., Perera, S., Feng, Y. et al. 2019. Skills required for offsite construction . CIB World Building Congress 2019. Hong Kong 17-19 June, 2019.

- There are different levels of BIM, ranging from Level 0, where there is no collaboration, and designs are drafted on CAD only, moving through Levels 1 and 2 which increase data exchange to Level 3 which has ‘open data’ sharing, built on cooperation and sharing.
- The most significant advantage of BIM is its ability to reduce errors throughout the lifecycle of the project. This is because a large volume of different data is included within the BIM, to see how combining different elements will work – for example, the different measurements, materials and conditions.
- Building a full digital model of the project pre-empts problems early on, and allows changes to be made before the physical construction has been carried out.

Other technologies increasingly used in global built environment industry include virtual reality (VR) and the visualisation of buildings and infrastructure that are being designed or in the process of construction. Video game technology has developed significantly since the mid-1990s and can be used to convert BIM into collaborative 3-dimensional environments. The technology development is coming from the tech community, but built environment firms are increasingly collaborating and integrating with these emerging technologies.

Despite these advancements, the market set-up in the construction sector often means it is less able or willing to invest in R&D than other sectors. One particular issue is that the boom-and-bust nature of the industry means that it is more difficult for companies to plan for the long term and to be sure investments made today will bear fruit in the future. Also, projects take years to plan and complete. In general, major or mega projects are relied upon to make step-changes in the use of technology because they have the scale of budget needed to invest in digitalisation, which usually involves digitisation of existing assets in addition to developing and implementing a range of new systems and processes.

Domestic Technological Drivers of Change

The lack of productivity in the Irish built environment sector is a concern of the government in Ireland. Irish labour productivity in the construction sector was 24% below the Euro Area average in 2015 – ranked 14th. This is a modest improvement on the 25% below the average figure recorded in 2017³². Ireland’s below-average productivity levels in the construction sector are likely linked to the national sector’s low level of comparative spending on Research and Development (R&D). For every person living in the Republic of Ireland, the construction sector spent €0.70 on research and development in 2017. In comparison, Finland (the global leader in innovation in the construction sector) invested €21 per capita. The Netherlands invests €5 per capita while the U.K. invests €2.40.³³

In 2017, Ireland’s National BIM Council published the Roadmap to Digital Transition for Ireland’s construction industry 2018-2021, setting out how to increase collaboration, reduce design and construction time and how to connect information digitally.

Offsite construction in Ireland is also a growing sector, emerging outside of the urban areas. A few successful companies are emerging, changing the construction process to emulate ‘just-in-time’ management practices.

³² Department of Public Expenditure and Reform, 2019. Project Ireland 2040 **Build** Construction Sector Performance and Capacity 2020

³³ Government of Ireland, 2020. Build: Construction Sector Performance and Prospects 2020.

Stakeholders' Perspectives on Technological Drivers of Change

Stakeholders reported the following in relation to technological drivers of change during the consultations for this study:

- **The importance of Building Information Modelling:** BIM dominated stakeholders' perspectives on technology in the built environment sector, in particular its benefits for construction and future management and maintenance of buildings. Barriers to its uptake were recognised, with some stakeholders arguing that BIM is more suited to some types of projects, such as larger and more complex building projects, or those in which future maintenance is relatively more important, than others. Still, many suggested that greater effort was required to equip workers with the necessary skills to encourage the greater adoption of BIM in the industry.
- **The need for changing skillsets to handle technological change:** The last decade has seen the introduction of more technology into the construction sector, with several participants highlighting BIM as a growing or key part of their business and having to recruit from new backgrounds to resource the necessary skills for BIM. The increasing presence of IT was pointed out, with many firms also taking on software engineers for the first time. The introduction of virtual reality and artificial intelligence technologies into the industry is also expected to increase the importance of IT skills. One participant noted that increasing automation has meant that they will only employ graduates with coding skills, and could mean they will be reducing their recruitment in the coming years. Another fascinating insight was the increasing use of drone data on projects, which is requiring new skills of workers, to process and analyse data from this particular data source.
- **Challenge sourcing technological skills:** In terms of skills that were identified by firms as being difficult to source, a number of these were linked to the newer technologies, particularly the integration of the engineering discipline with new technologies. Challenges for firms in recruiting specialists in BIM, software engineers and data analysts were documented and aligning skillset with the right "company fit" also makes recruiting difficult. Firms also reported that people with competencies in modelling software such as Civil 3D are difficult to find.
- **Impact and challenges of integrating technology:** Built environment firms expect that the introduction of increased technology over the coming decade will significantly impact on the services they offer, and the skills their employees require. The challenge for firms will be how to combine technological advances with core engineering skills, as older trades become more diluted with other skills. Some firms raised the cost of new technology, mainly investment in software licences, as a barrier to uptake. Many firms reported that they had experienced no cost savings while adopting new technology, whilst some felt that while technology (such as software licences and hardware) was initially expensive, it could bring efficiency benefits that would outweigh the costs in the long run.
- **Potential of and barriers to mainstreaming of off-site construction:** Stakeholders were positive towards off-site construction, with many arguing that increased adoption of construction techniques could help to reduce the effect of labour/skills shortages on the sector. Firstly, the efficiency offered by off-site construction can reduce the amount of labour required on-site and ensure that labour is used more efficiently. Additionally, some argued that as manufacturers of pre-fabricated units tend to locate in more rural areas, they would face fewer labour shortages when recruiting in comparison to construction enterprises, which are more likely to be located in urban centres where demand is highest.

However, barriers to its adoption were noted on both the demand and supply sides. On the demand side, some stakeholders noted a general preference towards brick-built buildings among customers (particularly in the residential market), even when pre-fabricated units could offer similar levels of quality to traditionally-built buildings. Similarly, some suggested that a lack of expertise among buyers regarding off-site construction made them more reluctant to invest in pre-fabricated builds in comparison to traditional builds. On the supply side, some suggested that off-site construction could pose problems for cash flow, with more being required upfront compared to traditional builds.

5.6 Legal Drivers of Built Environment Skills Change

Global Legal Drivers

Government legislation impacts the direction that different industries take. The most significant recent legislation affecting the built environment sector relates to carbon reduction and energy use and commitments to addressing climate change. In the EU this has manifested in the Energy Efficiency Directive and Energy Performance of Buildings Directive.

Legislation to protect the health and safety of construction workers impact on the sector and the training required of built environment workers. Laws relating to contracts and procurement have shaped the structure of the industry. Legislation can impact demand and supply in the construction sector by setting the rules that cover construction supply and regulations relating to finance and taxation that can impact investment and affordability.

National and international legislation can impact on the overall size and composition of the construction industry. In Ireland, much of this legislation is transposed from European Directives.

Statutory planning and building standard rules vary across countries, with countries' legal codes determining how quickly new construction developments can be approved and what types of buildings will be approved. Building codes, for example, can be a help or a hindrance to the adoption of new technologies like off-site construction. The way governments directly procure construction will also impact on the size and complexion of the industry. Governments have the flexibility to design their procurement processes to pursue desirable policy goals for the industry- for example, increasing trainee and craft apprenticeship numbers and availability.

Stakeholder Perspectives on Legal Drivers of Change

Stakeholders raised a number of issues around legal and regulatory drivers during the consultative phases of this study:

- **Call for streamlined approval and regulatory processes:** Most stakeholders acknowledged the importance of regulations for maintaining health, safety, quality and environmental standards. Some, however, critiqued the piecemeal process by which new regulations have been introduced in recent years, arguing that this led to delays and a reluctance to invest. On regulatory compliance, others noted that responsibility for certification and inspections is often overly segmented between different bodies, arguing that this could lead to delays. They expressed a desire for approval and regulatory processes to

be more streamlined. From the enterprises that were interviewed, this issue was raised by many firms, who consider that these factors are creating roles that did not previously exist. Firms are required to adapt/adjust to these changing regulations and policy, and increasingly are looking toward the public sector for skills, or attempting to attract public sector workers with backgrounds in policy development as a response to this changing regulatory environment.

- **Sectoral bargaining differences between the Republic and Northern Ireland:** Sectoral bargaining was identified as being problematic, particularly because of the essentially unified labour market between Northern Ireland and the Republic and different social clauses and regulations in the two jurisdictions. This favours the built environment firms from Northern Ireland, who do not face the same cost structure and therefore can offer more competitive tender prices than their counterparts in the South/Republic.
- **Public procurement:** Both industry and public sector stakeholders were critical of the public procurement process, commenting that public sector tenders and contracts are too prescriptive and place excessive emphasis on cost over quality of work produced (“cost is king”):
 - This suppresses a company’s costs, not allowing them to offer the most competitive salaries to workers, compared with opportunities for matching skillsets in other industries. Some also argued that this left companies unable and unwilling to innovate due to additional risks/costs associated with new technologies, discouraging innovation, dampening sectoral productivity and hampering the ability of firms to provide on the job training to apprentices. This elimination of education/training that can happen on site is seen as offloading development of the sector’s skills supply on to the public sector and education providers.
 - Also critiqued was that the current procurement system does not always allow buyers of services to take into account previous experience or established relationships with contractors.
 - The inclusion of social clauses within the procurement process, e.g. mandating the number of apprentices that should be used on a particular project was seen as a potential mechanism to increase the number of apprentices in the industry. However, if this were a pass/fail criteria, it would exclude many smaller firms and also it could cause an imbalance within firms – taking on apprentices for a particular project, but not necessarily being able to guarantee continued projects/work for them.
- **Public Works Contracts:** The issue of Public Works Contracts was discussed by both industry and government stakeholders. From an industry perspective it is considered both good and bad – beneficial because the Public Works Contract is seen to deter international competition for the project, but prejudicial because the reason that international firms are not inclined to tender for Public Works Contracts is that the risks are considered as being disproportionately weighted onto the contractor. There is hence little room for innovation and developing/fostering skills through these contracts.

5.7 Environmental Drivers of Built Environment Skills Change

Building and construction activities are responsible for 39% of all carbon emissions globally, and while buildings sector energy intensity has improved in recent years, buildings-related CO₂ emissions have continued to rise by around 1% per year since 2010. It is estimated that 28% of these emissions come from the use of the building over its lifespan (from energy used to heat, cool and light the building) while 11% is from embodied carbon in the materials and construction process³⁴.

Environmental drivers of change primarily consist of measures to reduce carbon emissions in the built environment sector through more robust environmental standards for new buildings, the retrofit of existing buildings, and the embedding of carbon emissions accounting throughout the supply chain.

Global Environmental Drivers of change

In the Climate Change Synthesis Report in 2007, the Intergovernmental Panel on Climate Change identified buildings as having the single most significant potential of any sector for the reduction of energy use, and hence greenhouse gases and emissions. Sustainable building or decarbonising the sector requires reducing both embodied carbon and energy use of the buildings. While more energy-efficient buildings are vital for meeting climate and energy targets, they also open up significant market opportunities for built environment companies. Energy efficiency initiatives are considered to have a double dividend in that that they are environmentally beneficial and lead to an overall increase in jobs.³⁵

In several countries, government schemes and building regulations were enacted to encourage the adoption of building techniques that reduce greenhouse gas emissions in both the construction phase of new buildings and when the buildings are in use. As this legislation requires new building methods to implement, they require some of the same skills as those discussed in the new technology section, including management, planning, numeracy and communication skills, as well as ICT, digital, renewable energy and energy efficiency skills.³⁶ The World Green Building Council set out a vision for the building and construction sector to reach net-zero carbon emissions by 2050, through:

- the elimination of embodied carbon emissions in buildings
- requiring innovative decarbonisation solutions adopted by the built environment sector
- mainstreaming carbon accounting through the procurement process
- designing renewable energy use into buildings and specifying low carbon materials
- designing buildings for use, reuse and deconstruction³⁷

³⁴ United Nations Environment. 2017. Towards and zero-emission, efficient and resilient buildings and construction sector. Global status report 2017

³⁵ International Labour Organization, 2019. Skills for a Greener Future: A Global View

United Nations Environment Programme, International Labour Organization and International Trade Union Confederation, 2008. Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World

³⁶ European Construction Sector Observatory, 2017. Improving the Human Capital Basis

³⁷ World Green Building Council, 2019. Bringing Embodied Carbon Upfront.

Various countries identified energy inefficiencies in the use of their existing building stock, particularly their historic buildings³⁸. However, given the amount of embodied carbon that exists within each building, the importance of maintaining, renovating and reusing these buildings was also recognised.

Domestic Environmental Drivers

Domestic environmental drivers of change for the construction industry primarily consist of government regulations and policy regarding the energy efficiency of buildings:

- The **EU Energy Efficiency Directive** required Member States to set out long-term strategies for mobilising investment in the renovation of buildings, and Ireland published its first strategy in 2014³⁹. It was recognised that the residential sector accounted for 27% of all energy usage in the country at that time and that Ireland’s energy consumption per dwelling was amongst the highest in Europe. This is partly attributable to a less energy-efficient building stock than in the rest of Europe, and the retrofit of existing buildings has become a key focus of national climate and environmental policy.
- Following a consultation process in 2017, the Irish Green Building Council published a set of recommendations for the **second National Renovation Strategy**. A National Renovation Upskilling Committee (Reno-NUC) was launched in February 2019 to encourage and facilitate construction workers and building professionals upskilling in energy renovation. The Sustainable Energy Authority of Ireland identified the skill set that is required for retrofit workers, identifying that retrofitting is a somewhat bespoke package of work which includes many skills from both a professional side and trade side. However, it also highlighted how retrofit brought in new design responsibilities, technologies, and trades which do not fall into the traditional roles such as Building Energy Rating (BER) Assessor, airtightness tester, thermal image technician, solar thermal installer, heat pump installer, external wall insulation detailer, insulation installer, and thermal bridging calculator.
- The **‘Energy Performance of Buildings’ Directive** was transposed into Irish law as a building standard regulation of ‘Nearly Zero Energy Building’ (NZEB), applied to all new dwellings commencing construction from the 1st November 2019. This means that all new homes will be nearly zero energy buildings and have a typical Building Energy Rating (BER) of A2. The Directive requires that where major renovations (defined as a renovation where more than 25% of the surface envelope of the building undergoes renovation) are carried out on a building, the whole building or dwelling should achieve a cost-optimal energy performance insofar as it is technically, functionally and economically feasible. The cost-optimal energy performance level for a typical dwelling is equivalent to a B2 BER. The majority of the existing housing stock is energy inefficient, with 78% having a C2 BER or worse. EU statistics indicate that 0.4% to 1.2% of the housing stock is renovated annually⁴⁰.

³⁸ Historic Scotland, English Heritage and Construction Industry Training Board, 2013. Skills Needs Analysis 2013 Repair, maintenance and energy efficiency retrofit of traditional (pre-1919 buildings in England and Scotland).

Besen, P. and Boarin, P. 2018. The Future of Historic Buildings: Retrofitting to improve the thermal performance of New Zealand architectural heritage.

³⁹ 2014. Better Buildings: A National Renovation Strategy. A second strategy was published in 2017, with a new one scheduled for publication in 2020.

⁴⁰ Department of Housing, Planning and Local Government

In 2019 the Government also published its Climate Action Plan, a wide-ranging roadmap to net-zero carbon⁴¹. The built environment accounted for 12.7% of Ireland's greenhouse gases in 2017, comprised of residential emissions, and emissions from commercial and public services. The Government committed to improving the energy efficiency of buildings, including homes, workplaces and schools, by meeting higher energy performance standards and by increasing retrofit activity. This is intended to reduce Ireland's dependence on fossil fuels, while improving living standards by making buildings more comfortable, healthier, safer, and less costly to heat. The Climate Action Plan has a set of key measures to improve the built environment sector, including:

- Introduce stricter requirements for new buildings and substantial refurbishments
- Retrofit approximately 500,000 existing homes to upgrade to B2 Building Energy Rating (BER) or cost optimal or carbon equivalent and to install 400,000 heat pumps by 2030- with a similar number of homes to retrofit in each of the following two decades
- Build a supply chain and a model for aggregation where home retrofits are grouped to allow this level of activity to be funded and delivered more effectively and efficiently
- Deliver two new district heating systems, and implement a roadmap for delivering district heating potential
- Increase attention to energy and carbon ratings in all aspects of managing property assets

In pursuit of the ambitious target to retrofit 500,000 homes, the SEAI ran a 'Deep Retrofit' multi-annual pilot programme (between 2017 and 2019) aimed at ensuring a BER grade of A3 or better was achieved at the end of a project, with renewable energy integrated into every project. The Deep Retrofit of a home involves multiple energy upgrades all at once, including:

- Reducing the level of heat loss, including some or all of wall insulation; roof insulation; floor insulation; and window upgrades;
- Installation of renewable heating systems to support the transition away from fossil fuels. The typical heating system installed on a Deep Retrofit Pilot Project is an air-source heat pump;
- Installation of mechanical ventilation to maintain good indoor air quality;
- Consideration of other renewable energy technologies, such as solar water heating panels and solar photovoltaic panels.

This is of particular significance for future skills needs in the built environment given the magnitude of workers that is likely to be required to deliver these upgrades and meet this target. The number of homes to be retrofitted each year to 2050- averaging 50,000 homes annually- means that retrofitting has the potential to be a long term career.

⁴¹ Department of Communications, Climate Action and Environment, 2019. Climate Action Plan

Stakeholders' Perspectives on Environmental Drivers of Change

In general, the issue of climate change is seen as a key environmental driver of change for the construction sector by industry stakeholders. The impact of climate change, and the change of building regulations that have arisen from it, has meant that construction firms are having to be more sustainable, as their industry will be one of the key ones in the fight to reduce emissions.

- **Climate change's impact on product market growth potential and Construction sector recruitment:** For some stakeholders, sustainable construction and management is a vital part of their business. They have a niche product that will grow in a market that is becoming more stringent about environmental impacts. Recent graduates, who are more environmentally conscious, could also be more attracted to these businesses, giving them an advantage in attracting the best Third level graduate talent.
- **New building standards and additional demand for certain skilled labour:** New building standards (e.g. NZEB regulations) will create additional demand for certain skills. The issue of appropriate traditional building skills, and older building stocks of residential dwellings, emerged as a concern in light of deep retrofits. Of the 1.67 million households in Ireland, it is estimated that approximately 15% (249,000) were built pre-1945 (pre-World War II), and 175,000 built pre 1919⁴². The need to retrofit these traditionally built buildings will entail ongoing need for and knowledge of traditional building skills. Furthermore, some participants believed that not enough was offered in terms of newer technologies, for example, LEED accreditation and volumetric manufacture; however, due to the fast-changing nature of technology it can be challenging for the education system to react to meet the needs of the industry.

5.8 Perspectives from Industry

Interviews with forty built environment firms were undertaken between January and April 2020 and were conducted using the "7 Questions Technique", which aims to identify strategic issues and highlight areas of agreement or conflict about the way forward. The activities of each business are shown in Figure 5.1, showing the range of built environment activities that the firms partook in. Figure 5.2 shows the range of size of firms that were interviewed, as measured by number of employees.

⁴² The Heritage Council, Improving your traditional building skills - <https://www.heritagecouncil.ie/advice-and-guidance/traditional-building-skills> and Central Statistics Office, 2016. Census data.

