TOWARDS LARGE SCALE DEEP RENOVATION – UNLOCKING IRELAND'S POTENTIAL

CONSTRUCTION PROFESSIONALS' ENERGY EFFICIENCY KNOWLEDGE AND UPSKILLING –

A SHORT REVIEW

ECCoPro Report 1

SEPTEMBER 2017

www.igbc.ie

IGBC
IRISH GREEN BUILDING COUNCIL

Funded by seai SUSTAINABLE ENERGY AUTHORITY OF IRELAND

ABOUT THE IRISH GREEN BUILDING COUNCIL

The Irish Green Building Council (IGBC), is the leading authority on sustainable building in Ireland. With a network of over 100 member organisations, the IGBC is working to transform the Irish construction and property sector into a global leader in quality and sustainability.

To do so, the IGBC has developed several sustainable building tools, including the Home Performance Index - Ireland's first national certification system for quality and sustainable residential development – and an Environmental Product Declaration Platform. The IGBC has also developed an extensive green building education programme, which includes BREEAM, LEED and LCA training courses.

See: www.igbc.ie

Acknowledgements

Thanks to all the organisations and individuals who attended and contributed to the two workshops on the construction industry energy efficiency upskilling needs in November 2016. These two workshop reports form the basis of this research. Thanks also to the various organisations listed below for their contribution to this report.

BUILD UPON

DISCLAIMER

The views expressed in this report are those of the Irish Green Building Council staff and do not necessarily reflect the views of all other parties named above.

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INTRODUCTION

Signals of climate change impacts are evident in Ireland. These include changes to key meteorological parameters such as average temperature, rainfall intensity and patterns, as well as ecosystem changes[1]. With buildings responsible for 36% of CO_2 emissions in the EU and most of our building stock predicted be still standing in 2050 increasing rate of the energy efficient renovation must be a top priority. As many as one million Irish homes are considered significantly energy inefficient and requiring upgrade work between now and 2050[2].

Against this background, the Irish Green Building Council, in conjunction with the Department of Communications, Climate Action and Environment (DCCAE), run a comprehensive consultation process in 2016 to co-design an ambitious national energy renovation strategy for Ireland. During that process, workshop participants highlighted that, depending on training and engagement, construction workers and construction professionals can act as advisor or as negative influencer; hence the necessity to better incentivise them to upskill in energy efficiency and sustainability[3].

▶ PROJECT OVERVIEW

As the lack of investment in skills at all levels of the construction industry supply chain represents one of the main risks to large scale energy renovation in Ireland, the Irish Green Building Council is now exploring the opportunity of introducing a customer-friendly energy efficiency accreditation system for construction professionals ECCoPro.

The objective of such a scheme would be to support closer alignment between professionals, and to allow end-users to clearly identify construction professionals who have upskilled in energy efficiency related skills, thus incentivising professionals to upskill in the area.

This project targets employed and unemployed construction professionals, as well as future construction professionals i.e. students.

About construction professionals

The literature does not offer a definite list of built environment professionals[4]. However, the term is generally used to describe all groups of stakeholders and professions that are directly and indirectly involved in the design, operation, preservation and development of the built environment.

These include architects, architectural technologists, auctioneers, estate agents, building control officers, contract managers, structural engineers, building services engineers, facilities managers, planners, site managers, surveyors (including building and quantity surveyors) and valuers.

Over 37,000 people worked in one of these professions in 2011[5]. However, employment contracted for architectural technologists, construction project managers and surveyors (9.4% on average annually), as well as civil engineers (2.1% on average annually) between 2010 and 2015. On the other hand, employment expanded for construction related technicians (3.7% on average annually), architects and town planners (2.6% on average annually) over the same period, although the absolute increases were small in magnitude[6].

Most built environment professionals are third level graduates typically to levels 6 and 7 of the European Qualifications Framework (EQF). See Appendix 1 for a comparison of EQF levels and Irish National Framework of Qualifications levels.

Other professionals such as asset managers, and specialised financial and insurance consultants can also significantly impact the energy renovation market. For this reason, their current energy efficiency knowledge and upskilling needs will also be explored as part of the ECCoPro project.

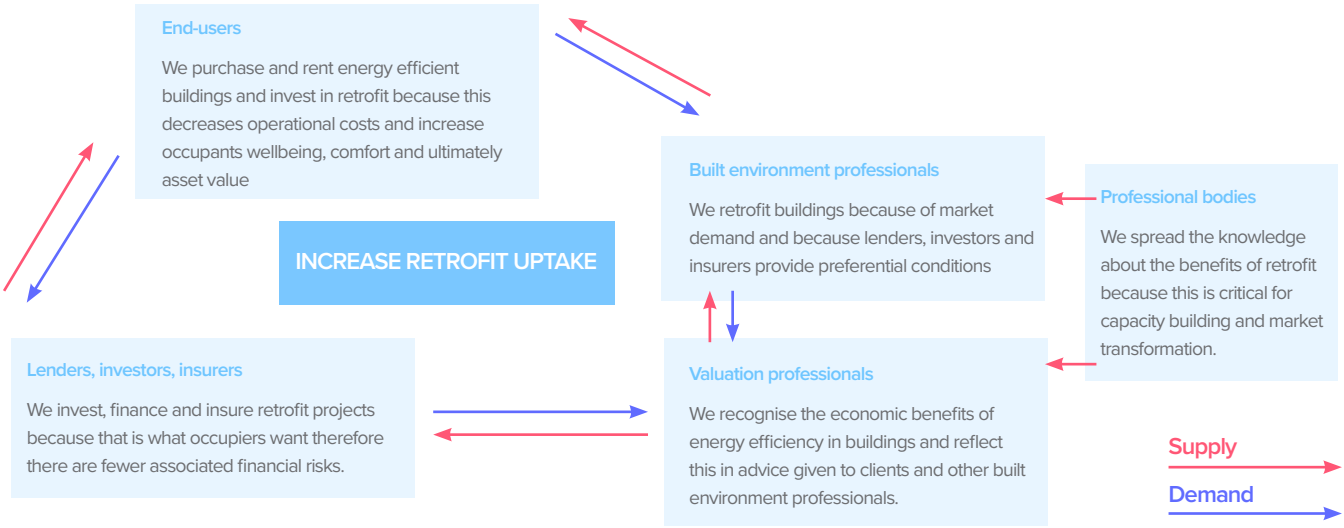


Fig. 1: Supporting Retrofit Uptake: The Role of Construction Professionals – Adapted from Hartenberger and Lorenz, 2013

The Dialogue Journey

The IGBC will host a series of workshops between October 2017 and March 2018 focusing on the design and delivery of a customer-friendly environmental certification system for construction professionals.

