CEPH Project - A Success Story

Information material for participants, trainers and providers of training courses for certified passive house designers

Source: Sambale / Müller Schur architekten
Authors

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Detailed information on the CEPH project is available at the website: www.passivehousedesigner.eu

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1. Introduction

The aim of this report is to provide relevant information to providers, trainers and participants of training courses for passive house designers developed within the Certified European Passive House Designer (CEPH) project.

The CEPH project, co-financed by the European Commission as part of the Intelligent Energy Europe (IEE) program, started on 1st of September 2008 and lasted for 30 months until 28th February 2011. The main objective of the CEPH project was to elaborate a high quality standardized comprehensive set of training materials for nine European countries and to provide the first European intensive training courses for passive house designers leading to the final certification of a “Certified Passive House Designer” issued by the Passive House Institute (PHI) Darmstadt. During the CEPH project a Passive House Trainer Course (PHTC) was also established in order to provide a pool of experienced and skilled trainers for passive house designers.

This document provides an overview of the partners involved in the realization of the CEPH project, on the CEPH courses already implemented and planned in Europe, on the certification scheme adopted for certifying the trained passive house designers and on the Passive House Trainer Course (PHTC) established during the project for the trainers of passive house designers. Moreover, the document provides also a proposal for the long-term sustainability of the CEPH training courses and certification scheme. The needs and prerequisites which led to the establishment of the CEPH project are also thoroughly explained. Overall, the CEPH project represents a success story in the implementation of training courses for passive house designers. The high quality of the training material and courses developed and established during the project has led to a high demand of participants in the CEPH courses, during and after the project lifetime, and to a high demand of requests for the right of use of the CEPH training material by training providers in order to establish new CEPH training courses.

During the project lifetime 19 CEPH courses have been implemented in nine European countries: Germany, Austria, UK, Denmark, France, Italy, Czech Republic, Slovakia and the Netherlands. During the CEPH project 495 passive house designers have been trained and 317 certified. The high demand of participants in the Certified European Passive House Designer (CEPH) course and in the “Passive House Trainer Course (PHTC)” has led the CEPH training providers to plan other courses after the end of the project. At the time being, seven other European countries have obtained the right to use the CEPH training material and to implement further CEPH training courses. Other three European countries have inquired their request for the utilization of the CEPH training material. In total, 20 training providers in Europe are offering training courses for passive house designers based on the training material developed during the CEPH project. Quality was the key and reference point behind the idea of the CEPH training courses. Since the beginning of the project, all CEPH partners and stakeholders were strongly committed in providing high quality training material and establishing high quality training courses for passive house designer and passive house trainers. This has guaranteed the long term-sustainability of the CEPH training course and has ensured the success of the CEPH project.
2. Need for certified passive house designers

This chapter provides an overview on the European policies related to the passive houses and the need for high qualified passive house designers.

2.1. The 20-20-20 targets

With the European Energy and Climate Change package in 2007, the European Union has set the mandatory and ambitious 20-20-20 targets: reducing greenhouse gas emissions by 20%, increasing the share of renewable in energy consumption to 20% and improving energy efficiency by 20%, all by 2020. Energy efficiency is at the heart of the EU’s 2020 Strategy for smart, sustainable and inclusive growth and the transition to a resource efficient economy in Europe.

As pointed out by Commission estimates in 2010, the target set by the European Union of saving 20% of its primary energy consumption by 2020 will not be achieved at the current path. According to the Commission’s most recent projections and as can be seen from the below figure 1, consumption in 2020 is expected to be equivalent to a saving of only 9% corresponding to a reduction of 164 Mtoe of primary energy instead of a reduction of 368 Mtoe as stated in the 20-20-20 targets.

![Figure 1 Projection of primary energy use for the EU by 2020](Source: DG ENER, Energy Efficiency Plan of European Commission, MEMO/11/149)

The greatest energy saving potential lies in buildings where nearly 40% of final energy consumption takes place in houses, public/private offices, shops and other buildings. Two thirds of this energy consumption is purely used for space heating with the major share of energy coming from fossil fuel sources. In most developed countries the construction sector is the highest contributor to the emission of greenhouse gases with an estimated average value of 33%.
As a result, **very low or nearly zero energy buildings** with very high energy performance are crucial to reach the 20-20-20 targets. Consequently, the European Union focuses on these buildings as an important step towards achieving these goals and requires that by 2018 all new buildings must be nearly zero energy buildings in which the very low or nearly zero amount of energy will be covered to a very significant extent by renewable energy sources [1].

Nearly zero energy buildings need 80% less energy for heating and cooling compared to conventional standards of new buildings and 90% less energy than the existing building stock. To increase the energy efficiency by 20% and to reduce the Greenhouse Gas Emissions by 20% by the year 2020, the nearly zero energy buildings technology will be an essential tool on this road. At the same time, these building needs to be safe, healthy, functional and comfortable as well as aesthetically integrated into our urban fabric. Meeting all these need means coming face to face with the building sector as it stands today: highly diverse, critically fragmented and with significant inertia to change [2].

### 2.2. European Energy Efficiency Action Plan 2011

With these challenges in mind, the European Union (EU) has consistently supported research and development on low energy architecture, whilst adopting the necessary legislation: the Energy Performance of Building Directive (Recast 2010/31/EU) and the Directive on the promotion of the use of energy from renewable energy sources (Directive 2009/28/EC). Both directives focus on the key role of very low energy buildings, the involvement of the public sector, the significant building integration of high-efficiency and renewable energy systems and on the importance of guidance and training to reach the 20-20-20 targets. The directives further promote the exemplary role of the public sector, proposing to accelerate the refurbishment rate of public buildings through a binding target and to introduce energy efficiency criteria in public spending. To deploy this approach on a wider scale, the Commission proposes that public bodies should take the lead in bringing their buildings up to high energy performance and that high standards of energy efficiency should systematically be applied when public authorities purchase goods (e.g. ICT equipment), services (e.g. energy) and works (e.g. refurbishment of buildings) [1].

On 8 March 2011, the European Commission (EC) has adopted a communication titled “Energy Efficiency Plan 2011”, which will build on the previous European Energy Efficiency Action Plan dated from 2006. This communication is a strategy paper that sets out ideas for binding measures to save energy and will be followed by a series of legislative proposals in the coming months. This finding raised the question of binding national energy efficiency targets. On this issue, the EC proposes to monitor the implementation of the national targets set in the context of the “Europe 2020” strategy and to review them in 2013. Should the results show that the 20% target is still unlikely to be achieved then the EC will consider proposing legally binding national targets for 2020.

The main proposals of the communication relate to the public sector as well as to the buildings and the industry sectors. Transports are not tackled by the communication since this issue has been addressed by the new White Paper strategy presented on 28 March 2011. In the building sector, which represents 40% of final EU energy consumption, the
EC will bring forward legislative proposals requiring Member States to introduce measures – in line with national property law - to address the problem of split incentives between the tenant and the landlord in case of rented buildings and apartments.

By 2015, new public buildings and existing public buildings that are subject to major renovation, shall adopt minimum levels of energy from renewable sources and by 2018, all new public buildings shall be nearly zero energy buildings. Energy performance certificates will be displayed in the majority of public buildings with the aim to encourage public authorities to implement the recommendations included in the certificate [2].