Figure 5.1: Main Business Activities of Firms Interviewed

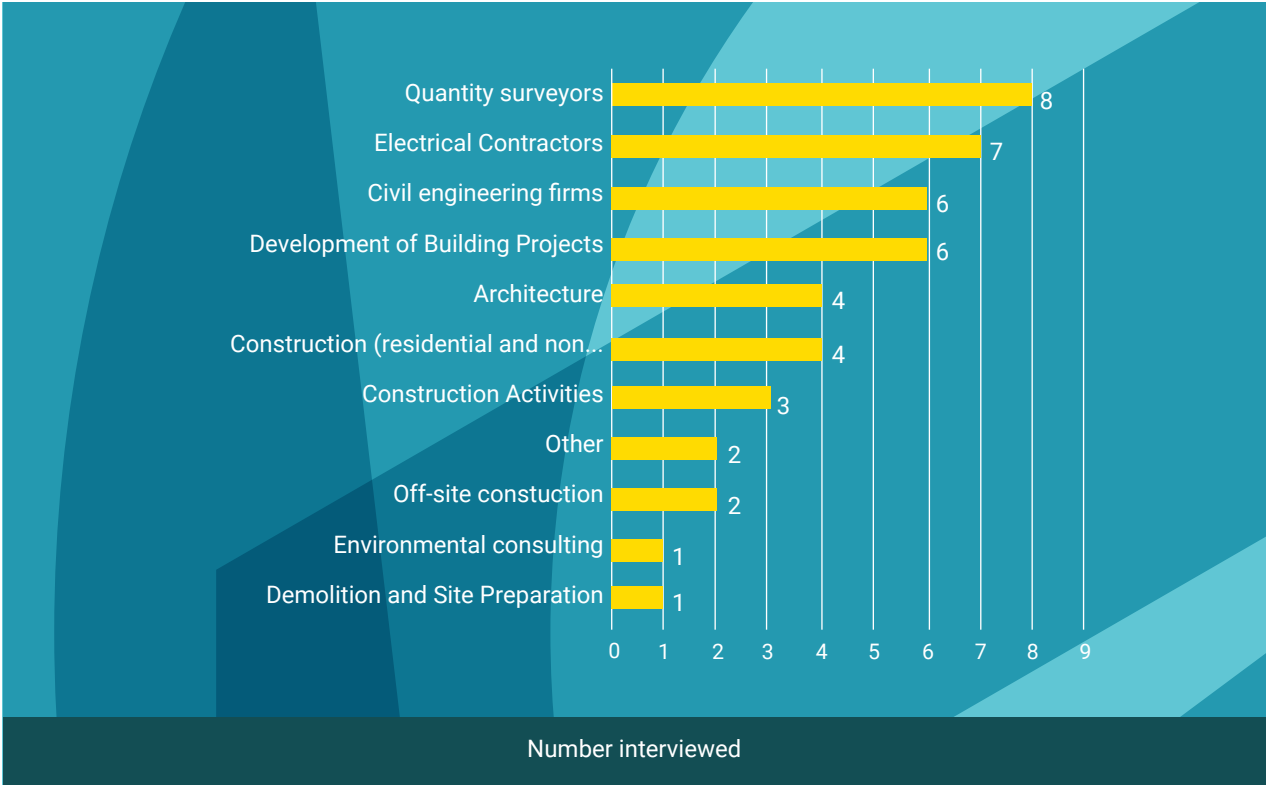
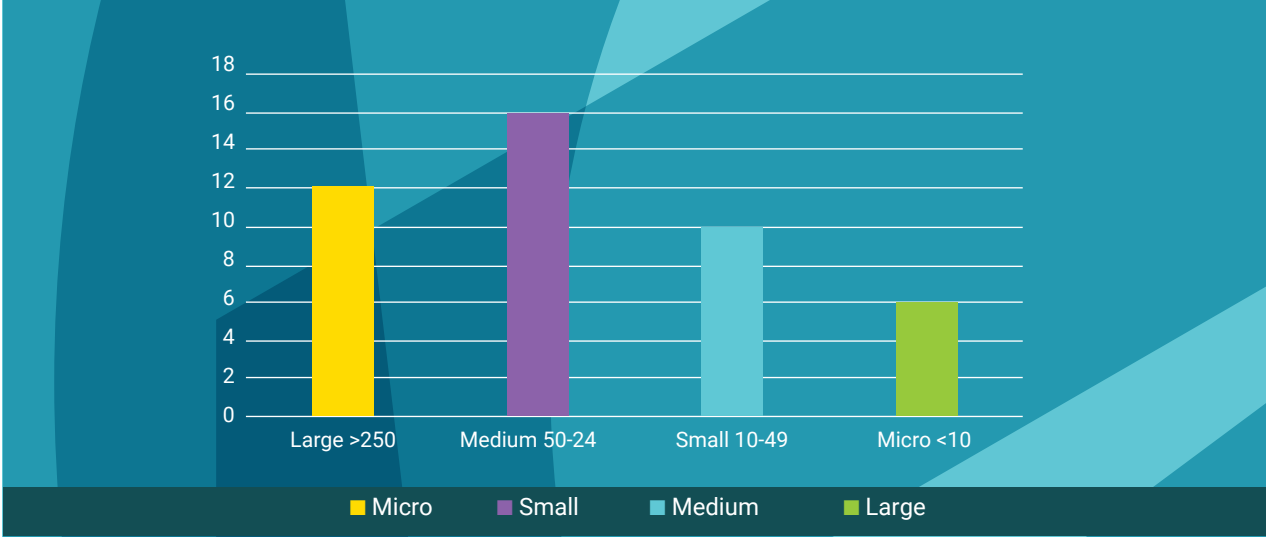


Figure 5.2: Size of firms interviewed (measured by number of employees)

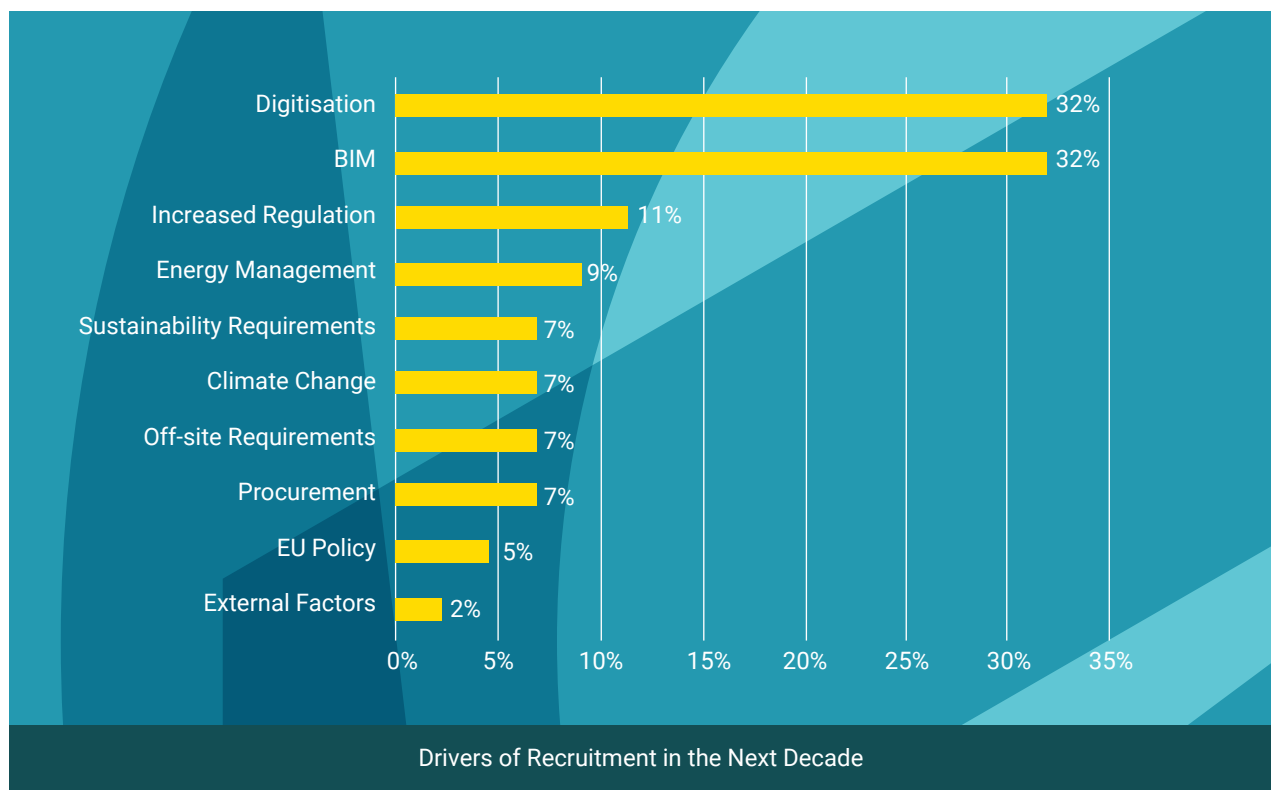


Source: Interviews, 2020

Overall the built environment sector (before COVID-19) was considered in good health, with the majority of firms stating that they had experienced growth since the 2008 financial crisis, and expected this to continue in the next decade. This growth is primarily driven by residential projects, although other business lines such as pharmaceutical companies and commercial spaces for international companies are also driving demand.

As firms look to continue to grow, their recruitment strategies are based upon expanding their core operations, which requires engineers, quantity surveyors and health and safety staff, to name a few. The drivers of recruitment for the built environment sector were considered to be digitalisation of the sector and the use of BIM, indicating that the industry is anticipating a move toward increased technology use, which has implications for the levels of skills in this area. Figure 5.3 shows the frequency of drivers for the sector, which were recorded through the interviews with industry, noting that each interviewee could identify more than one driver.

Figure 5.3: Drivers of Recruitment in next 10 years



Source: (CSO, 2018)

The two most significant themes that emerged from the perspective of the industry is that the impact of changing technology (particularly BIM) and climate change and incorporating sustainability means that firms are moving into new areas, particularly requiring a melding of engineering and technology skills within the sector.

There are challenges associated with recruiting the right people in the sector, the most prominent issue being the skills and experience gap caused by the 2008 financial crisis when workers were forced to leave the industry. The subsequent lack of staff with 10-15 years of experience is now affecting the industry. Low salaries and competition for workers from other sectors are also contributing to skills shortages. Firms thought that there were not enough apprentices being brought into the industry in recent years. However, responses from different firms were mixed in this regard, as more companies interviewed offered graduate programmes rather than taking on or supporting apprentices. Apprenticeship is more focused on the more “practical” parts of the industry; however, subcontractors are reluctant to take on apprentices due to the cost of training them up.

The firms interviewed generally agree that the Irish education system prepares young people adequately for entering the sector; however, due to the fast-changing nature of technology within the industry, it can be challenging to ensure students are training in emerging skills.

Improving the construction industry's reputation is seen as a priority by the industry to increase the number of new entrants to the sector, with an increased promotion in schools and colleges needed.

5.9 Conclusion

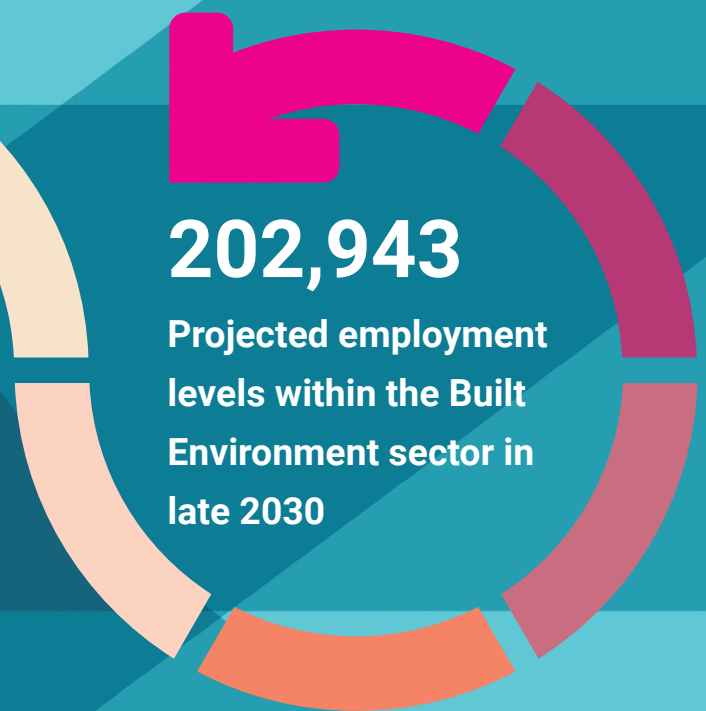
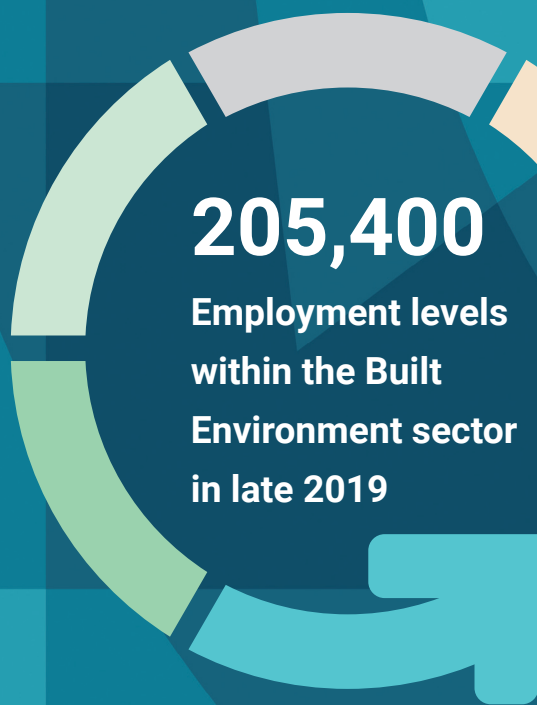
This section presented the future outlook for the industry and the role of political, economic, social, technological, legal and environmental factors in shaping this outlook. This PESTLE analysis was based on a conventional literature review, as well as the views of stakeholders and sector enterprises expressed throughout a series of interviews and workshops.

Political and economic forces primarily drive the overall outlook for the industry. The sector is highly cyclical, meaning that its performance is subject to fluctuations on the broader economy. As a result, the importance of public investment in acting as an automatic stabiliser for the sector was repeatedly highlighted. In that respect, plans like Project Ireland 2040 and the Climate Action Plan were generally viewed positively as sources of certainty for the sector. However, many stakeholders expressed concern regarding the timing, funding, and commitment given to these. The outlook for many small to medium-sized construction firms and contractors was relatively bleak. There was little optimism for future growth for their firms; they highlighted difficulties attracting apprentices into the sector and maintained that this is a considerable barrier for the sector as it is through the apprenticeship system that new entrants learn their skills.

6

Measuring the Skills Gap

Despite the impacts of COVID-19, employment in the Built Environment sector will be sustainable over the next ten years.



> Measuring the Skills Gap

6.1 Introduction

This chapter details the analysis undertaken to quantify the total demand for built environment labour for the next decade, from 2020 to 2030. An anticipatory model to improve the match between labour demand and labour supply for the built environment sector was designed, based on an analysis of quantitative trends in the labour market. The method was chosen according to a joint methodology developed by the European Training Foundation, the European Centre for the Development of Vocational Training and the International Labour Office (2016) for forecasting employment growth⁴³. This used Labour Force Survey forecasts produced by the CSO, official population projections from the CSO, labour force participation rates and unemployment and estimates of Gross National Income (GNI) growth over the next decade.

The first task was to estimate aggregate demand for labour in the built environment sector, from which the requirements of individual occupations could be calculated. This estimate of demand was then compared to existing labour supply and forecast population changes to approximate additional net requirements in built environment skills.

6.2 Labour Demand

The demand for built environment labour is pro-cyclical due to the volatility of the built environment sector from year to year. For this reason, the limitations of the skills demand forecast model are acknowledged, and the analysis is caveated that the model should be regularly updated and calibrated to test for veracity. This is not seen as an issue with the labour model developed itself, but with the underlying assumption/use of long-run averages for the sector, which smooth out the volatility that is present within the sector. This can be seen in Figure 6.1, where the forecast data for the next decade is smoothed according to long-run average projections. Also evident in Figure 6.1 is the historical data that was used to construct the forecasting model, along with a process of backcasting the model to calibrate it to actual employment data (solid orange line). All economic models are approximations of reality, an error between actual data, represented by the difference between the solid orange line in Figure 6.1 and the central forecast, or modelled value (dashed blue line) for certain years, most notably for 2019.

⁴³ European Training Foundation, the European Centre for the Development of Vocational Training and the International Labour Organization (2016). *Developing Skills Foresights, Scenarios and Forecasts. Guide to anticipating and matching skills and jobs Volume 2*. Geneva International Labour Organisation.

Figure 6.1: Built Environment Sector Forecasts, 2019-2030



There are many potential explanations for this gap, including the constrained labour market, or caution surrounding Brexit.

The model developed includes three scenarios, based on a set of assumptions. All three scenarios assume that GNI* per capita will be €46,000 in 2030 based upon a 4.5% unemployment rate. The model is, therefore, forecasting for a sustainable level of employment at the end of the reference period. It is expected/acknowledged that actual GNI* will continue to fluctuate between 2020 and 2030 but is assumed that it will adhere to the long-run average growth⁴⁴. Notwithstanding that this analysis was undertaken before the COVID-19 pandemic, the disruptions from the likely recession that is predicted for mid-2020 are not dissimilar to the disruption from the global financial crisis, which is captured in the historical data used for the model.

Population growth projections differentiate the three scenarios. Population growth is a driver for construction/built environment activity and therefore has a statistically significant impact on employment. Up to the end of 2019, the Irish economy had been tracking high population growth projections, based upon where the economy is in the economic cycle. It is expected that the population will fluctuate around the central growth forecast throughout the 2020-2030 reference period. Population figures are much less volatile than GNI* per capita, but present a timing risk to projections which can be updated with newly available data throughout the reference period.

CSO estimates place the total number of people in the labour force at 2.7 million by 2030. Based on the model's assumptions, it is expected (central forecast) that 202,943 people will be employed in the built environment sector by 2030, constituting 7.5% of the total labour force. The proportion of workers in the sector compared to total employment in the state is in a range of between 4.5% and 10% (lower to upper bound) as shown in Table 6.1.

⁴⁴ A €1,000 change in GNI* per Capita (2016 Prices) will increase or decrease employment by approximately 12,000 jobs

Table 6.1: Forecast 2030 Built Environment Employment

	December 2019	Central Forecast	Upper Bound	Lower Bound
Built Environment Employment	205,400	202,943	281,060	124,795
Percentage of total labour force	9%	7.5%	10%	4.5%

6.3 Skills Demand

Sector forecasts for the number of workers required in the built environment sector must be broken down and apportioned to specific occupations. The number of people in employment by occupation is determined by multiplying employment per industry by the shares of occupations in that industry's total employment. Census data was used to apportion employee numbers into occupations. However, the census data is somewhat dated, given that the last data is for 2016. Census information only provides a snapshot of the sector's skills composition in 2016 when the sector was growing rapidly. It is unlikely that the pattern or this fixed composition still holds, given that different occupations are required at different rates as the industry expands. Efforts were made to make forecasts more dynamic using Labour Force Survey Data, but the data that exists is too aggregated, and the data was too erratic, showing no conclusive trends⁴⁵. Based upon the 2016 Census Data, occupational employment for Built Environment sectors in 2030 is shown in Table 6.2 for Core Skills, and Table 6.3 for Niche Skills. For comparison, the 2016 Census data is shown, which is the most recent snapshot of numbers of people employed by occupation. However, this data should be treated with caution, as the Census data (by occupation) is not compatible with CSO's employment data (by industry). For example, the number of people employed in the built environment industry in 2016 was approximately 168,000, and this increased to 205,400 in the last quarter of 2019.

