

**BUILD UP SKILLS PROJECT NORWAY**



**BUILD UP SKILLS PROJECT PART III  
IMPLEMENTATION AND ENDORSEMENT PLAN**



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## 1. Introduction

Build Up Skills Norway is the national follow-up of the Intelligent Energy Europe project Build Up Skills. The competence of building workers in Europe is being reviewed in 29 EU countries. The focus on competence raising is linked to the EU's climate and energy goals.

The Build Up Skills project has reviewed the competence level in the field of energy among tradesmen and skilled workers in Norway, Build Up Skills: Part 1 - Status Analysis. The analysis showed a need to raise competence levels so as to achieve the goals of the EU and the Norwegian authorities for significant energy savings in our buildings. Competence targets for the different trades were defined as part of the project. The next part of the Build Up Skills project was to arrive at measures that should be taken to close the gap between today's knowledge and that of the future, Build Up Skills: Part 2 - Roadmap. This work looked at the education and training system, formal further or post-qualifying education and training and other post-qualifying education and training. A review was also made of the instruments that could be used to implement the measures.

This last part of the work is to evaluate how different measures are implemented and how they are planned to be implemented in the future. Against this background, proposals are made for what should be prioritised in the future.

## 2. Status analysis

The first milestone in the Build Up Skills project was to prepare a status analysis. The most important points in this include:

- The construction industry is perceived as a relatively attractive and solid industry, but is also subject to the effects of economic fluctuations.
- There are about 100,000 tradesmen. Carpenters represent the largest group employed (about 50,000), followed by electricians (about 30,000) and plumbers (about 16,500).
- The level of knowledge among builders tends to indicate knowledge of energy efficiency and energy conversion varies greatly and in some cases lacking.
- Courses organised by the buildings goods trade and industry organisations, as well as the use of the Byggforsk series from SINTEF Building and Infrastructure, are the tools most tradesmen currently rely upon for seeking knowledge.
- There is no national system for post-qualifying training after the craft or journeyman's certificate.

Since it would appear that the level of knowledge among builders in the field of energy efficiency and energy conversion is varied and in some cases lacking, competence goals for the various trades involved in building and construction have been developed in connection with the Build Up Skills project (Appendix 1). There is broad agreement between partners about these competence goals.

### 3. The roadmap

The second milestone in the Build Up Skills project was to prepare a roadmap. The roadmap includes 14 measures that need to be introduced in order to raise competence levels among tradesmen. The roadmap is a strategic document that describes strategies that should be introduced so as to ensure an adequate number of qualified tradesmen. Various instruments to ensure the implementation of the measures in the roadmap were also described.

The socio-economic effects of the improved energy efficiency of buildings, brought about by competence raising among tradesmen, were also investigated. The report is based on three different scenarios, from introducing a basic package of measures to a very ambitious package of measures. Ideally, the project consortium wanted to be able to isolate the effect of each measure, but there was insufficient time to allow for this. There are considerable uncertainties in the analysis because of the lack of basic data and it would be an advantage to be able to continue the process of obtaining more data so as to arrive at more precise conclusions. At the same time, the analysis indicates that it is beneficial socio-economically to invest on raising the competence level of tradesmen than is the case today.

### 4. Implementation of the roadmap

#### a. Introduction

It must be possible to implement the strategic roadmap in both the short and long term. Build Up Skills: Part 2 - Roadmap identified 14 measures for raising the competence of tradesmen. This is reflected in the implementation plan.

*Concrete* measures shall contribute to the implementation of the roadmap in the short term, and the implementation plan therefore describes measures intended to raise the competence of tradesmen in the field of energy straight away. Here the implementation plan is mainly based on the findings of the status analysis, which indicates that it is often *basic* knowledge that must be conveyed to tradesmen. The roadmap and implementation plan have looked at how knowledge of energy efficiency and energy conversion can be implemented in existing education and training structures. This is looked upon as being more effective than building up new systems. Energy efficiency and energy conversion must be a natural part of all initial and post-qualifying education and training.

#### b. How should the implementation plan be read?

As with the roadmap, the measures have been grouped into three areas: *Education and training* (measures 1 to 6), *formal further or post-qualifying education and training* (measures 6 to 9) and *other post-qualifying education and training* (measures 9 to 14). The measures have been given colour coded so as to make it easier to find who is implementing the measures.

