

Ex-ante evaluation of the initiative on the building workforce training and qualification in the field of energy efficiency and renewable energy within the Intelligent Energy Europe Programme

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Final Report

Client: DG TREN

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Table of contents

1	Introduction	4
1.1	Purpose of the Study	4
1.2	Report Structure	6
2	Methodology	7
2.1	Review of Method Used	7
2.1.1	Step 1: Problem definition	7
2.1.2	Step 2: Definition of objectives and indicators	9
2.1.3	Step 3: Development of policy options	9
2.1.4	Step 4: Impacts, risks and added value	10
2.1.5	Step 5: Assessment - Cost effectiveness, monitoring and evaluation	11
2.2	Data collection	12
2.2.1	Desk research	12
2.2.2	Consultation process (interviews/survey)	13
2.2.3	Data issues and establishing a baseline	14
2.3	Definitions of terms	14
3	Setting the Scene	16
3.1	Fundamental Issue - Policy context	16
3.1.1	Current EU policy and programmes	17
3.1.2	Skills	19
3.1.3	Intelligent Energy Europe II	23
3.1.4	Summary – A rationale for intervention	27
3.2	The target group	27
3.2.1	Current target group size and employment	28
3.2.2	Future Target Group Size and Employment	30
3.3	Skills and the target group	35
3.3.1	Current skills needs and shortages	35
3.3.2	Causes of skills shortages	37
3.3.3	Impact of increase in EE and RES in buildings on skills needs	40
3.3.4	Level and scale of future skills needs	44
3.3.5	Summary	50
3.4	Current training provision and qualifications	51
3.4.1	Training provision databases	51
3.4.2	EU Vocational training systems	52
3.4.3	Training provision – Member state case studies	53
3.4.4	Training provision – EU provision	59
3.4.5	Training Provision - IEE II	61

3.4.6 Training Provision - Employers	67
3.4.7 Qualifications and Certification	68
3.4.8 Summary of Provision	70
3.5 Summary	71
4 Problem Definition	75
4.1 Problem Analysis	75
4.2 Rationale for Intervention	78
4.2.1 Identified policy gaps	78
4.2.2 Intervention logic	78
4.3 Objectives	80
5 Options for Action	81
5.1 Recommendations from review	81
5.2 Policy fit	82
5.3 Proposed Options for Action for Evaluation	84
5.4 Preferred Option	85
6 Policy Analysis - Impacts, Costs, risks and added value	88
6.1 Impacts	88
6.2 Costs	91
6.3 Risks and Added Value	91
6.4 Monitoring and Evaluation	100
7 Research questions answered	102
8 Conclusions and Recommendations	113

1 Introduction

This is the final report, which builds on the submitted and approved inception and interim reports.

1.1 Purpose of the Study

The Terms of Reference (TOR) for this evaluation contain a description of the multiple reasons why DG TREN are considering if and how the Intelligent Energy - Europe (IEE) programme could be used to address the perceived lack of skills related to inter alia the installation of renewable energy and energy efficient equipment in buildings.

The description of the potential intervention contained in the terms of reference is as follows:

1. 'To support Member States efforts, to boost qualification and certification schemes and to improve access to vocational training in the building sector (inter alia for installers, technicians, inspectors and auditors)'
2. ...that 'The initiative would not be primarily intended to pay for the training directly, but rather to provide financial support to create, strengthen or link structures and instruments aiming at boosting the vocational training and qualification schemes for the building workforce'.
3. ...and 'This initiative could provide structures and instruments for leverage and align existing workforce training programmes and resources towards the energy efficiency and renewable energy topics'.

There are multiple drivers leading to a high and increasing demand for such skills, including policies clearly supporting the need to increase the installation of renewable and energy efficient technologies in buildings, such as:

- The EU recovery plan highlighting the employment and energy benefits available from major programmes of low carbon building refurbishment.
- Multiple targets under recent energy policy developments, such as the recast of the Energy Performance of buildings Directive, the Renewable Energy Directive, etc., all of which will need very extensive expansions in the installation of renewable energy sources and major improvements in energy efficiency. As buildings account for some 40% of EU energy use and 36% of CO₂ emissions

there is a clear need for major activity in improving their efficiency and installing renewable energy systems within them.

- Recently increased availability of EU funds to support skills development and the installation of energy efficient and renewable energy technologies in buildings.
 - The rules on the spending of EU regional development funding have been adjusted to allow Member States (MSs) to increase the amount that can be spent on energy efficiency improvements and renewable energy in housing. Similarly the criteria for European Social Fund (ESF) spending has been adjusted to allow earlier access to funds of up to €1.8bn to monitor and match skills development and upgrading.

Therefore there is a perceived need for action to address training and certification of this training in the building sector.

The TOR contains the following primary evaluation questions:

1. What is the rationale for public intervention?
2. What is the value added of EU intervention? Is it really needed? Would intervention by the Member States be more effective and efficient?
3. What are the objectives that the intervention intends to achieve and how will progress be assessed.
4. What are the interventions (i.e. the options for action) available and what are the risks associated with them? What is the most appropriate delivery mechanism to use? Would the same objectives be achieved more effectively and efficiently by other means? Which is the preferred option and why?
5. What are the results and impacts expected, in particular the social, economic and environmental ones?
6. What indicators will be suitable to measure these impacts?
7. How will monitoring and evaluation of the intervention be organised and implemented?
8. What are the lessons learnt from similar experiences?
9. To what extent is the intervention likely to be cost effective?
10. What is the potential opportunity loss of not implementing the annual IEE budget in a 'conventional way'? What are the expected impacts on the EACI which executes a large part of the IEE programme?

Final Outputs

This final report is intended to:

- (1) demonstrate a thorough analysis of the various options for action;
- (2) evaluate the added value of EU involvement;
- (3) provide a fully justified recommendation for the programme;
- (4) propose monitoring and evaluation processes for the programme;
- (5) include an executive summary written to be accessible to non-specialists;
- (6) take into account the Commissions comments and requests;
- (7) provide an overview of the study methodology, working within and building upon the Commission's evaluation and impact assessment guidelines;
- (8) have annexes attached which present all relevant evidence (and any confidential material) from the analysis process;

1.2 Report Structure

The remainder of this report is organised as follows:

- § Chapter 2: Summarises the study methodology
- § Chapter 3: Presents the problem
- § Chapter 4: Defines the objectives the intervention is designed to meet
- § Chapter 5: Presents options for action
- § Chapter 6: Policy analysis – added value
- § Chapter 7: Monitoring and evaluation
- § Chapter 8: Conclusions and recommendations

Annexes cover the following:

1. References – of literature reviewed
2. Questionnaire
3. List of Consultees
4. Training provision - MS case studies
5. Summary of MS training needs

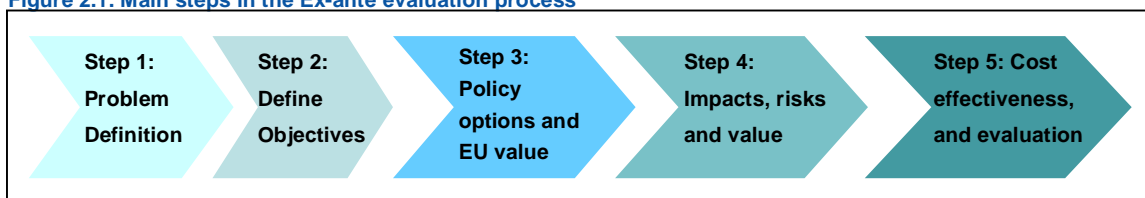
2 Methodology

2.1 Review of Method Used

Ex-ante Evaluation –
Five Steps

The evaluation was divided into the following steps.

Figure 2.1. Main steps in the Ex-ante evaluation process



2.1.1 Step 1: Problem definition

Steps 1: Problem Definition and past lessons	Step 2: Define objectives	Step 3: Options for action and EU value	Step 4: Impacts, risks and added value	Step 5: Assessment – cost effectiveness, monitoring and evaluation
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Identification of the problems, their scale, related factors, and needs assessment

Step one started with a thorough analysis of the current situation. This required an effective baselining of the policy landscape in which the intervention is designed to act.

In order to achieve this, we:

- Examined the target audience for the intervention.
- Analysed the current trends in the building sector in terms of the current employment trends and skills requirements; both in terms of quality and quantity.
- Identified current training provision which fits the definition (target audience and content) – via a literature review rather than primary research.
- Identified and quantified current and projected shortfalls in the labour market for the target group using data for sustainable construction and the wider construction sector, taking into account the variations between, and within, Member States – this required a member state sampling from existing literature rather than primary research.
- Identified problems in the labour market with regard to installing energy efficient equipment in buildings;
- Identified problems in the labour market for renewable energy development i.e. RE systems in buildings including solar energy, heat storage etc.;

Ex-ante evaluation of the initiative on the building workforce training and qualification in the field of energy efficiency and renewable energy within the Intelligent Energy Europe Programme

- Identified the root causes of these problems;
- Identified the immediate problems that need solving and compared these to longer-term problems;
- Identified the key stakeholders and their positions;
- Identified other factors (environmental, economic, social, cost) and the cause-effect relationships between them;
- Addressed the question 'Is the intervention consistent with recommendations from past programmes?' This step required a detailed review of EU and MS level documents including the following:
 - evaluations of the IEE programmes;
 - evaluations of vocational training and training promotion initiatives;
 - policy views from vocational training bodies (e.g. CEDEFOP)
 - audits of member states funding programmes in skills training, construction, buildings, qualification harmonisation;
 - relevant international literature, e.g. reports from IPCC, UNEP, OECD.
- Assessed the main issues in solving the identified problems. This included establishing a hierarchy between different needs, as explicitly mentioned in the ToR, in light of the objectives of the initiative and establishing that the need matches with overall EU objectives;
- Constructed a visual presentation of the relationships identified.

Tools and techniques used

We drafted a problem tree in order to illustrate the issues which any intervention would attempt to address. A key starting point for this was the problem trees already created in previous evaluations, such as the ex-ante of IEE II. Given the training focus of the issues we also reviewed analysis in the ex-ante evaluations of programmes such as the Lifelong Learning Programme.

In addition we undertook extensive desk research based on recent studies related to this topic. A key aspect of this step was considering and developing the rationale for intervention. This considered the following important points:

- In what areas the demand for employment / skills is expected to increase as the EU moves towards the low carbon economy that is the goal of so many of its policies. The quantification of expected skill shortages with sensitivity to whether this concerned all of EU 27 or only certain regions and countries.
- What the current levels of skills / employment are in these areas.
- What level is the current provision of training? Who provides this and on what basis (e.g. level of public funding support).
- What evidence is there of a current shortfall of training provision?
- What evidence is there of a lack of capacity to respond to the (predicted) increase in demand?

There has been considerable recent analysis of these issues and we were able to draw upon a significant amount of research and analysis of these issues, a summary of the literature reviewed is provided in the project references.

2.1.2 Step 2: Definition of objectives and indicators

Steps 1: Problem Definition and past lessons	Step 2: Define objectives	Step 3: Options for Action and EU value	Step 4: Impacts, risks and added value	Step 5: Assessment – cost effectiveness, monitoring and evaluation
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The proposed initiative on building workforce training and qualification in the field of energy efficiency and renewable energy needs to fulfil key objectives and procedures as laid out in the Competitiveness and Innovation Framework Programme (CIP) decision. In addition to this it would also need to take heed of policy developments such as those in the Energy Performance of Buildings Directive, its recast and RES Directive within the context of the EU’s ambitious plans set out in the 20-20-20 targets.

Defining objectives

In considering and defining the objectives we sought to answer the specific questions and issues raised in the TOR, to:

- identify the general, specific and operational objectives and how this programme would meet them;
- translate the policy goals into more tangible SMART objectives;
- assess if the expected results of an intervention correspond with its objectives, and if they are relevant to address the identified needs, problems and issues;
- define the basis on which achievement will be measured.

The existing general objectives of IEE II were also considered and respected. As with the problem analysis we also reviewed the objectives and intervention logics adopted for EU wide vocational training programmes.

2.1.3 Step 3: Development of policy options

Steps 1: Problem Definition and past lessons	Step 2: Define objectives	Step 3: Options for Action and EU value	Step 4: Impacts, risks and added value	Step 5: Assessment – cost effectiveness, monitoring and evaluation
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Identifying options for action

The key starting point was that all of the options for action were intended to provide additional EU level input to support and complement ongoing and planned future national programmes. Although they have been the main focus of our analysis the options considered were not limited to only those possible under the IEE programme. This allowed us to consider larger scale interventions than

the IEE can fund and enabled a better analysis of whether there is added value in EU intervention.

Once the problem analysis, the objectives and the key indicators were clear, the options for action were determined. Potential options were developed during the inception phase and were tested, developed and informed by our consultations.

Our analysis also considered the specific questions listed in the TOR, as follows:

- What are the options for action available and what are the risks associated with them?
- What is the most appropriate delivery mechanism to use?
- Would the same objectives be achieved more effectively and efficiently by other means?
- Which is the preferred option and why?
- Analysis of alternative delivery mechanisms to attain objectives and identify what options are available and undertake comparison of them on the basis of chosen criteria.
- Analysis of alternative delivery mechanisms to address earlier critical evaluation findings concerning the effectiveness of the instruments used in previous annual IEE work programmes or in similar interventions elsewhere.
- Analysis of the risks connected to the implementation of the alternative mechanisms, in order to identify suitable courses of action to prevent or mitigate their impact.

However it emerged early on during our work, that the only credible method of delivering an effective intervention would be MS specific projects reflecting the complex diversity of structures, issues and relative progress across the MSs. Taking into account the limited time and resources of the study, in agreement with the project officer in DG TREN the decision was taken not to develop the full range of initial options for action to the level of detail to carry out significant policy analysis and concentrate on the option which combined the substantive beneficial policy / delivery content of the initial options with a MS specific approach. However, we have considered the issues involved and how a wider option analysis could be carried out.

2.1.4 Step 4: Impacts, risks and added value

Steps 1: Problem Definition and past lessons	Step 2: Define objectives	Step 3: Options for Action and EU value	Step 4: Impacts, risks and added value	Step 5: Assessment – cost effectiveness, monitoring and evaluation
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Comparison of options for action

The comparison highlighted the advantages and disadvantages of the various options for action, across the economic, social, and environmental dimensions and it identified potential weaknesses and risks for each of the options. The options were compared from the point of view of effectiveness, efficiency and

consistency, including potential trade-offs between competing objectives. The outputs in terms of numbers of individuals trained was also considered.

The impact of the diversion of budget from other aspects of the IEE programme, primarily to the 'traditional' promotion and dissemination projects, was also considered. It was important to consider the opportunity loss of implementing the intervention to the IEE against allocating the budget in a more conventional way to quantify the risks of a different budget allocation. The impact of the work of the Executive Agency for Competitiveness and Innovation (EACI) has been considered (in terms of workload, existing capacity and expertise of the staff etc.).

The outputs and EU added value of the proposed intervention needed to be judged against the 'do nothing' option. This required comparison against those measures already in place and what was already being done in various Member States and also within the Commission. We attempted to establish:

- whether the alternative mechanisms would be complementary (no duplication) and coherent (no undermining/possible contradictions) to the existing ones;
- to what extent synergy effects could be expected; and
- what kind of synergy effects could be expected.

Tools and techniques for analysis

The following tools and techniques were used to gather the required data and to carry out the analysis:

1. **Desk research:** literature
2. **Questionnaire:** the a priori impacts identified were tested via a questionnaire survey among stakeholders.
3. **Interviews:** interviews with external experts and stakeholders.
4. **Data Analysis:** Output data from the existing programmes in comparison with the outputs expected from the proposed analysis.

Recommendations

On the basis of the comparisons, we made recommendations on the proposed option for action. The criteria listed above (pros and cons, weaknesses of the options, risks) were examined and conclusions drawn. On the basis of these conclusions we drafted a number of recommendations that should strengthen the preferred option and provide potential mitigation actions to overcome the risks associated with the option.

2.1.5 Step 5: Assessment - Cost effectiveness, monitoring and evaluation

Steps 1: Problem Definition and past lessons	Step 2: Define objectives	Step 3: Options for Action and EU value	Step 4: Impacts, risks and added value	Step 5: Assessment – cost effectiveness, monitoring and evaluation
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We conducted an analysis of the cost-effectiveness of the option for action to evaluate if the intervention would be the most cost-effective way to achieve the desired outcomes. The following aspects were taken into account:

- The cost implications of the proposed option with a comparison against alternatives inside and outside the IEE programme. This was informed by the costs of supporting projects of the nature predicted via other programmes. The analysis included the administration costs to the EU and the level of applicant match funding typically applied;
- The extent to which the budget is suitable to achieve the objectives, identifying the point to which diminishing marginal returns enable a suitable project scale to be identified;
- The extent to which the budget is adequate, was also informed by the review of suitability;
- The benefits of a staged action over several years.

Evaluation indicators

We aimed to identify measurable indicators to evaluate the results of the proposed intervention. We have described how to identify the relevant indicators, the data requirements, how the data can be collected and how to analyse the soundness and reliability of the proposed collection methods.

Plans for evaluation

In order to ensure that all relevant aspects were reviewed and that lessons learned have been fed back into the decision making process, they were evaluated according to the EC Handbook. In this step we have described what ***types of evaluations and monitoring*** are recommended for the future, what the ***focus*** of these evaluations should be and who should be ***responsible*** for carrying out the monitoring.

2.2 Data collection

2.2.1 Desk research

We have undertaken extensive desk research of recent studies related to this topic. Examples include the current work being conducted by Idea and ECORYS on eco-industries, which contains sub-sector reports on eco-construction and renewable energy sources. Other sources such as Cedefop, Eurostat, and Commission documents have been consulted. A number of sources for consultation were provided by the client and included reports that proved useful for mapping out the problems and needs assessments in the building sector in Europe. We also conducted a web search for other data sources. In addition to general information on the topic we collected data on specific countries in order to describe the current status of training provision for the building workforce for particular MS.

2.2.2 Consultation process (interviews/survey)

Stakeholder consultations were conducted as part of this study. A consultation plan was developed in the structuring phase of the project and agreed with the responsible DG TREN officers. The basic elements of our approach towards the Consultation plan were to: (1) define the objectives of the consultation; (2) identify the relevant target groups; (3) choose appropriate techniques; and (4) report on the consultation.

Consultation process

We suggested and agreed a list of consultees for this evaluation (see appendix 3 for a full list). We also worked with DG TREN to develop consultation materials, including questionnaires that addressed the main topics of the ex-ante evaluation. The questionnaires were used as a topic guide for a series of telephone and face-to-face interviews. In total 21 interviews were conducted with a wide coverage across stakeholder groups.

The questionnaires were also distributed by email to a number of consultees where direct contact was not feasible or possible. Table 2.1 describes the range of consultation methods per stakeholder group. Please refer to Appendix 2 for a copy of the questionnaire.

Table 2.1 Consultation type

Stakeholder group	Face-to-face interview	Telephone interview	Questionnaire by email
EU policy makers	x		
Sector representatives		x	
Training policy leads		x	
Companies		x	
Energy agencies			x
Building associations			x
Other		x	x

In addition to the face to face and telephone interviews we conducted a survey of two groups at member state level. These groups were energy agencies and building sector trade associations. These groups are considered important stakeholders with regard to setting up national level training schemes for construction workers. Furthermore, these organisations are considered to have a good overview of the current status and future needs with regard to training the building workforce in energy efficiency and renewable energy issues.

We sent the questionnaire (see Appendix) by email to senior members of staff at 25 energy agencies and 25 building associations¹ We also sent reminders by email and phone asking the target group to fill out the questionnaires. We received completed questionnaires from 21 energy agencies and 10 building

¹ Not all the contact details of every energy agency and building association in the EU27 could be found.

associations.² The Dutch building association was interviewed by phone and this qualitative data was used to enrich the questionnaire findings.

The variation in the population polled in the survey implies a need for caution in drawing strict conclusions. This variation stems from the heterogeneity of the member states. This survey does, however, provide us with some indications of the perceived need for training, the national initiatives in this field and the possible impact and reception of the proposed option for action.

2.2.3 Data issues and establishing a baseline

The primary data source used to establish the quantities in this report, particularly those used in chapter 3, is the Cedefop report 'Panorama – Future skills needs in Europe: focus on 2020'. This is the closest matching data set with comprehensive data broken down by sector, skill level and member state and then with annual requirements for each projected to 2015 and 2020. Still, the dataset does not have the required detail to provide a concrete baseline scenario for this study as there is not a clear match between the study sub-sectors of energy efficiency and renewable energy in the construction sector and the occupational sub-groups of auditors, installers, technicians and inspectors.

The calculations that have been made in chapter 3 are based on the Cedefop dataset and project a potential baseline scenario. The numbers are illustrative of the potential scale of annual requirements, based on the stated intelligent assumptions, but should be treated with caution given the assumptions used in their calculation. More detailed or comprehensive modelling of needs was not within the scope of this study or feasible within the time and resource constraints.

2.3 Definitions of terms

The following definitions describe the meaning of a number of terms which are regularly used in this study.

Energy efficiency (EE): encompasses all changes that result in a reduction in the energy used for a given energy service (heating, lighting, etc.) or level of activity. This reduction in the energy consumption is not necessarily associated with technical changes, since it can also result from a better organisation and management or improved economic efficiency in the sector (e.g. overall gains in productivity).³

² From the Portugal energy agency we received two filled out questionnaires from two different senior people.

³ World Energy Council at <http://www.worldenergy.org/>

Renewable energy sources (RES): means renewable non-fossil energy sources (wind, solar, geothermal, wave, tidal, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases).⁴

Skills gap: is an area where individuals within the existing workforce have lower skill levels than are necessary to meet business or industry objectives, or where new entrants lack some of the skills required for them to perform effectively.⁵

Skills shortage: is a lack of adequately skilled individuals in the labour market.⁶ A shortage typically exists for specialised and experienced workers, and can coexist with relatively high overall unemployment within the occupation. An occupation may be assessed as in shortage even though not all specialisations of the occupation are in shortage. Occupations may be in shortage in some regions and not in others.⁷

Option for action: is the proposed intervention which takes shape as a funding instrument to train and qualify the building workforce in the field of energy efficiency and renewable energy.

A number of descriptions of important categories in the **target group**, i.e. the building workforce, are presented below.

Technician: is a professional skilled in mechanical or industrial techniques or in a particular technical field, such as thermal properties of the building, heat losses, or lighting efficiency.

Installer: is a professional who places machinery or equipment related to energy efficiency or renewable energy sources in the building. He (or she) connects this machinery or equipment and commissions it ready for use, for example, insulation, solar panels and domestic wind turbines.

[Energy] auditor or [building] inspector: is a professional who conducts a survey of a property to determine its energy efficiency. This is typically done by visual inspection and a variety of techniques such as with blower doors, which measure the air tightness of the building envelope, and infrared cameras, which reveal hard-to-detect areas of high heat loss.

⁴ Article 2. of the EU Directive 2001/77/EC of 27 September 2001 on the promotion of electricity produced from renewable energy sources in the internal electricity market

⁵ Skills For Tomorrow's Media, September 2001

⁶ Skills For Tomorrow's Media, September 2001

⁷ Based on: www.skillsinfo.gov.au

3 Setting the Scene

This section presents our work on defining the problems of skills needs among the building workforce in terms of training and qualification in the field of energy efficiency and renewable energy. This section also includes the lessons from previous projects and programmes of relevance.

Discussions and comments resulting from the kick off and inception meetings and reports have led us to structure the problem definition as follows:

- ***What is the fundamental issue?*** - Why is there a need to increase both the efficiency of energy use and the use of renewable energy sources in buildings? This will not be covered in depth but is the vital first step in building an intervention logic.
- ***Who is/are the target group(s)?*** - The construction sector is large and diverse, so there is a need to clarify who the intervention would be targeted on.
- ***What skills are needed?*** - There is a need to focus on the specific skills which need to be developed and to reflect the variation in these skill needs between Member States (MSs).
- ***What is the evidence of a skills shortage?*** - What evidence is there to indicate that there is a current, and crucially a prediction of a future, skills shortage?
- ***What are the reasons behind the skills shortage?*** - What are the reasons that have been identified for any skills shortage?
- ***Current provision*** - What is the current availability of training, and how is this provision structured?

3.1 Fundamental Issue - Policy context

To successfully undertake this evaluation it is vital to first establish the strategic policy context that has led to a need for intervention.

3.1.1 Current EU policy and programmes

Overall EU policy is guided by the Lisbon Strategy, formulated in 2000 and re-launched in 2005 with the key aim to make the EU "*the most dynamic and competitive knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion, and respect for the environment by 2010*". The longer term perspective for the EU to 2020, as formulated in the 'Political guidelines for the next Commission'⁸, builds on this and explicitly lists a number of priorities. One of these priorities is to make a successful exit from the current financial crisis, among other activities, by stemming the rise in unemployment by upgrading the skills and quality of education. Another priority is to lead on climate change through the creation of new jobs and industries in low carbon technologies and exploiting the potential of EU environmentally-friendly industries, services and technology. The links between the Lisbon strategy, the new Commission priorities and the proposed intervention include improving and increasing the skills of the European construction workforce and reducing the energy use of buildings with their associated negative impacts on the environment.

A key complementary strategy is the EU Sustainable Development Strategy which articulates the core EU principle of "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*". This strategy was also re-launched, in 2006. The link to this area again relates to the need to reduce the energy use of buildings, and its associated negative impact on future generations.

Buildings Energy Efficiency and Renewable Energy

The EU's overall energy and climate change policy, through its 20-20-20 targets⁹, is clearly focused on renewable energy and energy efficiency. Buildings account for around 40% of all energy used in the EU and are an area where major potential exists for economic and environmental win-wins. Energy efficiency provides opportunities for emissions reductions at negative or low cost¹⁰ and renewable energy provides opportunities for emissions reductions and a cleaner environment. Both provide excellent economic opportunities for European industry. In addition to overall EU energy policy goals of more secure, competitive and sustainable energy, a variety of specific policies, directives and programmes have also been created to promote energy efficiency and renewable energy in buildings and include the:

- 20-20-20 Strategy
- Energy Performance in Buildings Directive (and recast)
- Eco-design Directives
- European Economic Recovery Plan

⁸ José Manuel Barroso, 2009. Political guidelines for the next Commission.

⁹ To increase the proportion of renewable sources in energy use to 20% of the total and improve energy efficiency and reduce greenhouse gas emissions by 20% by 2020.

¹⁰ IPCC (2007) Fourth Assessment Report: WG III Mitigation: Chapter 6 Residential and Commercial

- Energy Efficiency Action Plan
- RES Directive
- Energy Efficiency and Renewable Energy in Housing in ERDF
- New Skills for New Jobs¹¹

The EPBD directive will remain influential in next few years...

Among the key policies at work in the buildings sector is the 2002 Energy Performance in Buildings Directive (EPBD). A proposal for a recast of this policy was agreed by the European Parliament and the Council in November 2009. The existing EPBD though is among the key current drivers for the industry and with many measures in the recast not being applied straight away it is likely it will remain so for the next few years at least.

...and its recast will also have a major impact on the sector

The proposed changes in the recast are based around widening the scope and tightening the limits of the directive, with additional elements focused on increasing construction efficiency, promoting renewables and CHP, national targets for low/zero carbon buildings and on energy labelling for buildings and appliances. All buildings built after 31 December 2020 must have high energy-saving standards and be powered to a large extent by renewable energy. Public authorities will lead the way two years earlier and part of the funding for these changes will come from the EU.

Retrofit is a crucial component

Recent policies such as the recovery plan have begun to target buildings retrofit and renovation because of the rapid and large scale opportunities from construction employment this offers. This focus on existing buildings is a logical step as new build only accounts for approximately 1% of the building stock added each year. On this basis around 2/3 of the buildings that will be used in 2050 have already been built and therefore policies directed at retrofit are essential to achieve environmental, energy and climate change targets. The retrofit rate is currently in the range of 1.5-2% of the building stock each year.

The RES directive is a strong driver for buildings

The Renewable Energy Sources (RES) Directive¹² will also play a major role in increasing the use of renewable energy in buildings through its binding targets on energy from renewable sources. Among the directive's measures is a formalisation of the renewable energy targets for each member state and the requirement for each to produce a national renewable energy action plan to achieve these targets. Article 14 of the directive deals with information and training and sets out a requirement for action to assist builders and installers in acquiring skills, particularly in the area of small scale renewable energy. The key requirement is for all member states to have certification or qualification schemes for installers of small scale renewables in place by the end of 2012. The National Action Plans required under the directive will require MSs to detail how this will be achieved.

¹¹ <http://ec.europa.eu/social/main.jsp?catId=568&langId=en>

¹² 2009/28/EC

Economic and employment opportunities in low carbon are also central to policy

Alongside the greenhouse gas emission reductions embodied in the 20-20-20 targets and other policies there are also strong economic factors. The low carbon economy is recognised as one of the key future drivers of economic growth and positioning Europe at the forefront of low carbon development is a central policy objective. There are a variety of opportunities in the market for goods and services related to buildings energy efficiency and renewable energy and the policy drive to improve this in Europe is also about creating opportunities for European firms to flourish in this sector. Employment opportunities are strongly linked to this which is particularly important in the light of recent unemployment increases caused by the economic downturn.

The stakes are high for policy – failure will have serious consequences

The policies and targets listed above will be crucial in tackling two of the most important current policy issues, economic recovery (and future growth) and climate change. The potential consequences of failure of these policies are severe, including prolonged unemployment, increasing energy insecurity and dangerous climate change and all its implications.

Skills and training are among the most important remaining barriers

There are a number of barriers to the success of the policies promoting greater uptake of energy efficiency and renewable energy in buildings. Some of the barriers remain technical, with a number of technologies still at development and demonstration stages while others are being adapted to the domestic environment and tested in practical large scale applications. However, many of the barriers are non-technical, some of the most important include:

- fragmentation of the buildings services and design markets;
- the principal-agent problem (a.k.a. the landlord – tenant disincentive);
- energy market distortions;
- regulatory barriers (e.g. planning);
- lack of familiarity with, and risk aversion to, new technology;
- information barriers;
- cultural and lifestyle habits; and
- the availability of products and the skilled workers to design, build, install, operate and maintain them.

3.1.2 Skills

Although the lack of skills has emerged as one of the primary non-technical barriers to the improved uptake of energy efficiency and renewable energy in buildings, it is not an area that EU policy makers have wholly neglected. Skills issues have been the subject of much EU strategy over the last decade and there are a number of long standing policies and programmes addressing them.

EU skills policy

The Lisbon strategy has a strong focus on skills and life-long learning as one of the primary elements of a knowledge economy and the re-launch re-confirmed this stating:

"[It] Considers life-long learning to be a necessity; considers also that, to ensure that EU industry is competitive, the quality of education and training systems must be reinforced at various stages of life and access to higher education must

Lisbon Strategy: Life-long learning vital for knowledge economy

be facilitated; believes that education and training systems must target those areas where the EU is lacking skilled people and must respond to the requirements and gaps of a rapidly changing labour market and technological society."

Education and
Training 2010
work
programme

Following the original Lisbon strategy statement a number of training and skills specific strategies were developed under the Education and Training 2010 work programme. This saw the adoption of 3 objectives:

- increasing the quality and effectiveness of education and training systems;
- facilitating access for all; and
- opening up systems to the wider world.

The work programme was reviewed in 2004 and 2006, with both reviews highlighting that although some progress has been made, there is still a long way to go to meet these objectives. Two of the most relevant issues raised were the need to improve the quality and attractiveness of vocational education and training (VET) and that the European element of national programmes was growing but insufficient.

A Strategic
Framework for
European co-
operation in
education and
training

A new strategic framework for European cooperation in Education and Training, to 2020, was adopted in May 2009 by the Council¹³. This has 4 long term objectives:

- Making lifelong learning and mobility a reality;
- Improving the quality and efficiency of education and training;
- Promoting equity, social cohesion and active citizenship;
- Enhancing creativity and innovation, including entrepreneurship, at all levels of education and training.

The
Copenhagen
process for
vocational
education
2002

Parallel to the Lisbon skills process and the Education and Training 2010 work programme are the Bologna and Copenhagen processes. The Bologna process works in the area of higher education while the Copenhagen process addresses vocational education and training.

The Copenhagen process in 2002 defined four priority areas:

- strengthening the European dimension (trans-national co-operation to promote mobility and partnerships to make Europe a global leader in vocational learning);
- transparency, information and guidance;
- recognition of competences and qualifications; and
- quality assurance.

¹³ Council conclusions of 12 May 2009 on a strategic framework for European cooperation in education and training ('ET 2020') - 2009/C 119/02

This process is reviewed every two years: Maastricht (2004), Helsinki (2006), Bordeaux (2008), where commitments are made by member states to modernise their Vocational Education and Training (VET) systems and strengthen co-operation.

The last review in Bordeaux proposed four priorities:

- national implementation of cooperation instruments and agreements
- improving the quality and attractiveness of VET
- improving links between VET and the labour market
- strengthening European cooperation arrangements.

The next review will be held in Bruges in 2010

The process has maintained a strong focus on the image of VET and developed European tools to improve transparency and mutual trust such as :

- EUROPASS: a single framework for transparency of qualifications and competences
- Common principles and guidelines for the validation of non-formal and informal learning
- The European Qualifications Framework for lifelong learning (EQF)
- The European Credit System for VET (ECVET)
- European Quality Assurance Reference Framework for VET (now EQAVET, previously EQARF)

The Lifelong Learning Programme (LLP)

The European Commission has integrated its various educational and training initiatives under a single umbrella, the Lifelong Learning Programme. With a significant budget of nearly €7 billion for 2007 to 2013, the new programme replaces previous education, vocational training and e-Learning programmes, which ended in 2006. There are four sub-programmes focusing on different stages of education and training and continuing previous programmes:

- Comenius for schools
- Erasmus for higher education
- Leonardo da Vinci for vocational education and training
- Grundtvig for adult education

In addition the Transversal programme aims to ensure that the LLP as a whole achieves the best results possible. The four activities of Transversal focus on policy co-operation, languages, information and communication technologies, effective dissemination and exploitation of project results. The scheme which is most relevant to this evaluation is the Leonardo da Vinci Programme. The Leonardo da Vinci programme links policy to practice in the field of vocational education and training. It is important then that the policy objectives and practical lessons learnt from Leonardo da Vinci are considered in this project and also that duplication is avoided in selecting delivery models.

Leonardo da Vinci

The Leonardo da Vinci programme funds a variety of projects in the area of VET including trans-national exchange, giving individuals the chance to improve their competences, knowledge and skills through a period abroad, co-operation projects and themed networks. The policy framework for the Leonardo da Vinci programme is mostly based on the Copenhagen process.

The themed activities in 2006-7 included:

- VET and the labour market, guidance, target groups;
- Development of competencies and skills within companies, SME's, competences at sectoral level;
- Quality of VET systems and practices, continuous training of teachers and trainers;
- Transparency of qualifications, validation of formal and informal learning, credit transfer;
- E-learning.

In 2007 & 2008 the programme approved over 153,000 applications for exchange programmes and 645 pilot projects and programmes.

Leonardo da Vinci runs calls for centralised and decentralised projects such as EU-wide innovation projects or multilateral networks. Multilateral European projects and partnerships have been a window to Europe for the participating VET stakeholders and for many organisations the first step to open up and internationalise their education and training programmes. The centralised development of innovation projects is designed to respond to the innovation pressures that several countries have in common and should lead to brand new solutions, content, method and procedures within VET systems with clear EU level benefits. The decentralised Transfer of Innovation (ToI) projects combine several innovative results and practices in VET from several countries and thus are a learning experience for all partners. They generate important benefits by transferring existing best VET practices to other countries and thus help to avoid 're-inventing the wheel' in each member state.