⁴⁵ The unpredictable nature of the data is most likely driven by Labour Force Survey sample sizes.

Table 6.2: 2030 Occupation Forecasts, Part I Core Skills

Classification	Occupation	2016 Census data	2030 Total Requirements		
			Central Forecast	High Population Growth	Low Population Growth
Core Built Environment Skills	Carpenters and Joiners	12,630	17,555	24,313	10,795
	Electricians and Electrical Fitters	10,985	15,269	21,146	9,389
	Elementary Construction Occupations	9,708	13,494	18,688	8,298
	Construction and Building Trades N.E.C.	7,826	10,878	15,065	6,689
	Plumbers and Heating & Ventilating Engineers	7,245	10,070	13,947	6,193
	Architects	6,300	8,757	12,128	5,385
	Painters and Decorators	5,374	7,470	10,345	4,593
	Civil Engineers	4,707	6,543	9,061	4,023
	Production Managers and Directors in Construction	3,645	5,066	7,017	3,116
	Plasterers	3,411	4,741	6,566	2,915
	Construction Operatives N.E.C.	3,382	4,701	6,510	2,891
	Bricklayers And Masons	3,379	4,697	6,505	2,888
	Mobile Machine Drivers And Operatives N.E.C.	2,212	3,075	4,258	1,891
	Core Skills Subtotal		80,804	112,315	155,548
N.E.C. = not elsewhere classified					

Table 6.3: 2030 Occupation Forecasts, Part II Niche Skills and Totals

Classification	Occupation	2016 Census data	2030 Total Requirements		
			Central Forecast	High Population Growth	Low Population Growth
Niche Built Environment Skills	Floorers and Wall Tilers	2,131	2,962	4,102	1,821
	Construction and Building Trades Supervisors	1,756	2,441	3,380	1,501
	Architectural and Town Planning Technicians	1,487	2,067	2,862	1,271
	Refuse and Salvage Occupations	1,440	2,002	2,772	1,231
	Roofers, Roof Tilers and Slaters	1,256	1,746	2,418	1,074
	Glaziers, Window Fabricators and Fitters	1,171	1,628	2,254	1,001
	Construction Project Managers and Related Professionals	1,109	1,541	2,135	948
	Air-Conditioning and Refrigeration Engineers	627	872	1,207	536
	Energy Plant Operatives	606	842	1,167	518
	Waste Disposal and Environmental Services Managers	523	727	1,007	447
	Water and Sewerage Plant Operatives	490	681	943	419
	Pipe Fitters	478	664	920	409
	Chartered Architectural Technologists	409	568	787	350
	Crane Drivers	235	327	452	201
	Niche Skill Subtotal		13,718	19,068	26,407
Subtotal	Core & Niche Skill Subtotal	94,522	131,383	181,955	80,791
Other	Non-Built Environment Skills	50,896	71,560	99,105	44,004
Total	Sector Total	145,418	202,943	281,060	124,795

6.4 Skills Supply

Ideally, analysis and projections of the changing number of people with certain skillsets should be built around a stock-flow model using the existing workforce as a base, and focusing on exit from the sector (either through retirement or transversal skills causing leakage to other sectors) and entrance to the sector (newly qualified people, with a variety of skill sets). There is considerable missing data for such a stock-flow model, as it is not possible to trace the progression of built environment workers in and out of the sector. This section discusses some of these issues.

6.4.1 Existing Workforce

The existing workforce is the 'stock' or basis of the future workforce. The attrition rate within the industry is based on the age of the current workforce, the average duration that workers remain in the industry and relative opportunities for the use of their skills in other sectors.

It was recognised that a small number of occupations in the built environment sector would not draw from new entrants, as they require a certain level of in-sector experience. Three occupations where older and more experienced employees already operating within the industry are required were identified as:

- Production Managers and Directors in Construction – Core Skill
- Construction Project Managers and Related Professional – Niche Skill
- Waste Disposal and Environmental Services Managers – Niche Skill.

These occupations make up less than 4% of the sectoral employment. As may be expected, these employees are older relative to the overall workforce due to the fact that they draw from experienced staff and not new entrants. This will marginally increase the replacement requirements of other occupations which form the pool from which these employees are hired. However, given that these occupations make up only 4% of the sector, the imperative of continual supply of new skills to the sector becomes apparent.

Many workforce upskilling and continuous professional development courses are available in the built environment sector.

Springboard+ and Human Capital Initiative Pillar 1

The Springboard+ upskilling initiative in higher education offers free or heavily subsidised courses at certificate, degree and masters level leading to qualifications in areas where there are employment opportunities in the economy. The majority of courses are part-time for a maximum of 12 months provided by public and private Higher Education Institutes. All courses lead to qualifications in enterprise sectors which are growing and need skilled personnel, including information and communications technology (ICT); manufacturing; international financial services; and critical skills for enterprise to trade internationally. Qualifications are also available in cross-enterprise skills such as innovation, enterprise/entrepreneurship, digital marketing, and project management. The 2020 Springboard + courses relevant to the built environment sector and their providers- chiefly the Institutes of Technology and Technological University Dublin- are shown in Table 6.4.

From the 2020/21 academic year, graduate conversion courses funded under Pillar 1 of the Human Capital Initiative (HCI) are also available to reskill workers into areas of skills shortage, including the Built Environment. The HCI offers incentivised places for graduates to reskill on full time conversion courses at level 8 Higher Diploma and level 9 Postgraduate Diploma. 5,891 places across 93 courses have been announced across a range of subject areas under Pillar 1. Those relevant to the Built Environment are shown in Table 6.5.

Table 6.4: Springboard+ Built Environment Course and Providers (2020)

Provider/IT = Institute of Technology	Course Title	NFQ Level	
Athlone IT	HDip in BIM for Civil Engineering and Construction	8	Part Time
Athlone IT	SPA in Construction Management	8	Part Time
Colaiste Dhulaigh College of Further Education	Building Information Modelling	6	Part Time
Cork IT	Certificate in Strategic Building Information Modelling Management	8	Part Time
Galway Mayo IT	Certificate in Sustainable Building Technology	8	Part Time
Griffith College	Certificate in Building Information Modelling and Graphic Illustration	8	Part Time
Griffith College	Certificate in Entrepreneurship and Project Management (Built Environment)	8	Part Time
IT Carlow	Bachelor of Science in Energy Management (Buildings)	7	Part Time
IT Carlow	Certificate in On Site Wastewater Treatment and Disposal	7	Part Time
IT Tralee	Certificate in BIM with Revit	6	Part Time
IT Sligo	Certificate in BIM and Lean Construction Management	9	Part Time
Limerick IT	Certificate in Building Information Modelling- with Revit MEP (Online)	6	Part Time
Limerick IT	Certificate in Building Information Modelling with Revit Architecture (Blended and Online)	6	Part Time
Limerick IT	Certificate in Construction Project Management (Online)	6	Part Time
Limerick IT	Certificate in Near Zero Energy Buildings	6	Part Time
Limerick IT	MSc Quantity Surveying	9	Part Time
TU Dublin	BSc (Hons) in BIM (Digital Construction)	8	Part Time
TU Dublin	Postgraduate Certificate in BIM Technologies	9	Part Time
TU Dublin	Postgraduate Certificate in Building Performance (Energy Efficiency in Design)	9	Part Time
TU Dublin	Postgraduate Certificate in Digital Construction Analytics/ Engineering Analytics	9	Part Time
Waterford IT	Bachelor of Engineering in Fire Engineering	7	Part Time
Waterford IT	Bachelor of Science in Construction Site Management	7	Part Time
Waterford IT	Certificate in Engineering in nZEB Design (Postgraduate)	9	Part Time

Table 6.5: Human Capital Initiative Pillar 1 Built Environment Course and Providers (2020)

Provider/IT = Institute of Technology	Course Title	NFQ Level	
Cork IT	Postgraduate Diploma Construction Project Management and Building Information Modelling	9	Full Time
Cork IT	Postgraduate Diploma Facilities Management and Building Information Modelling	9	Full Time
Cork IT	Postgraduate Diploma Mechanical and Electrical Quantity Surveying	9	Full Time
Dundalk IT	Postgraduate Diploma in Building Surveying	9	Full Time
Galway Mayo IT	Circular Economy for a Sustainable Built Environment	9	Full Time
Galway Mayo IT	Postgraduate Diploma in Building Information Modelling and Digital Construction	9	Full Time
Letterkenny IT	BSc (Hons) in Construction Contracts Management	8	Full Time

Skillnet Ireland

Skillnet Ireland is a business support agency of the Government of Ireland. The CiTA Skillnet is the main construction related Skillnet - a network promoted by the Construction IT Alliance (CiTA). Established in DIT Bolton Street in association with Waterford IT in 2001, CiTA comprises IoTs and Architecture, Engineering and Construction enterprises and actively encourages the Construction sector to take full advantage of current and emerging ICT. The CiTA Skillnet supports Construction companies of all sizes and focuses on ICT training needs, including BIM, drone use, Lean, IT and soft skills, virtual environment and data analytics. Under Skillnet Ireland's Future Skills programme, CiTA have also secured funding to deliver the buildingSmart International Professional Certification, which, through a globally recognised qualification, aims to improve the exchange of information between software applications used in the construction industry, through standardised training content based on the latest international developments and best practices

Table 6.6: CiTA Skillnet Courses 2019

Course
Introduction to Lean Construction and the Last Planner (1 day)
BIM in company Tailored Training
Dynamo Essentials (2 days)
Higher Diploma in BIM (GMIT) Tuition fee- €5,000
Introduction to Autodesk BIM Tools
Industrial Electrical Systems- Level 1 (2 days)
Industrial Electrical Systems- NFQ Level 6
Instrumentation and Calibration- An Introduction
Introduction to BIM Principles
Lean Sigma Black/Green/Master Black/Yellow belt
Introduction to BIM using Revit
Advanced Revit Architecture
BIM ISO 19650- Essentials
Drone- IAA- SUS Ground School Theoretical and Flight Examination
IES Core Virtual Environment (VE) and New Part L Ireland 2017
Navisworks Essentials
Revit Advanced BIM Management
Revit Advanced Families
Revit Architecture Professional Blended
Revit BIM Collaboration
Revit Family Creation
Revit MEP Essentials
Revit Structure Essentials

Skillnet Ireland also supports the Lean and Green Skillnet, which provides training for enterprises in environmental, water and energy management- including the design and construction of wind farms. Training is provided in the areas of Lean Six Sigma, Operational Excellence, Sustainability and Management Skills through workshops or distance learning. Its member companies include Roadbridge Civil Engineering and Building Contractors, as well as companies across a range of other sectors, while its industry steering group includes representation from the Sustainable Energy Authority of Ireland and Environmental Protection Agency.

The recently established Construction Professionals Skillnet is a learning network for businesses of all sizes in the construction sector. The objective of this network is to support companies in the construction industry to grow and develop, and to address skills shortages in the sector. Construction Professionals Skillnet is promoted by the Construction Industry Federation.

In addition, Skillnet Ireland offers multi sector provision in the form of its Management Development programmes, which seeks to enhance management capacity across all firms and sectors, encouraging enhanced business performance.

Industry/Professional Representative Organisation Training

The Construction Industry Federation offers a considerable range of courses and training modules through its in-house training service. These are presented in Table 6.7.

Table 6.7: Construction Industry Federation on-going training and upskilling

	Course
Virtual Academy (online courses)	Asbestos Awareness
	Building Control (Amendment) Regulations
	Contractor Safety
	Core Safety Management Renewal
	Driver Training- DriveWize
	Electrical Safety
	Environmental Awareness
	Fire Safety
	Fire Warden
	Health and Safety Induction
	Legionella
	Lone Working
	Noise at Work
	Personal Protective Equipment
	Risk Assessment
	Update on Contracts and Legislation
Working at Height	
Building Control courses	Air Tightness
	CIF QCI Level 6 Building Regulations
	CIF/EPA Radon Prevention Measures on Site
	NZEB Half Day for Site Managers
	Site Managers-Practical approach to Building Regs.
	Working with the Assigned Certifier- A Site Managers Approach
Business Management	Emotional Intelligence Group Workshop
Construction Management	BSc in Construction Management (Online)- IT Sligo
Contracting and Tendering- Specialist Contractors	Payment Process Construction Contracts Act 2013
Environmental Management	2-day Environmental Management for Construction
Heritage	Conservation Theory for Heritage Contracting
Information Technology	DIT-CPD Certificate in IT for Site Workers
Lean	Lean 101 Construction (online)
Safety Management	CIF Appointed Person (Lifting Operations)
	CIF Core Safety Management Programme Renewal
	CIF IOSH Managing Safely in Construction
	CIF Management and Inspection of Scaffolding
	CIF Project Supervisor Design Process
	CIF QCI Level 5 Safety Representative
	CIF Site Supervisor Safety Programme
	CIF Temporary Works Coordinator 2Day Programme
	CIF/QCI Project Supervisor Construction Stage

Engineers Ireland provides numerous in-company continuous professional development training to members. A selection of these are shown in Table 6.8. In 2019, 3,457 delegates attended a total of 245 learning events, including 23 new specialist courses, and by the end of 2019, 116 engineering organisations achieved Engineers Ireland CPD Accredited Employer Standard⁴⁶.

Table 6.8: Engineers Ireland In-Company Continued Professional Development Training

Course Title	Description
CE Marking of Structural Steelwork	Equips candidates with the knowledge to fully understand the technical requirements and guidance on how they can ensure contracts are constructed in line with legislation and best practice.
Data Centres- Introduction to M&E Services	Gives mechanical and electrical engineers a good understanding of the data centre industry and in particular an introduction to the design of the power and cooling systems
Health and Safety Duties for Clients in Construction	Provides clients and those working with them on construction projects with an understanding of the legal obligations placed on them by the Safety Health and Welfare (Construction) Regulations 2013
An Introduction to Energy Market Fundamentals and Emerging Trends	Provides a wide breadth of energy issues, including the fundamentals and evolving factors within the energy supply chain, policy and regulation, market structure, economics and the emerging trends in technologies, consumer behaviour and business models
Introduction to Pumps and Pumping Systems	Provides insight to pump application, selection, operation and maintenance.
Management of Safety in Temporary Works	Focuses on the key factors that ensure the safe design and implementation of temporary works systems. It covers the fundamental roles and responsibilities of all parties involved, together with clear and concise guidance on the practical implementation.
Process Control Valves- Sizing, Selection and Application	Provides insight to control valves which is typically the final control element in the control loop—reviews the principles of control valves, actuators, positioners and related accessories.
Water Loss and Leakage Management- Level One	Provides an introduction to leakage detection, control and management and the relevant technologies used to assist in the process

⁴⁶ See Engineers Ireland Annual Report 2019 available from www.engineersireland.ie

The Society of Chartered Surveyors Ireland offers two courses in association with IT Sligo.

Table 6.9: Society of Chartered Surveyors Ireland

Course Title	Description
Property Services and Facilities Management	This Higher Certificate (NFQ Level 6) is provided by IT Sligo, as an online and part-time course.
M&E Quantity Surveying	This Higher Certificate (NFQ Level 6) is provided by IT Sligo as an online course. It is a one year course leading to an MSc in Project Management

The Irish Green Building Council provides a range of training to its members. These are shown in Table 6.10.

Table 6.10: Irish Green Building Council Training

Course Title	Description	Participants (2019)
NZEB Webinar series	Equips candidates with The European Energy Performance of Buildings Directive Recast (EPBD) which requires all new buildings to be Near Zero Energy Buildings by 31st December 2020, however, any new buildings occupied or procured by public bodies after 31st December 2018 must also be Near Zero Energy. Offers a range of webinars on renewables, ventilation, fabrics and materials, thermal bridging etc.	345
LEED Green Associate	LEED (Leadership in Energy and Environmental Design) is an internationally recognised green building certification system, providing third-party verification that a building or community was designed and built using strategies aimed at improving performance across a set of environmental and sustainability metrics.	60
Home Performance Training	The IGBC is building a pool of skilled Home Performance Index Assessors by delivering the Home Performance Index Assessor training. Ireland's first national quality and sustainability assessment system for new housing. The HPI is based on five verifiable categories: Environment, Economic, Health and Wellbeing, Quality Assurance and Sustainable Location.	15
BREEAM	The Building Research Establishment (BRE) originated in the UK, and the BREEAM is sustainability certification for buildings and communities	
EU Sustainable Buildings Framework	The Level(s) Framework is for building professionals and their clients to increase their understanding of how buildings impact upon the environment. It is a toolkit developed by the European Commission and is a voluntary reporting framework	

6.4.2 Craft apprenticeship training

The craft apprenticeship system is the most important source of skilled labour available to the built environment sector. The twelve occupations below account for 35 per cent of employment across the sector. To reiterate the importance of the craft apprenticeship system to the built environment sector, the total number of carpenters and joiners alone roughly equates to the combined requirement of skilled workers from third level institutions. Apprentice occupations include:

- Carpenters and Joiners – Core Skill
- Electricians and Electrical Fitters – Core Skill
- Plumbers and Heating and Ventilating Engineers – Core Skill
- Painters and Decorators – Core Skill
- Plasterers – Core Skill
- Bricklayers and Masons – Core Skill
- Floorers and Wall Tilers – Niche Skill
- Construction and Building Trades Supervisors – Niche Skill
- Roofers, Roof Tilers and Slaters – Niche Skill
- Glaziers, Window Fabricators and Fitters – Niche Skill
- Energy Plant Operatives – Niche Skill
- Pipe Fitters – Niche Skill.

The Education and Training providers for apprentices are shown in Table 6.11. Furthermore, there are four built environment sector apprenticeships under development (Table 6.12). SOLAS provided craft apprenticeship registration data for craft apprenticeship courses for the period 2009 – 2019, shown in Table 6.13. The data paints a concerning picture in terms of the supply of skilled apprentices. Except for electricians and plumbers, apprentice registrations are extremely low. There is a growing risk that low registrations will create a structural problem in the industry once the previous generation of skilled craftspeople retires.

