



Energy in Buildings in 2020: Construction Workers' Skills and Competences

Thursday, 24th May 2012, LINC Building, IT Blanchardstown

Report from the Workshop

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3rd August 2012



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1. Introduction

This report presents outcomes of the discussions held during the Futures Workshop organised as part of the Build Up Skills Ireland project (BUSI) on 24th May 2012 in the Blanchardstown Institute of Technology. The aim of the *Build Up Skills Ireland* (BUSI) project is to develop a national qualification roadmap for Ireland, which will set up-skilling, education and training targets for construction workers to ensure that their qualifications, skills and competences are in line with those needed to meet 2020 sustainable energy targets. The project is a part of the Europe wide initiative funded by Intelligent Energy Europe: *Build Up Skills: Energy Training for Builders*, which focuses on the continuing education and training of craftsmen and other on-site construction workers and system installers in buildings in relation to energy.

The aim of the workshop was to explore the future of energy solutions for buildings in 2020, identify new skills and competences that may emerge as a result of changes in construction trends in regard to energy, create potential job profiles in the area of energy and construction in 2020 and identify the main skills and competences these jobs will require with the view of education and training provision.

2. Participants and Programme

The event brought together 22 participants from a variety of backgrounds related to energy issues in construction in Ireland. The list of participants and their institutions is included in Table 1.

Name	Organisation
Ann Crotty	Sustainable Energy Authority Ireland
Bryan Fields	FÁS, Head Office
Darragh Lynch	Royal Institute of Architects Ireland, Ballymum Regeneration Ltd.
Derek Blackweir	Limerick Institute of Technology
Derek Walsh	FÁS, Head Office
Ela Krawczyk	Dublin Institute of Technology
Gary O'Sullivan	National Standards Authority Ireland Agrément
Gavin O'Se	GreenBuild Energy Rating and Building Information Services Ltd
John Carolan	Dundalk Institute of Technology
John Joe McHugh	Institute of Technology Sligo
John Mitchell	Royal Institute of Architects Ireland, DMOD Architects
Jonathan O'Toole	Passive House Academy
Kevin Kelly	Dublin Institute of Technology
Mark Keys	Institute of Technology Blanchardstown
Paddy Phelan	Tipperary Energy Agency
Pat Barry	Irish Green Building Council
Philip Owede	Institute of Technology Blanchardstown
Ruth Buggie	Sustainable Energy Authority Ireland
Seamus Hoyne	Limerick Institute of Technology
Sean Armstrong	Department of the Environment, Community and Local Government
Simon O'Neill	Dundalk Institute of Technology
Tim O'Leary	Dublin Institute of Technology

Table 1: List of workshop participants



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AGENDA

- 10.00 – 10.15 *Registration* (Tea & Coffee on arrival)
- 10.15 – 10.30 **Introduction**
Seamus Hoyne (Limerick Institute of Technology) and Ela Krawczyk (Dublin Institute of Technology)
- 10.30 – 10.45 **Main findings of the *Status Quo* report**
Mark Keyes (Blanchardstown Institute of Technology)
- 10.45 – 11.00 **Future of construction – key trends**
Tim O'Leary (Dublin Institute of Technology)
- 11.00 – 11.05 **Introduction of the strategic question**
"How can we achieve low energy buildings in 2020 and what implications this will have for skills and competences of construction workers?"
- 11.05 – 11.45 **Identification of drivers, trends and issues influencing energy in buildings up to 2020**
(Group work)
- 11.45 – 12.00 *Group Presentations*
- 12.00 – 13.00 *Lunch*
- 13.00 – 13.40 **Analysis of the drivers, trends and issues implications for construction workers attitudes, skills and competences** (Group work)
- 13.40 – 14.00 *Group presentations*
- 14.00 – 14.30 **Updating of existing and development of new job profiles** (Group work)
- 14.30 – 14.45 *Coffee break*
- 14.45 – 15.00 *Group presentations*
- 15.00 – 15.40 **Identification of implications for up skilling, training and education** (Group work)
- 15.40 – 15.55 *Group presentations*
- 15.55 – 16.00 **Next Steps and Close**



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Fig. 1: Workshop programme



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3. Results

3.1 Strategic question

A strategic question was set at the start of the workshop to guide the discussions throughout the day. The question was posed as following:

“How can we achieve low energy buildings in 2020 and what implications this will have for skills and competences of construction workers?”