Member States hold the responsibility of ensuring that required guidance and training are made available to all relevant actors, notably planners and architects, who need to consider the optimal combination of renewable energy sources and high-efficiency technologies when planning, designing and building industrial and residential areas. To stimulate the transformation of buildings into nearly zero energy buildings, Member States, in cooperation with local and regional authorities, will develop, distribute and provide information of training programs as well as the benefits and practicalities of using renewable energy sources to the citizens.


According to the Energy Performance Building Directive (EPBD) a “Nearly Zero Energy Building (NZEB) is a building that has a very good energy performance. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources”.

The Passive House construction standard achieves extraordinarily low energy consumption and therefore the Passive House concept serves as a basis for the realization of Nearly Zero-Energy Buildings (NZEB). All components needed for building Passive houses are available already so this concept offers today a strong contribution to the implementation of NZEB.

Passive Houses are increasingly being built not only as residential buildings, but also non-residential ones. Passive House components can be used successfully in the renovation of old buildings, too. Building users thus enjoy a great degree of comfort combined with very low energy costs. A large number of documented European and international projects in compliance with the Passive House standard demonstrate that the concept works very well in the different fields and is affordable. Many Passive Houses built all over the world are documented in the database: www.passivhausprojekte.de.

Examples of passive houses including renewable energy sources, e.g. photovoltaic systems, are shown in figure 2 and 3.
Examples of Passive Houses

Figure 2 (Source: Sambale / Heilergiger architekten)

Figure 3 (Source: Sambale / Müller Schurr architekten)
The cost-optimal balance between investment costs due to energy efficiency and saved energy costs was the fountainhead for the development of the Passive House concept. This cost-optimal balance is claimed in the EPBD. These requirements can be achieved already today when designing and building new Passive Houses or using Passive House components for energetic renovation.

The key role for fulfilling the ambitious aims in energy efficiency lies within the high quality along the whole planning and building process and the used components. To facilitate achieving the required high building quality needed for Passive Houses, the Passive House Institute (PHI) certifies suitable building components. For built Passive Houses the quality can be proven with the Certification “Quality approved Passive House (Dr. Wolfgang Feist).”

2.4. Highly qualified workforce

Recent analysis show that the above presented intentions can only be turned into real market development when sufficient architects and engineers with profound knowledge are available all over Europe being able to cope with the specific challenges of Passive House Design and implementation. Energy efficient building solutions are technically demanding and present an immense challenge for the building and renewable energy sectors. Furthermore, it is very important to provide potential investors or housing companies with the security that the selected architect holds the required qualifications. So far, a lack of appropriate training for architects, engineers, auditors, craftsmen, technicians and installers exists. Today, about 1.1 million qualified workers are available, while it is estimated that 2.5 million will be needed by 2015 in order to meet the 20-20-20-targets. Transition to energy-efficient technologies requires new skills, environment-conscious vocational education and training in construction and in many other sectors. According to a European study [3], the total cost for society in case of inaction and missed investment into the training of unskilled building workforce would amount to € 33.7 billion. Contrary to this sum, a calculation of the cost of training of low and medium skilled workers to be invested until 2020 would only amount to € 1.4 billion, which means that courses and programs such as CEPH amongst others could save the European society and tax-payers up to € 30 billion.

The European Commission is therefore launching the ‘BUILD UP Skills: Sustainable Building Workforce Initiative’ to support Member States in assessing training needs for the construction sector, developing strategies to meet them, and fostering effective training schemes. This will result in national strategies, roadmaps and recommendations for the certification, qualification or training needs of craftsmen. Once the first phases of implementation have been achieved, the Member States are further encouraged to adapt their professional and university training curricula to reflect the new qualification needs. The commission’s flagship initiative “An agenda for new skills and jobs” calls for skills supply to be matched with labour market needs. Transition to energy-efficient technologies requires new skills, environment-conscious vocational education and training in construction and in many other sectors.
The building sector itself is a very conservative sector which requires a new prioritization of education and training needs in relation to the new developments of the sustainable low-energy construction sector. At this stage, building companies, such as SMEs, force their employees to attend training courses. This trend needs to be reversed either by making training obligatory or providing enough incentives for employees and employers to participate nation-wide. Another factor complicating a high amount of qualified workers within the European context is the fact that vocational education and training differ from Member State to Member State in qualification schemes, learning paths, terminologies and meanings. To reach a qualified workforce specialized on low energy building in Europe with a high degree of professional mobility within the European economic sector requires the implementation of the European Qualification Framework (EQF).

This European Qualification Framework (EQF) requires as a first step the creation of a National Qualification Framework within each Member State that supports the translation of learning outcomes into a common understanding on the European level. In the long-term perspective, a National Qualification Framework is also important for making education schemes uniform. This is particularly essential for University schemes such as Bachelor or Master’s degree where training courses in low or nearly zero energy building can be integrated into their vocational education or can be provided as part of their degree, leading to certification.
3. Training courses for certified passive house designer: the CEPH project

This chapter provides an overview on the CEPH project, which had the aim of CEPH has been to provide as quickly as possible a sufficient pool of architects and planners in various European countries.

The CEPH project has brought together stakeholders from across Europe who already had experience in Passive House design training. The project team consisted of twelve Members from a total of nine EU member states: Austria, Czech Republic, Denmark, Germany, France, Italy, Slovakia, Great Britain and the Netherlands. Most of the participant organizations have a lot of experience with both Passive Houses and further education courses. In addition, the partners have been involved in various other projects co-financed by the European Commission in the field of low energy buildings. Synergetic effects can thus be utilized very effectively. The following project partners are part of the CEPH project or subcontracted (such as the PHI, Passive House Institute in Darmstadt).

<table>
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<tr>
<th>Table 1 List of CEPH project partners and subcontractor</th>
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<td><img src="image" alt="WIP" /></td>
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<td><img src="image" alt="Aarhus School of Architecture" /></td>
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<td><img src="image" alt="eza! energie- und umweltzentrum allgäu" /></td>
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<td><img src="image" alt="Passivhaus Dienstleistung GmbH" /></td>
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<td><img src="image" alt="Passivhus.dk ApS" /></td>
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</table>
3.2 Purpose and scope

Before the CEPH project, the first courses for Certified Passive House Designers given in German language from eza! Energie- und Umweltzentrum Allgäu, Passivhaus Dienstleistung GmbH and Energieinstitut Vorarlberg were very successful. The participants coming not only from German and Austria were deeply contended. Other organizations all over Europe recognized the need and huge demand for education in Passive House Design. They wanted to offer a course for Passive House Design in their further education program and asked for training material. But there was no standardized, high-quality textbook for Passive House training classes. Everyone who wanted to offer such courses had to work out own course material. Creating and updating these textbooks was very time-consuming. As well as the demand for high-quality training materials the demand for experienced, skilled teachers grew. The lack of both designers and instructors hampered the quick and successful implementation of highly efficient buildings.

To meet the European market requirements for Passive Houses and to cover the needs and large interest in education for architects and engineers dealing successfully with the Passive House concept, the project “CEPH – Certified European Passive House Designer” was initiated.

Within CEPH, the further education concept for “Certified Passive House Designer” has been brought from the German speaking countries to a uniform European level: Course contents and concepts have been compiled by four experienced course providers and translations to various European languages have been prepared. The project has been co-financed by the European Commission as part of the program Intelligent Energy Europe IEE, launched in September 2008 and finished in February 2011.