Table 6.11: Education and Training Providers for Construction Apprenticeships

Craft Apprenticeship	NFQ Level	Duration	Coordinating provider	Coordinating provider/Industry Lead
Brick and Stonelaying	Level 6	4 years	SOLAS	Education and Training Boards and Higher Education Institutions
Carpentry and Joinery	Level 6	4 years	SOLAS	Education and Training Boards and Higher Education Institutions
Geo-driller	Level 6	2 years	IT Carlow	Geological Survey Ireland
Painting and Decorating	Level 6	4 years	SOLAS	Education and Training Boards and Higher Education Institutions
Plastering	Level 6	4 years	SOLAS	Education and Training Boards and Higher Education Institutions
Plumbing	Level 6	4 years	SOLAS	Education and Training Boards and Higher Education Institutions
Stonecutting and Stonemasonry	Level 6	4 years	SOLAS	Education and Training Boards
Wood Manufacturing and Finishing	Level 6	4 years	SOLAS	Education and Training Boards and Higher Education Institutions

Table 6.12: Proposed New Apprenticeships, under development

Apprenticeship	NFQ Level	Proposed Duration	Proposer	Proposed Coordinating provider
Advanced Quantity Surveyor	9	2 years	Society of Chartered Surveyors Ireland	Limerick Institute of Technology
Scaffolding	5	2 years	Construction Industry Federation	Laois and Offaly ETB
Roofing and Cladding	5	3 years	Construction Industry Federation	City of Dublin ETB

For the craft apprenticeship registrations in Table 6.13 (which are delivered by the ETBs as well as through the Higher Education system, mainly through TUD, Cork IT and Limerick IT),⁴⁷ it is essential to bear in mind

⁴⁷ Phases 4 and 6 of Construction related craft apprenticeships are also provided by Athlone IT, IT Sligo, IT Tralee, Dundalk IT, Galway Mayo IT, IT Carlow and Waterford IT. Dun Laoghaire Further Education Institute also provides phases 4 and 6 apprenticeship training.

that this data identifies enrolments and not completions, and therefore is not indicative of the number completing these courses, but only of the attractiveness of each craft apprenticeship course at a given time. Given the cyclical nature of the built environment sector, it is likely that there is a significant timing risk associated with the completion of a craft apprenticeship. Without the necessary data, it is not possible to assess this hypothesis. However, a programme to help those who lose their job could be a solution to ensure that the sector retains its existing trainees. This would be beneficial to the long-term viability of the sector.

Table 6.13: Craft Apprenticeship Registrations by year

Classification	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Electrician	523	373	355	397	522	845	956	1,343	1,705	1,841	1,949
Carpenter and Joiner	140	96	72	91	99	185	291	399	443	591	597
Plumber	127	91	146	97	241	318	289	345	532	653	628
Bricklayer and Stonelayer	20	10	11	6	3	36	26	52	60	81	80
Plasterer	14	12	5	4	8	9	7	18	34	29	36
Painter and Decorator	19	8	18	11	8	11	19	27	44	30	31
Construction Plant Fitter	26	30	32	45	54	56	77	59	86	71	73
Wood Manufacturer and Finisher	24	23	12	11	21	23	48	71	59	95	102
Stonecutting and Stonemasonry	-	-	-	-	-	-	13	2	8	7	3
Total	893	643	651	662	956	1,483	1,726	2,316	2,971	3,398	3,499

Source: SOLAS dataset

A detailed breakdown of activities undertaken and built environment sector education and training provided by each Education and Training Board is given in the appendices to this report.

6.4.3 Higher Education Supply

A significant portion of the built environment sector requires higher education to obtain entry-level positions in the Built Environment sector. In total, six occupations require a specific qualification. These are:

- Architects – Core Skill
- Civil Engineers – Core Skill
- Architectural and Town Planning Technicians – Niche Skill
- Quantity Surveyors – Niche Skill
- Chartered Surveyors – Niche Skill
- Chartered Architectural Technologists – Niche Skill.

These occupations make up nearly 9% of the sector's total employment requirements. Entrants into these occupations are generally aged in their early to mid-twenties, due to the time it takes students to complete a third level qualification (NFQ level 7 – 9).

Information on undergraduate and postgraduate awards provides a means of measuring the qualified supply of labour available on an annual basis (Table 6.14 and Table 6.15). This information demonstrates the significant decline in interest in the third level built environment courses since 2008.

However, 2008 levels of graduate output in these courses were unsustainable, as the education system strained to keep up with the disproportionate size of the built environment sector with unrealistic growth expectations before the global financial crisis. It is essential to learn from this experience and realise that returning to 2008 levels of supply is unsustainable. Additionally, it is vital to consider the lag between graduate output and the sectors' employment prospects, where course selection amongst students appears to be based upon a current perception of an industry, and not necessarily future growth prospects. This present bias amongst third level entrants could exacerbate either oversupply or undersupply of labour, as the industry shifts its growth trajectory.

Table 6.14: Undergraduate Awards in Architecture and Building Courses, 2008 - 2017

Classification	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Combined Architecture and Building	119	147	180	144	141	141	154	77	91	97
Architecture and Town Planning	671	604	732	786	746	534	555	369	253	285
Building and Civil Engineering	2,169	1,957	1,984	1,692	1,650	1,398	1,004	845	937	776
Total	2,959	2,708	2,896	2,622	2,537	2,073	1,713	1,291	1,281	1,158

Source: EGFSN Secretariat (2019)

Table 6.15: Postgraduate Awards in Architecture and Building Courses, 2008 - 2017

Classification	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Combined Architecture and Building	0	0	0	-	13	11	25	73	61	70
Architecture and Town Planning	147	172	151	121	144	127	149	174	171	207
Building and Civil Engineering	117	104	169	136	133	148	179	149	138	174
Total	264	276	320	257	290	286	353	396	370	451

Source: EGFSN Secretariat (2019)

Institution	Level 6 to 9 courses offered by subject area						
	Engineering and Civil Engineering	Architecture, Urban Design and Planning	Land, Quantity Surveying and Construction Economics	Construction / Project Management	Environmental, Energy and Sustainability	BIM and Technology	Other / Specialist
Athlone Institute of Technology	✓		✓	✓		✓	
Cork Institute of Technology	✓	✓	✓	✓	✓	✓	✓
Dundalk Institute of Technology	✓			✓	✓	✓	
Galway and Mayo Institute of Technology	✓		✓	✓	✓	✓	
Institute of Technology Carlow	✓		✓	✓		✓	
Institute of Technology Sligo	✓	✓	✓	✓		✓	✓
Institute of Technology Tralee	✓			✓		✓	
Letterkenny Institute of Technology	✓		✓	✓	✓	✓	
Limerick Institute of Technology	✓		✓	✓	✓	✓	✓
NUI Galway	✓			✓			
Technological University Dublin	✓	✓	✓	✓	✓	✓	✓
Trinity College Dublin	✓			✓	✓		✓
University College Cork	✓	✓			✓		
University College Dublin	✓	✓			✓		
University of Limerick	✓	✓		✓			
Waterford Institute of Technology	✓	✓	✓	✓	✓	✓	

Notes: 1. Architectural technology listed under 'BIM and Technology'.

6.4.4 Unskilled/Semi-Skill Labour

Unskilled, or semi-skilled employment makes up approximately 17% of built environment employees. These workers often work on-site and do not require a higher education or craft apprenticeship qualification to practice. These employees may, however, require specific vehicle licenses or safe passes to comply with workplace regulations.

- Elementary Construction Occupations – Core Skill
- Construction and Building Trades N.E.C – Core Skill
- Construction Operatives N.E.C (8149) – Core Skill
- Mobile Machine Drivers and Operators – Core Skill
- Refuse and Salvage Occupations – Niche Skill

- Air Conditioning and Refrigeration Engineers – Niche Skill
- Water and Sewerage Plant Operatives– Niche Skill
- Crane Drivers – Niche Skill
- Elementary Cleaning Occupations N.E.C. – Niche Skill.

There is no information available on the number of people available in the economy to participate in these occupations from qualification data, as it is not possible to approximate these numbers from qualification awards. They make up a substantial portion of the workforce, and their availability should be more responsive when compared to occupations which require higher education or craft apprenticeship education. Their availability is therefore linked directly to the availability of labour in the economy at a given time and significantly associated with wage competition from other sectors.

6.5 Annual Requirements

As part of the forecasting process, annualised targets for the 2020-2030 period were developed for each occupation. These forecasts take into account and estimate the replacement rate to maintain the existing built environment labour force, and an additional adjustment is made for employment changes. These forecasts also take into account the leakage of staff to other sectors outside the built environment sector.

As part of these forecasts, occupation numbers were modelled for 2020 based upon Labour Force Survey sector data and 2016 Census occupational breakdowns. In the absence of detailed age data by occupation, assumptions were made to calculate the replacement rate of occupations based upon the modal (most common) age of educational attainment for:

- Third Level Qualification (age 22)
- Craft Apprenticeship (age 18)
- Upper Secondary Education (age 18)

Education attainment data was subtracted from the proposed retirement age of 68 due to be enacted by 2028, to derive a working life of between 46 and 50 years. These figures were then divided by 10 to annualise the replacement rate at 2% and 2.2% replacements per annum for the respective occupations.

To calculate the number of additional employees required by 2030, the 2030 forecast for each scenario was subtracted from the 2020 estimate and divided by 10 to annualise the rate.

Replacement numbers were then totalled and multiplied by a skills leakage coefficient to account for the loss of employees to other sectors of the economy. This was calculated individually for each occupation based upon the concentration of skills in the built environment sector in the 2016 Census.

Table 6.16 shows the annual requirements for the thirteen Core occupations identified, based on the central, high and low growth forecasts. It should be noted that these are the average annual requirements over 10 years, meaning that requirements may be more or less in any one year, and may differ based on the trajectory of the overall economy. Estimates of current annual supply are also given, but see the significant caveats on these estimates.

Table 6.16: 2030 Annual Occupation Forecasts, Part I Core Skills and Totals

Classification	Occupation	Estimates of Current Annual Supply	Annual Requirements		
			Central Forecast	High Population Growth	Low Population Growth
Core Built Environment Skills	Carpenters and joiners	431*	482	1,430	-194
	Electricians and electrical fitters	1,461*	419	1,244	-169
	Elementary construction occupations	N.A**	497	1,459	-22
	Construction and building trades n.e.c.	N.A**	268	799	-151
	Plumbers and heating and ventilating engineers	455*	243	724	-145
	Architects	391***	260	730	-77
	Painters and decorators	30*	195	579	-93
	Civil engineers	853***	210	587	-42
	Production managers and directors in construction	N.A**	134	378	-61
	Plasterers	22*	115	343	-68
	Construction operatives n.e.c.	N.A**	178	523	-3
	Bricklayers and masons	63*	125	373	-55
	Mobile machine drivers and operatives n.e.c.	N.A**	151	440	33
	Core Skill Subtotal			3,278	9,610

*Solas registration dataset. Considered to overstate supply as it counts registrations rather than awards. Based on 4-year average 2015-2018. ** No data available to indicate qualified entrants. Generally these professions do not require formal qualifications. *** The veracity of third level data cannot be established. It is highly aggregated and often links to multiple occupations, which may overestimate the supply. Length of time in education and progression to postgraduate study delays entry into the labour market. Estimates above are caveated, given they present 3 year averages taken from 2015-2017.

Table 6.17 shows the annual requirements for the 17 Niche occupations identified, based on the central, low and high growth forecasts.

Table 6.17: 2030 Annual Occupation Forecasts, Part II Niche Skills and Total

Classification	Occupation	Estimates of Current Annual Supply	Annual Requirements		
			Central Forecast	High Population Growth	Low Population Growth
Niche Built Environment Skills	Floorers And Wall Tilers	N.A**	80	237	-34
	Construction And Building Trades Supervisors	N.A**	79	232	-15
	Architectural And Town Planning Technicians	390***	79	219	-1
	Refuse And Salvage Occupations	N.A**	42	126	-35
	Roofers, Roof Tilers And Slaters	N.A**	38	114	-29
	Glaziers, Window Fabricators And Fitters	N.A**	71	207	8
	Construction Project Managers And Related Professionals	N.A**	38	106	-22
	Air-Conditioning And Refrigeration Engineers	N.A**	36	107	3
	Energy Plant Operatives	N.A**	23	68	-9
	Waste Disposal and Environmental Services Managers	N.A**	19	53	-9
	Water and Sewerage Plant Operatives	N.A**	23	68	-3
	Pipe Fitters	N.A**	18	55	-7
	Chartered Architectural Technologists	390***	13	37	-9
	Crane Drivers	N.A**	16	47	3
		Niche Skill Subtotal		575	1676
Subtotal	Core & Niche Skill Subtotal		3,853	11,285	-1,206

*Solas registration dataset. Considered to overstate supply as it counts registrations rather than awards. Based on 4-year average 2015-2018. ** No data available to indicate qualified entrants. Generally these professions do not require formal qualifications. *** The veracity of third level data cannot be established. It is highly aggregated and often links to multiple occupations, which may overestimate the supply. Length of time in education and progression to postgraduate study delays entry into the labour market. Estimates above are caveated, given they present 3 year averages taken from 2015-2017.

6.6 Skills Supply – Perspective from Industry Interviews

From consultation with built environment enterprises, most firms stated that they were looking for “more of the same” with regards to their recruitment, as the continuation of gradual growth continues in the next decade. The introduction of increased technology into the construction sector was acknowledged, requiring integration with existing skills and requiring Continual Professional Development. The challenge for businesses will be how to combine these technological advances with core engineering skills, as older trades become more diluted with other skills. BIM is a crucial driver for the firms interviewed and is expected to continue into the 2020s, along with the introduction of virtual reality technology and artificial intelligence and learning technologies. This increasing automation means that firms are looking for future graduates with coding skills.

The adaptation to climate change and increasing focus on mainstreaming sustainability into the sector is placing an increased emphasis on carbon accounting and understanding the lifecycle budget of buildings and infrastructure, also identified by industry as a critical driver for recruitment in the next decade. The incorporation of renewables in building design, the development of low-energy buildings to meet new building regulations and the consideration of the broader impacts of construction projects on the surrounding areas are key areas to meet zero-carbon targets. The development of off-site construction techniques, such as modular construction, can play a crucial part in reducing the environmental impact of the sector, as well as reducing transport and construction costs on-site.

Other emerging niche areas from the perspective of the industry include building life cycle assessments, and experience with third-party certification systems, for example, Leadership in Energy and Environmental Design (LEED) accreditation. Many firms expressed the view that having the right skill set and the right “company fit” makes recruiting difficult and noted that some of the skills required could be found in other sectors. In broader terms, there is a continuation of the trend of diversifying away from hard engineering skills, with potential workers expected to be more “well-rounded”, or have a broad array of skills. The more intangible skills that come with years of experience in the sector were considered essential and frequently missing, reaffirming the expectation of broad skillsets required by firms.

Built environment firms are expecting shortages of workers across all trades in the next decade, as they consider that not enough apprentices were brought into the industry in recent years. There is also likely to be a shortage of civil and structural engineers as the lack of graduates entering the market combined with high competition for their skills makes it very difficult to recruit in this area. This problem is also experienced for the hiring of quantity surveyors, with migrants covering supply shortages in recent years. Only one interviewee said that there would be an oversupply of skills in any sector, and that they believed that there were too many architects coming into the industry and that they need to be retrained to fit other gaps in the sector.

6.7 Conclusion

This section detailed the results of modelling exercises carried out to forecast the skills requirements for the Built Environment Sector over the next decade. The volatility of the sector makes it difficult to predict skills requirements in the short-term. In the long-term needs have been forecasted based on three different population growth and long-run economic growth.

The modelling exercises have found that employment in the Built Environment Sector is now at or near its optimum size based upon 2030 demand estimates. However, there remains significant “pent-up” demand in areas such as housing due to procyclical spending on construction since the 2008 financial crash. However, this demand is transient. Pent-up demand should be seen as momentary and not a new normal. This means that new jobs arising from temporary demand are unlikely to be sustainable in the long-term unless there is elevated population growth to sustain demand.

Future employment forecasts were broken down by occupation based upon current divisions within the industry. Occupational breakdowns fluctuate over-time depending on the type of demand driving the industry. The analyses presented here represent a snapshot of the industry in 2016 when the census was last undertaken. Updating these forecasts from 2020 to 2030 will ensure that these allocations remain relevant

7

Closing the Skills Gap

> Closing the Skills Gap

7.1 Introduction

This section of the report presents the ideas that were collected throughout this project for reducing skills gaps and labour shortages. These suggestions come from a variety of sources, including an international review of initiatives, the ideas and suggestions resulting from stakeholder engagement, interviews with built environment enterprises and two workshops held in Dublin and Cork to validate the research findings. The international review highlights skills and talent development initiatives within three OECD economies (New Zealand, Singapore, United Kingdom), which have recently developed strategies for their construction sectors to transform them into modern, attractive, high-performance sectors that optimally leverage new technologies. As Ireland's Built Environment sector is currently engaged in a similar effort, there may be lessons from these countries that can be translated into the Irish context.

The stakeholder engagement, consisting of telephone interviews and workshops allowed for the gathering of suggestions from industry and stakeholders. Not all of these suggestions are congruent with the aims of this report, but this does not mean that they do not have value, and their documentation may assist for other research needs.

7.2 Overview of International responses to Construction Sector Skills Challenges and Opportunities

7.2.1 New Zealand

The ambitions to transform New Zealand's construction sector rest on a Construction Sector accord, which was negotiated in 2018. This accord recognises skills development as key to driving the transformation of the sector in New Zealand; there is a recognised shortage of skills across trades and professions, and insufficient capacity to deliver on a growing pipeline of construction projects.

The Accord was accompanied by the development of a Construction Skills Action Plan, which aims to support Government collaboration with industry in meeting New Zealand's current and future construction needs. The Action Plan is composed of six initiatives:

- **Boosting skills through procurement:** Under the New Zealand Government's Procurement rules agencies are required to ask suppliers and sub-contractors what they can do over the life of the contract to train new construction workers and develop the skills of existing ones. Information around skills and training forms part of the evaluation criteria for contracts, which are monitored to ensure training and skills development commitments are delivered.
- **Jobs and Skills Hubs:** This is a free recruitment and training service in the Auckland area where jobseekers or existing workers are matched with training, apprenticeships and job opportunities with the construction and infrastructure sectors. The Hubs also support large projects in meeting social procurement targets.

- **Growing construction careers and credentials:** New Zealand’s Tertiary Education Commission (TEC) is working with the construction industry to increase awareness of careers and pathways through a dedicated information hub on its Careers NZ website, while also improving workforce capability and skills development in facilitating the industry in exploring and developing relevant micro-credentials.
- **Expanding Skills for Industry:** The Skills for Industry programme of New Zealand’s Ministry for Social Development partners with employers and training providers in providing industry-specific training for jobseekers across sectors, including construction. Training packages usually include entry-level health and safety training, business or industry induction and basic skills training, and in-work support.
- **‘Mana in Mahi’ - Strength in Work:** This is a Ministry of Social Development initiative that pays a wage subsidy to employers in a range of sectors to hire someone aged 18-24 in receipt of a benefit and offer them an industry training qualification, including apprenticeships.
- **Immigration settings:** A Construction and Infrastructure Skills Shortage list has been established to simplify the process of granting temporary visas to people with construction and infrastructure skills to fill an identified shortage.

This action plan is being built upon by a three-year Transformation Plan, published in early 2020, which aims to transform New Zealand construction into a high performing sector. The plan is led by a Construction Accord Leadership Group, composed of Government and industry representatives to coordinate its execution and engage with the sector to promote ownership and behavioural change in support of the plan.

This leadership group will be identifying ‘Beacon’ projects across New Zealand’s Construction sector- stages or elements of projects that demonstrate innovation or good practice in the use of technology or environmental sustainability in design or construction- using them to create, promote and share innovation and good practices, including in procurement, subcontracting, and workforce development and training. The leadership group will also be designing and implementing a plan to promote the behavioural and cultural change required to transition construction to a high performing sector- this will include actions to develop strong leadership, create a personal commitment to change and a shared accountability for success.

