



Information for participants and
providers of training courses for trades
people in energy efficient buildings

Authors

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Detailed information on the TRAINENERGY project is available on the website: www.trainenergy-iee.eu



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Table of Contents

	Page
1 Background and introduction.	4
2 Training materials	8
2.1 Understanding the needs of trades	9
2.2 Synopsis of the course material	10
2.3 How best to communicate key concepts to trades persons - Site Visits	14
3 Challenges & solutions to training of trades	15
3.1 Transposition of the EPBD Directive.	16
3.2 Impact on vocational training	18
3.3 Search of existing training material	19
3.3.1 Regulation resources.	19
3.3.2 Information resources	19
3.3.3 EU Project resources	19
3.3.4 Software resources	20
3.3.5 Learning/Teaching resources (courses)	20
3.4 Recruitment/Communication of trades people	20
3.4.1 Communication towards crafts	20
3.4.2 Lessons learned	22
4 Mechanics of training course delivery	23
4.1 Pedagogical reflections and reality	24
4.2 From the frontline	25
4.3 From the other side	27
4.4 Recommendations	27
5 Impacts & Successes.	29
5.1 Teachers	30
5.2 Craftspeople	30
5.3 Certification.	31
5.4 Other institutes	31
5.5 Feedback from unions and umbrella associations.	32
6 Conclusion.	33
6.1 Training material.	34
6.2 Training of trades	34
6.3 Certification.	34

background and introduction



TRAINENERGY is an Intelligent Energy Europe project that commenced in October 2009; operated for 24 months until its conclusion of September 2011. The aims of the project were to facilitate the implementation of 2 EU directives:

Energy Performance of Building Directive 2002 (EPBD 2002)

Energy End-Use Efficiency and Energy Services 2006

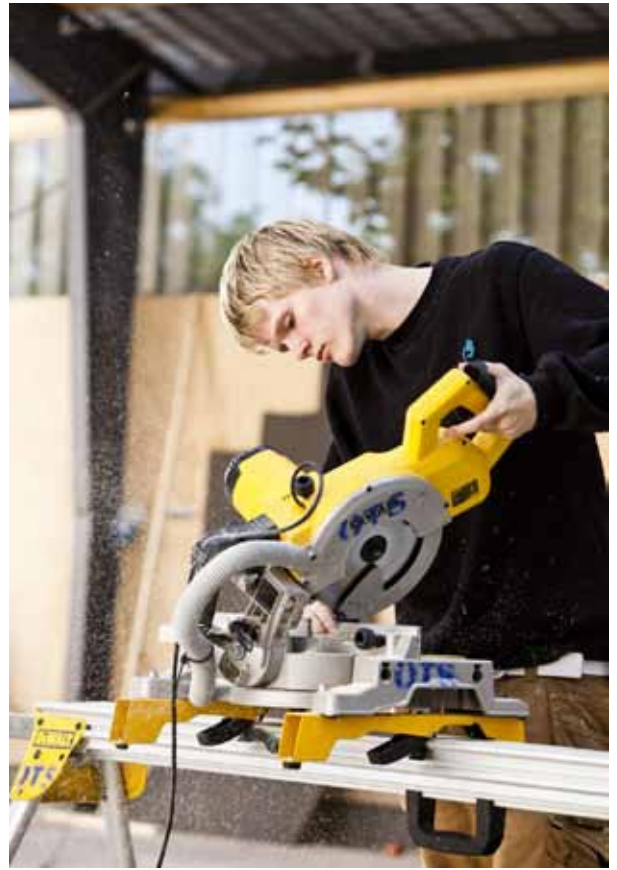
These were to be achieved through:

- Selecting 5 construction crafts most applicable to energy efficiency
- Developing vocational training material
- Training of trainers
- Training of trades people

This report should be utilised to influence the establishment of courses for training trades persons effectively to achieve the goals of the above EU directives. It will be particularly useful for any organisation that is undertaking any of the EU IEE skills road maps up to and including 2013. The project partners, undertaking detailed analysis and understanding of trades training requirements, delivered courses to trainers and over 500 trades people. The partners have a detailed understanding of the requirements vocational training courses. This report aims to capture that knowledge in order to influence future courses and skill development policies.

The whole life cycle of the energy consumption of houses and buildings are responsible for 40% of total EU energy consumption and 36% of the EU's total CO₂ emissions. Therefore reducing energy consumption of buildings is an appropriate method to tackle climate change and contribute to reducing the EU's energy import dependence. The European Council has set clear goals under its 20-20-20 initiative: reduction by 20% of the total energy consumption; 20% contribution of renewable energies to total energy production; 20% reduction of Greenhouse gases below 1990 emissions. In this context, the building sector must assume very ambitious objectives of 165 Mtoe in energy reduction and contribute 50 Mtoe from renewable energies in 2020.

In most European countries courses and qualifications have been developed to meet



the requirements of the EPBD 2002 to certify an independent assessor, who is qualified to certificate a building (Article 10). Consequently, the assessors have the necessary knowledge to design the retrofitting of a building. To meet this challenge, improvements in the installation of new technologies and updated new construction techniques are required. Currently there are very few specialised courses available to train trades people in these new technologies and techniques. The TRAINENERGY project aimed to address this knowledge gap by offering a training programme for trades people in the construction industry. This then addressed the prescribed innovations and was designed to meet the practical content of the requirements of directives EPBD 2002, Energy End-Use Efficiency 2006 and Energy Services 2006. During this project the project team completed a suite of training courses for trades people across Europe including designing the content, delivery, evaluation. As part of this, the team had a clear understanding of the challenges and solutions to up skill the European vocational construction workforce to achieve the aforementioned CO₂ reduction goals.