The major targets and results of the CEPH project were:

- Development of the material for a 10-days training course with 80 teaching units for Passive House design in German language;
- Translation of the material in different European languages (English, Czech, Italian, Slovakian, French, German, and Danish).
- Implementation of the new training courses for designers including examination in nine European countries (Austria, Czech Republic, Denmark, Germany, France, Italy, Slovakia, Great Britain and the Netherlands)
• Development and implementation of a two-day workshop for new course trainers and providers (PHTC – Passive House Trainer Course)

Detailed information on the CEPH project, on training courses for Passive House Designer and on the Passive House Trainer Course (PHTC) is the CEPH project website: www.passivehousedesigner.eu.

3.3 The CEPH training material

At the beginning of the CEPH project the consortium designed concepts and material for a 10 day training course for architects in German language. The main parameters of the training course for Certified Passive House Designers were developed on the basis of the experience of Energieinstitut Vorarlberg (EIV), Passivhaus Dienstleistung GmbH (PHD) and energie- & umweltzentrum allgäu (ezal) and were based on the examination regulations and training targets developed by the Passive House Institute (PHI) available at the link http://eu.passivehousedesigner.de/whydesigner.html or at the Passive House Institute website: http://www.passiv.de/. The final examination will be held by PHI. The concepts and materials have been examined in three pilot courses including an examination at the end of the course and optimized in view to the made experiences.

The first pilot courses in German language within the CEPH-project started in May 2009.

Three courses have been held:

- 4th of May - 22nd of May 2009 in Dornbirn, Austria; organised by EIV
- 6th of May - 20th of June 2009 in Darmstadt, Germany; organised by PHD
- 7th of May – 20th of June 2009 in Kempten, Germany, organised by eza

The overall examination was held July, 4th 2009, organised by all three partners in their facilities.

The German training material was revised and optimized according to the feedback of the pilot courses. The training materials, after the revision and optimisation of the training course design, covered approx. 800 pages.

The revised and optimised German training course materials were to be subjected to quality assurance before being translated into English. Quality assurance was carried out by the PHI. According to the feedback collected during the pilot courses, the CEPH German training course material has been further improved. The training material has been finalized at the end of July 2009. Afterwards the translation of the training material started in August 2009 and ended in September 2009.
The revision and optimisation of the training materials by the responsible training institutes and authors further improved the quality of the training materials. With many integrated exercises and case studies, the training course now offers even more practical relevance – an aspect that is very important and valuable for the training course participants. The further CEPH training courses commenced from autumn 2009.

The optimized German training material was then utilized for the implementation of the first CEPH courses in German language, which took place in:

1. Dornbirn (Austria), 9th September 2009 – 26th September 2009
2. Darmstadt (Germany), 9th September 2009 – 21st November 2009
3. Kempten (Germany), 16th October 2009 – 21st November 2009
4. Darmstadt (Germany), 27th January 2010 – 13th March 2010

The optimized German training material was then translated into English for the implementation of the CEPH pilot courses in English language, which took place in:

1. Glasgow (UK) started on 2nd November 2009
2. Dornbirn (Austria) started on 9th November 2009
3. Aarhus (Denmark) started on 9th November 2009

The final content of the course material for the 10-days has been created based on European standards while the national partners worked on local specifications [4]. The following outline gives an overview of the CEPH training course content:

**A. The passive house standard**
- A.1 Introduction Passive House
- A.2 PHPP Introduction

**B. Building envelope**
- B.1 Types of construction
- B.2 Exercise building envelope
- B.3 Airtightness
- B.4 Thermal bridge free construction
- B.5 Thermal imaging and airtightness measuring
- B.6 Passive house windows
- B.7 Tender stage
- B.8 Supervision and Quality Assurance
- B.9 Building envelope exercise

**C. Ventilation and heating**
- C.1 Ventilation
- C.1.1 Building services
- C.1.2 Concept
- C.1.3 Planning
- C.1.4 Practical implementation
- C.1.5 Examples
C.1.6 Exercise
C.2 Heating
C.2.1 Basics
C.2.2 Generation - Distribution
C.2.3 Temperature differentiation
C.2.4 Distribution losses

D. PHPP
D.1 PHPP

E. Economic
E.1 Economic Passive House

F. Passive house summary
F.1 Summary building envelope
F.2 Summary building services
F.3 Summary economics
F.4 PHPP energy balance
F.5 Design exercise

The German or English version of the course materials was then used in all other countries for translation: France, Italy, and Slovakia, Czech Republic, Denmark and the Netherlands. Several examples of slides of the CEPH training material are shown in the following figures 4, 5 and 6. Information on how to obtain the complete CEPH training material is shown in figure 7 and 8.

Figure 4: Training Material Slide in English
(Source: CEPH project, Deliverable D4.8 “Course Material in each National Language”)
Figure 5: Training Material Slide in Italian
(Source: CEPH project, Deliverable D4.8 “Course Material in each National Language”)
Figure 6: Training Material in Czech
(Source: CEPH project, Deliverable D4.8 “Course Material in each National Language”)

Výpočet tepelných ztrát a tepelných zisků vlivem oken (zde výřez z listu Okna):
Členění oken vypočítat odděleně: Každou část rámu a všechny délky okrajů skel je nutno zohlednit. Proto je třeba při výpočtu zadávat odděleně spojené okení prvky.
Zpravidla se počítají všechna okna jako otevíravá okna. Jednotlivé odchylky jsou tak zahrnuty jako bezpečné. Tepře v případě části se vyskytujících odchylek profilů (nevěrné zasklení nebo štulp) je možno definovat jeden nebo dva další typy rámu.
Doporučení: stanovit číslo pozic a tato zanést do pohledů nebo půdorysů a do výpočtu oken v PHPP. Právě u komplexnějších budov by to jinak bylo nepřehlédné.
Světovou stranu (úhel) je třeba uvést na stupeň přesně. Sklon k horizontální je zpravidla 90° u osazení ve stěně, u střešních oken je roven sklonu střechy. PHPP automaticky určí příslušné suneční záření.
Jako rozměry se používají rozměry hrubé stavby nebo vnější rozměr rámu bez rozšíření rámu. Rozšíření rámu, spáry osazení atd. se zpravidla započítají do tepelných mostů osazení.
Pro odečtení od fasád - popř. plochy střechy v listu Plochy stačí pouze zvolit příslušné číslo plochy (číslo pozice výpočtu obalové plochy).

Figure 6: Training Material in Czech
(Source: CEPH project, Deliverable D4.8 “Course Material in each National Language”)
The CEPH course material for a 10-days course is now available in different languages (Figure 7) for interested course providers at the CEPH website http://www.passivehousedesigner.eu.

![Figure 7: Extract of the CEPH training course material](Source: CEPH website http://www.passivehousedesigner.eu)

To obtain the right of use of the CEPH training material a request has to be forwarded to Passive House Institute Darmstadt (Figure 8).

