

National Upskilling Roadmap 2024-2030 Draft For Public Consultation

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BUSI2030



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1.0 What is BUSI2030?

Build Up Skills Ireland (BUSI2030) is a national project funded by the European Commission (CINEA) through LIFE programme funding. The project's scope is to analyse the current and future skills gaps in sustainable construction in order to meet Ireland's Climate and Housing for All targets. It aims at **creating a skills roadmap for Ireland to achieve the climate targets for housing, climate action, mitigation, retrofitting and the decarbonisation of Ireland's built environment.**

The project is led by the Technological University of the Shannon in partnership with the Irish Green Building Council, the Construction Industry Federation and the Laois Offaly Education and Training Board under grant agreement Project 101075961

A detailed Status Quo report regarding existing education provisions and future delivery targets and challenges was issued in June 2023. This BUSI2030 Status Quo Report is available [Analysis-of-the-National-Status-Quo-Ireland.pdf \(igbc.ie\)](https://www.igbc.ie/Analysis-of-the-National-Status-Quo-Ireland.pdf)

The methodology for the BUSI Status Quo Analysis included:

- Stakeholder Engagement c.350 individuals (**Public Sector, Educators and Industry**) - workshops, focus groups, formal & informal interviews, surveys;
- Assessment of existing and proposed initiatives, targets, statutory recommendations, ambitions at European and National Level and within private sector;
- Analysis of Education system 'Status Quo' + national skills strategies;
- Review of Qualification Frameworks regarding New / Updated requirements;
- Core skills required to address energy efficiency, renewable energy, decarbonisation, digital and digitisation processes, circular economy principles and life cycle analysis of Ireland's Built Environment.



Fig 1 BUSI2030 Status Quo Summary Outcomes



Fig 2 BUSI2030 Skills & Labour Shortages Possible Solutions

2.0 Context

The Build Up Skills Ireland 2030 (BUSI2030) Roadmap (draft Jan 2024) for the built environment presents research and makes recommendations on skills and labour shortages for energy efficiency, renewable energy, decarbonisation, digital and digitalisation processes, life cycle analysis and circular economy processes. Following on from the extensive findings of the BUSI 2030 [Status Quo Analysis](#) (June 2023) which focused on skills needed to meet the Climate Action Programme (CAP) and Housing for All (HfA) targets, along with further public workshops, BUSI2030 steering committee meetings and desk research analysis in the interim, this roadmap makes **core** and **enabling** recommendations for industry, policy and education stakeholders. The BUSI2030 Roadmap is now available for public consultation and feedback is requested from a variety of stakeholders and the general public over a 3-week period from January 19th 2024. The roadmap presents 4 key overarching recommendations and 12 sector specific recommendations for rollout, over the coming years, to meet 2030 targets. Resourcing of the Roadmap and a concerted unified effort across stakeholders, agencies, government departments and industry will be vital for the success of any skills strategy.

2.1 Introduction

The BUSI2030 [Status Quo Analysis](#) published in June 2023 outlines skills and labour shortages, and highlights the skills needed to meet the Climate Action Programme (CAP) and Housing for All (HfA) targets. The Build Up Skills Ireland 2030 (BUSI2030) Draft Roadmap presents recommendations to address these challenges, including the need to incentivise upskilling eg. a new scheme to help small and medium enterprises with the cost of upskilling and reskilling their employees is already due to be piloted under Budget 2024.

The Expert Group on Future Skills Needs and the results of the [OECD Skills Strategy](#) in Ireland (May 2023) have been crucial to our analysis. The [CEDEFOP](#) methodology is central to the work of BUSI2030 in relation to skills in Ireland [Ireland | CEDEFOP \(europa.eu\)](#). BUSI2030 is particularly concerned with skills mapping and skills gaps and in the CEDEFOP finding that opportunities for 'people with low qualifications will continue to shrink'.

The [Climate Action Plan 2024](#) specifies 'public sector leading by example' ('Achieve the buildings and retrofitting targets laid out in the Public Sector Climate Action Mandate') as seen reflected in BUSI2030 recommendations and 'cross-sectoral collaborations help to develop the talent and skills needed for the jobs of the future, and provide innovative technologies, processes and insights to address key challenges' as well as the development, design and delivery of new training content such as Quality and Qualifications Ireland (QQI) Level 4 Retrofit Assistant programme. Awareness raising measures such as 'National Campaign of Communication and Engagement on Climate Action' must extend to skills and construction skills to meet climate action targets.

[The Sustainable Development Goals](#) and [Level\(s\)](#) the EU European framework for sustainable buildings have also played a significant role in our work with particular emphasis on those identified in the Climate Action Plan 2024.

3.0 Key Themes

Arising from extensive stakeholder engagement, four key themes have emerged outlined below. Addressing these themes is key to meeting the training and upskilling required to enable Ireland to meet its climate targets. The four key themes are:

CONNECT THE SILOS:

A significant variety of actors and stakeholders are involved in the education, training and upskilling area relevant to construction. This includes Government Departments and their Agencies, public and private education and training providers, industry and others. There are multiple activities/initiatives on-going which, in some cases, are operating in silos. A strong concerted effort is required to develop a more effective and efficient Construction Skills Eco-System where these multiple actors must enhance collaboration.

