



**BUILD UP
SKILLS**

ENERGY TRAINING
FOR BUILDERS



**BUILD UP Skills – Netherlands –
National Roadmap & Results of WP3
Final Report**



May 2013



Further information

More details on BUILD UP Skills 'Netherlands' can be found on www.buildupskills.nl

More details on BUILD UP Skills can be found on www.buildupskills.eu

For the IEE programme, see <http://ec.europa.eu/intelligentenergy>

Our vision

NEW ENERGY CHALLENGES REQUIRE SUSTAINABILITY SKILLS

Business and education jointly responsible for skilled workers in order to realise the EU '20-20-20' objectives.

INTRODUCTION

Europe is developing an active policy in the area of energy conservation and zero-energy construction. In the Netherlands we see the direct corollary of this; in 2020 to 16% renewable energy and 20% lower CO₂ emissions. This presents a strong challenge both for the sector itself and for the supply industry. Seizing these opportunities means being prepared for the market demands and so having sufficiently knowledgeable and skilled workers. Aligning professional training with practice in the installation and construction sectors is one of these challenges. It is up to business and education to optimise and flesh out this alignment.

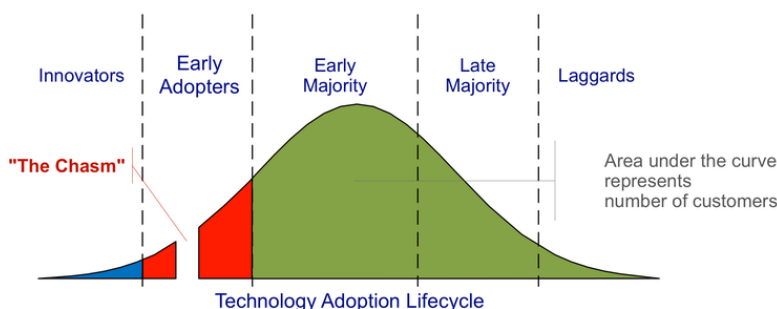
With the Build Up Skills initiative, Intelligent Energy Europe focuses on a joining of forces in order to increase the number of skilled workers in the construction sector (additional training upskilling of approx. 150,000 to 200,000 people).

Build Up Skills endeavours to establish additional education and training of skilled workers, like builders and fitters, so that in any case the objectives for the built environment in 2020 can be realised.

In order to realise the 2020 objectives successfully, also in terms of quality, upskilling is needed for at least 150,000-200,000 skilled workers in the construction and installation sectors. In addition, it is desirable that new influx of qualified school leavers from initial education is skilled in sustainability-critical competences. The same applies to lateral entrants and workers from abroad. The present structure of the education system in the Netherlands is not flexible enough for this.

SUMMARY & ANALYSIS OF THE SITUATION

Many of the changes in the construction and installation practice are driven by product innovations. In order to visualise the consequences of this for education, in this summary the various states of education are linked to the implementation phases of innovations, as distinguished in the 'technology adoption lifecycle' (Everett Rogers).



In order to realise the EU 20-20-20 objectives for 2020, it will be necessary to bridge the knowledge and experience gap between the innovators and the early majority.

At the same time, changes are taking place at the crossroads of disciplines.

For sustainable energy and energy conservation, companies need people who both understand the details and can take a comprehensive approach. It is important to keep a close eye on these developments.

Initial and post-initial education

In the current education system for the construction and installation sector, there is in practice an unnatural distinction between initial and post-initial education. Going forward, a better match between initial and post-initial training would be desirable.

Initial education

Initial education is based on the qualification files and corresponding professional competency profiles. The qualification files are drawn up nationally by the knowledge centres of the various professional sectors. The knowledge centre for the construction and technical installation are Fundeon (construction), Kenteq (installation), Savantis (finishing) and SH&M (Hout en Meubel). In these knowledge centres representatives of business and education meet to:

- ensure an up-to-date and effective qualification structure. This is set up based on up-to-date professional competency profiles, which describe the competences these professionals are expected to have;
- ensure a sufficient number and quality of learning companies;
- support learning companies in their training tasks;
- collect, analyse and publish labour market data.
(This is not a formal task description laid down in law, but is being performed by them.)

Organising this on a national level creates unambiguity and quality control of the professional education in the Netherlands. Employers can trust that a diploma gained in Groningen represents the same quality level as one gained in Maastricht.

Furthermore, students gain experience in daily practice as an employee (BBL) or intern (BOL) during 20%-80% of the education time of developments in the workplace and therefore also of the innovations. In fact, the learning companies are important partners for the RTCs in the development of up-to-date training in professional field committees and/or advisory bodies.