Chapter 2 outlines how the training needs were assessed in order to direct the development of the training material, including the principles of communication of ideas to trades persons. Chapter 3 details the status of building energy regulations, the EPBD implementation and examines the challenges and solutions to obtaining personnel to partake in courses and the drivers behind up skilling. Trades people, often self employed will only forgo wage earning employment if the courses offer a real reward, be they a requirement of their job, knowledge, or essential certification.

The project involved the following nine partners:



Gemeinnütziges Berufsförderungswerk
des Baden-Württembergischen
Zimmerer- und Holzbaugewerbes
- Germany



Tipperary Energy Agency
- Ireland

CENERGIA



Cenergia Energy Consultants
- Denmark



Asociación de investigación
de las Industrias de la Construcción
- Spain



Syddansk Erhvervsskole Odense-Vejle
- Denmark



Stephenson College
- United Kingdom



Groupement d'Interet Public – Formation Continue
et Insertion Professionnelle
- France



I. T. Power Limited
- United Kingdom



Cork Institute of Technology
- Ireland



training materials



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2.1 UNDERSTANDING THE NEEDS OF TRADES

The challenge of this element of the TRAINENERGY project was to understand the needs of the Trades people with regard to the implementation of low energy buildings. The vast range of subjects and the required detail in each subject was a source of some discussion. Some key conclusions to the discussion that framed the generation and adaptation of the content.

KEY KNOWLEDGE GAPS

- Trades persons knowledge of legislation was weak.
- Keeping current with latest trends, methods and products was generally weak.
- All the key sustainable building concepts such as air tightness, thermal bridging, passive U-values are alien to many trades people – this varied

substantially across Europe, with knowledge in Germany being ahead of other areas.

- The knowledge of one trade about other trade is a key gap and often is the source of energy wastage – e.g. plumber and electrician on heating controls. A joiner and block layer on thermal bridging and air tightness.
- Many of the personnel who currently undertake training courses for trades are not sufficiently abreast of latest developments. It was therefore apparent that there needs to be a particular focus on this group as part of the train the trainer sessions.

UP SKILLING POTENTIAL & CHALLENGES

- Trades persons rarely will give up a days work to up skill, i.e. many trades people will not spend any appreciable time with continuous professional development.
- Many trades people gain their up skilling knowledge by word of mouth and sales people/ brochures.

- Many trades people have not been successful in a classroom environment and courses will need to be innovative in methods of knowledge transfer.
- Current apprentices should be used to learn newer techniques and bring them to the building sites of Europe.
- Many trades will leave the course if they do not find it of sufficient interest.

SUBJECT MATERIAL

- Much discussion was had around air tightness, passivehaus, U-values and passive solar construction etc. with regard to new build.
- Most of the EU's building stock will need to be retrofitted, and it was felt that the course should focus at least 50% - 60% on retrofit skills.
- Lessons were learned from the EU Concerto project: SERVE to understand key retrofitting challenges for trades in the UK and Ireland.
 - Customers need to understand why they may need to pay more for more insulation etc.
 - Quality control needs to be established as part of any drive for low energy buildings.
- The knowledge gained from the Leonardo da Vinci CESBEM project also heavily influenced the generation of content.
 - Use of suppliers of systems to aid the training delivery.
 - Key concepts are better understood with practical demonstrations.
 - Variation across Europe of building methods driven by climatic conditions requires variation of delivery methods of same concepts.

COURSE OBJECTIVES

- 10 days will not teach anyone the detailed knowledge of all specific knowledge gaps.
- The varied nature of the trainees requires careful consideration of how best to ensure balanced tuition.
- Ensuring that the tradesperson knows an overview of each element where they can understand that there are further considerations, and where to find detail in the future: "Ensuring the tradesperson knows what he doesn't know."
- Giving the tradesperson sufficient knowledge that they will be able to understand the extra elements that require further knowledge.
- Understand drivers of homeowners to upgrading so that they can aid the implementation of the EPBD.

- Keep the tradespersons interest and ensure they partake in the full course.
- Integrate the suppliers and products available into the training courses, as these will often be the organisations that will continue education in the marketplace.
- From the above key points, Training material, summarised in section 3.2 was developed for the delivery at the courses. There was a requirement on every subject to ensure that the delivery was sufficiently detailed to be useful, but not too detailed that would take wither too much time per topic or make the training laborious and therefore suffer from a high percentage dropout.

2.2 SYNOPSIS OF THE COURSE MATERIAL

On analysis of the needs of the trades person a comprehensive training matrix was developed for the five trades. Specific core subjects were selected for each trade that would encompass all of the necessary elements relating to the energy performance of buildings. During discussions with both partners and tradespersons, it was decided that all trades should be exposed to each module for two reasons; firstly to ensure that current knowledge is in line with current best practice, and secondly so that all trades would have a good understanding of how their work relates to the workmanship of other trades in the process. Eg. The blocklayer and electrician understand how their work can have a direct influence on the airtight envelope of the building.



GERMANY

"The Train the Trainer course was very informative and helpful in understanding the teaching material. I found it very useful for my own teachings of German craftsmen.

It was very interesting to see the needs of craftsmen in different countries."

Wolfgang Schafitel

*Teacher at Kompetenzzentrum
Holzbau und Ausbau, Biberach*

As previously discussed, 10 days of exposure to this broad level of training material would not teach the tradesperson the detailed knowledge of all the specific knowledge gaps, but the content would ensure that the tradesperson understands an overview of each element and could understand that there are further considerations, and where to find detail in the future.