3.2 Drivers, trends and issues influencing energy in buildings up to 2020

In the first phase of the workshop, participants divided into three groups were asked to identify key drivers, trends and issues that will influence energy in buildings up to 2020 in five sectors: Technology, Political, Environment, Economy and Society. The following drivers, trends and issues were identified:

Technology

- **Part L of the building regulations** on low energy buildings has set minimum standards for energy efficiency and renewable energy in newly built homes. These standards are nearly reaching the passive homes standards.
- **Passive homes** in Ireland require at least 300sq footage to make them energy efficient. Contractors have to be specifically trained to build that type of houses to ensure that they meet their energy targets.
- **Holistic design** is necessary for achieving high energy efficiency in buildings, which is widely recognised by professionals. However, **holistic implementation** is also needed to ensure the efficient designs are implemented correctly. The interface between the trades people and new technologies is often lacking. Often the professionals (architects and engineers) are effectively training the contractors as their understanding, skills and knowledge are not sufficient to implement the designs correctly.
- **Retrofits of old houses** are very complex projects, which require good level of understanding of how the entire building works, especially areas like insulation and ventilation require much better understanding of their relationship with other building components.
- Introduction and integration of **renewable technologies**, such as photovoltaic, solar thermal, geothermal, micro wind, and biomass, **and other system components**, such as improved control systems and better boilers, require sufficient knowledge to conduct evaluation of their performance and cost-benefit analysis.
- The pressures on contractors to do things cheaper and more efficiently arising from the economic downturn have led to **less time for reflection and uptake of training** on new technologies and systems in the construction.

Political

- There is a **very positive policy environment** – with the European frameworks and directives, such as EPBD and EED, leading the way towards more energy efficient buildings and thus creating a need for training in this area. Consequently, the trainers should be confident in the market as it is stimulated by policy.
- The Irish government and its agencies have been introducing various mechanisms for the improvement of energy efficiency in building, including **grant schemes**, such as Better Energy Homes and Better Energy Workplace, which will be in place up to 2013. For the period after that, new mechanisms are being created, where the focus will be on **obligated parties** and **pay-back schemes**. The existing schemes facilitate affluent people, but not the low income households. Creating a greater awareness amongst the middle income households about the life cycle saving arising from investment in building energy efficiency/renewable energy solutions is required alongside new

schemes, as most people currently are more concerned with paying their bills at present than reducing them for the future.

- There is a **conflict of interest** between the utilities obliged to reduce energy usage and their core business model that is based on selling as much energy as possible.
- The **current education framework** – government policy focuses mainly on unemployed people, yet it is rather unlikely that the Irish construction market will require many new workers in the coming years. The **focus of up skilling** in this area should be on **workers already employed** as they are the ones currently building and retrofitting houses. However, the current thinking believes that currently employed people should have disposable income that can be invested in training. Yet the reality on the ground is that both employers and employees in many cases are not able to meet the financial burden of additional training. Another aspect of the education framework is on the axis of **retrofit versus new build** – there is a need for more programmes to address the complexity of retrofits.
- A **training time lag** is observed between introduction of new policy, such as new building regulations, and provision of training that would address the standards introduced by the new policy. Training should be developed simultaneously to the new policy, so when the new policy is introduced, new up-to-date training programmes could be implemented immediately.
- A need for **greater enforcement** of the standards has been signalled, especially when it comes to implementation.
- There are number of **other issues** that may have an impact on the strategic question from the political point of view: forthcoming revision of the apprentice structure; price of oil and associated carbon taxes, which will influence the financial condition of the exchequer and obligated parties; tensions between investment in energy efficiency and renewable energy systems; and policies created in other areas, such as health and employment, that may have an impact on the energy training and up skilling.