Post-initial education

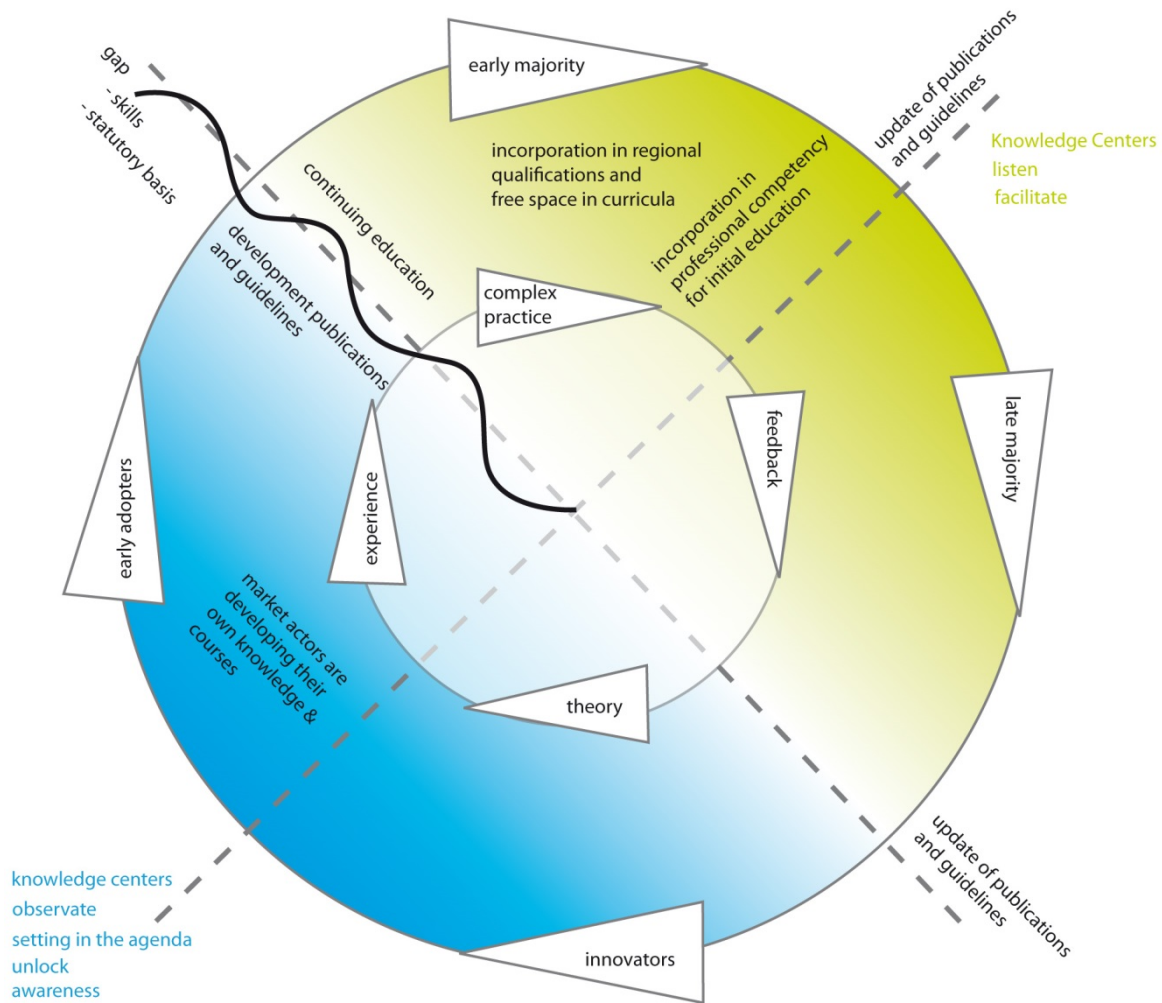
The professional post-initial training is based on demand from market parties for retraining. This demand often results from the first large-scale application of new technologies. Successful embedding in the design, construction and maintenance practice often requires retraining (internal/external). The resulting education demands are a translation of the demand from the 'early majority' after the innovation gap ('the Chasm').

Not until these innovations are sufficiently fundamental or substantial are they systematically embedded in BCPs and curricula. During the update cycle (currently 6 years) this content is recorded in the formal qualification file. In the meantime, individual teachers often include innovations in their teaching programmes, either in the discretionary part of the curriculum or otherwise. At the same time, industry leaders in the construction and installation sectors often train their own people internally. They set up experiments in which they can experiment with the use of new technologies, working methods and concepts. These internal training issues are a translation of the issues and solutions that the innovators and early adopters (before the innovation gap) encounter. This presents opportunities, whereby initial and post-initial training can strengthen each other by exchanging expertise, manpower and resources.

The present structure for the development and maintenance of the qualification structure under supervision and responsibility of the Foundation for the Cooperation on Vocational Education, Training and the Labour Market (Stichting Beroepsonderwijs Bedrijfsleven, or SBB) fully supports this development.

This may create a new dynamic in terms of the development and implementation of innovations (sustainability) that both can benefit from.

