intense
energy efficiency

INCREASING THE KNOWLEDGE ON ENERGY EFFICIENCY ISSUES OF CONSTRUCTION PROFESSIONALS IN CENTRAL AND EASTERN EUROPE:

A TRAINING NEEDS ASSESSMENT REPORT

Philipp Engewald

with contributions by
Sandra Oisalu
Dirk Schröder-Brandi
Wilfried Walther

Intelligent Energy Europe

Author:

Philipp Engewald

Baltic Environmental Forum Deutschland e.V.

Osterstraße 58, 20259 Hamburg, Germany

Tel: +49 (40) 53 30 70 75

E-mail: philipp.engewald@bef-de.org

INTENSE coordinating partner:

Ingrida Bremere

Project manager

Baltic Environmental Forum, Latvia

INTENSE

Intelligent energy saving measures for municipal housing in Central and Eastern European countries

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1. Introduction

This document is the first part of a target group assessment among different professionals from the construction sector in Central and Eastern European countries about their knowledge and needs for further qualification on issues of energy efficiency of new buildings. It is part of the project INTENSE – From Estonia till Croatia: Intelligent Energy Saving Measures for Municipal housing in Central and Eastern European Countries, which contributes to an improvement of energy efficiency in municipal housing in eleven countries: Estonia, Latvia, Lithuania, Poland, Czech Republic, Slovakia, Hungary, Slovenia, Romania, Bulgaria and Croatia.

The target group assessment, addressing architects, engineers, and construction workers, shall reveal information about the needs for further training and qualification to ensure, that building according to energy standards is implemented with a sufficient care and quality. This assessment is carried out within the activities of the work package "Stakeholders Training Program", as a part of the overall project INTENSE.

The background Paper on implementation of the target group assessment contains two major parts: Chapters 2-4 address the prerequisites and the frame of the survey. Chapters 5 and 6 explain the questionnaire and the results from the survey in detail.

These two major parts are followed by a summary with the main recommendations, not only with respect to the training programme of the INTENSE project, but also of general nature about the procedure of this particular survey.

2. Frame and scope of the assessment

2.1 Why a training programme for construction professionals?

The assessment is carried in the frame of a large-scale project to promote a holistic approach to energy efficient construction of new buildings all over Eastern Europe.[1] The development of the project has its origins the time of over-heated economies in Central and Eastern Europe with enormous activities in the building and construction sector. However, the quality of implementation showed that questions of energy efficiency were notoriously neglected and ignored.

One of the crucial factors explaining this phenomenon turned out to be a lack of knowledge and awareness among practically all important stakeholders from the construction sector. Customers were asking for cheap and fast solutions, investors were primarily interested in quick revenues, and both did not consider the long-term saving effects, although the initial investment might have been higher if energy efficiency measures were considered and included from the beginning. Yet, architects and engineers would have not been able to consult their customers on these benefits, as they themselves proved to lack competences and awareness of the topic. And finally, construction workers were largely not qualified and skilled enough in order to implement energy efficiency measures properly. Therefore, a training programme for construction professionals in Central and Eastern Europe should be developed that delivers to them information about the most crucial points of the whole construction process from the perspective of energy efficiency.

Many training programmes dealing with energy efficiency have been carried out in recent years, the project database of the Intelligent Energy Europe funding instrument gives an impressive insight (e.g. Training programme for local energy agencies and actors in transport and sustainable energy actions (TREATISE) – specific target group, Energy and Urban Planning In Restructuring Areas (ENPIRE) – addressing first of all Western Europe, Implementing EU Appliance Policy in Central and Eastern Europe (CEECAP), addressing Eastern Europe with a specifc topic. Another on-going programme is carried out in the frame of the project "Certified Passive House Designer (CEPH), which covers mostly Western European countries, and with Slovakia and the Czech Republic only two out of the INTENSE region. Further, there is the ILETE – "Initative for Low Energy Training in Europe" Project, which includes regions in Poland and Romania, but addressing a broad range of building professional. Most of these programmes, however, focus on a very specific topic, target group, or fuel source. In INTENSE we look at the larger picture bringing together the different aspects of energy efficient urban planning down to details for construction and how to make energy efficient houses more attractive and desirable for citizens. Moreover, the peculiarity of the training programme in INTENSE is its specific geographic scope: transferring state of the art, knowledge — but taking into consideration the local circumstances — to architects, engineers and craftsmen in 11 Central and Eastern European countries.

The training programme in INTENSE was designed relying on experience from Western European countries, however, targeted to meet the conditions and needs especially in Central and Eastern Europe with a much shorter history of thinking about environmental protection in the way it is done in the old EU, and with a special heritage from Socialist times with regard to the building stock and less focus on long-term investments.

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[1] The survey was carried out as part of the project From Estonia till Croatia: Intelligent Energy Saving Measures for Municipal housing in Central and Eastern European Countries (INTENSE), funded by the EU Commission's Intelligent Energy funding instrument..

2.2 Getting to know the needs to tailor the training programme

Indications from the INTENSE preparation phase suggest, that the level of knowledge and need for more training on certain topics may vary from country to country. But in order to focus on the right topics in a long-term perspective this target group assessment is carried out prior to finally determining the actual training sessions, which will be carried out within the frame of the project and afterwards.

The decisive question that needed to be answered was which method would allow the project team to gather sufficient information in a feasible and affordable way and the decision was taken to perform a survey based on a Delphi assessment with professional experts that can be assumed to have an overview of the conditions of the construction sector in their country. With the Delphi-method, a form of surveying smaller groups in social science research, opinions on future trends and needs can be systematically gathered from experts. Earlier experiences showed that checking curricula of educational institutions, e.g. technical universities or professional qualification programmes is not advisable, as the level of information that may be obtained is too general.[2]

The assessment is carried out simultaneously in the following countries: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romanian, Slovakia, and Slovenia.

It is important to point out here, that this assessment does not strive to be a fully representative and is not meant for research purposes. However, efforts for a systematic and methodologically guided investigation are needed to avoid as much as possible arbitrary and random results. The results should be indicative and should be guidance for the development of the programme.

As the financial and economic crisis has hit particularly the construction sector in the new Eastern European member states of the European Union, the assessment also will address this change of circumstances. Construction has come to a halt and this interruption offers a chance to evaluate what was done in the years earlier and to improve the quality and sustainability of buildings. Already now, the undesired results of fast and low-cost building becomes evident in many houses that have been built between Estonia and Bulgaria in the recent years and require repair works at high costs for the owners. It can be expected that in the future customers will demand for better quality and this demand can be met swiftly, if providers, i.e. particularly architects, engineers, and craftsmen are prepared for the new situation.

The following chapters will explain the methodology and the actual procedure within the project in greater detail.

3. Methodology

The assessment was based the so-called “Delphi-method”, which has been described initially by Dalkey (1967). A first extensive compilation of variations of the Delphi-method was prepared by Linstone and Turoff (1975) and most recent developments and enhancements of Delphi are explained e.g. by Händer (2002) whose work has been also to some extent the guiding instrument for the activities here.

The Delphi method is used to systematically predict developments in the future, to collect opinions, or to find a consensus among these opinions, this also ex-

[2] We refer here to the results of the project “Developing concepts for innovative and energy efficient construction of new buildings (2007-2009)” funded by the German Federal Environment Foundation, where exactly this has been tried out, although for slightly different purposes, and has had an impact on going a different way here.

plains it's designation "Delphi" in reference to the famous oracle in Ancient Greece (Häder, 2002). In modern times the Delphi method is often used in early steps of product research, e.g. to determine whether a certain technology will have a chance to prevail over others in the future. Alternatively, Delphi can be used to collect ideas and systematically sort them, or just to identify major trends among widely varying opinions on a given problem.

Mainly, Delphi is used for smaller groups of respondents. Usually we speak about experts in a specific field. The charm of the method is in fact, that it helps to avoid several traps which are frequently causing biased results with other methods, like interviews, brainstorming, or other forms of discussions in meetings.

One important aspect is that the Delphi assessments are carried out in written form, where a questionnaire is prepared (open and closed question can be used alike) and which each respondent is answering independently from the others.

In this way, interviewer effects can be avoided, as well as it may be difficult to find a meeting with many important experts in one field. Delphi also helps to prevent psychological traps that may occur in meetings. In face-to-face situations there is a tendency that the most dominant participant may assert himself, while this may not necessarily be the most dominant opinion among other participants of that meeting (Häder, 2002).

Another aspect of the Delphi method is, that it usually involves several rounds of questioning of the same people. A research on Delphi assessments have revealed however, that in practice acknowledge experts tend to stick to their opinion and that subsequent rounds of questioning tend to bring only minor changes to the results (Häder, 2002).

However, given the circumstances of the project, with many countries and languages and the fact, that the respondents were very difficult to get to participate in the survey, only one round was performed eventually. Additionally, the results, as we will see below were quite similar, so that this step was considered justified.

4. Procedure

4.1 Definition of the target group and selection of experts

During last two years a project[3] about energy efficiency in construction was carried out in selected Eastern European countries (Estonia, Latvia, Lithuania) where professional associations of above mentioned target groups were also approached to get and overview of related knowledge gaps. The results showed that in general the knowledge of the members of the associations was rated to be around 6-7 on the scale of 10 where 1 represented poor knowledge and 10 excellent knowledge. But it was pointed out that this doesn't mean that there is no need for awareness raising. Additionally construction related curricula were assessed taking into account energy efficiency criteria and it was shown that energy efficiency is not very deeply integrated to the current study programmes based on which the target group is taught.

To get a comprehensive overview of the training needs in the target countries on the one hand, but to keep the amount of questioned experts limited, it appeared justified to address the national divisions of unions and associations of these professional groups. These were identified for each country usually representing the

[3] We refer here to the project "Developing concepts for innovative and energy efficient construction of new buildings" (10/2007-03/2009). The project was funded by the German Fenderal Foundation for the Environment, with the main beneficiary being the Baltic Environmental Forum Deutschland e. V. The final project report with details on this small assessment in Estonia, Latvia, and Lithuania can be obtained from the author.

following higher levels in the organisation. The experts were contacted by the eleven coordinating partners beforehand to ensure their principle willingness to participate in the survey.

4.2 Development of the questionnaire

The design of the questionnaire is seen as a vital part of the implementation of the assessment. Therefore, major efforts were allocated to optimize the questionnaire – both, in terms of its length (number of questions included) and degree of knowledge , as well as the choice of the most suitable language for implementation of the assessment in multi-lingual settings, consequently several attempts were needed.

Initially, a first set of relevant questions was developed which resembled the list of potential training modules (cf. Table 1) and which would lead to results that would allow making decision for which level to prepare the training units.

The initial list proved to be too long and therefore required several steps of down-sizing, while ensuring that all aspects remain covered eventually, leading to a testable questionnaire. This questionnaire was provided to all participating countries where it was translated into national languages and a bilingual version was provided to experts from the partner municipalities which tested and commented the questions.

Given, that the topic is rather specific and one of the major challenges is to ensure that the translation is identical in all relevant languages of the project team, this time consuming procedure required additional efforts between the development team of the project and the translators among the partners in the countries.

After a pre-testing the questionnaire was shortened and revised, correcting questions that caused misunderstandings or misinterpretations in several languages. tries and languages.

Taking into consideration the advantages of online survey, this mode of questioning was selected. In a few cases, however it was necessary to provide paper versions of the survey to the experts.