The following is a synopsis of the material developed:

ENERGY USE IN BUILDINGS

- Energy Statistics
- Legislation
- Energy use for space heating, for domestic hot water, for pumps, for fans, for lighting
- Solar gain

HEAT LOSS IN BUILDINGS

- SI Units
- Heat transfer mechanisms
- Fabric and ventilation heat loss

U-VALUES

- Introduction to U-values
- Resistance of air layers/Surface Resistance, Calculation of U-values – Simple construction
- Calculation of U-values – Thermal Bridging, Calculation of U-values – Concrete slab ground floor
- U-value of elements adjacent to an unheated space, Thermal bridging, Window U-value

VENTILATION

- Airborne Pollutants
- Infiltration
- Ventilation Systems

SPACE HEATING SYSTEMS

- Space heating systems
- Space heating system fuel types
- Equipment operating efficiencies
- Standardised operation condition
- Space heating system controls
- District space heating

WATER HEATING SYSTEMS

- Water heating systems,
- Water heating system fuel types,
- Standardised operation conditions,
- Water heating systems losses,
- Water heating system controls

SPACE AND WATER HEATING CONTROLS

- Space heating controls,
- Water heating controls,
- Mechanical Ventilation Heat Recovery controls

RENEWABLE ENERGY SYSTEMS

- Solar thermal panels
- Heat pumps
- Bio-mass
- Solar Photovoltaic panels



GERMANY

“Learning from others’ means for the project TRAINENERGY not only learning from other disciplines but also learning to work trans-nationally and across the trades. With the growth of expertise in theory and practice participants contribute actively to achieving the overall European goal in saving energy and resources in their countries.”

Thomas Rothfuß

*European Federation of Timber Construction
Advisory Group Member*



Q3

Q3



FUELS

- Space heating fuels
- Water heating fuels

APPROVED CONSTRUCTION DETAILS

Thermal bridging, air infiltration

STRUCTURAL AIR TIGHTNESS

- Air leakage paths
- Quantifying air leakage
- Air pressurisation test
- Air permeability standards
- Air permeability of existing buildings, improving air tightness

This material assisted in the transfer of knowledge, in the generation of discussion between trades, and gave the trades person an extensive library of reference material for future projects.

On successful completion of this training the trades person was able to:

- Explain the key requirements of the EPBD2002 and the energy end use efficiency and energy

services 2006 and how they have been implemented in the partner country.

- List the factors that affect the energy use within a building with respect to space heating, water heating, lighting, and small power.
- Select appropriate technology to reduce energy consumption within the building.
- Recognise the impact of the interrelationship between trades on the energy performance of a building.
- Identify gaps in their knowledge base which will enable them to determine future training requirements.

The material also developed a foundation for further learning and gave participants an appetite to research and study specific areas of interest to them. The training material was accredited under the heading "Energy Efficient Building Practices" and on successful completion of TRAINENERGY, participants could use this accreditation to receive further exemptions on future studies, particularly in the area of Building Services.



2.3 HOW BEST TO COMMUNICATE KEY CONCEPTS TO TRADES PERSONS - SITE VISITS

The key concept of site visits is to introduce the trainee to the classroom concepts implemented in the environment that they will be working in. Difficult actions are often easy to show on a PowerPoint slide, where the trainees consider some actions unlikely to be easily implemented in practice, and therefore unlikely to be implemented at all in real buildings. Site visits overcome this, as they demonstrate real implementation in real buildings. Some examples of these concepts and their practical examples:

- Passive Solar Design: Trainees were skeptical of the building of houses with very small windows on the north side and very large on the south side, in addition to the interior layout that supports the window design (living rooms on south side etc.). On a day trip to the SERVE Concerto project, the trades persons viewed a multitude of different houses, all with different application of the same passive solar concept.
- New low carbon materials and methods, a core characteristic of the eco-village, were new to the trades persons. The site visits there showed the trades people the key differences and outlined where they perhaps needed to understand the materials better before utilising in their own building construction.
- External insulation has particular challenges around openings, services and at ground and fascia level. When each of the different trades were able to view the external insulation and the impact on their respective trades, they were clear on their own responsibilities.
- On site discussions between different trades were interesting, as the questions a plumber would ask about heating controls was learning material for the electrician and the discussion was of huge benefit to both. This may seem like an obvious or simple benefit, but as the two trades had never practiced together, it was of significant benefit.

challenges & solutions to training of trades



3.1 TRANSPOSITION OF THE EPBD DIRECTIVE

All the partners wrote a report on the existing knowledge in their countries. Each explained how the EPBD directive had been transposed:

SPAIN

In Spain the Energy Performance Directive has been transposed into the legal system with the following documents:

- The Building Technical Code: Basic Document - HE, which is a partial transposition of the EPBD: approved by Royal Decree 314/2006 on 17 March 2006 and came into effect on 29 September 2006.
- The Basic Procedure for Energy Efficiency Certification of New Buildings: approved by Royal Decree 47/2007 on 19 January 2007 and came into effect on 1 November 2007.
- The Regulation on Indoor Heating/Air-conditioning Systems (RITE): approved by Royal Decree 1027/2007 on 20 July 2007 and came into effect on 29 February 2008.

The transpositions are obligatory for new and refurbished buildings, except the Basic Procedure for Energy Efficiency Certification of New Buildings which has been brought into force for new buildings only.

IRELAND

There have been significant changes to the Irish building regulations over the last 10 years. Statutory instrument 666 of 2006 was the main transposition of the EPBD into Irish law. This made provision for the certification of energy performance of buildings (Building energy rating). This is in addition to technical guidance document part L of the Irish building regulations that has been revised no less than 4 times in the last 10 years:

- 2002 Significant up grade to energy performance of dwellings (on average less than 140kWh/m²/annum for space heating).
- 2006 bringing calculation methods in to line with the requirements of the EPBD.
- 2008 40% reduction in energy use for the average dwelling from 2006 calculation methodology (on average Less than 90 kWh/m²/annum energy for space heating).
- 2011 (published in the autumn) 20% further reduction from 2006 regulations (on average Less than 70 kWh/m²/annum energy for space heating).