Designing

19.10: Workshop 1
Defining Industry Skills Needs

05.12: Workshop 2
Defining a framework for holistic energy efficiency training of construction professionals

Communicating

25.01: Workshop 3
Putting end-users at the centre of the transition

Delivering

08.03: Workshop 4
Making Environmental Certification for Construction Professionals a reality

Note: Workshop dates are provided for information only and may be subject to change. Please visit www.igbc.ie for further details.

▶ REPORT STRUCTURE

The aim of this report is to set the scene for the ECCoPro Project. It is intended to be used as a source of reference by all organisations involved in the development of a customer-friendly environmental accreditation for construction professionals in Ireland.

The first part of the report covers current energy efficiency and retrofit knowledge among construction professionals, reviewing both initial education and continuing learning. The second part highlights best practice in relation to programmes content and accreditations.

At the end of the report (in the glossary of terms and acronyms), some of the more unusual but important words used are explained.

Organisations and individuals interested in getting involved in this process should contact Marion – Marion@igbc.ie.

CURRENT LEVEL OF SKILLS AND KNOWLEDGE

With the urgent need to reduce CO2 emissions, the importance of the built environment to society places a high level of responsibility on those professionals who plan, design, construct, manage and maintain that environment. In the residential sector for instance, construction professionals have a unique opportunity to provide personalised energy advice to homeowners at trigger-points i.e. when they need or wish to repair or improve their homes.

The objective of this section is to gain a better understanding of the current levels of energy efficiency and sustainability awareness and knowledge amongst students and construction professionals in Ireland.

▶ KEY ENERGY EFFICIENCY AND SUSTAINABILITY SKILLS FOR CONSTRUCTION PROFESSIONALS

Although energy efficiency and sustainability are often considered technical fields, research has shown that construction professionals need both hard (technical) and soft (e.g. communication) skills[7]. The need for multidisciplinary skills and cross-sector approaches is also often highlighted in the literature[8].

Technical skills

Several technical skills and competences were mentioned as part of Ireland's National Renovation Strategy consultation process[9]. These included understanding of basic building physics (e.g. thermal bridging, airtightness and ventilation), conservation, standards (e.g. NZEB) and risk evaluation, as well as renewables, co-benefits of energy efficiency and costing of various retrofit options.

"All construction professionals should have a broad enough level of knowledge so that they see when a problem may arise and they know where to go to find a solution"

– Irish built environment professional, August 2017

Soft skills

Soft skills are key for all construction professionals involved in retrofitting projects. Energy renovations can involve many different people and roles, and the effectiveness of communications between them is critical in ensuring the best results. Communication, customer care and psychology are of special importance when dealing with households who highly rely on information from construction industry professionals.

Multidisciplinary skills

People involved in Ireland's National Renovation Strategy consultation process called for more joined up thinking at all levels of the construction supply chain[9]. Collaboration between architects, technical experts and managers is necessary to develop mutual understanding of each other's disciplines and combine skills to achieve optimal retrofitting[10].

The divisions of responsibility often make it difficult to close the feedback loop from building performance in use to briefing, design and construction[11]. What appears to be missing is a common understanding of the built environment and a unifying body of knowledge that ties together the different groups of professionals[4]. The education and training of built environment professionals needs to strengthen the understanding of the consequences of one's own actions as these actions not only impact on society and the environment in general, but also on the specific objectives and scope of others at later stages in the value chain[11].

See appendix 2 for a detailed list of interdisciplinary skills required by construction professionals for NZEB.

▶ CONSTRUCTION INSTITUTES AND SUSTAINABILITY

Construction education in Ireland is monitored, and in some cases controlled by professional bodies covering disciplines such as architecture, surveying, engineering, and planning. This section explores how these bodies have embedded the concept of sustainability in their visions and objectives.

ASHRAE – Ireland

The Irish branch of ASHRAE currently represents approximately 100 members in Ireland. ASHRAE's key mission is to advance knowledge in the areas of building systems, energy efficiency, indoor air quality, refrigeration and environmental sustainability.

Association of Consulting Engineers of Ireland - ACEI

ACEI is a voluntary, self-regulatory professional body representing the interests of over 100 consulting engineering companies in Ireland. One of the objectives of the association is to ensure that a strong Irish-based Consulting Engineering profession is developed and strengthened to support the ongoing socio-economic development of the country, including the protection of the heritage and the environment. ACEI promotes amongst its members best practices, sustainability and ethical behaviour in the operation of their firms.

Chartered Institution of Building Services Engineers – Ireland

CIBSE promotes the career of building services engineers and operate registers of Low Carbon Energy Assessors and Certified Low Carbon Consultants. It currently represents over 800 building services engineers in Ireland. CIBSE's Code of Professional conduct state that members, in all grades, shall promote the principles of sustainability and seek to prevent the avoidable adverse impact on the environment and society.

Engineers Ireland

Engineers Ireland is the professional body for engineers in Ireland. It has over 22,000 members, including over 7,100 chartered engineers. The Code of Professional Ethics of the organisation requires members to practice and promote the principles of sustainable development. Among the five key competences expected of a chartered engineer, two relate directly to sustainability:

1. Chartered engineers must apply appropriate theoretical and practical methods to the analysis and solution of engineering problems, including planning and implementing solutions, taking a holistic approach to cost, benefits, safety, reliability, appearance and environmental impact.
2. Chartered engineers must make a personal commitment to abide by the appropriate code of professional conduct, recognising obligations to society, the profession and the environment.