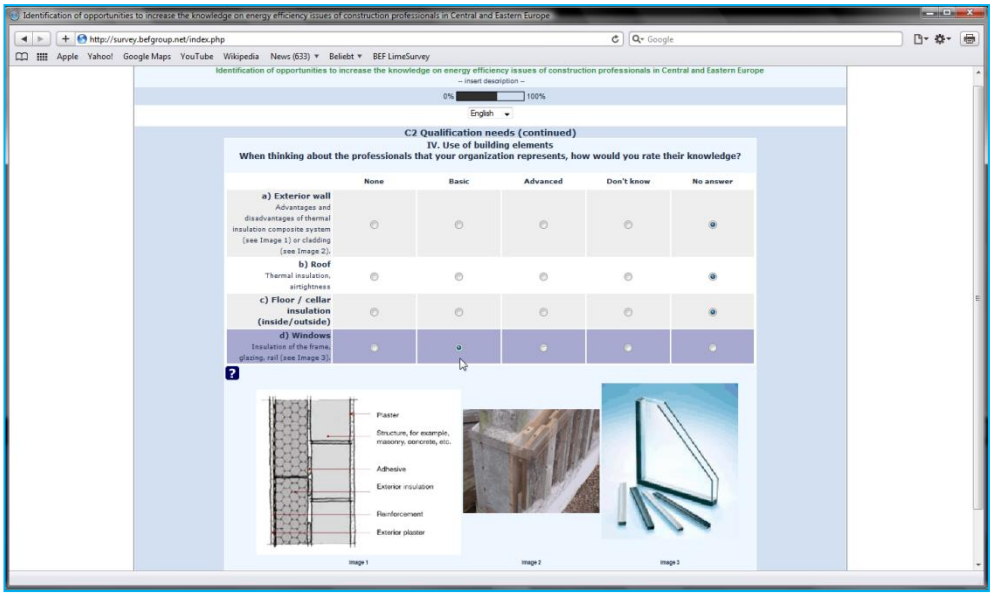


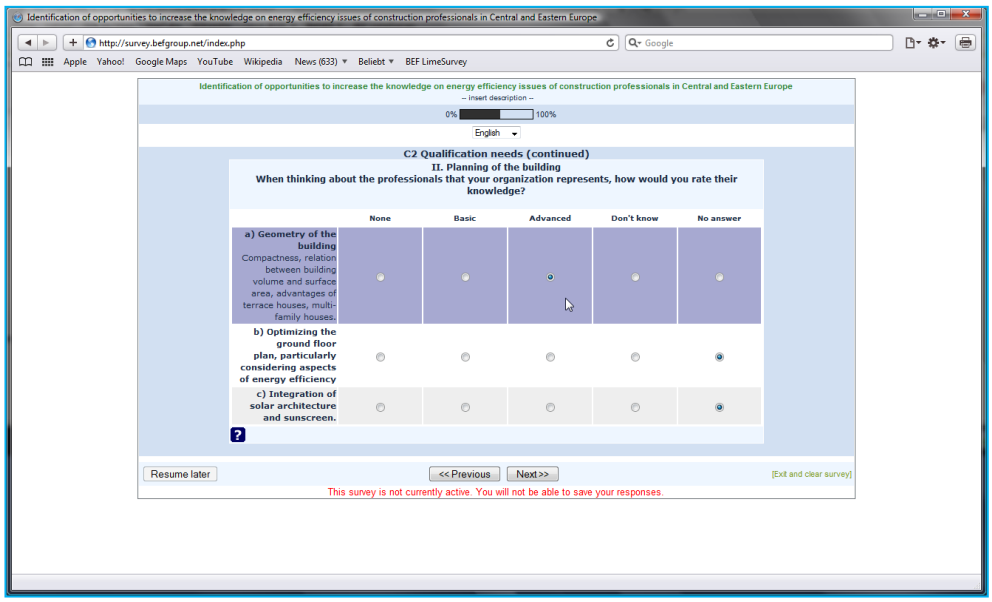
Table 1: Potential training modules

TOPIC / MODULE / STAKE-HOLDER GROUPS	1	2	3	4	5	6	7	8	9	10	11
	Legislation	Settlement planning	Regional conditions; Adapting to Climate Change.	Energy carriers; RES	Building physics	Construction elements; solutions (windows, walls, doors)	Systems engineering (heating & cooling)	Retro-fitting	Best practice	Cost-benefit assessment	Methods of awareness raising; households
GROUP 1: Already high qualification: Architects, Engineers, University lecturers											
GROUP 2: Practical orientation: Vocational school teachers, craftsmen											

No shade - we assume that this particular group does not need this specific module;
Light gray- we assume that the training module is needed;
Dark gray – we assume that more than basic knowledge should be transferred.

5. The questionnaire

In the following section we explain the structure of the final questionnaire and the reasoning behind the selection of the questions. The questionnaire is built-up in three sections: A. Personal information, B. Expectations towards the development of the housing market in the respondents country, and C. Gathers information about qualification needs.



In total 37 questions are included. These are almost exclusively closed questions, in sections B and C, and some open questions in the first section on very individual information about each respondent.

For illustration, in the annex to this document, we provide an example of a full questionnaire in English and in one of the national languages (Czech version), providing also an information about how it is presented to the respondents online.

5.1 Section A: Personal information

Since the level of experience is crucial to evaluate the answers of a respondent, this section was positioned at the beginning of the questionnaire. However it does not contain any point of exclusion, which would stop the questionnaire in case a respondent does not have a sufficient level of experience that it would allow him or her to make statements about the whole professional group which he or she represents. This was tried to ensure already during the selection process.

The questions in this section gather information about the qualification of the respondent (professional and other qualification not related to construction businesses, work experience, etc.).

5.2 Section B: Expectations towards the development of the housing market in your country

Section B addresses issues related to the future development of the housing market and the demand for energy or passive houses in the target countries. These questions shall give an indication to what extent the topic of energy efficiency has reached the target groups, but also shall give an idea, whether the

respondents believe that the economic crisis has stalled activities in the construction sector completely in the mid or even long-term.

Moreover, we try to understand whether there are generally prevailing obstacles that hinder reaching a low-energy standard of approximately 30-60 KWh/m² × year of heating demand. We have explicitly excluded here the issue of financial resources, as this issue will be addressed in other actions of the INTENSE project. Here, we ask for the availability of qualified professionals, the existence and enforcement of quality control procedures that ensure a proper execution, and we ask for any legal or administrative barriers that exist on any administrative level in the country, which could prevent the promotion of more energy efficient ways to build a new house.

5.3 Section C: Qualification needs.

The third section in this questionnaire shall directly answer to the specific qualification needs. As mentioned earlier, it covers the whole range of topics of potential training modules that can be developed by the project team (cf. Table 1: Potential training modules Table 1 and list below). The topics are listed and at first we ask about the level of attention these topics should receive, when carrying out a qualification programme that aims to increase the capacity of professionals in the field of energy efficiency. These answers can be ranked by country and compared to establish groups of countries with similar profiles for the training of trainers programme which will be carried out in the frame of the project.

The subsequent questions check subtopics of each potential module further, and ask for the level of knowledge the respondent would attribute to the professional group, which he or she represents.

Table 2: Topics addressed in Section C of the questionnaire

Topic Rated according to level of attention needed in the country in a specially designed capacity building programme (No attential to very high attention)	**Specifications** Rated according to level of knowledge among the professionals which the respondent represents (Basic, Average, Advanced)
I. Best practice Providing knowledge and information about objects already implemented (in your and/or other countries) in a short profile.	*No specification questions or checked in other subsections*
II. Settlement planning Information about holistic and sustainable planning	**a) Planning principles for energy efficient settlement planning**
	b) Urban sprawl and density of buildings
III. Regional climatic conditions	*No specification questions or checked in other subsections*
IV. Legislation	**a.) Knowledge of national and EU legislation**
V. Building concept and planning of the building Knowledge about the development of a building concept with regional, national, or European future (trend-setting) standards observing requirements of regional, national, technical, and historical (traditional) dimension. Optimize the first sketch of the building according to compactness and heating/cooling components of the building.	**a) Consumption of energy** Knowledge about standards of energy consumption according to legislation and future standards considering ecological and economic aspects.
	b) Systems engineering (heating, solar energy, air ventilation, heat recovery) Knowledge about systems engineering according to energy standards of the buildings, integration of solar-thermal systems, solar cooling systems

Topic Rated according to level of attention needed in the country in a specially designed capacity building programme (No attential to very high attention)	**Specifications** Rated according to level of knowledge among the professionals which the respondent represents (Basic, Average, Advanced)
	c) Type of energy Knowledge about exploitation of energy sources available in the building area, pay special attention to low consumption of primary energy
VI. Planning of building elements Using best practice of constructions concerning energy efficiency and humidity-balance to avoid structural damage (caused by the humidity)	**a) Geometry of the building** Knowledge about compactness, the relation the between building volume and surface area, advantages of terrace houses, multi-family houses
	b) Optimizing the ground floor plan, particularly considering aspects of energy efficiency
	c) Integration of solar architecture and sunscreen
VII. Planning a construction in detail Referring to V. And VI. Further optimize the construction, taking into consideration all building elements	**a) U-value** Heat conductivity, calculation according to EN 6946
	b) Humidity Sources of vaporization, rate of saturation of condensation, rate of air change per hour
	c) Heat accumulator Influence of materials related to inside temperature of the building
	d) Thermal bridge Knowledge about important thermal bridges and how to avoid them
	e) Air tightness Avoidance of unnecessary jointing and leakages, avoidance of draught inside the building, carrying out a Blower-door-test (according to EN 13829)
	f) Insulation materials Properties, scope of correct application, eco-balance, lifecycle of materials (production, processing, application, and disposal)
Use of building elements (topic in the section on specific knowldeg only)	**a) Exterior wall** Advantages and disadvantages of thermal insulation composite systems or cladding
	b) Roof Thermal insulation, air tightness
	c) Floor / cellar insulation (inside or outside)
	d) Windows Insulation of the frame, glazing, rail
VIII. Heating system Knowledge about heat production in different heating systems, looking at CO_2 emissions and efficiency level according to prEN 13790:2004	**a) Primary energy** Pollution, differences, oil, gas, biomass, NOT district heating
	b) Heating generators Differences of efficiency levels, emission temperature, electric power consumption, energy losses in heat distribution
	c) Differences between central heating and decentralized solutions

Topic Rated according to level of attention needed in the country in a specially designed capacity building programme (No attential to very high attention)	**Specifications** Rated according to level of knowledge among the professionals which the respondent represents (Basic, Average, Advanced)
	d) Control systems Regulation of room temperature, adaptation to heating generator, automatic regulation, time needed of a preset system to reach desired temperature
IX. Ventilation Knowledge about the importance of ventilation systems, advantages and disadvantages related to energy efficiency	**a) Air exchange** Rate and right behaviour to air rooms, indoor humidity, and comfort
	b) Ventilation Mechanical systems (with or without heat recovery)
	c) Ventilation with cooling Heat pump with cooling function
	d) Calculation and dimension of ventilation system
X. Combined heat and power, district heating Opportunities and limitations for these installations in different local conditions	*No specification questions or checked in other subsections*
XI. Energy calculation and energy balancing Knowledge about the calculation of energy use for space heating according to EN ISO 13790	**a) Heating degree days (in Kelvin-days / Kd)** Looking at climatic conditions in future perspective
	b) Heat generation and transmission
	c) Solar benefit
	d) Interior sources Lost heat from persons, electric appliances, lighting, etc.
	e) Energy exchange caused by ventilation
	f) Overall degree of energy loss
	g) Using application software
XII. Quality control Increasing the quality of the building already by checking, if the actual implementation is in accordance with national standards (compliant with EU directives)	**a) Quality control of the planning**
	b) Quality control of the execution
XIII. Properly informing inhabitants How to provide information to the inhabitants of a building about "how to live in a low-energy house"	*No specification questions or checked in other subsections*
XIV. Costs, profitability (repayment), and other benefits	**a) Alternative options for construction and their specific effectiveness**
	b) Calculation software to determine the cost-effectiveness of a low-energy building
XV. Awareness raising Informing comprehensively and to promote low-energy houses and better quality (long-lasting, but maybe more expensive initially, no cheap solutions)	*No specification questions or checked in other subsections*

6. Results

In this chapter, the three target groups – architects, engineers, and craftsmen – are compared to each other. Generally, as the training programme of the INTENSE project will set different emphasis for each target group in the first place and only then concentrate on specific needs of a certain country, an analysis of the results by country or geographical region will only be made where distinctive features in the data are salient.