Environment

- **Temperature comfort levels** at home - need for change of perception of what comfortable temperature is – moving away from what the luxury of very warm temperatures to what is necessary to keep people warm. Many low income houses suffer fuel poverty and struggle to keep the home temperature at sufficient levels, which has a strong negative impact on their life quality.
- House retrofits have large impact on **air quality**. Doing the retrofit in the right way has a lot of potential health benefits, yet doing it badly may have negative impact on the health of the house inhabitants and lead to additional costs.
- To ensure that retrofits are successful, workers carrying it out must have a holistic view of how the house should function after the renovation and training should be geared towards that.

Economy

- The **economic uncertainty** at present has strong impact on people working in the construction sector as it affects their job security, salary levels and tax rates. This in turn affects their ability to take up training – they may not afford it or may not have time to attend courses, as they need to work more to sustain their income.
- Some economic issues were already mentioned under Political heading: fuel costs and carbon taxes, fuel poverty, households' income, level of exchequer support for training etc.

Society

- **Changes in the household occupancy** and their impact on energy usage – due to high level of unemployment many more family members stay at home. Additionally, there is a rise in a number of households occupied by two or three generations.
- **Stronger civic response** to energy and environmental issues is needed. Ideally, people would be demanding energy efficient and renewable energy solutions as that would be dictated by their worldview – question was posed: what do we need to do to get to that point?

- Role of **different social stakeholders** in creating more demand for energy efficient buildings: it is not only about individual households, but there is space for community approaches, perhaps, housing associations could play a bigger role in this – examples of good practices in this area are needed.
- Expectations and role of the media – sharing of more success stories is needed to show what works and also what does not.

3.3 Analysis of the drivers, trends and issues implications for construction workers attitudes, skills and competences

During the second phase of the workshop, participants, working in the same three groups, were asked to discuss how the drivers, trends and issues identified earlier will influence construction workers' jobs, including attitudes, skills, knowledge and competences. The participants were asked to consider three levels of construction workers:

- Operatives
- Craftsmen
- Supervisors

Implications relevant to All

- There are a number of **different relationships between skills, knowledge and attitudes** that were identified:
 - All workers have skills, although they appear to not have “**love for the job**”, which makes a difference in creating an air tight house. It was believed that if they take pride in creating one, they will apply their skills with more care.
 - Most workers would have the right work **attitude**, however, they may not know that they are doing something wrong, unless someone identifies the mistakes and corrects them – there is a requirement for mentorship and learning on the job.
 - Do workers know that they don't know something, or do they think that they know all that is to know? How can workers that think they know what there is to know about their job be convinced to take up training?
- Importance of **multidisciplinary training** was identified. To create energy efficient building a set of different skills need to be employed in a correct way. Some workers can be highly competent in one area, but to do the job correctly they need to be aware of other skills and develop additional competences.
- A number of **motivation issues** related to taking up training by construction workers were identified. At present negative attitudes about the construction sector prevail: there are no construction jobs available; workers find it difficult to find value in their work and take pride. On the other hand, if standardised training across Europe would be implemented **better mobility** opportunities for higher qualified workers could become important motivational factor. Also, in general if a worker has more qualifications he/she is more employable and has an advantage over those lower qualified.
- **Attitudes towards training**: at present there is a lot of training available; however, trying to get people to take it up, particularly trades is difficult.
- **Team work on site**: if people come across a problem on site the operative would have the ability to see and report, craftsmen would have the ability to problem solve, supervisor would focus on why we do things in a specific way.

Implications relevant to Operatives

- It was difficult to distinguish whether the national qualifications framework is important to operatives. It appears that it is of lesser importance than for the craft qualified and supervisory workers.

Implications relevant to Craftsmen/Tradesmen



- Number of problems related to training for trades were identified:
 - There are **no CPD programmes for trades**.
 - There are **limited incentives** for tradesmen to go to training courses. Example was given of courses that were provided at very low cost, but it was still difficult to get workers to attend them, and half of those who turned up came with a negative attitude.
- **Knowledge of associated trades.** It has been identified that craftsmen need to move away from a silo approach to their job and develop an understanding of how their work and other types of craftsmen affects the energy efficiency in buildings now and in the future.
- **The role of trade and professional bodies in training.** Many workers once qualified they may not attend any training courses for many years, despite the vast changes in technologies, systems and regulations. Trade and professional bodies should be active in enforcing training, getting tradesmen to acknowledge gaps in their knowledge and feed the information about changes on on-going basis.