Institution of Civil Engineers

The Institution of Civil Engineers is a professional membership body that provide support to 525 civil engineer members in Ireland. The organisation has a sustainability guidance panel which meets quarterly and whose objective is to make members aware of their responsibility to help create a sustainable future, and to provide members with opportunities to develop their knowledge on the subject.

Institute of Professionals Auctioneers and Valuers - IPAV

IPAV promotes the public interest in the professional competence of over 1,100 members and is awarded the right to confer Recognised European Valuer (REV) status on its members. To become a REV, members must be proficient in TEGoVA Minimum Educational Standards (MES) and be able to show that they can complete valuations to "Blue Book" standards. More specifically, this means that REV must have a general knowledge of "energy, environmental and resource protection".

Irish Planning Institute - IPI

The IPI is a professional body representing over 700 planners in Ireland. One of the IPI objectives is to encourage environmental awareness in the planners' community. All members must comply with the IPI Code of Conduct. More specifically, members should always seek to secure the delivery of proper planning and sustainable development, pursue quality place making for people and shall respect diversity in cultures, ecosystems and the built environment. Furthermore, members shall aim to foster awareness of the need for proper planning and sustainable development among the public.

Royal Institute of the Architects of Ireland – RIAI

The RIAI supports and regulates the architectural profession in Ireland. It represents over 3,000 registered architects and approx. 200 architectural technologists. It is RIAI policy to promote sustainability as an integral part of the practice of architecture.

The RIAI Standard of Knowledge, Skill and Competence for Professional Practice as an Architect describes the areas and levels of knowledge, skill and competence required of an architect. These include several criteria that relate to sustainability and energy efficiency, e.g. understanding of the properties and appropriate use of materials in the context of building performance over time and ability to produce design solutions which reconcile the relationship between design, technology, environment, regulatory issues and costs while meeting user requirements. The RIAI Standard of Knowledge, Skill and Competence for Practice as an Architectural Technologist also incorporates several criteria relating to sustainability, including knowledge of the theory and principles of environmental design.

In 2012, the RIAI introduced a suite of CPD courses focusing on environmental and sustainable themes. Those who successfully complete two mandatory and one optional courses from the suite are entitled to apply for RIAI Environmental CPD Accreditation.

Society of Chartered Surveyors Ireland - SCSI

SCSI is the independent professional body for chartered surveyors in Ireland. It currently represents over 3,400 surveyors, including 173 registered building surveyors and 1,195 registered quantity surveyors.

The Assessment of Professional Competence (APC) ensure that those applying for membership are competent to practise and meet the high standards of professionalism required by SCSI. Sustainability knowledge and understanding is a mandatory competence for all pathways.

Building surveyors and quantity surveyors must have deep technical knowledge of construction technology and environmental services. Building surveyors must also have deep technical knowledge of building pathology and legal and regulatory compliance. Application of knowledge and understanding of sustainability and risk management are optional competences for building and quantity surveyors.

The Institution of Structural Engineers

The Institution of Structural Engineers has approximately 50 members in Ireland. The organisation aspires to create and promote sustainable solutions that can be used in practice in the built environment.

▶ INITIAL EDUCATION

A strong international momentum for promoting education for sustainability in universities has been building since 1990 and the importance of environmental education in the construction curriculum is now widely accepted among higher education institutions[12]. Best practice for sustainability education is for it to be provided in an institute that is committed to sustainability and where the entire curriculum is infused with relevant education in relation to environmental literacy requirements in contrast to an add on.

International research suggest that academic institutions have mixed results with respect to producing graduates with knowledge on the various aspects of sustainability. A deficit in student knowledge and understanding of environmental issues in a built environment context[12], as well as a lack of appropriate blend of hard and soft skills have been highlighted[7].

To gain a better understanding of the level of exposure of Irish students to retrofit, energy efficiency and sustainability education, courses accredited by Engineers Ireland, IPAV, IPI, RIAI and SCSI, as well as courses recognised by the Property Services Regulatory Authority as meeting the minimum academic qualification to become a licensed property service provider[18] were evaluated using the following method: If the terms “retrofit”, “energy efficiency” or “sustainability” appear in at least one of the following: the degree name, the description of the degree or any subject topics.

The terms retrofit, energy efficiency or sustainability are mentioned at least once in the degree name, course description or module name of nearly 67% of the degrees reviewed. However, significant differences exist among the professions. In fact, these terms are mentioned in over 80% of the architectural and engineering programmes, over 75% of the planning programmes, but slightly less than 60% of the surveying programmes and approximately 35% of the other property programmes. This is in line with previous research which have shown for instance that students of quantity surveying had less exposure to sustainability education compared to other construction students[13].