This range of activities gives Leonardo da Vinci the capability to work in the area of VET for energy efficiency and renewable energy in buildings, indeed a search for such projects on the Leonardo da Vinci database shows a number of programmes that could be relevant to any proposed intervention, these are reviewed in section 3.4.4. The existence of these types of programmes points to a potential overlap with any new projects (including pilot interventions) in the area of energy efficiency and renewable energy in buildings.

The construction sector as a whole has been identified as a priority in ECVET networks for 2010 in terms of the call for project proposals although the area of energy efficiency and renewable energy in buildings is not a specific focus of the Leonardo da Vinci or LLP programmes. Therefore, it is likely that while positive impacts are generated by Leonardo da Vinci - particularly through spread of best practice – there is a need to consolidate and co-ordinate a sectoral approach and

the small scale of each initiative brings a need to develop thematic networking. Indeed, thematic networking currently being carried out, is drawing attention to the results and achievements of projects funded as part of the "decentralised" and "centralised" actions of the Lifelong Learning Programme. This networking organises the exchange of information and meetings to learn from projects. It also facilitates mainstreaming of results into national and European vocational training and education structures and can influence further policy development and actions

Other EU relevant skills training funding

Skills and training issues are also addressed by other major EU programmes, often as part of wider strategy and objectives. These programmes include:

- ESF
- ERDF
- INTERREG

These programmes all have interests in skills and buildings energy efficiency and RES and have funded or allow funding of relevant training provision. This provision is more fully explored in section 3.4.4.

3.1.3 Intelligent Energy Europe II

The emergence of skills as one of the primary non-technical barriers to the increased uptake of energy efficiency and renewable energy in buildings brings it squarely into the remit of the Intelligent Energy Europe II (IEE II) programme.

IEE II
objectives

The IEE II programme builds on the experience gained from its predecessor (IEE I Programme [2003-2006] and previous related schemes) and continues to work towards the objectives of secure, sustainable and competitively priced energy for Europe. In terms of specific objectives and actions article 37 of Decision 1639/2006/EC of the European Parliament and of the Council, states that IEE II shall provide for particular action to:

- a) foster energy efficiency and the rational use of energy resources;
- b) promote new and renewable energy sources and to support energy diversification;
- c) promote energy efficiency and the use of new and renewable energy sources in transport.

Furthermore, as stated under article 38 of the legal decision, the programme's operational objectives are to:

"a) provide the elements necessary for the improvement of sustainability, the development of the potential of cities and regions, as well as for the preparation of the legislative measures needed to attain the related strategic objectives; develop the means and instruments to follow up, monitor and evaluate the impact of the measures adopted by the EU and its Member States in the fields addressed by the Programme;

- b) boost investment across Member States in new and best performing technologies in the fields of energy efficiency, renewable energy sources and energy diversification, including in transport, by bridging the gap between the successful demonstration of innovative technologies and their effective, broad market uptake in order to attain leverage of public and private sector investment, promote key strategic technologies, bring down costs, increase market experience and contribute to reducing the financial risks and other perceived risks and barriers that hinder this type of investment;
- c) remove the non-technological barriers to efficient and intelligent patterns of energy production and consumption by promoting institutional capacity building at, inter alia, local and regional level, by raising awareness, notably through the educational system, by encouraging exchanges of experience and know-how among the main players concerned, business and citizens in general and by stimulating the spread of best practices and best available technologies, notably by means of their promotion at EU level."

IEE II
programmes

The programme covers actions under three fields:

- SAVE with main key actions on energy-efficient buildings, industry and products.
- ALTENER programme with main key actions on electricity from RES (RES-e), RE heating/cooling (RES-H/C), domestic and other small-scale RE applications and the promotion of use of biofuels; and
- STEER programme to promote EE and the use of new and RES in transport.

IEE II also includes “Integrated initiatives actions”, which combine several fields (SAVE, ALTENER and STEER) or relate to EU priorities where EE and RES are of relevance, examples include:

- Creation of local and regional energy agencies;
- European networking to enhance collaboration between local players to promote the use of sustainable energy sources;
- Sustainable energy communities;
- Special Initiatives such as the Bio-business initiative, the Intelligent Energy Education Initiative, the Product standards initiative and the Combined heat and power initiative.

In Addition Article 43 of the Decision establishing the Competitiveness and Innovation Framework Programme (CIP) (under which IEE II sits) defines the two types of implementing modes that the IEE II programme could support:

- 1) Promotion and dissemination projects – including:
- (a) strategic studies
 - (b) creation, enlargement or re-organisation of structures and instruments for sustainable energy development, including local and regional energy management, and the development of adequate financial products and market instruments;
 - (c) promotion of sustainable energy systems and equipment in order to further accelerate their penetration of the market and stimulate

investment to facilitate the transition from the demonstration to the marketing of more efficient technologies, awareness campaigns and the creation of institutional capabilities;

(d) development of information, education and training structures, the utilisation of results, the promotion and dissemination of know-how and best practices involving all consumers, dissemination of results of the action and projects and cooperation with the Member States through operational networks;

(e) monitoring of the implementation and the impact of EU legislative and support measures.

Both, the 2007 and 2008 work programme focused exclusively on these types of projects.

2) Market replication projects – aiming at the market replication of the innovative techniques, processes, products or practices to help facilitate their market uptake.

In 2009 IEE supported the establishment of the European Local Energy Assistance (ELENA) Facility. This facility is implemented in cooperation with the European Investment Bank and provides support to local and regional authorities through technical assistance in developing bankable projects that contribute to meeting EU sustainable energy targets.

IEE also supports Concerted Actions in the field of sustainable energy that aim to enhance and structure sharing of information and experience from national implementation. By doing this they promote good practice in Member States in activities required for the implementation of directives relevant to the IEE programme e.g. EPBD, Energy Services, RES Directive – on-going preparation phase.

The primary objective of concerted actions is to promote dialogue and exchange best practice between MS states to:

- Assist with creation and adoption of national laws and regulations for certification, inspection and testing markets;
- Create favourable conditions for common solutions and standardization;
- Support the follow up of legislative implementation; and
- Encourage sharing of experience, good practice and networking in the field.

Concerted actions consist of meetings between MS representatives to discuss the issues associated with the implementation of EU level legislation. The IEE programme meets the administrative costs of these meetings.

The ex-ante evaluation of the IEE II programme and the recent mid term evaluation¹⁴ of the programme both mention 'education and training' in the intervention logic analysis and among the 'soft' measures to be used. Among the key recommendations of the mid-term evaluation were for an increased budget

¹⁴ Interim evaluation of the Intelligent Energy Europe II Programme within the competitiveness and Innovation framework Programme. Final Report April 2009. Deloitte consulting for European Commission Directorate General Energy and Transport.

for the IEE programme and to consider prioritising among the IEE objectives. Specific recommendations and points from the mid-term evaluation that are relevant to this evaluation include:

- Observation that IEE relevance could be improved by better collaboration with structural funds – This is relevant to the proposed intervention through the potential to add to existing structures or leverage support for training from other funding sources.
- IEE relevance could be improved by identifying target groups and beneficiaries on a more frequent and in-depth basis – this is highly relevant to the proposed initiative with the difficulties around understanding the target group and measuring benefits.
- Relevance of existing IEE objectives may be changing, the view was expressed that for example the need for dissemination was not significant for RES anymore – this may favour the initiative re-directing funds from dissemination activities.
- A need to respond to specific MS needs, for geographical sensitivity – this will be an important factor in the proposed intervention as a number of variables will differ between MS.
- A clear need for training development at all levels – this underlines the specific need for IEE activity and this initiative on training and qualifications.

Other relevant factors for the proposed intervention include how it would impact on the prioritisation between the EE, RES and Transport strands of IEE. Although there is no formal requirement of equal prioritisation between the three, at present there is an implicit agreement for equal prioritisation. The proposed intervention could alter this. This could cause issues within IEE with the programme evolving only slowly to date, and each unit/strand would obviously feel their work is important and require more focus, not less.

It was stated that having a clear view of the medium term priorities for IEE was important, to help applicants plan ahead. This may be important for the intervention as if it substantially changed the focus of the programme this would come as a surprise to applicants and could disrupt their planning.

In terms of setting priorities a balance needs to be struck between broadness and focus, auditors having a preference for a more tightly focussed programme with clear links between funding and objectives. The evaluation also noted that priorities between the IEE objectives were not clear. This could both serve to give the flexibility to promote any intervention but also to raise questions of its right to divert funding from other priorities.

A review of the database of IEE II projects reveals that many projects are classified under 'Energy Education'. However these projects are primarily aimed at including energy issues in the curriculum of schools and are not targeted at vocational training.

IEE has not
focused
closely on
vocational
skills...

...but some programmes are active

There are a number of IEE projects that have training and skills elements, these include the Qualicert, Trainenergy and CEPH Programmes. Section 3.4.5 further examines these and other initiatives and the extent to which they are having an impact on vocational training in the buildings EE and RES workforce.

It is clear then that action in the area of skills, workforce training and qualifications is well within the scope of activities of IEE as set out in the legal articles and established objectives and also in recent programme evaluations.

3.1.4 Summary – A rationale for intervention

Strong climate change, energy and economic drivers for action

An increase in energy efficiency and renewable energy in buildings is demanded by climate change and environmental targets. Action in this area is very closely aligned with EU energy policy to deliver more secure, competitive and sustainable energy to its citizens. A further imperative is provided by economic drivers, with both opportunities for recovery and for sustainable long term growth and employment in low carbon goods and services.

Skills shortages projected, current policy not at required scale in sector

Evidence of existing, and projections of future, skills shortages in energy efficiency and renewable energy in the buildings workforce poses one of the primary non-technical barriers to achieving these climate change, energy and economic objectives. The EU has a developed skills policy and the LLP through its delivery programmes such as Leonardo da Vinci which are working to improve VET across the Union. While Leonardo da Vinci has provided training projects and programmes relevant to the buildings energy efficiency and renewable energy workforce this specific area is not a target of the programme. Therefore action has not been on the scale to address skills issues in the sector.

Action on skills within remit of IEE II as a non-technical barrier to EE and RES

The Intelligent Energy Europe II programme has, at its core, the objective to remove non-technical barriers to intelligent energy use. It is clearly within the scope of the IEE programme to support activities that address the non-technical barrier of workforce training, skills and qualifications in the buildings energy efficiency and renewable energy workforce. To date IEE has focused primarily on promotion and dissemination activities, some addressing 'energy education' but only at school level, some at vocational level. In recent years a greater number of training and qualification based projects have been supported. In many ways this could be a logical next step for IEE. The heart of this evaluation is to explore how it can contribute to solving training, skills and qualification issues, in concert with existing EU and national skills programmes, to help remove a significant non-technical barrier to achieving EU climate change, energy and economic objectives. At the same time it is vital to consider the actions of other programmes such as ESF, ERDF and INTERREG and how action by IEE may complement or duplicate these.

3.2 The target group

With a rationale for intervention established, the next step in this evaluation is to define the problem, to identify the type and scale of intervention needed and the

added value, effectiveness and efficiency of EU intervention. The first step in this is to define and quantify the target group for the proposed intervention. The terms of reference describe the intervention **target group** as:

‘...[to] support Member States efforts, to boost qualification and certification schemes and to improve access to vocational training in the building sector (**inter alia for installers, technicians, inspectors and auditors**)’

3.2.1 Current target group size and employment

The target group of installers, technicians, inspectors and auditors is not explicitly covered by any of the current sectoral definitions used in economic mapping studies. The closest sectoral match from studies at the EU level is that of the wider sustainable (or eco) construction sector¹⁵, which includes all aspects of energy efficiency in building construction and retro-fit and the use of technologies (including renewable energy) in buildings. However, this definition does not cover the workforce involved in the operation and maintenance of the buildings facilities and technologies to maintain, monitor and optimise building energy efficiency and the performance of integrated renewable energy technologies.

In relation to sustainable construction, two major EU level studies – Ernst & Young (2006) and Ecorys (2009) – explored the sector as part of the eco-industry sector but did not quantify the current size / employment level in this sub-sector. The Ernst and Young study estimated sector values in the EU-25 of €40 billion in 2003 and 900,000 jobs in 2004 (6% of total sector) but it was clear that these were highly speculative estimates. On the basis of these reports, a sustainable construction employment figure in the range of 5-10% of the whole construction sector appears reasonable.

Characterisation of the eco-construction industry in those studies describes a highly competitive and mature niche market concentrated in the original EU-15 member states which account for over 80% of all EU activity, with a growing market in the 12 newer member states. Across the EU the industry is also characterised by a very high proportion of SMEs, between 90-95% of all firms by most estimates.

With the sustainable construction sector not well mapped by existing studies there is only limited data on sector size, employment and growth. This makes analysis of the target group difficult.

¹⁵ Sustainable construction consists of the production of equipment, technology or specific materials, or design, installation, management or provision of other services to minimise environmental impacts from building, construction and renovation, including the construction activity itself (workshop), selection of materials, consumption, emissions and other environmental impacts during use of the structure, management of construction waste. It does not include construction for an eco-activity facility. From Ernst & Young (2006) Eco-industry, its size, employment, perspectives and barriers to growth in an enlarged EU – N.B. the same definition is used in the 2009 update being carried out by Ecorys.

The current size of sustainable construction industry is not clear

The construction industry as a whole has detailed data available

Estimates based on the Construction Sector

The construction sector as a whole is captured much more clearly by existing data sources. Data from Eurostat indicates that in Q3 2009 approximately 15.9 million people were employed in construction in the EU-27. This was down from 17.3 million reported in Q3 2007, highlighting the extent to which the sector has been impacted by the recession.

Recent analysis and modelling of the whole construction sector for CEDEFOP¹⁶ indicates that over 15.1 million people were employed in it in the EU-25 in 2006¹⁷, or just over 7% of EU total employment. This data is based on the European Labour Force Survey and a European employment model. Table 3.1 presents the data in the Cedefop study by occupational sub-sector.

Making assumptions a current target group size of over 1.1 million is estimated

The occupational sub-sectors listed, allow a closer match to the target group of this study, though the proportions relevant to energy efficiency and renewable energy remain unclear. If the assumptions on this proportion that are made in the Ernst and Young and Ecorys studies are sensibly applied to the CEDEFOP data it is possible to estimate the size of the target group. Table 3.1 presents this results of this approach and shows that the target group is around 1.1 million workers, or 7.5% of the total construction workforce, in 2006.

Table 3.1 Construction Sector employment and estimated target group 2006 (000's)

Construction Occupational Subsector	Employment 2006	Match to Target Group	Estimated proportion of total employment	Estimated Target Group 2006
Legislators, senior officials and managers	1011	Inspectors & auditors	2	20
Professionals	560	Inspectors & auditors	2	11
Technicians and Associate Professionals	906	Technicians	5	45
Clerks	735			0
Service workers and shop and market sales workers	62			0
Skilled agricultural and fishery workers	25			0
Craft and related trades workers	9444	Installers & Technicians	10	944
Plant and machine operators and assemblers	1032	Installers & Technicians	5	52
Elementary Occupations	1366	Installers & Technicians	5	68
Total	15141			1141

Source: Own calculations based on Cedefop (2008)

¹⁶ Cedefop (2008) Panorama – Future skills needs in Europe: focus on 2020

¹⁷ It should be noted that the Cedefop data is based on the EU-25+, excluding Bulgaria and Romania but including Switzerland and Norway.

Assumptions make craft and trade related workers by far the largest element of the target group

The estimated proportions of total employment used in table 3.1 are based on assumptions regarding the target group size within the whole group, using the 10% figure of sustainable construction as a proportion of total construction as a starting point. In the case of inspectors and auditors it is assumed they are primarily contained within the legislators, senior officials and managers and professionals categories. As these are broad categories and as auditors and inspectors are specialist roles it is assumed they only make up a small proportion (2%) of the total. A similar process has been applied for installers and technicians in the other categories. On this basis the clerks, service workers and shop and market sales workers and skilled agricultural and fishery workers categories are all excluded from the target group as not relevant. The primary category assumed for technicians and installers is crafts and trade workers where it has been assumed that the full 10% of the workforce falls within the target group, this makes it by far the largest occupational grouping.

3.2.2 Future Target Group Size and Employment

Projecting the scale of the target group into the future faces the same data issues, as highlighted in 3.2.1, i.e. that the group is not discretely recognised in the statistics.

3 factors in labour demand for target group – expansion, replacement and greening

There are 3 primary factors that will affect future employment in the target group:

1. **Expansion demand** – from overall sector growth
2. **Replacement demand** – to replace labour that retires or otherwise leaves the workforce
3. **Greening demand** – 'greening' within the construction sector will expand employment in the target group among existing workers

Sustainable construction annual demand 21-42,000...

An approach based on the literature reviewed in the course of this evaluation and using sustainable construction as a proxy for the target group (i.e. accounting for around 5-10% of all construction workers) gives a 21,000-42,000 'business as usual' annual labour demand across the EU to 2015. While not insignificant this level is not high in EU terms and it could be expected that the target group as a sub-set of sustainable construction would have still smaller needs. This is based on only the expansion and replacement demand.

...but could be much higher, implications for size of target group

It can be assumed that there will be significant greening demand as policy measures to promote EE and RES in buildings take effect and therefore a strong increase in the importance and scale of sustainable construction within the wider construction sector. This 'greening' would mean that a higher proportion than 5-10% of future construction jobs would be in sustainable construction, with implications for the size of the target group. On the basis of 20% of the future workforce being 'greened', the annual requirement would increase to 84,000.

The differences between the current workforce and a 'greened' workforce that falls into the target groups may only be small. It may require only relatively minor changes to current practices. However, given the size of the existing workforce, it involves large numbers of individuals, albeit with only small training needs. This issue is discussed in the next section of the report.

There have been projections and estimates of the employment growth and potential labour demand from RES and EE in buildings made elsewhere, such as:

- 150,000 new jobs annually due to the Energy Performance in Buildings Directive (EPBD) recast¹⁸;
- 200,000 extra man years in sector to achieve emissions reductions and 285,000 extra jobs if EPBD extended to all residential buildings¹⁹;
- 20,000-856,000 new jobs annually in sector depending on policies, models and assumptions²⁰; and
- 500,000 new jobs in energy efficiency across the EU²¹.

The results suggested by these methods do not provide a close match with the target group of concern in this evaluation. Applying and developing the modelling approach used in table 3.1 allows a modelling which better meets our demands.

Estimates based on Construction Sector modelling approach

Starting from the wider construction sector, the Cedefop analysis referenced in 3.2.1, projects a relatively small 3% growth in the construction sector between 2006-2015, with a consequent increase in total employment from 15.1 million to 15.6 million. This increase gives an annual expansion demand of around 44,000 workers.

Across the whole EU economy of 210 million workers, the same Cedefop analysis projects that 51 million jobs will arise from replacement demand – new workers required to replace those who retire or otherwise leave the workforce. This projected replacement demand amounts to around 25% of the 2006 workforce.

When these whole economy occupational replacement rates²² are applied to the construction sector, they give a replacement demand of over 3.8 million workers through to 2015, as shown in Table 3.2. When combined with expansion demand, this gives an annual requirement of around 425,000 skilled construction workers across the EU until 2015.

¹⁸ EESC (2009) Opinion of the EESC on the proposal for the EPBD (recast)

¹⁹ GHK (2009) The impacts of climate change on European employment and skills

²⁰ ETUC et al (2007) Climate change and employment: impact on employment in EU-25 of climate change and CO₂ emissions reduction measures by 2030

²¹ IEA (2008) Energy Efficiency Requirements in building codes, energy efficiency policies for new buildings

²² Sector specific occupational replacement rates for construction are unavailable

Modest overall employment growth for construction means low expansion demand...

...but significant replacement demand

Estimates of annual requirement for over 425,000 skilled construction workers

Table 3.2 Construction Sector expansion and replacement demand analysis 2006-2015

Construction Occupational Subsector	Expansion Demand 000's	Replacement Demand 000's	Total Requirement 000's
Legislators, senior officials and managers	189	240	429
Professionals	124	118	242
Technicians and Associate Professionals	177	183	360
Clerks	5	182	187
Service workers and shop and market sales workers	4	17	21
Skilled agricultural and fishery workers	-4	7	3
Craft and related trades workers	-159	2455	2296
Plant and machine operators and assemblers	41	241	282
Elementary Occupations	65	367	432
Total (2006-2015)	442	3811	4253
Annual Demand	44	381	425

Source: Own calculations based on Cedefop (2008)

Significant variations exist between MS and employment growth concentrated outside EU-15

The projections also show (see Table 3.3) considerable variation in employment changes between member states. Major changes are projected to take place in Germany (-115,000), Poland (+124,000) and the UK (+143,000). Some member states also have major relative changes. These are highlighted in the table and include significant decreases in Estonia and Sweden and significant increases in Greece, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, the Netherlands, Poland, Slovenia and Slovakia; highlighting a trend for significant expected employment growth in construction in many of the newer member states, with the notable exception of Estonia.

Table 3.3 Construction Sector employment analysis by member state

Country	Employment 2006 000's	Employment 2015 000's	Employment Change 2006-2015	As %
Belgium	247	263	16	6.5%
Czech Republic	432	395	-37	-8.6%
Denmark	174	177	3	1.7%
Germany	2139	2024	-115	-5.4%
Estonia	58	43	-15	-25.9%
Greece	348	402	54	15.5%
Spain	2383	2392	9	0.4%
France	1601	1657	56	3.5%
Ireland	251	268	17	6.8%
Italy	1831	1765	-66	-3.6%
Cyprus	37	48	11	29.7%
Latvia	90	105	15	16.7%
Lithuania	146	205	59	40.4%

Ex-ante evaluation of the initiative on the building workforce training and qualification in the field of energy efficiency and renewable energy within the Intelligent Energy Europe Programme

Luxembourg	30	33	3	10.0%
Hungary	319	408	89	27.9%
Malta	8	10	2	25.0%
Netherlands	499	557	58	11.6%
Norway	145	152	7	4.8%
Austria	267	263	-4	-1.5%
Poland	678	802	124	18.3%
Portugal	462	484	22	4.8%
Switzerland	306	300	-6	-2.0%
Slovenia	66	82	16	24.2%
Slovakia	138	161	23	16.7%
Finland	166	175	9	5.4%
Sweden	248	202	-46	-18.5%
UK	2073	2216	143	6.9%
Total	15141	15589	447	3.0%

Source: Cedefop (2008)

Scaling to target groups and greening demand

By following the approach used in table 3.1, an analysis of the target group impacts can be performed based on the assumptions of the proportion of the target group within the whole construction sector requirement. Using the expansion and replacement demand estimated in table 3.2, annual requirements for expansion and replacement demand can be calculated. These requirements amount to around 680,000 or 68,000 annually to 2015 (see table 3.4) in the EU-25, in the target groups. Some of the proportions used have been adjusted from those used to estimate the current size of the target group (table 3.1) on the basis of a greater future need for labour in the target groups as the sectors grow.

Table 3.4 Estimates of target group expansion and replacement labour requirement 2006-2015

Construction Occupational Subsector	Construction Sector Total Requirement 000's	Target group	Estimated proportion of total demand	Estimated Target Group Total Requirement 000's
Legislators, senior officials and managers	429	Inspectors & auditors	2	9
Professionals	242	Inspectors & auditors	2	5
Technicians and Associate Professionals	360	Technicians	5	18
Clerks	187			0
Service workers and shop and market sales workers	21			0
Skilled agricultural and fishery workers	3			0
Craft and related trades workers	2296	Installers & Technicians	25	574
Plant and machine operators and assemblers	282	Installers & Technicians	10	28
Elementary Occupations	432	Installers & Technicians	10	43
Total	4253			677

Annual Requirement				67.7
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Source: Own calculations based on Cedefop (2008)

Greening demand will impact the workforce that continues to work within the sector throughout this period. Working from the estimated total construction sector employment of 15.6 million in 2015, subtracting the 1.1 million already considered 'greened' (within the target group) and discounting the 4.3 million already accounted within expansion and replacement demand leaves approximately 10.2 million workers in the construction sector. The expectation, and in many areas obligation, that sustainable construction will become mainstreamed over the next 10 years implies that a significant proportion of this 10.2 million remaining workforce will see a need for their roles to be 'greened' over this period.

Estimate target group size of 2.5 million, growth of over 1.4 million between 2006-2015

Applying the proportions used in table 3.1 to this remaining workforce as a conservative estimate of a 'greening' factor, enables a calculation of total greening demand within the target group as shown in table 3.5. The estimated greening demand totals nearly 750,000 over the next 10 years and when combined with estimated replacement and expansion demand, as calculated in table 3.4, gives a total labour requirement in the target group of over 1.4 million (140,000 annually). The greening demand represents over half of the total estimated requirement in the target group, highlighting the importance of up-skilling the existing workforce to carry out the new roles. Combining the total labour requirement with the size of the target group in 2006 (as estimated in table 3.1) gives **an estimated total target group size of over 2.5 million workers across the EU-25 by 2015, representing around 16% of total construction sector employment**

Table 3.5 Estimates of greening demand and total target group labour requirement 2006-2015

Construction Occupational Subsector	Remaining Workforce	Target group	Proportion of Remaining Workforce 'greened' into Target Groups	Total Greening Demand in Target Group	Total Replacement and Expansion Demand in Target Group	Total Estimated Target Group Labour Requirement
Legislators, senior officials and managers	751	Inspectors & auditors	2	15	9	24
Professionals	431	Inspectors & auditors	2	9	5	13
Technicians and Associate Professionals	678	Technicians	5	34	18	52
Clerks	553		0	0	0	0
Service workers and shop and market sales workers	45		0	0	0	0
Skilled agricultural and fishery workers	18		0	0	0	0
Craft and related trades workers	6044	Installers & Technicians	10	604	574	1179

Plant and machine operators and assemblers	739	Installers & Technicians	5	37	28	65
Elementary Occupations	930	Installers & Technicians	5	47	43	90
Total	10189			745	677	1422
Annual Requirement				74.5	67.7	142.2
Estimated 2006 Target Group Size						1141
Estimated 2015 Target Group Size (2006 + Total Requirement)						2563

Summary

Although the Cedefop projected expansion of employment in the whole construction sector is less than 500,000 to 2015, various studies have been highlighted that back the notion that sustainable construction will rapidly become more and more important within construction as a whole. The exact scale and rate of change is not known but the estimates presented here and the weight of current analysis points to an expansion in the sustainable construction sector on the scale of tens of thousands or more each year across the EU, and even in the hundreds of thousands in total over the next decade. This rapid expansion in sustainable construction will lead to strong demand for skilled workers in the target groups of this study and identifying the type, level, location and scale of these skills needs will be a crucial factor in targeting any intervention. The next section examines these factors to further detail and quantify the target group characteristics and skills needs.

Sustainable construction to move into mainstream – will lead to strong demand for skilled workers in target groups

3.3 Skills and the target group

This section explores the skills needs and shortages that currently exist in the wider construction sector and the target group, the causes of these shortages and how objectives for buildings EE and RES will impact the nature of the skills requirements of the target group.

3.3.1 Current skills needs and shortages

Reflecting on the construction sector as whole it is clear, from the variety of literature on the subject, that skills shortages have been identified as a common problem across the sector over the previous decade. European council communications and conclusions from 1997 and 1998 highlighted a "need to improve the education level, the qualifications of the workforce and the image of the sector"²³ due to existing and growing skills shortages and the prospect of an ageing workforce not being replaced. These views have been repeated since. Most recently Cedefop have referred to recruitment difficulties in the sector as

Construction sector skills shortages have been persistent

²³ EC from Danish Technological Institute (2008) Future Qualifications and skills needs in the construction sector

'endemic'²⁴, identifying a number of causes for the shortages, including structural barriers to skills development in the sector, these are explored in section 3.3.2.

Variations in the types and severity of skills shortages exist between member states and where the single European labour market works efficiently short term solutions to skills shortages can be found by drawing on skilled workers from other member states.²⁵ A reliance on this type of labour has been identified in the UK construction sector²⁶, though skills shortages are still reported.

The latest data from the construction sector suggests that it has suffered a marked decline during the economic downturn, due to development activity being put on hold or cancelled outright. This has been accompanied by significant falls in employment as highlighted in section 3.2. The resulting pool of unemployed labour has eased a number of skills problems in the industry in the short term at least. Quarterly job vacancy ratios for the sector have declined over the last 2 years in almost all MSs that have collected data, caused by a decline in the number of vacancies and also excess labour capacity. While the recession has somewhat eased current shortages in the industry there is still evidence that they exist in some MSs²⁷. An increase in work through a return to growth or major buildings energy efficiency and renewable energy programmes as laid out in recent recovery plans would exacerbate these problems.

In line with the wider sectoral situation, evidence of skills shortages in energy efficiency and renewable energy in buildings has also emerged in recent years. For example it is reported that in the UK there are shortages in the supply of technical specialists, designers, engineers, and electricians, in Germany the renewable energy industry is suffering from a shortage of qualified workers²⁸ and in France in renewable energy and energy efficiency installers²⁹.

Consultees from energy agencies and industry associations also cited evidence of the existence of skills shortages through the poor performance of new buildings and EE and RES appliances in them, with high proportions of incorrectly installed technology identified by manufacturers. Consultees involved in technology specific skills programmes pointed to the general skills shortages in the sector as a cross-cutting issue affecting all due to the interlinked nature of the various crafts and trades in delivering a completed building, where skills deficiencies in one area can have a knock effect on quality throughout the building. For example, a bricklayer needs to leave the correct opening size for a plumber to fit pipes through and the plasterer than needs to properly seal around this opening in order to minimise heat loss via the opening. There are many other

²⁴ Cedefop (2009) Skills for Europe's Future: Anticipating occupational skills needs

²⁵ This would only hold if qualifications are recognised. This is further elaborated in section 3.4.7.

²⁶ House of Lords Select Committee (2005) Science and Technology Second Report

²⁷ The Chartered Institute of Building (2009) Construction industry still suffering from skills shortage despite recession. [http://www.politics.co.uk/opinion-formers/press-releases/economy-and-finance/ciob-construction-industry-still-suffering-from-skills-shortage-despite-the-recession-\\$1296707\\$366321.htm](http://www.politics.co.uk/opinion-formers/press-releases/economy-and-finance/ciob-construction-industry-still-suffering-from-skills-shortage-despite-the-recession-$1296707$366321.htm)

²⁸ Cedefop (2008) Future Skills Needs for a Green Economy

²⁹ ETUC (2007) Climate Change and Employment: Impact on Employment in the EU-25 of climate change and CO₂ reduction measures by 2030

examples of the need for all of those involved in construction, (e.g. craftsmen, designers, architects, auditors and inspectors) to have an understanding of how the many elements in a building need to come together to form an efficient and low carbon whole.

Industry recognises skills shortages

Views from industry support this evidence of trends. The European Technical Contractors Committee for the Construction Industry (CEETB) for example has investigated the skills issue³⁰. It has found that the trend over the past decades has been for traditional "installers" to significantly extended their field of activities and develop into specialist engineering contractors. These installers not only offer the installation of technical equipment, but also offer a whole package of highly complex services in the areas of building comfort, end-use efficiency and renewable sources of energy. However, it believes that the provision of single skills is certainly not enough to meet the challenges that accompany the rapid development of products, technologies and the increasing complexity of the related installation processes.

Future growth in buildings EE and RES likely to compound existing shortages

The evidence presented centres closely around shortages in skilled trades and craft workers, specifically relevant to the target groups of the proposed intervention. There is strong general consensus that skills gaps exist in the buildings workforce for EE and RES. With skills shortages already existing in the buildings workforce in energy efficiency and renewable energy any anticipated future growth will increase the severity of shortages and could pose a major barrier to the achievement of overall EU economic, social and environmental objectives. Understanding and addressing the causes of the skills shortages is vital to the design of appropriate intervention.

3.3.2 Causes of skills shortages

There are many causes of skills shortages

This section reviews the general causes of skills shortages in the sustainable construction sector, as a proxy for the target group. The skills shortages in the sustainable construction sector have a variety of causes, a review of the extensive literature on the subject and views received through consultation reveal a number of important factors. Table 3.6 presents the major causes identified and evaluates the appropriateness of IEE intervention to address them.

Table 3.6 Major causes of skills shortages in the buildings EE and RES workforce

Causes	Within IEE & proposed intervention scope?
Rapid sector growth – in energy efficiency and renewable energy in buildings	No, sector growth is promoted and encouraged by IEE, skills shortages are a consequence
Rapid technological change – hard for workforce to keep pace – risks associated with new technologies	Yes , workforce impacts within IEE remit as non-technical barrier
Ageing workforce – ageing workforce profile due to lack of new entrants	No, age-profile of sector is factor in shortages but outside scope of proposed intervention

³⁰ From website <http://ceetb.eu/> and 'Comments of CEETB on the proposal for a Directive on the promotion of the use of energy from renewable sources (2008/0016 COD) §13 & Annex IV'

Causes		Within IEE & proposed intervention scope?
Workers in sector risk averse – reluctance to participate in training		Yes , IEE activities to promote training would fall in proposed intervention scope to strengthen instruments to support training.
Training through industry (or 'product schooling')– skills biased to trainers products, little wider learning – can lead to 'lock in'		Yes , initiative could potentially align these existing programmes towards wider skills needs.
Low valuation of skilled work – price of building often influenced more highly by land value than quality of physical structure or presence of EE and/or RE		No, building valuation is outside IEE scope, could be indirectly influenced by action on building markets.
Lack of awareness – of what can be achieved by EE and RE in buildings		Yes, but IEE already addresses through existing actions
Low consumer demand – for energy efficiency and renewable energy in buildings		Yes, but IEE already addresses through existing actions
Lack of new entrants – due to negative sector perception, related to:	Poor safety record	No, these are wider issues for the sector itself and fall outside the scope of the proposed intervention. Though if the interventions improve the sector's image they would be benefits here,
	Low pay – viewed as sector for 'uneducated'	
	Poor status in society – image of 'cowboy' operators	
	Male dominated – not open/friendly to female entrants	
High proportion of SME's in sector	Risk Averse – skills training and new technologies seen as a risk	Yes , within scope as a non-technical barrier and proposed pilot intervention could support / leverage training investment to overcome these issues.
	Not Innovative – only small budget for R&D	
	Sub-contracting – commonly used in industry, barrier to training internally	
	Lack of resources – time and financial to support skills training	
	Fragmented demand and structures	
	Reluctance to invest in training as this will enable employees to change jobs	
Labour market barriers - there remain difficulties in cross-border employment	Qualifications not portable between member states	Yes , important non-technical barrier that aligns with scope, although already being addressed through EQF
	Language barriers	No, outside IEE scope
	Differences in buildings regulations in nations and regions – EPBD implemented differently between MS and regions.	No, MS building regulations are outside IEE remit – though potential partner role in encouraging communication and harmonisation between MS
Quality and availability of training and skills provision – a variety of issues:	Lack of capacity – not enough places	Yes , within IEE scope and proposed intervention is specifically targeted to 'create, strengthen or link structure or instruments to boost' VET and qualifications
	Fragmented provision – too many providers	
	Lack of established occupational standards – courses not accredited	
	Variable quality and standard of provision – employers and learners not confident	
	Flexibility of courses – time taken to adapt to new technologies	
	Cost of equipment – providers can't afford to run some courses	

Many match IEE scope – some already IEE priorities

The range of different causes of skills shortages identified highlights the challenges facing the sector and goes some way to explain the persistence of skills shortages in many member states. It is also noted that many of the causes fall within the scope of IEE, indeed many IEE projects are already working to address some of these issues such as consumer demand and awareness. The causes identified above were raised by consultees throughout the consultation process, with lack of consumer understanding and demand for EE and RES in buildings a recurring theme. There was a belief that this is a crucial underlying factor and that low consumer demand for EE and RES in buildings means that the market demand is not there to support/require companies to invest in training, particularly when appropriate incentives are absent.