![Figure 8: How to purchase the CEPH course material](Source: CEPH website http://www.passivehousedesigner.eu)
3.4 The training courses for certified European passive house designers (CEPH)

During the CEPH project, at least one training course per participating country has been implemented: altogether six pilot courses and 19 training courses have been implemented in the last 30 months with the outcome of 495 trained Passive House Designers and 317 certified Passive House Designers in 2011 [5]. Most of the courses have been given in the national languages, although some modules were in English when given by a teacher from abroad. In Germany and Austria the teachers were from these countries only while in other countries, the courses were supported by teachers from Germany and Austria, in particular where the course was given for the first time ever [6]. The CEPH training course is designed as a full 80 hours intensive programme to cover all relevant issues for Passive House design. In the figure 9 and 10 is shown an example of a CEPH course in English language held in the time period of two weeks.
### Figure 9: Example of CEPH course timetable in English
(Source: CEPH Project - deliverable D4.8 “Course Material in each National Language”)

<table>
<thead>
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<td>welcome</td>
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<td>passive house</td>
<td>quality assurance</td>
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<td>information about</td>
<td>constructing without</td>
<td>building services</td>
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<td>the course, examination</td>
<td>thermal bridges</td>
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<td>standard</td>
<td>thermal bridges</td>
<td>building services</td>
<td>heating +</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>examples</td>
<td>passive house</td>
<td>ventilation</td>
<td></td>
</tr>
<tr>
<td>11:05</td>
<td>building envelope</td>
<td>constructing without</td>
<td>passive house</td>
<td>thermography +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>constructions</td>
<td>thermal bridges</td>
<td>building services</td>
<td>airtightness</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>examples</td>
<td>passive house</td>
<td>measuring method</td>
<td></td>
</tr>
<tr>
<td>11:50</td>
<td>lunchbreak</td>
<td>lunchbreak</td>
<td>lunchbreak</td>
<td>lunchbreak</td>
<td></td>
</tr>
<tr>
<td>13:00</td>
<td>building envelope</td>
<td>PHP basics</td>
<td>passive house</td>
<td>thermography +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>constructions</td>
<td></td>
<td>building services</td>
<td>airtightness</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>passive house</td>
<td>measuring method</td>
<td></td>
</tr>
<tr>
<td>13:45</td>
<td>building envelope</td>
<td>input exercise</td>
<td>passive house</td>
<td>thermography +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>constructions</td>
<td>PHP / opaque</td>
<td>building services</td>
<td>airtightness</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>building elements</td>
<td>passive house</td>
<td>workshop</td>
<td></td>
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<tr>
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<td></td>
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<td>passive house</td>
<td></td>
<td></td>
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<tr>
<td>14:30</td>
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<td>break</td>
<td>break</td>
<td></td>
</tr>
<tr>
<td>14:50</td>
<td>building envelope</td>
<td>input exercise</td>
<td>passive house</td>
<td>thermography +</td>
<td></td>
</tr>
<tr>
<td></td>
<td>constructions</td>
<td>PHP / opaque</td>
<td>building services</td>
<td>airtightness</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>building elements</td>
<td>passive house</td>
<td>workshop</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>passive house</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:35</td>
<td>building envelope</td>
<td>building envelope</td>
<td>passive house</td>
<td>workshop</td>
<td></td>
</tr>
<tr>
<td></td>
<td>air tightness</td>
<td>workshop</td>
<td>building services</td>
<td>ventilation -</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>passive house</td>
<td>technology</td>
<td></td>
</tr>
<tr>
<td>16:20</td>
<td>building envelope</td>
<td>building envelope</td>
<td>passive house</td>
<td>workshop</td>
<td></td>
</tr>
<tr>
<td></td>
<td>air tightness</td>
<td>workshop</td>
<td>building services</td>
<td>ventilation -</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>passive house</td>
<td>technology</td>
<td></td>
</tr>
<tr>
<td>17:05</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


CEPH Project – A Success Story
Figure 10: Example of CEPH course timetable in English
(Source: CEPH Project - deliverable D4.8 “Course Material in each National Language”)
3.5 The training courses for passive house trainers (PHTC)

It is necessary that every trainer who uses the material participated in the Passive House Trainer Course (PHTC). This course has been developed exclusively for the CEPH training material. It is recommended that the main persons involved in the course organization also attend the PHTC.

The first CEPH Passive House Trainer Course (PHTC) started in January 2010 in Dornbirn. Until now these courses were held several times in German and English by Energieinstitut Vorarlberg (EIV), Passivhaus Dienstleistung GmbH (PHD) and eza! Energie- und Umweltzentrum Allgäu.

This newly developed 2-day workshop “PHTC – Passive House Trainer Course” for course providers and their teachers offers the opportunity to acquire training skills in the context of the course for Certified Passive House Designers. Course providers and trainers will get practical information how to use the CEPH material in different course concepts. In general, the workshop is led by two speakers focusing respectively on didactics and the course contents related to the Passive House concept. In this course, it has been assumed that the technical knowledge about Passive Houses is well-known.

The PHTC consists of 18 teaching units with various practical exercises related to different topics:

- Passive House Designer Course: contents and curriculum for a ten days course
- Information about the exam for Certified Passive House Designer
- Overview of the CEPH course material
- Working methods with a variety of presentations forms
- The use of exercises in the course
- Using the Passive House Planning Package PHPP in the course
- Planning of teaching units with regard to contents and timing
- Practical tips for presentation and teaching

Within the PHTC the participants get familiar with the course material as well as different teaching methods. The course contains a lot of exercises where the participants can make use of their newly acquired knowledge.

The feedback of participants of the Passive House Trainer Course (PHTC) document the high quality and added value of this workshop for new course providers and their trainers:

- “I learned a lot creative ways how to present technical aspects.”
- “I liked the combination of technical and didactic aspects in the course.”
- “I got a lot of practical tips for my own lectures and courses”
4. The certified passive house designers

The aim of this chapter is to provide an overview on how to obtain the certification as passive house designer.

4.1 Certification procedure

The previous paragraphs pointed out the great and very fast increasing demand for experienced architects and engineers specialized in Passive House Design. Education in Energy Efficiency and Passive House Design will not only be very important in the vocational education but in the process of lifelong learning, too. The principles of designing a Passive House are the same all over Europe. The components have to be chosen according to the climate conditions. Once a PH Designer understands the main principles, (s)he is able to work in different countries.

The CEPH course for Certified Passive House Designer gives to experienced architects and engineers the opportunity to acquire skills and update knowledge in the energy efficiency so that they can adapt to changes in the jobs market. The CEPH-courses will give a strong contribution to the personal development across Europe in the sector of energy efficient buildings.

According to the certification of Passive House components and buildings, the concept for the certification of a Passive House Designer was developed in 2006 by the Passive House Institute in cooperation with eza! Energie- und Umweltzentrum Allgäu in Kempten.

The main targets of the certification of Passive House Designers are a vital improvement of the qualification of architects and engineers and ensuring a high quality in designing, building and operation of Passive Houses.

4.2 What should a Certified Passive House Designer know?

What do architects and engineers need in detail when designing and building energy efficient Passive Houses affordably and with high quality?

The Passive House concept is not a specific way of construction but an integral way that takes into account the very high quality of the thermal envelope, the building services as well as economic aspects.

The cost-optimal balance between investment costs due to energy efficiency and saved energy costs was the fountainhead for the development of the Passive House concept. To achieve this cost-optimal balance it is necessary that all components are dimensioned in a proper way. The whole life cycle of a building has to be considered. That means that not only costs for the initial investment but the cost for energy consumption over the whole life cycle have to be taken in account.

The following chart (figure 11) shows the different aspects related to the Passive House.
The most important knowledge for designing and building Passive Houses was compiled in the list of learning targets, to be found in the under [www.passivhausplaner.eu](http://www.passivhausplaner.eu) as shown in Figure 12.

![Figure 11: Image of all aspects related to Passive Houses](Source: CEPH D5.7 “A business concept for the passive house planner certification scheme” PHD)

![Figure 12: How to qualify as a Certified Passive House Designer?](Source: www.passivhausplaner.eu)
The knowledge for design and building passive houses can be gained in different ways: self-study, while designing and building a Passive House or in seminars and workshops.