Colour codes	
<b>The Norwegian Association of Masons and Bricklayers (NML)</b>	<b>The Low-energy programme (LEP)</b>
<b>The Norwegian Association of Building Constructors (BMF)</b>	<b>BNL (The Federation of Norwegian Construction Industries)</b>
<b>EBA (The Norwegian Association of Building Contractors)</b>	<b>Public authorities, others</b>
<b>NRL (The Norwegian Plumbers Association)</b>	

## 5. Education and training measures

### 1. Establish more pilot projects

Establish several pilot projects in which upper secondary schools, vocational schools, universities and university colleges, local authorities, local building and construction companies etc. work together to get knowledge about passive building into education and training for the building, electrical and climate, energy and the environment trades.

**Summary:** Pilot projects have been started in some local authority areas to give pupils and students actual experience of passive building. The experience from these projects is very good, but they have yet to be implemented on a larger scale.

The exchange model, in which pupils have more practice in companies, gives them more concrete experience. If this is to have an effect on knowledge in the field of energy, it must be linked to companies that are working on tomorrow's energy solutions.

Measure initiated	Schedule	What is planned for the future, what can be contributed	Schedule
Start of a number of pilot projects around Norway (Aust Agder, Oslo, Trøndelag, Stavanger).		More projects are planned.	2013 onwards
		The Low-energy Programme plans a knowledge portal from which teachers and teaching staff can obtain experience and inspiration for starting similar projects.	2013
		The Low-energy Programme shall help to establish a network for teachers who have started, or wish to establish, pilot projects.	2014
The exchange model (where the pupil switches between being taught in school and being out in a company) in Oslo, gives a more realistic and faster understanding of how new low-energy buildings and heating	2013-2018		

systems are built, because the pupils and apprentices spend more time out working on the buildings.

Courses for teachers, focusing on heating technology, renewable energy sources and combination solutions.

September 2013

Possible projects for implementing energy efficiency and energy conversion as part of the exchange trial in Oslo. 2014

Seeking collaboration with the specialist council for building and construction techniques<sup>1</sup> on possible projects 2014

#### Obstacles/problem areas

Traditionally, only a small proportion of tradesmen in the building and construction industry take much time to participate in lifelong learning activities. It is therefore important to reach those who are still in education and training with knowledge about energy-efficient building solutions.

Experience shows that teachers of building trades in educational institutions also have a great need for competence raising in energy and construction solutions. It is therefore important to develop nationwide education and training schemes for the building and electrical trades in which pupils, students and teaching staff can acquire practical knowledge of passive building, renovation with ambitious energy goals and the use of renewable energy in buildings.

Establishing 7 pilot projects would require a budget of NOK 6 million.<sup>2</sup>

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<sup>1</sup> The specialist council for building and construction techniques (FRBA) is working on developing the quality of the building and construction subjects at upper secondary level. FRBA consists of 13 members from teacher organisations and employer and employee organisations in the building and construction industry.

<sup>2</sup> The roadmap p. 57.

## 2. Increase recruitment of pupils with craft or journeyman's certificates from the school system into the building and construction industry

The building industry is subject to the effects of economic fluctuations, but assuming future stability there is a need for more qualified workers in the industry. A key instrument for meeting the workforce needs is to keep the workforce we already have.<sup>3</sup> It is also important to work on recruiting the younger working groups.

**Increase the recruitment of pupils with craft or journeyman's certificates from the school system into the building and construction industry.**

**Summary: General recruitment work is being carried out among industry organisations and education offices. There is however a need for further recruitment measures to get more pupils interested in the subject. No major new offensives have been started. The Federation of Norwegian Construction Industries is working on a recruitment project that could help to further strengthen the recruitment work.**

Measure initiated	Schedule	What is planned for the future, what can be contributed	Schedule
<b>A website has been established for use by schools, education offices and companies that give training</b>  <a href="http://www.murfag.no">www.murfag.no</a>	<b>Established in 2009 and updated in 2012</b>	<b>Disseminates knowledge to the educational system in collaboration with education offices and companies that give training</b>	<b>Updated but on-going</b>

**Local activities via NRL's education offices**

**(Courses in the use of the Heating Norm)<sup>4</sup>**

<b>On behalf of the industries, BNL has been responsible for joint recruitment material to first year building and construction</b>	<b>Every year</b>	<b>A major, multi-year recruitment project is being planned. This will focus on vocational training, engineering, vocational colleges,</b>	<b>Two to three years from autumn 2013</b>
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<sup>3</sup> Status quo analysis p. 41.