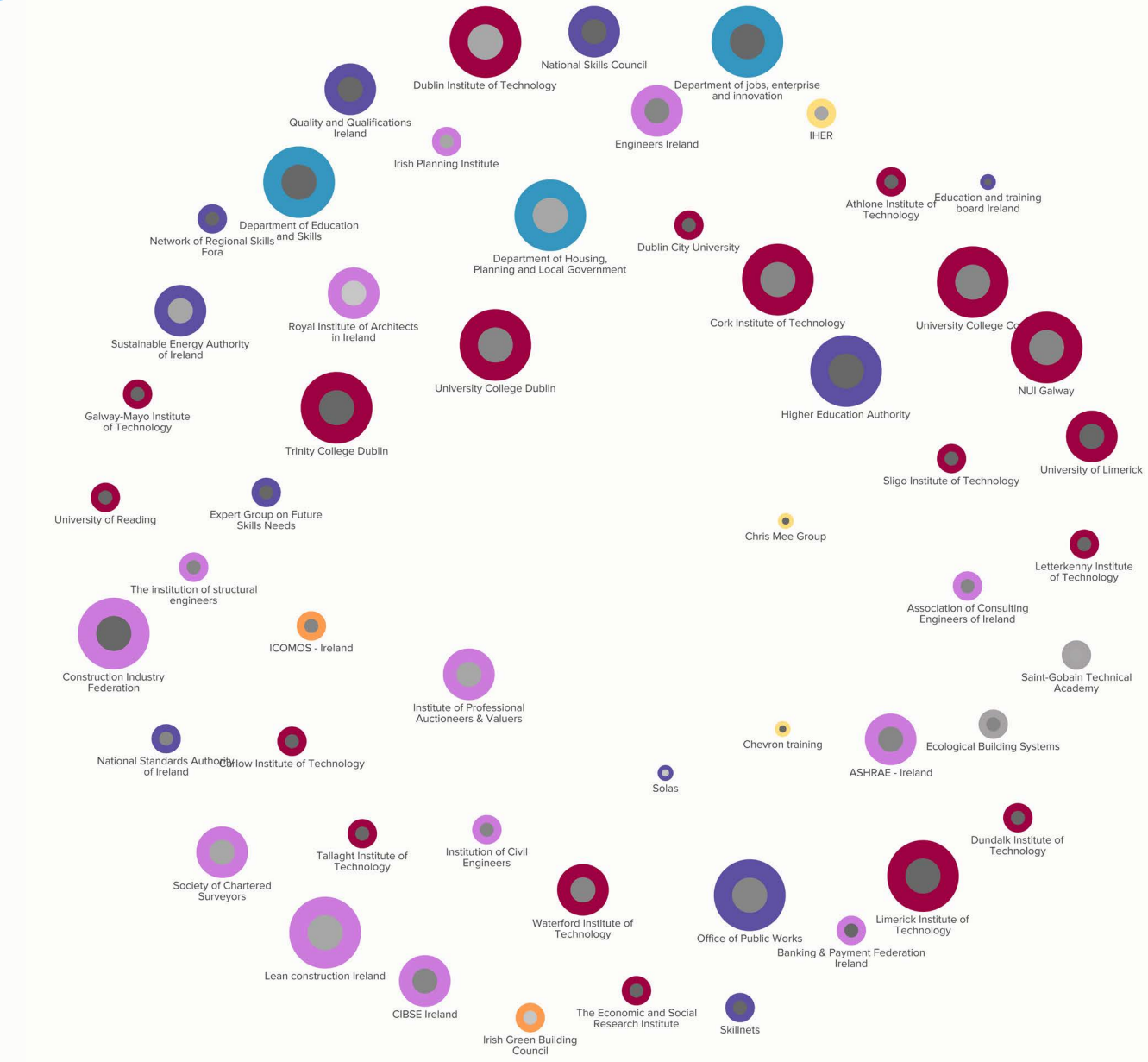
However, data on methods used to teach these concepts, multidisciplinary aspects and soft skills learning are scarce in Ireland and would require a more in-depth study. International research has shown that the curricula in most schools or architecture lack the thorough integration of sustainability. Furthermore, there is usually little integration of the knowledge of other disciplines such as building services engineering as part of architects’ education[14]. A survey carried out among DIT final year engineering students in 2012 showed that most of them had a discipline-led conception of sustainability, the majority failing to identify the complexity of the concept[15].

▶ LIFELONG LEARNING

Over the last decade, Irish professional bodies have sought to foster sustainable construction within their professional competency frameworks, developing associated CPD programmes for their members and / or incorporating it as a key requirement for membership. Examples of same include the RIAI Environmental CPD Accreditation scheme or CIBSE's certified low carbon consultants register.

In the last few years, some add-on or supplemental training programmes in sustainability and energy efficiency have also become available for the up-skilling of construction professionals. These are delivered by a combination of providers, including institutes of technology (e.g. DIT's MSc in Building Performance - Energy Efficiency in Design), as well as some manufacturers and construction materials/ systems suppliers such as Saint-Gobain Technical Academy and Ecological Building Systems.

Policy drivers for more sustainability have led Ireland's construction educators to better integrate these concepts into construction degree curricula and to develop some add-on programmes and CPDs. However, a recent Passive House Plus' survey[23] and Ireland's National Renovation Strategy consultation process have shown that the lack of sustainability and energy efficiency literacy among construction professionals in Ireland remain an issue if Ireland is to reach its climate targets.



Central Government | Other training provider | Other Public | NGO's and think tanks | Professional Institute | Representative body | Research & Academia

Size = Potential to influence the process

Shade = Current involvement in the process

PROGRAMMES CONTENT & ACCREDITATION – BEST PRACTICES

The aim of this second section is to explore best practices in relation to holistic energy efficiency training of construction professionals, but also to analyse and capture where and how skills accreditation systems have empowered end-users.

▶ HOLISTIC ENERGY EFFICIENCY TRAINING FOR CONSTRUCTION PROFESSIONALS

With stricter energy efficiency rules gradually coming into force in Europe, several energy efficiency training courses have been developed over the last decade. Examples of some successful cross-sector and sector specific training programmes are presented in this section.

Cross-sector training programmes

Collaboration between construction professionals is key to develop mutual understanding of each other's disciplines and combine skills to achieve optimal retrofitting. The necessity for construction professionals of gaining a good overall understanding of buildings in their environment led to the development of comprehensive green building certification training courses (e.g. LEED, BREEAM and the Home Performance Index). Several multi-disciplinary training programmes have subsequently been developed to encourage a higher level of cooperation between professionals in retrofitting projects. A range of successful and diverse examples is presented in this section.

Green Building Professional – Training and Certification Programme

The aim of this certification and training programme is to provide greater certainty of the abilities of professionals working in construction toward a sustainable built environment. The programme is designed to ensure cross-training between different disciplines.

Programme content:
8 mandatory courses: Legal Requirements and Voluntary Certification for Green Buildings - Green Design Principles - Financial Considerations of Green Buildings - Managing Green Building Projects - Sustainable Site Selection & Management - Lighting Design & Smart Buildings - Sustainable Materials & Resources and Building Envelopes of Green Buildings

2 extra courses to be chosen among the following optional courses: Creating & Managing Greener Workspaces - Landscape & Exterior Design - Circular Economy and Green Homes Certification.

Duration: 60 Hours / Course delivery: Classroom

The programme was developed by the World Green Building Council to encourage cross disciplinary thinking and cooperation. It is highly successful in Croatia and Romania where it is operated by the local Green Building Councils.