The highest potential for energy saving is in the design phase. To exploit this full potential, a Passive House Designer has to know the correlation between the quality of the thermal envelope and the components of the building services especially the heat recovery of the ventilation unit. The Passive House Planning Package (PHPP) calculation illustrates this very well and should be used in an early design phase in order to achieve the optimal cost balance. The Passive House Designer, thus, has to understand the principles of the calculation of the energy balance with PHPP.

The Passive House Planning Package (PHPP) is a very helpful tool for calculating the energy balance of a Passive House. It is validated with measurements and useful all over the world. All components needed for the thermal envelope and the building services can be optimized considering the entire technical potential of the respective component.

Those who would like to participate in a course for Passive House Design have to be familiar with basics of building physics and the conventional building practice. In the courses, only the most important principles of buildings physics directly related to the Passive House are revised. For those starting with the Passive House concept right from the beginning, the participation in a basic course is recommended.

4.3 What are the advantages of being a Certified Passive House Designer?

In the fast growing market of Passive House Design the need and demand for qualified architects and engineers will expand. The list of architects qualified as passive house designer for clients interested in building a Passive House and looking for a skilled architect is the already existing website www.passivhausplaner.eu hosted by the Passive House Institute and the website of CEPH www.passivehousedesigner.eu hosted by the CEPH consortium.

All Certified Passive House Designers are listed in a database on the Passive House Institute’s publicly accessible website www.passivhausplaner.eu and can be found by future clients. The certificate for Passive House Designers indicates potential customers the knowledge and experience of the holder for successfully planning Passive Houses. The logo given with every certificate can be used in e.g. the letterhead or in advertisement and the designer can give proof of his / her qualification in Passive House Design (Figure 13).
4.4 How to become a Certified Passive House Designer?

To become a Certified Passive House Designer, a verified qualification in an appropriate professional field is required. Candidates who do not have a subject related qualification will obtain the title “Certified Passive House Consultant”. An overview of different job description and their classification in “Designer” or “Consultant” can be found at the website www.passivhausplaner.eu.

According to the exam regulations available at the website www.passivhausplaner.eu there are two ways of obtaining the certificate. The first one is a more practical one by proofing the qualification with the documentation of a built and certified Passive House. The second way is a more theoretical way by passing the written examination given by the Passive House Institute. The certification procedure is shown in the following chart (figure 14).
The practical qualification is for those who built a Passive House already. It has to be proven that the applicant has exercised full responsibility for the project planning and design of the building.

For the theoretical qualification a written exam has been compiled by the Passive House Institute. Every person with a qualification in an appropriate professional field can attend this examination. There are four examination dates every year, offered by Institutions for further education, which signed a contract with the Passive House Institute to offer these examinations.

The following chart (figure 15) shows the two ways of getting the basic knowledge needed for designing and building a Passive House and participating in the written exam: self-study or participation in a course for Passive House Design, such as the Certified European Passive House Designer (CEPH) courses.
Figure 15: Ways of preparing for the examination as Passive House Designer
(Source: [www.passivhausplaner.eu](http://www.passivhausplaner.eu))

A list of all course and examination providers, examination dates and exam regulations as well as learning targets can be found on the website: [www.passivhausplaner.eu](http://www.passivhausplaner.eu). The PHI certificate is valid for five years and can be renewed by documenting a built and certified Passive House. Potential customers can find and select qualified designers via the database of certified designers to be found on the above website under the link passive house designers.
5. Providing training courses for certified passive house designer

This chapter offers an overview on the steps necessary to become a provider of CEPH training courses for passive house designers. There is now the possibility for course providers outside the CEPH project to obtain a right of use for the materials for an own 10 day course preparing the participants for the Certified Passive House Designer examination. Different aspects for running a course are illustrated in the following paragraphs.

5.1 Vision and strategy

The course participants should be able to design and build an affordable Passive House with high quality. The course provides the participants with the basics and principles. While passing the exam at the end of the course the participants give proof of their qualification and get the certificate "Certified Passive House Designer". It is valid for five years and can be renewed by documenting a built and certified Passive House. Potential customers can find and select qualified designers via a list of certified Designers on the internet.

5.2 Organization and management

In a first step the course provider has to familiarise him/herself with the procedures of Designer Certification: therefore the exam regulations should be read carefully from every person involved in the course organization. These documents can be found in the attachment or under www.passivhausplaner.eu. It is very important that the course provider and the teachers are very experienced in the Passive House concept.

5.3 Who can become a course provider for certified passive house designer?

A high quality education requires a high level of qualification of the course provider and the trainers. Therefore a right of use for the CEPH material can be granted to persons or organizations who:

- have a relation to Passive House Design and energy efficient buildings and
- have sufficient experience with further education

The experience of the course provider has to be documented. The information required to document this experience is been developed by the CEPH project partners.
5.4. CEPH teaching material for a 10-days course is available now

The teaching material for a 10-days course with 80 teaching units is available for course providers. It was compiled based on the catalogue of learning targets. The individual chapters cover all important aspects needed for designing and building Passive Houses:

- Principles and basics of the Passive House concept
- Design of the building envelope, thermal bridge-free and air-tight construction
- Concepts for building services: ventilation, hot water and remaining heat
- Economic feasibility
- Practical implementation of Passive House design
- Quality assurance in the design and building phase
- Calculation of the energy balance for the remaining heat demand and the primary energy with Passive House Planning Package PHPP

The Passive House Planning Package is a very helpful calculation tool. It is available in many languages. For more information, please visit: www.passiv.de.

The material consists of about 1.200 slights created with Microsoft ® PowerPoint. It contains lectures and different exercises. A sample slide can be found at the CEPH project website (www.passivehousedesigner.eu).

The course material has been created based on European standards and is available in different languages. Local specifications have been worked out within CEPH by the national partners. Of course, there is the possibility to add national aspects needed for the education in the respective countries.

During the project the material has been translated in most of the languages of the CEPH partners. Following the high interest in the material up to this date even non-CEPH partners in other European countries started to translate the material.

A right of use for the course material can be obtained from the Passive House Institute. Detailed information about the languages available and the details for obtaining a right of use of the course material is available on the CEPH website: www.passivehousedesigner.eu.

5.5 Using the CEPH teaching material in different course concepts

The course material can be used in different ways. Within the CEPH project two different course concepts have been tested: the open and the closed course concept. Every course provider can choose the course concept based on availability of local staff and classroom situations. The most important differences in the two tested course concepts are described as follows.
Open course concept:
The modular open concept consists of 10 course days with a particular topic handled on each day. Therefore participants can book individual days or take part in the entire 10-day course over a longer time frame depending on their professional flexibility and current knowledge. As a result, the particular group of participants is a bit different each day of the course. This flexibility is quite popular among the participants. They make great use of these options. E.g. some participants start with the first day dealing with the principles of designing and building a Passive House. Some months later they are attending the part “Energy Balance with the Passive House Planning Package PHPP” and continue with the other parts step by step. In return the flexibility for the participants is more time-consuming for the course organizer. This should be taken into account for the calculation of man-hours. In the open course concept the practical handling of the calculation tool Passive House Planning Package PHPP is taught in a two-day workshop. For this workshop every participant should have a computer. In other parts of the course the participants do not work with PHPP on a computer but the various topics are discussed in relation to the PHPP.