ADDRESS THE CARBON CHALLENGES:

EU and National policies demand that carbon become a central focus of the construction and built environment sector. At a minimum it is recommended that mandatory Zero Emission Building (ZEB) Fundamental Training should be provided at scale across the sector (including to trainers). This must then be supported by specific education and training, CPD and lifelong learning opportunities which must also respond to new and emerging areas such as Life Cycle Analysis (LCA), Modern Methods of Construction (MMC), Circular Economy principles.

CONSTRUCTION IS EXCITING?

The construction and built environment sector is evolving rapidly. A national campaign which promotes Green Careers (Construction, Consultancy and Education) should be developed to target those within education (primary, secondary and tertiary) and those in the workforce.

ENCOURAGE CLIMATE LITERACY & TRAINING:

An innovative and exciting public awareness campaign should be developed to maximise awareness of the positive actions the industry can take to address climate change, opportunities for entering the sector and information on new and emerging solutions.

Complimenting the 4 key themes are 12 sector specific recommendations designed to support training and upskilling required to achieve climate action and housing targets. Some recommendations are labelled 'core' meaning critical and others are labelled 'enabler' meaning supporting the realisation of the 'core' recommendations.

The Roadmap is presented as a table of recommendations under the headings 'Public,' 'Educators' and 'Industry,' regarding governance, awareness, systems and supports. The apportionment of implementation and monitoring is recommended to lie with the Construction Sector Skills Forum (CSSF). The purpose of the CSSF will be to provide an overview of the range of work emanating from participating organisations, which will facilitate networking and collaboration, as well as inform strategic developments for construction skills provision. BUSI2030 Roadmap recommends the enhancement and strengthening of this remit by government to include monitoring and oversight of the Roadmap itself.

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3.1 Public Sector Recommendations

1.0 SKILLS ECO-SYSTEM (Governance):	
1.1 Expand remit of Construction Sector Skills Forum (CSSF) to enhance co-operation and better inform: <ul style="list-style-type: none"> - Education and Industry collaboration - The National Skills Council - Development of cross departmental supports regarding current and potential workforce - Monitoring and oversight of the implementation of BUSI2030 Roadmap 	Core
2.0 GREEN CAREERS (Governance):	
2.1 Green Careers (Public, Existing Workforce, Schools): Actively promote and deliver a unified public campaign on career opportunities within the built environment and construction sectors, focusing on opportunities, climate action, sustainability, emerging technologies, circular economy, digitalisation, retrofit, renewables, net zero carbon strategies and nature-led solutions.	Core
2.2 Diversity & Inclusion: Actively promote diversity and inclusion (e.g. gender, age, cultural, socio-economic) in all aspects of the built environment to address current imbalances within construction (e.g., through recruitment strategies, mentoring programmes, buddy systems in education and workplace, promoting positive role models etc).	Core
2.3 Apprenticeships: Regular review of statutory processes of apprenticeships (craft and consortium led) regarding fast-paced course adaptation, climate action targets combined with working conditions, payments, accessibility, awareness etc.	Core
2.4 Diaspora: Promote and encourage skilled workers abroad to return home to take up employment in the construction sector.	Enabler
2.5 Mobility and Recognition: Consolidate government and industry initiatives to attract workers from abroad, including streamlining visas and mutual recognition of qualifications.	Enabler
3.0 QUALITY ASSURANCE FOR SUSTAINABILITY:	
3.1 QUALITY ASSURANCE FOR SUSTAINABILITY - CLIMATE LITERACY (Public):	
3.1.1 Climate Literacy: Deliver a public awareness campaign for all citizens to understand the importance of climate action in the built environment sector.	Core
3.2 QUALITY ASSURANCE FOR SUSTAINABILITY - ZEB FOR ALL:	
3.2.1 Zero Emission Buildings Fundamentals (ZEB) Training for All (Existing Workforce and New Entrants): Expedite provision of ZEB Fundamentals Training (at a minimum) and provide targeted leadership development training for all involved in construction sector. ZEB suite of training content to be regularly updated in line Climate Action targets and EU Legislation ambitions regarding de-carbonisation, climate mitigation and adaptation content.	Core
3.2.2 Public Sector ZEB Training: Expedite ZEB Fundamental Training for management and procurement teams, public representatives in Local Authorities, relevant State Agencies and Government Departments to increase understanding of the key issues.	Core
3.2.3 Construction Workforce ZEB Training Incentives: ZEB Fundamentals Training: Incentivise initially then mandate through mechanisms such as Green	Core