- There is a provision for nearly zero energy buildings in 2016 which would include for approx 50kWh/m²/ annum or less.

GERMANY

In Germany the Energy Performance in Buildings Directive has been transposed into the legal system with the Energieeinsparverordnung (EnEV) 2007 (Energy Saving Ordinance) which came into effect on 1st October 2007.

Most aspects of the EPBD were already implemented by the EnEV 2002 with:

- calculation method for energy performance
- requirements for new buildings based on the calculation method.
- compulsory energy performance certificates for new buildings and for certain major refurbishments.
- requirements for nearly all cases of modernisation of fabric elements.
- regular boiler inspections since 1978 and the need of replacement if necessary.

Missing in terms of the directive were:

- compulsory certificates in cases of sale and renting of existing buildings.
- compulsory display of certificates in buildings for public services.
- mandatory inspections of air conditioning units.
- energy consumption of air conditioning had to be taken into account in the calculation.

Consequently, the EnEV 2009 was implemented, which demanded a further 30% reduction in building energy consumption.



UK

"Being involved on the TRAINENERGY project enabled me to broaden my knowledge of all aspects of modern building practice both in the UK and within Europe and gave me great

satisfaction to deliver the subject material to tradesmen from all areas of the building industry."

Rob Hallam

Trainer / Assessor at Stephenson College

UK

In the UK the Energy Performance Directive has been transposed into the legal system within many documents. The vast majority of these have been embedded into the Building Regulations; particularly those of L. New buildings require energy assessment in design and then upon construction. Existing buildings require energy efficiency updates to existing fabric upon any refurbishment or extension.

In summary, Part L 2010 discussed new build in five areas:

- Acceptable CO₂ emissions of a 25% reduction in maximum emissions.
- Limits on design flexibility. E.g. limits on specifications of boilers, walls and windows.
- Limiting the effects of solar gains in summer to reduce the need for air conditioning.
- Quality of construction and commissioning with regard to thermal bridging, air tightness testing and commissioning.
- Providing information to ensure that the building uses no more energy than the designer intended.

The EU Energy Performance of Buildings Directive (EPBD) was introduced in the UK from January 2006 with a three year implementation period ending January 2009.

The EPBD introduced higher standards of energy conservation for new and refurbished buildings from April 2006 and will require energy performance certification for all buildings when sold or leased. In addition, it will introduce regular inspections for larger air conditioning systems and advice on more efficient boiler operations for commercial properties.

FRANCE

From 2006, France is starting to implement the Directive with the adoption of successive decrees and orders:

- decree of 14th September 2006 on the energy performance of domestic gas facilities of some buildings



FRANCE

"I enjoyed the TRAINENERGY course of training the trainers in Biberach in July 2010. This reinforced my knowledge about regulations and practices in energy saving throughout

Europe. My attendance at the training session has been the starting point of my involvement in the project: I have contributed on one hand to the information and training of trainers and craftsmen in Paris and on the other hand to the enrichment of the training materials after the test phase of the training."

Roger TOBAGI

TRAINENERGY trainer GRETA Network





UK

"As part of the team involved with the TRAINENERGY Project it was a great opportunity to meet and work with trainers from around Europe and share knowledge and

experience about different techniques of modern building practices across the UK and Europe. The experience gave me an opportunity to enhance my knowledge of the subject and the confidence to be able to cascade the information regarding Modern Building Techniques to people involved within construction industry in the UK."

Rob Brandrick

Trainer / Assessor at Stephenson College

- energy performance of existing buildings suitable for sale from 15th, September 2006
- decree of 19th March 2007 particularly relating to the display of energy performance certification
- decree of 3rd May 2007 on the thermal characteristics and energy performance of existing buildings
- energy performance for new buildings from 21st September 2007
- display of energy performance in the public buildings from 7th December 2007
- energy performance of refurbished buildings over 1000m² from 13th June 2008
- decree of 29th September 2009 creating a certificate for existing buildings with a high performance energy refurbishment

3.2 IMPACT ON VOCATIONAL TRAINING

When the partners attempted to summarise the effects of EPBD directive on vocational area; it transpired that there were no relevant courses available.

DENMARK

Currently in Denmark there are no courses – from a legislative point of view – it is a mandatory activity within the vocational system that push energy efficiency measures."

The Danish Construction Association and the unions promote energy measures partly as stakeholders and as lobbyist in regional and local trade committees. In this respect, they have been a major contributor in establishing Energy Technologist as a new role.

SPAIN

Spanish vocational training centres offer specialised training for the construction sector. As yet no training programs aimed at construction workers have been developed to cover the new energy-efficiency techniques in buildings. In some companies employees have received some kind of training in energy efficiency renovation by their own engineers or attending courses organised by companies or specialised training centres, but in general this offer is limited to cover the current needs.

GERMANY

The only courses on offer are vocational training courses to become a Gebäudeenergieberater (Building Energy Rate Assessor). The participation for these courses is limited to master craftsmen, engineers and architects due to the high level of knowledge required. Therefore the working force is not trained in a specific course regarding Energy Efficiency.

UK

Although Energy Efficiency is partially and indirectly covered in some obligatory subjects in vocational modules in the UK, there is little coordination in the approach within current courses. These are changing over the next year with all Construction courses changing to comply with new occupational standards.