Closed course concept
In the closed concept the participants have to book the whole 10-day course. Experience has shown that this concept is very good for networking because the participants are staying together for the whole course time. There is also less organization required. Individual content sections can be shifted around within the course such as if a speaker gets sick. On almost every day of this course, small exercises are done to show how to work with PHPP. The participants therefore need a computer or laptop every day and enough space to work with the course material and the laptop. At the end of the course there is a one day workshop in which the main spreadsheets in the PHPP are dealt with in detail.

5.6 Who can be a trainer for the CEPH material?

The quality of the courses depends on the professional knowledge in passive house design as well as didactic skills of the trainers. It is recommended that the trainers are Certified Passive House Designers. If not, they can be a designer in charge of a certified Passive House or they need an equivalent proof of their qualification in Passive House design. Furthermore they need experience as an instructor. To get to know the material developed within CEPH, a two-day course for trainers “Passive House Trainer Course (PHTC) was developed. Participation in a trainer course is mandatory for all trainers.

Detailed information on the Passive House Trainer Course (PHTC) is available on the CEPH website [www.passivehousedesigner.eu](http://www.passivehousedesigner.eu).
6. Financial and marketing aspects

This chapter provides an overview on the financial and marketing aspects related to training courses for passive house designer based on the experience gained during the CEPH courses. Moreover, an overview on the risk and opportunities related to the establishment of training courses for passive house designers is also given.

6.1 Cost analysis

Experiences related to financial aspects could be gained by the CEPH partners with the given courses. The following tables show the most important results of the financial analysis that has been drawn up within CEPH. The source for the information shown in tables 2, 3 and 4 is the CEPH project Deliverable D5.7 “A business concept for the Passive House Planner Certification Scheme” (PHD).

Table 2: Information about costs and fees related to the course

<table>
<thead>
<tr>
<th>Courses</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Participants</td>
<td>10-29 participants, 15 participants at average</td>
</tr>
<tr>
<td>What countries did participants come from?</td>
<td>Mainly “National” participants</td>
</tr>
<tr>
<td>In what language was the courses given?</td>
<td>Mainly in first language spoken in the respective country, in some cases German or English with simultaneous translation</td>
</tr>
<tr>
<td>How many teachers were directly involved in the course? (i.e. have taught on or several modules)</td>
<td>1-9 teachers, 5 teachers at average</td>
</tr>
<tr>
<td>Were the teachers from the respective country?</td>
<td>In most cases yes. In some cases the first pilot course was given by the experienced teachers from the CEPH developer group</td>
</tr>
<tr>
<td>Course fee</td>
<td>500/600 EUR to 2000 EUR including the respective VAT</td>
</tr>
<tr>
<td>What was included in the course fee?</td>
<td>Depending on the course provider: coffee/tea, soft drinks, snacks, lunch, note bloc, pen, colour-printed course material</td>
</tr>
<tr>
<td>Were there additional financial costs for the participants apart from travel/lodging?</td>
<td>License for PHPP software</td>
</tr>
</tbody>
</table>
Were there additional financial incomes for the organization (e.g. subsidies, sponsoring)?  no

Which were the expenses and costs related to the course for the organizers?  Organization and coordination of the course, rent for conference room, costs for printing the course material, simultaneous translation, catering and technical equipment

Table 3: Information about costs and fees related to the examination

<table>
<thead>
<tr>
<th>Exam</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam fee</td>
<td>240-480 EUR including VAT</td>
</tr>
<tr>
<td>Number of participants in the exam</td>
<td>6-29 participants, 15 at average</td>
</tr>
<tr>
<td>What was included in the exam fee?</td>
<td>Coffee/tea, snacks</td>
</tr>
<tr>
<td>Were there additional financial costs for the participants apart from travel and lodging?</td>
<td>No</td>
</tr>
<tr>
<td>Which were the expenses and costs related to the exam for your organisation?</td>
<td>Organisation and coordination of the exam, rent for conference room, costs for printing the exam material, simultaneous translation, technical equipment</td>
</tr>
</tbody>
</table>

Table 4: Evaluation and Recommendations

<table>
<thead>
<tr>
<th>Did the fees cover the costs?</th>
<th>In some cases, yes, In some cases, no</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the minimum required number of participants for the course to take place? (from the viewpoint of cost/income balance)</td>
<td>15 participants</td>
</tr>
<tr>
<td>Do you think there is a market for the CEPH in the future:</td>
<td></td>
</tr>
<tr>
<td>On the short term</td>
<td>Yes</td>
</tr>
<tr>
<td>On the mid term</td>
<td>Yes</td>
</tr>
<tr>
<td>On the long term</td>
<td>Yes</td>
</tr>
</tbody>
</table>

In most cases, the first courses for Passive House Design were given by foreign teachers experienced in teaching and with profound knowledge of the Passive House concept. The involvement of foreign teachers who were not fluent in the respective National language, required in some cases simultaneous translation of the course. Respectively, the costs for the first courses were high. But these initial high costs can be covered e.g. by funding or subsidies. Future courses can be given by national teachers in order to reduce the overall costs.
6.2 Ideas for marketing activities

For course providers who start to run the course for the first time in their country the following marketing activities and events can be used to raise interest in the course:

* a) *Information leaflet*
This leaflet should give an overview of the topics covered within the course. Additional information should also be provided: course dates, the referents, course fees, application form, and trading conditions.

* b) *Announcement on the website www.passivhausplaner.eu*
Every course provider who signs a contract with the Passive House Institute for the exam will be listed in the overview available under www.passivhausplaner.eu

* c) *Information event during the international Days of the Passive House*
The international Days of the Passive House are organized by the international Passive House Association iPHA and the IG Passivhaus Deutschland. Every second weekend in November interested people can visit built Passive Houses worldwide. In a Passive House, there could be a speech given by a certified Passive House Designer about the Passive House concept. The course provider could inform about the course concept, contents and dates.

* d) *Information event on local fairs related to energy efficient buildings*
The course provider could organize a speech related to the Passive House Concept. At local fairs which are related to energy efficient buildings. There could be the opportunity to visit a built Passive House.

* e) *Advertisement in local and regional magazines related to energy efficiency*

* f) *Cooperation with associations of professionals for architects and engineers in the respective country*
The education of architects and engineers is very important. In different countries, the CEPH courses are running in cooperation with associations of professionals for architects and engineers already. New course providers could contact those associations who are not yet working in the field of Passive Houses.

6.3 Risks and opportunities

The following risks and opportunities should be taken into account for the administrative and technical course organization. The following list is not final as other risks and opportunities can occur. The CEPH group does not take over any liability for any risks that occur while using the course material.