Implications relevant to Supervisors

- It has been acknowledged that in the retrofit projects craftsmen are more likely to take on a **managerial role** and manage other trades than in the case of new build construction work.
- Workers in supervisory role need to be prepared to carry out **tasks related to the completion of the overall project**: they need to enforce the implementation of building regulations; check installed systems and ensure that work is done to the correct standard.
- For all construction workers the feel good factor arising from **contributing to societal needs** is important, the supervisors can also add value to their company – by doing their job well they can bring repeat business. Often to be able to do that, they require additional training. Such training should also include training on entrepreneurial skills that will enable supervisors to start new businesses.

Other Implications Identified

- The point made earlier about the policy and **training time lag** has been made again in this session. A proposal has been made to design training that will supersede current regulations and provide **future-proofed programmes**.
- There are different criteria for training of different groups: general energy related training, technology specific skills, more project management skills. Gaps for each group should be identified.

3.4 Updating of existing and development of new job profiles

During the next session, participants, working in the same three groups, were asked to consider how in the light of developments discussed earlier will the construction job profiles change up to 2020? The participants were asked to discuss the following groups:

- Operative level (general operatives, concrete workers, roofers, glaziers, steel workers)
- Craft level (carpenter/joiners, brick & stone layers, plasterers, plumbers, electricians)
- Supervisory level (system installers/specialists, supervisors/foremen, domestic retrofit project managers)

Operative level

- Operatives were considered to be **one of the most important people** on site as they are usually first on site and last to leave; however, they are often not appreciated and seen in a negative light. They have good all-around knowledge about the activities on site, although they don't have technical ability.
- Their **current role** involves taking in, storing and distributing materials and systems, such as airtightness systems.
- **Operatives' training:**

- Should be focused on awareness rather than skills and detailed knowledge, perhaps, something like Energy Safe Pass training would suffice.
- Should instigate change in work practices on site, mainly to do with materials on site – understanding their purpose, qualities and maintenance and treatment suggestions to ensure that they are not damaged.
- Induction to important activities on site to create an awareness that what happens around them is really important.
- Need to create environment on site, where operatives would take **pride in the job** – feel integrated and part of the whole project.

Craft level

- There are a number of **common training themes** that all trades could benefit from at the start of any training programme. These themes could form a foundation course. The themes include:
 - Building envelope
 - Air quality
 - Ventilation
 - Condensation
 - Energy within the building
- **Specific themes** for individual trades include:
 - **carpenters, joiners** – knowledge of condensation control and practice of ventilation requirements
 - **brick stone layers, plasterers** – knowledge of condensation control and practice of ventilation requirements as they are involved in the air control of the building
 - **plumbers** – they work with heating and ventilation and installation of renewable technologies. As there is no regulation in this sector, the likely feedback to training courses would not be positive.
 - **Electricians** – they require more knowledge in control and smart home technologies.
- Proposed **new crafts**:
 - **Craft technician role** – would require trade qualification and a further course that would prepare them for a multidisciplinary and a higher supervisory role on the site. It would mean a more attractive rate of pay. It would be mostly applicable to deeper retrofits, but not necessarily required on any domestic job that is undertaken. It would be similar to the master craftsman role.
 - **Domestic retrofit project manager** - a role on site, similar to a safety person on site. They would take on that additional role along other jobs they would be doing. Their role would require additional knowledge compared to an average worker on site.

Supervisory level

- There is a need for a **new role** at this level for small and medium sized projects, especially around retrofitting. It would be similar to construction manager or foreman. The requirements for this role include the following:
 - An overarching and in-depth knowledge of all associated trades that would facilitate integration of their trades on site.
 - Ability to advise clients on cost-benefit analysis, pay-back times, materials, technologies, techniques and other issues related to the building project.
 - Knowledge of current building regulations.
 - Ability to interpret specifications and drawings.
 - Ability to take on managerial tasks.
 - Ability to ensure correct completion of the project, commissioning, and hand-over to a client followed by advice on the on-going maintenance.
- Such role could be taken on by someone who would come from crafts, but would require additional qualifications, perhaps, new level 7 qualifications.