There are three pillars within the Transformation Plan dealing specifically with skills and talent-related issues:

- **People Development:** This aims to boost the 2018 Skills Action Plan and build capability through several initiatives:
 - The leadership group will work with New Zealand’s Tertiary Education Commission, the Ministry of Business, Innovation and Employment, and the wider industry to identify skills gaps, assess them against available education and training programmes and develop new initiatives to address gaps. There will also be a focus on broader professional standards and life skills (literacy, numeracy) that support a career in construction, and skills in contracts, risk and business management.
 - The leadership group is also coordinating industry input into the New Zealand Government’s review of the shape of Vocational Education, successfully advocating for a Workforce Development Council for construction to be set up,⁴⁸ partnering with Regional Skills Leadership Groups and Workforce

⁴⁸ Workforce Development Councils provide a forward, strategic view of the future skills needs of industries, help translate industry skills needs for the vocational education system, set standards, develop qualifications and help shape curricula, provide advice to the TEC on investment in vocational education, and endorse programmes that lead to qualifications.

Development Councils to ensure the skills people are being trained in match industry needs, and again, successfully working with the TEC and vocational education experts to co-design and establish a Construction Centre for Vocational Excellence to drive innovation and excellence in teaching and learning.

- The plan aims to boost diversity within the construction workforce, in particular amongst women, through existing campaigns to promote the sector’s career opportunities, and through capability building initiatives in different population groups, including Maori and Pasifika. There will also be initiatives to promote workplace cultures that welcome and value diversity and share best practices. The initial focus of this campaign is on increasing the participation of women in construction through support for the Women in Trades and Engineering New Zealand’s The Diversity Agenda initiative.
- The leadership group has also committed to developing a long-term vocational and professional workforce plan by 2022, to include industry-led initiatives, to ensure a better match between skills supply and the pipeline of construction work.
- **Business Performance:** This pillar aims to address a poor understanding of business practice and risk, in particular around pricing, allocation and management of commercial risks, including through the development and rollout of a dedicated education programme for construction leaders. By establishing a clearer view of the construction project pipeline, greater sectoral planning and confidence in investing in skills and technology is also being supported. The leadership group is also working with industry to collate, analyse and share information on good practice with a focus on quality throughout the project lifecycle.
- **Health, Safety and Wellbeing:** Health and safety practices are viewed as critical in supporting a planned acceleration of housing and infrastructural development. The plan is aiming to standardise the number of different prequalification schemes that contractors have to engage with to improve efficiency and consistency, support and build upon existing initiatives such as Construction Health and Safety New Zealand’s (CHASNZ) client leadership programme, and ensure health and safety is considered throughout the lifecycle of all projects. It also supports the implementation of CHASNZ’s mental health in construction strategy programmes, such as the Mates in Construction suicide prevention programme, and the implementation of mental health action plans across the sector.

7.2.2 Singapore

In 2017 Singapore published a Construction Industry Transformation Map, which its Government developed in close partnership with industry, trade associations, institutes of higher learning and unions. The objective of the Map is to transform the sector into one that adopts technologies to make it more advanced and integrated, and by 2025 to train a total of 80,000 professionals specialising in:

- Green buildings, involving design for green buildings and sustainable practices in operations and maintenance
- Design for manufacturing and assembly (DfMA)/Off-Site Construction, involving upfront design for ease of manufacturing and assembly, and highly automated offsite production facilities and efficient and a clean onsite installation process; and
- Integrated Digital Design (IDD), enabled by BIM, and which fully integrates processes and stakeholders along the value chain, through advanced ICT and smart technologies.

It aims to increase adoption of DfMA and IDD by establishing a robust DfMA ecosystem to make it price competitive, as well as enabling widespread adoption. It also aims to develop IDD shared platforms and standards to support the adoption of IDD solutions. It aims to build strong and capable firms by reviewing public procurement practices for better differentiation of quality, more transparency, and greater collaboration among firms.

The Transformation Map is seeking to underpin these ambitions through the attraction of a pipeline of talent to the Singaporean Construction sector, with higher-skilled jobs, more competitive salaries and better working environments; and by building core engineering skills in transformational areas via structured professional development pathways across three areas: pre-Employment Training, Internships and early job training, and Continuing Education and Training.

A Built Environment Skills Taskforce was set up to establish a structured development pathway across these three areas, recommending:

– **Pre-employment training (PET)**

- The incorporation of new industry transformation areas into the curriculum of Built Environment related courses, including through the development of new elective modules, provision of training resources by trade associations and industry firms to make the curriculum more relevant to industry needs, and the facilitation of long term collaboration between trade associations and schools in curriculum development through trade association representation on school Academic Advisory Panels.
- Development of Built Environment specialisations for Mechanical and Electrical engineering courses, to encourage students in broad-based courses to take up Built Environment electives.
- Inter-disciplinary training, to expose graduates to multiple disciplines to better prepare them for real work conditions, such as the incorporation of inter-disciplinary problem definitions and team requirements in design projects and project competitions.

– **Internships**

- Structured internships which, based on industry feedback, would last at least 6 months, with pre-defined learning outcomes and effective industry mentorship. A set of desired learning outcomes and internship guidelines were developed to help firms and students achieve a more enriching internship experience.
- A 4 day Built Environment Formation programme to help prepare students for internship, helping them to understand the industry and Industry Transformation Map areas such as Integrated Digital Delivery, Design for Manufacturing and Assembly, and Green Buildings, via training workshops, industry sharing sessions, site visits and simulation activities. This programme aims to benefit about 2,000 interns over five years. Built environment Future Leaders and Young Leaders are engaged as anchor facilitators for the programme. In addition, representatives from relevant Trade Associations and Chambers, industry professionals and veterans also assist in co-developing and co-delivering the programme.

– Continuing education and training

Built Environment personnel should continually upskill themselves to stay up-to-date with the latest industry developments. For iBuildSG scholarship and sponsorship recipients (offered by the Singaporean Government’s Building and Construction Authority in collaboration with industry firms), sponsoring firms should provide continuing education and on-the-job training during the bond period for the scholarship and sponsorship recipients. The Taskforce has partnered with professional boards to encourage Built Environment personnel to upskill themselves through continuous education and training by including BE transformation areas in the registration framework for Professional Engineers and Architects.

The attraction of new entrants to the sector is being supported by the Singaporean Government’s *Building Careers* website,⁴⁹ which contains information about Singapore’s built environment sector, its prospects and career opportunities, allows job seekers to browse for job listings, allows employers to post jobs and source candidates, and includes resources to enhance students’ knowledge of the sector.

7.2.3 United Kingdom

In 2018 the UK also launched a Construction Sector Deal, to deliver a substantial improvement in the sector’s productivity growth and with it housing and infrastructure over the subsequent years. Enhancing workforce capability is central to this vision, with the UK’s Construction Industry Training Board forecasting the need for 31,000 new entrants to the sector each year to 2022; the CITB is the UK agency responsible for supporting skills development across the Construction sector, by providing strategic direction in identifying current and future skills needs and training methods, supporting and influencing training providers to deliver on these needs, setting out training and progression routes, funding construction training and promoting the sector.

The UK sector’s skills challenge is being reinforced by the unfavourable older demographic profile of the sector’s workforce, and the impact on inward migration of the UK’s departure from the European Union. To support the delivery of the deal, the UK sector’s Construction Leadership Council- an industry and Government grouping which works to enhance efficiency, skills and growth across the sector- developed a “Skills Workstream” strategy and action plan in 2018, highlighting the areas that need to be acted upon to deliver on skills needs; this was built upon by a 2019 Future Skills Report, which sets out to support the transformation of UK construction into a sector with a step change in safety, productivity, quality and sustainability.

A number of priority areas have been set out in the Skills Workstream, and Future Skills reports, with a view to broadening the sector’s pipeline of talent and retaining its existing workforce:

- **Promotion of career opportunities:** It has been recommended that the UK industry establish a coordinated approach to promoting construction careers under a single banner, including through an enhancement of the CITB’s Go Construct Platform⁵⁰ and school and college engagement initiatives such as Inspiring Construction and Build UK’s Open Doors.

⁴⁹ <https://www.buildingcareers.gov.sg/>

⁵⁰ <https://www.goconstruct.org/>

- **Work experience programmes:** The industry has been developing structured work experience programmes, to build upon existing initiatives such as Experience Construction, supporting employers to commit to work placements for T levels students (industry-focussed two-year study programmes for 16-18-year-olds, developed in collaboration with business) and other work experience initiatives to attract under-represented groups. The CITB has also committed to working with the Department of Education to ensure that construction funding under its National Retraining Scheme enhances opportunities for onsite work experience and training.
- **Boosting diversity:** The industry is working to boost its gender, ethnic and socio-economic diversity, and through specific campaigns is targeting cohorts such as the unemployed, former military personnel and occupations with skills transferable to construction.
- **Retention of talent:** The industry is setting out through active research to identify the key drivers of people leaving the sector- including pay benchmarking with comparable roles in other sectors- and develop mitigating strategies. It is also developing programmes to engage and retain the current workforce and provide continuous employment.

The strategies are also aiming to **boost UK apprenticeship numbers**, which while growing, remain below those required by industry. The Construction Leadership Group and CITB are working with employers, trade associations and government to create an optimal structure for employers to invest in high quality and relevant apprenticeships, including the development with the Institute for Apprenticeships of employer led Trailblazer standards that reflect the needs of a modernised construction industry; establishment of a Construction apprentice working group to provide evidence on and solutions to construction's future apprenticeship needs; and support for the sector in accessing information about the apprenticeship system and supports, such as information on standards, the apprenticeship levy, models for supporting apprentices in small employers and CITB grant funding.

The Construction Leadership Council and CITB are **also working with training providers to ensure they understand and respond to the sector's priority needs**. The CITB's funding will be targeted on priority areas, and providers will be influenced and supported to use innovative, multiple format training methods that take account of emerging technologies, to enhance take up and relevance of training. Common training standards and programmes are also being developed in key areas such as health and safety, management and employee wellbeing, to improve standards and facilitate more attractive working environments.

Development of the skills required to support the adoption of digital and manufacturing technologies, to drive smarter, more productive design, manufacture and assembly solutions- and ultimately significant productivity improvements, reduced costs and project delivery times, and increased quality and environmental outcomes- are a key focus of the UK skills strategies.

Adoption of these technologies will require **a more digitally literate workforce**. To this end the strategies have recommended the definition of digital skills as a learning requirement in newly developed apprenticeship standards, as well as industry developing closer, collaborative relationships with technology, software and equipment providers to enable fully integrated technical solutions; this will

include the retraining or employment of professionals from outside construction to manage systems integration and data sciences, and industry working with training bodies to create and invest in data sciences training at all levels to enhance the sector's capabilities. The CITB is also working with industry to equip organisational leaders to deliver digital change. At the same time, it has been recommended that industry develop a competency framework for digital literacy across the workplace, especially for older workers, through the development of new resources and capability for digital upskilling. It has also been recommended that professional institutions, training providers and industry develop and deliver qualifications and mandated continuing professional development activities that accelerate understanding and deployment of digital skills.

The delivery of smart construction projects, involving offsite, automation and digital technology, is also identified as requiring delivery teams with **greater technical skills** in installation, assembly and coordination activities, compared with traditional construction. This will require digitally literate, multiskilled, high trained installation and assembly technicians, as well as existing professional and leadership roles (engineers, project managers) able to operate in different environments, manage complex logistics and lead multidisciplinary site and manufacturing teams. It has been recommended that through the CITB's identification and mapping of new standards and qualifications, industry work with established training providers to develop upskilling routes for both existing employees and new entrants- several institutions have been identified as well-positioned to deliver on these requirements: Construction Scotland Innovation Centre, the Advanced Manufacturing Research Centre at the University of Sheffield, and the Cambridge Centre for Smart Infrastructure and Construction.

The UK has also emphasised **collaborative skills**, i.e. the ability to build and maintain relationships, communications, critical and creative skills, as key enablers for working more innovatively and productively. It has been recommended that the CITB work with Government, industry and training providers in designing and deploying a common work readiness scheme for all new entrants, to allow them to understand the context of the industry, integrate quickly, and enable them to manage in volatile, uncertain and ambiguous environments. The CITB with industry has also been advised to develop a suite of funded training opportunities to engage all of the industry in accelerating a behavioural change programme, to increase professional collaboration.

The industry is also aiming to improve the understanding of the link between industry culture, individual behaviour and productivity- including reviewing to what degree individual behaviours are influenced and shaped by industry culture, and whether this could be influenced through training. This includes looking at the behavioural change in other industries and how it has been achieved, and whether the identified need for more flexible skills sets and behavioural change is being supported by the industry's supporting infrastructure.

Like New Zealand, there is also an emphasis in the UK on **leveraging procurement as a means of stimulating skills development**. By embedding smart construction in early design and procurement processes, this is seen as creating demand for skilled employees and drive employers to invest in training, smart construction techniques and behaviours. The UK strategies recommend investment by clients in collaborative tendering processes with scoring criteria to favour bid teams willing to collaborate, embed digital technologies and leverage industrialised manufacturing techniques. This is also relevant to the industry ambition to reduce the number of workers not in direct employment, which is seen as a clear

barrier to employers investing in developing the skills necessary to deliver on future industry needs. This has involved a call for all public and private sector clients to consistently mandate direct-hire practices in their supply chain, which has been reported as reducing risks associated with delivery certainty, reputation and quality, and overcoming skills shortages, spiralling labour costs, poor productivity and quality performance.

7.3 Workshops

Stakeholder workshops were undertaken during the research process and provided an opportunity to gather policy suggestions from a broad audience of participants with industry or policy backgrounds. The research group gathered a considerable number of recommendations (approximately 180 recommendations) from both Cork and Dublin workshops alone.

As would be expected, many suggestions from the participants of the workshop overlapped. There were also cases where several participants pre-agreed recommendations before attendance. Several participants were involved in parallel studies and advocated for proposals arising from their research which were already in various stages of implementation. Some suggestions specified a desirable outcome but did not determine the mechanism through which the result could be achieved.

Workshop participants were invited to submit three preferential recommendations, each to address the future skill needs for the built environment sector. Due to the number of recommendations received as part of this process, these have been summarised and merged with similar proposals for brevity. Suggestions have been organised according to the four policy strands which the EGFSN can influence.

Further Education and Training and Higher Education

A significant proportion of all suggestions concern Further Education and Training and Higher Education. These recommendations, although touching on several issues, focus on increasing the supply of qualified individuals available to the Built Environment sector. The following suggestions, some of which are paraphrased or combined for brevity, were proposed throughout the workshops:

- **Workshop Suggestion 1 (WS1) - A Single Applications Portal:** Workshop participants stated that secondary-level education is biased towards third-level education and directing student progression through the Central Applications Office (CAO) system. This system excludes Further Education, Apprentices and other Post Leaving Certification Training courses. The exclusion of these courses creates an availability bias amongst students in favour of third-level education courses. Combining application portals would reduce this availability bias.
- **Workshop Suggestion 2 (WS2) - Modular Craft Apprenticeship Paths:** Industry participants frequently stated that the qualification process for apprentices was too long in some instances. Several education providers noted that industry representatives are often unwilling to compromise on course duration and content if it involves downgrading a qualification on the NFQ framework. Various suggestions were made to make qualifications more modular similar to the 'Higher Certificate', 'Degree', and 'Higher Degree' system in third-level education. This suggestion would allow

apprentices to qualify incrementally and according to their needs. It may also foster multi-disciplinary qualification.

- **Workshop Suggestion 3 (WS3) - Earn & Learn Craft Apprenticeship Model:** Many who attended the workshops desired more significant subsidisation of the craft apprenticeships or an 'Earn & Learn' Model. It was noted that craft apprenticeships for many built environment occupations are already subsidised, which is not the norm for post-2016 apprenticeship courses outside of the Built Environment Sector. This move would transfer more of the cost of training to the Exchequer from the industry. The wage differential between what is received by apprentices and the amount received by unskilled labour within the industry was noted as problematic, as it is a financial disincentive for the apprentice.
- **Workshop Suggestion 4 (WS4) - Multi-Annual Budgeting for Education:** Education providers consistently raised the issue of budget uncertainty when planning Built Environment courses. These courses are substantially more costly to deliver relative to others (given the range of tools, machinery and increasingly software), and the lack of Multi-Annual Budgeting means that there is considerable effort required to maintain the level of funding allocated for built environment courses.
- **Workshop Suggestion 5 (WS5) – Coordinated Campaigning from Industry:** A recommendation on targeted and coordinated campaigning from the built environment industry was made. This was not limited to third-level education, but also could be targeted at secondary level. The campaign should be aimed at students at different stages. It could highlight how construction helps deliver essential health, education and humanitarian projects, as well as sustainability objectives, and that the industry is characterised as an integrated problem-solving sector – anticipating future needs and building accordingly. Work experience programmes in Transition Year could be used to engage with secondary schools.

Upskilling/Reskilling

Upskilling/Reskilling suggestions primarily focus on labour quality and adaption. There was a significant crossover of recommendations between upskilling/reskilling and other themes. Considerable focus was given to the recognition of skills:

- **Workshop Suggestion 6 (WS6) – Mandate the Construction Industry Register Ireland (CIRI):** Making CIRI mandatory was the most commonly identified issue amongst workshop participants in the context of ensuring Quality through appropriately skilled labour. The purpose of the CIRI register is to assure customers that they are dealing with a competent contractor. Registration is currently only voluntary. Many participants stated that the checking of qualifications is limited in the industry. The legislation to make CIRI mandatory is available but has not been enacted.
- **Confirming brief with Custodian Consultancy Workshop Suggestion 7 (WS7) – Development of One-Stop-Shop for Training and Development:** The visibility and accessibility of training and upskilling were frequently mentioned during the workshop process. A suggestion was made for a one-stop-shop platform to increase the visibility and accessibility of training and upskilling. It is understood that such an app is in development arising from a parallel study conducted by Limerick Institute of Technology (BusApp). It is not clear as to whether this has the necessary support from all providers.
- **Workshop Suggestion 8 (WS8) – Expand Continued Professional Development (CPD) Systems to**

Skilled Tradespeople: Desire was expressed for an expansion of CPD systems to additional trades. Several reasons were attributed to this suggestion, including to professionalise the sector, improve employer attitudes to training and development, and keep skills relevant, e.g. NZEB.

- **Workshop Suggestion 9 (WS9) – Support Training Needs of Small Businesses or Sole Operators:** Opinions were expressed from training providers that there are numerous undersubscribed training and courses provided and funds available and under-utilised for courses. The structure of the industry is seen as a barrier for small businesses who are time and resource-poor and find it challenging to release employees for upskilling.

Net Migration

In the absence of a stable industry, net migration is an essential mechanism for labour supply when dealing with volatile swings in employment. It allows the industry access to an additional source of labour in a tight labour market, and those who are made redundant to seek employment elsewhere when local markets are depressed. Migration also enables domestic firms to access extremely specialised services/labour that is not always viable in small domestic markets such as Ireland's. The following proposals were made concerning migration during the workshops:

- **Workshop Suggestion 10 (WS10) – Development of a Skills Passport:** Skills Passports were mentioned in two contexts, the first concerning foreign workers and the need to establish skills equivalencies to allow them to work in Ireland. Secondly, concerning skilled workers in Ireland who possess the necessary skills, but not the corresponding qualification, and the need to provide equivalency tests to recognise these skills and bridge the qualification gap.
- **Workshop Suggestion 11 (WS11) – Improving Information for Migrants:** A desire to improve the information available to migrants seeking to immigrate to Ireland was stated. Some specific issues were raised with current information, including the accuracy of the information available to immigrants.