<sup>4</sup> The Heating Norm is about administrative provisions, laws, regulations and recommendations that affect the planning, building and operation of energy centres. It also takes into account requirements for using less fossil energy and lower energy consumption and the rules and requirements from the EU. In this context, water-borne heating systems are an important instrument for being able to meet national and global energy issues, as well as giving more flexibility with regard to reliable supply. The Heating Norm sets requirements for those who plan, build, control and operate water-borne energy systems. For more information, see <http://www.nrl.no/article.php?articleID=1815&categoryID=188>.



at upper secondary level

choice of subjects in secondary schools and “Bolig-ABC”.<sup>5</sup>

EBA has recruitment and competence among the strategic goals of its action plan

2010-2013

Specific action plan for recruitment presented to the main committee on 20 March 2013

2013 –

Joint recruitment project in the BNL family. EBA has set aside funding

EBA uses the building training offices<sup>6</sup> to recruit. They have contact with schools and participate in educational fairs

Continuous

Establishment of the website [www.blitømrer.no](http://www.blitømrer.no)

Launched Oct. 2012

General ongoing development in collaboration between the Norwegian Association of Building Constructors and associated education offices

Ongoing

#### Obstacles/problem areas

This measure is important for getting enough qualified workers in building and construction to enable for energy efficiency and energy conversion goals to be reached. Recruitment to the building and construction industry must start in secondary school. The present trend is for pupils to apply for other, more popular education and training, without this necessarily leading to a job. Guidance given at this level is traditionally poor or lacking.

<sup>5</sup> Bolig-ABC is a website for secondary schools. It considers questions relating to planning and living in one's own home by means of various practical exercises. The teaching material has been tried out in several schools and covers interior and exterior architecture, universal design - accessibility for all, construction, building model houses, electrical installations, economics, the environment and energy consumption.

<sup>6</sup> Byggopp's training offices are leaders in recruitment and information. For more information, see <http://www.byggopp.no>.

### 3. Establish more in-company training schemes

Establish more schemes in which vocational teachers can spend time in companies that have ambitious building projects in the area of energy, where they can get up-to-date information about new building techniques, new materials, new regulations etc.

**Summary:** In-company training scheme trials have been carried out. Work is now going on to establish a fixed structure for in-company training. Whether this scheme will help to raise energy competence will depend on whether such schemes are aimed at building projects with ambitious energy goals. There have been no such projects as yet, but there will be opportunities as a permanent scheme becomes established.

Measure initiated	Schedule	What is planned for the future, what can be contributed?	Schedule
<p><b>No systematic in-company training has been started for bricklaying, but some individual education offices have established such schemes</b></p> <p><b>(Akershus county council for example)</b></p>			
		<p><b>Industry associations can help with providing training places, but this measure must be initiated by the educational system.</b></p>	
The national in-company training trial has now been completed and evaluated by Fafo. <sup>7</sup>	2011 and 2012	Further work on in-company training is under discussion. The aim is to establish a fixed structure in which in-company training is included in the (formal and informal) further education of teachers and instructors	Autumn 2013 onwards

<sup>7</sup> It is reasonable to interpret the positive experience as indicating that in-company training is a good method for training vocational teachers. There are also theoretical grounds for this. It is probable that all vocational teachers would benefit from in-company training in those sections of working life that their pupils will enter. However the need for in-company training at individual, school and subject level varies somewhat between training types (width/depth) and subjects." Anne Inge Hilsen, Torgeir Nyen, and Anna Hagen Tønden, *Hospitering i fagopplæringen – evaluering av forsøksordninger i seks fylker*", Fafo report 2012:61, p. 120

The education offices establish better collaboration between schools and companies, so as to increase motivation for in-company training among teachers.

#### Obstacles/problem areas

Vocational teachers face particular challenges when it comes to covering their competence needs. General competence development schemes will not adequately cover the need for technical development and updates in all areas. The internal professional environment in a vocational college could be limited. Technological and other changes in the performance of the work may therefore require a technical update that is difficult to obtain outside the workplace. Energy consumption in buildings is a good example of an area in which things are moving quickly, with new building products, technology, requirement levels and focus areas for practical building and renovation. At the same time, specific training in the field of energy must be part of a larger whole.