6.1 General remarks about the respondents

6.1.1 Distribution of responses

In total, 22 respondents completed the survey, whereof 7 were architects, 12 engineers, and 3 were craftsmen.

Table 3: Distribution of responses across target groups and countries

Country	Architects	Engineers	Craftsmen	Total
Bulgaria	1	1	—	**2**
Croatia	—	1	1	**2**
Czech Republic	1	1	—	**2**
Estonia	1	1	1	**3**
Hungary	1	1	—	**2**
Latvia	1	1	1	**3**
Lithuania	1	3	—	**4**
Poland	—	1	—	**1**
Romania	1	—	—	**1**
Slovakia	—	—	—	**—**
Slovenia	—	1	—	**1**
Total	**7**	**12**	**3**	**22**

As we can see from the data in Table 3, there is an imbalance between the targets groups. While engineers and architects have responded to the survey in greater numbers, this is not the case for craftsmen.

6.1.2 Working experience and other professional qualification

The primary demand for participation in the survey was that the respondents have a broad overview of the situation in their country with respect to the current situation in the construction sector and specifically with respect to the level of knowledge and qualification of their colleagues.

The participants came from national professional associations, as well as (technical) universities. Around 70 per cent of the respondents had a working experience or more than 10 years either as architects, engineers or in a handicraft profession.

6.2 General evaluation of the current situation in the construction sector

The INTENSE project assumes, that there is a lack of proper qualification of professionals, that there could be a lack of access to building materials needed for energy efficient construction, and it assumes, that potentially administrative barriers persist, that need to be tackled in order to widely achieve an improved energy standard of buildings in the Central and Eastern European target countries. It should be mentioned here once again, that the following answer were based on the opinions of experts that know the circumstances in the whole country, and not about the situation in just their organization or region alone.

Table 4: Current situation in the construction sector

Topic	Target Group	Median	
a) Sufficiently qualified craftsmen are hard to find.	Architects	2.0	Applies somewhat
	Engineers	2.0	Applies somewhat
	Craftsmen	2.0	Applies somewhat
b) This low energy standard cannot be achieved because sufficiently qualified architects/enginieers are hard to find.	Architects	3.0	Somewhat doesn't apply
	Engineers	2.5	Applies somewhat
	Craftsmen	2.0	Applies somewhat
c) The existing quality control procedures allow this low-energy standard (Quality control refers to the implementation/building phase).	Architects	3.0	Somewhat doesn't apply
	Engineers	2.0	Applies somewhat
	Craftsmen	4.0	Doesn't apply at all
d) The national legislation does have incentives that make it attractive to construct a house with such a low-energy standard.	Architects	3.0	Somewhat doesn't apply
	Engineers	4.0	Doesn't apply at all
	Craftsmen	4.0	Doesn't apply at all
e) There are too many administrative/legal barriers, that make it not attractive to build according to this standard.	Architects	2.0	Applies somewhat
	Engineers	3.0	Somewhat doesn't apply
	Craftsmen	3.0	Somewhat doesn't apply
Question: Assuming, roof, windows, or walls shall be newly installed or modernized in order to achieve a low-energy standard (30-60 KWh/m² × year heating demand) and the financing is secured, to what extent do the following statements apply to your country? (1 = Applies fully / 4 = Doesn't apply at all)			

Lack of qualified personnel: Looking at item a), all target groups across the ten participating countries, agree, that the lack of sufficiently qualified craftsmen is an issue. Even, the craftsmen themselves agree on the same level. The respondents are also critical with respect to the availability of qualified architects and engineers (item b) that have the necessary skills to build houses according to a low-energy standard.

Quality control: A low-energy standard can only become reality, if all demands are fulfilled with regard to the quality of the work. Here quality control, does not only refer to a control enforced by authorities, but it also includes a kind of quality assurance self-imposed by either associations or the professionals themselves. In sum: are the necessary preconditions met, for that the newly constructed building really consumes only 30-60 KWh/m² × year of heating demand[4] if operated properly. Looking at the responses to item c) engineers are fairly optimistc, while architects tend to think the opposite and craftsmen are respond that they are not convinced that the current quality control procedures allow a low energy standard. We will also see further down, that the level of knowledge among all target groups is evaluated as basic.[5]

Legial and administrative environment: Although our respondents do not see too many legal barriers or obstacle that would hinder a construction according to a low-energy standard, they quite clearly state that there are no incentives in the national legislation that would make it attractive to build such a house.

> Further qualification focussing on energy efficiency is necessary for all target groups: architects, engineers, and craftsmen, while the latter group should receive special attention.

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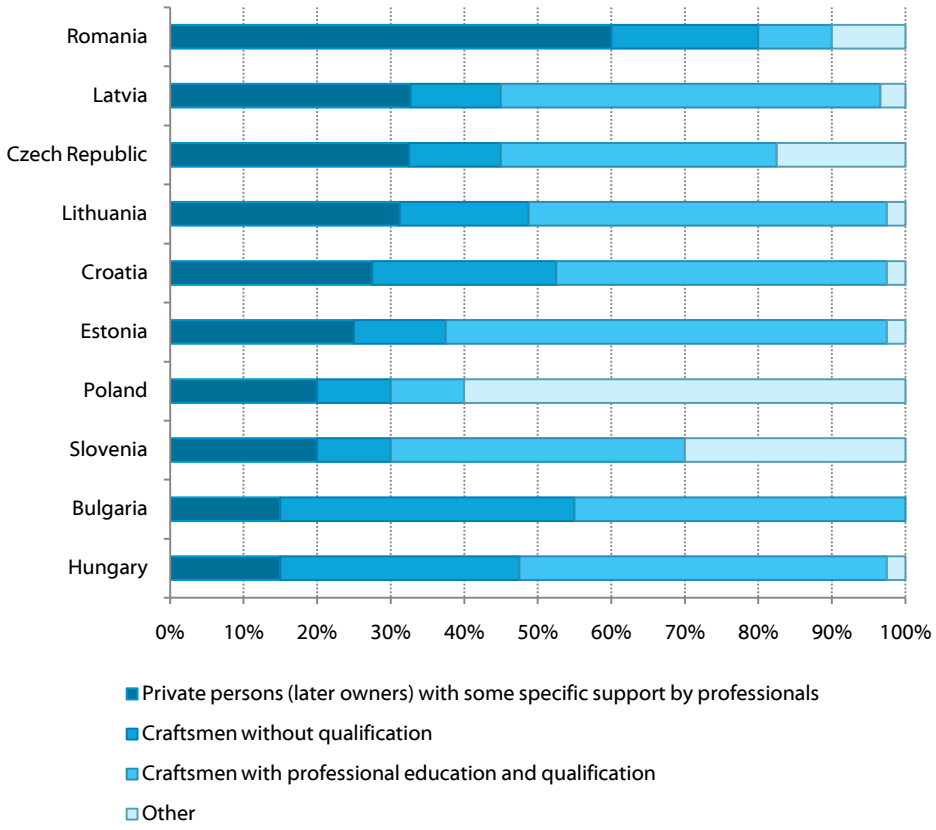
4 At the time the project was developed and still when the questionnaire was first disseminated, this figure was considered a great improvement. In comparison to the existing practices.

5 A problem with quality control is, that it is not clearly defined, particularly in the legislation of most INTENSE countries. This however should be discussed with the participants of the training programme to ensure that all understand and speak about the same issue.

- Quality control and assurance should be included in the programme and probably should receive a special focus.
- Financial and legal incentives should be highlighted, during the training course for those countries, where such incentives do exist, in order to further spread the knowledge about them.

Further on, the respondents were asked to give their estimation about the level of professionalism at a typical construction site in their country. It was assumed that for several reasons, that there is a high amount of non-professionals and non-qualified actors working at construction sites in Central and Eastern Europe. The reasons were that on the one hand there are many individuals building houses and seeking for low-cost and on the other hand it was assumed that qualified personnel has moved to other EU member states seeking for better salaries.

Figure 1: of professional and non-professional actors at a construction site by country



Although the results, as shown in Figure 1, are subjective, overall, there is a high amount of non-professionals and non-qualified workers involved, except in a few countries, like Estonia, Poland, and Slovenia. 'Other' involved actors, which have been specified are, architect, and engineers, as well as such actors, as business people, and politicians.

6.3 Future developments in the housing sector

The construction sector in Central and Eastern Europe, which was experienced an enormous boom prior to 2008 has suffered substantially from the economic crisis, which unfolded fully during the subsequent year. To estimate the future demand for living houses in general and the demand for low-energy and passive houses, the respondents were asked to take a look ahead 10 years from now.

They were asked to rate the demand on a scale from 1 to 7, where '1' was equal 'no demand' and '7' was equal to 'very high demand'.

As we can see from Figure 3-Figure 6, below, craftsmen have more pessimistic estimations for the future than the other two target groups. However, all groups estimate a moderate demand for new living houses in general (Figure 3), which is not so surprising, given, that much of the demand was met during the boom phase.

When comparing the demand for low-energy houses (Figure 4) with that for passive houses (Figure 5), we can see a more steep increase in comparison to the general demand and we can expect, that our target audience is aware that also the market will demand for more emphasis on energy efficiency in the future.

Additionally, the comparison of the two building types on average, the demand for passive houses is expected to be only slightly lower than that for low-energy buildings.

> Given, that with the current developments, legislation across Europe will tighten the standards, the majority of aspects of energy efficient construction, the training program could stress more on achieving the passive house standard. This is further supported by the estimations, that our respondents have with respect to the future demand of solutions for mechanical air ventilation and systems with heat recovery, which is essential in a passive house (Figure 2).