The only stand alone course is one that is obligatory for gas boiler installation engineers, which is called Energy Efficiency. This trains engineers on a very basic building energy heat loss model.



Technical and academic universities have adapted well and offer good training at this level. Vocational is catching up as mentioned before.

IRELAND

There is no formal structure of energy based vocational training. The existing vocational training courses need to be modernised, and there are significant gaps in their training. However there is a significant number of, although disjointed, specific vocational training courses and certification requirements. For example to under take and grant supported solar or other renewable energy installation requires specific approved courses. There are a large number of private sector training organisations providing these and other energy based specific training courses.

3.3 SEARCH OF EXISTING TRAINING MATERIAL

An extensive search of training material linked to the EPBD directive was carried out to determine the scope of new material that needed to be developed. All partners were involved in this search.

They found some relevant material on

- 3.3.1 Regulation resources
- 3.3.2 Information resources
- 3.3.3 EU Project resources
- 3.3.4 Software Resources
- 3.3.5 Learning/Teaching resources (courses)

3.3.1 REGULATION RESOURCES

<http://www.epbd-ca.org/>
http://ec.europa.eu/energy/efficiency/buildings/buildings_en.htm
http://europa.eu/legislation_summaries/energy/energy_efficiency/l27057_fr.htm

3.3.2 INFORMATION RESOURCES

<http://www2.ademe.fr>

3.3.3 EU PROJECT RESOURCES

Leonardo da Vinci project: PROCONSTR
<http://www.proconstr.eu/>

IEE project : "Energy Path"

<http://www.ines-solaire.org/anglais/MODULES/page/Modules.html>
<http://www.energypath.eu/>

PASSIVE-ON PROJECT

This resource was proposed by Ireland and extensively used for the TRAINENERGY Programme (The Passive-On project has been promoted and coordinated by the end-use Efficiency Research Group of Politecnico di Milano).

Ireland noted that the material coming from that project was particularly suited to TRAINENERGY on completion of a lot of foundation modules.

The Passive-On project examined how to take the PassivHaus concept forward, especially in Southern Europe. In these regions the problem of household energy use is one not only one of providing warm houses in winter but also, and in some cases more importantly, of providing cool houses in summer.

<http://www.passive-on.org/en>

3.3.4 SOFTWARE RESOURCES

INES

<http://www.ines-solaire.org/anglais/MODULES/page/Modules.html>

3.3.5 LEARNING/TEACHING RESOURCES (COURSES)

It was noted (Germany) that new materials courses were offered by manufacturers, but these courses often focused on the products and didn't look to the interaction between the relevant crafts.

<http://www.passive-on.org/en>

<http://www.ines-solaire.org/anglais/Modules/page/Modules.html>

<http://www.energyath.eu/>

Summary of section 3.3

Challenges could be clearly seen from developing a content that would cover all aspects of the EPBD whilst also delivering the material at a level that a tradesperson could understand. Consideration was needed that a few candidates may have obtained only foundation level learning and/or that they may have not attended formative training for a number of years.

However, it was considered that the content required for TRAINENERGY was generic enough to be understood; therefore new material would need to be developed.

In Ireland for example, a number of plumbers at an energy efficiency course had not seen a guidance document issued that detailed their specific obligations with respect to the energy performance of building services. This was widely accepted of being replicated in many different European countries. Another example of variation in levels of knowledge across Europe showed that in Germany, apprentices have to complete U-value calculations, where some trainers in the UK do not know how to complete these calculations.

3.4 RECRUITMENT/ COMMUNICATION OF TRADES PEOPLE

3.4.1 COMMUNICATION TOWARDS CRAFTS

During the project, partners carried out different tasks to inform the industry about the project and offer relevant information about TRAINENERGY to target groups.

The target groups included both crafts people in the construction industry and trainers who could provide training on energy efficiency in construction in the participating countries of Germany, Denmark, France, Spain, UK and Ireland.

Crafts people were doubtlessly the most important target group in the project dissemination. Therefore, it was planned from the outset to keep them informed about the project coupled with progress about the materials being developed and courses scheduled in their countries.

It became essential to the TRAINENERGY project that coupled with training the crafts people, testing training materials would be necessary. The project intended to carry out test courses in all partner countries and consequently train a total of 500 craftsmen. Therefore the TRAINENERGY partners advertised the courses using different methods and make the information available to as many potential candidates as possible.

Using the project information, questionnaires were sent out and test courses were advertised by each partner using various publications, internet and by mail, employing databases previously developed. Presentations at umbrella organisations were also conducted.

The crafts people were contacted:

- At the start of the project to assess their knowledge in energy efficiency with regard to their job role. This assisted in identifying their training needs, in order to design the required materials.
- At different points in these two years to keep them informed and survey their level of knowledge.
- Before the training commenced in order to recruit candidates for the courses.

Partners implemented the dissemination and communicated directly using the following methods:

- E-mails: Newsletters sent to the partners' databases of crafts people and other relevant contacts (trainers, representatives of trade associations, etc.).
- Post: Sending letters and brochures to the partners' databases.
- Telephone: Calling crafts people whose details were already held on previously developed data bases.
- Publications: publishing inserts and advertisements in specialised magazines.
- Websites: advertising the courses on the partners' own websites.
- Presentations: Conducting presentations at other organisations such as trade associations etc.

When designing the materials, partners considered the target group were crafts people:

- Style was kept simple and direct, avoiding unnecessary technical and administrative references or well formal language.
- Content included practical information such as dates, venues, prices of courses etc.
- The materials highlighted the need of the training courses in energy efficiency for crafts people.



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3.4.2 LESSONS LEARNED

Contacting crafts people and obtaining feedback from them proved to be a challenge. Fortunately, most partners in the consortium have had previous experience with reaching trades persons and were able to vary the approach used.