The annual budget to enable full-scale in-company training in building and construction is estimated to be NOK 5 million.

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#### 4. Increase participation in further and post-qualifying education in the area of energy by teachers of vocational subjects.

Increase participation in further and post-qualifying education in the area of energy by teachers of vocational subjects.

Summary: Some small projects have been started that could be scaled up, but if these measures are to have an effect, greater efforts than are being made today will be required.

Measure initiated	Schedule	What is planned for the future, what can be contributed?	Schedule
		In a new strategy, the Low-energy Programme has chosen to prioritise post-qualifying training for teachers and teaching staff	2013-2015
The Heat Forum's five course models for the use of renewable energy sources and combination solutions can also be used for training vocational teachers.		Simpler technical solutions for heating are developed in the industry to meet the needs for heating and cooling passive buildings.	
Annual sessions for vocational teachers in heat technology courses.			

#### Obstacles/problem areas

The Karlsen Committee report on vocational training for the future says that vocational teachers have a great need for updating in line with technical changes in working life. Post-qualifying training for vocational teachers must therefore be boosted so that pupils can be given up-to-date knowledge about energy.

## 5. Revision of teaching aids

Include fresh knowledge about passive building, energy-efficient renovation and the use of renewable energy for heating and ventilation in the next revision of teaching aids and materials for the vocational subjects involved in building and construction.

Summary: Some work has been done here and further improvements are planned. Teaching aids have not been updated with regard to the requirements on passive building level and near-zero energy level that will come in 2015 and 2020. As a result of white paper number 20 (2012/13) an updating of teaching aids will have to occur. Energy efficiency and energy conversion can be included here.

Measure initiated	Schedule	What is planned for the future, what can be contributed?	Schedule
Industry teaching compendium for 3rd year upper secondary carpentry	Established spring 2011	Revision planned for spring 2014. Opportunity to include more about the measures	Ongoing
Post-qualifying training opportunities have been established in carpentry	Start-up in Oslo May 2013	Start-up in Bergen autumn 2013. Future training opportunities will be designed on the basis of response to these first two programmes of courses.	Ongoing
Post-qualifying training for carpenters includes a great deal of material linked to building physics, which is essential for energy-efficient building. The content of this will be updated and linked with developments in this field.		The costs for companies of offering post-qualifying training are considerable. At the same time, this post-qualifying training is essential for building skills. Clarification must be sought as to whether it is possible to receive support from various sources that would help to defray the cost of this training.	2013/2014
Updates have been made to the Heating Norm <sup>8</sup> and to the textbook "Competence compendium for heating systems 2011 <i>Water-borne heating and energy conversion. District heating centres using</i>		Further collaboration with ENOVA on teaching aids and materials	2013-2014

<sup>8</sup> See footnote 4.

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*renewable energy resources"*

A review can be begun into needs for teaching materials and their content. 2014/2015

**The Low-energy Programme has developed course material about passive building that will also be distributed to teachers and teaching staff. 2013**

**Obstacles/problem areas**

Teaching aids and materials must be updated in line with the development of requirement levels, building practice and practice in the building industry. The budget for updating in the energy field is estimated to be NOK 15 million (NOK 5 million a year for 3 years).

## 6. Review of curricula

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**Vocational college: Review of the curricula for building and climate and for climate, energy and the environment to assess the need for competence goals in the field of energy and the environment.**

**Summary: At present there are no concrete processes or any plans for these. Education in climate, energy and the environment has however been developed at six vocational colleges in Norway.**

<b>Measure initiated</b>	<b>Schedule</b>	<b>What is planned for the future, what can be contributed?</b>	<b>Schedule</b>
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**Education in climate, energy and the environment developed at six vocational colleges in Norway.**

### **Obstacles/problem areas**

**The vocational colleges offer an important formal education in building. But energy efficiency and the energy aspect have yet to be included in the teaching goals in this form of education. A review must therefore be made of the national goals so that they can coincide with society's ambitions in this area.**

## 6. Further education and training measures

### 1. Revision of education and training in building

**Master's certificate:** The master's certificate board<sup>9</sup> have decided that training in the building trades shall be extended with a teaching module. At present no decision has been made on what technical goals will be included. It would be natural for climate and energy to be included when the content is developed.