Public Procurement and/or relevant public grant criteria, the participation in ZEB training to deliver critical upskilling through CPD at scale (c.160,000+). Provide additional (benefits / paid time off) incentives for construction micro, small and medium businesses to upskill their workforce through funded accessible, flexible and blended, micro-credentials pathways.	
3.3 QUALITY ASSURANCE FOR SUSTAINABILTY - FASTTRACK PROCESSES:	
3.3.1 BIM Mandate: Review viability to fast-track BIM Mandate to focus on micro, small and medium businesses	Enabler
3.3.2 Circular Economy (CE) Roadmap: Expedite delivery and implementation of <i>proposed</i> National Circular Economy Roadmap	Enabler
3.3.3 Modern Methods of Construction (MMC) Roadmap: Expedite delivery and implementation MMC Roadmap	Enabler
3.3.4 Build Digital: Review viability to fast-track implementation of Build Digital with specific focus supporting micro, small and medium businesses.	Enabler
3.3.5 SEAI Pathfinder Projects: Review viability to fast-track sharing findings and delivery of projects	Enabler
3.3.6 Innovation Supports: Capital support programmes which support innovative solutions addressing carbon, biodiversity etc to be required to integrate capacity building actions and contribute to skills development through relevant means	Enabler
3.4 QUALITY ASSURANCE FOR SUSTAINABILTY - REGISTERS:	
3.4.1 Registers: Facilitate approved Registers for contractors and consultants and specialist Installers linked to quality and competency criteria. Link participation to grant provisions.	Core
3.4.2 CIRI Registers: Expedite Implementation of the Contractor Register CIRI prioritising micro, small and medium sized businesses mandate annual CPD, with annual review of competencies	Core
3.4.3 Construction Safety Licensing Bill: Extend the scope of the Bill so that it is used as a mechanism for licensing construction skills. The Bill's objective is to put in place a license requirement for certain operations in the construction sector to improve competency in these areas. The Bill, as currently drafted, is limited to the operations / skills as listed in the Safety, Health and Welfare at Work (Construction) Regulations 2013. This legislation could be the vehicle to extend the competency requirements, and so quality of delivery, for other construction related skill areas, such as retrofit.	Core
3.5 QUALITY ASSURANCE FOR SUSTAINABILTY - SUPPLY CHAIN:	
3.5.1 Further support construction industry micro, small and medium businesses: Actively promote, tailor support and incentivise engagement of construction enterprises to participate in training. Strengthen lean, green and digital supports and advice at local / regional level through local enterprise offices network regarding financial, tax, funding programmes.	Core
3.5.2 Innovative Approaches: Support low carbon innovative technologies and processes through green public procurement and grants to build capacity in the industry and improve resource efficiencies and to stimulate demand.	Enabler
3.5.3 Certification of Materials & Products: Support fast-tracking certification processes to encourage innovation and knowledge sharing.	Enabler
4.0 STRENGTHEN PUBLIC SECTOR TO LEAD BY EXAMPLE:	

4.1 Holistic approach: Support and fund a combined public sector approach to achieving and exceeding Climate Action Plan targets, promoting high standards of building performance, exceeding minimum standards.	Enabler
4.2 Resource Efficiencies: Prioritise and Incentivise economies of scale to deliver Ireland's targets with limited resources (e.g. in energy renovation projects: terraces, housing estates, sustainable energy communities; district heating projects)	Enabler
4.3 Sustainability Checklists / Best Practice Case Studies: Establish sustainability checklists for all public sector retrofit, new and maintenance projects, enforcing use of Display Energy Certificates (D.E.C) for all public buildings.	Enabler
4.4 Quality Assurance: Provide additional resources and ZEB training for Local Authority Building Control and Enforcement Offices	Enabler
5.0 COLLABORATION & KNOWLEDGE SHARING:	
5.1 Skills Eco-System: Provide a central source with information and access to public and private training and CPD offerings to strengthen the collection, exchange and provision of skills information (CPD in one place) e.g. building on experience of the Build Up Skills (BUS) advisor app and DASBE	Core
5.2 Built Environment networks: Support and resource the Construction Industry Council to strengthen the collaboration by construction industry stakeholders focusing on Climate Action Plan targets.	Core
5.3 Exemplar Case Studies: Establish and support a public platform for sharing best practice (public & private) projects & delivery models which can act as a central knowledge hub for education/training providers. Incentivise contributions of best practice as well as lesson learned.	Enabler
5.4 Learnings from Pilot Projects: Consolidate outputs and share resources and findings of numerous national, European and internationally publicly funded research projects e.g. Construction Blueprint and BIMzeED . Refer also to Appendix 3	Enabler

3.2 Education Recommendations

Following on from the findings of the [Build Up Skills Ireland Status Quo Analysis \(June 2023\)](#) and the projected requirements of upskilling the current student population (roughly 26,000) and the current workforce (roughly 164,000) along with reskilling new entrants (projected at 120,000 if business as usual construction systems prevail), a considerable challenge is presented to the education and construction sectors across all national qualifications framework (NQF) and in keeping with European Qualifications Levels (EQF) levels of educational attainment.

The following recommendations and a concerted unified effort, if implemented, will assist in meeting Climate Action and Housing for All targets in the built environment to 2030 through short, medium and long term actions and onwards to 2050 targets.