Sustainable Renovation for the Construction Sector

This multi-disciplinary programme was specifically developed for those designers, architects, energy engineers and craft workers whose role it is to advise clients on sustainable energy efficient home renovations.

Programme content:

The training course covers technical aspects such as building physics, renewables and energy efficiency and a psychology strand. The psychology strand was developed to enable building advisors to better consider the motivations and other needs of homeowners.

Duration: 5 days / Course delivery: Classroom

Country: The training materials were developed in Germany but adapted for an Irish audience as part of a pilot scheme involving approximately 10 trainers – Surecon Project.

Domestic Retrofit Coordination and Risk Management

Domestic retrofit projects can be risky and complicated. They require high-quality, specialised project leadership and management. Against this background, the Domestic Retrofit Coordination and Risk Management training course was developed to up-skill construction professionals to become approved retrofit coordinators able to lead, manage and quality assure retrofit projects.

A more advance training course "Retrofit Coordinator Plus" was also developed for those with a good base-knowledge of retrofit best practice. All courses are fully CPD Accredited by the Royal Institute of British Architects and lead to a diploma.

Programme content:
Introduction to Domestic Retrofit - Assessing Dwellings for Retrofit - The Business Case for Retrofit: Costing, Evaluation and Funding - Building Services Retrofit - Ventilation and Airtightness for Retrofit - Building Fabric Retrofit and Fundamentals of Solid Wall Insulation - Retrofit Coordination and Risk Management and Retrofit Building Physics.

Extra topics covered as part of the "Retrofit Coordinator Plus" course include Software Options for Retrofit Coordinators, Building Regulations, Advanced Low Energy Retrofit of Traditional Buildings, Scaling Up Retrofit - materials, Products and processes and Introduction to Passivhaus Retrofit.

Duration: Domestic Retrofit Coordination and Risk Management: 8-day learning programme

Course delivery: Class-room. Some of the CPD courses required to maintain accreditation are available online

Country: The programme is delivered across the United Kingdom by a partnership of public and private organisations.

DIT's MSc in Building Performance - Energy Efficiency in Design

The programme has been designed to enable professionally qualified architects, architectural technologists, engineers and building surveyors to develop skills in energy efficiency design for new and renovation building projects. The programme is project based and explores a range of new build and renovation design strategies for residential and non-residential building types using a variety of digital modelling and environmental design software applications as well as real case studies.

Programme content:

NZEB Policy & Technologies - NZEB Calculation & Cost Optimality - Energy Modelling Tools (DEAP, PHPP and Dynamic Simulation / NEAP) - Hygrothermal Risk Assessment for Building Performance - Thermal Bridge Calculation for Building Performance - Building Environmental Assessment Methods - Building Performance NZEB Design Project: Multi-Unit Residential & Office - Building Performance Research Project.

Duration: 2.5-year part time - The programme can be completed over a longer period as a series of modules which combine to form a Postgraduate Certificate, a Postgraduate Diploma and ultimately an MSc.

Course delivery: Comprise online and college-based modules

Country: Ireland – operated by Dublin Institute of Technology

Sector specific training programmes

While all construction professionals involved in a retrofit project require a common body of knowledge, some profession specific skills are needed to support retrofit uptake - see Fig. 1 page 5. This section presents a few examples of successful sector specific training programmes.

BUILT ENVIRONMENT PROFESSIONALS

Energy Assessor Training

CIBSE has developed a range of courses for building services engineers wanting to become energy performance specialists. These include a certified low carbon consultant training course. Topics covered include the Energy Performance of Buildings Directive, building regulations Part L, energy efficiency in buildings, energy performance certification, calculating carbon performance and compliance.

Duration: 2-day learning programme

Course delivery: Class-room

Country: United Kingdom

RIAI Environmental CPD Accreditation

This programme aimed at architects and architectural technologists is made up of two mandatory CPD courses (Sustainable Fundamentals Reviewed and Renewable Technologies) and one optional module to be chosen from the following CPD courses: Designing Low Energy Domestic Refurbs and Building Fabric Design.

The modules cover topics such as technical design and performance, legislation, cost analysis and optimising payback to the client.

Duration: Approximately 32 hours

Course delivery: A blend of online and traditional classroom courses

Country: Ireland

END-USERS

Training for Rebuilding Europe

Capacity building of public and private property owners is crucial to inform and empower them to take the right investment decisions and confidently engage in business relations with professionals. Training materials were developed for both associations of property owners and local authorities as part of this project. Topics cover include legal and policy background, building standards, financing of the refurbishment of existing buildings, citizen awareness raising and most common and applicable technical solutions for the retrofitting of buildings.

Duration: 1 day

Course delivery: Classroom

Country: France, Belgium Germany, Italy, Spain, Greece and the UK

LENDERS, INVESTORS AND INSURERS

Dutch Green Building Council's Training Programme for bank managers in building, infrastructure and real estate

Climate change presents risks and opportunities for the financial sector. Recently the Dutch Government announced that assets with an energy label lower than C (so D, E F or G) can not be used as an office anymore after 2023. The risk of real estate becoming a stranded asset is now suddenly a priority on many agendas. In the built environment, significant opportunities for financial institutions to provide innovative financing products for energy efficiency upgrades and sustainable buildings have been identified. However, many of these opportunities remain untapped due to a skills gap among mainstream banking practitioners in their appreciation and understanding of critical environmental factors.

Against this background, the Dutch Green Building Council has recently developed an introductory training course on sustainable buildings for bank managers and valuers. Topics covered include an introduction on sustainability, challenges facing society, energy transition, policies and legislation, sustainability certifications and the business case for green buildings (including health and productivity).

Duration: 1 day

Course delivery: Classroom

Country: The Netherlands

VALUATION PROFESSIONALS

Renovalue: Integrating Sustainability into Valuation Practice

A free training course on how to identify and apply energy efficiency and renewable energy factors into a valuation. Topics covered include the impact of sustainability on the wider real estate market, understanding the importance of buildings in relation to climate change and energy targets and its relevance to managing risk for clients, integrating energy efficiency and sustainability considerations in valuations, creating higher quality valuation reports, preventing errors and mispricing of assets and articulating the business case in conversations with clients.