**Risks**
A very good course management and relevant experience in Passive House Design are very important for running a course successfully, even though an entrepreneurial risk has to be accepted.
a) Financial risks
The success of a course depends on different aspects: From the financial point of view a certain number of participants is needed. The experience of CEPH shows that in average 15 participants are needed to cover most of the costs. Every course provider should fix a date at which he decides to run or to cancel the course.

b) Risks due to cancelation of participants
Another risk is that in some cases participants have to cancel the course or single modules due to changes in their actual working situation before the respective seminar. In some cases, this happened several times and required time for the general administration of the course. Therefore it is recommended to charge a rebooking fee in order to cover these costs.

c) Sudden absence of trainers
Another risk is the sudden illness-related absence of a trainer. In such a case the course provider should have a kind of backup. Perhaps a module can be changed or there is another trainer who can cover the respective topics. In the open concept, the change of modules is not possible because some participants registered for this module only. In the worst case, the provider has to cancel this module. If possible, he should organize this module at another date or he has to pay back the fee for this module. The experience has shown that it is not easy to organize a second trainer for all modules. However, the sudden absence of a trainer happened only few times.

d) Unsatisfied participants due to not enough experienced trainers
Another more important risk regarding trainers is that trainers do not have the needed knowledge in Passive House Design and / or not skills in teaching. This can lead to very unsatisfied participants and can be solved only by choosing the trainers very carefully according to their experience in teaching and Passive House Design.

e) Participants do not have the required prior knowledge
In some courses it happened that the prior knowledge of the participants was very different. Some of them had some experience in Passive House Design already while others did not know the principles in building physics. Therefore it was difficult for the trainer to cover all the aspects. The experienced ones were unsatisfied because they did not learn enough and the beginners were unsatisfied because they did not understand all topics. To reduce this risk, the course provider has to clarify in his advertisement and from the very beginning onwards, that the course requires prior knowledge in building physics. Perhaps the provider can offer a basic course before the start of the CEPH course.

Opportunities
Education in Passive House Design is a very important step to fulfill the requirements of the Energy Performance Building Directive (EPBD) in the respective country. Every course provider is part of a worldwide group of highly qualified course providers which can result in a competitive advantage. They can participate in a fast growing innovative and forward-looking market in the vocational education as well as further education sector. Last but not least, education in Passive House Design provides a very important contribution for environmental and climate protection.
7. Ensuring the long term sustainability of the CEPH training courses

The aim of this chapter is to define the fundamental steps necessary to ensure the long term sustainability of the training course for passive house designers established within the CEPH project.

7.1 Quality is the key point

The added value of the CEPH project is related to the high quality of the CEPH training material and CEPH training courses offered during the project. Quality has been the key point since the beginning of the project and during all activities implemented during the CEPH project, such as the developing of the German training, the translation of the training material into English and into the National languages, the establishment of the “Passive House Trainer Course (PHTC)” for improving the didactical skills of the trainers, the implementation of the pilot courses in German and in English languages, the quality control of the pilot courses for the improvement of the training material and the implementation of 19 CEPH courses and their related quality control in the target countries of the CEPH project.

The relevant role of quality was clear for all the partners and the subcontractor involved in the CEPH project. Overall, this has created a high demand for the CEPH training material and CEPH training courses by all relevant stakeholders, who have acknowledged the high quality of the CEPH training material and training courses and, as consequence, have generated a high demand for the implementation of new CEPH courses for passive house designer in the CEPH target countries and also in other European countries not involved in the CEPH project. This has led to the three following success stories:

1. after the project life time, further CEPH training courses are offered by the CEPH partners in the CEPH target countries. At the time being CEPH courses are already planned in Czech Republic, Denmark, French, Germany, the Netherlands and United Kingdom

2. after the project life time, the "Passive House Trainer Course" are offered by the CEPH partners in Austria and Germany;

3. In addition to several course providers in the CEPH countries who did not belong to the CEPH consortium, course providers from seven European Member States in non-CEPH countries asked and obtained the right of use for the CEPH material, too. Three other European Member States have asked for the right of use of the CEPH training material (Figure 16).
7.2 European Qualification Framework (EQF) and National Qualification Framework

In order to obtain high quality low energy buildings in Europe it is necessary to establish a high quality certification scheme. The challenge in establishing such a scheme is related to the fact that the European countries have to implement at National level a structure defined at European level by the European Directives [7],[8] related to energy efficiency and renewable energy. Vocational Education and Training (VET) at National level is characterized by different qualification schemes, different learning paths, different terminologies and meaning. In order to define a common language to start a dialogue about a common understanding of qualification, the European Commission has launched in 2008 the “European Qualification Framework (EQF)". The EQF has been defined in such a way to be comparable among the European countries. This is done by identifying learning outcomes instead of learning paths. The learning outcomes are related to the knowledge, skills and competences for eight qualification levels, from basic level to expert level. The aim of the EQF is to create a common tool to be able to compare the learning outcomes among different European countries. The European Qualification Framework represents a fundamental tool to create a common understanding of learning outcomes and a reference point for the creation of National Qualification Frameworks (NQFs). The definition of learning outcomes is another necessary and essential step for ensuring the long term sustainability of the CEPH project. The definition of these learning outcomes will guarantee the integration of the CEPH training courses into higher education and therefore to the further dissemination and sustainability of the CEPH material and training courses.
7.3 Synergies with other relevant sectors

Quality has been the key and reference point in all activities carried out during the CEPH project. The development of high quality training material and the establishment of the high quality training courses were considered by the CEPH partners and stakeholders, involved in the project, as the only possible way to guarantee and ensure the long term sustainability of the material and courses offered during the project. As shown in several sessions of this report and the material developed during the CEPH project, the ambitious aim of achieving a long term sustainability of the CEPH training courses and material has been fully achieved.

Besides quality, the network of contacts of the CEPH partners and subcontractor will be fundamental to ensure the replication of the CEPH training concept and certification scheme in Europe and also worldwide after the end of the project life time. Figure 17 shows the worldwide network of contacts of the subcontractor PHI, Passive House Institute Darmstadt, Germany.

For the long-term sustainability of the CEPH project, it was also relevant to share the CEPH experience with the renewable energy sector, in order to profit from the experience of others who have already faced some of the challenge related to the CEPH project, for instance in the establishment of certification schemes for professionals. In order to ensure the long-term sustainability the dissemination activities need to be addressed by stakeholders in the sectors relevant to the project. For the CEPH project this was the sector of low energy buildings; however, other sectors were also included, especially those who had already experienced some challenges and could provide guidelines such as the experience from the renewable energy sector in establishing mandatory certification schemes for installers of small-scale renewable energy systems in buildings [7 and 8].

Figure 17 “Worldwide network of contact for the dissemination of the CEPH project”
(Source: Passive House Institute (PHI))
The European Directive 2009/28/EC [7] on the promotion of the use of energy from renewable sources also states the accreditation and certification scheme for installers of the renewable energy systems. This EU Directive can also be a guide for preparing the certification procedure for a long-term sustainable concept for the passive house designers within the CEPH project. This certification scheme should become available by the end of 2012 on Member State level and may take into account existing schemes and structures as appropriate. In future, similar certifications schemes and structures could be also implemented for other sectors also involved in training such as the passive house sector. Consequently, this accreditation and certification process should lead to a licensing scheme for all qualified professionals.
8. Recommendations

The aim of this chapter is to provide policy makers and trainer providers of training courses for passive house designers with recommendations to establish the training courses and to ensure their long term sustainability.

8.1 Participants to the CEPH courses

While the number of participants per course varied between 10 and 29 persons, the average number of participants during the project was 18. Most participants gave a positive feedback and appreciated the content and methods of the course as well as the enthusiasm of the teachers. Nevertheless, some respondent stated in their feedback that there might be a decreasing need for the course in the near future as certification as a passive house designer has neither legal status nor legal requirement in the country concerned. In order to sustain a high rate of participants and to increase awareness and interest in building passive houses, the legal requirements and frameworks need to change to act as incentive for architects and builders as well as for training centres offering the courses. In order to further promote a certification or qualification within the low energy building sector, only certified professionals should be allowed to construct new public or private buildings. Furthermore, the “train the trainer” course was considered a very useful tool as it focused on the improvement of the didactic skills of the teachers as there are not many specialized teachers in Passive House Design and Construction, whereas there are many specialists on building physics and construction.