6.0 Further Education and Training (FET) & Higher Education (HE) ECO-SYSTEM (Public + Private):	
6.1 Skills Mapping: Establish a system allowing for clearer and consistent data acquisition on content of all existing publicly funded further and higher education training courses along with an accurate national skills mapping programme for existing, new and emerging construction roles and tasks. Required data would include specific course content, learning outcomes, entrant numbers and graduate numbers, and places available comparable across all education providers.	Core
6.2 Central Platform for upskilling in construction: Centralise data and information on all construction upskilling, reskilling and new skill training programmes in a user friendly, easily accessible public platform, similar to CAO platform e.g. Build Up Skills advisor APP	Core
6.3 Train the Trainer (TtT): Establish, monitor and regularly update a coherent system of TtT programmes and pathways for supporting upskilling of trainers in the Further Education and Training and Higher Education systems (targeting current and emerging issues regularly updated e.g. zero emission construction, MMC, circular economy, indoor air quality, digitisation and digitalisation in the built environment).	Core
6.4 Flexibility in delivery: Ensure greater flexibility in delivery methods and in accreditation systems across the education sector in order to deliver the training required at scale including the utilisation of micro credentials and onsite, online, self-directed delivery. Support will need to be provided to trainers as well as to trainees in this regard.	Core
6.5 Training Centers: Re-Focus existing NZEB Education and Training Board's Centres of Excellence (CoE) to ZEB Centres of Excellence regarding course offerings and processes. Provide additional mobile training rigs to facilitate on-site workforce development	Core
7.0 PRIORITISE GREEN CAREERS (Course Provision):	
7.1 Innovative training and upskilling opportunities across EQF levels: Develop and promote new training modules and new course content tailored across EQF levels to complement the Climate Action Plan and Housing for All developments such MMC Demonstration Park at the National Construction Training Campus.	Core
7.2 Continuous Professional Development (CPD) :	Core

Develop Continuing Professional Development (CPD) training programmes for construction professionals eg engineers/architects/energy advisers/planners/ecologists to address identified skills gaps e.g. circular economy, lifecycle analysis, digitisation, digitalisation for built environment sector professionals	
7.3 New Training Provision in Emerging Technologies e.g. MMC : (Similar approach required for other emerging technologies) Create broader MMC manufacturing technician apprenticeship/trade courses focused on MMC / Modular Construction; Create modules with a focus on innovation, modern materials and manufacturing which can be integrated into the curriculum for all third level and CPD courses in civil, built environment, mechanical and electrical engineering and construction studies courses	Core
7.4 Effective dissemination of new research to education sector: Utilise research outcomes to provide evidence and data to inform new programme development and education and training pathways. Disseminate the work of relevant Government supported initiatives such as DASBE (HEA), Construct Innovate (Enterprise Ireland) and Build Digital (Project 2040 and the Construction Sector Group Innovation and Digital Adaption).	Enabler
8.0 AWARENESS IN SCHOOLS:	
8.1 Career Guidance: Increase engagement with career guidance counsellors (and other relevant teachers) to ensure promotion of construction as a green and sustainable career. Create content for career guidance, transition year, construction technology teachers to promote innovative green and digital construction career pathway options. Promotion of Generation Apprenticeship within schools in conjunction with (PLC, FET, HE) CAO offerings.	Core
8.2 Promotion of construction as an exciting career Continue to host events together such 'Higher Options' and 'World skills' to ensure equal status and visibility to both. <i>*Higher Options provides a unique opportunity for up to 30,000 students from across Ireland to speak to representatives from third-level institutions from Ireland, the UK, Europe and further afield. Students can gather information about their third-level options and attend career talks on a wide range of topics.</i> <i>** Worldskills Ireland is a partnership between enterprise, industry, education, training and government that raises the profile and recognition of skills and apprenticeships and prepares the talent of today for the careers of the future.</i>	Core
8.3 Upskilling of teachers: Provision of ZEB fundamentals training for career guidance and all teachers focusing on construction and related skills.	Core
8.4 Make innovative technologies available to schools: Utilise mobile training rigs, VR/AR and mobile technologies available to all primary and secondary schools to facilitate active learning and encourage entry into construction careers.	Enabler
9.0 LIFELONG LEARNING:	
9.1 Pathways to Life Long Learning opportunities: Promote pathways from work to FET to HE for career progression opportunities; further options for construction related pathways should be explored. In order to meet the construction labour needs, pathways from non-construction related roles should be given equal prominence e.g. IT to digitisation in construction, procurement to green procurement, accountant to carbon accounting. Digital security will be considered essential to avoid disruption and raise resilience.	Core
9.2 Recognition of Prior Learning and Experience:	Core

Ensure greater flexibility in RPL to allow for greater entry into construction courses should be supported.	
SCHOOLS	
9.3 Stronger Links between Secondary and Tertiary: Higher education institutes to continue to work in collaboration with education providers at second level to ensure promotion of new skills in construction as career opportunities.	Core
FET & HEA	
9.4 New apprenticeships and traineeships: Contribute to the development of new apprenticeships, traineeships and micro credentials to ensure that the skills gaps are addressed	Core
9.5 Career pathways: Provide support and guidance to FET and HE learners through individual mentoring and career guidance, while also developing innovative tools e.g. using AI to support career/upskilling choices and pathway identification	Core
9.6 ZEB Fundamentals Training: Mandatory (Zero Emission Buildings) Fundamentals training for all construction workers with annual updates of course content	Core
9.7 Upskilling of existing student population: Encourage education and training providers to update curricula of programmes to ensure modules reflect most current content relevant to ZEB, circular economy, digitisation, and energy efficiency	Core
PRIVATE TRAINING PROVIDERS	
9.8 Coordinated approach to CPD: Structured programme of thematic CPD events for all professional bodies, to support climate action targets and BUSI2030 roadmap implementation	Core
9.9 Skills mapping and pathways: A national skills mapping programme across all construction roles is required to establish baseline and required skills to meet climate action targets. A good example is seen in circular skills mapping in a Horizon funded project BUSGoCircular .	Core

3.3 Industry Recommendations

A collective effort from all stakeholders within the built environment sector is required. Contractors, Sub-Contractors, Developers, Consultants, Suppliers, Property Advisors etc.