Duration: 1.5 hours

Course delivery: Online

Country: Several European Member States – Operated by RICS

▶ ACCREDITATION OF SKILLS AND COMPETENCES

Recognising energy efficiency skills is critical in incentivising construction professionals to upskill in the area. This last section analyses various skills accreditation systems which have proven to be useful in empowering end-users.

Skills Cards

A skills card consists in a registry of the professional qualification of a construction worker or professional in the form of a personal identification card.

Skills cards are usually used to address safety at work and illegal employment, as well as to keep track of professional qualifications and training. They generally contain information on the professional qualifications of each construction worker in the form of a personal identification card (often electronic), which gives him access to the construction site.

Usually, the skills card requires the registration of the employee's qualification in a centralised database. Nevertheless, the implementation of the skills card varies considerably across countries, as it can be either mandatory or voluntary, and government-sponsored or led by industry or social partners.

Skills cards are mainly used in larger scale projects. E.g. CSCS cards in the UK are now required for most commercial construction projects as they help contractors meet the requirements of the Safety, Health and Welfare at Work Act and Construction (Design and Management) Regulations. However, they are rarely asked for by home-owners which in most cases do not know about them.

Examples of skills cards currently in use in Europe

Construction Skills Certification Scheme (CSCS) - United Kingdom

A smart card containing information on the cardholders' identity, qualifications and training that provides a simple, consistent way for construction workers to show that they have the required qualifications and training to work on a construction site. Various cards exist for various levels of qualifications and job types.

UD-Cards – Denmark

A smart card introduced in 2013 which contains information on the cardholders' identity, as well as qualifications and training (including health and safety training). The information is directly connected to the database of Danish educational institutions taking part in this scheme, meaning information is automatically updated every time a worker attends training.

ID06 Skills Database – Sweden

An electronic card that stores and centralises all the professional qualifications of workers on the building site, enabling the site manager to quickly check that all employees have the necessary skills to perform their respective tasks.

Build Up Skills App - The Netherlands

The BUILD UP Skills Advisor App allows both tradesmen and construction professionals to list their skills in relation to energy efficiency, renewables and retrofit, as well as to better identify areas in which they should upskill. The key idea behind that app is to better match individuals with the right training course(s) for them. When a construction professional or worker complete a specific course, he can add it to his profile but this will only go live when participation is confirmed by the training provider. On the other hand, workers and professionals can rate training courses they have taken part it. Llife-long-learning users of the app can also subscribe on update streams in the form of 'new courses' and short sets of questions. The app was developed based on the findings of two EU projects (BUILD UP and Prof / Trac) and is available on both Android and iOS. The app IT-infrastructure is designed for implementation in other countries and languages.

Certifications & Registers

The certification of the quality of construction services allows to increase consumer confidence by making sure that minimum quality standards are upheld. It also contributes to the recognition of skills and the promotion of professional development.

Various certification schemes and registers operate in Ireland and Europe, many in the field of conservation but also some in the areas of energy efficiency and sustainability. These schemes are characterised by their diversity:

1. Some are government-sponsored (e.g. BER assessors in Ireland) while others are led by industry (e.g. Green Building Professionals Certification Programme)
2. Some are mandatory (e.g. NSAI Thermal Modellers Scheme) while others are operated on a voluntary basis (e.g. RISC accredited in building conservation)
3. Some schemes are linked to specific training programmes (e.g. Retrofit Coordinators in the UK) while other recognised a wide range of training courses as relevant education (e.g. BedreBolig in Denmark)
4. Some go beyond simple certification and operate various grades of qualifications (e.g. Ireland's Conservation Accreditation System)
5. Some operate a central register (e.g. Retrofit Coordinators in the UK and Green Building Professionals Certification Programme in Romania) while other simply provide a "badge" to be used on the certified organisation website but no central databases (e.g. RIAI Environmental CPD Accreditation).

Examples of certifications and registers currently in use in Ireland and Europe

	Country	Mandatory	Online Register	Linked to Specific Training Programme	Grades of certification
RIAI – Conservation Accreditation System: An accreditation system operated in Ireland to recognise differing levels of conservation specialist expertise and assist consumers in the selection of a suitable practice.	Ireland	Y	Y	Y	Y
Green Building Professionals -Training & Certification Programme: A certification and training programme initiated by the Romanian Green Building Council to provide greater certainty of the abilities of professionals working in construction toward a sustainable built environment.	Croatia/ Romania		Y	Y	
CIBSE Certified Low Carbon Consultants: Registrants on the CIBSE Low Carbon Consultants register have been certified by CIBSE to be competent to minimise energy use and carbon emissions from buildings both in design and operation. They have successfully completed CIBSE Energy Assessor Training and are able to go beyond the current legal minima in improving the nergy performance of both new and existing buildings.	UK		Y	Y	
Domestic BER Assessors must have the relevant pre-qualification of a EQF level 5 award in construction studies or equivalent, subsequently been certified as having successfully completed a training course for BER Assessors and pass the SEAI Domestic BER Examination.	Ireland	Y	Y	Y	
Non-Domestic BER Assessors must have a qualification in a building construction related discipline, hold membership of a professional organisation at the specified grade and pass the SEAI Non Domestic BER Examination.	Ireland	Y	Y		
DEC Assessors must be registered with SEAI as a Non-Domestic BER Assessor and have successfully completed a DEC Assessor Workshop delivered by SEAI.	Ireland	Y	Y	Y	
The RIAI Environmental CPD Accreditation was designed to confirm the position of the architectural profession as the lead profession advising on the environmental aspects of the built environment including technical design and performance, legislation, cost analysis and optimising payback to the client. Those who successfully complete 2 mandatory and 1 optional course form the RIAI Environmental CPD suite are entitled to apply for RIAI Environmental CPD Accreditation.	Ireland			Y	
Retrofit Coordinator: 8-day learning programme to up-skill construction professionals to become retrofit coordinators.	UK		Y	Y	Y
Bedrebolig: Better Housing (BedreBolig) advisor have at least 2 years of relevance professional experience in construction, and an education on level EQF 4 or higher. This education must be supplemented with relevant energy education (energy advisor or other course activity of 2-3 days corresponding to its level or more). In addition, the advisor must have completed the BedreBolig Advisory Program.	Denmark		Y	Y	
Construction worker skills register: An online register of training for site operatives and craftworkers in the construction industry in Ireland. To register, construction site operatives or craftworkers must complete a minimum of a Foundation Energy Skills (FES) training course or a FES Train the Trainer course.	Ireland	Y	Y		
"Registered Energy Auditor: Under Statutory Instrument (SI) 426 of 2014 large enterprises must carry out an energy audit of their operations every 4 years. To demonstrate compliance, a business must use a Registered Energy Auditor to complete the audit. Registered energy auditors must have a technical qualification (minimum EQF level 6) in a relevant discipline e.g. engineering, architecture or building services and at least 7 years relevant professional work experience since achieving this qualification. Registered energy auditor must also have been awarded one of the following titles: Energy Institute Chartered Energy Engineer; Energy Institute Chartered Energy Manager; Association of Energy Engineers Certified Energy Manager; Association of Energy Engineers Certified Energy Auditor; Practicing Non Domestic BER Assessor registered with SEAI or ESOS (UK Auditing Scheme) Lead Assessor.	Ireland	Y	Y		