Figure 2: estimate the demand for mechanical air ventilation or ventilation systems with heat recovery in the coming 10 years

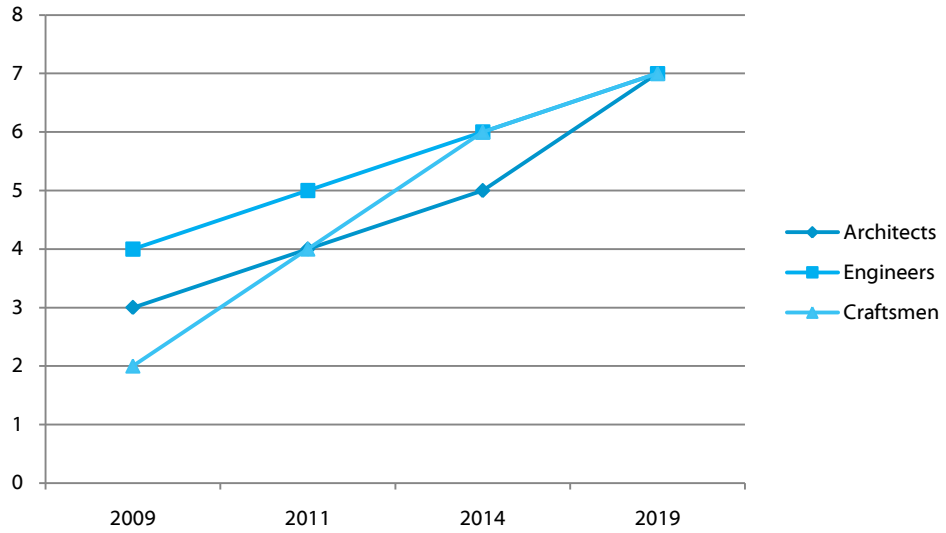


Figure 3: Eastimation of the demand for new living houses in the coming 10 years

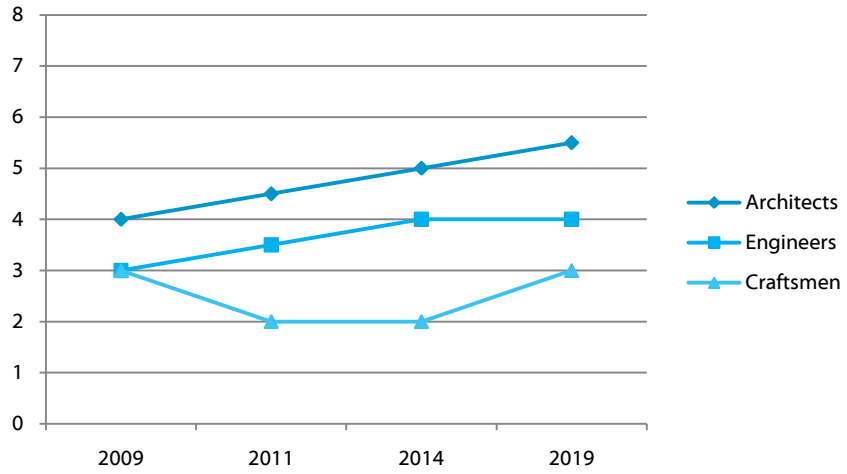


Figure 4: Estimation of the demand for houses with a low-energy standard (30-60 KWh/(m² x year)) in the coming 10 years

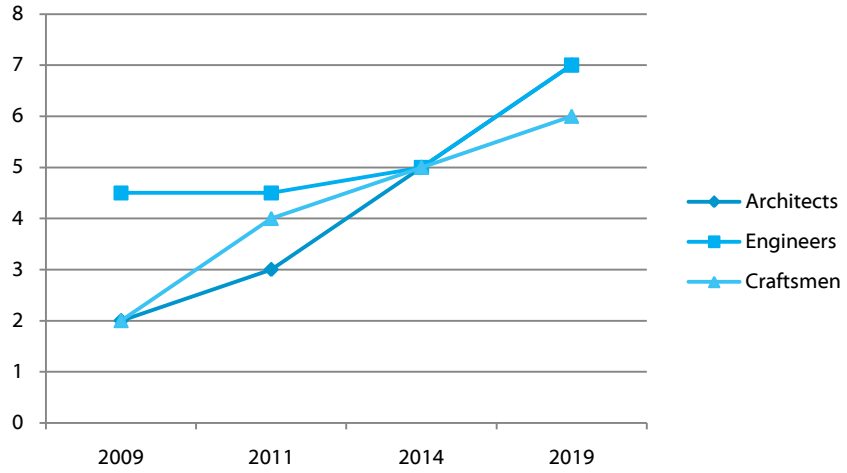


Figure 5: Estimation of the demand for passive houses (15 KWh/(m² × year)) in the coming 10 years

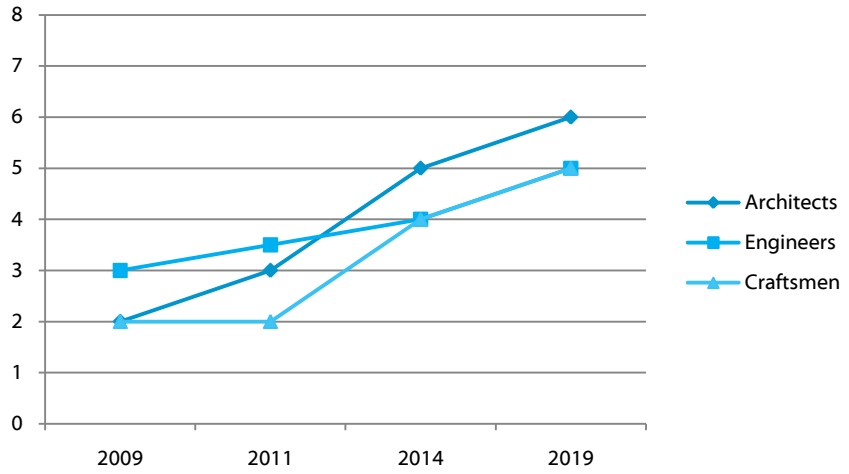
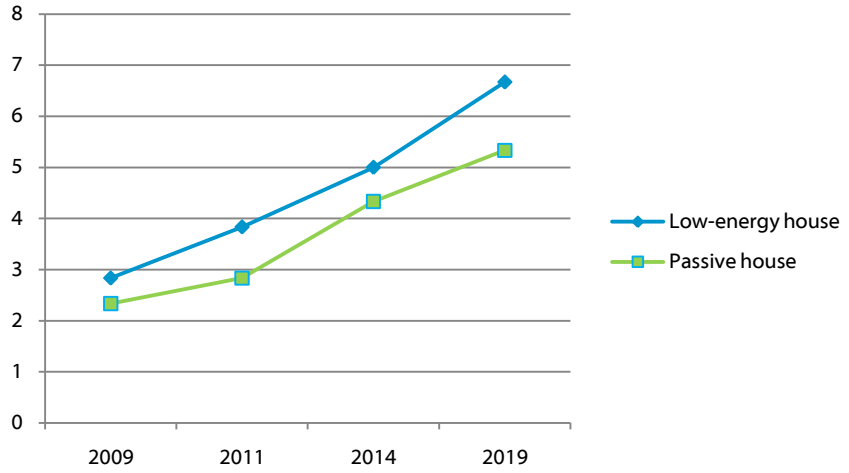


Figure 6: Comparing the demand for low-energy houses and passive houses in the coming 10 years



6.4 Expectations towards the training programme

What expectations do our respondents have with regard to a future training programme that focuses on improving the qualification of architects, engineers and craftsmen with regard to energy efficiency? Therefore we asked them to tell as which of a set of given topics (see Table 5) should receive special attention when carrying out capacity-building, to achieve a higher qualification that focuses on energy efficiency and to assign a level of importance scaled from '1' equal to not important at all to '7', meaning 'indispensible'.

In sum, the expectations are high, and not very diversified. When we look at the importance that the respondents assign to the different topics, which should be covered in the trainings, none of them is below a level of '6' which means, that it is very important to pay special attention to these topics.

In comparison, we also don't see too many outstanding peculiarities with regard to how important the majority of the topics are typically in the work of our target groups (Table 6). Surprising may be however, the importance that our respondents assign to "awareness raising"[6], which on average has a score of 6.3 out of 7. This may be exaggerated; however there are additional reasons why not to put too much emphasis on this topic in the training programme — Within INTENSE we consider awareness raising generally important and therefore a whole work package is devoted to it (see also below).

Lowest in the ranking is the topic of "Regional conditions, taking into account future developments (climate change)". From the current perspective, changes to the climate in the coming 25-50 years must be expected and if we want to promote higher quality of construction, we expect buildings to be long-lasting, and here this topic comes into play, considering the right dimension of a heating system or offering technical solutions for a building, that allows up- or downgrading, if the climatic conditions change in the future and do not match anymore those conditions under which they were planned.

Other sections of the survey, however, help to overcome the clear setting of preferences by the respondents themselves (see in particular chapter 6.5). Generally, however, we can conclude:

- Given, that the INTENSE project is not exclusively about a training programme for construction professionals, and not all topics can be covered to the same extent, it is recommended when preparing the concept of the training programme to concentrate on the topics, to pay special attention on those topics, which are specifically important with respect to energy efficiency.
- Although awareness raising of customers with regard to energy efficiency is an important issue, the INTENSE project contains a complete separate work package, which is concerned with this topic. It is therefore, advisable, only to mention its importance where necessary in connection with other topics of the programme, but maybe not to devote an entire module to it.
- Since we can expect a change of climatic conditions within a few decades and since we expect buildings built with a certain quality level also to last for several years, all target groups, but particularly architects and engineers should be made aware about the implications that climate change has on the planning of a building and its details.

[6] Awareness raising, as it is meant here, is addressing customers.

Table 5: Topics which should receive special attention in future training program

Topic	Target Group	Median	Level of importance	Average importance
a) Best practice	Architecs	7.0	Indispensible	6.8
	Engineers	6.5	Very important	
	Craftsmen	7.0	Indispensible	
b) Settlement planning	Architecs	7.0	Indispensible	6.0
	Engineers	6.0	Very important	
	Craftsmen	5.0	Important	
c) Regional and climatic conditions	Architecs	7.0	Indispensible	6.0
	Engineers	5.0	Important	
	Craftsmen	6.0	Very important	
d) Legislation	Architecs	7.0	Indispensible	6.2
	Engineers	6,5	Very important	
	Craftsmen	5.0	Important	
e) Building concept and planning of the building	Architecs	7.0	Indispensible	6.7
	Engineers	6.0	Very important	
	Craftsmen	7.0	Indispensible	
f) Planning of building elements	Architecs	7.0	Indispensible	7.0
	Engineers	7.0	Indispensible	
	Craftsmen	7.0	Indispensible	
g) Planning a construction in detail	Architecs	7.0	Indispensible	7.0
	Engineers	7.0	Indispensible	
	Craftsmen	7.0	Indispensible	
h) Heating system	Architecs	7.0	Indispensible	6.8
	Engineers	6,5	Very important	
	Craftsmen	7.0	Indispensible	
i) Ventilation	Architecs	7.0	Indispensible	7.0
	Engineers	7.0	Indispensible	
	Craftsmen	7.0	Indispensible	
j) Combined heat and power, district heating	Architecs	6.0	Very important	6.3
	Engineers	6.0	Very important	
	Craftsmen	7.0	Indispensible	
k) Energy calculation, energy balancing	Architecs	7.0	Indispensible	7.0
	Engineers	7.0	Indispensible	
	Craftsmen	7.0	Indispensible	
l) Quality control	Architecs	7.0	Indispensible	7.0
	Engineers	7.0	Indispensible	
	Craftsmen	7.0	Indispensible	
m) Informing inhabitants	Architecs	7.0	Indispensible	7.0
	Engineers	7.0	Indispensible	
	Craftsmen	7.0	Indispensible	
n) Cost, profitability and other benefits	Architecs	7.0	Indispensible	7.0
	Engineers	7.0	Indispensible	
	Craftsmen	7.0	Indispensible	
o) Awareness raising	Architecs	7.0	Indispensible	6.7
	Engineers	6.0	Very important	
	Craftsmen	7.0	Indispensible	

According to your opinion, which of the following topics should receive special attention when carrying capacity-building, in order to achieve a higher qualification that focuses on energy-efficiency? Assign the level of importance to the following items (1 = Not important at all / 7 = indispensible)