Survey results validate causes and identify defined skills sets as an important issue

Complementing and validating the causes identified through consultation and the literature a survey of energy agencies and building associations across the EU was also conducted. The results are presented in table 3.7 with a clear response that ‘lack of defined skill sets relating to energy efficiency and installations of renewables in buildings’, is an important barrier. A reason for this may be that it is not clear to those in the sector, what new skills the building workforce requires. As the new skills are not explicitly defined there is no particular need observed by the building workforce to engage in training. The former factor implies that the provision does not match the need of the building workforce. This could either be as a result of the lack of need for EE and RE training or due to the fact that the building workforce does not see any relevance in this particular subject. The importance of the latter element (the lack of awareness of provision of building training) is not fully shared by the building associations. The building associations believe that the building workforce is more aware of the provision of training than the energy agencies.

Table 3.7 Most important barriers to training and skills development

Barrier	Energy agencies	Building associations
generally poor uptake of training in the building industry	6	2
lack of defined skill sets relating to energy efficiency and installations of renewables in buildings	15	9
lack of flexibility/lack of rapid response in the provision of building training	5	5
Lack of relevant training courses	9	8
Lack of awareness of provision of building training	7	3
Lack of access to building courses/training	5	2

Other barriers that were mentioned refer to the lack of time for the building workforce to undertake training and its high cost, especially for small enterprises. This barrier is also mentioned in literature, especially for SMEs that cannot afford to spare time from current projects to have their personnel trained, or to meet the course costs. Additional barriers relating to the lack of certification and accreditation schemes for installers and/or performance guarantees and the lack of an appropriate legal framework for the obligatory re-training / specialisation of certain occupations in the recent advances in technology were also raised. In the Netherlands, the survey answers of the energy agency aligned with the views of the Dutch building association, indicating that the lack of demand for EE and RE measures from building owners was an important barrier. If there is no demand

for building companies to install extra EE and RE technology then no additional training will be given to its workforce. In other words, they felt the focus of activity should be further upstream in boosting the demand for EE and RE which in turn will require the building workforce to seek training.

In summary the barriers our consultation and survey have identified to the uptake of training which are most relevant to the IEE programme and within the scope of the proposed intervention are:

- Rapid technological change;
- A workforce that is risk averse;
- Low valuation of skilled work in sector;
- **Portability of qualifications;**
- The variety of problems stemming from a high proportion of SMEs in the sector; and
- **A variety of problems related to the quality of training and skills provision.**

It is clear that qualifications and the quality of training and skills provision are regarded as genuine and important barriers by those in the sector, demonstrating that the scope of the intervention is relevant. It is also vital that any intervention is forward looking and accounts for the growth in skills needs expected from the push for greater EE and RES in buildings, given that shortages already exist.

3.3.3 Impact of increase in EE and RES in buildings on skills needs

The growth in buildings EE and RES as part of the wider transition of sustainable construction into the mainstream will lead to a variety of changes in the buildings workforce and particularly for the target groups of installers, technicians, inspectors and auditors. As in other sectors of the economy the transition will affect the types of jobs and skills required in 3 main ways, it will:

- **Create new occupations and skills needs** – these could emerge around technologies and processes that are not currently deployed, perhaps through technologies that do not yet exist or existing technologies such as fuel cells which as yet are not widely commercial or practical at buildings level.
- **Lead to a greening of existing occupations and skills needs** – policy and legislative drivers for more energy efficient and low carbon buildings, matched with consumer demand for the same, will push skills development in the sector. The requirements of existing occupations will change as skills and knowledge of new technologies becomes essential in the industry. Some trades and craft occupations, such as carpentry for example, may only see small changes but others, particularly those in energy efficiency and renewable energy installation and technician roles are likely to see rapid change to match the pace of technological change. This could lead to real innovation and a change in what these and their related occupations (e.g. electricians, plumbers) entail, blurring the lines

between some roles. This greening of skills will also affect professionals across the sector such as architects, planners, managers and others including the other functions within the target group, of inspectors and auditors. This affects those already in the workforce and those new entrants that will be brought in to replace these workers as they retire or leave the sector.

- **Make some occupations and skills obsolete** – certain technologies and processes will become obsolete, or significantly smaller scale as legislation works against or prohibits them and other newer technologies develop e.g. oil or coal fired boilers.

These changes will place new demands on learners and providers and also new challenges for policymakers, employers and other sectoral and skills stakeholders to address. There will also be changes to many roles in the construction process that are not currently considered part of 'sustainable construction' that reflect the need to improve energy efficiency and incorporate renewable energy. Many of these changes may require only very minor changes to existing skills, with some reports such as a Canadian report into skills for EE construction³¹ suggesting that skilled craft and trades workers may be able to learn many of the techniques to 'green' their skills through short courses or through on the job training. This is an important point to consider in terms of the type of intervention that is required, i.e. a very large part of the skills needs in question relate to the existing workforce who are arguably more difficult to reach than new entrants, in terms of ensuring the successful take-up of training.

The European Trade Union Confederation (ETUC) is concerned that the drive to energy efficiency and renewable energy in buildings will inevitably have an impact on jobs, the working conditions and the incomes in many sectors. It argues that the social partners must be involved in addressing these impacts. The ETUC has called for a new European framework for tripartite dialogue on climate change, involving the social partners and the Commission.³²

The changes will not only impact the skills needs but also the way people in the sector work and the health and safety implications. Stakeholders such as the European Federation of Building and Woodworkers (EFBWW) see these developments leading to vocational and professional training becoming ever-more important.

The EFBWW has topics on the agenda relating to upgrading skills with regard to the integration of young people in the labour market, lifelong learning, employability of construction workers, the changing situation in the labour market owing to such factors as an ageing society and the ever-greater requirements of construction enterprises. They regard lifelong and multidimensional learning as indispensable for every construction worker. The

³¹ Clean Air Partnership (2007) Skills for Energy Efficient Construction: A report on trades training for energy efficient buildings in the Greater Toronto area

³² www.etuc.org

great variety of work situations and fast pace of technological developments mean that building workers need to undergo continuing further training.³³

The survey of energy agencies and building associations conducted during this study indicated that most believed there is at least some need for training in the buildings EE and RES workforce (see table 3.8). The median response for the energy agencies regarding their opinion on the scale of training needs is in the ‘some need for training’ category, while the median opinion of the building associations is that there is a ‘large need for training’. This shows that key actors at MS level recognise the need for training in this field which is an important prerequisite for the proposed EU initiative.

Table 3.8 Approximate scale of training need in MS

	Energy agencies	Building associations
no/little need for training	0	1
some need for training	15	3
large need for training	7	6

Type of specific future skill needs

A variety of studies³⁴ have examined what the specific future skills needs related to buildings energy efficiency and renewable energy skills will. These needs encompass almost every occupation within the buildings and construction sectors. The needs include core skills such as Science, Technology, Engineering and Maths (STEM) and IT skills, technical skills, management and soft skills and knowledge of the necessary new technologies, policies and processes.

The need for architects to improve their skills in designing EE and RES into buildings is seen as a key starting point by many. Multiple reports also refer to the need for a systems integrator, someone who oversees and integrates the various processes, technologies and personnel in new-build and retrofit projects. This is likely to be an evolution of a project or site manager role with improved skills in design and technical knowledge. A common general skill that is also frequently mentioned is the ability for all workers to think of building as a system and how their work interacts with other aspects of the building to contribute to overall EE. This point was raised in the consultations of this study, in that training to understand the whole system, the value chain and the systemic aspects is important to achieve the end result of an energy efficient building.³⁵

General skills needs are also expected to become more important in future, particularly issues around quality. Poor quality installations caused by low skills are expected to become more serious issues as the skills requirements for more energy efficient buildings become higher, for example to build a fully airtight *passivhaus*.

³³ www.efbww.org

³⁴ See Annex One for references of literature reviewed

³⁵ Interview Bouwend Nederland (building association in the Netherlands) held 4 January, 2010.

Table 3.9 summarises the specific occupations and skills and knowledge areas identified as future needs, sorted into needs felt to be inside and outside the scope of the target groups of this study. Though clearly the occupations outside the scope of this study are important to achieving policy goals in buildings EE and RES, particularly generic skill sets in STEM, IT and innovation.

Table 3.9 Scoping Identified occupations and skill and knowledge areas

Scope	Specific Occupations	Specific Skills and Knowledge areas
Inside scope of this evaluation	<ul style="list-style-type: none"> • Technicians (non-graduate) • Installers (Renewable Energy, Energy Efficiency equipment, Insulation, HVAC) • Energy managers and auditors • Buildings inspectors • Plumbers • Carpenters • Electricians 	<ul style="list-style-type: none"> • Knowledge of Renewable Energy, Energy Efficiency, sustainable construction techniques, legislation, resource management • Operation and maintenance of building insulation materials and energy saving equipment • Retrofit
Partly inside scope of this evaluation	<ul style="list-style-type: none"> • Facilities managers • Systems integrator • All other trades people (bricklayers, glazers, floorers, building envelope specialists, tilers, gas fitters, pipe fitters, metal workers, painters, decorators) 	<ul style="list-style-type: none"> • Facilities management – complex systems • Systems thinking
Outside scope of this evaluation	<ul style="list-style-type: none"> • Architects • Engineers • Planners • Surveyors • Ecologists • Designers (interior, industrial) • Site and Project managers 	<ul style="list-style-type: none"> • Science, Technology, Engineering and Mathematics (STEM) skills • Diagnostic techniques • Quality workmanship – attention to detail • IT skilled – multidisciplinary • Organisational skills • Production and distribution of building insulation materials and energy saving equipment • Integrated buildings design • Finance • Sales and marketing • Leadership • Innovation • Processes

Skills needs scoped to target groups – other skills also vital to wider objectives but outside scope of proposed intervention

It is important to recognise that although specific occupations such as architects, designers and engineers or generic skills such as of IT skills, Finance and marketing will be vital to developing more energy efficient and renewable energy integrated buildings, they fall outside the specific terms of this initiative. This initiative is specifically targeted on the inspectors, auditors, technicians and installers and the skills necessary for them to improve energy efficiency and renewable energy in buildings. These types of skills fall directly into the study scope and indirectly draw in other closely related roles such as facilities managers and the range of other trade and crafts workers responsible for

buildings energy efficiency such as bricklayers, glazers, floorers, building envelope specialists etc;

The question of the balance of needs within the target group was also raised during the survey and the categories of building workforce (by occupation / trade) highlighted as most in need of skills training are presented in the table 3.10. Every category is covered, but we see a large need for the installers of renewable energy and energy efficiency. Other trades that were also mentioned are the designers, planners, architects, HVAC technicians, designers and engineers for renewables and energy efficiency and the vendors of equipment and systems.

Table 3.10 Trades in need of training

	Energy agencies	Building associations
plumbers	7	4
electricians	6	1
installers renewable energy	15	8
installers energy efficiency	14	9
installers insulation	8	6
inspectors	10	5

Overall the views expressed through the initial survey and by consultees were that there was a large need for skills training in the sector for the target groups. Embodied in this was also a strong expectation that skills training needs will persist into the future and intensify in some areas, be it geographically, technology related or in specific skill sets.

The European Construction Industry Federation (FIEC) as a representative of the employers in the sector, state that awareness of the fundamental role buildings play in determining energy efficiency is vital for society as a whole³⁶. It acknowledges the need for additional training (school and vocational training) in energy efficiency across the construction industry and that more existing funding, that can be used for energy efficiency training, e.g. ESF, Leonardo da Vinci, as well as other specifically energy efficiency related funding sources, is needed. These funds should be channelled into vocational training of the profession and in particular, craftsmen and SMEs³⁷.

3.3.4 Level and scale of future skills needs

With the types of skills scoped for this study an estimate of the level and scale of skills needs can be made.

Level

The analysis for Cedefop of the construction sector skills profile in 2006 (see figure 3.11) shows that over 38% of the 2006 workforce have low qualifications,

³⁶ www.fiec.eu

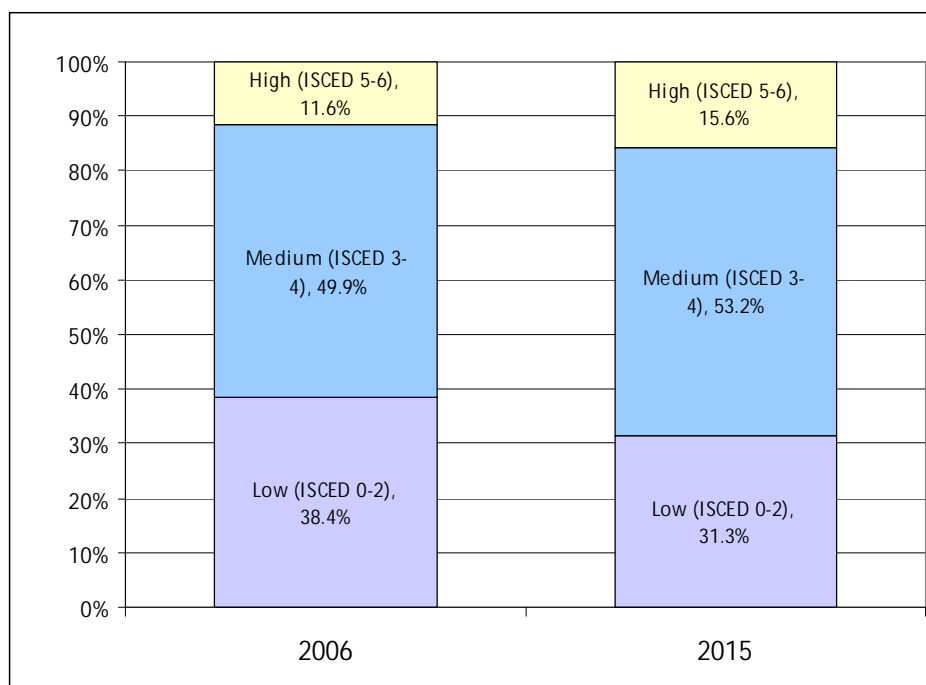
³⁷ Public Consultation on the Evaluation and Revision of the Action Plan for Energy Efficiency [COM(2006) 545], available on <http://www.fiec.eu>

Greater training support required

Move to more highly skilled workforce profile

a significantly higher proportion than the whole economy average of 26%. The projections to 2015 show a move towards a more highly skilled construction sector workforce, with the proportion of those with low qualifications falling to 31% of the workforce.

Figure 3.11 Construction Sector – Changing Skills Profile 2006-2015



Over 90% of expansion and replacement demand at ISCED levels 3 and above

The change towards higher qualifications is projected to be most marked among craft and related trades workers, plant and machine operators and assemblers and elementary occupations. Notably these are the occupational sub-sectors most closely matched to the installer and technician target groups and with the highest existing proportions of workers with low qualification levels. Table 3.12 presents the expansion and replacement demand requirements for the whole construction sector by skill level. Although there remains some demand at the low qualification levels (ISCED L0-2), the great majority of the labour requirement is expected to be at medium (ISCED L3-4) and high (ISCED L5-6) levels. There is significant projected demand for medium skills in craft and related trades workers between 2006 and 2015, over 1.6 million workers, reflecting the expected upskilling required for the target groups.

Table 3.12 Construction Sector expansion and replacement demand by skill level 2006-2015

Construction Occupational Subsector	Total Requirement 000's	Low Qualification Requirement 000's	Medium Qualification Requirement 000's	High Qualification Requirement 000's
Legislators, senior officials and managers	429	89	139	199
Professionals	242	19	79	143
Technicians and Associate Professionals	360	35	133	191
Clerks	187	4	97	88

Construction Occupational Subsector	Total Requirement 000's	Low Qualification Requirement 000's	Medium Qualification Requirement 000's	High Qualification Requirement 000's
Service workers and shop and market sales workers	21	8	9	4
Skilled agricultural and fishery workers	3	-1	2	-1
Craft and related trades workers	2296	157	1658	483
Plant and machine operators and assemblers	282	-34	287	30
Elementary Occupations	432	10	369	52
Total	4253	288	2773	1189
As % of total		6.8%	65.2%	28.0%

Source: Own calculations based on Cedefop (2008)

Reasons for higher skills profile are unclear – may only reflect a formalisation of skills already present in workforce

It is not clear from the Cedefop analysis how or why this change in profile occurs, it may be due to up-skilling within the sector but it may also be due to retirement of those from the sector classed as low skilled, i.e. with little formal education, but hands-on know-how, experience and skills; plus the entry of younger workers with higher certified educational attainment (but little experience). A combination of these factors is most likely, with mixed implications for actual skills shortages.

Scale

Continuation of the modelling approach to the target group developed in section 3.2 with the skills needs by level presented in Table 3.12 allows an estimate of the target group skills needs at each level to be formulated. This is presented in Table 3.13 and as before highlights an EU-wide need for around 140,000 workers each year in the target groups. The profile by skill level breaks this down into approximately 50,000 workers at low (ISCED L0-2), 80,000 at medium (ISCED L3-4) and 15,000 at high levels (ISCED L5-6). The requirement profile focuses significantly more on the low skilled group than for the wider sector, this is a reflection of the fact that professional occupations have been largely scoped out and the strong influence of the craft and trades related workers group dominates the skills profile of the target group. At the same time the skills profile is higher than that of the trades and craft workers sub-sector in 2006.

Table 3.13 Estimate of target group annual demand by skill level 2006-2015

Construction Occupational Subsector	Total Requirement	Estimated Target Group Low Qualification Requirement 000's	Estimated Target Group Medium Qualification Requirement 000's	Estimated Target Group High Qualification Requirement 000's
Legislators, senior officials and managers	24	6	10	8
Professionals	13	1	3	10
Technicians and Associate Professionals	52	5	28	18

Clerks	0	0	0	0
Service workers and shop and market sales workers	0	0	0	0
Skilled agricultural and fishery workers	0	0	0	0
Craft and related trades workers	1179	409	663	107
Plant and machine operators and assemblers	65	23	40	3
Elementary Occupations	90	42	43	5
Total	1422	486	786	150
Annual Requirement	142.2	48.6	78.6	15.0
As % of total		34.2%	55.3%	10.6%

Source: Own calculations based on Cedefop (2008)

Scoping target group to only low and medium skills leaves 125,000 annual need

In respect of the proposed intervention it is likely to be most closely targeted on the low and medium skills groups, encouraging the acquisition and building of skills at the lower levels, developing progression pathways for workers to the medium levels and at the medium levels enabling workers to gain the skills and qualifications to meet the new demands of energy efficiency and renewable energy in buildings. These groups total over 1.25 million over the next 10 years, or over 125,000 annually, a significant potential target group on the assumption that these workers will all require some form of training or qualification.

Location

Needs vary significantly between Member States

As noted in section 3.2 the scale of needs at member state level is dependant on a variety of factors such as climate, level of development, culture and national building regulation; the nature of skills training and certification systems in each MS are also key factors. Questionnaires sent out to the MS management committee of the IEE programme by DG TREN prior to this study point to specific national needs and priorities for the target groups. These are summarised in Table 3.14. These views give an insight into the scale and variation of needs for the target group. They also highlight the variation in the level of understanding, mapping and data availability regarding the issue between member states.

Table 3.14 Summary of MS initial survey responses – by target group and scale

Member State	Needs and Priorities	Quantity
Austria	Priority to train buildings inspectors, auditors and skilled professionals	Unknown
Belgium (Flanders)	Needs for installers, building contractors, architects and engineers	A few - several thousand
Bulgaria	Priority for installers, inspectors, auditors, architects and engineers	a 'considerable number' required
Czech Republic	Auditors and inspectors	About 2,000
Denmark	Main target groups are installers (electricians, plumbers, etc;) and other technicians (carpenters and bricklayers). Carpenters particularly important.	Over 260,000 carpenters and installers in country, many will need training.
Estonia	Priority need for installers, other technicians, architects and designers	Unknown

Member State	Needs and Priorities	Quantity
Finland	Training need for architects, HVAC designers and project managers for new-build and maintenance and facilities managers for existing buildings. General need for inspectors, auditors and energy assessors.	Unknown
Germany	Needs in all areas, installers, inspectors, auditors, other technicians and others including project developer, project manager (construction engineers, architects..), product developer (heating pumps), creation of a project controller, somebody who is responsible for the energy efficiency/ RES in the whole building process and who is controlling the process, craftsmen, facility manager, site manager, architects, designers/planners and teachers.	Numbers could be 'huge', priority on energy efficiency, renewable energy can integrated later on.
Ireland	Priorities 1. Installers and other technicians (designers, specifiers) 2. Auditors 3. Inspectors High priority – architects, engineers Need to engage building owners – life cycle costs	Total BER assessors: 2,500, Other Assessors: (boilers – xx) (air con – xx), Installers: 400. Architects: 2,000, Engineers: 5,000. Rough estimates.
Lithuania	Needs in all areas including inspectors (boilers, heating, HVAC systems), energy auditors and certification professionals.	50-100 other technicians, 300-500 energy certification professionals and the market will ascertain the remaining numbers of workforce needed to be trained
Malta	Priorities 1. Installers (builders, insulation, designers and interior decorators) 2. Inspectors and auditors 3. Other technicians	· Installers - not available - possibly around 250 · inspectors buildings - around 200 · auditors - around 200 · inspectors boilers - 30 · inspectors ACs - around 150 · builders - around 150 · designers - around 80 · other technicians - around 150
Poland	Highest priority: Installers and auditors Medium priority: Inspectors Others – local authority auditors knowledge	At vocational level 3,000-5,000, energy auditors and inspectors for buildings 1,500-2,500, Energy auditors for industry 1,000-2,000
Spain	Need for Energy managers and auditors, installers and maintenance skills, inspectors and technicians	Unknown
Sweden	Installers, operational staff (caretakers, facilities managers) , public sector inspectors (energy efficiency)	Some needs
United Kingdom	Range of professional skills, energy advisors, public planning and building control officers, facilities management (technical skills).	Unknown

Source: IEE Management Committee survey

This data provides an insight into the different priorities of each member state and points to their likely views on solutions to address building workforce training. One member state feels the priority lies in upgrading auditors and inspectors (Czech Republic), while most states also include the installers (e.g. Ireland, Austria) and others take a broader scope also including architects and engineers (e.g. Bulgaria, Belgium). In Denmark a strong need for skills in carpentry, potentially in the tens of thousands, was identified, yet no other state mentioned this as an explicit need. Furthermore, the rules with regard to

accrediting training and trainers differ per country.³⁸ The patterns illustrated here show the different approaches to assessment, validation and recognition, for example the German system is highly formal, hence the ban on no accredited individuals issuing energy performance certificates, while other countries are less strict. Some countries, for example the UK, have seen Health and Safety or other requirements drive qualifications development and certification in the target groups.

The modelling approach also provides quantitative estimates of requirements

A quantitative estimate can also be provided using the modelling approach developed in this report. Table 3.15 presents an estimate of total skills needs for each EU-25 member state at each skills level, based on the projected share of total EU construction employment in 2015. For all countries this represents 7-13% of their 2006 construction workforce. The largest needs arise in Germany, Spain, France, Italy and the UK, consistent with their population size.

Table 3.15 Estimate of total requirement by MS and qualification level 2006-2015

Country	Total Requirement '000	Estimated Low Qualification '000	Estimated Medium Qualification '000	Estimated High Qualification '000
Belgium	24	8	13	3
Czech Republic	36	12	20	4
Denmark	16	6	9	2
Germany	185	63	102	20
Estonia	4	1	2	0
Greece	37	13	20	4
Spain	218	75	121	23
France	151	52	84	16
Ireland	24	8	14	3
Italy	161	55	89	17
Cyprus	4	1	2	0
Latvia	10	3	5	1
Lithuania	19	6	10	2
Luxembourg	3	1	2	0
Hungary	37	13	21	4
Malta	0.912	0.312	0.504	0.097
Netherlands	51	17	28	5
Norway	14	5	8	1
Austria	24	8	13	3
Poland	73	25	40	8
Portugal	44	15	24	5
Switzerland	27	9	15	3
Slovenia	7	3	4	1
Slovakia	15	5	8	2
Finland	16	5	9	2
Sweden	18	6	10	2

³⁸ Partly cited from Towards an Energy Efficient European Building Stock An RICS Status Report on the Implementation of Directive 2002/91 on the Energy Performance of Buildings (EPBD) in the EU Member States

UK	202	69	112	21
Total	1422	486	786	150
Annual Requirement	142.2	48.6	78.6	15.0
% of total		34.2%	55.3%	10.6%

Data has limitations – estimates should be treated as indicative

The estimates provided in table 3.15, represent the expected annual labour requirement for the target groups across the various skills levels. These estimates fit broadly with the opinions and data received during consultations. At the same time it has become clear through this study that detailed MS specific data on the exact scale and nature of skills needs in the target groups is very limited. The numbers we have calculated illustrate the potential scale of annual requirements but should be treated with caution given the assumptions used in their calculation as more detailed modelling was not feasible within the resources of this study.

3.3.5 Summary

This section has estimated that based on 2006 data the target group is approximately 1.1 million workers. Projections based on various assumptions anticipate that the target group could more than double to over 2.5 million by 2015, constituting over 15% of the total construction workforce. This growth of 1.4 million will come from expansion of the sector, replacement of those leaving the sector and a greening or re/up-skilling of those already working in the sector. This is likely to cause skills problems for a variety of reasons, not least the fact that skills shortages already exist in the wider construction sector and specifically in EE and RES skills.

The causes behind these existing shortages are varied, from a lack of consumer demand, high proportion of SMEs and poor sector image through to a lack of defined skill sets and qualifications and issues around training provision. The latter two along with consumer demand, emerged as recurring themes through the course of this evaluation and illustrate the need for an intervention to address qualifications and training for the buildings EE and RES workforce.

With regard to the type and scale of skills needs that will emerge as policy pressure increases the demand for EE and RES in buildings it is clear that the target groups are among the occupations with the most important roles to successfully achieve this and as such they will experience changes in their skills requirements. Mapping the types of skills needs to the skills profile of the target groups enables an estimate of the levels of skills demand with almost 90% of the skills requirement arising at Lower and Intermediate skills levels. This estimated requirement amounts to over 125,000 annually through to 2015.

Attempts to illustrate the geographical spread of these needs highlighted the deficiencies in the current data. There are some quantitative assessments by officials in selected member states which give an insight into the likely types of needs but these are not extensive and we could not identify a consistent source of data wholly appropriate to the task. This raises key issues around the actual size

and type of the need, which while widely understood to exist and expected to grow in the coming years are not accurately and consistently quantified.

3.4 Current training provision and qualifications

This section examines the current structure of provision through the vocational education and training (VET) systems in the EU and the qualifications framework, it also identifies current specific provision for the target groups both inside and outside of IEE II. This is of relevance as any intervention would need to be delivered by and integrate with the existing systems.

3.4.1 Training provision databases

Across the EU the potential number of providers and courses relevant to the target groups is huge and beyond the scope of this study to fully map. Existing data sources at the EU level are limited, some such as PLOTEUS (Portal on Learning Opportunities throughout the European Space), which is an online database of courses throughout the EU, can provide indications of the number of providers of courses down to the level of specific occupations or technologies, for example:

- Engineering and Engineering Trades > Electricity and Energy >
 - Air-conditioning programmes (227 links)
 - Electrical fitting (227 links)
 - Electrical trades (228 links)
 - Heating trades (227 links)
 - Solar energy (227 links)
- Architecture & Building > Building and Civil Engineering >
 - Insulation (189 links)
 - Building renovation (189 links)
 - Building technology (189 links)
 - Building construction (189 links)

But the similarity of hits in each of the categories highlights that the level of detail available is misleading and investigation of the courses listings and those known to exist in these categories on a member state basis shows that the database is far from complete.

A Match and Map scheme was proposed in the New Skills for New Jobs communication of 2008, to provide 'a user-friendly, transparent online service for citizens, providing qualitative information on occupations, skills, learning and training opportunities across the EU.' It has been developed as part of EURES (the European Employment Services Portal), and linked to the PLOTEUS and EURAXESS portals, to 'provide a clear geographic mapping of the EU job offers matching a user's profile, feedback on why jobs and skills do not match, and information on learning opportunities.' The objective of this is to enable users to target their job search to areas where their skills are in demand or

highlight the skills in demand in a particular area and guide users to suitable training. As with PLOTEUS the system is only as comprehensive and effective as the jobs and skills/course database and a review of EURES on this basis by a Cedefop study³⁹ shows coverage is far from complete and can differ considerably between member states.

3.4.2 EU Vocational training systems

Training systems vary between member states

The provision of vocational training for the buildings workforce across the European Union is varied with a number of different delivery systems and structures with different levels of public and private involvement. It is important to understand these differences to assess the suitability of any proposed intervention. A study by Ecotec⁴⁰ into VET provision in the EU characterised 6 types of system:

- **The Nordic countries** (Denmark, Finland and Sweden) characterized by a strong lifelong learning culture and an emphasis on school-based VET and levels of social protection expenditures and universal welfare provision which are at their highest in Europe.
- **Continental systems where VET is highly institutionalized** (Germany and Austria), where social partner involvement is strong and plays a critical role in stratification prior to full labour market entry.
- **Continental systems where VET is less institutionalized** (France, Belgium, Luxembourg and the Netherlands) and company training is more common. There is moderate to strong involvement of employers in IVET and CVT.
- **Mediterranean countries** (Spain, Italy, Portugal and Greece) with VET systems that are mainly school-based and less well developed than other countries, with comparatively low levels of employer input and where labour markets exhibit a number of rigidities.
- **Central and Eastern European countries** (Poland, Lithuania, Latvia, Estonia, Hungary, Slovenia, Slovakia, Czech Republic) which in the main inherited a highly centralised and state controlled system from the socialist period but which since the collapse of communism have followed a variety of paths in response to a variety of factors including inward investment, globalisation, the consequences of EU enlargement and domestic politics, to cite just a few.
- **UK and Ireland** which are distinguished by the minimal nature of institutional regimes governing labour markets and in which education and training systems are characterised by choice and competition with employer involvement variable by sector.

³⁹ Cedefop (2009) Skills for Europe Future: Anticipating Occupational Skills Needs

⁴⁰ Ecotec (2008) Beyond the Maastricht Communiqué: developments in the opening up of VET pathways and the role of VET in labour market integration: Consolidated Final Report

The differences in provision structure will have a significant impact on both the extent of current shortages and also the impact of any intervention in this area. Each system will have its own strengths and weaknesses, analysis by the Danish Technological Institute⁴¹ of 4 countries sustainable construction skills training provision found the following:

- **Germany** (Continental system where VET is highly institutionalized): vocational training is the responsibility of various partners public and private, national and regional. Training is mostly in company but also has school based elements. This link provides sound theoretical background while also meeting employers needs. At the same time the system is highly specialised and the narrow specialisms make it harder for learners to choose and restrict the flexibility and adaptability of the system.
- **Italy** (Mediterranean country): vocational training is company based and managed at regional level by employer-employee partnership agreement. A problem with the system in Italy is the differing quality standards between regions, meaning that the same qualification may be achieved with very different course content.
- **UK** (UK & Ireland) training is primarily employer led with on-site training. Voluntary agreements regulate the sector but with a national framework and employer led bodies responsible for establishing national occupational standards and co-ordinating provision. Apprentices are paid by employers but their training is publicly funded. Despite policy measures to fund apprenticeships in SMEs there is a continued lack of places.
- **Bulgaria** (Central and Eastern European countries): training is centralised and school based, lasting between 2-6 years. The curriculum is set nationally by the ministry and while this provides consistency the system is quite rigid and does not adapt quickly to new training requirements.

3.4.3 Training provision – Member state case studies

Given the resource constraints of this evaluation the analysis of provision therefore needed to be taken at member state level where some reviews of provision relevant to the target groups have already been carried out. Taking the examples of differing VET systems detailed in 3.4.1 we have selected 6 countries, Germany, the Netherlands, France, Italy, the UK and Lithuania as a basis to assess provision, as this will give coverage of a range of provision across the types of system. Reviewing the available data from these countries and supplementing and validating this through consultation we find the following:

Germany

A wide number of organisations play a role in further vocational training relating to energy efficiency in buildings in Germany. Examples include the local energy

⁴¹ Danish Technological Institute (2008) Future qualifications and skills needs in the sustainable construction sector.

agencies (e.g. the *Energie.Atentur.NRW* provides continuous training via different institutions), technical training institutes (e.g. the combined refresher course of the *Hauptverband Farbe Gestaltung Bautenschutz* and the *BZL-Lauterbach*, or a similar course at the *TÜV Akademie GmbH*) and engineering agencies (e.g. the Dipl.-Ing. Klaus Brockmann Engineering Agency for Environmental technologies).

The German VET-system is known to be decentralised and corporatist; with training and education in the construction sector generally the joint responsibility of the federal government, the federal states, the social partners, and enterprises.⁴² This collaboration is regarded as facilitating a built-in linkage between theory and practice, requiring a substantial part of the practical training to take place in companies. Nevertheless, some feel that vocational training in Germany does not perform as well as in other European countries such as Scandinavia, France or the Netherlands as German companies have not developed systematic professional continuing training concepts to the same extent as in other countries.⁴³ Looking specifically at the construction industry, some feel that too many and too narrow specialisations make adequate vocational training difficult within the construction sector. This is said to make it increasingly difficult to navigate the system and to develop future job profiles and meet skill needs.⁴⁴

Consultees who expressed the need for additional measures in workforce training also expressed their doubts about the effectiveness of the proposed option for action, anticipating difficulties arising from coordinating many different stakeholders. Furthermore, a variety of training already exists but with currently only low demand, it was felt that it would be more productive to focus on boosting market demand.

The Netherlands

One of the ways that specific EE training provision in the Netherlands is organized, is under the *Meer met Minder Program* (More with Less Program). This is a national program of energy savings in existing residential and other buildings. The objective is to reach 2.4 mln existing residential and other buildings before 2020 and to make these 20-30% more energy efficient.

The parties involved in the program are government bodies: the ministry of Housing, Spatial Planning and the Environment (VROM), the ministry of Economic Affairs and the municipalities. Other parties (initiators and partners) are also involved. The initiators are *EnergieNed*, the association for companies active in production, transport, trade or supply of gas, electricity or heat; Aedes, the association of housing corporations; *Bouwend Nederland* (Building Netherlands), the association for building companies; and *Uneto-VNI*, the trade organisation of the installation sector and technical retail trade. The latter two

⁴² Danish Technological Institute (2008) Future Qualifications and Skills Needs in the Construction Sector.

⁴³ Federal Institute for Vocational Education and Training, BIBB 2007

⁴⁴ Danish Technological Institute (2008) Future Qualifications and Skills Needs in the Construction Sector.

organisations are involved in the provision of training for the building workforce. Both *Bouwend Nederland* and *Uneto-VNI* have committed themselves within the *Meer met Minder Program* to take care of training, certification and quality control and to stimulate the quantity and quality of execution. *Bouwend Nederland* focuses on the builders, while *Uneto-VNI* focuses on installers of energy efficient technology.