CONCLUSION

The move towards an energy efficient and sustainable building sector constitutes one of the primary drivers for future skill needs[16]. Energy efficiency and sustainable construction carry significant market potential, being expected to attract extensive investments and providing major opportunities for businesses in the general economy. Furthermore, construction professionals have substantial responsibility in promoting a more sustainable built environment and in empowering Irish citizens in our transition to a low carbon economy.

Policy drivers described in this report have led Ireland's construction educators to better integrate the concepts of energy efficiency and sustainability into construction degree curricula and to develop some add-on programmes. Promoting sustainability is now presented as one of the key objectives of most construction professionals' bodies in Ireland, and many of them have run related CPDs. Nevertheless, with the EU planning for nearly zero energy buildings by 2020, the Irish construction sector is confronted with the urgent need to update the sustainability and energy efficiency skills of its workforce.

Robust training and accreditation programmes have been developed throughout Europe, and Ireland has experimented over the years with some excellent examples as well. Some of the best practices presented in this report will form the basis of our discussions over the next few months. However, the specificities of the Irish market (e.g. the impact of the recession on the sector and the high international mobility of the workforce) will need to be fully considered in that process.

NEXT STEPS

The IGBC will host a series of workshops between October 2017 and March 2018 focusing on the design and delivery of a customer-friendly environmental certification system for construction professionals.

19th October: Workshop 1 – Defining Industry Skills Needs

5th December: Workshop 2 – Defining a framework for holistic energy efficiency training of construction professionals

25th January: Workshop 3 – Putting end-users at the centre of the transition

8th March: Workshop 4 – Making Environmental Certification for Construction Professionals a reality in Ireland

Organisations and individuals interested in taking part in this process should contact Marion@igbc.ie.

GLOSSARY OF TERMS AND ACRONYMS

ACEI: Association of Consulting Engineers of Ireland

Architect: Architects plan and design new buildings, as well as restore and conserve old buildings. The Building Control Act, 2007 provides for the registration of title[17].

Architectural Technologist: Architectural technologists usually work within multidisciplinary teams with responsibility for the preparation of production information such as working drawings, schedules and specifications as well as site surveys, administrative procedures.

ASHRAE: American Society of Heating, Refrigerating and Air-Conditioning Engineers

Auctioneer / Estate Agent: An individual or an organisation who on their own behalf or on behalf of their organisation holds a license to practice as same under the Property Services (Regulation) Act 2011. They are also referred to as a Property Service Provider[18].

Building control officer: A person with the authority to control building work that is subject to the Building Regulations.

Built environment professionals: All groups of stakeholders and professions that are directly and indirectly involved in the design, operation, preservation and development of the built environment.

Building services engineer: Building services engineers deals with the design, installation, operation and monitoring of the mechanical and electrical systems required for the safe, comfortable and environmentally friendly operation of buildings.

Building surveyor: Building surveyors carry out building surveys and provides management and design consultancy services. The Building Control Act, 2007 provides for the registration of title[17].

CIBSE: Chartered Institution of Building Services Engineers

CPD: Continuing Professional Development

Contract managers: Construction contracts managers manage building contracts, building costs and construction projects.

CSCS: Construction Skills Certification Scheme

DCCAE: Department of Communications, Climate Action and Environment

DIT: Dublin Institute of Technology

EQF: European Qualifications Framework

Facilities manager: A facilities manager is responsible for planning, designing and managing premises facilities and for co-ordinating the physical workplace with the work of an organisation and its employees. Under the Property Service (Regulation) Act 2011, all property services providers, including facilities managers, must be licenced to practice, and meet the minimum qualification (EQF 5) to qualify[18].

IGBC: Irish Green Building Council

IPAV: Institute of Professionals Auctioneers and Valuers

IPI: Irish Planning Institute

Other surveyors: Chartered surveyors who offer other services such as mortgage valuations, homebuyers' survey and valuations, land surveying, estate management and other forms of survey, as well as building-related advice. It is not unusual for any individual chartered surveyor to have expertise in several areas. There is no provision under existing legislation for the registration of these titles.

Planners: Planners advise decision-makers, communities, investors, interest groups, business people and the public at large on issues to do with the spatial development, growth, management and conservation of regions, cities, towns, villages, neighbourhoods, local areas and parcels of land.

Quantity surveyor: Quantity surveyors advise on the costs of developing all types of buildings and infrastructure. The Building Control Act, 2007 provides for the registration of title[17].

RIAI: Royal Institute of the Architects of Ireland

SCSI: Society of Chartered Surveyors Ireland

SEAI: Sustainable Energy Authority of Ireland

Site managers: A site manager oversees operations on a day-to-day basis, and ensure that work is done safely, on time and within budget and to the right quality standards.

Structural engineer: Structural Engineers create drawings and specifications, perform calculations, review the work of other engineers, write reports and evaluations, and observe construction sites.