Table 6: Importance of different topics for typical work of respondents

Topic	Target Group	Median	Level of importance	Average importance
1. Financing (cost/benefit analysis)	Architecs	7.0	Very important	7.0
	Engineers	7.0	Very important	
	Craftsmen	7.0	Very important	
2. Construction elements	Architecs	7.0	Very important	6.7
	Engineers	7.0	Very important	
	Craftsmen	6.0	Important	
3. Building design	Architecs	7.0	Very important	6.3
	Engineers	6.0	Important	
	Craftsmen	6.0	Important	
4. Best practice	Architecs	6.0	Important	6.3
	Engineers	6.0	Important	
	Craftsmen	7.0	Very important	
5. Legislation (European, national, and local)	Architecs	7.0	Very important	6.3
	Engineers	7.0	Very important	
	Craftsmen	5.0	Somewhat important	
6. Awareness raising of customers or the public in general	Architecs	6.0	Important	6.3
	Engineers	6.0	Important	
	Craftsmen	7.0	Very important	
7. Air ventilation	Architecs	7.0	Very important	6.0
	Engineers	6.0	Important	
	Craftsmen	5.0	Somewhat important	
8. Settlement planning	Architecs	7.0	Very important	5.8
	Engineers	5.5	Somewhat important	
	Craftsmen	5.0	Somewhat important	
9. Retrofitting	Architecs	6.0	Important	5.7
	Engineers	6.0	Important	
	Craftsmen	5.0	Somewhat important	
10. Energy carriers	Architecs	5.0	Somewhat important	5.3
	Engineers	6.0	Important	
	Craftsmen	5.0	Somewhat important	
11. Regional conditions, taking into account future developments (climate change)	Architecs	5.0	Somewhat important	4.3
	Engineers	4.0	Average	
	Craftsmen	4.0	Average	

When designing, planning, or constructing/retrofitting a building, how important are the following topics in general for your work? Assign the level of importance to the following items (1 = Not important at all / 7 = indispensible)

6.5 Assessing the current knowledge

In order to get an overview, on which level to begin the training programme for the different target groups, the respondents were asked to evaluate the current level of knowledge regarding different aspects relevant for a holistic overview on energy efficient construction. The fields ranged from basics of planning and building to details on different building elements and further on to 'softer' topics, like energy efficient urban planning, financing, quality control, or knowledge of the relevant legislation.

In the following section not necessarily, every group must have "advanced" knowledge. For example planning issues are not necessarily of primary concerns for craftsmen, in contrast to architects and engineers, as the former are implementing the plan of the latter. Nevertheless, therefore craftsmen are expected to have at least "basic" knowledge about planning issues.

6.5.1 Basics of planning and building

In this section we look at the knowledge of our target groups in the following four areas: The general building concept (Table 7), the planning of a building in detail (Table 9), the planning of building elements (Table 10), and the use of different building elements (Table 11). Additionally, we have asked the respondents to give us their estimation which impact different building elements have on the overall energy efficiency of a building (Table 8).

In short, these are the fundamentals of a construction process for our target groups and these are well known by our target groups. As we have briefly stated in the introduction to Chapter 6, a basic knowledge of craftsmen in the planning segments can be expected and is not necessarily a lack.

It is noteworthy to remark here, that two items of the Detail planning (Table 9), items b) Humidity, and c) the Heat accumulator are less known by our target groups. These items are important with respect to quality issues (b), as well as technical aspects of the heating system and therefore should receive some attention in the training programme

Further, we don't find any surprising results regarding the impact which different building elements have on the energy efficiency of a house. If we subdivide the all items into 3 groups, as indicated (I-III) in Table 8, I, with roof, walls, and windows, are the one's which should be addressed first and have the highest impact. Then followed by the heat installations (II), while (III), the intermediate floors and ceilings are to some extent outstanding. On the one hand, they do have a significant impact, and must be insulated properly, but this has most effect, in conjunction with according measures taken earlier in I and II.

> For the training programme it can be assumed, that generally, the target groups have a sufficient fundamental knowledge of the basics of planning and building and no surprises should be expected here.

Table 7: Level of Knowledge in the field "Building concept"

Topic	Target Group	Median	Knowledge level	
a) Consumption of energy Knowledge about standards of energy consumption according to legislation and future standards considering ecological and economical aspects.	Architecs	2.0	Basic	
	Engineers	3.0.	Advanced	
	Craftsmen	3.0	Advanced	
b) Systems engineering (heating, solar-energy, air ventilation, heat recovery) Knowledge about systems engineering according to the energy standards of the buildings, integration of solar-thermal systems, solar cooling systems.	Architecs	2.0	Advanced	
	Engineers	2.5	Intermediate	
	Craftsmen	3.0	Advanced	
c) Type of energy Knowledge about exploitation of energy sources available in the building area, paying special attention to low consumption of primary energy	Architecs	2.0	Basic	
	Engineers	3.0	Advanced	
	Craftsmen	3.0	Advanced	
Level of knowledge: 1 = None / 2 = Basic / 3 = Advanced				

Table 8: Impact of different building elements on the energy efficiency of a building

Topic	Target Group	Median	Impact	
a) Roof	Architecs	7.0	Very high	I
	Engineers	6.5	High	
	Craftsmen	7.0	Very high	
b) Walls	Architecs	7.0	Very high	
	Engineers	7.0	Very high	
	Craftsmen	7.0	Very high	
c) Windows	Architecs	7.0	Very high	
	Engineers	7.0	Very high	
	Craftsmen	6.0	High	
d) Heat installations	Architecs	7.0	Very high	II
	Engineers	6.0	High	
	Craftsmen	6.0	High	
e) Floor and intermediate ceilings	Architecs	5.0	Somewhat high	III
	Engineers	4.0	Average	
	Craftsmen	2.0	Low	
Assuming, there are no financing obstacles, how would you rate the following construction elements according to their impact on energy efficiency of a building? (1= No impact / 7 = Very high impact)				

Table 9: Level of knowledge in the filed "Planning a construction in detail"

Topic	Target Group	Median	Knowledge level	
a) U-value Heat conductivity, calculation according to EN 6946	Architecs	2.0	Basic	
	Engineers	3.0	Advanced	
	Craftsmen	2.0	Basic	
b) b) Humidity Sources of vaporization, rate of saturation of condensation, rate of air change per hour	Architecs	2.0	Basic	
	Engineers	2.5	Intermediate	
	Craftsmen	2.0	Basic	
c) Heat accumulator Influence of materials related to the inside temperature of the building	Architecs	3.0	Advanced	
	Engineers	2.0	Basic	
	Craftsmen	2.0	Basic	
d) Thermal bridge Knowledge about important thermal bridges and methods how to avoid them	Architecs	2.0	Basic	
	Engineers	3.0	Advanced	
	Craftsmen	2.0	Basic	
e) Air tightness Avoidance of unnecessary jointing and leakages, avoidance of draught inside the building, carrying out a Blower-door-test (according to EN 13829)	Architecs	3.0	Advanced	
	Engineers	3.0	Advanced	
	Craftsmen	2.0	Basic	
f) Insulation materials Properties, scope of correct application, eco-balance, lifecycle of materials (production, processing, application and disposal)	Architecs	3.0	Advanced	
	Engineers	3.0	Advanced	
	Craftsmen	2.0	Basic	
Level of knowledge: 1 = None / 2 = Basic / 3 = Advanced				

Table 10: Level of knowledge in the field "Planning of building elements"

Topic	Target Group	Median	Knowledge level	
a) Geometry of the building Compactness, relation between building volume and surface area, advantages of terrace houses, multi-family houses	Architecs	3.0	Advanced	
	Engineers	3.0	Advanced	
	Craftsmen	2.0	Basic	
b) Optimizing the ground floor plan, particularly considering aspects of energy efficiency.	Architecs	3.0	Advanced	
	Engineers	3.0	Advanced	
	Craftsmen	2.0	Basic	
c) Integration of solar architecture and sun-screen.	Architecs	3.0	Advanced	
	Engineers	3.0	Advanced	
	Craftsmen	2.0	Basic	
Level of knowledge: 1 = None / 2 = Basic / 3 = Advanced				

Table 11: Level of knowledege in the field "Use of building elements"

Topic	Target Group	Median	Knowledge level	
a) Exterior wall Advantages and disadvantages of thermal insulation composite system (see Figure 7) or cladding (see Figure 8)	Architecs	2.0	Basic	
	Engineers	3.0	Advanced	
	Craftsmen	2.0	Basic	
b) Roof Thermal insulation, airtightness	Architecs	2.0	Basic	
	Engineers	3.0	Advanced	
	Craftsmen	2.0	Basic	
c) Floor / cellar insulation (in-side/outside)	Architecs	2.0	Basic	
	Engineers	3.0	Advanced	
	Craftsmen	2.0	Basic	
d) Windows Insulation of the frame, glazing, rail (see Figure 9)	Architecs	2.0	Basic	
	Engineers	3.0	Advanced	
	Craftsmen	2.0	Basic	
Level of knowledge: 1 = None / 2 = Basic / 3 = Advanced				

Figure 7: Schematic outer wall construction with thermal insulation compsite system

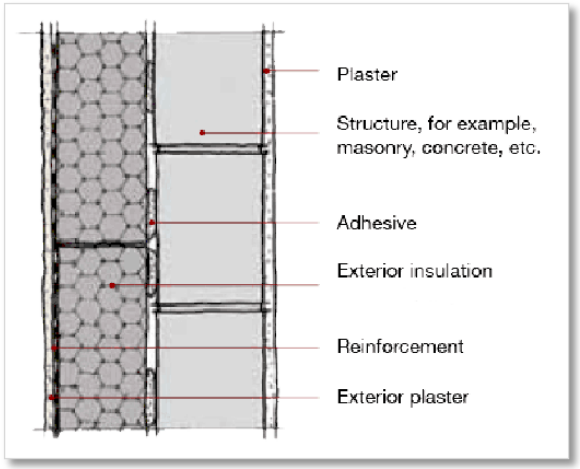


Figure 8: Out wall construnction: cladding

Figure 9: Window insulation

6.5.2 Heating and ventilation systems, and energy balancing

Heating and ventilation systems are an essential issue in a building when it comes to energy efficiency. The best technical standard of a heating system does not lead to savings, if it is oversized and wrong instructions on how to operate it or how to efficiently cool a building will lead to costly surprises on the side of the consumer.

We see in the following, that both, knowledge about heating systems (Table 12) and the about ventilation (Table 13) are consistently rated 'basic' by all target groups. The same principally applies to the field of energy calculation and balancing (Table 14).

> All these aspects should be treated in the training programme accordingly. Given, that across all topics the target groups can be assumed basic, prioritization of the subtopics shall be made accordingly as needed to perform a most effective training programme.