**Summary:** Several concrete processes are under way here. A master's certificate is being extended by a further teaching module. Implementation has not as yet been fully clarified. But there are good opportunities for energy efficiency and energy conversion being integrated into the teaching module for many of the subject groups.

Measure initiated	Schedule	What is planned for the future, what can be contributed?	Schedule
NML is working with the other main building disciplines to revise and develop master's training for bricklayers so as to increase its technical content.	Awaiting discussion by the master's certificate board	Difficult to determine	
The Norwegian Association of Building Constructors wishes "Post-qualifying training for carpenters" to fully or partially represent the teaching module in master's training for carpenters.	Discussed by the association's committee in January 2013. Now awaiting further discussion by the master's certificate board	Pending	Pending
The Norwegian Association of Building Constructors' education and training committee has been charged with developing future master carpenter training up to the year 2020.	Discussed by the association's committee in January 2013. Now awaiting further discussion by	Pending	Pending

<sup>9</sup> The master's certificate board determines which subjects are included, requirements for training and practice and the educational content, as well as adopting action plans and budgets.



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**the master's  
certificate  
board**

	The board will hold contact meetings with the various industries in the BNL community by summer 2013, so as to start work on devising content for the teaching module.	2013/2014
Plumbing has always had a teaching module, including a great deal about heating techniques.	Revision of the module for heating, including more about specific solutions for low-energy buildings.	2014

**Obstacles/problem areas**

Education to master's certificate standard is key to the further education of tradesmen in Norway. Today's education and training is primarily mercantile, with little technical content. It has now been decided that this education and training will include an appropriate teaching module. Thus it is vital that the technical teaching module in the new course of training includes key aspects of energy efficiency and energy conversion, on the basis of the competence goals devised in connection with the Build Up Skills projects.

## 2. Establishing a qualification/ certification scheme for installers of heating systems

Establishing a qualification/ certification scheme for installers of heating systems based on renewable energy. Implementation should be followed up with information about the scheme.

Consider establishing other qualification/certification schemes for tradesmen with regard to passive building or renovation with ambitious energy goals.

Summary: There are no plans for any certification schemes here. Competence-raising courses have been established for plumbers that have some of the same effects as certification.

Measure initiated	Schedule	What is planned for the future, what can be contributed?	Schedule
In connection with the Renewables Directive, Norway considers that the requirements for the installation of renewable heating have been fulfilled through the scheme for central approval and that no new scheme will therefore be established.			
KPK courses <sup>10</sup>  So-called KPK courses are short courses intended to improve skills within a narrow area of a particular subject - a new jointing method for example.  Courses relating to the Heating Norm		Establish several short KPK courses in energy efficiency and energy conversion.	

### Obstacles/problem areas

According to the Renewables Directive (2009/28/EC) article 14 (3), the EEA countries shall introduce a certification or qualification scheme for installers of technical systems based on renewable energy with effect from 2012. After considering the experience of qualification/certification schemes for heating fitters, the need for and benefits of similar schemes for other groups of tradesmen in building and construction could be evaluated.

<sup>10</sup> Short courses intended to improve skills, with the suppliers as course presenters

# 7. Formal further education and training

## 1. Pilot projects in the field of energy

Establishing a pilot project on energy to define specific formal training for tradesmen who wish to continue in their own vocational subject.

Summary: A pilot covering buildings that are worthy of preservation has been started. The pilot that has been started can be expanded in the field of energy, but there are as yet no firm plans for this.

Measure initiated	Schedule	What is planned for the future, what can be contributed?	Schedule
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Expansion of eLearning and iFag.

Include individual heating technique solutions in the industry's eLearning programme.

<p>Since 2005, BNL has been working on establishing a structure for formal further education and training in subjects. During the period 2005 to 2010, the Norwegian Association of Building Constructors and BNL had projects under the Building Cost Programme. After this programme was concluded, a project for further education and training in 2012 was supported by VOX, the Norwegian Building Authority and the Directorate for Cultural Heritage. In December 2012 the project presented its report <i>Good tradesmen for new generations</i>, which described the content and formulation of a formal system.</p>	<p>2012</p>	<p>In 2013, the project is now completing the description of a formal system, within the framework of the vocational colleges, and has started a pilot course in Røros, in collaboration with the building conservation centre in Røros.</p> <p>The project is continuing in collaboration with the Directorate for Cultural Heritage, VOX, Røros and Gjøvik Vocational College. There are also plans to link Oslo Vocational College with the project.</p>	<p>2013</p>
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The authorities have set up Bygg21<sup>11</sup>, which is a