Whereas the training under the *Meer met Minder Program* is directed at those working on existing buildings, the *Bouwlokalen* (Building Places) is directed at new buildings. This initiative is organised by Bouwend Nederland and SBR, the knowledge platform for the building sector. In the *Bouwlokalen* building workers across the target groups of this study are trained (on half day courses) in EE for new buildings, with the supply of training matched to the demand. Subjects that are addressed in the course are RE in buildings, necessary permits for geothermal energy, technical design of EE and RE, maintenance, business models for large scale introduction of sustainable energy in the built environment, working together successfully by the different actors (architect, installer, supplier and builder), and selling sustainable energy to the consumer.

Our consultations suggest that in the Netherlands training for plumbers, electricians and installers is adequate but co-operation could be improved. This is an issue covered in the *Bouwlokalen*. Furthermore, a lack of training provision is not currently regarded as an issue by many as they consider that an adequate supply is already in place. However, it was also suggested that the demand for courses could be much larger. This lack of demand reflects the fact that builders currently do the minimum as demanded by law and will not seek training until further knowledge on EE and RE is needed. It was reported that the uptake of training in order to achieve a competitive advantage is rare.

France

The construction sector in France employs over 1.4 million workers and of these over 300,000 are crafts and trades workers. These workers are among the primary targets of the training element of the *Grenelle* initiative launched in 2007 which is a major national programme driving energy efficiency in buildings. The *Grenelle* programme involves major stakeholders in the construction sector and looks at all aspects of the problem to improve the environmental performance of buildings.

As part of the training and education programme a range of learning tools have been developed including a magazine with articles and drawings explaining best practice techniques and methods and training for craftsmen run by one of the major firms in the construction sector (Saint Gobain) which is also developing an e-learning tool with a similar approach to the magazine, using visual representations of new techniques and processes. A number of other companies are promoting their own training programmes though there are concerns that this training will be product focused and not give workers the skills to apply techniques more widely.

The primary national scheme is called FEEBat “*formation aux économies d’énergie pour les entreprises et artisans du bâtiment*”, literally translated “training for craftsmen and employees of firms from the building sector”. The scheme aimed to train 50,000 people by the end of 2009. The scheme itself is based around 3x2 day courses that are targeted at craftsmen and other workers to give a holistic approach to buildings EE retrofits. The 3 courses are as follows:

- Course 1 - general approach of energy saving refurbishment
- Course 2 - methodology and software introduction for energy analysis and holistic energy refurbishment solutions
- Course 3 - learning about nine different technical solutions, 3 focusing on inter-crafts cooperation for energy efficiency.

The scheme is backed by a quality certification system that enables customers to search for certified providers.

In France energy providers are obliged to reduce their energy use and this is achieved through an energy saving (white) certificate system. This obliges the providers to assist their customers to reduce their energy consumption through a variety of measures. Funding training and skills development for EE is among the options. To date only EDF Energy has taken up this option by supporting the FEEBat initiative.

Results of the programme are not yet fully clear as the scheme has only been active a short time but it is understood that the wider initiative has played a key role in mobilising stakeholders towards a vision to improve buildings EE in France.

Italy

In Italy vocational training in the construction industry has traditionally been carried out by “a national vocational training system jointly managed by employers and employees’ federations and based on the national collective agreement for construction firms signed by National Association of Construction Sector Workers (ANCE) and the workers’ unions.”⁴⁵ This agreement is implemented by the regional organisations and training institutions. The regional implementation has been reported to have led to significant differences in training between the northern and southern regions of Italy. This has resulted in differences in competence outcomes and quality levels.

In terms of vocational training, Italy is characterised by a weak link between the higher education institutions and construction sector practice sector.⁴⁶

Traditionally, there has been limited cooperation. More recently, employers have started criticising vocational training by arguing that employees increasingly require a combination of technical skills and management skills which are not acquired at university. This could go a long way in explaining the weak

⁴⁵ Danish Technological Institute (2008) Future Qualifications and Skills Needs in the Construction Sector.

⁴⁶ Danish Technological Institute (2008) Future Qualifications and Skills Needs in the Construction Sector.

correlation between participation in further training and subsequent wage rises, which is very likely to discourage participation in lifelong learning.

Training in the RE field is provided by different stakeholders such as training centres and manufacturers mainly in the fields of photovoltaic and solar thermal. Few courses, however, include a final examination. The training offered ranges from master courses, to higher technical education (financed by regional funds), to courses offered by companies working in the sector and to courses organised by educational institutions. The courses provided by the companies in the sector do not require specific entrance criteria and the trainees do not have to pass a final examination. They receive a certificate of attendance at the end of the training. The training courses organised by training institutions associated with universities or research centres are primarily aimed at professionals in the field in order to update and/or deepen their knowledge on the design of photovoltaic systems or technical regulations.⁴⁷

The United Kingdom

A new national skills strategy was launched in November 2009 and is led by the Department for Business, Innovation and Skills (BIS). It is based around demand led provision, with provision being targeted on skills that are demanded by employers and individuals with an aim to focus on *'the areas of the economy which can do most to drive growth and jobs.'*⁴⁸

Vital players in the UK skills sector are the Sector Skills Councils (SSCs) which are independent, national, employer led sector organisations that play a key role in articulating the needs of employers of all sizes to enable the demand-led skills system in the UK to function. They do this through building partnerships to influence providers, employers and funding organisations, defining national occupational standards and research to identify skills gaps, shortages and needs. There are 25 SSCs covering key sectors, 3 SSCs Construction Skills, SummitSkills and Asset Skills have the closest involvement with the target groups and have been highly active across the central issues.

Vocational training relevant to the target groups is publically funded through a variety of means including the Train to Gain programme and apprenticeships funded through a construction sector training levy. Employers also play a major role in the provision of skills providing some sort of training for over 60 per cent of the workforce⁴⁹. This means that the UK has a relatively high proportion of employers offering some form of continuing vocational training. However, typically the training provided is relatively short and does not lead to any certification or qualification.

⁴⁷ Paragraph based on draft version of QUALICERT Common quality certification & accreditation for installers of small-scale renewable energy systems

⁴⁸ BIS (2009) Skills for Growth

⁴⁹ LSC (2007) National Employers Skills Survey 2007: Main Report

Training organisations in the sector include a mix of further education colleges and private providers. Employers are also key deliverers of skills training with over half of the total training spend supporting on-the-job – on-site training and a smaller proportion supporting off-site training. The training system in the UK is geared to provide skills for specific processes rather than any wider learning.

A number of the largest firms, sometimes in partnership with the SSCs (national skills academies) and each other, have set-up their own internal training institutions and academies to provide standardised, tailored training or to meet perceived deficiencies in existing provision.

As in other MSs there is the view in the UK that training in the sector for EE and RES is a ‘chicken and egg’ situation, that there is not enough demand to warrant training but a lack of skills hinders an increase in demand. In the past it has taken legislative intervention and public support to overcome this type of issue (for example some plumbers were paid to take up training aimed addressing the lack of skills that were seen as being a barrier to the uptake of condensing boilers). Some believe that a market demand for EE and RES technologies will eventually ensure skills provision and training is successfully implemented within the existing frameworks.

Lithuania

In Lithuania training in the construction sector is provided through formal and informal vocational education. The formal vocational education includes initial vocational training, continuous vocational training and vocational/career counselling. The main institutions providing training are vocational schools and colleges. Regarding the energy efficiency and renewable energy training in the construction sector no overall strategy or programme at national level can be identified. However, some of the vocational training programmes are devoted to energy efficiency related training, some training in this field is initiated by the industry representatives and some funding was available through the implementation of ESF projects.

Some of the examples of the energy efficiency training programmes provided in the vocational education and training institutions are presented below:⁵⁰

- *Thermo-insulator training programme.* This training programme provides training on thermal insulation of buildings. It is provided in 3 institutions.
- *Insulator training programme.* This training programme focuses not only on buildings but also on other objects. There is one institution in Lithuania providing this programme.
- *Winter-proof maker of buildings training programme.* The goal of the programme is to provide training on insulation of various parts of buildings including through the application of new technologies. Some 14 institutions offer this training programme.

⁵⁰ The information is based on the <http://www.aikos.smm.lt/aikos/programos.htm>

Organisations such as vocational schools, public organisations, associations working in the construction fields, energy efficiency and environment protection also participate in various international projects which provide or develop training opportunities in the field of energy efficiency (including the INTENSE project discussed in the following section)

Other

The survey conducted during the course of this study asked energy agencies and the building associations who they perceived as the key organisations involved in the current national/regional provision of training for the building workforce in energy efficiency and renewable energy. The answers received showed a wide variation, especially with regard to the role of national ministries (see table 3.16). Energy agencies often felt that national ministries had a role, while building associations less frequently saw a role for the national ministry. Educational institutions are regarded as important actors, as are energy agencies, construction industry groups and building product manufacturers. Other important actors that were also mentioned were employers and employees associations, installer trade associations/renewable energy equipment associations, the national energy laboratory and municipalities.

Table 3.16 National/Regional training organisations most involved

	Energy agencies	Building associations
national ministry	10	3
regional ministry	1	2
national/regional energy agencies	9	5
educational institutions	16	9
construction industry groups	11	7
building product manufacturers	15	6

3.4.4 Training provision – EU provision

Skills provision, primarily remains a matter for individual member states but with significant funding support at EU level through various programmes. These support a variety of pilot programmes, courses and projects relevant to the target group, including the following:

- **LLP – Leonardo da Vinci** – has supported a variety of relevant projects including:
 - Ecological friendly Construction with Competence (Project Number D/04/B/F/PP-146 195)
 - Development and evaluation of advanced training modules for innovative, energy-saving construction (existing and new building) - zero-energy houses (Project Number D/02/B/F/PP-112 689)
 - Better Building - Certifying VET Teachers as Energy Saving Advisers. A Transfer System (Project Number LLP-LDV/TOI/2007/IT/307)

- Transfer of innovative European concepts for training and certification in energy-saving construction methods, in order to make qualifications acquired in vocational and advanced training more transparent. (Project Number DE/08/LLP-LdV/TOI/147181)
 - Development distance training courses for SMART Buildings Energy management. (Project Number EL/00/B/F/PP/114146)
 - EU.CERTI.CON European Certificate for Renovation and Rebuilding in Construction Sector is new innovative training course for construction in the area of rebuilding (Project Number 2006-SK/06/B/F/PP-177437)
- **ESF** – The European Social Fund which is tasked with increasing and protecting employment across the EU to help reduce regional differences in prosperity and living standards and promote cohesion. A key focus of ESF spending is skills development, with sustainable development being mainstreamed into funding for 2007-2013. The economic downturn has led to moves to bring forward at least €1.8 billion of ESF funding to alleviate unemployment and provide training in areas of anticipated job vacancies, this has clear relevance to the skills of the building workforce.
 - **ERDF** – The European Regional Development Fund traditionally supports infrastructure and economic development projects but the rules for spending have also been relaxed as part of the EU recovery plan. Now up to 4% (previously 2%) of a member states allocation can be put towards energy efficiency and renewable energy in housing. These recent changes have already led to ERDF contributing to a number of projects promoting EE and RES in buildings, of which training is sometimes an element. Typically though ERDF funding is allocated to cover physical items or capacity building. Various examples of relevant programmes were provided through consultation with DG REGIO including:
 - Energie (Alsace) project – which 2 years ago was awarded best cohesion policy project. It focussed on integrating RES and EE at regional level. The first phase was RES focused – solar hot water, PV and biomass with high subsidies to install (up to 80%). The second phase focused on energy efficiency and ran into skills gap issues as they found that there were not enough skilled individuals to install the equipment required in the time required. The programme responded by setting up a structure to help with training, forcing a reallocation of funds to the skills issue to address the lack of skills at craft level.
 - **INTERREG** – This programme has a regional development focus and is targeted at regional and local authorities to support the exchange of experience and best practice. Its 2 priorities, information and the knowledge economy and environment and risk prevention, are both relevant to the buildings sector and the sub-themes of natural and technological risk including climate change, waste prevention and management and energy and sustainable transport all have direct

applications to the sector. In the past INTERREG has supported projects directly related to skills such as:

- the SmartLIFE project - which was a partnership between public authority and training bodies in the UK, Sweden and Germany to build skills in sustainable construction through sharing best practice and cross-national learning. It has trained over 2,500 workers in sustainable construction skills since 2006 and created networks successfully sharing best practice between the partner institutes in the 3 countries.
- Powercluster – this project focused on offshore wind energy in the North Sea. This programme had a specific work package on skills.

3.4.5 Training Provision - IEE II

It is important to realise that the IEE programme has already supported a number of projects which address some or all of the issues of relevance to the proposed intervention.

At least 2 completed programmes in the area of buildings workforce EE and RES training and qualification have previously been supported by IEE, these are:

- **EEBD (2005-2007)** - The Electronic Energy Buildings Directive action produced a web-based vocational tool to help implement the training requirements for the building certification market arising from new European legislation.⁵¹ Project partners investigated the vocational training needs across the regions of the EU and developed appropriate training material as well as an electronic platform.

Relevant lessons learnt from this project include:

- Since there are significant delays in countries transposition of directives any vocational training tools should be flexible and expandable for future use.
 - There is a need for general information on the EPBD, and on regional differences in regulations and energy performance in buildings. Depending on their profile, end users demand a variety of specific information.
- **EUREM.NET (2006-2009)** – The Training and Network of European Energy Managers project aimed at expanding the successful "European EnergyManager" training program EUREM to nine further EU countries. The training program developed in the EUREM (2003-2005) project was extended and country-specific adaptations made. The project involved training where each participant developed a concrete project to improve their company's energy performance. New partners secure the sustainability of the training and a European-wide certificate "European EnergyManager" was

⁵¹ Although such a web-based vocational tool might be useful, the forum activity is very limited and dates from 2007

implemented. Support to all energy-relevant questions was offered via a web-based knowledge and exchange platform designed to become the central interaction point for all European EnergyManagers.

Relevant lessons learnt include:

- Energy-saving potential was significantly higher than originally estimated.
- The demand from the target group was very high, project more than 70% oversubscribed.

Both of these projects developed training and certification in areas relevant to the target groups, they also both developed web based tools as a platform for learning, interaction and exchange. Full project descriptions are available from the online IEE project database at <http://ieea.erba.hu/ieea/page/Page.jsp>.

Current and Ongoing IEE Provision

The 2009 calls for proposals has supported a number of projects relevant to the area of training, skills, certification and qualification in the buildings energy efficiency and renewable energy workforce. Among the priorities identified in these areas are long-lasting training schemes for the building workforce, training for installers, maintenance staff and sales personnel and market transformation actions in buildings appliances and construction materials⁵². In renewable energy the 20-20-20 package has led to a change in focus of IEE activities with a clearer priority attached to '*institutionalised training and certification of installers*'⁵³.

Under this objective the training relates to:

- renewable electricity installers, operation and maintenance teams;
- planners, architects and authorising officers for large scale RES heating and cooling systems; and
- small-scale renewable energy applications in buildings system installers (biomass, solar PV, heatpumps).

The 2009 call also notes existing projects in the area of renewable energy in buildings training are active under the IEE programme including the⁵⁴:

- **QUALICERT programme (2009-2012)** - QualiCert stands for “Common quality certification and accreditation for installers of small-scale renewable energy (RE) systems”. In line with Member States (MS) obligations arising from the new Directive on RE sources, QualiCert proposes a concerted action on certification and accreditation of installers of small-scale building-integrated RE systems. The action addresses the Directive’s requirement of certification schemes in each MS that obey to a set of similar criteria and recognise each other’s certification.

Budget: €1.1m (75% EU contribution)

⁵² <http://www.energiehelpline.co.uk/documents/4-CallcontentEE.pdf>

⁵³ <http://www.energiehelpline.co.uk/documents/2-CallcontentRE.pdf>

⁵⁴ Information provided by EACI

- **GEOTRAINET programme (2008-2011)** – the objective of this programme is to develop a European Education programme towards the certification of geothermal installations. Different groups of professionals are involved in Ground Source Heat Pumps; GEOTRAINET project is focused on two target groups: designers (geologists, geotechnical engineers, HVAC engineers) and drillers (including installers and maintenance personnel). The project will develop an education programme, and prepare didactic (i.e. teaching) materials, training courses and an e-learning platform. Training structures in 8 EU countries (Austria, France, Germany, Ireland, Romania, Spain, Sweden, and UK) will be established for professionals in the geothermal sector.

Demand for participation on these courses is high, selection is used by programme co-ordinators to target most relevant groups. Programme is based around a train-the-trainers approach.

Budget: €0.95m (75% EU contribution)

- **SEPEMO-Build (2009-2012)** – the objective of this project is to overcome market barriers to a wider application of heat pumps. One key requirement to achieve awareness about real life performance is a universal methodology for field measurement of heat pump systems seasonal performance factor (SPF). The project will produce training materials and guidelines for improving heat pump system quality, reliability and energy performance for the system for all types of heat pumps, to be used for training of installers and designers and incorporated within the EU-CERT certification scheme (organised by EHPA).

Budget: €1.5m (75% EU contribution)

- **ILETE (2008-2009)** – The Initiative for Low Energy Training in Europe (ILETE) is implemented at a Regional level and targets the Buildings Industry through training programmes and communication. Its goal is to increase awareness of the opportunities and the growing importance for low energy consumption in buildings across Europe. To achieve this, the ILETE project has three priorities:
 - To set up initial training on low consumption for architects and engineers;
 - To set up ongoing training on low consumption to reach industry professionals;
 - To inform the general public and contracting authorities on level A certification.

The project is based on wide surveys of those in the industry, confirming a need for training and for closer co-operation between crafts workers, specialists and architects.

Budget: €1.0m (49% EU contribution)

- **CEPH (2008-2011)** - The project will elaborate the first intense training course for Passive House Designer on the European level. This training

course will enable the participants – after the passing of an exam – to obtain the Certificate of European passive house designer.

Budget: €1.5m (74% EU contribution)

- **INTENSE (2008-2011)** - INTENSE aims at transferring intelligent energy saving measures for municipal housing from “old” EU Member States to “new” Member States and Accession countries in Central and Eastern Europe. Built on a holistic approach for planning of energy optimized housing, the project comprises an analysis of legal preconditions, experience exchange on best practice examples, development and implementation of training programmes, pilot planning activities at partner municipalities, and public awareness raising.

The initial focus is on training for engineers and architects with training delivered through universities or other accredited institutions. Training developed then tested with stakeholders before being introduced. Intention to diversify training to municipal workers and craft levels but not yet developed how.

Budget: €3.2m (75% EU funded)

- **ENFORCE (2009-2012)** - The ENFORCE project aids the diffusion of energy certification (Energy Performance of Buildings Directive 2002/91/EC). It aims to give final consumers independent, qualified, information and assistance on energy certification of their buildings, allowing them to make informed decisions. It tackles obstacles to intelligent patterns of energy use by studies of best practice, a consumer advice call-centre, an information campaign and most relevant to this study by creating a trans-national network of trained energy auditors, operating under a common code of conduct.

Training will be provided to graduates through a 120 hour course (110 hours of classroom learning) with a final exam that leads to a diploma (valid in region [Italian system is region based]) that allows the holder to perform energy performance certification assessments. The course costs €500 with funding from European, local or regional bodies. A non publicly funded course is available to existing professionals with a greater focus on ethics than technical skills.

Budget: €1.5m (75% EU contribution)

- **EDUCATE (2009-2012)** - Awareness of climate change and technical requirements arising from new regulations has triggered demands for architects with advanced skills in sustainable design and energy efficiency. This has required that environmental education sits at the core of the architectural curriculum at university and professional level. To meet these challenges, this Action will:
 - Remove pedagogical barriers to the integration of energy-related design principles within architectural discourse

- Define and test a curriculum which bridges sustainability and design studio in architectural education
- Develop a web portal on sustainable design and energy efficiency that facilitates such integration in higher education and supports continuing professional development;
- Propose homogeneous criteria for accreditation of architectural curricula and professional registration that establish the level of knowledge and skill in sustainable design and energy efficiency expected of graduated architects in Europe
- Promote and disseminate environmental know-how and best practice, fostering change of behaviour and expectations towards the integration of sustainable design and energy efficiency in building practices.

Budget: €1.7m (75% EU contribution)

- **USE Efficiency (2009-2012)** – A common higher educational stream, addressing energy efficiency in university buildings, will be created in this action which is under negotiation. Involving universities and market players, it builds on the opportunity to improve energy efficiency in university buildings and to establish training courses for students. Students will be the main target group and given practical EE experience through practical application to university systems.

Budget: €1.8m (75% EU contribution)

- **TRAINENERGY (2009-2011)** – this programme is preparing and implementing a pilot qualification for craftsmen in the building sector. The objective is to contribute to qualification aimed at making recent European legislation as effective as possible in the 7 participating MSs. It is expected that the programme will focus on 5 trade crafts. The first stage will involve surveying the industry to gauge their understanding of their skills needs. Among the goals of the project are to encourage continual skills development, to get both employees and developers to appreciate the market value and premium that better buildings generate. The project will involve:
 - an on-line training database with institutionalised (nationally approved and validated) training modules
 - training guides for craftsmen and for trainers, including common European elements and national tailored ones.
 - craftsmen and trainers accredited during the pilot phase. Will use a train the trainers approach to multiply outputs.
 - Training to focus on specific skills – targeted so that trainees understand the need for EE and methods to achieve it e.g. air-tightness.

The action is accompanied by measures to disseminate its outcomes and to facilitate roll out of the concept through a replicable model.

This project is arguably the closest match to the subject of this evaluation as it is solely targeted at craft level workers and interestingly it reflects the variation in construction practices between countries by preparing some

material that is common between countries, where practices are shared, but also country specific material. The lack of consistent data on the nature and scale of the skills need is also reflected in the project as the collection of such data is the first stage of the project.

Budget: €0.95m (75% EU contribution)

- **BUILD UP** – this initiative is an online tool that has been created under the IEE work programme to support the implementation of the EPBD. It is a portal for practitioners and professionals to network and share best practice and exchange knowledge, tools and resources. It is targeted at home owners, building professionals, public authorities and umbrella organizations.

EACI has also indicated that more proposals for projects addressing training of the building workforce in EE and RES technologies will be selected such as recent approvals, Schools Panel for High Energy Efficiency products (SHEEP), Empowerment of SME to network for intelligent energy (EMPOWER), and Master and Post graduate education and training in multidisciplinary teams implementing EPBD and beyond (IDE-EDU).

These active projects cover a large range of activities and have a combined budget of over €10 million. On the basis of a 3 year project cycle around €3 million will be invested by IEE each year to 2012. Each of the projects directly tackles an aspect of training or certification provision for the buildings workforce, from integrating renewables as part of building preparations (GEOTRAINET) to managing energy use in buildings once operational (ENFORCE). Over half of the projects have a direct role in training provision, from supporting initial training in ILETE to designing and implementing new training courses on CEPH. Action to establish and/or harmonise qualifications is also a key theme for over half of the projects listed. The design and provision of learning tools, training materials and guidelines is also common across a number of the projects. Co-ordination, information and awareness are also strong themes through these active projects, this is not unexpected given the nature of traditional IEE programmes. The majority of the projects are targeted at professionals and the renewable energy focussed projects are, sensibly, technology specific.

The EPBD Concerted Action

The Energy Performance of Buildings Directive (EPBD) Concerted Action is another initiative supported by IEE that crosses into the area of training and skills for the buildings workforce. The concerted action is designed to share best practice and encourage commonality of implementation of the EPBD, for example the need for qualified and independent building energy assessors was a subject of discussion. The issues discussed covered action in 4 core areas:

- **Certification:** to discuss and prepare a structure for the energy certification of buildings that maximizes similarities and reduces the range of different options selected;

- **Inspections:** to discuss and prepare a coherent basis for the methodologies for inspection of heating boilers and air-conditioning equipment;
- **Training:** to discuss and prepare ways to implement the schemes for accreditation of energy audit and inspection experts; and
- **Procedures:** to discuss criteria for implementation of the common calculation methodology for calculation with as similar criteria for simplifications as possible.

The outcomes to date of the programme include national summary reports for the 29 participants and technical reports on interesting and core issues, including training.

Relevant lessons learnt from this project include:

- With no single common terminology comparison between MS is difficult
- Strong and independent legal position is needed for assessors and inspectors
- There was no clear solution whether training should be offered by market or publically funded institutions. A variety of systems exist: with no government involvement in France, Hungary or the Netherlands. In Ireland, Portugal and the UK, the government sets the criteria for the training programs and trains the trainers. In Belgium (Flanders), Bulgaria, Portugal, Spain (intensive course) and Denmark, the government only covers the cost of training materials, whereas all costs and organisation is done by the government in Cyprus and in Spain (basic training).

A new Concerted Action under the IEE programme on the implementation of the RES Directive will be launched in 2010 and will include a working group on training, whose work will need to be coordinated with that of any new EU initiatives in this area. The existing Concerted Action for the EPBD, is expected to continue with the recast of the directive and could also potentially add a working group for skills and training.

3.4.6 Training Provision - Employers

Employers are among the most important training providers...

Employers play a key role in training provision, according to the Eurostat adult education survey they provide over 30% of all non-formal vocational education and training, more than any other form. In 2005 companies average expenditure on these training courses as a percentage of total labour costs was around 2.3% which when taking into account the cost pressures and margins in the private sector illustrates a significant commitment to training.

...but data on their impact and role is limited and needs further research

Data on employer provision is limited and therefore it is hard to quantify the number of courses or training provided by employers. What is clear is that employers are one of the most important providers, through in-house courses or through funding external provision, of training in all sectors, including

construction and within the target groups. In planning any initiative this aspect should be more fully investigated to fully understand the provision environment.

3.4.7 Qualifications and Certification

Qualification portability is a major labour market barrier

The lack of portability and transparency of competences and qualifications between member states has been identified as a major barrier to the functioning of the single European labour market. This is both due to a lack of clear and Europe-wide accepted accreditation and the different requirements of building and construction sectors in member states (e.g. building regulations, membership of trade bodies). These issues exacerbate skills shortages as skilled labour cannot be drawn from a European pool.

The EQF process is addressing portability issues

The adoption of the European Qualifications Framework (EQF) in 2008⁵⁵ has provided a meta-framework to address the problem by creating a common European reference that relates and equates national qualifications systems.

The EQF is based on learning outcomes and is not designed to map across directly onto any of the standard definitions of occupations or education and training levels. This is important for this evaluation as standard definitions are not fully established in the target groups for energy efficiency and renewable energy and the outcomes (i.e. trained individuals) are the overall objective not harmonised qualifications.

The success of transparency efforts on this basis is dependent on work in member states to classify their qualifications within the meta-framework. Response from member states in mapping their national qualifications frameworks (NQF) to the EQF has been positive with Ireland and Malta having already referenced their NQF and indications from the great majority of other member states are that they plan to do so by 2011.

It offers opportunities to integrate EE and RES into certifications and courses

Nonetheless, to implement EQF countries have to define their national qualifications levels in learning outcomes. It should be stressed that even with the positive response by member states to the EQF, the whole process remains highly challenging as it involves unpacking existing qualifications to see where they fit onto the EQF (involving sector bodies as well as those within the VET system). If consistency and equivalence between qualifications is not achieved there is a risk that the process could become more of a tick-box exercise rather than a useful and relevant process and then this could devalue the system. Never-the-less this review of the qualifications presents an excellent opportunity to integrate energy efficiency and/or renewable energy skills into existing courses. For this reason the timing of any proposed intervention could be quite fortuitous.

The European credit system for vocational education and training (ECVET) adopted by the Council and the Parliament in June 2009⁵⁶ helps in the design of

⁵⁵ http://ec.europa.eu/education/lifelong-learning-policy/doc44_en.htm

qualifications in the form of units of learning outcomes. It can facilitate the accumulation, transfer and recognition of knowledge, skills and competences gained by individuals, towards a qualification. It can also enable access to lifelong learning and borderless learning in VET. Indeed, the ECVET recommendation asks for a greater permeability with the European Credit Transfer and Accumulation System (ECTS).

The European Quality Assurance Reference Framework (EQAVET)⁵⁷, also adopted by the Council and the Parliament in June 2009 supports member States in promoting and monitoring quality improvement in VET at different levels.

Views from industry on the qualifications issue are strong and highlight the delicate balance of issues in this area. For example the CEETB in its comments on the Directive on the promotion of the use of energy from renewable sources⁵⁸ stated that it is happy to see some attention on the training of the workforce. However, they also felt it critical to state that the upgrading of the workforce's knowledge should be based upon their national qualification schemes or existing vocational training systems. That the directive should not aim to create isolated or cheap qualifications or easy market access through granting yet another certificate in an already crowded market place, it should, furthermore, not be used as an instrument to reform the vocational systems of the EU-member states. Additionally, it states that 'binding EU-regulation towards re-certification within certain periods would on the one hand undermine the life-long learning process and on the other hand not really expand the knowledge of installers as to what refers to renewable energies but hold it on the same level.'⁵⁹ These same concerns could quite easily apply to any proposed intervention that addresses qualification issues.

Through consultations a further concern was raised around certification where mandatory certification requirements could lead to shortages, in the short term at least, of certified workers. This could restrict firms' business opportunities and raise costs as they train staff to become certified. A reluctance to train workers to become certified was also raised as an issue for SMEs, as this then gives the worker job mobility and so the employer who funds the training may not receive the full benefit of their investment.

An analysis of accreditation and certification issues across all MSs in respect of the implementation of the EPBD directive and its requirements for energy certification and inspection was published by the Royal Institution of Chartered Surveyors (RICS) in 2008⁶⁰. This highlighted the high diversity in systems that exist and the methods that have been used to provide qualification and inspection

⁵⁶ http://ec.europa.eu/education/lifelong-learning-policy/doc50_en.htm

⁵⁷ http://ec.europa.eu/education/lifelong-learning-policy/doc1134_en.htm

⁵⁸ 2008/0016 COD §13 & Annex IV

⁵⁹ CEETB Position Paper (2008) Comments of CEETB on the proposal for a Directive on the promotion of the use of energy from renewable sources (2008/0016 COD), available on www.ceetb.eu

⁶⁰ RICS (2008) Towards an Energy Efficient European Building Stock

systems for auditors and inspectors. A summary of the RICS findings is provided in Annex 5.

3.4.8 Summary of Provision

The research carried out during the course of this evaluation elicited a number of views on training provision for the buildings EE and RES workforce in the target groups. It identified an emergence of a variety of EU wide tools to enable users to find courses and match their needs to provision though the data from these tools was far from complete.

There at least 6 different types of vocational education and training (VET) systems within the EU. A review of case studies from member states found a variety of problems existing for each, in some (Germany, Italy) provision was organised regionally which created differences within the MS. The German system was believed to provide very good initial training but then to lack a system for continuing vocational education. The Netherlands identified a range of provision and active programmes and pointed to lack of demand as the key issue rather supply of courses. A similar point around product demand was raised in the UK, where there was a range of courses available and employer skills organisations are actively supporting all areas relating to skills. In France a national programme around building energy efficiency retro-fits is identified as being a success and the involvement and funding from energy suppliers an advantage that could be applicable elsewhere. In Lithuania only a few courses were identified and these all related to insulation.

The analysis on the member state basis is useful but does not directly illustrates where specific gaps in training exist. Some gaps are identified for example in continuing education in Germany, and in a lack of courses beyond insulation in Lithuania. The presence of gaps in one of the wealthiest member states and also significant gaps in a new member state points to potentially large gaps in provision when extrapolated to the EU-27.

Skills training provision and initiatives for the target groups are being promoted by a range of other EU supported programmes including Leonardo da Vinci, ERDF, Interreg and ESF. These often have direct overlap with the types of intervention proposed for evaluation.

Initiatives through IEE are already active within the area, but often with a regional focus to a network of 5-10 MSs. Most of these programmes have only started in recent years and remain in progress so the impacts are as yet unclear. The other major initiative by IEE on training is through its concerted action on the EPBD directive, this is recommended as a success and proposals for a concerted action on the RES directive are already underway.

Skills training and provision through employers is recognised as a major factor for training in the target groups but commenting beyond this is difficult as data on employer inputs is limited. This is an area where further research is required.

Action on qualifications is being driven in MSs by a variety of factors, prime among them is the move towards the European Qualifications Framework (EQF) and incorporating the skills and training requirements of the RES directive. Indications are that although qualification issues remain a barrier currently much work is underway to integrate national systems to an EU framework and that by 2012 major progress is likely to have been made. Another challenge is the implementation of the Recommendations of the European Parliament and of the Council on the establishment of a European Credit System for Vocational Education and Training (ECVET) and the European quality framework for vocational and Training (once EQARF, now EQAVET).

As may be expected there are a great many factors and actors at work in training provision across the EU member states. The extent of the supply of suitable provision and importantly also the demand for such provision when it is present also varies by member state. Within the resource constraints of this study it is hard to conclude beyond a few key points such as:

- Some data on provision is available but there are important gaps in understanding, particularly around employer provision and where gaps may exist.
- Relevant provision is being funded by other EU programmes – this could enhance the proposed initiative but also raises the risk of duplication.
- Policy programmes such as the EQF and RES directive are driving forward work on qualification development. This is already being supported through IEE by the concerted actions.

3.5 Summary

This chapter has examined the fundamental issues relevant to the need to increase both the efficiency of energy use and the use of renewable energy sources in buildings. It was found that the skills issue is emerging as one of the primary non-technical barriers to achieving this policy objective, forming part of a strong rationale for intervention in this area.

To narrow down the scope of the intervention a specific target group was defined covering inter alia the installers, technicians, inspectors and auditors. The current and future size of this target group has been estimated based on several studies. Although a large variety in projections is observed, we noted that various studies have been highlighted that support the notion that sustainable construction will rapidly become more important and mainstreamed within the building sector. It is estimated that the expansion of the sustainable construction sector is on the scale of tens of thousands or more each year across the EU, and even in the hundreds of thousands in total over the next decade leading to strong demand for skilled workers in the target groups.

Expansion of the sector, replacement of those leaving the sector and a greening of the skills of those already working in the sector might drive the growth of the

target group to over 2.5 million by 2015, constituting over 15% of the total construction workforce. There are a variety of reasons why the policy goals around lower energy use in buildings are failing to translate into the large scale provision and uptake of training. These reasons include a lack of consumer demand (to convince builders that there is a demand for the technologies in question and that they should therefore seek to enhance their skills in this area). The reasons also include the historically low take up of training in the construction industry relates to issue such as a high proportion of SMEs and a poor sector image which has made attracting high skilled entrants difficult. Construction skills development in this area is also hindered by a lack of defined skill sets and qualifications and issues around the quality and scale of training provision. The latter two along with consumer demand, emerged as recurring themes through the course of this evaluation and emphasise the appropriateness of an intervention to address qualifications and training for the buildings EE and RES workforce.

Mapping the types of skills needs to the skills profile of the target groups enabled an estimate of the levels of skills demand with almost 90% of the skills requirement arising at Lower and Intermediate skills levels. This estimated requirement amounts to over 125,000 annually through to 2015. Attempts to allocate these needs to MS level highlighted the deficiencies in the current data; quantitative assessments by officials in selected member states give an insight into the likely types of needs. It was found that the extent of the needs of the training for the building workforce varies considerably between MS.

A review of existing provision in this area indentified a number of vocational training schemes directed at energy efficiency and renewable energy. As may be expected there are numerous factors and actors at work in training provision across the member states. The extent of the supply of suitable provision varies by member state. It would be valuable to examine the factors behind the success of these schemes that have addressed similar skills and training issues.