Valuer: Someone whose job is to estimate the cost or value of a building. There is no registration of the title or licensing process. However, valuers who are members of IPAV and/or SCSI must meet certain standards of professionalism.

APPENDIXES

EQF Levels	Irish NFQ Levels
1	1 & 2
2	3
3	4
4	5
5	6
6	7 & 8
7	9
8	10

1. Comparison of Irish National Framework of Qualifications (NFQ) with European Qualifications Framework (EQF)

2. Interdisciplinary skills required by construction professionals for NZEB as identified as part of the PROF-TRAC programme

Source here

Interdisciplinary skills	Skills definition
Communication	Being able to listen and summarize conversations (in common language) Realizing common understanding an Involving other people in the project objectives.
Information management	Understanding technical drawings (2D/3D) and texts. Being able to interpret information (also in BIM-models). Understanding of the complete NZEB building process.
Collaboration (teamwork & facilitation)	Working together in cross-trade settings, in other words, with all involved NZEB building disciplines. Being able to connect the individual performance to a team performance. Can enthusiasm for sustainable NZEB buildings.
Quality assurance	Taking responsibility in assuring quality of its own work. Being aware of the consequences of his actions on the energy performance of the NZEB building and the building process. Able to implement and assess self-inspection methodologies. Skills on commissioning and maintenance.
Sustainable architectural design	Being able to design with all partners a NZEB building with comfort and sustainability as starting point. Having a clear view on energetic consequences with every choice made in the design process.
Integrated design	Can design integrally with the other involved NZEB building disciplines.
Sustainable building materials Sustainable installation materials Environmental (indoor) quality	Being able to asses building materials on sustainability and make the right selections in the design Being able to asses installation materials on sustainability and make the right selections in the design. Having a clear view on indoor environmental consequences with every choice made in the design process.
Economics	Having a clear view of issues on finance, costing, LCC analysis during the NzEB building process
Procurement	Being able to facilitate the process of NzEB tenders and (sub)contracts

REFERENCES

1. EPA, “A summary of the state of knowledge on climate change impacts for Ireland”, 2009, https://www.epa.ie/pubs/reports/research/climate/CCRP1(low).pdf

2. SEAI, 2017, “Up to a million Irish homes need a Deep Retrofit to boost energy efficiency”, http://www.seai.ie/News_Events/Press_Releases/2017/Up-to-a-million-Irish-homes-need-a-Deep-Retrofit-to-boost-energy-efficiency-.html

3. Irish Green Building Council, “Build Upon Final Recommendations”, 2017, https://www.igbc.ie/wp-content/uploads/2017/03/IGBC-BUILD-Upon-Final-Web-24.02.17-1.pdf

4. Hartenberger, U., Lorenz, D. and Lützkendorf, T., 2013, “A shared built environment professional identity through education and training”, Building Research & Information, Vol. 41, Nº 1, pp. 60–76

5. CSO, 2011, Population Aged 15 Years and Over, Employed or Self-employed by Sex, Detailed Occupational Group and Statistical Indicator. Available at http://www.cso.ie/px/pxeirestat/Statire/SelectVarVal/saveselections.asp

Note: The result of the “Persons at work by occupational groups” CSO Census 2016 are due to be published in December 2017.

6. Solas, 2016, “National Skills Bulletin 2016”, http://www.solas.ie/SolasPdfLibrary/NationalSkillsBulletin2016.pdf

7. Toor, S., Ofori, G. Developing Construction Professionals of the 21st Century: Renewed Vision for Leadership. Journal of Professional Issues in Engineering Education and Practice Vol. 134, Issue 3 (July 2008)

Becerik-Gerber, B., Gerber, D., Ku, K.. “The pace of technological innovation in architecture, engineering, and construction education: Integrating recent trends into the curricula.” Journal of Information Technology in Construction 16 (2011): 411-432.

8. Conte, E., 2016, “Sustainability and Built Environment: The role of Higher Education in Architecture and Building Engineering”. European Journal of Sustainable Development (2016), 5, 3, 1-10

9. Irish Green Building Council, “Build Upon Ireland - Mini Workshop 2: Making sure we have the right skills”, 2016, https://www.igbc.ie/wp-content/uploads/2017/03/Report_Final.pdf

Irish Green Building Council, “Build Upon Ireland - Mini Workshop 5: Making sure we have the right skills – Pre-1945 Buildings”, 2016, https://www.igbc.ie/wp-content/uploads/2017/03/Report_Final_Skills_2.pdf

10. Gucyeter, B., 2016, “The Place of Sustainability in Architectural Education: Discussion and Suggestions”, Athens Journal of Architecture, July 2016

11. Leaman, A., Stevenson, F. and Bordass, B. (2010) Building evaluation: practice and principles. Building Research & Information, 38(5), 564–577.

12. Cotgrave, A.J. and Kokkarinen, N. (2010) Developing a model promoting sustainability literacy through construction curriculum design. Structural Survey, 28(4), 266–280.

13. Tan, A., Udeaja, CE., Babatunde, S. and Ekundayo, D. (2017), ‘Sustainable development in a construction related curriculum- quantity surveying students’ perspective’ , International Journal of Strategic Property Management, 21 (1) , pp. 101-113.

14. Lidgren, A., Rodhe, H., Huisingh, D. (2006). “A systemic approach to incorporate sustainability into university courses and curricula,” Journal of Cleaner Production 14 (2006): 797-809, doi: http://bit.ly/1PRLfZG.

15. Nicolaou, I., Conlon, E. (2012). “What do final year engineering students know about sustainable development?”. European Journal of Engineering Education.

16. European Commission, 2017, “European Construction Sector Observatory - Analytical Report, Improving the human capital basis”

17. Irish Parliament, Building control act 2007, Public Act Number 21 of 2007. Available at http://www.irishstatutebook.ie/eli/2007/act/21/enacted/en/pdf

18. Irish Parliament, Property Services (Regulation) Act 2011, Public Act Number 40 of 2011. Available at http://www.irishstatutebook.ie/eli/2011/act/40/enacted/en/print

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