One clear challenge observed was the low use of computerised information technology employed by the crafts people. As online and electronic communication is readily available and used in business as a low cost and effective solution for contacting large groups of people, most partners used this method in their campaigns to recruit candidates. Considering the low number of responses, it became apparent that this was not the best method to reach the audience required.

A clear example of this can be found in UK where more than 13,000 emails were sent by Stephenson College but with barely any response from the craftsmen. In this case, UK realised quickly that email was not the best method to contact this target and started using other means such as telephone and traditional post. This method is more time-consuming and expensive but became a more effective method of obtaining responses.

There were also some factors promoting the dissemination from partners to craftsmen:

- Experience: As a consequence of the long experience of partners carrying out dissemination, they were able to adapt their communication strategy to the situation in each country.
- Contacts: Partners count on a good network in the building sector including umbrella organizations, professional associations, companies and chambers of commerce and specialised training providers.

A good example of this can be found in the Danish national dissemination strategy that was based in a partnership with the regional craft union. Using their network Danish partners optimised their resources and maximized results benefiting of this direct communication channel. Danish partners Syddansk Erhvervsskole Odense-Vejle contacted 3F. This is the craft union for a variety of construction operatives. With their assistance, they helped recruit candidates.

Crafts people also register with this organisation when they are unemployed and they also counsel the working members regarding training and career opportunities.

Recommended future action would be:

- Planning and adapting the communication strategy to the target group is essential.
- Materials should be designed to catch their attention, arising interest and sending the desired message in a direct manner. In the case of craftspeople, the simpler the message, the better the response.
- Dissemination channels should be chosen considering the target group characteristics, not only following economic reasons.
- New technologies as well as social networks are becoming one of the most effective communication channels in our societies. However we cannot ignore that there are groups whose familiarity and use of internet is still low. Therefore, more traditional channels such as post, phone or presentations should be considered.
- Overall however, the experiences show that combining personal and mass communication is the most effective dissemination strategy. Consequently, it would be recommended that any further activities would be using personal communication when possible, presentations, meetings, visits, telephone calls through organisations.



SPAIN

"I enjoyed the TRAINENERGY course very much and I think that it is going to help me improve my relationship with customers. With the knowledge acquired I will be able to find the most suitable solution in each case."

Carmen Serrano
TRAINENERGY course attendee from Valencia

mechanics of training course delivery





Often, a trades person's preferred learning style is in practical and visual learning rather than studying books or journals. This learning style has been considered when designing, and conducting the course. This chapter offers an insight into some of the positive experiences that we have gained from the project. Consequently, the project has provided the partners with a valuable input into future training programs and as such is offered as a reflection within this report.

4.1 PEDAGOGICAL REFLECTIONS AND REALITY

With this in mind, the course was organised with the training environment as an open workshop. The theoretical sessions were then backed up with by practical exercises. As the module on heating and ventilation on the first course was considered to be a 'heavy' classroom session, the second course then incorporated a visit to a local university hospital where a major reconstruction work on the ventilation system was being undertaken. The entire class attended the visit which incorporated practical learning of U-values and how buildings experienced heat transfer through fabric and air movement.

This concept of hands-on learning is a European phenomenon. In the train the trainer session in Biberach these issues were discussed among the participants. Some of the participants having a more pedagogical experience than others provided the opportunity for knowledge transfer. The training session in Biberach also highlighted another important issue; that being the communication between the different trades.

One of the most important outcomes of the project is this issue of communication within a building site between the different trades. This respect for professional competences and of sharing experiences and competence is of vital importance for the energy efficiency.

Therefore in the courses attempts were made to mix the target groups so that this sharing of insight could become a natural part of the course. As one participant observed:

"Normally we ignore – and in the worst cases we obstruct each other's work. There is nothing that teaches us to discuss and plan work together"

This view was not unique. The TRAINENERGY project has stimulated the exchange of ideas and best practice. The latter part of the course was a project phase in which the participants had to complete an assignment in pairs. This exercise in itself also stimulated the interaction between the participants with differing backgrounds.

As the courses were rolled out, it became evident that in several countries that the course easily could be delivered both as a full or part time course and where participants could join evening classes and/or weekends. This could make the course possible for both employed and unemployed to participate. In Denmark, the union then clarified that their members registering as unemployed had the right to select a 6 week long up skilling course. The regional chairman for Fyn explained that this would then make their members more employable through the participation in the course.

Among the crafts people it was discovered that there were differing preferences for attending courses during the year. In UK & Ireland, plumbers would not go on courses in winter and in Germany, the joiners were too busy in the summer and preferred to up skill in the winter.

Other issues involved potential fees of the courses and missed working hours resulting in reduced incomes. This was noticeably relevant for one-man businesses where there is little time or financial capital to undertake supplementary training. A different picture was seen in larger companies where workers will undertake training because it is a part of their contract for continuous professional development.

In the early courses fees were not charged. In the UK, this had a negative effect where crafts people were signing up and did not then attend the lectures. Not taking a fee for supplementary training in some countries indicates that the value of the course is low.

Alternatively, in Denmark courses are often free, so the picture across the EU is not equal. A suggestion for the UK was to then ask for a symbolic fee in order to make sure that people would participate in the courses.



SPAIN

"The course clarifies the current situation concerning the existing option and solutions in the market and provides us with a good basis to learn more and in

more detail in the future"

Jorge Perini

TRAINENERGY course attendee from Valencia

4.2 FROM THE FRONTLINE (TRAINER)

Finn Skrydstrup, a TRAINENERGY instructor from Denmark offered an overview on how the course was perceived from the instructor point of view:

"First and foremost this is a new and existing area for me. I have been a teacher in our woodworking department for several years. I have predominantly instructed apprentices in their later years – and this has given me a head start in relation to working with the more mature audience."