Table 12: Level of knowledege in the field "Heating system"

Topic	Target Group	Median	Knowledge level	
a) Primary energy Pollution, differences, oil, gas, biomass, NOT district heating)	Architecs	2.0	Basic	
	Engineers	2.0	Basic	
	Craftsmen	2.0	Basic	
b) Heating generators Differences of efficiency levels, emission temperature, electric power consumption, energy losses in heat distribution	Architecs	2.0	Basic	
	Engineers	2.0	Basic	
	Craftsmen	2.0	Basic	
c) Differences between central heating systems and decentralized solutions Advantages, disadvantages	Architecs	2.0	Basic	
	Engineers	2.0	Basic	
	Craftsmen	2.0	Basic	
d) Solar thermal water heating Efficiency level, electric power consumption	Architecs	2.0	Basic	
	Engineers	2.0	Basic	
	Craftsmen	2.0	Basic	
e) Control system Regulation of room temperature, adaptation to heating generator, automatic regulation, time needed of preset system to reach desired room temperature	Architecs	2.0	Basic	
	Engineers	2.0	Basic	
	Craftsmen	2.0	Basic	
Level of knowledge: 1 = None / 2 = Basic / 3 = Advanced				

Table 13: Level of knowledege in the field "Ventilation"

Topic	Target Group	Median	Knowledge level	
a) Air exchange Rate and right behavior to air the rooms, indoor humidity and comfort	Architecs	2.0	Basic	
	Engineers	2.0	Basic	
	Craftsmen	2.0	Basic	
b) Ventilation Mechanical systems (with or without heat recovery)	Architecs	2.0	Basic	
	Engineers	2.0	Basic	
	Craftsmen	2.0	Basic	
c) Ventilation with cooling Heat pump with cooling function	Architecs	2.0	Basic	
	Engineers	2.0	Basic	
	Craftsmen	2.0	Basic	
d) Calculation and dimension of ventilation systems	Architecs	2.0	Basic	
	Engineers	2.0	Basic	
	Craftsmen	2.0	Basic	
Level of knowledge: 1 = None / 2 = Basic / 3 = Advanced				

Table 14: Levelo of knowledge in the field “Energy calculation and balancing”

Topic	Target Group	Median	Knowledge level	
a) Heating degree days Looking at climatic conditions in future perspective	Architecs	2.0	Basic	
	Engineers	2.0	Basic	
	Craftsmen	2.0	Basic	
b) Heat generation and transmission	Architecs	2.0	Basic	
	Engineers	2.5	Intermediate	
	Craftsmen	2.0	Basic	
c) Solar benefit	Architecs	2.0	Basic	
	Engineers	2.0	Basic	
	Craftsmen	2.0	Basic	
d) Interior sources (lost heat from persons, electric appliances, lighting, etc.)	Architecs	2.0	Basic	
	Engineers	2.0	Basic	
	Craftsmen	2.0	Basic	
e) Energy exchange caused by ventilation	Architecs	2.0	Basic	
	Engineers	2.0	Basic	
	Craftsmen	2.0	Basic	
f) Overall grade of energy loss	Architecs	2.0	Basic	
	Engineers	2.0	Basic	
	Craftsmen	2.0	Basic	
g) Using application software	Architecs	2.0	Basic	
	Engineers	2.0	Basic	
	Craftsmen	2.0	Basic	
Level of knowledge: 1 = None / 2 = Basic / 3 = Advanced				

6.5.3 Quality control, profitability, holistic planning, and legislation

The remaining topics, which were checked in the questionnaire for the level of knowledge of architects, engineers, and craftsmen, are less technical, but are part and parcel of a comprehensive knowledge on energy efficiency issues.

Quality control is an issue, which is important related to any construction. However, in order to successfully achieve a low-energy or passive house standard, the building and the building elements must not only be planned carefully, but all materials and installations must be applied and adjusted properly. To minimize failures and insufficient performance, particularly of people working at the construction size, an efficient system of quality control is essential (which must of course also be enforced).

Table 15: Level of knowledege in the field "Quality control (Ensuring national standards)"

Topic	Target Group	Median	Knowledge level	
a) Quality control of the planning	Architecs	1.0	None	
	Engineers	2.0	Basic	
	Craftsmen	2.0	Basic	
b) Quality control of the execution	Architecs	2.0	Basic	
	Engineers	2.0	Basic	
	Craftsmen	2.0	Basic	
Level of knowledge: 1 = None / 2 = Basic / 3 = Advanced				

> Given, that the knowledge here is rated either 'none' or mainly 'basic', it is recommended to specifically address this topic in the training programme.

Costs and profitability: In order to promote low-energy buildings and to convince customers that a higher initial investment may in long-term lead to greater savings, all target groups should have a sufficient knowledge about benefits and should be able to provide information about costs/benefits of alternative solutions. In general they should be able to advise the customer and find the right balance between a striving for efficiency and savings versus costs and financial capacities of the client.

Particularly craftsmen note, that they have no knowledge about these issues, while the other two groups note basic (Table 16). All three groups have stated earlier, that this is very important for their every day work (see, Table 6: Importance of different topics for typical work of respondentsabove, Table 6), and therefore this appears to be a crucial issue for the training programme.

Table 16: Level of knowledege in the field "Costs and profitability"

Topic	Target Group	Median	Knowledge level	
a) Alternative options for construction and their specific effectiveness	Architecs	2.0	Basic	
	Engineers	2.0	Basic	
	Craftsmen	1.0	None	
b) Calculation software to determine the cost-effectiveness of a low-energy building	Architecs	2.0	Basic	
	Engineers	2.0	Basic	
	Craftsmen	1.0	None	
Level of knowledge: 1 = None / 2 = Basic / 3 = Advanced				

> Special attention should be paid to this topic as the level of knowledge is low and it is a very important issue for all target groups. Consider devoting a whole module to the topic.

Energy efficient city planning: Although, for many architects and engineers, and especially craftsmen, this may not be a central issue of their work. This topic brings together all other aspects of energy efficiency. Understanding the principles of in the large scale, how a whole district should look like, if it is to be energy efficient, will give our target audience the possibility to look not only at the detail, but also to view their projects from afar – and might decide differently, with respect to location of a building, materials or heating and cooling systems.

The INTENSE project as a whole, however, targets at municipalities and for them, this topic is very crucial. Nevertheless, we also consider it important for all target groups, including craftsmen, that they should get this complete overview.

Table 17: Level of knowledege in the field "Energy efficient city planning"

Topic	Target Group	Median	Knowledge level	
a) Planning principles for energy efficient settlement planning	Architecs	2.0	Basic	
	Engineers	2.0	Basic	
	Craftsmen	1.0	None	
b) Urban sprawl and density of cities	Architecs	2.0	Basic	
	Engineers	1.0	None	
	Craftsmen	1.0	None	
Level of knowledge: 1 = None / 2 = Basic / 3 = Advanced				

> The topic is new for all target groups and explains the connections between all aspects of energy efficient construction. It explains to understand the effects different solutions in sum. The topic should therefore receive special attention in the training programme.

Legislation set the frame within which an architect, an engineer, or a construction worker can and must act. For municipal actors, and particularly in the frame of the INTENSE project, knowing the range of opportunity to decide freely within the legislation is additionally important. It may enable them to set stricter local standards and thus force the demand for more energy efficient construction within their territories.

Table 18: Level of knowledege in the field "Legislation"

Topic	Target Group	Median	Knowledge level	
a) Knowledge of national and EU legislation	Architecs	2.0	Basic	
	Engineers	2.0	Basic	
	Craftsmen	2.0	Basic	
Level of knowledge: 1 = None / 2 = Basic / 3 = Advanced				

All our target groups rate their knowledge as basic. The knowledge about EU legislation is comparatively high among architects and engineers – we should note here, however, that the respondents are higher ranked representatives of professional associations and such a result is therefore not surprising.

Table 19: Level of respondents' knowledge of the Energy Directive (2002/91/EC)

Topic	Target Group	Median	Knowledge level
Please, rate your knowledge of the Energy Directive 2002/91/EC on a scale from 1 = None to 10 = very high	Architecs	8.0	High
	Engineers	7.5	High
	Craftsmen	4.0	Intermediate

> It is recommended to embed the topic into the training programme in connection with the different topics. Highlighting responsibilities and opportunities.

7. Concluding remarks

Generally, the target group assessment among architects, engineers, and craftsmen in 10 Central and Eastern European countries has revealed, that all topics covered are important for a training programme that focuses on energy efficiency. Looking a bit closer at the results, we see, that the principle technical knowledge and knowledge about planning – ranging from general planning of a project to detailed planning of construction elements – are well known. For the training programme this means, that it can rest on a solid technical basis and focus on particular aspects concerned with achieving a better energy performance of buildings.

'Softer' topics, however, like energy sound urban planning, energy balancing, how a quality control system works, or benefits are less known and therefore require special attention in the training programme to be developed in the frame of the INTENSE project.

The survey was carried out among representatives of professional associations or staff of technical universities with a long working experience in their profession and a good overview of the knowledge of their colleagues in the country.

Altogether, the respondents were hard to motivate and especially craftsmen were underrepresented in the survey, despite many direct approaches to convince them to participate. From our experience, however, we cannot say why this was so difficult, as we did not receive any reasoning, why they eventually not decided to participate.

Looking at the technical side of the survey as it has been planned and implemented, there are a few aspects, which should be taken into consideration when carrying out a similar action, regardless of whether a Delphi type survey is carried or, interviews are conducted. These points mentioned here may seem, logical or obvious, yet, they are so crucial, and that it is always wise to remind oneself.

Sufficient time should be allocated to such a survey, even if it is addressing a large scale of respondents, and a huge amount of data is collected. Questions on very specific topics require more time until they are sufficiently formulated. Now, additionally, having to translate the questionnaire into many languages, as it is the case in our project requires additional time.

A careful translation often reveals weak points of the questionnaire which have not been considered by the team, which constructed it. Either the target language does not know specific terms, which bears the risk of being not precise enough or later not sure whether the results are actually comparable. Often however, these issues do not become overt: each party assumes that it the translation resembles the original. This cannot be avoided when working in such multiple-language settings, but be aware and take it double check more often than less.

The survey however cannot get the diversity of particular the target groups in all its detail. And most of all, since this is not a scientific project, we need once more to stress that this survey cannot claim a scientifically acceptable representativeness, but it is a compromise between the needs of the project and the available resources, aiming at a best possible coverage of the needs for training and further knowledge among the questioned target groups.

8. References

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9. Annex

9.1 Technical specifications

The survey data was collected online using LimeSurvey Ver. 1.72 (build 5737) in the period from September-December, 2009.

9.1.1 Availability of materials

The raw data of the survey and the is available in the following formats.

	Data PASW Statistics ® 17	Survey structure LimeSurvey Version 1.72 (5737) (available languages)
All countries	X	en
Bulgaria	X	bg/en
Czech Republic	X	cs/en
Croatia	X	hr/en
Estonia	X	et/en
Hungary	X	hu/en
Latvia*	X	en
Lithuania*	X	en
Poland	X	pl/en
Romania**	X	en
Slovakia	—	sk/en
Slovenia**	X	En
*) Survey was conducted in forms of internviews and not online **) Surveys were only conducted in English.		

The raw data is available upon request from the author. It does not contain any information that will allow connecting a specific answer with a respondent.

The original English questionnaire and all translation are available in Word Format. A sample is provided on the following pages, other translations are available upon request from the author of this report.

9.2 Questionnaire (Bilingual example English and Czech)

(On the following pages)

Note, that some scales may vary from the actual scales used the the electronic version. They have been modified for technical reasons, and do not have any significant impact on the results.

A. PERSONAL INFORMATION
A. OSOBNÍ ÚDAJE

[010] For how many years have you been working in the construction sector (incl. planning and execution)?
[010] Kolik let pracujete ve stavebním odvětví (včetně výkonné a plánovací oblasti)?

☐ méně než 1 rok ☐ 1-3 roky ☐ 3-5 let ☐ 5-10 let ☐ více než 10 let

[020] What is your qualification?
[020] Jaká je vaše kvalifikace?

[030] Are you working exclusively with for the union or association?
[030] Pracujete výhradně v zastoupení svazu (resp. sdružení, asociace ap.)

☐ ANO → pokračujte k otázce 040 ☐ NE → pokračujte k otázce 031

[031] What is your current other profession?
[031] Jaká je Vaše stávající jiná profese?

[032] For how long have you been working in this profession?
[032] Jak dlouho pracujete v této profesi?