Formal further education and training could be an area for this

<sup>11</sup> In Bygg21, the government is inviting the building industry and other key players to join a broadly-based collaboration in order to develop a knowledge-based building industry and increase competence and the ability to get things done at all levels of the industry. Bygg21 shall propose measures to increase competence and the

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**collaboration project intended  
to build skills in the building  
industry.**

**body to work on.**

#### **Obstacles/problem areas**

**A lack of development opportunities has been put forward as one reason why it can be difficult to keep skilled tradesmen in the building and construction industry. For tradesmen who wish to remain in their trades, there is currently no national system or offer of systematic education or craft or journeyman's certificates.**

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ability to get things done in the industry. Bygg21 shall develop strategies and measures for R&D and innovation, education and competence raising and the dissemination of knowledge and experience.

**2. Force the development and updating of building details, guidance material etc. at passive building level, for both new building and existing buildings**

One of the clear findings of the status analysis is that one of the most favoured methods of building up skills is the use of the Byggforsk series from SINTEF Building and Infrastructure.

**Force the development and updating of building details, guidance material etc. at passive building level, for both new building and existing buildings.**

**Summary: The industry organisation is in dialogue with SINTEF Building and infrastructure to develop new details. ENOVA has begun the development of recommendations for passive building. The area in which detail is most lacking is in existing buildings and energy efficiency.**

Measure initiated	Schedule	What is planned for the future, what can be contributed?	Schedule
<p><b>Meetings between the Norwegian Association of Building Constructors and SINTEF Building and Infrastructure</b></p> <p><b>This was because they wished to have the association's input in the further development of the Byggforsk series in terms of user friendliness, weaknesses, defects, potential etc.</b></p>		<p><b>A great need for new recommendations in significant areas. For example, there is a lack of suggested solutions for renovation work, non-standard details, the building as a whole, all the technical areas included, such as interaction and interfaces between technical and passive measures, correlation between products etc.</b></p>	
<p>The 2014 issue of the plumbing handbook is being revised, including making it available as an app.</p> <p>The Heating Norm is ready, but courses in the use of it are being run during this year.</p>		<p>Collaboration with SINTEF Building and Infrastructure on the development of more information sheets on individual, practical heating solutions.</p>	
		<p>When new regulatory requirements have been introduced previously, the authorities have supported the development of information sheets and course materials.</p>	<p>2014- 2015</p>

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**New energy requirements have been signalled for 2015 and it is possible that the government authorities will support the production of new recommendations**

#### **Obstacles/problem areas**

**The building industry uses building details and guidance material partly to ensure that the building solutions chosen are good and reliable. At present we lack robust standard solutions and other tools for planning and building passive buildings and renovating to a high energy standard.**

**The budget for developing and updating building detail sheets and guidance materials for passive building level (both new and existing buildings), with 50 new recommendations being introduced by 2020, is estimated to be NOK 20 million (NOK 5 million a year for four years).**

### 3. Develop existing course material

Further develop existing course material to give specific detailed knowledge for every single trade and to cover practical use of the knowledge on the building site.

Summary: Some things have been commenced here. But there is a need to increase the scope of available information and to ensure that what is developed is suited to each subject.

Measure initiated	Schedule	What is planned for the future, what can be contributed?	Schedule
		<p><b>Must be looked upon as an extension of the course material of the educational wing of the Norwegian Association of Building Contractors.<sup>12</sup></b></p>	
The Low-energy Programme has started a project to adapt technical material on energy renovation into a tool that could be used by both carpenters and other trades.	2013		
The Low-energy Programme has had a passive building course developed, with course compendia that give the industry a basis for preparing itself for future regulatory requirements. Compendia have been developed for planners, active tradesmen and project owners.	Completed 2012	The material is being adapted for the internet, so as to make it more easily available	2013
<b>Obstacles/problem areas</b>			
Some course material has been produced. One issue however is that part of what has been done is focused on general problem areas. This may be perceived to be uninteresting and as something of little benefit in terms of one's own day-to-day work.			
At the same time, it is important that the different trades have an interdisciplinary understanding of			

<sup>12</sup> Through its educational wing, the Norwegian Association of Building Contractors aims to help develop skills in companies by offering a wide range of useful courses.

what is needed to achieve energy-efficient projects.