For Finn it is vital that the notion on energy and energy saving and optimizing issues is presented to the students from the very beginning in order to educate and influence the attitude amongst the builders. "It is obvious that target groups we had during the courses had a more mature attitude – they could easily adopt to the concept and understand the necessity and importance of the lessons. Maybe it is due to the fact, that many of them were house owners themselves and consequently could see an immediate use and benefit of the lessons".

Having reflected on the different target groups Finn drew attention to the complexity of the subject. "For me the most important lesson learned during the course of action is the fact, that we as a training provider have an obligation to make it understandable. The theory can be complicated to understand, let alone the calculation of U-values. It is vital that the participants understand the concept, which presents a challenge not to over simplify and lose the details and main points. We have to accept that the participants may have been away from



the educational system for many years and often struggle with the classroom setting. This is a condition that we have to accept and adapt to as trainers."

Reflecting on this challenge the training was reorganised: "During the courses I have changed the learning style from a theoretical oriented course to a very practical and hands-on course. The participants have more experiment based lessons rather than theoretical. I made it clear that every time I wanted to explain a theory I had to back it up with a practical illustration. I noticed during the lessons where we were looking at thermal images of a building half of the class was dozing off. I needed to increase their interest in the lesson. They had to do the recording themselves in order to fully grasp what was going on."

Finn made a clear statement on the training in Biberach: "The success of optimizing the energy consumption and the reduction of heat loss has to do with the builder's ability to communicate with each other. We have all seen examples of tradespersons criticising each others work which

are often due to lack of understanding and is counter productive and often disrespectful." The course could well serve as a model for future courses in the sense that we have benefited a lot from bringing participants from different trades and professions together. "The future looks promising. All the stakeholders that have been involved in the course – both in the recruitment phase and during the delivery of the content have shown a sincere interest in continuing the courses."

We have discussed a model where the two week course could be spread over a longer period of time and then delivered in smaller modules. This could also be looked on positively by employers. We also discussed who to tailor-make the course to, so that it could fit into different environments e.g. onsite courses in the workplace.

The same discussions we had across the partner countries, with a general consensus that two hours classroom training per day is about the most that will be productive when delivering material to trades people.

4.3 FROM THE OTHER SIDE (TRAINEE)

Bjarne Tang was participating in the first course and commented as to how it felt to be presented with new material:

"I am currently unemployed due to the recession and general slow economy. I was at my obligatory "conversation" at the Union in order to register when the shop steward drew my attention to the TRAINENERGY Course. It was new for me, but I got the impression that if I would be introduced to some issues of energy saving measures my employability would become far better. The entire sector needs people with right skills in this direction.

The course itself was very interesting. Some of the themes I knew a little about, but to have the overview and also the financial side of the matter was an eye opener for me. I am not used to work with the computer in my daily work, but I found it useful to see some of the illustration and the pictures. That makes the understanding easier. I also found it helpful that we worked together with people from other trades. I am a carpenter and normally I work with other carpenters and hear very little about the problems and challenges of other professions work".



4.4 RECOMMENDATIONS

- Conduct the training for smaller groups with a mixed audience of different professions.
- Keep the slides to a minimum.
- Keep the slides short.
- Use illustrations and picture material.
- Build in practical exercises.
- Use practical and experimental learning styles.
- Structure the days so that there is an overweight of hands-on exercises and experiments for the target group.
- Give precise instructions relating to the profession on a practical level.
- Mix the target groups so that different professions are represented.
- Make sure that there is interaction so that the participants have the chance to exchange view points and experience.
- Prepare a certificate that shows what the participants have been through.



FRANCE

"The partnership and the activities developed through the TRAINENERGY IEE project have been very fruitful for our training centers: reinforcement of the

relationship with the professional bodies of the construction and energy sector, adaptation of the training offer related to energy saving and intended for trainers and craftsmen, design of innovative training tools, delivery of certificates.... The project pushed as well the vocational schools and the GRETA Network training centers to promote training and jobs opportunities in the field of sustainable development and energy saving."

Réda FARAH

*Inspector in charge of the construction
and energy saving training
French Ministry of Education
Rectorat of Paris*

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Safe Cable Systems

impacts & successes



A very positive effect of the project was to experience the work involved in achieving a low energy consuming building. The project partners, which were mainly educational/vocational institutions of the building industry, were forced to think across the trades.

An awareness about energy saving arose amongst those involved. Each trade by itself knows how to implement the perfect technical solution to achieve a high quality energy saving building. However, this knowledge must be brought to the trades people who have been working in the field for years. Even with this knowledge, the efforts are often damaged by following trades on the building site. The necessity of appropriate interaction on the building site arose in order to achieve buildings requirements of energy saving. The fact that these ambitious energy saving goals can be only reached together, brought teachers, trades and institutions in this project together.

The impact and the successes of the project were:

5.1 TEACHERS

Teachers and course instructors had to consider other trades and their work. In some partner institutes they joined forces for the first time over trade-barriers and department borders to develop the TRAINENERGY course material. The motivation of the involved teachers was high; due to the gap in vocational training in this area and that they were ambitious to learn about the new aspects of energy saving in new and existing buildings.

This border crossing resulted in a better understanding of the different trades among the teachers. Having additional knowledge of the interacting problems on the building site and their solutions, it was then possible for them to pass on their knowledge to the course participants.