In determining the overall status of training in the EU at least six 6 different types of vocational education and training (VET) systems exist. In addition to skills provision via national systems, we have identified a wide variety of EU supported projects under the auspices of a variety of programmes including Leonardo da Vinci, ERDF, Interreg and ESF. As relevant provision is being funded by other EU programmes – this could enhance the proposed initiative but also raises the risk of duplication.

These EU programmes often have direct overlap with the types of intervention proposed for evaluation. Collaboration with Leonardo da Vinci for example, could be very relevant for the proposed initiative and if a focus on EE and RES in buildings was to be prioritised, strategic fit would need to be demonstrated with Leonardo da Vinci objectives and also the possibility for EU level materials to be developed. The concept of utilising ESF funds, for example to mainstream pilot projects funded under Leonardo da Vinci, was elaborated and might be a theme for future feasibility analysis.

We aimed to review and identify the lessons learned of the most relevant initiatives through IEE that are already active within the area. However, the most relevant initiatives have only started in recent years and remain in progress so the impacts are as yet unclear. Another relevant initiative supported by the IEE is its concerted action on the EPBD directive, which covered skills issues (relating to energy auditors). Plans for a concerted action on the RES directive, which also has a skills aspect, are already underway.

A number of aspects of previous projects appear of relevance to the design of a future intervention in this area. For example, the French FEEBat scheme funded by white certificates could be successfully expanded to other countries with similar certification schemes such as Italy.

Additionally, skills training and provision through employers was recognised as a major factor for training in the target groups. It was noted that that possibly short courses may be enough to 'green' skills for many existing workers. However, commenting beyond this is difficult as data on employer inputs is limited. This is an area where further research is required.

Data gaps and uncertainties

The figures produced on the size of the target group give a useful indication but have limitations, related to the lack of quality and coverage of current EU level data. The following key factors should be considered when reviewing the data provided:

- **Uncertainty regarding future policy developments** – it is difficult to predict the speed with which demand for EE and RES in buildings will increase and the speed (and extent to which) this demand will translate into demand for skills. Events or policies at a national level could have significant unforeseen impacts.
- **Modelling approach** – the data calculated using the model approach is based on a series of assumptions, while best efforts have been made to make them realistic and intelligent, there are margins of error. A lack of data specific to the target group has required us to use factors from the whole economy or from the wider construction sector. This means that construction specific issues, such as a comparatively old age profile which could mean higher replacement rates than the economy average are not fully reflected in the data.
- **Geography** - the data presented does not fully reflect the variation in climate, culture, tradition, building stock, current target group workforce size and skills or the many other factors between the MSs. As a result the distribution in the growth and labour requirement in the target group between member states is unknown, though evidence suggests needs will be higher in most newer MSs.
- **EU-25** – the data presented only covers the EU-25 as the original data source excludes Romania and Bulgaria. An approximate adjustment to the EU-27 could be made by a 5% increase to all totals.

Estimates
provide
starting point
but have
limitations

- **2006 Base** – the data does not fully account for the changes that have taken place in the last few years.
- **Existing skills base and dead weight** – in calculating the potential skills needs of the target group the data does not fully reflect the skills base of the existing workforce. Data on training that may happen regardless of any intervention is also lacking.
- **Type of skills needs** – the data only points to potential level of skills needs, but does not specify in any detail what skills training may be required, either by delivery type (e.g. short courses, certifications or full diplomas) or precise subject area (e.g. electrician skills in connecting PV).

The existence of data gaps is not unexpected with high levels of interest in the area of buildings EE and RES, but also many of the national plans to co-ordinate economic recovery, climate change and job creation packages not yet fully developed.

The implication of these concerns is that a constantly evolving policy landscape, matched with a lack of reliable data on skills needs for the target groups means that at present a detailed mapping of needs is impossible. This suggests the need for further and continuing work prior to any intervention to appropriately map and target any programme. This further preparatory work would need to focus on mapping the type, level and scale of skills needs for the target groups in each member state to give a sound basis to design appropriate policy interventions. It should also allow the design of policy that can react flexibly to changes.

Mapping studies have been carried out within some MS and could potentially fit into an analysis of skills needs, but this may require considerable extra work and would still require new research in those MS where no skills needs mapping has been carried out.

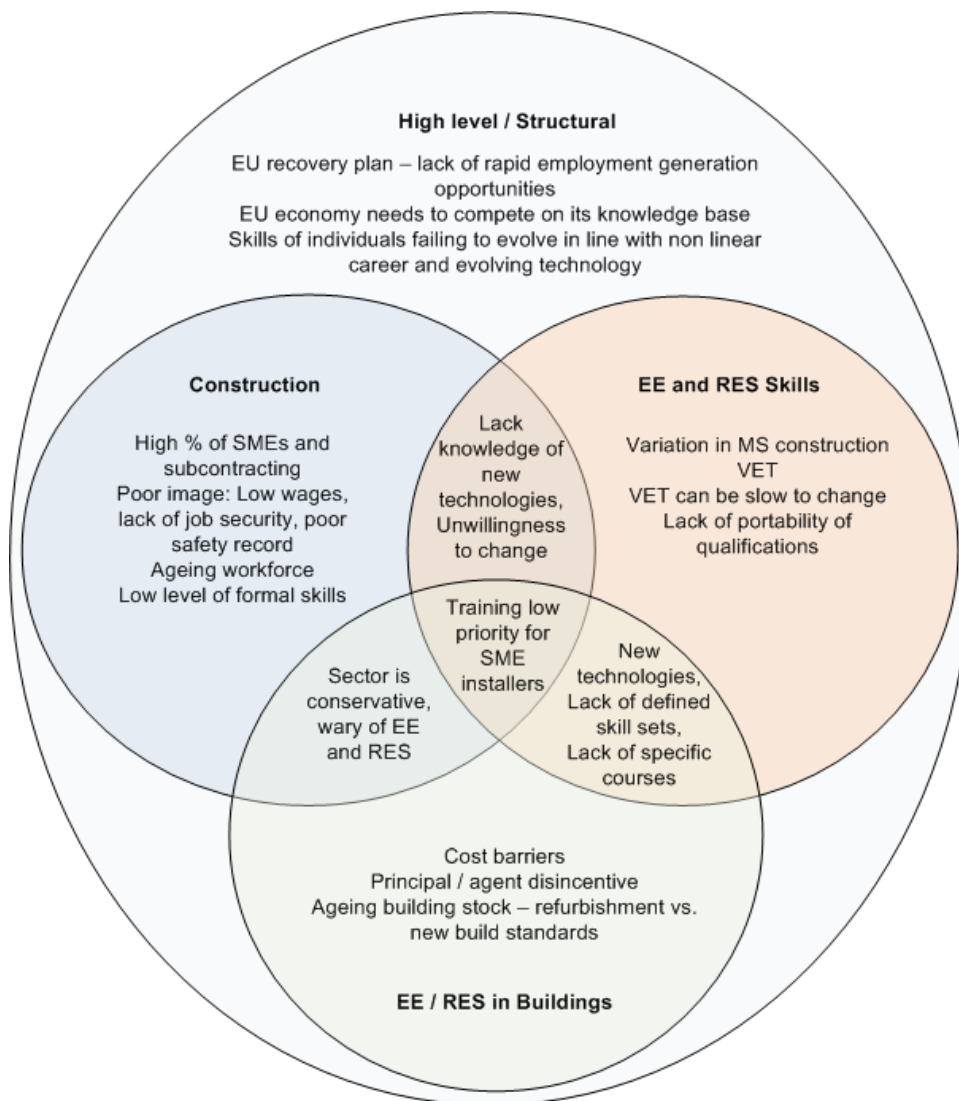
4 Problem Definition

This section of the report considers the objectives that an intervention should aim for. It also considers potential indicators to measure progress towards achieving the objectives.

4.1 Problem Analysis

It is clear from the information already presented in the problem analysis that there are a wide variety of issues of relevance to this proposed intervention. It is also clear that these issues lie in a variety of specific and generic areas and that many of the problems are well known and already the focus of significant policy activity which has developed over many years. This makes the problem analysis highly complex and implies a need to focus on particular issues. Figure 4.1 is a (non exhaustive) attempt to present the main problem areas to illustrate their diversity and overlap.

Figure 4.1 Areas and Examples of Problems Relevant to the Proposed Intervention

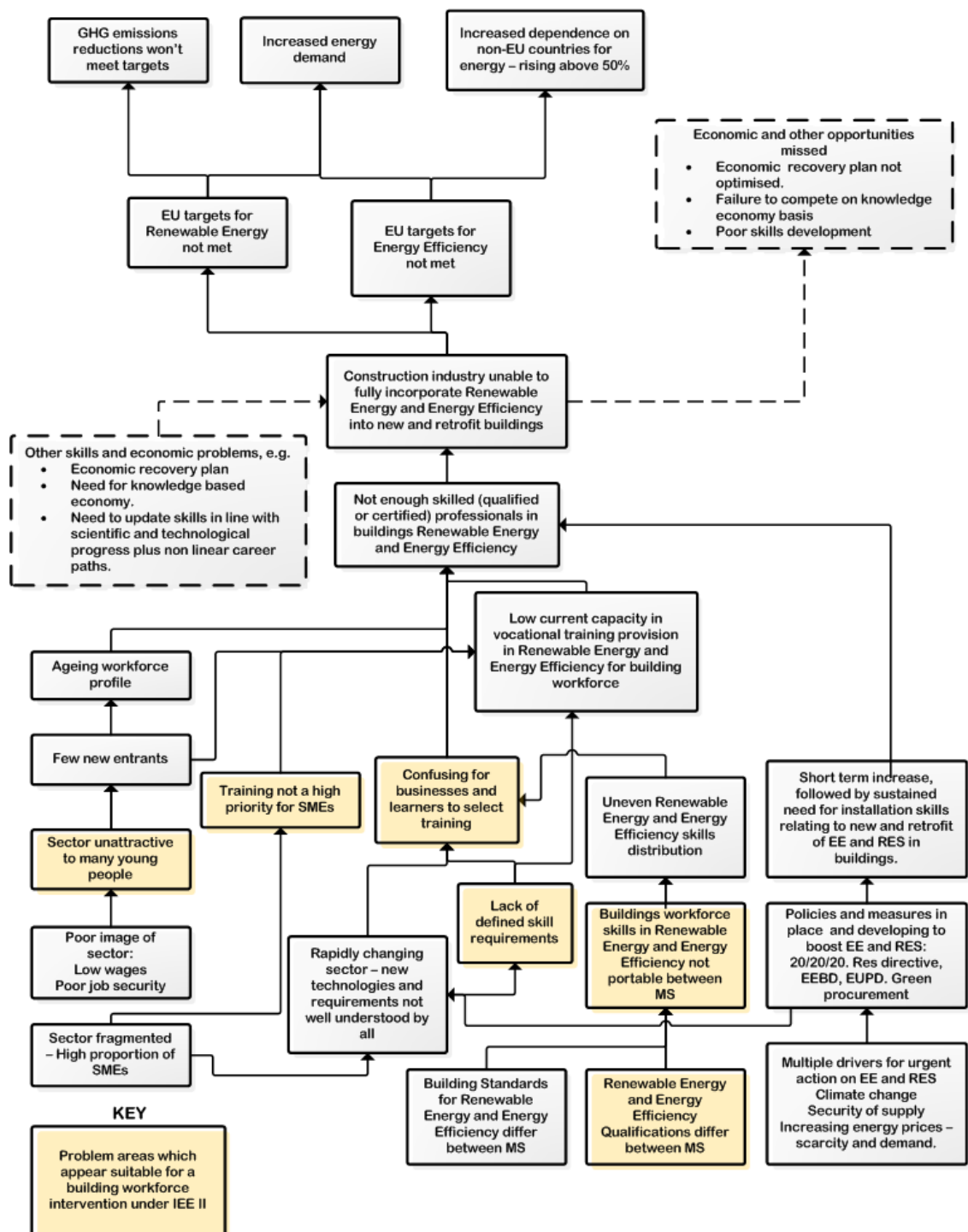


It is important that the intervention is scoped to target the types of problems that can be addressed by the structures or schemes the terms of reference describes. This suggests that this intervention needs to carefully focus its activities in areas such as schemes to address low participation levels or course quality (in order to avoid both diluted impacts and duplicating existing policy activity). This focussing needs to be informed by which problems are regarded as most important, the strategic nature of the IEE II programme and the scale of funds available. Crucially, as shown by the previous section, these issues and their relative priority will vary between MSs.

These problems can be restructured to form a problem analysis diagram which is intended to link the issues and lead to an objective tree / intervention logic. We have done this in figure 4.2 and highlighted the problem areas where there appears to be potential for the IEE to usefully intervene. This selection is based upon the following criteria:

- A non technical issue - in line with the remit of IEE to address these.
- An issue which combines an EU wide applicability with the ability to deliver MS level activity.
- Issues which are not already (clearly) the subject of other programmes / policies. The 'clearly' is added to make it clear that although the issues may come under the scope of other programmes there may be a lack of focus on the specific issues of interest here.

Figure 4.2 Problem Tree



4.2 Rationale for Intervention

4.2.1 Identified policy gaps

The range of causes identified for skills shortages in the energy efficiency and renewable energy in buildings workforces points to a number of issues for policy to address. The persistence of these shortages over time points to a failure of existing policies to deal with the causes. Whether policies in recent years have had a full chance to take effect is unclear but the urgent need for action to cut carbon emissions makes it hard to wait and see. The combination of these factors points to a need for urgent policy action to address the shortages that continue to exist now and that are projected to increase in future without action.

As discussed in previous sections the Intelligent Energy Europe programme strategy is clearly placed across the issues of energy efficiency and renewable energy in buildings. The remit of IEE also allows for action on education and training with skills shortages one of the key non-technical barriers. It has already supported a number of projects addressing qualifications, training and skills in this area.

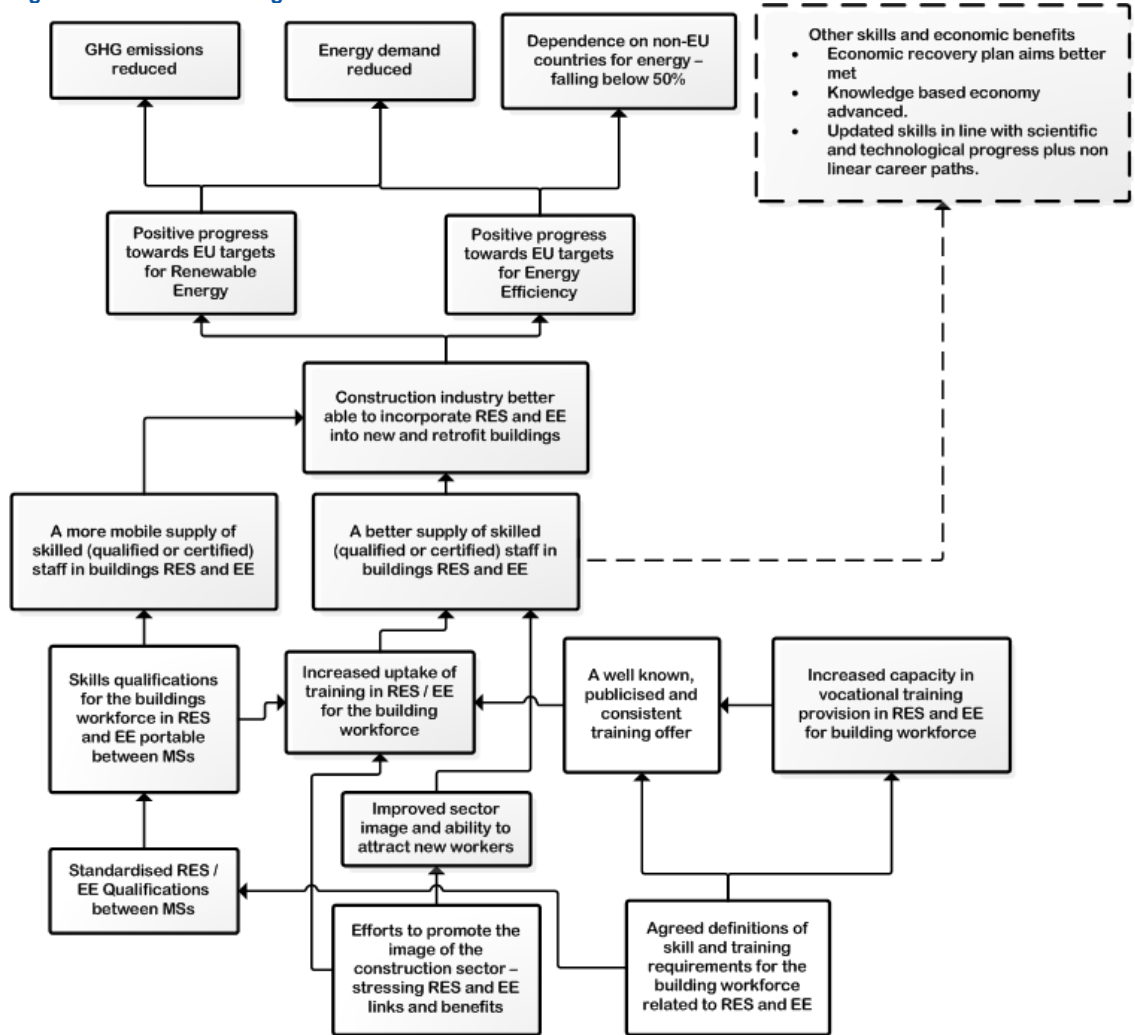
In the area of vocational education and training the over-arching EU strategy has recently been updated and lifelong learning is at the heart of action in VET. The Leonardo da Vinci programme is the element of the LLP programme that deals with vocational education and training. Its overall objectives closely match the subject of this evaluation in dealing with qualifications and workforce training. Leonardo da Vinci does not have a clear energy efficiency, renewable energy or buildings focus but in its wide coverage has supported and continues to support projects and exchanges in these areas.

This shows that potential overlap may already exist between IEE and Leonardo da Vinci actions and so raises questions around duplication of efforts. Duplication is somewhat unlikely given the scale of the issue, the various causes of shortages and the small number of projects. Still it may be advisable to look into the potential synergies between the two programmes and how partnership delivery could increase effectiveness.

4.2.2 Intervention logic

The intervention logic for the proposal is effectively a restructuring and restatement of the problem tree with the objectives being to address the selected problems. These objectives can then be reviewed and potential measures of success in achieving these objectives can be drafted. The figure below presents this.

Figure 4.3 Intervention Logic



The policy interventions which appear at the base of the above diagram are further described in the next section of this report - delivery options, as is the target audience.

4.3 Objectives

A review of the intervention logic, suggests that the following objectives are appropriate. As with the indicators, these would need to be developed in more detail, when the MS specific options for action are further developed.

- High level
 - Reduced greenhouse gas emissions – related to a reduction in buildings energy use.
 - Increased utilisation of RES in buildings.

- Intermediate
 - Employment levels in construction as a whole – reflecting the goals of the EU recovery plan to maintain jobs and in longer term for sustainable growth.
 - Increased employment levels related to sustainable construction.
 - Increased national and international accreditation of RES qualifications relevant to target groups.
 - Improved quality of training delivery
 - Improved quality of course curricula and content

- Operational
 - Positive perception of careers in construction, related to EE and RES in the target groups.
 - Detailed descriptions of skill requirements relating to EE and RES in the target groups.
 - Increased number of places available on training courses for EE and RES for the target groups.
 - Increases uptake of places on training courses for EE and RES for the target groups.
 - Increased number of trainers in courses for EE and RES for the target groups.

5 Options for Action

Our analysis of the problem and the overarching programme objectives and potential indicators enables us in this section to consider the options for action available.

5.1 Recommendations from review

In reviewing the extensive literature on the subject during the problem definition a range of solutions to the problems identified in section 3.3 were put forward, including:

- Training and skills
 - Mapping the scale and types of needs
 - § Need to actively match supply and demand
 - Improved vocational training in construction
 - § Update course content and curricula
 - § Practical solutions from industry to feed back into vocational training
 - § More flexible provision
 - Free or low cost training for installation and maintenance of RES
 - Improve general skills in sector
 - § Core skills
 - § ICT skills
 - § Management skills
 - Improve technical knowledge and skills
 - Encourage SMEs to invest in training
 - Expand training programmes – apprenticeships in sector
 - Incentives for RE companies that take on and train workers
 - Investment in Continuing Professional Development (CPD)
 - Energy efficiency and renewable energy education to begin in primary school
 - Improve quality of workmanship
 - Harmonisation of accreditation and mutual recognition of qualifications
 - Recognition of prior 'learning' (experience)
 - Improved educational pathways – no 'dead ends'
 - Improve social dialogue in VET systems design
- Energy Efficiency
 - Extension of energy labelling of products and for buildings

- § Benchmarking energy and resource use
 - Improving integration in the construction process
 - § Systems approach – not just considering the physical structure
 - Greater R&D in construction and building materials
 - Need to focus strongly on refurbishment and retrofit in addition to new build
 - Establishing professional liability for poor quality work
 - Maintaining and improving enforcement and monitoring
 - Support use of life-cycle costing in development phases
 - Raising awareness and information of EE solutions for buildings
 - Tighter building regulation
 - Public sector procurement to champion standards
 - Incentives for EE investments
 - Spread of best practice
- Greater communication and partnership between sector stakeholders
 - Public sector as primary coordinator
- Behavioural change in building users
- Business development support for SMEs in EE and RES
- Improve attractiveness of sector to potential employees
 - Improve awareness of career options
 - Improve health and safety record
 - Need to attract more women and minority groups - inclusivity

The recommendations have a strong focus on reform of vocational education and training in construction. A focus on continued regulatory support for energy efficiency and changes in processes and accountability were also among the recommendation to address skills shortages and promote energy efficiency in buildings. Other general areas for action were also identified such as the key role of public intervention, the need for behavioural change in users and a need to improve the overall attractiveness of sustainable construction as a sector all people would like to work in.

5.2 Policy fit

Consideration of existing policies and the overall context as elaborated in the problem definition shows areas where actions along the line of these recommendations are already being taken. For example there is evidence of:

- Skills mapping exercises at national and regional level – though substantial gaps still exist
- Subsidised training in EE and RES as part of recovery plans
- An expansion and extension of apprenticeships, particularly in new member states
- Changes to curricula towards a more general focus, a greater focus on core skills

- Opening up of educational pathways
- Greater practical elements to tertiary level courses
- The implementation of the EQF, ECVET and EQAVET
- A move towards greater focus on buildings retrofit
- Progress on tightening building regulations (e.g. EPBD recast)

In these areas and others, the geographical coverage and extent to which these measures meet the needs varies. Policy gaps for an IEE sponsored programme could still exist where action is already being taken but for example where general efforts have not specifically focused on the energy efficiency and renewable energy in buildings workforce or where coordination efforts have begun but could go further and faster.

The consideration of possible options for action for IEE to pursue in this area needs to be informed by the following factors:

- other existing actions and programmes in this area;
- best match with overall IEE strategy;
- the programme objectives; and
- fit within the realms of EU-wide implementation given the budgetary constraints.

It is useful to restate the description of the potential intervention contained in this evaluation's terms of reference, which are to:

1. '[To] support Member States efforts, to boost qualification and certification schemes and to improve access to vocational training in the building sector (inter alia for installers, technicians, inspectors and auditors)'
2. ...that 'The initiative would not be primarily intended to pay for the training directly, but rather to provide financial support to create, strengthen or link structures and instruments aiming at boosting the vocational training and qualification schemes for the building workforce'.
3. ...and 'This initiative could provide structures and instruments for leverage and align existing workforce training programmes and resources towards the energy efficiency and renewable energy topics'.

A review on this basis points to actions in line with the following recommendations. **Those that appear the best fit with the scope of the initiative have been highlighted:**

1. **Mapping the scale and type of need, in order to compare need, demand and existing provision in a series of MS specific gap analysis.**
2. Improve access to VET
 - More flexible provision
 - Recognition of prior learning (experience)

- Improved educational pathways
 - Improve attractiveness of sector
- 3. Support to create, strengthen and link structures and instruments to boost training and qualifications**
- **Updating course content and curricula**
 - Practical solutions from industry to feed back into VET courses
 - Improve ICT skills
 - Improve management skills
 - **Transparency and mutual recognition of qualifications**
 - Maintaining and improving enforcement and monitoring
 - Support use of life-cycle costing in development
 - **Spread best practice**
 - **Greater communication and partnership between sector stakeholders**
4. Leverage and align existing programmes
- **Encourage SMEs to invest in training**
 - Improve social dialogue in VET systems design
 - Improving integration in construction process
 - Raising awareness and information of energy efficiency in buildings

This matching of recommendations to programme terms shows that there are a variety of potential options for action in each area. Some identified areas, although within the scope of the IEE would not necessarily be suitable as options for action, due to issues such as subsidiarity (e.g. enforcement and monitoring), others have a very close match to the IEE programme objectives.

Issue 1 (the gap analysis) needs to be done before the other steps – in order that that can be designed to reflect the knowledge collected.

5.3 Proposed Options for Action for Evaluation

The initial options for action described in the inception report, and the main drawbacks with these are as follows:

1. Business as usual - no new additional EU initiative on training for EE and RES supported by IEE.

2. Collaborative action - MS government level coordination / analysis (cf. EPBD) of the training needs, qualification harmonisation, future demands and delivery models. This runs the risk of duplicating existing and ongoing government action at MS level, for example through the concerted actions under the EPBD. It should be noted that no detailed reporting or high level exchange of best practices on national training activities is foreseen under the EPBD Concerted Action. Only mandatory training for certifiers and inspectors will be

looked into and because of this creation of a platform for exchanges of Member States practices in the field is additional to the Business as usual – no change option.

3. Pilot schemes - possibly at centralised EU level – targeted on training providers who could design and pilot training provision targeted on areas of identified need and future demand. This runs the risk of lacking scale and commitment from MS level.

4. Awareness raising – at EU level - of need, demand and delivery models – targeted on training providers in order to increase the likelihood (and speed) of replication of suitable training. Although useful an intervention solely targeted at awareness raising is unlikely to have a large enough or rapid enough impact.

5. Combination of 2, 3 and 4 – this has emerged as the preferred option following discussions during and after the inception meeting. This preferred approach is the option that the remainder of our work focuses on.

5.4 Preferred Option

The combination option no. 5 is an approach phased over a number of years. The first phase, during year one, would be to gather more detailed data on the nature of the skills needs, current provision and views of relevant actors at a member state level. This would be followed by a second phase when, if it appears feasible and appropriate from the findings of stage one, member state level partnerships would design and implement training courses. The third and final phase would be for member state level expansion of the courses piloted during phase two. The level of funding required from the EU would start off relatively low in phase one, increase in phase two and potentially increase again in phase three – depending on findings.

The draft IEE 2010 Work Programme allocates €1 million to preparatory work for a training initiative, most likely within the scope of the EPBD and RES Directive Concerted Actions, though the goal of any IEE funding would also be leverage additional funding to create impact and EU added value. This may be possible through establishing a process or building capacity through IEE that also draws on existing programmes and funds such as ESF, LLP (Leonardo da Vinci) or MSs own programmes. These partnerships could be essential as a first step and to ensure a continuity of funding once IEE funding is used.

As stated above, the purpose of phase one, would be to gather member state level data on existing training, skills needs, potential providers, relevant structures etc. This approach has been designed to reflect the wide variation in the scale, nature and structure of relevant training provision between member states which our literature review has revealed and the need to design an intervention which best fits this variation. There are a number of ways which this data collection and review could be delivered. The primary options we have identified are:

(i) The Commission could ask Member States to provide the data on their own needs and current provision. This work could be done by the relevant member state government departments and / or the national energy agencies. Though the resources, scale and knowledge of relevant construction skills issues of the energy agencies varies considerably between MSs. There may well be demands for funding from whoever prepares the information.

(ii) IEE could be used to gather the data via the concerted action route. It should be possible to extend the scope of an existing concerted action project, ideally the project concerned with the Energy Performance of Buildings Directive (EPBD). Using the EPBD concerted action would offer efficiencies as the existing partners in these projects will have a good familiarity with modern energy efficiency and renewable energy technologies in buildings – albeit from a building standards as opposed to training and skills point of view. The concerted action on the renewable directive will already be considering skills issues as this is an explicit requirement of the directive and one where a coordinated approach between MSs offers clear benefits. For example any standardisation of qualifications will increase their portability.

The first phase of the favoured approach will also involve a partnership at member state level, or possibly regional level. The idea of adopting a member state approach is to allow schemes which reflect the variety of approaches and structures and the degree of progress made in addressing the issues between the member states. Furthermore, a call for proposals could be launched, in which per MS/region eligible organisations would participate. The Commission would then only set up the eligibility/selection and award criteria and the Member States/regions could propose a scheme/structure that most suits the local situation.

The first stage is foreseen as involving the development of a training offer covering one aspect of the skills needs identified in the first stage. The choice of subject area would be left to the member state partnership to decide. The development of the training offer would include the preparation of course content (curriculum), the training of trainers, promotion of the training to the appropriate target group and a pilot scale operation of the training course.

The partnership element of the proposed first stage is key. The proposal is to bring together a group of relevant actors best placed to design and deliver training appropriate for the member state. This partnership should ideally include members such as construction industry representatives, training delivery bodies, national energy agencies, construction labour groups. The make up of this partnership, both in terms of match and willingness would be an important issue to be investigated during phase one.

IEE is seen as having a significant input to the funding of the first stage though a significant level of match funding would also be expected from the member states. This match funding is seen as vital in ensuring that the MSs are committed to the training offer and its continuance after the pilot stage. The possibility also

exists that funding could be utilised from other national and EU sources in this phase. For example funding available via ESF to train people in refurbishing existing buildings and the MS funding that may need to be made available to fund the training requirement included in the RES directive. It may also be possible to utilise funds from the Leonardo da Vinci project to fund the piloting of courses.

The second and final phase of the proposed intervention is the most difficult to describe in detail at this point as it depends on the outcomes and successes of phases 1 and 2. In principle it is envisaged that the MSs would utilise the partnership and model they have developed in phase 1 to design and implement training schemes covering more subjects and at a larger scale.

The EU added value of the three stage approach is expected to come from a number of sources. There would be the opportunity to transfer best practice between the MSs. This could include that identified during phase 1 and also the material and approaches developed during phase 1. If course curricula developed in MSs could be shared and standardised this would have the major additional benefit of increasing transferability and the mobility of labour, though it should be stressed that this would not be the prime purpose of the policy.

6 Policy Analysis - Impacts, Costs, risks and added value

6.1 Impacts

The ultimate impact of the proposed policy relates to the faster uptake of RES and reduced energy consumption in buildings as well as a more highly skilled and qualified workforce, with jobs created locally.

The consequences of poorly constructed buildings can be assessed by considering the overall energy saving potential in buildings. The largest cost-effective savings potential lies in the residential (households) and commercial buildings sector (tertiary sector), partly because of its large share of total consumption (around 40%). About 80% to 90% of total energy used during the life of a building is consumed during its operation, while the rest in the construction and demolishing phase.⁶¹ In the residential (households) the full energy saving potential is now estimated to be around 27% whereas for commercial buildings sector it is estimated at 30%. In residential buildings the greatest energy saving opportunities are the retrofitting of wall and roof insulation. In commercial buildings the greatest energy saving opportunities lies in improved energy management systems. Improved appliances and other energy-using equipment still offer enormous energy savings opportunities.⁶² Table 6.1 lists the estimates for the full energy saving potential (EU25).

Table 6.1 Estimates of EU energy saving potential in buildings

Sector	Energy consumption (Mtoe) 2005	Energy Consumption (Mtoe) 2020	(Business as usual) Energy Saving Potential 2020 (Mtoe)	Full Energy Saving Potential 2020 (%)	Cost saving potential as result of less energy usage (billion Euros) ⁶³	CO ₂ emission saving potential (Mt) ⁶⁴
Households (residential)	280	338	91	27	199	455
Commercial	157	211	63	30	138	315

⁶¹ EEA (2007) Sustainable consumption and production in South East Europe and Eastern Europe, Caucasus and Central Asia, EEA Report, No 3: European Environment Agency.

⁶² COMMUNICATION FROM THE COMMISSION Action Plan for Energy Efficiency: Realising the Potential {SEC(2006)1173} {SEC(2006)1174} {SEC(2006)1175}

⁶³ Based on Eurostat data: Electricity - domestic consumers - half-yearly prices - New methodology from 2007 onwards for the EU27

⁶⁴ We convert kWh to kg of carbon saved based on the current DEFRA guidelines (0.43 kg/kWh).

buildings (Tertiary)						
Total	437	549	154	57	337	770

Source: European Commission, EU-25 Baseline Scenario and Wuppertal Institute 2005.

While the table lists the overall figures, it is important to remember the variation that can be expected per MS. Most energy in the residential sector is used for space and water heating. Due to weather pattern variations the requirements for houses differs and opportunities and mechanisms for energy efficiency measures differ. Southern MSs have a smaller share of space heating and a larger share of cooling in their energy balances than their northern counterparts.⁶⁵ Overall, energy efficiency factors in buildings also vary according to geography, climate, building type and location.⁶⁶

Although the potential is high there is a risk that those aspects which are taken up will not achieve their full potential as a consequence of poor skills in the building workforce. I.e. the energy saving and renewable energy installations might not achieve their full potential as a consequence of suboptimal installation. The extent of this effect is, however, hard to determine.

Although the skills needs and the lack of know-how are more and more regarded as a barrier to EE and RES uptake, as a barrier to proper installation, maintenance and inspection of equipment,⁶⁷ it is hard to make a robust assessment of the impact on energy saving potential due to the lack of skills of the building workforce. However, if we take a conservative estimate, of 10% of the energy saving potential being dependant on the building workforce being fully skilled and qualified then a significant cost of inaction becomes apparent, as shown in table 6.2.

Table 6.2 Potential costs of unskilled EE & RES workforce

Sector	Energy Saving Potential 2020 (Mtoe)	CO ₂ emission saving potential (Mt) ⁶⁸	Cost saving potential as result of less energy usage (billion Euros) ⁶⁹	Value €m at shadow carbon cost in 2020 of €40 / tonne
Households (residential)	9.1	46	19.9	1840
Commercial buildings	6.3	32	13.8	1280

⁶⁵ Towards energy-efficient housing: prospects for UNECE member States An interim unedited draft prepared for the First UNECE Workshop on Energy Efficiency in Housing, 21-22 April 2009, Sofia, Bulgaria

⁶⁶ World Business Council for Sustainable Development 2007, Energy Efficiency in Buildings, Business realities and opportunities, Summary Report

⁶⁷ For example, AN SBCI Report to COP 14 Presentation of findings and recommendations (2008) Poznan.

⁶⁸ We convert kWh to kg of carbon saved based on the current DEFRA guidelines (0.43 kg/kWh).

⁶⁹ Based on Eurostat data: Electricity - domestic consumers - half-yearly prices - New methodology from 2007 onwards for the EU27

Total	15.4	78	33.7	3120
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On the basis of the calculations in table 6.2 around €3.7 billion of energy cost saving potential would be jeopardized by low quality installations caused by a lack of skills in the buildings EE and RES workforce. Extending this to the climate change impacts using a shadow cost of carbon in 2020 of €40 / tonne then a further €3.1 billion cost could be incurred. This highlights the importance of achieving a highly skilled workforce, even partial success of the initiative in improving skills and consequently the quality of buildings EE and RES installations could have massive impacts.