Alternative Supply

Alternative Supply concerns the expansion of the pool from which the Built Environment Sector can draw labour. There are several concerns concerning the supply of Built Environment labour, including diminished interest amongst those in their late teens and early 20s. What is perhaps the most significant challenge for the industry currently is the gender imbalance in the industry. As one person remarked: the industry “only pulls labour from half the workforce.”

- **Workshop Suggestion 12 (WS12) – Provide Female Role Models and Mentoring:** One of the challenges for the industry is to change the ‘masculine’ image of the industry. This image forms a cultural barrier for women when choosing careers. To change this perception, several individuals proposed championing female role models in the industry to break this stereotype and encourage more women to join the industry, including through ensuring girls secondary schools provide built environment subject options. This includes courses in design and communication graphics (technical drawing), technology, engineering, applied maths and construction studies.
- **Workshop Suggestion 13 (WS13) – Source Labour from other Sectors:** The transferability of skills across the built environment sector was noted, and there is the potential to source labour from

graduates in non-core disciplines such as IT, Business, Arts etc. and transitioning them through an Earn and Learn model, which encourages a more diverse workforce.

7.4 Stakeholder and Enterprise Interviews

Interviews were undertaken throughout the project with both key stakeholders and built environment enterprises. The primary purpose of this was to develop a context for the analysis. However, during this process, we also asked interviewees what they felt should be changed.

In total, 60 interviews were completed. Twenty interviews were conducted with key stakeholders. Key stakeholders came from a variety of backgrounds including government departments, industry/professional representative organisations and unions. A further 40 interviews were held with built environment enterprises. Interviews were completed throughout the research process.

Interviewees were questioned on what they would change, and what they would change if resources were not an object, i.e. an unconstrained choice. Many of the suggestions were specific to their background, and some were outside the scope of this study. Suggestions which were outside the scope of this study were omitted. Suggestions which were repeated from the workshop events are also omitted. Omissions were undertaken to avoid overrepresentation where specific suggestions may have been repeated by the same person or groups of persons.

Again, suggestions have been organised according to the four policy strands which the EGFSN can influence.

Further Education and Training and Higher Education

This sub-section concerns Further Education and Training and Higher education. These recommendations, although touching on several issues, focus on increasing the supply of qualified individuals available to the built environment sector. A significant proportion of all recommendations in this category were repeated across both workshops and interviews. This was due to the high level of participation of education providers and professionals. Many of the suggestions received from education providers are listed under heading 7.3; they have not been repeated here for brevity.

- **Interview Suggestion 1 (IS1) – Reduce the Length of Craft Apprenticeships:** Several interviewees remarked that the length of some craft apprenticeship courses was excessive and that they required significantly less time to become skilled. There was an appetite to reduce the length of courses to boost supply. Education providers, however, remarked that this would affect the qualification received and that employers were unwilling to compromise the status of qualifications.
- **Interview Suggestion 2 (IS2) – Training in Off-Site Construction:** Several interviewees raised the need to support Off-Site Construction specifically. In many cases, the type of support was not specified. However, some interviewees identified that specialised training was required for off-site construction firms and that this may require the development of specific course material.

Upskilling/Reskilling

Upskilling/Reskilling suggestions primarily focus on labour quality and adaptation. There was a significant crossover of recommendations between upskilling/reskilling and other themes. The considerable focus in stakeholder interviews was on the need for continuous learning and the flexibility of access:

- **Interview Suggestion 3 (IS3) – Incentivise Employers to allow Staff to Attend Short-term Training:** Issues with staff being released from on-site responsibilities to attend short-term training courses due to delivery pressures were highlighted throughout the research process. Interviewees suggest that there was a need to incentivise employers to allow employees to attend these courses for upskilling purposes. The mechanism of incentivisation was not elaborated on in detail.
- **Interview Suggestion 4 (IS4) – Establishment of Local Authority Construction Companies:** One suggestion obtained from stakeholders was to create direct built environment employment at Local Authority level to maintain housing stock. Such employment could be direct or established in a social enterprise scheme. Development of such a company would allow Local authorities to meet their own needs and provide craft apprenticeship opportunities to meet long-term skills needs⁵¹.
- **Interview Suggestion 5 (IS5) – Centres of Excellence for NZEB:** Education providers wished to see more Centres of Excellence developed outside the South-East for NZEB courses to improve the accessibility of the training for those operating in other regions of the country.
- **Interview Suggestion 6 (IS6) – Development of a ‘Teagasc Style’ Advisory Agency:** Many interviewees identify the lack of research and development in the industry to boost productivity as an issue. Interviewees frequently identified ‘Teagasc’ as an example of an institution they would like to see in the built environment sector to boost productivity amongst companies.

Net Migration

Migration allows the industry access to an additional source of labour in a tight labour market, and those who are made redundant to seek employment elsewhere when local markets are depressed. Discussions surrounding migration during interviews often focused on those who left Ireland during the previous recession in 2008, although previous attempts to attract these labourers back to Ireland have been ineffective:

- **Interview Suggestion 7 (IS7) – Champion Built Environment Exporters:** Issues were raised with how focused the built environment sector is on the domestic market. A need to diversify to other markets was identified to reduce risk. The need for promotion of good behaviours amongst construction companies could be brought about by promoting success stories. Participants also highlighted that an increased presence of Irish construction companies abroad would promote Ireland as a destination of global built environment talent.
- **Interview Suggestion 8 (IS8) – Promote the Industry to the Diaspora:** Many interviewees lamented the loss of construction skills due to emigration. In the aftermath of the 2008 recession, many skilled labourers emigrated to countries such as the UK, Australia and Canada. The quantum of those who emigrated is not accurately known. This labour is thought to be more skilled now, having worked in a variety of countries for several years. Suggestions were not specific and were discussed in the vein of promotion. It should be noted that significant efforts have been exerted to attract this labour back to Ireland over the past several years, but success appears limited.

⁵¹ An example of scheme which prompted this suggestion was found in Glasgow, Scotland. A link to this scheme is found here: <https://www.citybuildingglasgow.co.uk/>

Alternative Supply

Alternative Supply concerns the expansion of the pool in which the Built Environment Sector can draw labour. As was the case in the workshop, significant focus was given to female participation in the Built environment sector. However, the focus on female participation during these issues was more pronounced. Suggestions included:

- **Interview Suggestion 9 (IS9) – Encourage Adult Craft Apprenticeship:** It was suggested that adult craft apprenticeship should be developed to qualify experienced site workers in a trade as a means of providing progression opportunities to unskilled and semi-skilled labourers.
- **Interview Suggestion 10 (IS10) – Review Site Practice for Gender Equality:** One interview highlighted that on-site construction practices were not conducive to gender balance or family life due to restrictive time schedules or a lack of flexibility. These restrictive practices act as a barrier to female participation in the industry. This analysis is backed-up somewhat by the low levels of female participation amongst on-site occupations relative to off-site built environment occupations. It was highlighted that off-site practices had changed dramatically, but that significant “catching-up” is required for on-site professions.
- **Interview Suggestion 11 (IS11) – Bursaries for Female Craft Apprenticeship:** An interviewee suggested that those who employ female apprentices should be financially rewarded. It was suggested that a reward mechanism in this vein was to boost initial female participation in these roles, increasing the appeal of these professions across genders.

7.5 Summary of Feedback

This section provides a summary of the recommendations made to the research team throughout the process. These tables have not been produced to endorse any particular options listed (recommendations are made in the following chapter) but to provide a summary of feedback received by the research team for transparency purposes.

The engagement for this study consisted of gaining insights from over ninety stakeholders in the built environment sector, including perspectives from industry itself, key informants including training providers and government agencies. The engagement consisted of group discussion and dialogue in a workshop setting alongside one-on-one interviews across an array of industry and stakeholders.

There was overlap and common recommendations emerging across all the engagement undertaken for this study. Table 7.1 presents recommendations from the Dublin and Cork workshops – emerging after discussion and debate in a group setting. Many of these recommendations were expressed or echoed in the industry and stakeholder interviews, identified in the column on the right hand side of Tables 7.1.

Table 7.2 is labelled Stakeholder Recommendations, presenting a summary of the key informant recommendations. Again, many of these recommendations were also expressed in the enterprise interviews, shown in the last column on the right of the Table.

In these tables, suggestions have also been cross-checked with the literature review and international responses to construction skills challenges and opportunities to identify any consistent themes across the research.

Table 7.1: Workshop Suggestion

Code	Suggestion	Identified in:	
		Cork/Dublin Workshops	Enterprise Interviews
WS1	A Single Applications Portal	✓	
WS2	Modular Craft Apprenticeship Paths	✓	✓
WS3	Earn & Learn Craft Apprenticeship Model	✓	✓
WS4	Multi-Annual Budgeting for Education	✓	✓
WS5	Coordinated Campaigning from industry	✓	✓
WS6	Mandate the Construction Industry Register Ireland (CIRI)	✓	✓
WS7	Development of One-Stop-Shop for Training and Development	✓	
WS8	Expand Continued Professional Development (CPD)	✓	✓
WS9	Support Training needs of small businesses or sole operators	✓	
WS10	Development of a Skills Passport	✓	
WS11	Improving Information for Migrants	✓	✓
WS12	Provide Female Role Models and Mentoring	✓	✓
WS13	Source labour from other sectors	✓	

Source: Analysis of Response Data

Table 7.2: Stakeholder Suggestions

Code	Suggestion	Identified in:	
		Key Informant Interviews	Enterprise Interviews
SS1	Reduce the Length of Craft Apprenticeships	✓	✓
SS2	Training in Off-Site Construction		✓
SS3	Incentivise employers to allow staff to attend short-term training		✓
SS4	Establishment of Local Authority Construction Companies	✓	✓
SS5	Centres of Excellence for NZEB	✓	✓
SS6	Development of a 'Teagasc Style' Advisory Agency	✓	✓
SS7	Champion Built Environment Exporters		✓
SS8	Promote the Industry to the Diaspora		✓
SS9	Encourage Adult Craft Apprenticeship	✓	✓
SS10	Review Site Practice for Gender Equality		✓
SS11	Bursaries for Female Craft Apprenticeship		✓

Source: Analysis of Response Data

7.6 Conclusion

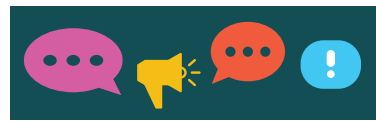
This section has presented a menu of policy options available to the EGFSN. These policy options form a long-list of solutions which were considered in the formation of this report. Options were gathered from a variety of sources, including those implemented in other jurisdictions and those obtained from policy-makers and industry representatives during the workshopping process.

This section had the dual purpose of recognising the contribution of workshop participants during this research study and also to show transparency in decision making for EGFSN in the final stage of preparing recommendations emanating from this research and consultation.

8

Recommendations

> Nine priority actions



1. A coordinated Campaign from Industry, with support from education and training providers and Government, to promote careers in the Built Environment Sector



2. Examine the scope for reforms to Built Environment education, training and qualifications (including apprenticeship)



3. Aligning skills within the Built Environment sector with technological change



4. Developing the skills to enhance the sector's contribution towards climate change mitigation



5. Development and increased engagement with entrepreneurial and management skills training



6. Place the Construction Industry Register Ireland on a statutory footing



7. Assess the merits of developing a "Skills Passport" for Built Environment activities, to facilitate the recognition of skills or competencies



8. Explore the use of the Procurement Process to stimulate skills development



9. Engage in ongoing monitoring and evaluation of the demand for Built Environment sector skills

> Recommendations

This section details the recommendations arising from this study, which are for the consideration of built environment stakeholders- across industry, education and training providers and government- as they seek to plan for the required quality and necessary quantity of built environment skills in the coming years, in line with broader private sector activity and national ambitions around housing, infrastructural development and climate change mitigation.

Nine priority actions have been recommended in total:

1. A coordinated Campaign from Industry, with support from education and training providers and Government, to promote careers in the Built Environment Sector
2. Examine the scope for reforms to Built Environment education, training and qualifications (including apprenticeship)
3. Aligning skills within the Built Environment sector with technological change
4. Developing the skills to enhance the sector's contribution towards climate change mitigation
5. Development and increased engagement with entrepreneurial and management skills training
6. Place the Construction Industry Register Ireland on a statutory footing
7. Assess the merits of developing a "Skills Passport" for Built Environment activities, to facilitate the recognition of skills or competencies
8. Explore the use of the Procurement Process to stimulate skills development
9. Engage in ongoing monitoring and evaluation of the demand for Built Environment sector skills

While this study adopted a ten-year timeframe, it is advised that these recommendations be treated as short to medium term priorities by the sector's stakeholders, for substantial delivery within a two year timeframe. On advancement of the recommendations set out above, it is advised that this be progressed by way of a targeted implementation group composed of the public and private stakeholders responsible for delivering on the associated actions, with a sunset clause of two years to ensure the focus among the membership is on delivery of the study's recommendations. It will be important to ensure alignment of the work of this implementation group with the actions that emerged from the productivity analysis of the Construction sector, undertaken and published under the remit of the Construction Sector Group in 2020. This alignment has been reflected in the recommendations.

The securing of adequate funding will of course be important to advancing a number of the recommendations that have been set out. It will be important for the Built Environment sector, aligning with the evidence presented in this report, to work closely with the education and training system in developing the required provision and in particular engage fully with the programmes competitively funded through the National Training Fund (e.g. Skillnet Ireland, Springboard+, Human Capital Initiative), which seek to respond to areas of demonstrated enterprise demand and which are aligned with national policy ambitions.

Recommendation 1: Coordinated Campaign from Industry, with support from education and training providers and Government, to promote careers in the Built Environment Sector

- Industry to lead on a coordinated marketing campaign to promote career opportunities within Built Environment activities, including through the development of a ‘shared identity’ for the sector, with support from education and training providers in relevant subject areas, as well as the State. This campaign should be targeted at those of school going age as well as potential career changers and those across other sectors of the economy with skills that are transferable to Built Environment activities.

Responsibility: Industry Representative Organisations (Lead), interfacing with various Further Education and Training and Higher Education Providers and Higher Education Authority, SOLAS, relevant Government Departments

- As part of this marketing campaign, incorporate existing initiatives to address gender balance within Built Environment activities. To support this objective, and formation of career choices, facilitate greater access for female Junior and Senior cycle students to subjects and facilities relevant to the Built Environment.

Responsibility: Industry Representative Organisations, Department of Education

- As part of the coordinated marketing campaign, Industry to work with the Department of Employment Affairs and Social Protection and Education and Training Providers to target, recruit and reskill those workers from other sectors finding their job roles becoming redundant due to digitalisation and the transition to a low carbon economy, as well as the impact of Covid-19.

Responsibility: Industry, in collaboration with Department of Employment Affairs and Social Protection and Further Education and Training and Higher Education providers

Several parallel marketing initiatives are being undertaken by built environment sector organisations at present to promote the sector or specific trades. There is a need to develop a ‘shared identity’ for the industry to market itself more effectively, and for this marketing to be supported by education and training providers in relevant subjects areas or careers, as well as the State, which has set out ambitious national targets in housing, infrastructural development and retrofitting for the coming decade. Leadership, however, is ultimately the responsibility of the sector, and enhanced coordination will be necessary to underpin efforts to promote careers across Built Environment activities.

Frequent responses from industry and stakeholders alluded to the negative perception of the industry, and how it is not a desirable sector as a career choice for young people. Reasons given included it being considered unsafe, male dominated and too volatile, amongst others. A comprehensive review of these perceptions could equip the industry with the evidence to overcome them. The sector is diverse, and a coordinated campaign led by industry could highlight the opportunities that the sector offers to those deciding on their career options– in terms of problem solving, future-proofing the built environment, addressing/mitigating the effects of climate change, or a modern narrative of the activities undertaken in the sector. Given the evidence provided in this study of the Built Environment’s competition with other sectors for a range of skills, it is also important that this messaging and outreach be targeted at those already in the workforce with the relevant transferable skills.

Several suggestions were given for how the built environment sector could redefine itself, such as how it delivers essential health, education, and humanitarian infrastructure, as well as how it delivers on sustainability challenges and problem-solving – anticipating future needs and building accordingly.

Coordination can effectively be harnessed from the industry itself. As an example, the New Zealand Construction Leadership Group highlights ‘Beacon Projects’ – showcasing projects that demonstrate innovation or good practice in procurement, subcontracting and workforce development. This can serve to encourage employer investment in education and training. It also feeds into wider communications and careers promotion, enhancing the attractiveness of the sector to school students and jobseekers, and illustrating available progression pathways in the sector.

In tackling negative perceptions, broadening its appeal and thereby its potential pool of skills, two groups, in particular, should receive a special focus in this coordinated campaign by industry. First, significant cultural barriers exist for female participation in the built environment sector. Evidence of occupational labour data shows:

- less than 1% participation across many craft apprenticeship-based occupations and only 4% women working in ‘core’ or ‘niche’ Built Environment occupations
- A masculine image of the industry
- Lack/drop off of girls’ interest in skills required by the built environment sector due to limited subject options for girls at the second level; and,
- A lack of gender mainstreaming across the sector.

It is proposed that female role models in the industry be championed to start the process of breaking this stereotype and encourage more women to join the industry. Existing initiatives to increase girls’ participation in STEAM subjects at secondary schools are acknowledged. Reform of on-site practices to make them more conducive to gender balance and family life will also be important, but fall outside the direct scope of this study.

A lack of female exposure to built environment subjects at second-level is a critical barrier to female participation in the sector. At a minimum, schools within a region could work together to provide access to additional subjects and facilities, where practical. More broadly, measures should be taken to facilitate equality of opportunity for female students at post-primary level. It is during this time that students form decisions about career choices. These may include the decision to follow CAO applications or craft apprenticeship routes. Greater investment could be made available for facilities in girls’ schools at second-level to provide courses in design and communication graphics (technical drawing), technology, engineering, applied maths and construction studies.

Second, against the backdrop of digitalisation and the transition to a low carbon economy- which are expected to see some enterprises transform their business models and adapt to new realities, but also some workers finding their job roles becoming redundant- there exists an opportunity for the Built Environment sector to tap into an additional supply of skills as national policy objectives (housing, infrastructural development, climate change mitigation) ensure that it represents a sector with a long-term future in the context of an evolving economy.

With the impact of Covid-19 serving to accelerate these trends, the Built Environment sector is in a position to target, recruit and reskill those from other sectors of the economy with less viable growth prospects. This will require a close working relationship with the Department of Employment Affairs and Social Protection and promotion of reskilling opportunities through Higher Education and Further Education and Training programmes. New Zealand offers a template in its Jobs and Skills Hub.

Recommendation 2: Examine the scope for reforms to Built Environment education, training and qualifications (including apprenticeship)

- To establish a needs assessment for built environment education and training, including craft apprenticeships:-
 - Undertake a mapping exercise of the skills required (including technological capabilities) against the education and training programmes available to the Built Environment sector to identify any gaps in provision.
 - Where there are found to be grounds for additional apprenticeship programmes or changes to existing craft apprenticeships, open a broad dialogue with the Apprenticeship Council on any requirements or options for proposed changes.
 - Industry to engage with the existing skills infrastructure (Skillnet Ireland/ further education and training and higher education providers) on the development of appropriate programme responses to identified skills needs for non-apprenticeship programmes.