10.0 INDUSTRY ECO-SYSTEMS	
10.1 Registers: Establish approved registers for contractors, consultants and specialist installers linked to quality and competency criteria, approved CPD, recognition of prior learning and promoting lifelong learning. Refer also to 3.4	Core
10.2 Networking: Support and participate in existing built environment networks to encourage sharing of best practice, case studies, innovation and training materials to promote a greater culture of collaboration e.g Construction Industry Council; Construction Sector Group.	Enabler
11.0 GREEN CAREERS	
11.1 Awareness Campaign: Promote and participate in a public campaign on career opportunities within the construction sector, with focus on emerging technologies, circular economy, digitisation, digitalisation, retrofit, zero emission strategies and nature-led solutions.	Core
11.2 Career Events: Participate in opportunities to promote the sector as a sustainable career option to students, teachers and parents by supporting events such as World Skills Ireland, Higher Options and other regionally run career events.	Core
11.3 Schools Outreach: All built environment organisations to actively promote, at scale, careers in the industry to students, teachers and parents to increase the uptake of built environment CAO courses, apprenticeships and traineeships.	Core
11.4 Apprenticeships and Traineeships: Industry representatives to continue to work with SOLAS and the National Apprenticeship Office to promote greater uptake of apprenticeships and traineeships.	Core
11.5 Career pathways: Participate in a national skills mapping programme to showcase the career progression pathways available in the industry.	Core
11.6 Migrant workers: Support migrant workers to upskill, re-train and learn new construction skills through appropriate and relevant provisions, taking into account any barriers such as language.	Core
11.7 Diversity & Inclusion: All built environment organisations to actively promote diversity and inclusion to address current imbalances within the industry.	Enabler
12.0 GREEN SOLUTIONS	
12.1 ZEB FOR ALL (Participation):	
12.1.1 Construction workers and consultants to participate in ZEB fundamentals training (as a minimum). Promote also to material suppliers, builders providers, property advisers and funders etc.	Core

12.2 GREEN PROCUREMENT:	
12.2.1 Promote and facilitate participation in green public procurement training, at scale, for procurement and tendering professionals.	Core
12.2.2 Promote a culture of design and delivery for performance, (not just for compliance) with a view to exceeding minimums and anticipating future requirements.	Enabler
12.3 EMERGING TECHNOLOGIES	
12.3.1 Promote innovation through the application of alternative processes and use of emerging technologies to deliver more sustainable buildings.	Enabler
12.4 LIFELONG LEARNING & CPD:	
12.4.1 Promote a culture of lifelong learning within industry with a particular focus on support for micro, small and medium businesses to increase participation in training.	Core
12.4.2 Industry to encourage and incentivise employee training participation with the contemplation of CIRI certification and re-certification requirements.	Core
12.4.3 Support training initiatives for carbon & digital literacy to address current and forthcoming ESG requirements, as well as regulatory changes.	Enabler
12.4.5 Support and encourage green leadership within industry to promote green cultures in organisations.	Enabler

4.0 Feedback Required

This document is available for public consultation for a period of 3 weeks. The purpose of the consultation is to allow feedback from members of the public. All feedback will be collated and presented to the platform oversight committee for BUSI2030 for consideration.

A final document will be available before the end of March 2024, submitted to the funders and presented to the public on [Making sure we have the right skills to decarbonise Ireland's built environment - BUSI2030 - Irish Green Building Council \(igbc.ie\)](#).

Your feedback is greatly valued.

This document will remain open for public consultation until midnight February 9th 2024.

Survey is available [here](#)

Appendix 1: Glossary

Apprenticeship: An apprenticeship is a training and education programme. It mixes learning in a college or training institution with work-based learning in a company. At least half of apprenticeship learning is done on the job. As an apprentice, you earn while you learn. You have a formal employment contract, and you're paid a salary during your apprenticeship training. Apprenticeships can last between two and four years.

Building Life Cycle: A building's lifecycle can be broken down into sixteen modules across three stages as defined in EN15978. The definition of the specific life cycle stages of a building is defined in EN 15978. The life cycle stages include A1-3 production, A4-5 transport and construction, B1-7 use, and C1-4 end of life.

Building Renovation Passports are masterplans for retrofit and include a record of works. They ensure that any renovation works are planned and implemented in a holistic and technically sound manner, facilitating a step-by-step approach to deep renovation.

Built Environment: ranges from the scale of the individual building to neighbourhoods, communities, and cities with their associated infrastructure.

CAO: The Central Applications Office processes applications for undergraduate courses in Irish Higher Education Institutions (HEIs) and Further Education and Training Institutes. Decisions on admissions to undergraduate courses are made by the HEIs who instruct CAO to make offers to successful candidates.