The costs of achieving the full savings by ensuring that workers in the target groups are all qualified and certified to carry out buildings EE and RES work are also likely to be of a similar scale but again the complexities involved mean that only a indicative estimate can be made. On the basis of all of the estimated target group of 1.42 million being fully trained, at an average course cost of €1,000 this would total around €1.4 billion. Any such funding would be likely to come from a variety of sources.

Results from the survey into the funding of training for the target group (see table 6.3) showed that usually the costs are borne by the employer or the individual. According to the energy agencies, the training fees for the training in renewable energy sources are paid by individuals in 5 member countries. It was also found that there is a large variety in training funding providers. This holds for both buildings EE and RES. It was also mentioned that parts of the costs are borne by climate protection programs (e.g. *HausderZukunft*), depending on the situation by government, individual and/or employer. In some cases the costs are borne by the producer (or seller) of energy efficiency means.

Table 6.3 Financial support for training provision

	Energy agencies/EE	Building associations/EE	Energy agencies/RES	Building associations/RES
full costs borne by individual	5	2	7	1
full costs borne by state	3	3	3	3
full costs borne by employer of individual	7	8	7	7

With individuals, the state and employers funding most training currently it may be expected that each of these groups will also be major funder of training going forward. So of the estimated €1.4 billion training cost, the amount provided through other methods such as EU funding or under the proposed IEE initiative would proportionally only be a small amount. This could mean that the initiative may still be able to have a significant impact if it is able to leverage and/or generate synergies with other funding sources.

6.2 Costs

The survey also investigated the **cost effectiveness** of the proposed policy idea. On the question of how much budget would be needed in the country to effectively start up the scheme and lead the structure/partnership a large number of respondents were hesitant in giving concrete numbers. Making any such estimate would depend on the intensity and type of activities of the option for action and this remains difficult at this stage. Answers ranged from EUR 100,000 to EUR 5 mln annually. The existence of other national/regional funds that could be available to **sustain** the training scheme after implementation of the EU initiative vary a lot per MS.

6.3 Risks and Added Value

Our consultations and surveys generated a significant body of comment on the proposed option for action. Different views and comments were found in our consultation with the stakeholders. First the comments from the interviews are discussed after which the results from the survey are discussed.

Positive comments

According to one consultee co-funding options should be identified, for IEE to co-fund training for 2-3 years. The approach would be flexible between MSs and would target specific occupations/skills. The main priority should be to ensure an impact from the funded training and that it is cost efficient. It is believed that a bottom-up approach to co-funding would be best. One consultee mentioned that he is wary of mandatory requirements distorting the market, but recognised that this is a trade-off against quality assurance, particularly for SMEs.

According to one interviewee, the MSs have demonstrated their willingness to act on this issue through such actions as their lobbying, and subsequent action on changes such as relaxation of ERDF spending rules (to allow more rapid and larger spending on improving the energy efficiency of housing). Another potential aspect to the intervention was suggested by another consultee who believed it would be good to request projects that focused on the EU-wide harmonisation of knowledge and training. The desire for standardisation and harmonisation was also raised by another consultee who was less positive on this issue feeling that such an objective is unrealistic given the variances between national, regional, local and cultural building requirements and procedures. He felt that it may be possible to help with transferability of qualifications but that this should not be a primary aim of any intervention.

One consultee while agreeing that a further policy initiative is necessary highlighted the risk of duplication but also potential for synergies with existing initiatives. Another interviewee felt that most MSs are already beginning to partly address this issue (partly due to the inclusion of construction projects in recovery plans). Examples of this response were quoted from Ireland and Belgium where Public Employment Services (PES) have already led training

programmes targeted at EE and construction. The risk of duplication was also mentioned by another consultee, who specifically raised the dead weight effect of training provision that will take place anyway. An example of a training scheme developed in this area in Belgium was mentioned where it was found that the dead weight effect was 50%-70% which is high. However, even under this scenario some 30-50% of those receiving the training would not have done so otherwise, which could be viewed as representing a worthwhile intervention. The opportunity for synergy with some of the major (part ERDF) capital schemes to support the construction of energy efficient buildings was also raised. The consultee who raised this possibility described how a combination of EU, MS and private capital could be used to fund the development of training capacity in this area.

Negative/critical comments

One consultee believed that an additional policy initiative of the type described was not necessary and that resources would be better focused on improving the performance of existing schemes and programmes, particularly in tailoring them to the needs of SMEs. He believed that the proposed intervention was too small, leadership was unclear, and that it would duplicate other existing initiatives and didn't demonstrate how it would reach the SMEs that should be targeted. This view was shared by another consultee who expressed doubts over the value of an additional EU level intervention as MSs are already required to take action in this by various directives including the RES directive. Another consultee suggested that any additional EU training initiative should be integrated into existing standard programmes.

The integration of the proposed EU initiative into existing programs was also suggested by another consultee who felt that the proposed intervention is not useful. He felt that training schemes should not come on top of the existing legal obligations but that efforts should be directed to integrating and improving existing training schemes. An increased level of national coordination was accepted as useful but the point was raised that as the issue is one that is often led on a regional basis (e.g. in Belgium), 'national' level coordination is not always appropriate. In such MSs a regional approach (with some inter-regional coordination in mind) would be the only way to progress.

Another Belgian consultee was also critical of the proposed intervention. This criticism derived from past experience of regional transposition of the EPBD (article 8) which they regarded as creating barriers between regions because the training programmes were slightly different amongst regions. There is no mutual recognition between regions in one country, let alone with other member states. This increases administrative burdens. Furthermore, the industry (manufacturers) are required to train the regional trainers from a general point of view taking into account all technologies and product ranges. The competence level of the trainers provided by the regions varies and hence so does the quality of the training courses. As a result manufacturers and importers need to ensure, as they did in the past, that additional and specific training for their employees for their product ranges is available. In general the product and often brand related technical issues

can not and are not dealt with during the regional training courses that, after exams, provide for an individual certificate. In the case of EPBD, employers have to fund the training of their employees (up to 152 hours) and when the employees have passed their exams the employer is confronted with a request for a pay rise, otherwise the employee leaves for another company or starts as an independent trader.

Another consultee suggested that the role of the EC should be to support learning between MS, i.e. sharing best practice, rather than directly funding the development of training. This consultee felt that the new concerted action on RES should try to emulate success in this area by the concerted action on the EPBD. Another consultee raised concerns around the added value of EC involvement, if they used their funding to support the development of MS level schemes rather than concentrating on sharing of best practice, which offers better opportunities for EU added value.

Another consultee suggested that EU efforts to address this issue would be better focussed on boosting market demand for buildings EE and RES. This view was shared by another consultee who felt that the skills gap is more of a reflection of lack of demand for the relevant technologies and this lack of demand translates to a low take up, and hence supply of training. The current economic downturn was also felt to be a potential problem for the proposed intervention as construction firms will be less likely to invest in training when their survival is not guaranteed.

Ideas for improvement

A number of suggestions to improve the option for action were offered, as follows:

One consultee suggested that there is a need for clarity on the target group – i.e. which part of construction workforce is being targeted and why. The inclusion of the building maintenance workforce was also suggested. Another consultee questioned the scope of the workforce being targeted with the suggestions that there are important skills needs in other parts of the sector such as architects and designers.

A number of consultees raised the need for additional work to quantify the level of skills needs at various levels and specific to MSs as being vital. One consultee also raised the issue that a lack of basic skills (e.g. literacy) in parts of the sector would pose a barrier to any skills training programme intervention.

The need for an initial mapping stage was referenced by one consultee as having justification from high level strategy views, for example president Barroso specifically mentioned the "big growth potential for green jobs...by mapping the skills needed for the future" – providing direct justification for the mapping stage of the proposal.⁷⁰

⁷⁰ http://ec.europa.eu/commission_barroso/president/pdf/press_20090903_EN.pdf: p. 20

Another consultee suggested that the detailed design of the intervention should be focused on how IEE can best add value in addressing needs. A specific aspect that one consultee thought any intervention should seek to include was the validation of prior 'learning' including practical experience.

With regards to the intervention type, one consultee suggested that a scheme which offered a fiscal or financial incentive to favour qualified/certified workers would be a more effective way of ensuring high quality energy efficient projects rather than supporting and developing training provision. In addition energy feed in tariffs linked to the use of certified suppliers (of the renewable energy sources in question) was also suggested as an option for action. However, another consultee noted that financial incentives for consumers of this nature had not been successful in Germany.

A skills specialist consultee expressed an opinion that the intervention was good, and should enhance the take up of skills related to RE and EE. The use of a financial incentive to encourage take up of training was suggested, with the proviso that this incentive should be substantial enough to encourage take up. The issue of the balance between the cost (both literal and opportunity) of the training versus the potential reward to the individuals concerned was raised by a number of consultees. A common view amongst those consulted was that the learner should ideally contribute to the cost of training in order to encourage a genuine commitment from them, and hence improve the likelihood of successful completion. The good strategic link between the proposed policy and the EU policy goal of flexicurity (i.e. improving job security while also improving flexibility of career options for the workforce) was mentioned by one consultee.

One consultee expressed the opinion that pilot programmes were not an effective use of funds, as their generally small scale inhibits their ability to have a wide impact.

A point was raised regarding the combination of any intervention with ERDF and ESF funding in that it is not unusual for ERDF funding to be administered and prioritised at a regional level with aspects of ESF funding controlled at a national MS level. This can lead to difficulties in combining the two in related projects.

With regard to the practicalities of training delivery in this field one consultee identified the timing of training as an important issue. The training is likely to be more popular if scheduled during winter when construction work is often disrupted by weather. Another climate related issue was raised by another consultee who suggested that an efficient EU wide solution would be skilled and mobile workforce that moves on a seasonal basis.

With regard to the use of the concerted action route to deliver the first stage of the intervention a concern was raised that it would be difficult to introduce a whole new concerted action, focussed just on these issues, as there is not a related piece of new legislation.

The "training of trainers" was suggested as an important part of any intervention designed to increase the capacity of training in the installation of many of the modern products of relevance. The installers and manufacturers (or importers) of the relevant equipment should be consulted and involved in the development of any training. A consultee described the present situation in Belgium whereby installers limit themselves to the installation of a heating system with the subsequent after sales service of manufacturers called upon to service and maintain the equipment. This situation was described as being due to the legal requirements of the EPBD. Due to the increased complexity of technology, a trend was described as emerging whereby installers and after sales services are becoming more and more linked with a single manufacturer who is often pushed to do so in order to maintain the reputation of his brand. This trend may be compared to that in the automotive industry where garages are specialising in one brand, in order to be able to cope with technological advances. Such a tendency of vertical integration may spill over to into the heating industry.

Two Belgian consultees reported that an important risk related to the proposed option for action was one of it resulting in a proliferation of regional or federal initiatives that would fragment the market even further without necessarily increasing competence levels and with the risk of increasing costs to the consumer. They regarded it as unlikely that a policy relying on regional/national inputs would benefit from the effects of scale (that large EU programmes can offer). They considered that equipment manufactures would be best placed to provide the level inputs required to benefit from the effects of scale, especially since many of them produce products that are sold and installed all over Europe.

The consultees described a number of interesting aspects with regard to training of the building workforce. One of these aspects is that the larger manufacturing and installation companies find it easier to cope with training requirements than smaller companies, as the larger companies can reserve more money for training activities. A related aspect is the withdrawal of (smaller) installation companies from maintenance activities for specific technologies/brands. This could happen if the level of training and qualifications required becomes too high and requires longer or more expensive courses, if this is the case then it is likely that these companies will not become skilled and/or certified to use particular technologies. The technology supplier companies would be likely to benefit from this with their internal training efforts supporting business growth in service and maintenance. Larger installation companies could also benefit as they have the capacity and resources to support training and remain active in maintenance and other support services. Therefore, the lack of training within smaller installation companies would result in a concentration of larger companies within the manufacturing and installation sectors of industry, possibly enhancing the shift towards vertical integration (i.e. manufacturers also engaging in maintenance and installation activities).

The link with other programs and organizations is discussed in the next section.

Ideas on collaboration

One consultee suggested interventions involving a diverse mix of public and private funding sources. This involved utilising SME specific funding to support construction companies develop their skills, which would provide a good match with multiple EU priorities including skills, SMEs, construction, innovation, low carbon economy, climate change etc. This could be part of a wider project involving a regional centre for SME construction training – with ERDF funds used to contribute to the cost buying the physical building, MS funding used to pay the teachers and ESF funds used for training administration.

Another consultee pointed out the cross over of the proposed intervention with the policy activity and programmes of other parts of the Commission. The remits of both DG Employment and DG EAC clearly cross into this area and given the scale of the problem, the large size (relative to IEE) of the funding pots these DGs have (albeit that ESF and others are managed at MS level) and also their much greater experience in training issues their involvement should be sought for any large scale intervention. The fact that objectives for EE and RES are very high on the agenda of TREN but less so for the other DGs, was raised as a point which might complicate any collaboration. However, some consultees raised concerns about the ability of DGs to collaborate.

Consultees believed that the other DG's and ESF would be largely supportive of intervention that opened up jobs and supported skills development as long as it did not interfere with their own initiatives. One consultee felt that there was a very strong potential for positive synergy between Leonardo da Vinci and the proposed interventions, citing issues such as the opportunity to influence the debate in terms of establishing European qualifications standards and identifying the necessary learning outcomes for the qualifications necessary for workers in the green sector. This type of combined approach was thought to offer a strong contribution to increasing the mutual trust among training providers in the green sector, the quality of training, the public image of the sector, and the mobility of workers in the sector.

One consultee who supported the intervention pointed out the importance of active dissemination and promotion of any training offers which are developed. This activity should be pursued in close cooperation with the educational institutions who have good access to the target workforce. The suggestion was made that incentives could be given to those institutions and to the building workforce who might use those schemes.

The use of concerted actions to further investigate the policy needs and options was regarded as a promising option for action, according to an EACI consultee as MSs are involved and motivated to share knowledge on skills issues. The EPBD concerted action was described as ongoing and successfully bridging geographical boundaries. The RES concerted action which is currently under development was also thought to offer a natural fit with the IEE policy objectives. It was also noted that there is a directive under discussion to introduce National

Energy Action Plans (NEAP) for EE in buildings, estimated to be due in 2012 and that this would also be likely to specifically address training requirements.

The CEETB regard life-long learning as a way to deal with the upgrading of skills that are required to keep up with the acceleration of scientific and technological progress. The training can be delivered via a wide variety of means, these include distance learning or e-learning, training-on-the-job, product-schooling (teaching skills related to a specific product, often by the manufacturer of the product) or correspondence courses and also includes postgraduate programmes.

At the same time there are some within the construction industry that would prefer action to address shortages to come from within the industry itself rather than public sector intervention as they consider that this would add a further layer of bureaucracy and potentially not react to employers needs in a timely manner. They feel that such an industry led response is already happening in a number of places, for example in Flanders industry led courses into the EPBD requirements for EE for boiler and water heater installers are being delivered.

Survey Opinions on the option for action

The option for action suggested in the questionnaire was to establish a national (or regional) scheme for training and upgrading skills for the building workforce related to energy efficiency and/or renewable energy implemented through partnership/grouping/structure of a diverse set of stakeholders in each member state. It is foreseen that such a scheme would be co-financed from different financial sources (public and private). It is proposed that cost of setting up the scheme, preparatory and piloting phase could be financed from the European EU funds. The schemes could be adapted to the national/regional needs regarding target groups to be trained as well topics to be covered. According to 18 out of 22 energy agency responses and 9 out of 10 building associations this option for action sounds useful to address the barriers to training and skills development for the building workforce in energy efficiency and/or renewable energy in their country. In addition 1 out of 17 energy agencies and 1 out of 7 building associations believe the intervention to be useful to some extent.

A number of ideas on how to improve the proposed EU initiative were raised. One idea was that the structure should be a backbone of different courses (at European level) which the countries could modify according to their national needs. This focus on the training needs of most relevance to each MS was regarded as crucial. The suggestion was also made, that any intervention should take a balanced approach and seek to keep administrative complexity at the lowest possible level. Additionally, it is crucial that all potential actors/stakeholders (e.g. associations of installers/technicians) are involved in the planning and implementation of the policy.

One of the other suggestions relating to the certification of the building workforce is that member states should develop and implement a national training and accreditation programme for installers of renewable energy and

energy efficiency systems. An important first step for this certification is to standardise the training courses by defining the required skills. Several energy agencies address the point that appropriate legislation needs to accompany any proposition for mandatory certification of the building workforce.

Other respondents would like to see greater involvement of employment agencies and RES & EE companies in the preparation of (discussing their needs) or the execution of training courses.

Actor involvement

The type of actor(s) that would be suitable for involvement in the proposed intervention varied between MSs. The survey respondents chose several actors to be involved in the training scheme, with the training/educational institutions as the most important one (see table 6.4). Many energy agencies saw national energy agencies as a prime stakeholder. This response may be biased by the fact that the energy agencies that responded already had some knowledge of building workforce skills issues. This effect can also be seen from the responses regarding the building workforce where the building sector association was ranked highest together with the training/educational institutions. Other organisations that were mentioned as relevant were associations of installers/technicians, other professional bodies (e.g. Chamber of Civil Engineers, Chambers of Architects, etc.) and manufacturers of RE technologies and their associations.

Table 6.4 Actors suitable to involve in any intervention

	Energy agencies	Building associations
national energy agency	15	3
regional energy agency	9	1
building sector association	12	9
building companies	7	3
national training ministry	9	4
training/educational institutions	18	9
employment agencies	8	3
ESF agencies at member state level	2	1

Impact of the proposed EU initiative

The energy agencies considered the lack of body to lead and follow up on the idea to be the main risk related to this proposed policy idea, although the other risks were also ranked highly (see table 6.5). Building associations see the duplication of other initiatives in this field as a significant risk. Other risks that were noted relate to the extra costs and coordination issues with too many stakeholders with possible consequences for inefficiency, a lack of flexibility and a lack of consistency. This would be accompanied by a high administrative burden and complexity. Furthermore, the level of financing and the lack of funding for its implementation on the field of several years is regarded as a risk. Very few energy agencies and building associations foresee no risks at all.

Table 6.5 Risks of proposed new EU initiative

	Energy agencies	Building associations

duplication with other initiatives in this field	6	8
lack of scale of the policy idea	4	5
lack of body to lead and follow up on the idea	8	6

Synergies/complementarities

It was found that approximately half of the energy agencies and building associations expected synergies/complementarities between the proposed intervention and existing national/regional initiatives. The majority of the other half found it hard to assess the potential for synergies/complementarities. Only a minority indicated that there was no potential for synergies/complementarities. One respondent mentions that the proposed solution is widely recognised and initiatives are under development to provide a solution. Another respondent, however, mentioned that national initiatives were uncommon. This gives a further indication of the differences between member states.

Synergies are expected under the condition that the EU initiative is tailored to national needs. Moreover, the proposed solution should be designed in a way that enables reaching full synergy in the medium-term. Other ways that synergies would materialise would be through common training material pools, advanced evaluation procedures, better coordination with international activities, better recognition of training, etc.

In Flanders, for example, an education program for energy experts (necessary degree to produce energy performance certifications) already exists. In the next two years an education program will be organised to certify installers of renewable energy applications (based on the renewable energy directive). The setup of this training will be led by stakeholders such as the regional government, the federation of installers and quality research centres. These parties should be involved to avoid possible opposition of the existing educative/training centres. The idea would furthermore build on existing expert competences. Another example of a national initiative is the Holland Solar/Uneto-VNI Masterplan. It is suggested that teaming up with these parties would be very effective in the EU initiative. Also, in the programme 'Meer met minder'⁷¹ numerous activities are undertaken to improve the skills of the workforce with regard to energy efficiency and renewable energy.

One building association noted that it could provide support and coherence to existing initiatives and encourage new ones. The partnership between the building sector (associations and companies), the research (universities and research institutions) and the training and educational institutions could introduce new technologies in the building sector in order to tackle the environmental and energy challenges. These challenges can be tackled at national/regional level but would be more efficient if we act in concert with the European Union, and European EU funds, to reach the common target of quality training in energy efficiency and renewable energy.

⁷¹ In English: More with less

Further attention to EU initiative

According to a large number of energy agencies further attention should be devoted to the proposed intervention in order to ensure it meets its objective of improving skills training and qualifications in the buildings workforce (see table 6.6). This should primarily be done by mapping the skills needs of the building workforce and modeling future demand as these figures are not regarded as being clear at MS level.

Table 6.6 Areas for further attention prior to any EU initiative

	Energy agencies	Building associations
mapping skills needs	15	6
identifying current provision	12	4
identifying/modelling future demand	16	8

Other points of attention that were mentioned are:

- motivation for enterprises and employees
- anticipation on ongoing activities
- procedures for accreditation of training and certification processes
- identifying other important workforce groups (vendors etc)

These issues have been covered elsewhere.

Overall survey conclusions

- Lot of variety among MSs, as was expected
- Need for training is recognised
- Different initiatives at MS level are already present in many countries which may be part of the perceived risk of duplication with the EU initiative
- Accreditation and other legal initiatives would help the training uptake at MS level
- Involvement of all stakeholders (also the producers of EE and RE technologies) from the start is regarded as very important in safeguarding a demand driven training approach.

6.4 Monitoring and Evaluation

One interviewee expressed concerns over how the added value of any intervention in this area would be monitored and measured. In order to be successful an intervention would need high level engagement at MS level across all relevant sectors. Concerns were also expressed due to the perceived difficulty of directly influencing these issues at EU level, partly because the practical interventions need to be designed and implemented at MS level

Given that the favoured option for action is a multi stage process with the nature of the detailed stages being largely dependant on the findings of the initial data gathering and needs analysis it is not possible to discuss the monitoring and evaluation of the detailed options for action in any detail.

The isolation and measurement of the impacts directly attributable to an IEE intervention in this area will be problematical due to the presence and overlapping activity of so many other larger scale MS and EU programmes and policies. If and when MS specific interventions are designed and implemented, there are a range of potential indicators which would be expected to show positive changes as a result. These include the following:

Uptake and quality of training – The number of training places taken up and the quality of this training. The quality can be judged in part via the opinions of those that receive the training. The high level (result) indicator of this is the quality, in terms of energy efficiency and optimised installation of renewables, of the construction projects delivered by those trained.

Skills profile of construction industry – The literature indicates that the existing skills profile of the construction industry, particularly the trades group, which is the largest part of the target group, is one where the highest level of educational attainment is lower than typical. This is already predicted to increase over time but it would be hoped that this initiative would have some extra benefits in this area.

Match with public and private EU and MS funding – The problems targeted by the proposed intervention are large scale, in terms of numbers of workers with some potential skills needs and complex, in terms of the variation in factors between MSs and the large number of relevant actors. Therefore, in order for the proposed IEE intervention to make any significant impact, it needs to use its limited funds in close combination with as many other sources of funding as possible, including other EU funding, MS funding and private sector funding.

7 Research questions answered

The original starting point for this evaluation was to consider the diversion of the majority of IEE funding in 2010 towards the development of training and certification in the building sector. During the course of the work, the situation evolved to one where the diversion of funding was not going to occur so rapidly and as such the evaluation has somewhat broadened its consideration of the issues in question and how to address them rather than the operational realities and consequences of a practical change in the focus of the IEE. Given the complexity of the issues and the number of actors already involved in this policy field, the decision to delay a fundamental refocusing of the IEE is an understandable decision.

We have structured this section the primary evaluation questions from the original terms of reference for this work. This reflects our opinion that there is clearly a genuine issue of major importance and continuing and increased policy interventions, at both MS and EU levels and via numerous programmes, are required to address it.

1. What is the rationale for public intervention?

Our review of the policy drivers and existing situation in terms of energy, learning and skills and the construction sector in general, illustrates that there are multiple rationales for public intervention in this area.

Buildings are major users of energy, with approximately 40% of all energy use in the EU related to their heating, lighting and services. There is a clear policy goal to reduce the amount of energy they consume and to decarbonise this reduced consumption. This will both reduce greenhouse gas emissions and mean that less energy has to be imported. There is substantial potential to reduce energy use and increase the use of renewable energy sources in both new and existing buildings. A vital aspect (among many others) of realising this potential is the degree to which the workforce responsible possess the correct practical skills. The greater the degree and speed with which these skills become present, the greater will be the level of potential benefits achieved. There is evidence that in many MSs there is a lack of skills in this area and a lack of specific training provision – though there is a lack of comprehensive data on this.

Our analysis of the size of the target audience indicates that there are some 2.5 million workers in the building industry (some 16% of the sector) with skills needs of the nature proposed by this initiative. However this estimate has been

Ex-ante evaluation of the initiative on the building workforce training and qualification in the field of energy efficiency and renewable energy within the Intelligent Energy Europe Programme

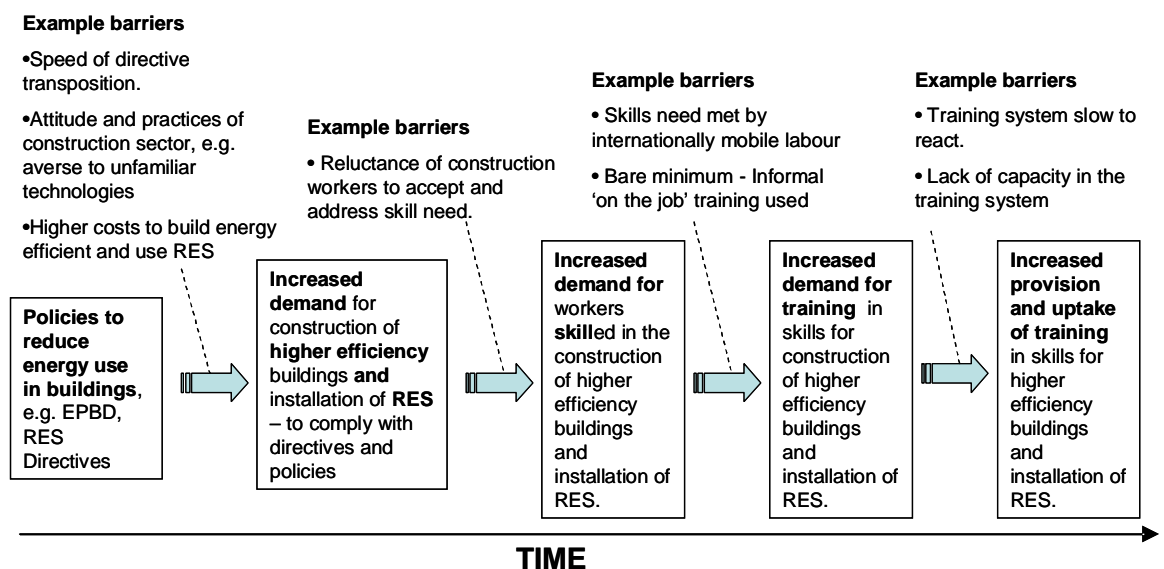
produced in the absence of any comprehensive and consistent review of skills gaps in this area. There is widespread anecdotal evidence of skills gaps which we have collated. There is significant variation in the views on the scale and nature of the skills need and it is clear that there is significant variation both between and within MSs.

Policy interventions designed to modernise the skills of new and existing building workers also address some of the high level policy goals of the Lisbon agenda through both enabling Lifelong learning and increasing the level of modern skills in the labour force.

The intervention has additional rationale in terms of its fit with the need for a short term policy response to the economic downturn. This fit lies in the quick employment and economic activity which can be stimulated via construction projects. Where these construction projects are focussed on housing they also offer the benefits of reducing energy consumption and improving quality of life for the residents.

The rationale for intervention in the provision of training for building workers in energy efficiency and renewables relates to a number of potential failings in the way in which the policy goal (of improved efficiency and uptake of renewables) translates into demand for skills and subsequent provision and uptake of training. Figure 7.1 summarises the key steps in this process along with some of the main barriers.

Figure 7.1 Intervention rationale over time



As the diagram shows, the provision of training is linked to the demand for the skills but there are a number of barriers to both the development of the demand and the translation of this demand into the provision of training. Addressing these barriers via policy interventions, such as the one being evaluated in this report, will reduce the time taken for this process to work and as the speed of emissions

reductions is almost as important as the scale this is an important aspect of the rationale.

Policy interventions in this area also offer the ability to more strongly influence the quality of the training provision as well as issues such as alignment with formal qualification systems and its consistency and hence portability between MSs than would be the case if the provision of training was left solely to the market to recognise and provide. However, issues such as consistency and portability, important as they are to the skills agenda, should not become the focus of the intervention. This partly reflects the variation in building practices that exist across the climatic zones of Europe and EU MSs.

Our research has shown that defining the target group and their specific needs is complex and that the group does not fit a recognised definition. We have attempted to estimate the size and nature of the group by using data on the construction sector and its constituent parts as a whole. The skills needs also divide between new entrants to the industry (individuals recruited to replace those that retire and to meet any growth in demand) and those associated with the need to up-skill the existing workforce. The existing workforce should only need to 'top up' their existing skills.

2. What is the value added of EU intervention? Is it really needed? Would intervention by the Member States be more effective and efficient?

A key starting point in the discussion of this question is the fact that the vast majority of spending on education, including the vocational training that the building workforce may require in order to make buildings more energy efficient, is controlled at the MS level. However there is a long history of EU level intervention in vocational and educational training (vet), through such programmes as Lifelong Learning and its constituent Leonardo da Vinci programme. These programmes tend to focus on issues such as portability of qualifications, transfer of best practice and transnationality. The EU also contributes to the funding of larger scale training through the European Social Fund (ESF) though the individual MSs control the final use of this funding in line with EU level policy goals.

The arguments we have collated which suggest that MS level intervention would only be more effective and efficient when there is a significant degree of variance between the MSs. There is strong evidence to support variance of this degree in terms of the structure of the VET system in general and with specific relation to construction. There is also a variation in construction practices between the MSs that relates to both climatic factors and the historic availability of building materials. Significant variation also exists in terms of the current standard of construction in terms of energy efficiency and the uptake of renewables as well as in the availability, uptake and capacity of relevant training provision. These variances support the notion of an MS level intervention being more efficient and effective.

Despite the genuine variance between MSs, the case for IEE intervention in this area, is the same as that made for other existing EU intervention in this area. This case is that EU intervention focuses on issues such as transfer of best practice and portability and recognition of qualifications and this is done in addition to MS activity and in line with their traditions and structures. In addition to this, the case has been made that many of the skills needs in question stem in part from the implementation of energy related EU directives in this area with a skills aspect (e.g. certification of inspectors in EPBD, training of installers in RES directive, possibly future skills inclusion in the national energy action plans). Therefore, the EU has a legitimate role in seeking to harmonise the way in which these directives are implemented and to enable the sharing of best practice. This is the rationale for the concerted actions supported under IEE. There are also potential benefits to be derived from efforts to coordinate the efforts and expenditure used for VET related to RES and EE in buildings.

3. What are the objectives that the intervention intends to achieve and how will progress be assessed.

The objectives that the intervention intends to achieve have been analysed and structured via a problem tree and intervention logic. The higher level overall objectives can be split into two groups as follows:

- High level
 - Reduced greenhouse gas emissions – related to energy saving in building energy.
 - Reduced energy use
 - Increased utilisation of RES in buildings.
- Intermediate
 - Increased number of places available on training courses for EE and RES for the target groups.
 - Increases uptake of places on training courses for EE and RES for the target groups.
 - Increased national and international accreditation of RES qualifications relevant to target groups.
 - Increased number of trainers in courses for EE and RES for the target groups.
 - Improved quality of training delivery
 - Improved quality of course curricula and content

Given the scale of the sector and the increasing scale and diversity of activity designed to achieve these objectives, there will be an inevitable difficulty in isolating the effects of any specific funding. Therefore, when the MS specific interventions that could result from the proposed IEE activity in this area are designed and enacted there will be a need to closely match the specific outputs to their intended intermediate objectives with the intention of illustrating some additionality. These MS specific outputs would be expected to include data such

as numbers trained, numbers of courses, number of places on courses but also more strategic outputs such as level of match funding achieved – both from other EU sources (LLP, ESF, ERDF and other) and from national (public and private) sources. Strategic output indicators such as these illustrate match with national and other EU priorities and also shows progress against an area where past evaluations of IEE have suggested improvement was possible in that it fails to link to other EU spend.

4. What are the options for action available and what are the risks associated with them? What is the most appropriate delivery mechanism to use? Would the same objectives be achieved more effectively and efficiently by other means? Which is the preferred option and why?

The complexity of the problems that exist in this area in combination with the lack of consistent data on the size of the target group, the nature of the skills need and the current level of relevant provision have had an important impact on the nature of the options for action that we have been able to define and the level of analysis of these that has been possible.

The first important conclusion is that before any detailed options for action can be formulated and analysed there is a need for more detailed baseline information to be collected in order to identify and recognise the differences in the current situation and subsequent needs, between MSs. The situation in each MS is the result of a complex interaction of variables, including construction practices, construction training, current provision, VET practices and progress in terms of current uptake of energy efficiency and renewable energy in buildings. It is clear from our work that a common approach across MSs will not be appropriate and that any intervention needs to be carefully designed to reflect the nature of the problem(s) in each.

However there are a number of points regarding the design of any intervention which have become apparent:

There is a need to build any intervention around the existing provision system and the work of relevant stakeholders (actors). Actors from both the public and private construction industry and training providers need to be involved in order to seek to avoid duplication and to best reflect the systems and needs of each MS. Our work also makes it clear that the identity of these actors will vary between MSs.

There is already significant EU expenditure in this area, E.g. construction is already a priority sector for Leonardo da Vinci, ERDF and ESF expenditure on construction and renewable energy / energy efficiency projects is significant. Any opportunities that exist to work alongside this existing activity should therefore be prioritised as the major scale of the training need mean that if IEE acts in isolation, its relatively small budget will struggle to have any significant impact.

The first step of any intervention should be to carry out (or collate existing) more detailed baselining / needs analysis at MS level. The existing EPBD and forthcoming RES directive IEE concerted actions could offer a quick and suitable method of facilitating this. Their match to this need relates to the fact that they are already (or very soon will be) set up and the majority of the relevant actors in each MS are either already involved or will be known to actors which are already involved. This process would also allow for examples of best practice, and the factors which make it so, to be identified.

Once MS specific needs have been more accurately defined, it will be possible to design and implement a set of interventions tailored to each MS. These interventions should comply with the general points made above though beyond this are a number of suggestions as to the way in which they could be structured and then operate. These include the possibility of setting up pilot training courses in a specific skill need - to both meet a headline skill need and (if this is a need in the MS) to bring together the relevant actors to design, promote, deliver and expand training in this area.

The question of why this is the preferred option for action requires a consideration of the counterfactual. On the assumption that this is the best way for the IEE to intervene in this field the counterfactual would be that the training would develop with less sharing of best practice between the MS and with less regard to the EU level issues.

5. What are the results and impacts expected, in particular the social, economic and environmental ones?

The results and impacts that could be expected from the intervention closely relate to the objectives discussed with regard to question 3.

As with the other objectives, the isolation of the social, economic and environmental impacts that would be directly attributable to the intervention of the IEE in this area would be very difficult given the large number of programmes and policies which are active in this area. Some examples of the specific areas where improvements should have an impact are as follows:

Social – A higher skilled construction workforce who should be more efficient and better able to meet the future demands of the economy. A more energy efficient stock of housing which should be warmer and cheaper to run for its inhabitants – this should improve their health and wellbeing.

Economic – A potentially more mobile construction workforce, improved security of energy supply (via reduced demand and reduced imports).

Environmental - reduced energy use and lower carbon energy use (more RES) leading to a reduction in greenhouse gas emissions and all other emissions associated with the energy industry.