Responsibility: Industry, Unions with Department of Further Education and Training and Higher Education, Higher Education Authority, SOLAS

Industry and Government are committed to the expansion of apprenticeship opportunities across the economy, including within craft apprenticeships- this is reflected in the Generation Apprenticeship promotional campaign, as well as the recently published Further Education and Training Strategy, 2020-2024 and the forthcoming Action Plan for Apprenticeships. This commitment has been highlighted in recent years in the year on year increases in funding in the National Training Fund for apprenticeship training and the broadening of access to apprenticeships through the Generation Apprenticeship campaign.

One of the main challenges encountered by the construction industry sector is the structure of the industry with a dominance of self-employed or small sub-contractors, along with discernible ageing of the sector's workforce. This is the crucial factor in facilitating the expansion of craft apprenticeship registrations, which are ultimately reliant on employer sponsorship. This is being reflected most significantly in the low registration numbers for the wet trades.

Increasingly there is limited capacity to develop, train or retrain with this changing structure. Any recommendations should consider this underlying trend if it continues and its implications for skills transfer. Given that skills are passed on from person to person on the job, current indicators are that the pool of craftspeople that are willing or able to transfer these skills to the next generation is decreasing, thereby decreasing the supply of training required for the sector.

This is in a context where employers engaged in craft-based apprenticeships benefit significantly from the National Training Fund- in particular through the payment of training allowance to apprentices, which is not available to employer involved in the new consortia led apprenticeships. Notwithstanding this, there is a commitment under the new programme for Government to enhance skills and capacity in the construction sector, including through a review of the funding model for apprenticeships as part of the new Action Plan for Apprenticeships as well as the expansion of shared apprenticeship initiatives, which are being employed by the sector to spread the cost of apprentice recruitment. This also includes a commitment to develop mature apprenticeships, which were proposed in the context of this study.

On specific proposals raised in the research undertaken for this study, Construction industry participants stated that, in relation to craft apprenticeships, the qualification process was too long for some tradespeople. Reducing the duration of the qualification processes, they argued, may lead to more efficient use of funding. Also, streamlining qualification times may increase the responsiveness of labour supply in industry to changes in demand- important given the ambition to mainstream technological adoption throughout the Built Environment sector- reducing frictional shortages. However, employee representatives emphasised the risk of compromising on content if it were to result in a downgrade of qualification, either perceived or in terms of NFQ level.

Changes to the qualification processes are systematically reviewed as craft apprenticeship programmes are updated and are not feasible without the consent of industry organisations, trade union representatives and education providers. In considering the scope for changes to apprenticeships, it should be examined whether a potential solution lies in the communication of the range of qualifications available in addition to craft apprenticeships- such as short specific skills courses, including those provided through Skillnet Ireland, traineeships and PLC courses, in addition to graduate and postgraduate level qualifications. Some of these options provide subsidised and shorter training options that specifically seek to support SMEs, including within the Built Environment sector.

As a first step, building on the evidence presented in this report, a mapping exercise on the range of skills required and qualifications available in the built environment could be utilised to identify gaps in supply and the appropriate placement of Further Education and Training and Higher education programmes to meet those skills needs. Once this evidence base has been established, and if there are found to be legitimate grounds, a broad dialogue should be opened by industry with the National Apprenticeship Advisory Committee (NAAC) and Apprenticeship Council on any requirements or options for proposed changes, in particular with a view to enhancing employer engagement with apprenticeship programmes, including in those trades that are significantly under-utilised at present (e.g. the wet trades).

As a second recommendation on craft apprenticeships, it is suggested that the benefits of developing them in a tiered structure to reflect different occupations also be examined- for example, the approach that is in operation for Manufacturing Engineering and Chefs. This examination would need to be aligned with the mapping exercise above, on the range of skills and qualifications available in the Built Environment. Development in this format could yield several benefits, including:

- Making labour supply more responsive;
- Increase the diversification of qualifications (multi-disciplinary); and
- Allow tradespersons to specialise through further qualification

This could be important to the shift to smart construction. The UK experience shows that the delivery of smart construction projects, involving offsite, automation and digital technology, is also identified as requiring multidisciplinary delivery teams with greater technical skills in installation, assembly and coordination activities, compared with traditional construction.

Subject to demand for such an approach being confirmed, this enhanced offering would enable employers to employ a range of skilled craftspeople to meet the requirements of a job. It would also provide progression routes for existing unskilled or semi-skilled labour to develop broad sets of skills.

Recommendation 3: Align Skills with Technological Change

- To prepare the sector for Technological adoption and other emerging trends, rank the potential importance of various technologies for each Built Environment occupation, to ensure more detailed conversations can take place on technological change and training may be targeted to pertinent groups. Coordinate this work with the activities of the Build Digital initiative for BIM, the proposed National Centre of Excellence for Construction, and the Joint Working Group on Offsite Construction. In collaboration with these initiatives and Groups, work to promote the uptake of existing and newly developed training across the Built Environment workforce.

Responsibility: Industry in collaboration with Build Digital, National Centre of Excellence for Construction, Joint Working Group on Offsite Construction and Education and Training Providers

- Maximise the leveraging of online or blended learning provision to facilitate the upskilling of the existing built environment workforce in skillsets required for technological adoption and other emerging trends.

Responsibility: SOLAS, Higher Education Authority and Further Education and Training and Higher Education providers, Built Environment related Skillnet Ireland networks

- Ensure that digital and environmental sustainability skills are embedded across Built Environment Senior Cycle subjects, apprenticeship programmes and broader further education and training and higher education provision.

Responsibility: Department of Education, Department of Further Education and Training and Higher Education, SOLAS, Higher Education Authority and Further Education and Training and Higher Education providers

- Mainstream digital literacy throughout the Built Environment sector at both worker and managerial level, through engagement with SOLAS's Skills to Advance programme and the leveraging of Skillnet Ireland's Digital Skills Initiative for SME managers.

Responsibility: Industry, in collaboration with Education and Training Board network and Skillnet Ireland

- To facilitate the greater levels of collaboration and communication between different occupations necessary under ‘Smart Construction’ activities, roll out soft skills upskilling programmes through industry representative organisation training services and Built Environment related Skillnet training, and embed soft skills in education and training programmes for new entrants to the sector.

Responsibility: Industry representative organisations, relevant Skillnet Ireland networks, Further Education and Training and Higher Education providers

No concrete recommendations arose through the workshops or interviews concerning technological change. BIM often dominated conversations concerning digital skills, with a recommendation to regulate its use. However, these were broad discussions on the need to ensure the availability of these skills. There is a need for the industry to plan for technological skills needs for a variety of technologies including BIM, mobile technologies, virtual reality, artificial learning and intelligent automation. The emerging trends for the industry include digitalisation and changing technologies and practices as the industry mainstreams sustainability and responds to climate change.

This includes the use of BIM but extends wider to integrate critical analysis and new-information based literacy (discovery) with the practical knowledge of construction methods and theory. This is an enhancement to existing problem-solving techniques used within the sector and can also facilitate enhanced perceptions of the attractiveness of the industry, changing the image of the industry. Innovation is at the core of change in the built environment sector, and there is a need to mainstream innovations into training while also developing preparing the future workforce for future technological change.

It is recommended that the potential importance of various technologies is ranked for each occupation to ensure that more detailed conversations may be had on technological change and so training may be targeted to pertinent groups. This is of particular relevance to emerging trends – such as innovation in construction methods (e.g. off-site or modular buildings) and the need for the sector to address climate change, lower its emissions and embrace sustainability.

Given the likely centrality of digital and environmental sustainability skills in the future, it is recommended that these skills are embedded across Built Environment Senior Cycle subjects, Further Education and Training and Higher Education programmes, as well as apprenticeship programmes for new entrants to the sector. Given the issues identified in the research around the release of staff to attend short term training, the leveraging of online or blended learning provision- like in NZEB training (see next recommendation)- will also be important in facilitating the upskilling of the existing built environment workforce in digital skillsets.

This can extend to basic digital literacy, as catered for through programmes such as EXPLORE, SOLAS’s Skills to Advance, BIM programmes provided through the Higher Education Sector, Enterprise Ireland and the CiTA Skillnet, and the digital Construction network proposed under Skillnet Ireland. The integration and deployment of technology into the Built Environment sector also requires digital literacy training at a managerial level- which can involve leveraging of programmes such as Skillnet Ireland’s existing Digital Skills Initiative, or bespoke programmes delivered through the Construction related Skillnets.

This work should be linked to the development of two initiatives arising from the Productivity analysis undertaken and published under the remit of the Construction Sector Group in 2020:

- The Build Digital centre by the Department of Public Expenditure and Reform, with the Construction Sector Group, which is intended to be a destination for training and peer to peer knowledge transfer on areas such as BIM, supported with industry funding.
- The development of a National Centre of Excellence for Construction, which it is proposed will be a centre for product research and development in new technologies, with demonstration projects and learning resources on areas such as modern methods of construction, the circular economy, and sustainability in construction.

In the interviews undertaken for this study, the need to support off-site construction specifically was raised, through the development of specialised training and the development of specific course material. This should align with the work to be initiated by the Construction Industry Council, as recommended in the 2020 Analysis of Productivity in the Irish Construction sector, for the establishment of a Joint Working Group to guide the development of the off-site construction sector. This is to be supported by industry working with education and training bodies to upskill the sector on modern construction methods, as well as BIM and digital innovations.

The greater integration of elements such as BIM and off-site Construction- which will serve to facilitate greater levels of collaboration and communication between different occupations within Built Environment activities, over traditionally more fragmented approaches- will meanwhile increase the importance of 'soft skills' to the Built Environment workforce. This emphasis is reflected in the UK approach and its explicit recognition that 'hard skills' such as those based on knowledge and technology are required but not sufficient for workers in the sector. 'Soft' skills, such as those needed to work and collaborate on projects, are becoming more relevant to the sector.

Recommendation 4: Developing the skills to enhance the Built Environment's contribution to Climate Change Mitigation

- To meet significantly increased demand in coming years, enhance the accessibility of training in Near Zero Energy Buildings and energy efficient retrofit using a blend of online learning. Ensure an appropriate geographic spread of NZEB and retrofit upskilling training locations, to meet the need for physical training.

Responsibility: SOLAS and Education and Training Boards/Education and Training Boards Ireland (ETBI)

- Enhance industry engagement, including through the use of online and blended learning, with Higher Education provision in the area of building performance, energy efficiency and the circular economy, in particular through the Springboard+ programme and relevant programmes approved for funding under the Human Capital Initiative. Also enhance industry engagement with relevant Skillnet Ireland networks, including through the development of new building energy performance training.

- **Responsibility:** Industry in association with the Higher Education Authority, Higher Education Institutions, relevant Skillnet Ireland networks

- Mainstream the Irish Green Building Council/Sustainable Energy Authority of Ireland accreditation system to incentivise upskilling in energy renovation.

Responsibility: National Renovation Upskilling Committee, Industry working with the Irish Green Building Council and Sustainable Energy Authority of Ireland

During the research, issues were highlighted with the geographical locations of some courses which do not provide easy access to those working across the country. In particular, given the targets set under the Climate Action Plan, there will be increased demand for Near Zero Energy Buildings awareness, skills and qualifications, as well as skills in the area of energy efficiency retrofit, the targets and investment in which will provide continuous work over the coming decades. Pilot programmes in NZEB have been developed by stakeholders working with Waterford/Wexford ETB. It is recommended that the accessibility of such skills training be enhanced. This could sometimes be done by using a blend of online learning (accessible wherever the learner is and at a time that suits them) coupled with a reduced need for in-person attendance at a physical training location. This physical training provision will also require an appropriate geographic spread of NZEB and retrofit upskilling training locations.

Industry, as well as Higher Education institutions, should also work to enhance the Built Environment workforce's access to and engagement with the extensive Higher Education provision in the space of building performance, energy efficiency and the circular economy- in particular through the part-time and subsidised provision under the Springboard+ programme. Under the 2020 iteration of Springboard+, programmes are being offered in sustainable building technology, building energy management and energy efficiency in design, on site wastewater treatment and disposal and NZEB. A masters qualification in the circular economy is also being funded under Pillar 1 of the Human Capital Initiative. There is also scope for Built Environment related Skillnet networks to enhance their training offerings in this space.

Mainstreaming of the Irish Green Building Council/Sustainable Energy Authority of Ireland accreditation system, which is intended to incentivise upskilling in energy renovation, is also recommended, through the progression of the work of Ireland's National Renovation Upskilling Committee (Reno-NUC). This will be an important support to the mainstreaming of these skills across the built environment sector. The Reno-NUC is an example of good collaboration between the IGBC and SEAI, and is progressive in that it identifies not only the technical skills, but the 'softer-skills' (communication, customer care and psychology), and 'multidisciplinary skills' (collaboration skills) that are increasingly recognised as being essential for working in the Built Environment sector.

Recommendation 5: Development of and increased engagement with Entrepreneurial and Management Skills Training within the Built Environment sector

- Promote enhanced engagement by Built Environment enterprises with existing Management Development provision, particularly that provided through Skillnet Ireland, Enterprise Ireland and the network of Local Enterprise Offices.

Responsibility: Industry in collaboration with Skillnet Ireland, Enterprise Ireland and the Local Enterprise Office network

- Embed training on the 'Business of Construction', including the fostering of entrepreneurial skills, across craft apprenticeship programmes and Further Education and Training and Higher Education Built Environment provision, for new entrants to the sector. Introduce short courses or modules to enhance associated skills for existing managers/owners within the sector.

Responsibility: Industry in collaboration with craft apprenticeship and Further Education and Training and Higher Education providers

Many issues were highlighted during the research concerning industry structure in terms of the size of firms. Concern was expressed about the low number of firms graduating from micro-enterprises employing under ten employees, to small to medium enterprises employing between 10 and 249 employees. As has been seen, this industry structure is impacting on the sector's capacity to provide craft apprenticeship opportunities and allied training.

Although there is no concrete evidence to suggest why this is, many interviewees indicated that firms might have the technical knowledge but lack the entrepreneurial skills to grow a business. Furthermore, a gap in middle management within the built environment sector was highlighted due to the migration of workers after the last recession. There is a deficiency in the sector of workers with 10-15 years' experience.

This management training shortfall was identified in the EGFSN's retrospective construction sector analysis that preceded this study (2019), where it was noted that the numbers from the construction sector engaging with Skillnet Ireland's Management Development provision and Enterprise Ireland's management development courses in recent years were limited and needed to be addressed. These are existing initiatives that the built environment sector can leverage. The training offerings and supports of the 31 Local Enterprise Offices are also relevant to this recommendation.

These gaps are important for the progression of the built environment sector to a dynamic domestic as well as export-oriented sector, which reduces its exposure to cycles in the domestic economy. The embedding of an emphasis on the whole 'Business of Construction' in education and training, by placing a strong lens on supporting existing companies and new entrants to become world class, can help address this vulnerability, and by enhancing sectoral performance overall, also further support the promotion of career opportunities within the Built Environment sector.

This would require a joined-up commitment by all players including construction sector companies, public and private sector clients and academia to enhance provision on the "Business of Construction". While there is a desire to see entrepreneurial, management and leadership skills mainstreamed into built environment courses, many suggested that there is also an opening for short courses or modules to enhance these skillsets within the sector.

Recommendation 6: Place the Construction Industry Register Ireland on a Statutory footing

Responsibility: Department of Housing, Planning and Local Government

Significant issues were identified during the research with the checking of qualifications in the industry. There was substantial and broad support to place the Construction Industry Register Ireland (CIRI), registration for which is currently voluntary, on a statutory footing. The General Scheme to make CIRI mandatory has been published by the Department of Housing, Planning and Local Government and the legislation is currently being developed. This initiative will contribute to an enhanced culture of competence and compliance in the Construction sector and will ensure a level of competency for builders, improve standards and also promote the attainment of qualifications and therefore skills levels within the sector.

Recommendation 7: Assess the merits of developing a “Skills Passport” for Built Environment activities, to facilitate the recognition of skills or competencies.

Responsibility: Built Environment Skills report Implementation group

An idea which was discussed extensively in the workshops was the development of a skills passport. Such a passport would be seen as facilitating:

- Foreign workers, including any returning members of the Irish diaspora, who need to establish skills equivalencies to allow them to work in Ireland. This could boost the attractiveness of Ireland to overseas workers by allowing recognition of non-formal and informal learning.
- Skilled workers in Ireland who may currently possess the necessary skills, but not the corresponding qualification, enabling an employer to verify that the worker presenting is competent to undertake work.

Further analysis, however, is required to clearly define the concept of a ‘Skills Passport’, the merits of its development in an Irish context, and how it would work with other qualification, accreditation and Continuing Professional Development schemes and industry registration and assessment schemes. This analysis should be undertaken by the Implementation Group to be established to advance the recommendations of this report.

It would be important for this assessment to be cognisant of the Construction and Quarries Skills Certification Schemes, as well as the Europass initiative, managed in Ireland by Quality and Qualifications Ireland, which facilitates the mobility of workers and learners throughout Europe; this is through the development and promotion of a series of documents and tools which help make skills and qualifications clearly and easily understood.

Recommendation 8: Explore the use of the procurement process to influence skills development

Responsibility: Office of Government Procurement

The issue of procurement was discussed extensively in the interviews with industry, and it is increasingly seen as a constraint. The phrases ‘race to the bottom’ and ‘lowest-cost options’ were frequently used. Procurement is viewed as a pinch-point, and one that the industry grapples with.

From the international review of the literature, however, procurement is increasingly used to influence skills development in New Zealand and the United Kingdom. In the United Kingdom, for example, smart construction is embedded in early design and procurement processes, which is seen as creating demand for skilled employees and drives employers to invest in training, smart construction techniques and behaviours. In the UK context investment by clients in collaborative tendering processes with scoring criteria to favour bid teams willing to collaborate, the embedding digital technologies and the leveraging of industrialised manufacturing techniques is advocated.

Given the experience of New Zealand and United Kingdom, and the role played by procurement in their strategies for transforming their respective construction sectors, the Office of Government Procurement should be asked to assess whether the use of the procurement process to stimulate or safeguard skills can be replicated in the Irish context.

This is a potential means of shifting the dominance of costs in the procurement process to a focus on quality of output and support the objectives of a number of objectives under the Construction Sector Group's productivity agenda, such as Build Digital, the Joint Working Group on Offsite Construction and proposed National Centre of Excellence for Construction.

Recommendation 9: Ongoing Monitoring and Evaluation of Built Environment Skills

Responsibility: EGFSN Secretariat with industry stakeholders, working with Skills and Labour Market Research Unit, Central Statistics Office, EU Sector Skills Alliance, ESCO

Through the skills forecasting work undertaken as part of this study, the volatility of trends within construction employment were highlighted, meaning that leading indicators may provide reliable forecasts only for 2-3 year periods, rather than the 10 year timeframe adopted as part of this analysis. It will be important, using the model developed for this study, that through the proposed implementation mechanism for these actions, the forecasts are updated periodically to support their medium-term reliability and broader built environment skills planning within the education and training system.