A circular economy is one that is restorative and regenerative by design, and which aims to keep products, components and materials at their highest utility and value at all times, distinguishing between technical and biological cycles.

CIF: Construction Industry Federation is the Irish Construction Industry's representative body. It provides a range of services to members across many areas including training and skills development.

CIRI: Construction Industry Register Ireland in an online register, supported by Government, of competent builders, contractors, specialist sub-contractors and tradespersons who undertake to carry out construction works. The objective is to be recognised as the primary online resource used by consumers in the public and private procurement of construction services.

CSSF: Construction Sector Skills Forum, (established by the Department of Further and Higher Education, Research, Innovation and Science) is a forum of experts in the construction sector aimed at boosting participation in the construction workforce.

Cross Departmental Support: The purpose of a Cross-Government Network is to bring together the wide range of actors across government departments, their agencies and local authorities who are responsible for implementing actions and policies which impact on an objective.

Decarbonisation: is the means of reducing carbon dioxide (and other greenhouse gas) emissions into the atmosphere. Climate neutrality is the goal of the decarbonisation process, i.e., to achieve zero net greenhouse gas emissions (Net Zero carbon footprint) by the target date.

Embodied carbon: covers the entire carbon emissions associated with construction materials, their sourcing, manufacturing, and transport as well as construction processes throughout the whole lifecycle of a building or infrastructure. Embodied carbon modules (or lifecycle stages of a building) are included in EN 15978.

EN 15978: This European Standard specifies the calculation method, based on Life Cycle Assessment (LCA) and other quantified environmental information, to assess the environmental performance of a building, and gives the means for the reporting and communication of the outcome of the assessment. The standard is applicable to new and existing buildings and refurbishment projects.

The **EU Taxonomy** outlines the key criteria to be met for an economic activity to be regarded as "green" or "social", with a view to tackling greenwashing. In simple terms, the more environmentally friendly a project is, the easier it should be to obtain funding at a lower interest rate.

Further Education and Training (FET) offers a wide variety of life-long education options to anyone over 16. FET includes apprenticeships, traineeships, Post Leaving Cert (PLC) courses, community and adult education as well as core literacy and numeracy services. FET courses and programmes are provided through Education and Training Boards (ETB's) throughout the country as well as through other local providers - including online through SOLAS' eCollege - and at levels one to six on the National Framework of Qualifications (NFQ). In terms of skills development the following programmes are most relevant; Apprenticeships, Traineeships for both upskilling the current workforce and employment focused training for unemployed people or school leavers, Skills To Advance (STA) Programmes - for people who are currently in employment, SST (Specific Skill Training) Programmes for prospective new entrants.

Greenhouse Gases (GHG): In the context of the scope of the built environment only the following GHGs with Global Warming Potentials (GWP) are considered: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆). Their GWP is quantified in units of carbon dioxide equivalent. A kilogram of carbon dioxide therefore has a GWP of 1 kg CO₂eq.

IGBC: Irish Green Building Council in a non-for-profit membership organisation that aims to achieve a more sustainable built environment through research, education and advocacy work.

Level(s): Launched in October 2020, Level(s) is a framework of sustainability indicators that are common to all buildings. The key idea is that if all member states focus on these same indicators, we can use them to learn, set benchmarks and develop standards. The framework offers comprehensive manuals for the understanding and reporting of each indicator. Level(s) was developed as a detailed reporting framework to improve the sustainability of buildings from the life cycle perspective, including the transition towards a circular economy. It encourages life cycle thinking and supports users all the way from design stage through to operation and occupation of a building. **Life Cycle Assessment (LCA)** is defined as a systematic set of procedures for compiling and examining the inputs of materials and energy into a process, and the outputs in terms of the associated environmental impacts directly attributable to the process. It defines the scope or system boundary of the process and assigns environmental impact factors to all energy and materials within that scope, which in turn becomes the inventory for measurement. ISO 14040- 44 provides a general overview of the principles, framework, and requirements; The detailed procedure for applying LCA methodology in the built environment is described in EN 15978 (ISO 14040: 2006).

LOETB: Laois and Offaly Education and Training Board LOETB manages and operates Community National Schools, Post-Primary Schools, and Further Education and Training (FET) Centres delivering education and training programmes. One of the main employers in the midlands, LOETB provides services and programmes to over 17,000 FET beneficiaries. LOETB manages the National Construction Training Campus at Mount Lucas, host to an nZEB/Retrofit Centre of Excellence, the country's first Scaffolding Apprenticeship, a unique Utilities Traineeship and Ireland's National MMC Demonstration Park <https://www.loetb.ie/>

MMC: Modern Methods of Construction describes a range of innovative and new construction practices such as off-site construction, digitalization, use of bio-based materials and more.

Nearly Zero Energy Building (NZEB): A building that has an extremely high energy performance, while the nearly zero or exceptionally low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby. It is also a definition and specification required to comply with TGD L 2022.

Net Zero (Whole Life) Carbon Asset is one where the sum total of all asset related GHG emissions, both operational and embodied, over an asset's life cycle (Modules A1-A5, B1-B7 (plus B8 and B9 for Infrastructure only), C1-C4) are minimized, meet local carbon, energy and water targets, and with residual 'offsets', equals zero.