6. What indicators will be suitable to measure these impacts?

As with the objectives and the discussion of impacts above, the isolation and measurement of the impacts directly attributable to an IEE intervention in this area will be problematical due to the presence and overlapping activity of so many other larger scale MS and EU programmes and policies. If and when MS specific interventions are designed and implemented, there are a range of potential indicators which would be expected to show positive changes as a result. These include the following:

Uptake and quality of training – The number of training places taken up and the quality of this training. The quality can be judged in part via the opinions of those that receive the training. The high level (result) indicator of this is the quality, in terms of energy efficiency and optimised installation of renewables, of the construction projects delivered by those trained.

Skills profile of construction industry – The literature indicates that the existing skills profile of the construction industry, particularly the trades group, which is the largest part of the target group, is one where the highest level of educational attainment is lower than typical. This is already predicted to increase over time but it would be hoped that this initiative would have some extra benefits in this area.

Match with public and private EU and MS funding – The problems targeted by the proposed intervention are large scale, in terms of numbers of workers with some potential skills needs and complex, in terms of the variation in factors between MSs and the large number of relevant actors. Therefore, in order for the proposed IEE intervention to make any significant impact, it needs to use its limited funds in close combination with as many other sources of funding as possible, including other EU funding, MS funding and private sector funding.

7. How will monitoring and evaluation of the intervention be organised and implemented?

With regard to the first proposed stage of intervention, a construction skills addition to the existing concerted actions on the EPBD and RES directives, the monitoring and evaluation should be the simple achievement of the collection of data against a pro-forma. This pro-forma should be finalised by those involved but should include the following as a minimum:

- a. Scale of skills need – by sub sector
- b. Nature of skills need (e.g. 1 hour, 1 day, 5 days of training in ...)
- c. Current provision
- d. Potential providers
- e. Potential funding requirement and sources.

If the initial concerted action stage indicates that a specific intervention at MS level is appropriate, the organisation and implementation of the monitoring and evaluation will depend on the nature of the intervention. If, for example, the intervention is let as a tender via the Executive Agency then it would have specific outputs and indicators as per a normal IEE project. These would be expected to include development of curriculum, accredited courses developed, trainers trained, match funding, training hours delivered etc.

8. What are the lessons learnt from similar experiences?

There are a number of lessons apparent from the wide range of similar interventions studied. The delivery and detailed scoping of existing EU funded interventions in VET is done at the MS level. For example the extensive numbers of training courses supported by ESF although strategically guided by EU policies are all designed and delivered at a national, often sub national level. The pilot VET projects funded under the Leonardo da Vinci programme, although requiring international project partners, are selected and monitored by MS level coordinating and management organisations. This decision reflects the very diverse nature of VET systems between the MSs.

From our review of existing training provision in this area and our stakeholder consultations, it is clear that there are a diverse range of actors relevant to the provision of construction training. For any new intervention to be effective and credible it will need to have the support, backing and involvement of these stakeholders. The identity of the stakeholders varies between MS as a factor of the variations in vet systems and the nature of the construction industry.

There are a complex and longstanding set of barriers involved with translating the need for improved construction skills, into a demand for these skills and finally into the provision and uptake of training in these skills. It would not be appropriate or credible for a new IEE intervention to attempt to address these barriers in isolation from the existing interventions and systems in each MS.

The case was made by a number of consultees that the existing market in the provision of training in this area is sufficiently mature to recognise the genuine commercial demand for skills and training as they emerge from the construction industry and to quickly develop and supply appropriate training. This includes training developed and provided by the manufacturers or distributors of building materials and equipment who have a clear commercial incentive to train independent workers how to install their products. This market does clearly exist and function, with examples of a rapid response and uptake of training, e.g. the significant number of inspectors who became trained in order to comply with the building certification requirement of the EPBD. However, others consulted pointed out the problems of relying solely on a market based response, which include;

- A concern that manufacture provided training can distort the market in favour of a particular manufacturer.

- A lack of formal / recognised accreditation for some of the training provision. Which causes problems in terms of portability of the qualification and also raises concern about the control of the quality.
- A potential concern over the cost of training representing a barrier to some.

9. To what extent is the intervention likely to be cost effective?

With regard to the collection of the specific MS demand, supply and other baseline data the method of extending the scope of the existing concerted actions could provide strategic co-ordination and deliver the required information to a high standard for a lower cost than an alternative based on the use of external consultants, or via a call for proposals.

With regard to the cost effectiveness of any second stage of MS specific intervention, it is hard to estimate or calculate this as there are no details to work with. At a fundamental level the cost effectiveness calculation involved is as follows:

Cost of training provision
(Materials, teachers, administration etc)

MINUS

Income derived from trainees
(On the assumption that they contribute to cost of the training, which is not a given as subsidies are often provided and there are even examples of builders requiring compensation for attending training (to make up for lost revenue)).

DIVIDED BY

The value of the energy saved and emissions avoided via the more efficient building work and better installed RES that the training enabled.
(It would be possible to measure a sample of building projects and produce an estimate of the typical energy use from a project carried out to a high standard by well trained workers, vs. the energy use from the same project completed to a lesser standard by less well trained workers. This would show the energy savings effectively enable by the training. While this figure would be interesting and useful there are many other factors involved in the actual energy use of buildings so there would be a need to avoid over extrapolation).

A more mechanistic measure of cost effectiveness could be achieved by comparing indicators such as the cost per training opportunity developed with other programmes of a similar nature. This data should be available at MS level for national programmes but also for EU programmes such as Leonardo da Vinci, ESF and the IEE projects that have already targeted this area.

We have also estimated the potential value of the energy savings that could be achieved via high quality installations – enabled by the provision of training. Although a very approximate figure this shows that if 10% of the potential energy savings available from buildings are regarded as contingent on well trained workers the loss of these energy savings would amount to €3.7 billion or 78Mt of CO₂, or €3.1 billion at a shadow carbon price of €40/tonne. If this is compared to our estimate of the total training need related to energy efficiency of 1.4 million and the cost of each training opportunity is estimated at €1000 this would incur a cost of €1.4billion. This illustrates the cost effective nature of intervention in this area.

10. What is the potential opportunity loss of not implementing the annual IEE budget in a ‘conventional way’? What are the expected impacts on the EACI which executes a large part of the IEE programme?

The first part of this question is a difficult one to answer and is one where we have been unable to source or produce conclusive data. The reasons for this are two fold. The first issue regards the value of the potential benefits of the proposed intervention. As has been discussed in a number of the points above isolating and attributing the impacts and results from any IEE funded intervention in an area where there are so many other factors of relevance and so many other MS and EU policy interventions at play would be complex.

The second issue regards the value of the counterfactual. I.e. what would be the value of the benefits achieved by implementing the IEE budget in a conventional way? It is not possible to answer this precisely as it is not possible to know what projects, and subsequent benefits, would be supported if the IEE continued without seeking to divert funds towards the issue of construction skills. The obvious proxy for this data is the value / benefits of the projects supported by IEE in the past. Given the non technical nature of the barriers targeted by IEE the identification and valuation of these benefits has been an ongoing issue in the programme evaluations. The IEE programme evolved and genuine and useful efforts have made to address this issue. This has been achieved via a formal requirement on each project to produce clear and measurable output indicators. However this step is relatively recent and as yet there has been no results of attempts to formally collate and sum up these indicators to produce some overall benefit / output measure for the programme as a whole.

Another point of relevance from the previous programme evaluations concerns the slow evolution over time of the priorities of the IEE programme and the approximately equal weight given to energy efficiency, renewable energy and transport. If IEE was to divert all, or major part of its resources towards the issue of a perceived skills gap in the building industry with regard to energy efficiency and renewables this would be counter to its historically consistent evolution and spread of priorities. While radical change can be often be positive it would send confusing signals to potential applicants for whom a consistent set of programme objectives are an important factor in developing projects. The mid term evaluation also made it clear that the management committee were not in favour

of a change in focus more in favour of one aspect / issue. Therefore, taking into account the limited budget of the IEE that could be allocated to the training, this should have a leverage effect – mobilising other public or private funds to complement the cost of the training programmes.

It should also be made clear that the majority of those consulted, while welcoming extra attention and funds to address the issue of skills gaps were clear that this was a well developed policy area and that the IEE programme should be careful to complement existing activity rather than duplicating it.

The mid term evaluation of IEE and the evaluation of the EACI have both reached a positive conclusion regarding the functioning and evolution of the approach to programme management that the EACI have delivered. If the IEE were to adopt an approach of funding interventions led, for example, by MS departments which no longer required the involvement of the EACI, these benefits would be lost.

8 Conclusions and Recommendations

Rationale for Intervention

The EU's overall energy and climate change policy, through its 20-20-20 targets, is clearly focused on renewable energies (RES) and energy efficiency (EE). As buildings account for nearly 40% of all energy used in the EU, major potential for energy savings exists in the building sector. Energy efficiency provides opportunities for emissions reductions at negative or low cost⁷² and renewable energy provides opportunities for emission reductions and a cleaner environment. A further imperative is provided by economic drivers, with opportunities available to both bolster economic recovery and to promote sustainable long term growth and employment in low carbon goods and services.

Regarding the issue of employment, the training and skills of the workforce are considered to be key issues. Following the original Lisbon strategy statement, a number of training and skills strategies were developed under the Education and Training 2010 work programme. However, there is a need to improve the quality and attractiveness of vocational education and training (VET).

Furthermore, it can be assumed that there will be a significant greening demand as policy measures to promote EE and RES in buildings take effect and therefore a strong increase in the importance and scale of sustainable construction within the wider construction sector. This 'greening' would mean that a higher proportion than the current 5-10% of future construction jobs would be in sustainable construction. On the basis of 20% of the future workforce being 'greened', the annual requirement would increase to 84,000 jobs.

This evaluation considers a proposed intervention by the Intelligent Energy - Europe (IEE) programme to address the perceived lack of skills related to inter alia the installation, maintenance and inspection of renewable energy and energy efficient equipment in buildings. The core of this study is to explore how it can contribute to increased RES and EE training and skills in the building environment (together with existing EU and national skills programmes). At the same time, it is vital to consider the actions of other programmes such as ESF, ERDF and INTERREG and how action by the Intelligent Energy – Europe programme may complement these.

⁷² IPCC (2007) Fourth Assessment Report: WG III Mitigation: Chapter 6 Residential and Commercial

For example, it is likely that while positive impacts are generated by Leonardo da Vinci - particularly through spread of best practices - there is a need to consolidate and co-ordinate a sectoral approach, and develop thematic networking. While Leonardo da Vinci has provided training projects and programmes relevant to the buildings energy efficiency and renewable energy workforce, thematic networking would draw attention to the results and achievements of projects funded as part of the "decentralised" and "centralised" actions of the Lifelong Learning Programme in this field. These actions would help organise the exchange of information, meetings to learn from projects, facilitate the mainstreaming of results into national and European vocational training and education structures, and influence further policy development and actions.

The Intelligent Energy - Europe II programme aims to remove non-technical barriers to intelligent energy use. It is clearly within the scope of the IEE programme to support activities that address the non-technical barrier of workforce training, skills and qualifications in the buildings energy efficiency and renewable energy workforce. To date, the IEE has focused primarily on promotion and dissemination activities, some addressing 'energy education' but mainly at school level, only some at vocational level. However, in recent years a greater number of training and qualification based projects, have been supported, but their results are not yet available - these include the Qualicert, Trainenergy and CEPH projects.

Skills shortages and causes

Our consultation and survey have identified the following barriers to the uptake of training which are most relevant to the IEE programme and within the scope of the proposed intervention:

- Rapid technological change;
- A workforce that is risk averse;
- Low valuation of skilled work in sector;
- **Portability of qualifications;**
- The variety of problems stemming from a high proportion of SMEs in the sector; and
- **A variety of problems related to the quality of training and skills provision.**

Variations in the types and severity of skills shortages exist between member states. Where the single European labour market works efficiently, short term solutions to skills shortages can be found by drawing on skilled workers from other member states. A reliance on this type of labour has been identified in the UK construction sector, though skills shortages are still reported.

Energy agencies and industry associations cited evidence of the existence of skills shortages through the occasional poor performance of new buildings and EE and RES appliances in them, with high proportions of incorrectly installed

technology identified by manufacturers. Consultees involved in technology specific skills programmes pointed to the general skills shortages in the sector as a cross-cutting issue affecting all due to the interlinked nature of the various crafts and trades in delivering a completed building, where skills deficiencies in one area can have a knock on effect on quality throughout the building.

The causes identified above were raised by consultees throughout the consultation process, with lack of consumer understanding and demand for EE and RES in buildings a recurring theme. There was a belief that this is a crucial underlying factor and that low consumer demand for EE and RES in buildings means that market demand is not encouraging companies to invest in training, particularly when appropriate incentives are absent. Training in the sector for EE and RES is a 'chicken and egg' situation: there is not enough demand to warrant training but a lack of skills hinders an increase in demand. In the past, it has taken legislative intervention and public support to overcome this type of issue (for example in the UK some plumbers were paid to take up training aimed at addressing the lack of skills that were seen as being a barrier to the uptake of condensing boilers). Some believe that a market demand for EE and RES technologies will eventually ensure skills provision and training is successfully implemented within the existing frameworks.

Other barriers that were mentioned refer to the lack of time for the building workforce to undertake training and its high cost, especially for small enterprises. This barrier is also mentioned in the literature, especially for SMEs that cannot afford to spare time from current projects to have their personnel trained, or to meet the course costs. Additional barriers relating to the lack of certification and accreditation schemes for installers and/or performance guarantees and the lack of an appropriate legal framework for the obligatory re-training / specialisation of certain occupations in the recent advances in technology were also raised.

It is clear that qualifications and the quality of training and skills provision are regarded as genuine and important barriers by those in the sector, demonstrating that the scope of the intervention is relevant. It is also vital that any intervention is forward looking and accounts for the growth in skills needs expected from the push for greater EE and RES in buildings, given that shortages already exist.

The lack of portability transparency of competence and qualifications between member states has been identified as a major barrier to the functioning of the single European labour market. This is both due to a lack of clear and Europe-wide accepted accreditation and the different requirements of building and construction sectors in member states (e.g. building regulations, membership of trade bodies). These issues exacerbate skills shortages as skilled labour cannot be drawn from a European pool.

The success of harmonisation efforts on this basis is dependent on work in member states to classify their qualifications within the new system. Response from member states in mapping their national qualifications frameworks (NQF) to the EQF has been positive with Ireland and Malta having already referenced

their NQF and indications from the great majority of other member states are that they plan to do so by 2011.

Through consultations a further concern was raised around certification where mandatory certification requirements could lead to shortages, in the short term at least, of certified workers. This could restrict firms' business opportunities and raise costs as they train staff to become certified. A reluctance to train workers to become certified was also raised as an issue for SMEs, as this then gives the worker job mobility and so the employer who funds the training may not receive the full benefit of their investment.

Type of specific future skill needs

Many people see the need for architects to improve their skills in designing EE and RES into buildings as a key starting point. Multiple reports also refer to the need for a systems integrator, someone who oversees and integrates the various processes, technologies and personnel in new-build and retrofit projects. This is likely to be an evolution of a project or site manager role with improved skills in design and technical knowledge. A common general skill that is also frequently mentioned is the ability for all workers to think of a building as a system and to be aware of how their work interacts with other aspects of the building to contribute to overall EE. This point was raised in the consultations of this study, in that training to understand the whole system, is important to achieve the end result of an energy efficient building.⁷³

General skills needs are also expected to become more important in future, particularly issues around quality. Poor quality installations caused by low skills are expected to become more serious issues as the skills requirements for more energy efficient buildings become higher, for example to build a fully airtight *passivhaus*.

Table 3.9 summarises the specific occupations, skills and knowledge areas identified as future needs, sorted into needs felt to be inside and outside the scope of this study. Though clearly the occupations outside the scope of this study are important to achieving policy goals in buildings EE and RES, particularly generic skill sets in Science, Technology, Engineering and Maths (STEM), IT and innovation.

It is important to recognise that although specific occupations such as architects, designers and engineers or generic skills such as of IT, finance and marketing will be vital to developing more energy efficient and renewable energy integrated buildings that they fall outside the specific terms of this initiative.

⁷³ Interview Bouwend Nederland (building association in the Netherlands) held 4 January, 2010.

Table 3.9 Scoping Identified occupations and skill and knowledge areas

Scope	Specific Occupations	Specific Skills and Knowledge areas
Inside scope of this evaluation	<ul style="list-style-type: none"> • Technicians (non-graduate) • Installers (Renewable Energy, Energy Efficiency equipment, Insulation, HVAC) • Energy managers and auditors • Buildings inspectors • Plumbers • Carpenters • Electricians 	<ul style="list-style-type: none"> • Knowledge of Renewable Energy, Energy Efficiency, sustainable construction techniques, legislation, resource management • Operation and maintenance of building insulation materials and energy saving equipment • Retrofit
Partly inside scope of this evaluation	<ul style="list-style-type: none"> • Facilities managers • Systems integrator • All other trades people (bricklayers, glazers, floorers, building envelope specialists, tilers, gas fitters, pipe fitters, metal workers, painters, decorators) 	<ul style="list-style-type: none"> • Facilities management – complex systems • Systems thinking
Outside scope of this evaluation	<ul style="list-style-type: none"> • Architects • Engineers • Planners • Surveyors • Ecologists • Designers (interior, industrial) • Site and Project managers 	<ul style="list-style-type: none"> • Science, Technology, Engineering and Mathematics (STEM) skills • Diagnostic techniques • Quality workmanship – attention to detail • IT skilled – multidisciplinary • Organisational skills • Production and distribution of building insulation materials and energy saving equipment • Integrated buildings design • Finance • Sales and marketing • Leadership • Innovation • Processes

In respect of the proposed intervention it is most closely targeted on the low and medium skills groups, encouraging the acquisition and building of skills at the lower levels, developing progression pathways for workers to the medium levels and at the medium levels enabling workers to gain the skills and qualifications to meet the new demands of energy efficiency and renewable energy in buildings. These groups total over 1.25 million over the next 10 years, or over 125,000 annually, a significant potential target group on the assumption that these workers will all require some form of training or qualification.

Preferred Option for Action

It became clear during our work that the only credible method of delivering an effective intervention was for MS specific projects reflecting the complex diversity of structures, issues and relative progress across the MSs. The preferred option for action takes an approach phased over a number of years. The first phase, would be to gather more detailed data on the nature of the skills needs, current provision and views of relevant actors at a member state level. This would be followed by a second phase when, if it appears feasible and appropriate

from the findings of stage one, member state level partnerships would design and implement training courses. The third and final phase would be for member state level expansion of the courses piloted during phase two. The level of funding required from the EU would start off relatively low in phase one, increase in phase two and potentially increase again in phase three – depending on findings.

The draft IEE 2010 WP allocates €1 million to preparatory work for a training initiative most likely within the scope of the EPBD and RES Directive Concerted Actions, though the goal of any IEE funding would also be to leverage additional funding to create impact and EU added value. This may be possible through establishing a process or building capacity through IEE that also draws on existing programmes and funds such as ESF, LLP (Leonardo da Vinci) or MSs own programmes. These partnerships could be essential as a first step and to ensure a continuity of funding once IEE funding is used.

The use of the concerted actions to achieve the first phase, as opposed to letting consultancy studies, is recommended as it reflects the need to act swiftly and to contribute to the provision of practical solutions as soon as possible in an area where the need to act, and the presence of some demand, is clear.

The second phase of the favoured approach will involve a partnership at member state level, or possibly regional level if the first phase indicates this would be the most appropriate solution for a particular MS. The second phase would take place the year after the first phase and its duration would reflect the time needed on a MS basis. The idea of adopting a member state approach is to allow schemes which reflect the variety of approaches and structures and the degree of progress made in addressing the issues between the member states. Furthermore, a call for proposals could be launched, in which eligible organisations from MSs and / or regions could participate. The Commission would structure the eligibility/selection and award criteria such that Member States/regions can propose a scheme/structure that suits their local situation.

The second stage is foreseen as involving the development of a training offer covering one aspect of the skills needs identified in the first stage. The choice of subject area would be left to the member state partnership to decide. The development of the training offer would include the preparation of course content (curriculum), the training of trainers, promotion of the training to the appropriate target group and a pilot scale operation of the training course.

The partnership element of the proposed second stage is key. The proposal is to bring together a group of relevant actors best placed to design and deliver training appropriate for the member state. This partnership should ideally include members such as construction industry representatives, training delivery bodies, national energy agencies, construction labour groups. The make up of this partnership, both in terms of match and willingness would be an important issue to be investigated during phase one.

IEE is seen as having a significant input to the funding of the second stage though a significant level of match funding would also be expected from the member states. This match funding is seen as vital in ensuring that the MSs are committed to the training offer and its continuance after the pilot stage. The possibility also exists that funding could be utilised from other national and EU sources in this phase. For example funding available via ESF to train people in refurbishing existing buildings and the MS funding that may need to be made available to fund the training requirement included in the RES directive. It may also be possible to utilise funds from Leonardo da Vinci to fund the piloting of courses.

The third and final phase of the proposed intervention is the most difficult to describe in detail at this point as it depends on the outcomes and successes of phases 1 and 2. In principle it is envisaged that the MSs would utilise the partnership and model they have developed in phase 2 to design and implement training schemes covering more subjects and at a larger scale.

The EU added value of the three stage approach is expected to come from a number of sources. There would be the opportunity to transfer best practice between the MSs. This could include that identified during phase 1 and also the material and approaches developed during phase 2. If course curricula developed in MSs could be shared and standardised this would have the major additional benefit of increasing transferability and the mobility of labour, though it should be stressed that this would not be the prime purpose of the policy. Additionally, the EPBD and RES Directive Concerted Actions provide a valuable platform for exchanges of the information/best practices and could play a coordination / advisory role in the IEE Building Training Initiative.

Recommendations

Based on the conclusions made above we have the following recommendations:

1. Due to the complexity of the barriers, the significant variations between MS structures, the progress and the lack of consistent data on the scale and nature of the skills need in this area, a more detailed MS level analysis of the skills needs and current provision is required. This could be done hand in hand with a concerted action.
2. Widening the scope of the existing concerted action concerning the EPBD and the forthcoming concerted action on the RES directive provides a cost effective method of carrying out this needs and data analysis. This method should also produce rapid and high quality results.
3. This first stage should also seek to gather the MS level views and potential involvement of the wide range of relevant actors – the construction industry, equipment manufacturers, training providers, trade associations, etc.
4. There is also significant potential for synergy with other IEE training spending and other Commission spending which is managed by other DGs. The key synergies are with the Leonardo da Vinci part of the Lifelong Learning Programme, the ESF and the ERDF. There is also

potential synergy with funds designed to support innovation in SMEs. The relevant DGs need to meet to improve collaboration of their activities in this area.

5. When the MS level data and needs have been collated, the second stage should be to support a suite of interventions which best suit the situation in each MS. In some MSs, this could take the form of developing, piloting and promoting a pilot training scheme in a subject identified as a priority need. However this approach will not be appropriate for all MSs.
6. The Commission could work more closely together with the European associations active in this field, with the aim to set up a more common skills programme for RES and EE in the building environment.

Annex One: References

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Annex Two: Questionnaire

QUESTIONNAIRE FOR ENERGY AGENCIES

The European Commission is investigating ways in which the possible skills gaps in the building workforce with regard to energy efficiency and renewable energy can be addressed. It has appointed ECORYS to assist them in a study on this subject. As part of the investigation they are carrying out a brief survey of skills needs in this area, along with current provision of skills and opinions on potential policy options.

The work of ECORYS and thus the quality of the study depends very much on the cooperation and support from relevant stakeholders. We therefore kindly ask you to assist ECORYS in this important work.

- The survey will take about 10-15 minutes; and
 - Survey responses will remain anonymous.
-

We are looking for respondents with some involvement in or some knowledge about the training or certification issues with regard to energy efficiency and renewable energy in the building sector in your country.

1. Does the above description apply to you?
 yes, please indicate your activities or involvement:
 no

If you have answered 'no' to question 1, the questionnaire ends here and we thank you for your time and willingness to cooperate. If you answered 'yes' please continue.

2. Name of organization:
3. Interviewee Name:
4. Function:
5. Phone/fax:
6. E-Mail:

Need for measures in the field of building workforce training and qualification with regard to energy efficiency and renewable energy

7. What approximate scale of 'training need' exist in your country - with relation to practical skills training for installing energy efficient and/or renewables in buildings?
 no/little need for training

- some need training
- large need for training

8. Please indicate what you understand to be the most important barriers to training and skills development for the building workforce in energy efficiency and renewable energy in your country.

- generally poor uptake of training in the building industry
- lack of defined skill sets relating to energy efficiency and installation of renewables in buildings
- lack of flexibility / lack of rapid response in the provision of building training
- lack of relevant training courses
- lack of awareness of provision of building training
- lack of access to building courses/training
- other, namely

9. Do you think there is a need for additional measures in this area?

- yes
- no

10. Please indicate the categories of building workforce (by occupation / trade) that are in most need of skills training in energy efficiency and renewable energy installation in buildings in your country.

- plumbers
- electricians
- installers renewable energy
- installers energy efficiency
- installers insulation
- inspectors
- other, namely

11. With regard to the current national/regional provision of training for the building workforce in energy efficiency and renewable energy - who are the key organisations involved in this training?

- national ministry (construction, energy or training focused):

- regional ministry (construction, energy or training focused):

- national/regional energy agencies
- educational institutions
- construction industry groups
- building product manufacturers
- other, namely

12. How are the costs borne for provided national/regional training for the building workforce in *energy efficiency* in your country?

- full cost borne by individual
- full cost borne by state
- full cost borne by employer of individual
- partial cost borne by

13. How are the costs borne for provided national/regional training for the building workforce in *renewable energy* in your country?

- full cost borne by individual
- full cost borne by state
- full cost borne by employer of individual
- partial cost borne by

Proposed policy option

There are a number of policy options/ideas to help address the problems in terms of skills needs among building workforce of energy efficient and renewable energy technologies. The proposed policy option could establish a national (or regional) scheme for training and upgrading skills for the building workforce related to energy efficiency and/or renewable energy implemented through partnership/grouping/structure of diverse set of stakeholders in each member state. It is foreseen that such a scheme would be co-financed from different financial sources (public and private). It is proposed that cost of setting up the scheme, preparatory and piloting phase could be financed from the European EU funds. The schemes could be adapted to the national/regional needs regarding target groups to be trained as well topics to be covered.

14. Does this policy option sound useful to address the barriers to training and skills development for the building workforce in energy efficiency and/or renewable energy in your country?

- yes
- no, please indicate why not:

15. How could this proposed policy option be improved?

16. Which type of actor(s) in your country would be willing to get involved in the proposed grouping?

- national energy agency
- regional energy agency
- building sector association
- building companies
- national training ministry
- training/educational institution(s)
- employment agencies
- ESF agencies at member state level
- other, namely

Impact of the proposed policy option

The following questions relate to the impact of the proposed policy option and the risks and added value involved in establishing a grouping/structure of relevant actors in each EU member state or region within a state to train and upgrade the skills for the building workforce related to energy efficiency and/or renewable energy.

17. What do you think are the main risks related to this proposed policy option?

- duplication with other initiatives in this field
- lack of scale of the policy idea
- lack of body to lead and follow up on the idea
- other, namely

18. To what extent do you think synergies/complementarities could be expected between the proposed policy option and existing national/regional initiatives?

19. What issues do you think need to be given further attention in order for the proposed policy option to meet its objective of improving skills training and qualifications in the buildings workforce?

- mapping skills needs
- identifying current provision
- identifying / modelling future demand
- other, namely

Cost effectiveness of the policy idea

The following questions relate to the cost effectiveness of establishing a grouping/structure to train and upgrade the skills for the building workforce related to energy efficiency and/or renewable energy.

20. How much budget do you think would be needed in your country to effectively start up the scheme and lead the structure/partnership?

21. What national/regional or other funds do you think could be available to support the scheme?

Thank you for your cooperation.

Annex Three: Full consultation list

STAKEHOLDERS	CONTACT PERSON
EU POLICY MAKERS	
DG Energy and Transport (TREN)	Mr Karl Kellner Mr André Brisaer
Executive Agency for Competitiveness & Innovation (EACI)	Mr. William Gillet Ms Maria Laguna Mr Vincent Berrutto Ms Nathalie Cliquot
DG Education and Culture (EAC) / Executive Agency DG Education	Mr Joao Delago
DG Enterprise – (unit responsible for the construction industry)	Mr Antonio Paparella
DG Employment	Ms Monika Slebinger
DG REGIO	Mr Mathieu Fichter
SECTOR REPRESENTATIVES	
European Renewable Energy Research Centres Agency (EREC / EUREC)	Christine Lins, Secretary general
European Alliance of Companies for Energy Efficiency in Buildings (EUROACE)	Andrew Warren
CEETB	Frank O Baumeister, European Head
TRAINING POLICY LEADS	
European Centre for the Development of Vocational Training (Cedefop)	Peter Szovics
European Training Foundation (ETF)	Bohren Chakroun
ENERGY AGENCIES (AT MS LEVEL)	
Österreichische Energieagentur	
Vlaams Energie Agentschap + CWAP	
Energy Efficiency Agency of Bulgaria EEA	
Cyprus Institute of Energy	
MPO - Ministerstvo průmyslu a obchodu (Czech Energy Agency closed in 2007)	
Energistyrelsen Danish Energy Authority	
MOTIVA Oy	
Deutsche Energieagentur DENA	
Centre for Renewable Energy Sources CRES	
Energy Centre Hungary	
Ente per le Nuove tecnologie l'Energia e l'Ambiente ENEA	
State Enterprise Energy Agency	
MIEMA	
SenterNovem	
Krajowa Agencja Poszanowania Energii KAPE	

Agência para a Energia ADENE
Slovak Innovation and Energy Agency SIEA
Department for Energy Efficiency and Renewable Energy, Ministry of the Environment and Spatial Planning
Instituto para la Diversificación y Ahorro de la Energía IDAE
Energimyndigheten
The Energy Saving Trust EST
BUILDING ASSOCIATIONS PER MS
Österreichischer Verband gemeinnütziger Bauvereinigungen
Fachverband der Bauindustrie
Confederatie Bouw
Bulgarian Construction Chamber
Svaz podnikatelů ve stavebnictví v České republice (SPS)
Estonian Association of Construction Entrepreneurs (EACE)
Confederation of Finnish Construction Industries RT
Építési Vallalkozók Országos Szakszövetsége (EVOSZ)
Lithuanian Builders Association (LSA)
Bouwend Nederland
Poish Green Building Council
Portuguese Federation of Construction and Public Works Industry (FEPICOP)
Construction and Building Materials Association (CBMA)
Asociación de Empresas Constructoras de Ambito Nacional (SEOPAN)
Agrupación Nacional de Constructores de Obras Públicas (ANCOP)
Sveriges Byggindustrier (BI)
Other organizations/programs
Eufores
ASIPIE
Build up
ENFORCE (2009-2012) (IEE program)

Annex Four: Training Provision - Member States Case Studies

Germany

In Germany there are approximately 17.3 million residential buildings as well as roughly 1.5 million non-residential buildings. According to the Federal Ministry of Transport, Building and Urban Development⁷⁴ (BMVBS), approximately 73 percent of the residential buildings were constructed before 1978, the year that the first Thermal Insulation Regulations came into effect. DENA, the German Energy Agency, reports existing buildings to have an energy-demand three times as large as new buildings. Furthermore, 87 percent of the total energy demand in private households is used for space and water heating. Of this number, 80 percent can be reduced by embracing modern energy saving building techniques.

In 2007 Germany implemented the EPBD by means of the Energy Savings Act or Energy Conservation Regulations⁷⁵ (EnEv 2007). The implementation of the EnEv 2007 has also stimulated the use of an energy certificate providing data on the energy efficiency of a building.⁷⁶ Since 2002, this energy performance certificate has been compulsory for new buildings and buildings that have been refurbished in a comprehensive way. With the implementation of the EnEv 2007, however, the energy performance certificate gradually became compulsory for all other buildings.

As of the July 2008, anyone wishing to rent or buy a property constructed before the end of 1965 has been able to demand that the owner, landlord or seller provides an energy certificate. Two such certificates exist: a requirement certificate and consumption certificate. The requirement certificate is based on a technical analysis of the building, whereas the consumption certificate is based on the actual building energy consumption for hot water and heating over the last three years.

The requirements for assessors of energy certificates are outlined in the Energy Conservation Regulations. Assessors must have had "building-related" training. As such, architects and engineers as well as skilled craftsmen and technicians are authorized. In addition to this initial qualification, assessors must have either acquired knowledge about energy efficient buildings/construction during their studies or during further vocational training, or have acquired related professional experience of at least 2 years. The BMBVS emphasizes that there are no accreditation bodies or national examinations in the federal states in order to minimize bureaucracy. The assessor must determine whether he/she is accredited according to the requirements outlined in the Energy Conservation Regulations.

⁷⁴ In German: Bundesministerium für Verkehr, Bau und Stadtentwicklung.

⁷⁵ Energieeinsparverordnung

⁷⁶ In German: Energieausweis

Assessors who issue permits but are not accredited according to this requirement are fined.

The federal states previously had the responsibility of setting the accreditation requirements for experts. However, due to the federal government legislation in this area these are now set at federal level as discussed above. As such, the involvement of the federal states in terms of setting regulation in this area has declined over recent years. Due to the absence of accreditation bodies or national examinations, a wide number of organizations now play a role in further vocational training on the assessment of energy efficiency in buildings. Examples include the local energy agencies (e.g. the Energie.Atentur.NRW provides continuous training via different institutions), technical training institutes (e.g. the combined refresher course of the Hauptverband Farbe Gestaltung Bautenschutz and the BZL-Lauterbach, or a similar course at the TÜV Akademie GmbH) and engineering agencies (e.g. the Dipl.-Ing. Klaus Brockmann Engineering Agency for Environmental technologies).

The German VET-system is known to be decentralist and corporatist; training and education in the construction sector is generally the joint responsibility of the federal government, the federal states, the social partners, and enterprises.⁷⁷ This collaboration has been known to facilitate a built-in linkage between theory and practice, requiring a substantial part of the practical training to take place in companies. Nevertheless, vocational training in Germany performs significantly worse than in other European countries such as Scandinavia, France or the Netherlands as German companies have not developed systematic professional continuing training concepts to the same extent as in other countries.⁷⁸ Looking specifically at the construction industry, too many and too narrow specialisations make adequate vocational training difficult within the construction sector. This is said to make it increasingly difficult to navigate the system and to familiarize with future job profiles and skill needs.⁷⁹

DENA has carried responsibility for a national PR and advertising campaign for the energy performance certificate, for running a database of energy efficient buildings as well as for various model projects (e.g. Zukunft-haus). Furthermore, DENA provides a nationwide database of assessors authorized to issue energy certificates and has even developed its own seal of quality for energy certifications. This voluntary national quality seal, Das DENA-Gütesiegel, is based on standards exceeding the minimum requirements of national legislation.

DENA's has been consulted in this study and they see the need for additional measures in this area but have doubts about the effectiveness of the proposed policy option resulting from the difficulty in coordinating too many different stakeholders. Furthermore, due to the fact that a certain supply or offer of trainings exists but that a sincere lack of demand with craftsmen remains, they

⁷⁷ Danish Technological Institute (2008) Future Qualifications and Skills Needs in the Construction Sector.