#### 4. Arrange courses for instructors

Organise courses for instructors so as to ensure the capacity of qualified course holders and to give a geographical spread of course holders, making it easier to take courses locally.

Summary: There are some concrete plans for the implementation of courses for instructors in the future. These courses will give useful knowledge of whether these instructor courses are a good model for nationwide use.

Measure initiated	Schedule	What is planned for the future, what can be contributed?	Schedule
The Norwegian Association of Building Constructors' new programme of post-qualifying training programmes for carpenters		Depending on the response to these new courses, it may be necessary to establish courses for instructors	2013-2014
The Low-energy Programme is planning courses for instructors in passive building and energy renovation	Autumn 2013-2014		

The education offices arrange courses locally

#### Obstacles/problem areas

One issue is that courses are mainly arranged in a few cities and large towns. There is rarely an economic basis for organising courses in many places. The limited geographical spread of courses is often cited as an obstacle to tradesmen attending courses. By training instructors who have a more local base, the availability of course holders can be improved and the course costs can be reduced.

Dissemination of knowledge, courses and instructor's courses to a limited extent will cost approximately NOK 40 million (NOK 8 million a year for five years).

## 5. Increase course participation among tradesmen in building and construction.

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Increase course participation among tradesmen in building and construction. Relevant instruments could be competence requirements for performing building work, competence requirements for receiving subsidies for building projects with ambitious energy goals, establishing qualification/certification schemes for various professions and trades or establishing a training fund

Summary: There is a pressing need for more effort here, even though some activities have been commenced.

Measure initiated	Schedule	What is planned for the future, what can be contributed?	Schedule
No plans beyond the existing certification requirement with regard to the Heating Norm			
ENOVA and the Low-energy Programme have begun courses for energy advisers in spring 2013. Those who pass a test after completing the course will be able to call themselves energy advisers. This is not a formal approval scheme, but a way of identifying those who have skills above the minimum level. The competitive benefits for companies and individuals will hopefully increase course participation.	2013	There is a need for long-term training in this and for bodies other than the Low-energy programme and ENOVA to get involved. Work must continue into how this can be done.	Autumn 2013

### Obstacles/problem areas

Surveys that have been carried out for the Low-energy Programme show that the present day competence level in the field of energy among tradesmen and skilled workers is variable and in some cases lacking altogether. The results of the learning conditions monitor also show that the building and construction industry is less involved in formal further education, continuing education and learning-intensive work than many other industries. The percentage of tradesmen taking part in lifetime learning has been greatly reduced in recent years.

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## 6. Integrate courses on energy efficiency in buildings

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Integrating courses on energy efficiency in buildings, use of renewable energy and energy-efficient building products into the building products retailers' internal training. Summary: Some companies already have quite comprehensive training packages for employees, but scope and content varies from chain to chain.

Measure initiated	Schedule	What is planned for the future, what can be contributed?	Schedule
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Several of the building goods chains are now systematically working on internal training in the field of energy.

### Obstacles/problem areas

The building goods chains could be effective conveyors of information about energy-efficient solutions to both home owners and professional customers (builders). Knowledge of this area in the building goods industry is currently varied.

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## 8. Added value of the Build Up Skills project

The status analysis indicates several barriers to building up skills in this area.

- Very many of the energy efficiency measures that are carried out in existing buildings do not involve any need for planning permission. This means that no requirements are set for the competence of those doing the work, and there is no control over whether the work has been done correctly.
- Few customers demand competence in the field of energy; as a rule the choice of tradesmen is done on the basis of the lowest price.
- The building industry in Norway is very good and many builders have full order books. This means there is little incentive for companies to obtain extra skills in order to get more jobs. The companies also often prioritise the implementation of projects and have little time to set aside for post-qualifying training.
- There are few positive incentives in the form of good financial conditions that would contribute to changing demand in the market.

According to the industry organisations, these last three obstacles mean that it may not be appropriate to introduce either mandatory or voluntary certification schemes. This means that the industry organisations are continually stressing the disadvantages of introducing such schemes.<sup>13</sup>

The Norwegian Build Up Skills project has therefore focused on looking at how energy efficiency can be implemented in existing structures. Experience shows us that the easiest way to achieve the greatest effect is if knowledge about energy is a natural part of teaching in line with other areas. In the proposed measures for education and training, therefore, consideration has been given to how existing and proposed schemes can include more teaching about energy efficiency.