Net Zero carbon – operational energy asset is one where no fossil fuels are used, all energy use (Module B6) has been minimised, meets the local energy use target (e.g., kWh/m²/a) and all energy use is generated on- or off- site using renewables that demonstrate additionality. Any residual direct or indirect emissions from energy generation and distribution are 'offset'.

OECD: The Organisation for Economic Co-operation and Development (OECD) is an international organisation that works to build better policies. Together with governments, policy makers and citizens, they work on establishing evidence-based international standards and finding solutions to a range of social, economic and environmental challenges.

Operational carbon: 'Operational Carbon – Energy' (Module B6) are the GHG emissions arising from all energy consumed by an asset in-use, during the operational stage of its life cycle.

Resilient design: Presence of capabilities for resilience. Systems, institutions and people are considered 'resilient' when they have absorptive, adaptive, anticipative, preventive and transformative capacities and resourced to cope with, withstand and bounce back from shocks. (UN Common Guidance)

Skills Mapping: The identification of current and future skills levels in order to properly gauge the skills and knowledge gaps within a given sector. This is done in order to properly understand what is needed to bridge these gaps through training and upskilling processes (Authors own) on Helping Build Resilient Societies [UN-Resilience-Guidance-Final-Sept.pdf](#)

Traineeships are structured training programmes, developed and delivered by the Education and Training Boards (ETBs) working in partnership with industry representatives and employers, that combine learning in an education and training setting with work-based learning e.g. the Utilities Traineeship at the National Construction Training Campus was developed with CIF, Civil Engineering Contractors Association and employers in the Utilities Sector. Traineeships provide with an opportunity to develop cutting edge skills and on-the-job knowledge, enhancing career options and improving employability. Generally leading to an award at NFQ Levels 4-6, or equivalent, Traineeships are between 6-20 months in duration and include at least 30% of learning on-the-job.

TUS: Technological University of the Shannon

ZEB: A Zero-Emission Building (ZEB) is defined as a building with a very high energy performance, with the very low amount of energy still required to be fully covered by energy from renewable sources and without on-site carbon emissions from fossil fuels it will further include the calculation of life-cycle Global Warming Potential (GWP) and its disclosure through the energy performance certificate of the building. [Defining Zero-Emission Buildings](#)

Appendix 2: Sample Roles

CONSULTANTS	CONTRACTORS / SUPPLIERS	OTHER
Acoustician	Agricultural Mechanic	Accountants and Tax experts
Architect (Registered)	Air to Air Heat Pump Installer Air to Water HP Installer Ground Source HP Installer (+ Maintenance / Servicing)	Agronomists
Architectural Technologist	BER Assessor	Automation and Robotics
Architecture and Town Planning	Biomass Boiler Installer (+ Maintenance / Servicing)	Biodiversity Officer
BIM Manager	Bricklayer	Botanist
BIM Technologist	Building Renovation Passport Manager	Building Control Officer; Enforcement
Building Surveyor (Chartered)	Carpenter	Citizen engagement specialist
Circular Economy Plant Designer	Construction Operatives	Conservation & Repurposing Officer
Circular Product Designer	Construction Plant Fitting	Consumer Behaviour Specialists
Civil Engineer	Construction Project Manager	Contract Administrator
Construction and Buildings trades Supplier	Construction Supervisor	Data Analytics
Design Engineer	Crane Drivers	Data Programmer
Development Engineers	Curtain Walling Installer	Data Scientists
Directors in Transport and Distribution	Demolition Contractor	Digital Management
Electrical Engineer (Chartered)	District Heating Technician	Digital Processing
Energy Assessor	Electrical Instrumentation	Documents Controller ; Quality Assurance
Energy Engineer	Electrician	Ecologists Clerk of Work
Environmental consultant / Manager	Energy plant Operatives	Ecologists
Facilities Manager	EV Technician	E-Commerce Specialists
Fire Safety Engineer	Floorers	Enforcement Officer
Flight Engineer	General Operatives	Environmental professionals
Geospatial consultant; Laser Scanning;	Glazier	Environment protection specialists
Health and Safety designer	Health and Safety Contractor	Facility Manager
HVAC Engineers	Heat Pump Installer / Technician	GPS experts
IT engineers	Insulation Operatives	Green/ Smart City Managers
Landscape Architect	Internal & External Insulation Installer	Health and Safety Officers
Legal Advisor	Joiner	HR specialists
Marine Engineer	Landscaper	ICT Professional
Material and process engineers	Large Goods Vehicle Driver	ICT Technician
Mechanical Engineer (Chartered)	Machine Drivers	Industrial Problem analysts
OEM (equipment) engineers	Marine Equipment and ROV operators	Industrial Symbiosis facilitator
Physical Scientist	Material extraction/ recycling/ reuse expert	Land Surveyor
Product Designers (Heat Pump, PV, Solar...)	Painters and Decorators	Legal Adviser
Production and Process engineers	Pipe Fitters	Legislators