☐ méně než 1 rok ☐ 1-3 roky ☐ 3-5 let ☐ 5-10 let ☐ více než 10 let

[040] Please, name other experiences (more than 3 years) which are not related to construction:
[040] Vyplňte, prosím, další pracovní pozice (trvající déle než tři roky), které se nevztahují ke stavebnímu odvětví:

Description Popis	How many years? Kolik let?	Space for remarks Poznámky
a)		
b)		
c)		

[050] Have you participated in any seminars/workshops/trainings in the past 5 years which were related to your profession?
[050] Zúčastnil/a jste se v posledních 5 letech nějakých seminářů, workshopů či školení, které se vztahují k Vaší profesi?

☐ ANO → pokračujte k otázce 051 ☐ NE → pokračujte k otázce 110

If YES, please name the most recent ones.
Pokud ANO, vypište, prosím, poslední z nich:

Type of event: *Training/ Workshop/ Seminar/ Conference* Typ události *Školení/Workshop/Seminář/Konference*	Year Rok	Key words about its contents Klíčová oblast události
a)		
b)		
c)		

B. EXPECTATIONS TOWARDS THE DEVELOPMENT OF THE HOUSING MARKET IN Czech Republic
B. VYHLÍDKY NA ROZVOJ BYTOVÉHO TRHU V ČR

[110] Assuming, roof, windows, or walls shall be newly installed/modernized to a low-energy standard (30-60 KWh/(m²×year) heating demand) and the financing is secured, to what extent do the following statements apply to your country?
[110Předpokládejme, že mají být nově instalovány případně modernizovány střechy, zdi nebo okna na nízkoenergetický standard (spotřeba na vytápění 30-60 kWh/(m²×rok)) a financování je zajištěno. Jaké tvrzení odpovídá nejlépe stavu v ČR?

	Zcela souhlasí (1)	(2)	(3)	(4)	(5)	(6)	Zcela nesouhlasí (7)	Nevím
a) Sustainable building materials are easily available. a) Stavební materiály vyhovující požadavkům udržitelného rozvoje jsou snadno dostupné	☐	☐	☐	☐	☐	☐	☐	☐
b) Sufficiently qualified craftsmen are hard to find. b) Je obtížné nalézt dostatečně kvalifikované řemeslníky	☐	☐	☐	☐	☐	☐	☐	☐
c) This low energy standard cannot be achieved because sufficiently qualified architects/engineers are hard to find. c) Tohoto nízkoeenergetického standardu nelze dosáhnout, protože je obtížné nalézt dostatečně kvalifikované architekty a stavební inženýry	☐	☐	☐	☐	☐	☐	☐	☐
d) The existing quality control procedures allow this low-energy standard (Quality control refers to the implementation/building phase). d) Stávající postupy kontroly kvality umožňují dosáhnout tohoto nízkoenergetického standardu (Kontrola kvality se vztahuje k legislativě a stavebnímu procesu)	☐	☐	☐	☐	☐	☐	☐	☐
e) The national legislation does have incentives that make it attractive to construct a house with such a low-energy standard. e) Státní legislativa vytváří podněty, které motivují ke stavbám nízkoenergetických budov	☐	☐	☐	☐	☐	☐	☐	☐
f) There are too many administrative/legal barriers that make it not attractive to build according to this standard. f) Existuje příliš mnoho administrativních a právních překážek, které komplikují stavby nízkoenergetických budov	☐	☐	☐	☐	☐	☐	☐	☐

[120] Thinking about the demand for low-energy houses (30-60 KWh/(m²×year)), how would you estimate the demand in your country?
[120] Jak byste ohodnotil/a a odhadl/a poptávku po nízkoenergetických domech (30-60 KWh/(m²×year) v ČR?

	Žádná poptávka									Velmi vysoká poptavka		Nevím
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)		
a) Nyní?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐
b) Za 2 roky?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐
c) Za 5 let?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐
d) Za 10 let?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐

[130] Thinking about the demand for passive houses (15 KWh/(m²×year)), how you estimate the demand?
[130] Jak byste ohodnotil/a a odhadl/a poptávku po pasivních domech (spotřeba na vytápění nanejvýš 15 kWh/(m²×rok)) v ČR?

	Žádná poptávka									Velmi vysoká poptavka		Nevím
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)		
a) Nyní?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐
b) Za 2 roky?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐
c) Za 5 let?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐
d) Za 10 let?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐

[140] How would you estimate the demand for mechanical air ventilation or ventilation systems with heat recovery?
[140] Jak byste ohodnotil/a a odhadl/a poptávku po systémech nuceného větrání nebo nuceného větrání s rekuperací tepla v ČR?

	Žádná poptávka									Velmi vysoká poptavka		Nevím
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)		
a) Nyní?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐
b) Za 2 roky?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐
c) Za 5 let?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐
d) Za 10 let?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐

[150] Thinking about CHP (Combined Heat and Power) and district heating, how do you estimate the demined in your country?
[150] Jak byste ohodnotil/a a odhadl/a poptávku po kogeneračních jednotkách a centrálním zásobování teplem v ČR?

	Žádná poptávka									Velmi vysoká poptavka		Nevím
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)		
a) Nyní?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐
b) Za 2 roky?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐
c) Za 5 let?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐
d) Za 10 let?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐

[160] Thinking about the demand for **new** living houses in general, how would you estimate their demand?
[160] Jak byste ohodnotil/a a odhadl/a poptávku po **nových** domech obecně?

	Žádná poptávka									Velmi vysoká poptavka		Nevím
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)		
a) Nyní?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐
b) Za 2 roky?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐
c) Za 5 let?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐
d) Za 10 let?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐		☐

C. QUALIFICATION NEEDS
C. KVALIFIKAČNÍ NÁROKY

[210] According to your opinion, which of the following topics should receive special attention when carrying out capacity-building, to achieve a higher qualification that focuses on energy efficiency? Assign the level of importance to each of the following items
[210] Které z následujících témat zasluhuje podle Vašeho názoru zvláštní pozornost pro zlepšení kvalifikace v problematice úspor energie?

	Zcela nedůležité									Nepostradatelné
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
a) Best practice Providing knowledge and information about already implemented objects (in your and/or other countries) in a short profile **a) Nejlepší techniky** Stručné poskytnutí znalostí a informací o již implementovaných technikách (v ČR I v zahraničí)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
b) Settlement planning Information about holistic and sustainable planning **b) Plánování osídlování** Informace o holistickém a udržitelném plánování	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
c) Regional climatic conditions **c) Regionální klimatické podmínky**	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
d) Legislation **d) Legislativa**	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
e) Building concept and planning of the building Knowledge about the development of a building concept with regional, or national or European, future (trend-settings) standards under observance and requirements of national, regional, technical and historical dimensions and existing culture of buildings. Optimize the first sketch of the building envelope according compactness and heating/cooling components **e) Územní plánování a plánování budovy** Povědomí o vytváření územního plánu na základě budoucích (předpokládaných) regionálních, národních nebo evropských standardů se zřetelem k národním, místním, technickým a historickým zvyklostem a stávajícímu typu zástavby. Přizpůsobení prvotního návrhu pláště budovy požadavkům na statiku, vytápění a chlazení budovy.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
f) Planning of building elements Using best practice of constructions concerning energy efficiency and humidity-balance to avoid structural damage. **f) Plánování základních součástí budovy** Uplatnění nejlepších stavebních technik pro dosažení nízké spotřeby, s ohledem na vlhkostní chování konstrukce	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
g) Planning a construction in detail Referring to e) and f) further optimize the construction, taking into consideration all building elements. **g) Detailní plánování staveb** Optimalizace všech prvků budovy stejně jako je uvedeno v bodech e) a f,	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
h) Heating system Knowledge about heat producing in different heating systems under CO2 emission and efficiency level according to prEN13790:2004 **h) Topný systém** Znalosti o produkci emisí CO2 v různých vytápěcích systémech (při účinnostech uvedených v ČSN EN ISO 13790)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

	Zcela nedůležité									Nepostradatelné
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
i) Ventilation Knowledge about the importance of ventilation systems, advantages and disadvantages related to energy efficiency. **i) Větrání** Znalosti významu větracích systémů, výhodách a nevýhodách, znalosti o úsporách energie, které tyto systémy přinášení	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
j) Combined heat and power, district heating Opportunities and limits for these installations in different local conditions **j) Kogenerační jednotky, oblastní vytápění** Možnosti a omezení těchto zařízení za různých lokálních podmínek	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
k) Energy calculation, energy balancing Knowledge about Calculation of energy use for space heating according to EN ISO 13790 **k) Výpočet energie, energetická rovnováha** Znalost výpočtu spotřeby energie pro vytápění podle normy ČSN EN ISO 13790	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
l) Quality control Increasing the quality of the building already by checking the implementation in accordance with national standards (compliant with EU directives). **l) Kontrola kvality** Zvyšování kvality budov kontrolou provedení v souladu s národními standardy a direktivami EU	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
m) Informing the inhabitants How to provide information to the inhabitants of a building about "how to live in a low-energy house" **m) Informování obyvatel** Jak poskytnout obyvatelům budovy informace o "Životě v nízkoenergetickém domě"	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
n) Costs, profitability (repayment), and other benefits **n) Náklady, rentabilita a další výhody**	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
o) Awareness raising Informing comprehensively to promote low-energy houses and better quality (long-lasting, but maybe more expensive instead of cheap solutions) **o) Zvyšování povědomí** Komplexní informace k propagaci nízkoenergetických domů a lepší kvality	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

[220] When you think about the professionals that your organization represents, how would you rate their knowledge?
[220] Jak byste ohodnotil/a znalosti odborníků ve Vaší společnosti v následujících oblastech?

	Znalosti			
	Žádné	Zá-kladní	Odborné	Nevím
I. Building concept **I. Koncepce výstavby**				
a) Consumption of energy Knowledge about standards of energy consumption according to legislation and future standards consider-ing ecological and economical aspects. a) Spotřeba energie Znalosti požadavků na spotřebu energie ve vztahu k legislativě a budoucím požadavkům, které budou zahrnovat ekologické a ekonomické aspekty.	☐	☐	☐	☐
b) Systems engineering (heating, solar-energy, air ventilation, heat recovery) Knowledge about systems engineering according to the energy standards of the buildings, integration of solar-thermal systems, solar cooling systems. b) Návrh TZB (technického zařízení budovy) (vytápění, solární energie, větrání, rekuperace) Projektování TZB s ohledem na požadavky na energetickou náročnost budov; integrace solárních topných a chladících zařízení	☐	☐	☐	☐
c) Type of energy Knowledge about exploitation of energy sources available in the building area, paying special attention to low consumption of primary energy c) Typ energie Povědomí o využití místně dostupných zdrojích energie, se zvláštním ohledem na snížení spotřeby primární energie.	☐	☐	☐	☐
II. Planning of the building **II. Projektování budovy**				
a) Geometry of the building Compactness, relation between building volume and surface area, advantages of terrace houses, multi-family houses a) Geometrie budovy Kompaktnost, vztah mezi objemem budovy a zastavěnou plochou, výhody terasových domů, bytové domy	☐	☐	☐	☐
b) Optimizing the ground floor plan, particularly considering aspects of energy efficiency. b) Optimalizace zastavěné plochy, s přihlédnutím k aspektům úspor energie	☐	☐	☐	☐
c) Integration of solar architecture and sunscreen. c) Začlenění prvků solární architektury a slunečních clon	☐	☐	☐	☐

[220] Continued: When you think about the professionals that your organization represents, how would you rate their knowledge?
[220] Pokračování: Jak byste ohodnotil/a znalosti odborníků ve Vaší organizaci v následujících oblastech?