⁷⁸ Federal Institute for Vocational Education and Training, BIBB 2007

⁷⁹ Danish Technological Institute (2008) Future Qualifications and Skills Needs in the Construction Sector.

indicate that it might be more useful to provide the market with instruments to strengthen the demand side of building owners.

The Netherlands

One of the ways that specific EE training provision in the Netherlands is organized is under the *Meer met Minder Program* (More with Less Program). This is a national program of energy savings in existing residential and other buildings. The objective is to reach 2.4 mln existing residential and other buildings before 2020 to make these 20-30% more energy efficient.

The parties involved in the program are governmental bodies: the ministry of Housing, Spatial Planning and the Environment (VROM), the ministry of Economic Affairs and the municipalities. Also other parties (initiators and partners) are involved. The initiators are EnergieNed, the association for companies that is active in production, transport, trade or supply of gas, electricity or heat; Aedes, the association of housing corporations; Bouwend Nederland (Building Netherlands), the association for building companies; and Uneto-VNI, the trade organization of the installation sector and technical retail trade. The latter two organizations are involved in the trainings for the building workforce. Both Bouwend Nederland and Uneto-VNI have committed themselves within the *Meer met Minder Program* to take care of training, certification and quality control and to stimulate the quantity and quality of the execution. Bouwend Nederland focuses on the builders, while Uneto-VNI focuses on the installers of energy efficient technology.

Whereas the trainings under the *Meer met Minder Program* are directed at existing buildings, the *Bouwlokalen* (Building Places) are directed at new buildings. This initiative is organized by Bouwend Nederland and SBR, the knowledge platform for the building sector. In the *Bouwlokalen* building workers are trained (half a day) across the target groups of this study in EE for new buildings, and the supply of training is matched to demand. Subjects that are addressed in the course are RE in buildings, necessary permits for geothermal energy, technical design of EE and RE, maintenance, business models for large scale introduction of sustainable energy in the built environment, working together successfully by the different actors (architect, installer, supplier and builder), and selling sustainable energy to the consumer.

From consultations we learnt that in the Netherlands training for plumbers, electricians and installers is adequate but co-operation could be improved. This is, however, covered in the *Bouwlokalen*. Furthermore, training provision is not an issue as training supply is already in place. It is believed that demand for courses is bigger issue. As such, builders currently do the minimum as demanded by law until further knowledge on EE and RE is needed. Self-initiated training efforts in order to achieve a competitive advantage are rare.

So what are the requirements for buildings in the Netherlands? Following the decree energy performance buildings and the regulation on energy performance of buildings⁸⁰ since 2008 it is mandatory for residential and utility buildings that are sold or rented to be provided with an energy label. Energy performance advisors can audit the building and issue such labels.

In the Netherlands energy performance advisors are required to be experts having a higher (building related) technical education. Experts need to follow an additional course in order to become an energy performance inspector and to receive a valid certificate.⁸¹ Furthermore, companies, not individuals are accredited by certifying bodies. If a company possesses a NLEPBD-Certificate, a justified trust is said to exist in the company's delivered services meet the demands as they are outlined in the certification guidelines. As such, the certificate is meant to be a quality signal of the delivered product or service. A certifying body checks whether the certified company and its products meet the criteria at least once a year. The companies accredited by one of the certifying bodies are listed at the KBI, the information office for certification in the building and installation sector.

France

The construction sector in France employs over 1.4 million workers and of these over 300,000 are crafts and trades workers. These workers are among the primary targets of the training element of the *Grenelle* initiative launched in 2007 which is a major national programme driving energy efficiency in buildings. The Grenelle programme involves major stakeholders in the construction sector and looks at all aspects of the problem to improve the environmental performance of buildings.

As part of the training and education programme a range of learning tools have been developed including a magazine with articles and drawings explaining best practice techniques and methods and training for craftsmen run by one of the major firms in the construction sector (Saint Gobain) which is also developing an elearning tool with a similar approach to the magazine, using visual representations of new techniques and processes. A number of other companies are promoting their own training programmes though there are concerns that this training will be product focused and not give workers the skills to apply techniques more widely.

The primary national scheme is called FEEBat "*formation aux économies d'énergie pour les entreprises et artisans du bâtiment*", literally translated "training for craftsmen and employees of firms from the building sector". The scheme aimed to train 50,000 people by the end of 2009. The scheme itself is based around 3x2 day courses that are targeted at craftsmen and other workers to give a holistic approach to buildings EE retrofits. The 3 courses are as follows:

- Course 1 - general approach of energy saving refurbishment

⁸⁰ In Dutch: BEG: Besluit Energieprestatie Gebouwen, and REG: Regeling Energieprestatie Gebouwen

⁸¹ NLEPBD-Certificate

- Course 2 - methodology and software introduction for energy analysis and holistic energy refurbishment solutions
- Course 3 - learning about nine different technical solutions, 3 focusing on inter-crafts cooperation for energy efficiency.

The scheme is backed by a quality certification system that enables customers to search for certified providers.

In France energy providers are obliged to reduce their energy use and this is achieved through an energy saving (white) certificate system. This obliges the providers to assist their customers to reduce their energy consumption through a variety of measures. Funding training and skills development for EE is among the options. To date only EDF Energy has taken up this option by supporting the FEEBat initiative.

Results of the programme are not yet fully clear as the scheme has only been active a short time but it is understood that the wider initiative has played a key role in mobilising stakeholders towards a vision to improve buildings EE in France.

Italy

In Italy vocational training in the construction industry has traditionally been carried out by “a national vocational training system jointly managed by employers and employees’ federations and based on the national collective agreement for construction firms signed by National Association of Construction Sector Workers (ANCE) and the workers’ unions.⁸² This agreement is implemented by the regional organisations and training institutions. The regional implementation has been reported to have led to significant differences in training between the northern and southern regions of Italy. This has resulted in differences in competence outcomes and quality levels.

Under recent amendments, regional regulations on the energy efficiency in buildings has been standardized at national level. With the introduction of the energy performance certificate⁸³, every new building or building undergoing reconstruction after a demolition of the existing building as well as any building exceeding 1000 square meters must be in the possession of an energy certificate prepared by a qualified professional. Municipalities carry the responsibility for supervising and controlling the energy certification. They have the power to apply penalties if misconduct occurs.

Law dictates that energy certifiers should at least fulfill three requirements: (1) they should hold a technical diploma or a degree of first or second level compatible with the activity of energy certification, (2) they should be listed in the respective professional register and (3) they should have undergone a recognized course, promoted/sponsored by the accreditation body, and pass the exam.

⁸² Danish Technological Institute (2008) Future Qualifications and Skills Needs in the Construction Sector.

⁸³ In Italian: Certificazione Energetica

In terms of vocational training, Italy is characterised by a weak link between the higher education institutions and construction sector practice sector.⁸⁴

Traditionally, there has been limited cooperation. More recently, employers have started criticizing vocational training by arguing that employees increasingly require a combination of technical skills and management skills which is not acquired at university. This could go a long way in explaining the weak correlation between participation in further training and subsequent wage rises, which is very likely to discourage participation in lifelong learning.

Training in the RE field is provided by different stakeholders such as training centres and manufacturers mainly in the fields of photovoltaic and solar thermal. Few courses, however, include a final examination. The training offered range from master courses, to higher technical education (financed by regional funds), to courses offered by companies working in the sector and to courses organized by educational institutions. The courses provided by the companies in the sector do not require specific entrance criteria and the trainees do not have to pass a final examination. They receive a certificate of attendance at the end of the training. The training courses organized by training institutions associated with universities or research centres are primarily aimed at professionals in the field in order to update and/or deepen their knowledge on the design of photovoltaic systems or technical regulations.⁸⁵

The United Kingdom

Skills and training policy and provision has been an area of high activity in the UK in recent years, culminating in the release of a new national skills strategy '*Skills for Growth*' in November 2009 by the Department for Business, Innovation and Skills (BIS). The strategy characterised a skills system that successfully addresses the skills needs of the upper and lower ends of the skills spectrum but fails to sufficiently address needs at intermediate (vocational, advanced technician) levels. Skills strategy is based around demand led provision, with provision being targeted on skills that are demanded by employers and individuals with an aim to focus on '*the areas of the economy which can do most to drive growth and jobs*'.⁸⁶

BIS is the ultimate governance body for skills and training, it relies on the UK Commission for Employment and Skills (UKCES), an independent public body that draws on staff from the public, private and third sectors, for high level strategic advice on skills and training policy. UKCES, on behalf of the government, licenses the Sector Skills Councils (SSCs) which are independent, national, employer led sector organisations. Their role is to articulate the needs of employers of all sizes to enable the demand-led skills system to function, they do this through building partnerships to influence providers, employers and funding

⁸⁴ Danish Technological Institute (2008) Future Qualifications and Skills Needs in the Construction Sector.

⁸⁵ Paragraph based on draft version of QUALICERT Common quality certification & accreditation for installers of small-scale renewable energy systems

⁸⁶ BIS (2009) Skills for Growth

organisations, defining national occupational standards and research to identify skills gaps, shortages and needs.

There are 25 SSC's covering key sectors, 3 SSC's Construction Skills, SummitSkills and Asset Skills have the closest involvement with the target groups. These SSC's are involved in the wider development of the Renewable Energy Skills Strategy in 2010 and have been active to varying extents in developing training and qualifications for the target groups. Construction Skills has also been a key partner in the development of the National Skills Academy for Construction which is designed as a centre of excellence for the delivery of skills training and provision.

Vocational training relevant to the target groups is funded through a variety of means publicly funded through the Learning and Skills Council (LSC). Train to Gain is an economy wide programme that has supported over 1.3 million training courses since April 2006 and approximately 250,000 apprenticeships were started in 2007-2008. ESF funding of training is also significant across the wider economy. Employers also play a major role in the provision of skills providing some sort of training for over 60 per cent of the workforce⁸⁷. This means that the UK has a relatively high proportion of employers offering some form of continuing vocational training. However, typically the training provided is relatively short and does not lead to any certification or qualification.

Publicly funded training is typically brokered by business support services and only for training through providers contracted through the LSC to assure certain quality standards. Training organisations include a mix of further education colleges and private providers. Employers are also key deliverers of skills training with over half of the total training spend supporting on-the-job – on-site training and a smaller proportion supporting off-site training. A number of the largest firms, sometimes in partnership with the SSCs (national skills academies) and each other, have set-up their own internal training institutions and academies to provide standardised, tailored training or to meet perceived deficiencies in existing provision.

Private training providers are also important providers of skills training, most typically firms offering specialised short courses in 'soft' skills or businesses such as manufacturers offering training tied to products. Trade Unions and other third sector organisations provide training but on a smaller scale and provision is typically short courses that don't lead to recognised qualifications. Trade Unions are playing a growing role in some industries through their learning representatives who help workers into skills training.

The buildings workforce sector has seen strong engagement by the relevant SSC's particularly SummitSkills and Construction Skills, responsible for building services engineers (plumbers, HVAC, electricians) and construction trades and crafts workers respectively. Both SSCs have been working to develop National

⁸⁷ LSC (2007) National Employers Skills Survey 2007: Main Report

Occupational Standards and to integrate these into the European Qualifications Framework, these have been completed for a number of the target groups already. SummitSkills have also been highly active in developing the Micro [Renewable] Certification Scheme to accredit installers of buildings RES, the implementation of the training and assessment requirements of the RES directive 2009/28/EC and in developing a National Skills Academy for Green Skills.

The SSC's have both been active in mapping the skills needs for their sector footprints and this is a key role of the SSC. This mapping data has attempted to quantify skills training needs into the future, the SummitSkills work is more advanced in this respect and the level of detail may enable match to the target groups of this study.

A search of the national database of accredited qualifications (NDAQ) lists a number of relevant and accredited courses and units currently being provided in the UK. Coverage in some areas and technologies is better than in others with gaps existing and course only recently introduced, again the evidence suggests that building services engineering type skills are better served than energy efficiency skills. There are a range of courses offered for energy auditors but large concerns over the quality of both providers and courses.

The reality within industry training at craft levels in the UK is that it is largely 'on the job' with a short initial training period followed by working with experienced workers to pick up basic skills. It is felt by some (RW2) that this is sufficient for most basic construction skills. The training system in the UK is geared to provide skills for specific processes rather than any wider learning.

There is the view in the UK that training in the sector for EE and RES is a 'chicken and egg' situation, that there is not enough demand to warrant training but a lack of skills hinders an increase in demand. In the past it has taken legislative intervention and public support to overcome this type of issue (transition to condensing boilers). Some believe in the case of EE and RES that a marketplace will emerge for these technologies in time and market demand will then ensure skills provision and training is successfully implemented within the existing frameworks.

Lithuania

According to 2006 statistical data, around 107,000 people are employed in the construction sector in Lithuania. This represents 10% of all employment in the country.⁸⁸ The training in the construction sector is provided through formal and non-formal vocational education. The formal vocational education in Lithuania includes initial vocational training, continuous vocational training and vocational/career counselling. The main institutions providing vocational training are vocational schools and colleges. Regarding the energy efficiency and renewable energy training in the construction sector no overall strategy or programme at national level can be identified. However, some of the vocational

⁸⁸ http://www.pmmc.lt/Skelbimai/SEK_EN/EN-Stat.%20sekt.%2008.07.30.pdf

training programmes are devoted to the energy efficiency related training, some training in this field is initiated by the industry representatives and some funding was available through the implementation of the ESF projects.

Some of the examples of the energy efficiency training programmes provided in the vocational education and training institutions are presented below:⁸⁹

- *Thermo-insulator training programme*. This training programme provides training on thermo insulation of buildings. It is provided in 3 institutions.
- *Insulator training programme*. This training programme focuses not only on buildings but also on the other objects. There is one institution in Lithuania providing this training programme.
- *Winter-proof maker of buildings training programme*. The goal of the programme is to provide training on insulation of various parts of buildings including through the application of the new technologies. Some 14 institutions are providing this training programme.

The organisations like vocational schools, public organisations, associations working in the construction fields, energy efficiency and environment protection also participate in various international projects which provide or develop training opportunities in the field of energy efficiency. One of the examples of these projects is *INTENSE - From Estonia till Croatia: Intelligent Energy Saving Measures for Municipal housing in Central and Eastern European countries*. One of the activities of the project includes developing training modules for stakeholders, such as architects, engineers or craftsmen who are responsible for the implementation of specific measures during the construction of new houses. The project includes number of partners from 12 countries⁹⁰.

⁸⁹ The information is based on the <http://www.aikos.smm.lt/aikos/programos.htm>

⁹⁰ <http://www.intense-energy.eu/english/metanavigation/about-the-project/>

Annex Five: Member States Summary

Member State	Provision of education and training for the construction sector (DTI)	Higher education - different challenges to each system (DTI)	Continuing education and training uneven across Europe (DTI)	Requirements independent experts (RICS Status Report on EPBD)	Needs and Priorities	Quantity
Austria				Austria has many consultants and institutions well experienced in 'conventional' energy consulting for new and existing buildings, but usually not many of them have been concerned with heating, ventilation and Air Conditioning. A common system of information and training ('Arbeitsgemeinschaft Energieberaterausbildung' – ARGE EBA) has been put in place to increase the number of independent experts in order to guarantee a high level of expertise. The requirements to become an expert vary in the different 'Bundesländer'.	Priority to train buildings inspectors, auditors and skilled professionals	Unknown
Belgium (Flanders)				<p>In the Brussels Capital Region Control the regulation is the responsibility of the regional administration of energy. Energy councillors ('Conseillers PEB') will check the requirements. They can be architects or civil engineers who need to have been accredited by the ABEA (Brussels Energy Agency).</p> <p>In the Flemish region The requirements for inspectors were published on 20 March 2008. Flanders differentiates between two different types of assessors: Type A (inspector) needs to have followed training courses including:</p> <ul style="list-style-type: none"> o An introduction to building physics o An introduction to technical installations such as heating systems, sanitary hot water, ventilation, cooling, solar heaters and photovoltaics o The inspection protocol o The actual inspection document o The certification software o The database for certificates <p>There is a theoretical and practical exam.</p> <p>Type B (auditor) needs to have followed training courses including:</p> <ul style="list-style-type: none"> o The legal framework with regard to the difference between certificate and audit o The audit document o The audit software (only used for single family buildings) o A practical case study A candidate must at least achieve 60% to pass. <p>In the Walloon region Control of the regulation is the responsibility of regional and local administration. Since September 2006, architects and engineers have been informed about certification and trained to complete audits. The training to be an accredited assessor takes five days. Auditors have to be accredited by the Walloon region.</p>	Needs for installers, building contractors, architects and engineers	A few - several thousand

Bulgaria	The Bulgarian VET-system is centralised and characterised by school-based training and practice. Vocational education and training in Bulgaria generally lasts between 2-3 years, but can last up to 6 years depending on the starting level. The vocational construction education and training includes 4 years of general school training followed by the option of an additional year of specialisation. At the national level, VET is the responsibility of the relevant ministries. The Bulgarian Ministry of Education and Science develops the curricula for the schools, which refer directly to the Bulgarian Ministry of Education and Science. The main components of the curriculum are identical for all schools. A challenge of centralised systems like the Bulgarian is the rigidity in changing curricula. VET schools have to contact the Bulgarian Ministry of Education and Science if they want to make changes, and it may take 2-3 years before changes are implemented.	In Bulgaria, the system of higher education is in the process of becoming more compatible with other European systems. The system faces basic challenges concerning funding and recruitment and retention of students and teachers. A challenge is that it is becoming more difficult to attract students as the number of high school students is decreasing due to demographics. In addition, the universities have problems with high dropout rates and students leaving to study abroad.	In Bulgaria, participation in continuing education and training is low. According to interviews among Bulgarian education institutions and sector organisations one of the explaining factors is that trade unions till now have played a minor role in the development and organisation of training in Bulgaria. Another contributing factor is a low demand for skilled workers. Till now the majority of enterprises have employed low-skilled, low-paid workers. A recent initiative from the Bulgarian government requires that companies must ensure that their employees have vocational certificates. So far many enterprises have yet not complied with these, and there are complaints that the requirements have not been accompanied by financial incentives.	In Bulgaria the EEA is in charge of a public register for entities carrying out energy efficiency audits and the certification of buildings. Entities are accredited by the Agency against a fee according to regulation 16-1238 in force since 28 December 2007. The main requirements towards these entities are: <ul style="list-style-type: none"> o A minimum set of technical means for measuring. o Available staff with at least 3 specialists in the fields of architecture, civil engineering, thermotechnics, electrical engineering o To have successfully passed the exam on audits and/or certification of buildings o 3-6 years experience in the field o A bachelor's or masters degree depending on the qualification The examination material and the evaluation are standard for the whole country and are prepared by accredited high schools in coordination with the executive director of the EEA and are approved by the Ministry of Economy and Energy. At the end of the training course the assessors need to sit a twopart final exam, an individual test and present an individual project. The final exam is conducted by an examination commission which consists of professors from the Technical University and a representative of the EEA.	Priority for installers, inspectors, auditors, architects and engineers	a 'considerable number' required
Cyprus				In Cyprus the exact requirements regarding the independent experts allowed to issue the certificates have not been finalised.		
Czech Republic				In Czech Republic inspections are carried out by authorised specialists according to Act. No. 86/2002. Requirements: <ul style="list-style-type: none"> o Six years relevant experience o An additional exam which consists of an theoretical part and an oral exam before a committee consisting of six members of various ministries 	Auditors and inspectors	About 2,000
Denmark				In Denmark there are 3 types of energy inspectors: <ul style="list-style-type: none"> o For single-family residential buildings o For multi-family residential buildings, commercial and public buildings o In-house inspectors for commercial and public buildings Requirements: <ul style="list-style-type: none"> o At least 5 years relevant experience o A successful completion of a special training o Compulsory participation in an annual 'refresher' course o A mandatory professional indemnity insurance (needs to be kept in force for at least 5 years after ceasing activity as inspector) 	Main target groups are installers (electricians, plumbers, etc.) and other technicians (carpenters and bricklayers). Carpenters particularly important.	Over 260,000 carpenters and installers in country, many will need training.

England	<p>England can be defined as having an employer-led on-site learning system where students mainly acquire competencies through company training. The VET-system is primarily regulated through voluntary agreements rather than national legislation. In the employer-led system, the employer contributes to the apprentices' wages, while school training is funded by the state. There is no official delineation between vocational education and training, and it can take place in various settings managed by different bodies. A challenge in this system is the continued lack of suitable and sufficient places for apprentices even though there is a levy/grant system for employers that take in apprentices. SMEs with annual payrolls below £73,000 are exempt from the levy, although they still qualify for grants, advice, and support.</p>	<p>In England, the higher education system is mainly private (self-owned institutions). Consequently, all universities have their own degree-awarding powers and determine their own degrees, other qualifications, and the conditions that apply to achieving them. One challenge is to make the system more demand-driven based on better career guidance. The UK Commission for Employment and Skills (UKCES) suggests that the way the colleges are funded should be changed. In the current system, the colleges are assessed on the number of students that pass the courses. It is argued that the English system leads to many students who only attend courses that they are certain to pass. It is also suggested that young people entering the construction sector should have access to better information about the different programmes and career opportunities.</p>	<p>The Leitch Review of Skills (2006) concluded that employers' provision of CET in the UK is insufficient. The review, which covers all sectors, reported that 'more than one third of adults do not hold the equivalent of a basic school-leaving qualification. Almost half of adults are not functionally numerate and one sixth is not functionally literate.' A factor influencing continuing training is the high share (30%) of self-employed persons, as it can be difficult to gain access to them and convince them of the importance of training and further education.</p>			
Estonia				In Estonia certification will be carried out by experts who have attended training courses for energy certifiers and fulfil other relevant professional requirements.	Priority need for installers, other technicians, architects and designers	Unknown
Finland				<p>In Finland For new buildings, the principle designer will be qualified to issue the certificate. For existing buildings, there are three approaches:</p> <ul style="list-style-type: none"> o Within 'housing companies', the certificate will be presented together with the 'Property Management Certificate'. The property manager is qualified to issue the certificate. o Within the existing 'Energy Audit Program' (EPA), energy audits are carried out for all buildings, except for residential and government buildings. The energy auditor is already qualified and does not need further accreditation. o Separate certificates can be issued by legally empowered experts with appropriate professional qualifications with a degree in the building/ energy sector and an additional exam. 	Training need for architects, HVAC designers and project managers for new-build and maintenance and facilities managers for existing buildings. General need for inspectors, auditors and energy assessors.	Unknown

Germany	<p>In Germany, the VET-system is decentralist and corporatist, as the construction sector is the joint responsibility of the federal government, the Länder (the federal states), the social partners, and enterprises. The main advantage of this dual system is the built-in linkage between theory and practice, as a substantial part of the practical training takes place in companies. As it is based on tripartite cooperation between government, employers, and trade unions, it enables updated curricula in line with labour market needs. According to interviewees, a disadvantage of the current system is that there are too many and too narrow specialisations within the construction sector. The many specialisations make it more difficult for both enterprises and potential apprentices to navigate the system and to adapt to future job profiles and skill needs which often transcend specific occupational profiles.</p>	<p>In Germany, the tertiary education systems (in particular the Fachhochschulen) are generally considered to have good links between the industry and the educational institutions. Higher education programmes for the construction sector often include practice-oriented education and work placements. Furthermore, there is a general practice of using external trainers from the industry. The challenge is to attract students who have the capacity and motivation to study construction engineering, as the sector is affected by a continuous lack of engineers.</p>	<p>In Germany, low-skilled workers and workers close to retirement participate less in continuing education and training than the rest of the workforce. This is partly because German companies have not developed systematic professional continuing training concepts to the same extent as in other countries. According to the Federal Institute for Vocational Training (BIBB), "vocational training in Germany performs significantly worse than in other European countries such as Scandinavia, France or the Netherlands" (BIBB: 2007).</p>	<p>The German regions set the accreditation requirements for experts. Therefore rules may considerably differ per 'Bundesland'. Due to the fact that there is a high demand for certificates, a wide range of qualifications are given market access. Certificates may be issued:</p> <ul style="list-style-type: none"> o For all buildings: <ul style="list-style-type: none"> By architects and engineers of building-related backgrounds and by other engineers and natural scientists with a building-related degree who have either acquired knowledge about energy efficient buildings/construction during their studies or during further vocational training or who have related professional experience of at least 2 years. Only for residential buildings: <ul style="list-style-type: none"> - By master craftsmen or someone with an equal qualification related to building and building appliances (including chimney sweepers) who have successfully attended an additional vocational training course. - By persons who are authorized to perform energetic calculations for new buildings according to the building codes of the 'Bundesland' –within the scope of their authorisation. • For new buildings, setting accreditation requirements is the responsibility of the German 'Bundesländer'. Although there will be no formal system of approval and certification, there will be a penalty if an unauthorised person issues a certificate. In addition building owners can be fined if they do not make a certificate accessible to a prospective buyer or tenant. As there is no official register of experts, there is no national register of certificates either. However, as of July 2008, a voluntary national quality seal for inspectors will be introduced by the German Energy Agency (Dena) to monitor the quality of the certificates and the qualification of the inspectors and to build consumer confidence. 	<p>Needs in all areas, installers, inspectors, auditors, other technicians and others including project developer, project manager (construction engineers, architects..), product developer (heating pumps), creation of a project controller, somebody who is responsible for the energy efficiency/ RES in the whole building process and who is controlling the process, craftsmen, facility manager, site manager, architects, designers/planners and teachers.</p>	<p>Numbers could be 'huge', priority on energy efficiency, renewable energy can be integrated later on.</p>
Hungary				<p>For Hungary The Chamber of Engineers and the Chamber of Architects agreed in early 2006 that a common examination board will issue the licences for experts who are in possession of an appropriate diploma and can demonstrate relevant practical experience and upon completion of an additional exam. This agreement has been approved by the State Office of Housing and Building. Budapest University of Technology and Economics and other bodies have started to offer courses for potential experts (32 hours of training). About 1.500 practising engineers and architects have been prepared to sit the exams. To date no licences have been issued due to the lack of the relevant regulation regarding certification. Some of the participants of the training courses carried out a pilot certification program on a voluntary basis involving all residential buildings in a small town in order to gain experience and to prove the usability of the originally proposed asset method.</p>		
Ireland				<p>In Ireland BERs will be carried out by specially trained BER assessors, registered by Sustainable Energy Ireland (SEI). A list of BER assessors (usually building professionals like architects, engineers, etc.) as well as the requirements set are available on www.sei.ie/epbd Assessors have to re-register annually. Registration is subject to payment of fees.</p>	<p>Priorities</p> <ol style="list-style-type: none"> 1. Installers and other technicians (designers, specifiers) 2. Auditors 3. Inspectors <p>High priority – architects, engineers</p> <p>Need to engage building owners – life cycle costs</p>	<p>Total BER assessors: 2,500, Other Assessors: (boilers – xx) (air con – xx), Installers: 400. Architects: 2,000, Engineers: 5,000. Rough estimates.</p>

Italy	<p>In Italy, vocational training in the construction industry is carried out by a national vocational training system jointly managed by employers and employees' federations and based on the national collective agreement for construction firms signed by ANCE (National Association of Construction Sector Workers) and the workers' unions. The ANCE agreement is interpreted and implemented by the regional organisations and training institutions and has so far led to significant differences in training and skills in the northern and southern regions of Italy. Therefore, a main challenge to the adaptability of the Italian VET system is to define and ensure comparable competence outcomes and quality levels across regions. Though regional/local adaptation to employers needs is desirable, a challenge to the Italian VET system is to define and ensure comparable competencies and quality levels across regions. As the vocational training system is not related to a national qualification framework, two workers may have the same vocational training qualifications but with quite different content. According to interviewees, one of the reasons is that the articulation of skills demand of the industry of Northern Italy is clearer and more organised than in Southern Italy.</p>	<p>In Italy, a challenge is to establish a better link between the higher education institutions and the realities of working life in the construction sector, as there is limited tradition for cooperation. Employers argue that employees increasingly need a combination of technical skills and management skills and that graduates do not acquire such skills at university.</p>	<p>In Italy, there is a weak link between participation in further training and subsequent wage rises, which is very likely to work as a disincentive to participating in lifelong learning.</p>	<p>In Italy experts carrying out the inspection of boilers need to be certified by ENEA or the regional municipalities. All inspectors need to undergo training and also need to be registered with regional organisations. (For example 'Casa Clima' for Bolzano, 'SACERT' for Milano, 'ECO ABITA' for Reggio-Emilia).</p>		
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Lithuania			<p>In Lithuania The 'Certification Centre of Construction Products' under the Ministry of Environment was appointed to manage the accreditation of experts and the registration of the certificates. The expert training program was adopted by Order no. D-1-305 in June 2006. Training courses started in November 2006. The program will be revised every 5 years. Requirements: Market access is for engineers with a relevant experience of three years in construction, who have followed special training courses (32 hours) and certification practice of 3 buildings. Two institutions were appointed as teaching bodies for experts: The 'Architecture and Building Institute' of the Kaunas Technological University / The 'Quality Management Centre' of the Vilnius Gedimino Technical University. Requirements for inspectors of boilers and A/C systems:</p> <ul style="list-style-type: none"> o A higher technical education o 3 years experience in ventilation and A/C related fields o A certificate of having obtained a intermediate level in electrical safety o Special training courses <p>The training is organised by the General Director of the Lithuanian Labour Market Training Authority under the Ministry of Social Security and Labour by approved training programmes. Training will start at the end of 2008.</p>	Needs in all areas including inspectors (boilers, heating, HVAC systems), energy auditors and certification professionals.	50-100 other technicians, 300-500 energy certification professionals and the market will ascertain the remaining numbers of workforce needed to be trained
Luxemburg			In Luxembourg the calculations have to be performed by architects, technical engineers and/ or accredited experts, who have completed the required training course.		
Malta			In Malta, architects and civil engineers ('Periti') as well as mechanical and electrical engineers require an accreditation which is issued by the State. They also fall under the rules, regulations and codes of ethics issued by their respective Chambers. In terms of training, a programme is being drawn up for holding training courses for assessors and certifiers in September 2008. It is likely that 'Periti' and engineers will be asked to attend an induction course on the chosen software/s and upon successful completion of the course will be registered as assessors with the Malta Resources Authority.	<p>Priorities</p> <ol style="list-style-type: none"> 1. Installers (builders, insulation, designers and interior decorators) 2. Inspectors and auditors 3. Other technicians 	<ul style="list-style-type: none"> - Installers - not available - possibly around 250 - inspectors buildings - around 200 - auditors - around 200 - inspectors boilers - 30 - inspectors ACs - around 150 - builders - around 150 - designers - around 80 - other technicians - around 150
Netherlands			In the Netherlands energy performance inspectors are experts and need a valid NLEPBD-Certificate as described in BRL 9500. The requirements can be downloaded on www.isso.nl Companies, not individuals are accredited by certifying bodies. Experts will need to have a higher (building related) technical education and will need to follow an additional course in order to become an energy performance inspector. Registered certified companies can be found under www.kbi.nl		
Poland			In Poland Boiler and A/C system inspections will be carried out by specialist engineers who have followed a course at a technical university and have passed special exams. For the certification, candidates need to have a relevant higher education and pass an additional exam. Certain specialized professions like architects are exempt from following these courses and may access the market directly. Courses are being introduced at university level to prepare experts. Poland needs an estimated 5000 assessors.	<p>Highest priority: Installers and auditors</p> <p>Medium priority: Inspectors</p> <p>Others – local authority auditors knowledge</p>	At vocational level 3,000-5,000, energy auditors and inspectors for buildings 1,500-2,500, Energy auditors for industry 1,000-2,000

Portugal				<p>In Portugal only qualified experts are permitted to issue certificates and to carry out inspections. They must be recognised architects or engineers with at least 5 years' experience, on the basis of peeranalysis of their CVs carried out by elected boards within their professional associations. In addition, qualified experts must attend recognised courses and pass a demanding national exam that evaluates their knowledge about the technical requirements of the building regulations and the details of the certification system itself. ADENE co-ordinates the training of qualified experts and is responsible for the Energy Certification module in all courses. These courses are available in the three areas covered by the system and award different qualifications:</p> <ul style="list-style-type: none"> • Residential and small nonresidential: RCCTE • Large non-residential/ Energy: RSECE-E • Large non-residential/ IndoorAir Quality: RSECE-QAI <p>A professional licence, valid for 5 years, is issued to qualified experts. It is subject to renewal pending proof of continued training and lack of malpractice. The first group of qualified experts, consisting of about 200 experts, has been given the additional qualification for training new experts. Recognised courses are already offered by more than 40 universities or accredited training institutions, and more than 700 candidates are undergoing training as of January 2008. The goal is to have 2000 qualified experts by 2009.</p>		
Romania				<p>Requirements in Romania:</p> <ul style="list-style-type: none"> • A specialised course at a university • An exam at the Ministry 		
Slovakia				<p>In Slovakia the requirements for energy experts are set forth in the Slovak Act No. 555/2005. This Act will be amended in 2008 in the context of Directive No. 2006/32/EC. Energy certificates may only be issued by officially licensed experts. To be qualified and to obtain a licence, a university degree in the relevant area of certification is required, as well as three years of experience in the field. 'Energy Auditor' training courses are organised and professionally supervised by the SIEA.</p>		
Slovenia				<p>In Slovenia the certificates are issued by chartered engineers, after an additional training, exam and approval by the state.</p>		
Spain				<p>In Spain inspections of thermal installations have been carried out by experts for years because of safety regulations. For the EPBD, an additional training of 2-3 days is required. Mainly architects and engineers are involved in the certification process. The specific requirements depend on the respective regional authorities.</p>	Need for Energy managers and auditors, installers and maintenance skills, inspectors and technicians	Unknown
Sweden				<p>In Sweden the system for independent energy experts requires certified experts from an accredited company. To get an accreditation, the company needs to have at least one certified expert in a leading position. Experts will need to have a degree from a basic technical education. They need at least five years experience, of which at least two years need to have been spent in an area directly linked to energy auditing and certification. They also need to pass an additional theoretical exam.</p>	Installers, operational staff (caretakers, facilities managers) , public sector inspectors (energy efficiency)	Some needs
United Kingdom				<p>In England, Wales and Northern Ireland an Energy Assessor needs to have both appropriate qualification and accreditation. Qualification: Energy Assessors should hold a current qualification in Energy Inspection. This is being developed as part of a 'National Occupational Standard in Energy Inspection'. The qualification will be approved by the 'Qualifications and Curriculum Agency'. Qualification bodies will develop assessment procedures that align with the 'National Occupational Standard'. Accreditation: Different accreditation schemes have been set up for each sector requiring certificates. To be an energy assessor and produce energy certificates and Air Conditioning inspections an assessor must belong to an accreditation scheme as well as having the appropriate qualifications or experience and learning. The accreditation schemes control the quality of energy assessments, DEC's and advisory reports by ensuring energy assessors are competent and have the appropriate skills to conduct assessment. For further information and a list of accredited schemes, visit the website below where companies approved by the government to operate accreditation schemes for energy assessment are listed: www.communities.gov.uk/planningandbuilding/theenvironment/energyperformance/energyassessment/accreditation/</p>	Range of professional skills, energy advisors, public planning and building control officers, facilities management (technical skills).	Unknown
Scotland				<p>In Scotland, there is no specified qualification for energy assessors. The Scottish Government has entered into protocol with professional organisations/institutions whose members already have an understanding of the building/ energy sectors. Only members of protocol organisations may produce EPCs for existing buildings. A list of the organizations who have signed protocols is available on www.sbsa.gov.uk/european_issues/epcprotocols.htm</p>		