Project Manager	Plasterer	Logistics
Quality control and planning engineer	Plumber	Logistics Manager
Quality Surveyor	Production Manager	Material Passport Manager
Retrofit Engineer	PV and Solar Installer	Procurer
Reuse Consultant	Refrigeration Technician	Project Manager
Reuse Coordinator	Repair Specialist	Quality Control Manager
Standards and Accreditation assessor	Researcher and Innovator	Quantity Surveyor
Structural Engineer (Chartered)	Reuse Contractor	Renewable Energy Analyst
Telecommunications engineers	Roof Tilers and Slaters	Renewable Energy Manager
Third Part Assessors; BREEAM, CRREM, HPI, LEED etc	Roofers	Safety Officer
Ventilation Engineers	Scaffolders	Site administrator
	Service Technician	Site Manager
	Site Manager	Site Supervisor
	Solar Technicians	Solicitors
	Steel Erectors	Sustainability Trainers
	Stone Layer	Telecommunications engineers
	Systems Integration eg PV& Battery connection	Town Planner
	Tilers	Transport and Logistics Manager
	Water Monitoring	Transport and Mobility specialists
	Welders	Urban space Specialists
	Window Fitters	Waste management Operator
		Waste Management Trainers
		Waste sorting optimisation specialists

Appendix 3: Reference Projects

Centralise Best Practice outcomes from public and private funded projects eg:

International Frameworks
Examples: EU Level(s) Framework; Science Based Targets (Climate + Nature) SBTN; UN Global Biodiversity Framework; UN Sustainable Development Goals (SDGs); World Building Council for Sustainable Development (WBCSD) Sector Roadmaps
EU Projects
Examples: BIMzeED; BuildingLife; BURNS; BUS2014; BUSGoCircular; BUSLeague; Charter; Community Energy Hubs; CO2 Performance Ladder; Community Led Home Retrofit Awareness Raising and Training; Construction Blueprint; DELIVEREE project; DRIVE; Erasmus+ project; FEMCON (Empowering Women in Construction); GUPP; HP4ALL; HumanTech; LIFE; Net Zero Cities; New Skills for Nearly Zero Energy Buildings; QualiBuild; REPowerEDU; RES2; Sustainable Energy Communities, The Spark; THRIVE4women Programme; TOP CLeveR; Transition Pathway for Construction.
National Projects
Examples: Bio-CERG, Build Digital, Building Change: Resilient Design Curricula for 21st Century Professionals, CE-CON, CitA, Construct Innovate, Designing Futures, ecollege, ENACT Retrofit, ENFUSE 2040, Enterprise Ireland (Green + Digital + Lean Supports), ETBs Outreach, Future Building, HCI PILOT PROJECTS: (REEdI- Rethinking Engineering Education in Ireland, AMASE: Additive Manufacturing Advancing the South East, Centre for Insurance, CONVENE: Transforming university-enterprise engagement for a more sustainable and resilient post-pandemic Ireland, Creative Futures Academy, Cyber Skills, DCU Futures - A radical restructuring of the DCU Undergraduate Curriculum, Digital Academy for Sustainable Built Environment (DASBE), Enabling Future Pharma, GROWTH HUB, HigherEd 4.0: Enabling agile responsiveness from Higher Education, MicroCreds, Next generation teaching and learning for the changing needs of society and enterprise, Postgraduate Certificate in Innovative Materials for Industry 4.0.) INDICATE, Ireland's Knowledge Centre for Carbon and Climate; JobsPlus, Learnovate, Mentors Works (Small Firms Association), Realising the potential of recognition of prior learning and lifelong learning in Irish higher education, Regional Assemblies Supports, Regional Skills Fora Supports, Risk and Data Analytics Studies (CIRDAS), SEAI Programmes, Skillnet (70+no. Eg Construction Professionals Skillnet, CitA Skillnet), Skillnet Climate Ready Academy, Skills to Advance, Springboard, Strengthening and Protecting the Funds Industry in Ireland, Sustainable Futures, TERG, The ADVANCE Centre for Professional Education, The iEd Hub: Holistic education for enterprise, with enterprise in Healthcare and Biopharma, The Innovation Exchange, The National Rediscovery Centre, thisisfet, UL@Work, UPFRONT CO2, Viable Homes, Virtual Laboratories in higher education as an innovative pedagogical tool.
Industry Projects / Networks
Examples: ACEI Pledge to Net Zero, CIF (Initiatives and Supports), Circuléire, CMEx, CO2 Performance Ladder, Construction Centres of Excellence (ETBS), Construction Industry Council, Construction Industry Technology Alliance, Cultural Heritage Alliance, Design4Zero, EPD Ireland, Fuel Poverty, Healthy Homes, Lean Construction Ireland, MMC Ireland, Building Life II, Platform4MMC Toolkit by UCD); RIAI Climate Challenge + DfMA, EI Sustainability Plan, SCSi Surveyors Declare.
Assessment & Reporting: Systems & Tools
Examples: ACT-D, Aqueduct, BioScope, BPIE, BREEAM, Carbon Designer, CDP Supply Chain Standards, CRREM, ENCORE, EPDS, GRESB, GRI3, (Global Reporting Initiative), HPI, IBAT, INDICATE, Last Planner, LEED, LifeCycle Costings, NABERS, SBTN (Science Based Targets Network) Toolkits, WELL