Target groups for training are also the architect associations. It is important to win the architectural associations for the new certification schemes. This will be reached by personal talks with the respective stakeholders on European and Member State level in which the requirements and benefits of the new certification scheme will be explained in detail. Obligatory training for the SME sector is hard to implement although it is absolutely necessary to acquire certifications, particularly for small companies.

8.2 Expectations about future costs and fees

Another pertinent factor to be considered for a sustainable future of the project strategy is the costs related to the CEPH training courses in each individual country. So far the costs have been financed by the CEPH-project budget; however, the ideas about the future height of the course fees diverge: some respondents do not expect changes, whereas others expect the fees to be higher in future, as these are not covering the costs. In favour of lower fees it can be argued that lower fees may attract more participants and therefore have a positive influence on the interest in the course. In combination with lower fees it has been suggested to shorten the course in its content to reach more architects and consultants. Two important points should be taken into account when calculating the fee.

Separation of the exam fee from the course fees:
Not every course participants takes part in the exam at the end the course so the fee for the exam should be excluded from the course fee.
Rebooking fee:
In the open course concept a rebooking fee is proved to be successful. The participants appreciate this concept due to its flexibility because it is possible to choose the course dates according to the professional obligations and the time available. For the course provider, this flexibility causes more work in administration. Often, the participants want to postpone a single seminar or workshop. To reduce the changes in booking and to cover these additional expenses the rebooking fee is recommended.

8.3 Content

It is highly recommendable to be aware that most study materials reflect the central European building practice and traditions and that every training course and regulations should be adapted to National Building Requirements and traditions of each Member State. Another point that was raised during the feedback session was the importance to address social houses in the curriculum, as non-residential buildings have different standards and needs than residential buildings. As already mentioned under the section Certification, the course should be split into “Certified European Passive House Architect” and “Certified European Passive House Consultant”. Although basic knowledge is required by both target groups, consultants are focused on other aspects than architects. Specifically, the building design is of more importance for architects, whereas the heating and ventilation technology, building physics, quality control, and economics and building process are more relevant for consultants.

8.4 Continuity and Sustainability

CEPH ensures long-term sustainability and a continuity of the courses even after completion of the project objective through a variety of intranet platforms, download options, database provision, and workshops as well as information fairs. Through networking with existing course providers and established platforms in the Energy Building sector, the Certification scheme will continue. Furthermore, for a sustainable development within the Passive House Sector, projects such as CEPH need to be firmly embedded in national educational institutions such as Schools of Architecture of Universities. In the next steps, co-operation with associations of professionals for architects and engineers in the respective country must be facilitated. The education of architects and engineers is very important. In different countries, the CEPH courses are running in cooperation with associations of professionals for architects and engineers already. New course providers could contact those associations who are not yet working in the field of Passive Houses. An interesting suggestion was to additionally establish a “European Association of Passive House Course Providers” that would meet once or twice a year to discuss relevant data and developments, to synchronize activities and to inform and discuss the national variations.
8.5 Passive House Related Services

In this regard, one important and relevant outcome of this assessment is the fact that most of the Passive-House related services are available but uncommon in the European Member States. While the lack of available knowledge has been targeted via CEPH and other training institutions providing courses for architects, contractors and builders, the availability of Passive House services is almost non-existing in all European countries.

In general, passive house services, be it advice, guidance or counseling, financial services, or passive house components are less common available and are viewed as much more expensive than common products. Knowledge based on experience or on educational and vocational training courses for architects and contractors alone is not sufficient. What is further needed is a positive influence on the demand of passive houses from regional, national or local policies or regulations. Furthermore, to tackle the financial service availability, soft loans should be provided for Nearly Zero Energy Buildings built by licensed professionals.
9. Conclusions

It is well known that new buildings can be designed with much less energy consumption as buildings which were designed in a conventional mode. Much more than 10,000 Passive Houses [9] have been already built all over Europe. These are buildings, whose heating energy requirement is about one-tenth of the energy compared to the average building stock. The quality requirements for the Passive House standard were compiled already quite some years ago and were published on the internet under free access. In addition, several planning tools have been developed, such as the Passive House Planning Package (PHPP). However, these tools cannot replace high qualified designers and architects. To overcome this lack of workforce and lack of qualified and experienced trainers has been the key goal of CEPH project and all its partners.

The added value of the CEPH project was related to the high quality of the CEPH training material and CEPH training courses offered. Quality has been the key point since the beginning of the project and during all activities implemented during the CEPH project, such as:

- the developing of the German training;
- the translation of the training material into English and into the National languages;
- the establishment of the "Passive House Trainer Course";
- the implementation of the pilot courses in German and in English languages;
- the quality control of the pilot courses for the improvement of the training material;
- the implementation of 19 CEPH courses;
- the quality control of the CEPH courses.

The relevant role of quality was clear for all the partners and subcontractor involved in the project. Overall, this has created a high demand for the training material and training courses by all relevant stakeholders, who have acknowledged the high quality of the CEPH training material and training courses and, as consequence, have generated a high demand for the implementation of new courses for passive house designer in the CEPH target countries and also in other European countries not involved in the CEPH project. This has led to the three following success stories:

1. after the project life time, further CEPH training courses are further offered by the CEPH partners in the CEPH target countries;
2. after the project life time, the "Passive House Trainer Course" are further offered by the CEPH partners in Austria and Germany;
3. already during the CEPH project, in addition to several course providers in the CEPH countries, who did not belong to the CEPH consortium, course providers from seven European Member States, not part of the CEPH consortium, asked and obtained the right of use for the CEPH training material as well. Three other European Member States have asked for the right of use of the CEPH training material.
Besides quality, the achievement of the long-term sustainability of the CEPH training material and courses has been reached by the dissemination activities carried out during the project. For a proper dissemination it was important to have partners with a strong network of contacts in Europe and worldwide in the passive house sector. For the long-term sustainability of the CEPH project, it was also relevant to share the CEPH experience with the renewable energy sector, in order to profit from the experience of others who have already faced some of the challenge related to the CEPH project, for instance in the establishment of certification schemes for professionals.

In order to ensure the long-term sustainability the dissemination activities need to be addressed by stakeholders in the sector relevant to the project. For the CEPH project this was the sector of low energy buildings; however, other sectors were also included, especially those who had already experienced some challenges and could provide guidelines such as the experience from the renewable energy sector in establishing mandatory certification schemes for installers of small-scale renewable energy systems in buildings.

Until the end of the CEPH project in February 2011, over 1100 Certified Passive House Designers were listed in the database on the website www.passivhausplaner.eu. Over 900 certificates have been given to the designers within the project time of CEPH and over 300 designers successfully obtained their certificate as Passive House Designer in a course given by CEPH partners [4].

Until now, more than 40 course providers are offering courses for Passive House Design and the exams given by the Passive House Institute worldwide. Over 20 providers are using the material developed within CEPH. The interest is still growing.

The project CEPH could give a strong contribution to the quick and successful implementation of the Passive House concept all over Europe and building up the necessary workforce. The number of interested participants and course providers is still growing.

The project CEPH has set a milestone in the further education of very high efficient Passive Houses.
10. References


[5] CEPH Project - Deliverable D4.6 “Overview of courses in all 9 countries and Evaluation of the 19 courses”


[9] CEPH-Project - Deliverable 2.1 “Database and report of state of the art” (ECN)