- A need for ventilation systems installers has been also identified.

3.5 Identification of implications for up skilling, training and education

In the final session, participants, working in the same three groups, were asked to identify what are the training / education / up skilling requirements for construction workers arising from the issues discussed earlier and the job profiles that were developed in the previous session. The participants were asked to discuss the same three groups as in the previous session:

- Operative level (general operatives, concrete workers, roofers, glaziers, steel workers)
- Craft level (carpenter/joiners, brick & stone layers, plasterers, plumbers, electricians)
- Supervisory level (system installers/specialists, supervisors/foremen, domestic retrofit project managers)

Operative level

- The general training required for Operatives centres around **awareness about energy** issues on site.
- Specific requirements were also developed for different types of Operatives:
 - **Construction workers** – need to have better understanding of the differences between different types of concrete, as well as to develop better attention to finishing details. Attention to details was identified as critical across all areas.
 - **Roofers** – as they work on large spaces responsible for 40% loss of heat, they require up skilling in both industrial and domestic roofing.
 - **Glaziers** – they require knowledge of different coatings and what would things, like turning glass inside out, mean, what are differences between warm edge spacers and standard ones etc.
 - **Steel workers** – they require knowledge of thermal bridging, implications of different amounts of steel in critical areas etc.
- The following **learning outcomes** were identified for Operatives:
 - greater understanding and awareness around the ventilation, thermal heat loss, energy consumption;
 - ability to bring to the attention any defects that are in the system and make sure these are dealt with;
 - to show good understanding of terminology and the ability to identify products and differences between them;
- Training should also help to develop a **more positive attitude** – emphasis on being a team player and having a more proactive attitude. There should also be emphasis on ethics in any training that is introduced right across the board. On the other side of this, there should be awareness of consequences arising from not complying.

Craft level

- There should be a **common ground for all craft people** coming to trades in regard to energy training. This should be facilitated by the apprenticeship system.
- A **level 6 programme** was proposed for people who finished their apprentice training with craft certificates.
 - Programme participants could achieve higher certificate by doing 60 credits (one year full time or two years part time). After a one year programme an attendee could become a sustainable practitioner, by completing six modules, three in each semester.
 - Modules would include: heating, ventilation, plumbing and construction. There would also be core modules: building regulations, computer science, building science, software applications and so on.
 - There could also be specific modules included in the programme – these would be proposed by ITs around the country. A programme participant would pick and choose a number of

specific modules that would be completed over a period of time in different locations, but would lead to a major award.

- A two year programme would lead to, for example, a **certificate for a sustainable building technician**. Additionally, if a person got a higher certificate at level 6, the modules they completed could be recognised for a degree award.
- Some of the modules could be taught online. As the programme would be offered by a group of different institutions, a quality assurance would need to be provided by at least one institution.

Supervisory level

- A course was proposed: **project and construction site supervisor for retrofits and energy efficiency**. Different modules address the following:
 - Understanding of basic principles of services and fabric (both areas at the same time).
 - Core Project management skills: programme making , sequencing, health and safety, building regulations, contract law – the traditional project management skills needed for working on site would be still required for energy efficiency building project manager.
 - Understanding of a building as a system and chain reaction relationships – what effects different actions would have on the building energy performance and quality of living in building.
 - Understanding of life cycle costs, operating costs and capital costs in order to assist clients and homeowners in decision-making regarding the project.
 - Project completion: understanding of commissioning and sufficient understanding of legal contracts.
 - Communications skills as they are critical for effective communications with engineers, trades, and clients.
 - Software competency.
 - Principles of the building physics.
 - An overview of renewable systems: types and control strategies associated with those.
- Such course should be **accredited by a professional body** like CIOB, Engineers Ireland or CIAT as it would give more credibility to qualifications and could be part of the level 7 Framework. It should be available to be completed on part time or full time basis. It could also be an add-on course for existing professional course. The duration should be between 12 and 18 months. The graduates would acquire a quite broad range of skills, both through classroom learning and placement on site.