One of the biggest challenges faced from the beginning of the project was the different knowledge level of the craftsmen and teachers between the participating EU countries. Owing to the different historical development of the building trades over recent centuries, we have now have a different system of education and consequently a different level of knowledge. Returning to the basics of building physics proved a demanding challenge for some of the lecturers.

This forced some partners to offer additional courses to the trainers before sending them to the Train the Trainer course. This meant that they had a better opportunity to understand the training material and ensure a more equal level of competence amongst the teachers overall.

The participating 24 teachers enjoyed the cross trade and international experience. The training material was taught and discussed in small, cross trade international groups. The international mixture of the group provided a deeper experience and resulted in a positive experience for all in the course. This then improved the motivation of them all.

5.2 CRAFTSPEOPLE

The cross trade education led to better understanding between different trades. Even in the given courses, which were held for crafts people in the five chosen trades, it was clear that they started to reflect in their own role.

The training material was written to assist every trades person to experience other trades, and therefore build better buildings.

In one of the Danish courses an exercise was conducted to set up an air tightness layer within a small model unit. This layer was built in by the different trades. When commencing the blower




IRELAND

“The current economic climate has forced trades people to consider upskilling. Trainenegy has given these trades people a unique opportunity to re-enter the classroom, and given them an opportunity to get back on the education ladder. TRAINENERGY also gives them the confidence to complement their learning with their vast experience, promoting better building practices.”

Paul Keane
Project Manager, CIT

door test (see technical information-box) leakages were observed and discussions started as to whose fault it was between the participants!

For the first time they saw the air tightness as a common goal instead of focussing on their own work.

This experience can be viewed on the You-Tube channel "TRAINENERGY". www.youtube.com/trainenergy 

Technical information:

BLOWER DOOR TEST

A blower door test is a diagnostical tool developed to locate air leakages of buildings by measuring the air tightness of that building.

Using a calibrated fan, build into an exterior door or window, air is blown into the house until a pressure difference of 50 Pa is measured by a pressure-sensing device. By measuring the fan speed the leakage-rate of the house can be calculated.

The test is then repeated by producing an underpressure of 50 Pa inside the building.

This test is done to determine and eliminate the leakages of a building in order to stop uncontrolled air changes and therefore uncontrolled loss of heat. This leakage leads to cold air streaming into the warm construction and causes condensation which leads to mould and fungis.



5.3 CERTIFICATION

Common European certification of the course was proposed in order to receive recognition of the course throughout the EU. The European certification system European credit system for vocational education and Training (ECVET) is not yet completed. For this reason the course was certified in participating countries (UK, Denmark, Ireland, France, Spain and Germany) on a national basis only.

In Ireland where the course was successfully accredited to Hetac level 6.

5.4 OTHER INSTITUTES

Such was the response of course participants, that other teaching institutes requested to hold the TRAINENERGY course as well. In Germany several institutes were interested in offering the course to crafts people. These were for example Handwerkskammer Bildungszentrum Münster (HBZ) , Münster, Berufsförderungswerk der Südbadischen Bauwirtschaft GmbH, Bühl, Ausbildungszentrum-Bau in Hamburg GmbH (AZB), Hamburg and Handwerkskammer Osnabrück-Emsland.



IRELAND

"Upskilling of professionals in the construction sector needs to keep pace with the rate of change in EU Directives, national building regulations, and product innovation.

TRAINENERGY is one of many programmes that facilitates this upskilling"

Fergus Delany

*Building Services Content Expert,
responsible for the development of course material*

Owing to the course certification it has become easier for new training partners to offer this TRAINENERGY course to trades people in future.

5.5 FEEDBACK FROM UNIONS AND UMBRELLA ASSOCIATIONS

Positive feedback about the courses was received from the unions, umbrella organisations and network partners.

Contacts were made through the installed advisory group, which consisted of experts in the building industry, umbrella associations and training centres. Members of the advisory group visited the Train the Trainers course and one of the courses for trades people in the UK. The feedback from the experts observing the improved training material was very positive.

Presentations of the TRAINENERGY project were made to assist recruitment and awareness to the unions and umbrella organisations in the building industry. The feedback received from these presentations was very positive. Consequently, more interest in delivering the course will result.



conclusion





Widespread up skilling of all trades persons is a key enabler to decreasing the CO₂ emissions of the EU's ageing building stock. This is a huge challenge, as vocational training requires a careful balance between retaining interest of the students, who are often forgoing wage earning work and cost effective delivery methods.

6.1 TRAINING MATERIAL

An extensive range of training material was developed, tested and improved. Some key conclusions to this development are that:

- Practical lessons, hands on activities and demonstrations are the most important learning strategy
- Legislation, while difficult to deliver in teaching, is fundamental to the upgrading of buildings and content of the course.
- Training material must outline concepts that require further knowledge and professional designing. I.e. Trades people are not able to know everything.

6.2 TRAINING OF TRADES

In order to recruit and train trades people effectively; there are many factors that need to be taken into account.

- They will only attend if it is value added, a training course is not free, it should have a cost value.
- Cross trade courses have proven to be beneficial for the participants for energy efficiency.
- The training material supported two potentially conflicting areas. In one sense, it offered some basic skills for the experienced tradesperson to understand the demands of energy saving techniques. It also offered new materials for new technologies that are required to match the current and future demands on energy saving.

6.3 CERTIFICATION

It is clear from each of the countries that some form of mandatory certification will be required to ensure that trades persons are sufficiently skilled to implement energy efficiency measures in buildings. In some countries and area's trades persons do not even know about legislation, guidance and general requirements for upgrading buildings. This should be addressed as soon as possible. The EU commission has clearly understood this with the Build up skills initiative. It is hoped that all Build up skills consortiums read and understand the concepts and learnings from this project.



TRAINENERGY