## 9. Challenges associated with the Build Up Skills project

Experience from meetings during the Build Up Skills project is that so far the individual bodies involved have not made decisions that will contribute greatly to meeting the needs that have been identified, so as to implement the measures described above.

Projects have been started that coincide with the Norwegian Build Up Skills roadmap, but these must be scaled up considerably to make a greater effect in such a large industry. Feedback from those involved is that the roadmap could form a basis for and provide continuity to further work.

When the combined contributions of the individual bodies are considered as a whole, here too they do not appear adequate to develop sufficient competence in relation to need. This will be the greatest challenge in further work - getting the different stakeholders to contribute more, in a real and coordinated manner, instead of waiting for others to take responsibility.

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<sup>13</sup> Status analysis p. 41.

## 10. How to maintain the added value of the project?

For many of the measures proposed in the roadmap, more time will be needed to make a sufficient impact where it is needed. It is therefore important to seek to maintain the added value of the work done during the Build Up Skills project. A natural way of doing this would be to continue the platform that has been created during the Build Up Skills project, and in particular the collaboration between the Low-energy Programme and the industry organisations. ENOVA is an important contributor and should be part of the platform, either through direct involvement or as a member of the Low-energy Programme committee.

The entire added value of the Build Up Skills project should be continued through the platform. But one thing that is considered to be fundamental is to ensure that the competence goals, which were devised in connection with the status analysis, are included in curricula. The upper secondary curriculum creates a binding basis for the individual subject curricula in the individual schools. The curriculum is made up of a general section and a section for each individual subject and includes purpose, main areas/structure, competence goals for each year, basic skills and provisions for final assessment. Academic and vocational education and training is based on close collaboration between members of trade and industry and the education authorities. It therefore provides an opportunity for those involved, together with the Low-energy Programme, to continue the work of the Build Up Skills project in energy skills for tradesmen.

The competence of existing tradesmen should also be regularly evaluated. In connection with Build Up Skills Norway and the Low-energy Programme's other activities, surveys have been made of the competence of various categories of tradesmen, with the emphasis on finding out the extent to which they have the necessary knowledge to satisfy the requirements of existing and future regulations on energy efficiency in buildings. The results indicate a need for considerable improvement in both secondary and upper secondary education and training for many vocational groups. The aim is to carry out further surveys of competence so as to determine the extent to which the measures that have been reviewed, initiated or proposed during the Build Up Skills project have contributed to increasing the competence of tradesmen.

## 11. Conclusion

The results of the Build Up Skills project, both in form of reports (the status analysis, the roadmap and the implementation plan) and in the meetings and other contact with many bodies and agencies, create a solid basis for further work and have broad support among the partners. The Low-energy Programme is a collaboration between the building industry and government agencies and will be central in following up on the work of Build Up Skills.

The conclusion should not be static, however, but dynamic, and look at future challenges. The biggest challenge in the area of skills is associated with existing buildings and skilled workers will be essential to obtain the greatest energy savings here. At the same time, there are few driving forces that are supporting the desired development of this market segment.

This also has consequences for the value of post-qualifying training in this area. When builders do not obtain competitive advantages from post-qualifying training, there is little reason to believe that they will devote time and resources to it.

In the pending implementation of the Build Up Skills project, it will be important to focus on post-qualifying training in energy efficiency measures for existing buildings. The further development of guidelines, recommendations and course material is one area that must be worked on further and where little is happening today.

Good courses and training opportunities must be developed that can improve the skills of building workers. For these measures to succeed, however, they must be combined with instruments that create competitive advantages for companies that take post-qualifying training beyond the minimum levels of the regulatory requirements. Further work must be done on looking into the competitive benefits that can be realised and that would lead to greater change in the market.

In addition to post-qualifying training in energy efficiency in existing buildings, there is a great need for more competence in the education system. A few pilot projects have been started that have had a positive effect on the competence of both teachers and pupils. As well as increasing knowledge about energy-efficient buildings, the projects have also had positive effects on the dropout rates from building and construction studies in these schools and the pupils have found it easier to find apprenticeships. The challenge for the future will be to integrate this knowledge into the entire educational system.

## **12. Authors and contributors**

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