	Znalosti			
	Žádné	Zá-kladní	Odborné	Nevím
III. Planning a construction in detail **III. Detailní plánování staveb**				
a) U-value Heat conductivity, calculation according to EN 6946 a) Součinitel prostupu tepla Tepelný odpor a součinitel prostupu tepla - výpočet podle normy ČSN EN 6946	☐	☐	☐	☐
b) Humidity Sources of vaporization, rate of saturation of condensation, rate of air change per hour b) Vlhkost Zdroje vlhkosti, vlhkostní bilance konstrukce, rosný bod, vliv větrání	☐	☐	☐	☐
c) Heat accumulator Influence of materials related to the inside temperature of the building c) Tepelná akumulace Vliv materiálů na teplotu uvnitř budovy	☐	☐	☐	☐
d) Thermal bridge Knowledge about important thermal bridges and methods how to avoid them d) Tepelný most Povědomí o tepelných mostech a metodách jejich eliminace	☐	☐	☐	☐
e) Air tightness Avoidance of unnecessary jointing and leakages, avoidance of draught inside the building, carrying out a Blower-door-test (according to EN 13829), carrying out a Blower-door-test (according to EN 13829) e) Vzduchotěsnost Zamezení nadbytečného těsnění a eliminace průduchů, zamezení nadměrného sucha uvnitř budovy, provádění Blower-door-testu (testu průvzdušnosti) podle normy ČSN EN ISO 13829	☐	☐	☐	☐
f) Insulation materials Properties, scope of correct application, eco-balance, lifecycle of materials (production, processing, application and disposal) f) Izolační materiály Vlastnosti, oblast použití, ekologická rovnováha, životní cyklus materiálů (výroba, zpracování, použití, likvidace)	☐	☐	☐	☐

[220] Continued: When you think about the professionals that your organization represents, how would you rate their knowledge?
[220] Pokračování: Jak byste ohodnotil/a znalosti odborníků ve Vaší organizaci v následujících oblastech?

	Znalosti			
	Žádné	Zá-kladní	Odborné	Nevím
IV. Using building elements **IV. Plánování základních součástí budovy**				
a) Exterior wall Advantages and disadvantages of thermal insulation composite system (see image 1) or cladding (see image 2) a) Obvodové zdi Výhody a nevýhody kontaktního zateplení (obr. 1) a zateplení s odvětranou mezerou (obr. 2)	☐	☐	☐	☐
b) Roof Thermal insulation, airtightness b) Střecha Tepelná izolace, vzduchotěsnost	☐	☐	☐	☐
c) Floor / cellar insulation (inside/outside) c) Izolace podlah a sklepů (vnitřní/vnější)	☐	☐	☐	☐
d) Windows Insulation of the frame, glazing, rail (see image 3) d) Okna Tepelně technické parametry rámů, zasklení, distančního rámečku (obr. 3)	☐	☐	☐	☐

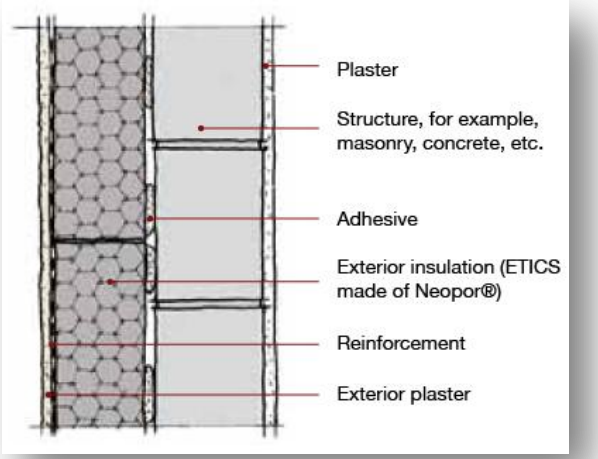

Image 1

Image 2

Image 3

[220] Continued: When you think about the professionals that your organization represents, how would you rate their knowledge?
[220] Pokračování: Jak byste ohodnotil/a znalosti odborníků ve Vaší organizaci v následujících oblastech?

	Znalosti			
	Žádné	Zá-kladní	Odborné	Nevím
V. Heating system **V. Topný systém**				
a) Primary energy Pollution, differences, oil, gas, biomass, NOT district heating) a) Primární energie Emise, rozdíly, topný olej, plyn, biomasa (v individuálních kotelnách, nikoli v systémech CZT (dálkového vytápění))	☐	☐	☐	☐
b) Heating generators Differences of efficiency levels, emission temperature, electric power consumption, energy losses in heat distribution g) Kotle a další zdroje tepla Rozdíly v účinnosti, výstupní teploty, spotřeba elektrické energie, ztráty v rozvodu tepla	☐	☐	☐	☐
c) Differences between central heating systems and decentralized solutions Advantages, disadvantages c) Rozdíly mezi ústředním vytápěním a decentralizovaným řešením (lokální vytápění) Výhody a nevýhody	☐	☐	☐	☐
d) Solar thermal water heating Efficiency level, electric power consumption d) Solární ohřev vody Účinnost, spotřeba elektrické energie	☐	☐	☐	☐
e) Control system Regulation, room temperature, adaptation to the heating generator, automatic regulation, time needed of preset system to reach desired room temperature e) Měření a regulace Regulace, teplota v místnosti, spolupráce s regulací kotle,, automatická regulace, čas potřebný k dosažení požadované teploty v místnosti	☐	☐	☐	☐
VI. Ventilation **VI. Větrání**				
a) Air exchange Rate and right behavior to air the rooms, indoor humidity and comfort a) Výměna vzduchu Intenzita výměny vzduchu a správná funkce větracího systému, vnitřní vlhkost a uživatelský komfort.	☐	☐	☐	☐
b) Ventilation Mechanical systems (with or without heat recovery) b) Větrání Nucené větrání (s rekuperací/bez rekuperace)	☐	☐	☐	☐
c) Ventilation with cooling Heat pump with cooling function c) Větrání s chlazením Tepelné čerpadlo s možností chlazení	☐	☐	☐	☐
d) Calculation and dimension of ventilation systems d) Navrhování větracího systému	☐	☐	☐	☐

[220] Continued: When you think about the professionals that your organization represents, how would you rate their knowledge?
[220] Pokračování: Jak byste ohodnotil/a znalosti odborníků ve Vaší společnosti v následujících oblastech?

	Znalosti			
	Žádné	Zá-kladní	Odborné	Nevím
VII. Energy calculation and balancing **VII. Energetické výpočty, energetická bilance**				
a) Heating degree days Looking at climatic conditions in future perspective a) Délka topné sezóny, denostupně Posouzení klimatických podmínek s výhledem do budoucnosti	☐	☐	☐	☐
b) Heat generation and transmission b) Výroba a rozvod tepla	☐	☐	☐	☐
c) Solar benefit c) "Solární výhody"	☐	☐	☐	☐
d) Interior sources (lost heat from persons, electric appliances, lighting, etc.) d) Vnitřní zdroje tepla (tělesné teplo, elektrické spotřebiče, osvětlení atd.)	☐	☐	☐	☐
e) Energy exchange caused by ventilation e) Ztráty tepla větráním	☐	☐	☐	☐
f) Overall grade of energy loss f) Úhrn energetických ztrát	☐	☐	☐	☐
g) Using application software g) Využití výpočetního softwaru	☐	☐	☐	☐
VIII. Quality control **VIII. Kontrola kvality**				
a) Quality control of the planning a) Kontrola kvality projektu	☐	☐	☐	☐
b) Quality control of the execution b) Kontrola kvality provedení	☐	☐	☐	☐
IX. Costs and profitability **IX. Náklady a ziskovost**				
a) Alternative options for construction and their specific effectiveness a) Alternativní konstrukční řešení a jejich specifické výhody a nevýhody	☐	☐	☐	☐
b) Calculation software and practices (pay-off periods) b) Výpočty ekonomické efektivity (návratnosti), použití software	☐	☐	☐	☐
X. Energy efficient city planning **X. Plánování energeticky šetrných měst**				
a) Planning principles for energy efficient settlement planning a) Základy energeticky šetrného plánování sídel	☐	☐	☐	☐
b) Urban sprawl and density of cities b) Urbanizace a hustota zalidnění měst	☐	☐	☐	☐
XI. Legislation **XI. Legislativa**				
a) Knowledge of national and EU legislation a) Povědomí o národní a unijní legislativě	☐	☐	☐	☐

[230] Assuming, there are no financing obstacles, how would you rank the following construction elements according to their impact on energy efficiency
[230] Jak byste ohodnotil/a následující konstrukční prvky vzhledem k jejich vlivu na energetické úspory za předpokladu, že financování je zajištěno?

	Žádný vliv									Silný vliv	Nevím
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
a) Roof a) Střecha	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
b) Walls b) Zdi	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
c) Windows c) Okna	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
d) Heat installations d) Vytápěcí systém	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
e) Floor and intermediate ceilings e) Podlahy a vnitřní stropy	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

[240] When designing, planning, or constructing/retrofitting a building how important are the following topics in general for your work?
[240] Jak důležitá jsou ve Vaší práci následující témata při projektování, plánování, stavbě a rekonstrukci budov?

	Nedůležitá									Velmi důležitá	Nevím
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
a) Legislation (European, national, local) a) Legislativa (Evropská, národní, místní)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
b) Settlement planning b) Plánování osídlování	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
c) Regional conditions, taking into account future developments c) Regionální podmínky, se zřetelem k budoucímu vývoji (klimatické změny)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
d) Energy carriers d) Druhy paliv a energií (média)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
e) Building design e) Návrh budov, projektování	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
f) Construction elements f) Konstrukční prvky	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
g) Air ventilation g) Prvky větrání	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
h) Retrofitting h) Rekonstrukce	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
i) Best practice i) "Nejlepší" techniky	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
j) Financing (cost/benefit analysis) j) Financování (analýza nákladů a výnosů)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
k) Awareness raising of customers, public k) Připravenost na růst počtu zákazníků a obyvatelstva	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

[250] To what extent are the following groups of people usually involved in the construction and modernization of buildings in your country? Please give percentages. The total should be 100%
[250] V jakém rozsahu jsou následující skupiny zapojeny v procesu výstavby a modernizací budov v ČR? Udejte, prosím, procentuální podíl, úhrn bude 100%.

a) Private persons with some specific support by professionals a) Soukromé osoby s určitou podporou odborníků		%
b) Craftsmen without qualification b) Řemeslníci bez kvalifikace		%
c) Craftsmen with professional education and qualification c) Řemeslníci s profesním vzděláním a kvalifikací		%
d) Other, please specify d) Jiné skupiny – prosím specifikujte		%

[270] The Energy Directive (2002/91/EC) foresees and "energy label" for each building that indicates its energy consumption and that shall raise the awareness of people to accelerate the speed of energy saving. Please answer the following two questions.
[270] Energetická direktiva 2002/91/EC zavádí "energetické štítky", které vypovídají o energetické úspornosti budovy a zvýšením občanského povědomí urychlují prosazení úsporných opatření. Zodpovězte, prosím, následující otázky.

	Žádné									Velmi vysoké	Nevím
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
a) Please rate your knowledge of the directive 2002/91/EC a) Prosíme ohodnoťte Vaše znalosti směrnice 2002/91/EC (o energetickém provedení budov) resp. vyhlášky o energetické náročnosti budov č. 148/2007 Sb,	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
	Žádná									Absolutní	
b) According to your opinion, to what extent does the following statement apply: An energy label would lead to faster saving of energy in your country b) Jaká je platnost výroku "Energetické průkazy budov povedou k většímu šetření energie v ČR?"	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

[300] Finally, we would like to ask you if there is anything else, that you would like us to take into consideration when preparing a training concept.

[300] Pokud máte dojem, že bychom měli do koncepce školení zahrnout ještě nějaká další témata, budeme rádi, když nám je sdělíte…

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