In terms of enhancing both these forecasts and insight into the built environment sector, it is also recommended that the Central Statistics Office is asked to disaggregate Architectural and Town Planning Technicians, Quantity Surveyors and Chartered Surveyors in Occupation Statistics to allow the accurate quantification of those working in these occupations. To ensure that CSO statistics facilitate insight into the emerging trends within the built environment sector, it will also be important that a reclassification be undertaken as to what activities are included in construction e.g. offsite construction, currently classified as manufacturing, and then what skills will be required.

Specific issues to be addressed that could be part of the review include ensuring the figures published accurately reflect the number of architectural graduates who may be eligible to enter the register of architects in Ireland after completion a further two years of post-graduate professional experience and a professional practice examination. The changing information needs to inform and progress training and skills within the built environment sector requires periodic reassessment to ensure it is fit for purpose, and sufficient to inform policy.

It is also recommended that the Irish Built Environment sector engage with the European Commission's Sector Skills Alliances,⁵² which aim at tackling skills gaps by identifying sector specific labour market needs and demand for new skills with regard to one or more occupational profiles and the updating of qualifications and certificates.

⁵² https://ec.europa.eu/programmes/erasmus-plus/programme-guide/part-b/three-key-actions/key-action-2/sector-skills-alliances_en

The sector should also engage with the Blueprint for Qualifications metadata scheme, which is currently being developed through the European Skills, Competences, Qualifications and Occupations (ESCO). This aims to ensure all EU member states and actors have a common view on the attributes that all qualifications share such as the title, awarding body, European Qualifications Framework level, and description of the learning outcomes. This common understanding or common language is to be structured in an agreed 'metadata schema'. This would necessitate convening a small working group (Engineers Ireland, Royal Institute of Architects of Ireland, Society of Chartered Surveyors Ireland, CSO, HEA) to progress this recommendation. This work could also potentially contribute to the analysis to be undertaken in support of recommendation 7, the Skills Passport.

Appendices

Appendix I

> Terms of Reference for Study

Research and Consultancy Services for the undertaking of research and a forecast on the demand for skills within the Irish Construction sector to 2030

Introduction/Background

The Department of Business, Enterprise and Innovation is commissioning research to determine the demand for, and nature of, the future skills needs of the Irish Construction sector to 2030. The Expert Group on Future Skills Needs (EGFSN), which advises the Irish Government on current and future skills needs of the Irish economy, and on other labour market issues that impact on Ireland's enterprise and employment growth, will be the main client. Research and secretariat support is provided to the Group by DBEI.

Rationale for current study

As reflected in a number of key Government strategies, ambitious national targets have been set for housing, infrastructural development and sustainability within the built environment over the coming years. These include:

- *Rebuilding Ireland*, the Government's Action Plan for Housing and Homeless,⁵³ which has committed to increasing overall housing supply to a baseline of 25,000 new homes annually by 2020, a baseline that will need to be maintained in the coming decades to meet expected demand;
- *Project Ireland 2040*,⁵⁴ which sets out an ambitious long-term physical infrastructure development strategy to meet future population growth;
- The *Climate Action Plan to Tackle Climate Breakdown*,⁵⁵ which highlights the role of the built environment in carbon emissions, and the need to substantially enhance higher energy performance standards, in particular in the period to 2030.

As the wider economy and Construction sector have returned to growth, however, these ambitions have been set in the context of emerging skills shortages across a number of construction occupations, including Civil Engineers, Construction Project Managers, Quantity Surveyors, Carpenters, Glaziers, Steel Erectors/fixers, Curtain wallers, scaffolders and pipe layers.⁵⁶ Employment within construction has grown to 144,600 in Q2 2019, from a low of 80,900 in Q1 2013, while, after a contraction during the downturn, output of construction skills from the education and training system (i.e. apprenticeship registrations and Built Environment Higher Education programmes) has been recovering from a low base.

⁵³ https://rebuildingireland.ie/wp-content/uploads/2016/07/Rebuilding-Ireland_Action-Plan.pdf

⁵⁴ <http://npf.ie/wp-content/uploads/Project-Ireland-2040-NPF.pdf>

⁵⁵ https://www.dccae.gov.ie/en-ie/climate-action/publications/Documents/16/Climate_Action_Plan_2019.pdf

⁵⁶ See the 2018 National Skills Bulletin- <http://www.solas.ie/SolasPdfLibrary/Construction%20Occupations.pdf>

In light of the demands that Government policy and wider private sector development will pose for the construction sector over the coming decade, it is now appropriate to quantify the demand for construction skills over that timeframe, as well as determine the nature and evolution of the skills required to deliver on the forecast level of construction activity. This will permit the undertaking of evidence-based planning by both Government and the broader Construction stakeholder community around the nature and scale of required education and training responses, as well as around other sources of construction skills supply.

Important considerations in determining the future skills needs of the Construction sector will be- but are not limited to- the sector's performance in the areas of productivity and environmental sustainability. Ireland's Construction sector has significantly lagged other countries in relation to its labour productivity, as based on Gross Value Added per hour.⁵⁷ On the whole the Irish economy has 34% higher productivity than the euro area average, while construction is 5.4% lower. This has implications for the sector's capacity to deliver on the targets set out in the Government's strategies in a manner that serves both cost effectiveness and the competitiveness of the broader Irish economy.

Apart from issues around skills supply, forthcoming research- which this study will seek to build upon- has identified a number of contributors to these low levels of productivity,⁵⁸ including:

- Firm composition (i.e. a prevalence of SMEs and microenterprises), deficits in managerial capacity, and the fragmented nature of the Irish construction sector, with a lack of integration and collaboration arising from supply chain complexity; there is widespread dependency on subcontractors and agency workers, with multiple parties working to different schedules and budgets, fragmented decision making, often incompatible work processes and ill-defined risk transfer mechanisms;
- The sector's cyclical nature, and challenges that arise for the viability of firms, employment security and the capacity to invest in people and resources, as well as lack of clarity on the public sector pipeline, which is seen to restrict investment in resources, technology and training, as well as the development of specialised areas; and
- Issues around the level of workforce and reliance on non-standard forms of employment (subcontractors, agency workers), which mitigates against training and upskilling for workers with a knock-on effect on skills capacity and investment in productivity enhancing technologies.

A number of areas have been identified as key to enhancing productivity within the Irish construction sector, with the Construction Sector Group- a grouping composed of the key Government and industry stakeholders within Construction- setting out a roadmap to advance these areas in the coming years. These include:

- Building Information Modelling, to support greater collaboration and a more integrated approach to management and delivery of the built environment;
- Off Site Construction, to deliver more sustainable buildings and infrastructure, through a reduction in waste (with precision and automated production processes), inefficiency and delays often arising with onsite construction projects; and
- The Circular Economy, which offers the opportunity to embed resource efficiency, material recycling and reuse within the sector, including the use of innovative, low carbon, zero waste materials

⁵⁷ For more on the current context of the Irish construction sector, see the Build Construction Sector Performance and Prospects 2019- <https://www.gov.ie/pdf/?file=https://assets.gov.ie/6659/3312cd28edf04f4c83666ac76b534c45.pdf#page=1>

⁵⁸ This research, commissioned by the Department of Public Expenditure and Reform, will be made available to the successful tenderer- see Methodology Part (a).

The *Climate Action Plan* has also set ambitious targets for enhancing the energy efficiency performance of Ireland's built environment, which in 2017 accounted for 12.7% of greenhouse gas emissions. Ireland's homes use 7% more energy than the EU average and emit 58% more CO₂ equivalent. The action plan targets a 40-45% reduction in CO₂ eq emissions from the Built Environment sector relative to 2030, through measures such as the sharp reduction in the use of fossil fuels, the completion of 500,000 building retrofits to achieve a B2 BER minimum, the installation of 600,000 heat pumps, smarter design, and more stringent building regulations, in particular the mandating of NZEB for all new buildings.

Study objectives and Methodology

In order to properly support the delivery of public and private construction activity over the coming decade, this study will seek to:

- Identify the nature and quantify the scale of the skills needs of the Construction Sector to 2030. This will include the development of construction skills demand forecasts based on a number of assumptions, including assumptions related to productivity and environmental sustainability, as well as the targets set out in prevailing national strategies; and
- Develop a suite of recommendations that can be drawn upon to ensure that the future skills needs of the Construction sector are fully addressed by stakeholders through the education and training system and any other relevant sources of skills supply.

The methodology of this study will comprise several integrated qualitative and quantitative elements. The **project consultants** will be required to undertake **elements A, B and C**, described below. The **Department of Business, Enterprise and Innovation** will undertake **elements D and E**. The successful tenderer will be required to integrate the findings from all elements into a single report which will contain recommendations aimed at developing a skills base that will address the future skills needs of the construction sector in the years to 2030.

A. Concise Literature Review

The focus of this review, to be prepared by the successful tenderer, will be on available international or domestic information and research on the evolving skills needs of the Construction sector over the coming decade. Please note that, in co-operation with the Project Steering Group established to help oversee this study, the Department of Business, Enterprise and Innovation will facilitate the project consultants in accessing other relevant documentation for this review.

This will include a detailed assessment of Construction skills initiatives recommended by Government and industry strategies over the last ten years, which provides an overview of construction skills supply trends, and initiatives in the areas of boosting construction skills supply, aligning education and training provision with Construction sector needs, on export diversification activities within the Irish Construction sector, and measures to boost its productivity and innovation performance.

The Project Consultants will also be provided with a comprehensive economic analysis of productivity in the Irish construction sector, commissioned by the Department of Public Expenditure and Reform on behalf of the Government's Construction Sector Group. This analysis will provide an overview of the

industry dynamics and operational factors contributing to the existing productivity performance in the Irish construction sector; an international comparative analysis of this productivity performance; and a suite of policy options and actions for industry and professional representative bodies based on leading international practice, which can improve efficiency in the sector.

B. Research exercise conducted through structured interviews and workshops with companies, organisations and stakeholders

The aim of this phase of the research will be to:

- Identify the main trends and drivers that will impact on the nature and demand for skills within the Construction sector over the coming decade, on the numbers employed and their skillsets, competences and qualification requirements;
- Identify the main trends and drivers that will impact on the supply of skills within the Construction sector over the coming decade, including the nature of employment on offer and the availability of career pathways;
- Identify any current/anticipated skills and competency gaps that will arise;
- Consider how enterprises plan to address any such skills gaps, including through further and higher education, upskilling/reskilling, continuing professional development or inward migration; and
- Elicit proposals in relation to the building up of an adequate talent pool of skills within the Construction sector in Ireland.

This mainly qualitative research element will comprise of:

- (i) Structured interview surveys with at least 40 construction enterprises. The enterprises will be selected by the successful tenderer in conjunction with the Department of Business, Enterprise and Innovation, with the co-operation of the Project Steering Group established to oversee the study.
- (ii) Structured interview survey with at least 20 key informants, including sectoral representative organisations.⁵⁹
- (iii) Discussions with a wider group of enterprises, organisations and key informants at 2 workshops, one of which is to be held in Dublin, and one outside of Dublin. The successful tenderer will be responsible for organising and facilitating the workshops, and for securing the engagement of the companies and key informants at the workshop. The workshop venues will be arranged by DBEI, which will be responsible for all costs associated with the use of the room, equipment, refreshments, etc.

C. Skills demand scenarios for Construction occupations to 2030

This element will present three possible construction sector demand scenario forecasts broken down by sub-sector to 2030- the difference between them illustrating the level of any uncertainty in relation to the realisation of their underlying assumptions, drivers and supporting conditions- for the main Construction occupations.

⁵⁹ See the membership of the Government's Construction Sector Group: <https://www.gov.ie/en/policy-information/cae030-construction-sector-group/>

Each scenario will depict credible forecasts based on key drivers and trends, including those related to productivity and environmental sustainability; Department of Finance⁶⁰ and Department of Public Expenditure and Reform forecasts⁶¹ for the building and construction sector; as well as targets set out in Rebuilding Ireland, Project Ireland 2040 and the Climate Action Plan, including information around the sequencing of public infrastructure projects. They will also seek to quantify any shift towards off site construction (manufacturing), as well as the increased demand for Irish construction services internationally. There will be one central scenario that is anticipated as most likely to occur.

The 2016 Census employment figures for the core Construction occupations will represent the baseline data for each scenario, with input from other data sources relating to 2016-2019 trends within the Construction sector (including Labour Force Survey data on construction occupations from Q3 2017 on). For this demand scenario, occupations (SOC 2010 occupational codes) such as the following will be examined:

- **Civil Engineers and Construction Project Managers:**
 - Civil Engineers 2121
 - Construction Project Managers and Related Professionals 2436
 - Production Managers and Directors in Construction 1121
- **Architects and town planners, architectural technologists, and surveyors**
 - Architects and town planners (incl. 2433 Quantity Surveyors and 2434 Chartered Surveyors) 2431
 - Chartered Architectural Technologists 2435
- **Construction related Technicians**
 - Building and Civil Engineering Technicians 3114
 - Architectural and town planning technicians (incl.3122 Draughtspersons) 3121
- **Skilled Craftspersons**
 - Electricians and Electrical Fitters 5241
 - Bricklayers and Masons 5312
 - Plasterers 5321
 - Floorers and Wall Tilers 5322
 - Plumbers and Heating and Ventilating Engineers 5314
 - Carpenters and Joiners 5315
 - Painters and Decorators 5323
- **Other Construction Trades**
 - Welding Trades (incl. Steel erectors 5311) 5215
 - Roofers, roof tilers and slaters 5313
 - Glaziers, window fabricators and fitters 5316
 - Construction and Building Trades n.e.c. 5319
 - Construction and Building Trades Supervisors 5330

⁶⁰ http://budget.gov.ie/Budgets/2020/Documents/Budget/Budget%202020_Economic%20and%20Fiscal%20Outlook_B.pdf

⁶¹ <https://www.gov.ie/pdf/?file=https://assets.gov.ie/6659/3312cd28edf04f4c83666ac76b534c45.pdf#page=1>

This will also include a new infrastructure pipeline report, which is being developed by the Department of Public Expenditure and Reform, to provide visibility on the sequencing of Ireland's largest planned projects over the coming years.

– **Construction operatives and elementary**

- Elementary construction occupations 9120
- Road construction operatives 8142
- Rail construction and maintenance operatives 8143
- Construction operatives n.e.c. (incl. 8141 Scaffolders, Stagers and Riggers) 8149

D. International Review of Actions by selected countries to develop and attract a supply of talent within the Construction sector

This element, to be undertaken by the Department of Business, Enterprise and Innovation, will include an assessment of actions in a selected number of countries, which have been identified as good examples in implementing relevant education and training programmes that are serving to address the future skills needs of construction activities identified as part of this study.

E. An assessment of the current supply of skills of the Construction sector at NFQ levels

This element, to be undertaken by the Department of Business, Enterprise and Innovation, in collaboration with the Skills and Labour Market Research Unit in SOLAS, will be an assessment of the current supply of skills at NFQ levels categorised by those participating on public and private:

- a) Higher Education programmes
- b) Further Education and Training programmes
- c) Continuing professional development programmes

Outputs Expected

A report (80-90 pages- excluding appendices), with an Executive Summary, to be prepared by the successful tenderer, which will include the following:

- The mapping of identified skills needs against existing/planned programme provision for construction skills;
- Identification of any current/anticipated gaps in skills provision for construction, and the scale and nature of the developmental response(s) required to address any such gap;
- Three demand scenarios outlining how the demand for construction skills will develop in the years to 2030; and
- Recommendations on any tailored measures to build up the domestic supply of talent in construction, including through (a) the third level education and further education systems; (b) upskilling/reskilling, (c) continuing professional development, (d) inward migration, and (e) any other supply. Recommendations made will advise on optimising the use of existing resources- both Government and private sector.

Expected Project Time Line

It is anticipated that the Project will commence in November 2019, with the final report to be completed by early-May 2020 at the latest.

Appendix II

> Members of the Steering Group

Caroline Spillane (Chairperson)	Engineers Ireland
Robert Deegan/Dr Albert Jordan	Department of Communications, Climate Action and the Environment
Phil O' Flaherty/Trudy Duffy	Department of Education and Skills
Sean Armstrong	Department of Housing, Planning and Local Government
Stephen Hughes	Enterprise Ireland
Dr Ruaidhri Neavyn	Higher Education Authority
Caroline Shally	Skills and Labour Market Research Unit, SOLAS
Shauna Dunlop	SOLAS
Anthony Duffy	Transport Infrastructure Ireland
Sarah Ingle	Association of Consulting Engineers of Ireland
Dermot Carey	Construction Industry Federation
Carol Hunt	DPS Group Global
Dr Richard Manton	Engineers Ireland
Liam Berney	Irish Congress of Trade Unions
David Howard	Property Industry Ireland, Ibec
Sandra Campbell	Royal Institute of Architects of Ireland
Gillian Murtagh	Shay Murtagh
James Lonergan	Society of Chartered Surveyors Ireland
Kevin Daly	Department of Business, Enterprise and Innovation
Dr Alan Power (Project Manager)	Department of Business, Enterprise and Innovation

Appendix III

> Members of the Expert Group on Future Skills Needs

Tony Donohoe (Chairperson)	Ibec
Kevin Daly	Head of Secretariat and Principal Officer, Labour Market and Skills Unit, Department of Enterprise, Trade and Employment
David Hegarty	Assistant Secretary, Department of Enterprise, Trade and Employment
William Beausang	Assistant Secretary, Department of Further Education and Training and Higher Education, Research, Innovation and Science
Kathleen Gavin	Principal Officer, Department of Education and Skills
Keelin Fagan	Enterprise Ireland
Dr Vivienne Patterson	Higher Education Authority
Dr Laura Bambrick	Irish Congress of Trade Unions
Ray Bowe	IDA Ireland
Shauna Dunlop	SOLAS
Joan McNaboe	Skills and Labour Market Research Unit, SOLAS

Appendix IV

> Glossary of Terms

AnCO An Chomhairle Oiliúna

BER Building Energy Rating

BIM Building Information Modelling

CAD Computer Aided Design

CAO Central Applications Office

CIF Construction Industry Federation

CIRI Construction Industry Register Ireland

CiTA Construction IT Alliance

CPD Continued Professional Development

CSG Construction Sector Group

CSO Central Statistics Office

DBEI Department of Business, Enterprise and Innovation

EGFSN Expert Group on Future Skills Needs

ESCO European Skills, Competences, Qualifications and Occupations

ETB Education and Training Board

ETBI Education and Training Boards Ireland

EU European Union

FÁS Foras Áiseanna Saothair

GDP Gross Domestic Product

GNI Gross National Income

GVA Gross Value Added

HCI Human Capital Initiative

HEA Higher Education Authority

IGBC Irish Green Building Council

ILO International Labour Organisation

ISIF Ireland Strategic Investment Fund

ICT Information and Communications Technology

IT Information Technology

IT Institute of Technology

LEED Leadership in Energy and Environmental Design

NAAC National Apprenticeship Advisory Committee

NACE Nomenclature statistique des activités économiques dans la Communauté européenne

N.E.C. Not Elsewhere Classified

NFQ National Framework of Qualification

NZEB Nearly Zero Energy Buildings

OECD Organisation for Economic Co-operation and Development

PLC Post Leaving Certificate

QQI Quality and Qualifications Ireland

R&D Research and Development

Reno-NUC National Renovation Upskilling Committee

SEAI Sustainable Energy Authority of Ireland

SLMRU Skills and Labour Market Research Unit

SOC Standard Occupational Classification

UK United Kingdom



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