The chart below summarises this dynamic with its interactions and connections. The chart combines the basic ingredients for a learning individual/organisation/sector/society with the 'technology adoption lifecycle'. This combination makes it possible to perform various analyses aimed at system optimisation.



Three major success factors can be distinguished in this cycle. The first success factor concerns the degree to which the knowledge obtained from the various experimental set-ups can be made available. The second success factor is the degree to which potential users are aware of the pros and cons of an innovation so that they can decide whether to adopt it. The third success factor relates to the degree to which actors are focused on actively searching for new knowledge. Actions to accelerate the implementation of innovations should be aimed at this.

SOLUTION DIRECTION 'Focus on future-oriented craftsmanship'

Achieving the objectives for 2020 will require a applying a range of technologies that are currently innovative. Innovators and early adopters have meanwhile gained ample practical experience of these technologies. And knowledge institutions like SBR and ISSO have translated a great deal of this knowledge into draft guidelines and in some cases into course material and exams. BuildUpSkillsNL believes that over the next three years we will find ourselves right in the middle of the 'Knowledge Gap' (or Chasm). Focusing all efforts on raising consciousness and competence for the next three years will be needed to bridge this gap to a sufficient degree. Only then will the 'early mass' on the demand side of the market gain enough confidence to order a move towards sustainability at a manageable risk or no risk.

BuildUpSkillsNL proposes as the key intervention to complement the professional competency profiles in 2013 and 2013 with competencies which the innovators and early adopters have determined are essential for the desired quality level of sustainable buildings & installations. Adjustments of BCPs are made based on the maintenance cycle, in conjunction with analysis of signals received from the chain. Matching these with the available retraining supply bears out which type of training is lacking. Also, the new and existing training supply can be improved and fine-tuned based on the profiles, especially in terms of certification and accreditation. (objective institute-independent testing and recognised certification of training institutes and diplomas). In addition to reducing qualifications, this also speeds up the BCP update cycle.

Through this 'focus on future-oriented skills' the stakeholders take their responsibility; they focus more on early identification of innovative knowledge, on making this knowledge transparent and available and encouraging that the most up-to-date knowledge is actually used and transmitted. With an active attitude from the government impeding laws and legislation can be identified promptly, so that solutions can be worked on from an early stage. This means a promotion of the sector and a strengthening of the contribution to the Dutch economy: in this way our companies in this sector will increase their competitive position and their innovative power. The skilled workers will work in a sector with a positive and innovative image that they can be proud of. They will be the most persuasive ambassadors.

Summary

Before you is the report of the National Roadmap BuildUpSkills, containing the findings of the Dutch consortium that is working on the project. In the report you will find the context of the BuildUpSkills project, formulated actions based on the status quo analysis, the results of WP3 (including deliverables) and a proposed Roadmap.

This Roadmap outlines the formulated actions in order to work to improve skills levels between 2013 and 2020 so that the European 20-20-20 objectives can be realised from that perspective.

Purpose

The purpose of this Roadmap is threefold.

1. Presenting the status quo as of April 2013, based on the draft report Roadmap Actions (of 1 March 2013), supplemented with comments received from market parties.
Based on discussions with market parties in order to broaden support (endorsement) these actions have been clustered and linked to the parties involved, resulting in an effective and efficient action plan.
2. This document served as conference document for the working conference on 18 April 2013.
3. For the realisation of a number of high-priority clusters the consortium will submit a subsequent application to IEE Europe before 1 May. This application will be drawn up in parallel with the endorsement process.

Reading guide

For the summary, we have described our vision, which also fleshes out an analytic framework. Using this analytic framework, the actions for the Roadmap have been prioritised. In addition, the developed analytic model serves as a guideline for endorsement discussions with market parties.

After a brief introduction of the BuildUpSkills project, in two chapters more background information is given about:

- The National Energy Objectives 2020 (Chapter 2)
- Demand for skilled personnel in the construction sector and the desired relationship between initial and post-initial training (Chapter 3).

Chapter 4 describes the barriers identified in the status quo analysis. In an appendix, solution-oriented actions, measures and prioritisation are given for these.

Clustering of actions

The parts discussed separately in Chapter 4 are developed in Chapter 5 into a Roadmap towards 2020. In this Roadmap, the actions are visually grouped so that their location in time, priority and stakeholders are clear at a glance.

Based on the endorsement discussions and comments from market parties the individual actions have been clustered and linked to the parties involved.

In the detailing of the clustering, interdependence between 'separate' actions has been charted. For example, formulated actions on accreditation will be more effective and win more support after actions in the context of 'BCP+' have been completed.

BUS-NL Platform

Since the Roadmap has a 2013-2020 time frame, a 'virtual' platform has been set up where:

- information is exchanged;
- parties jointly look for opportunities to actually carry out the formulated actions;
- the Roadmap is frequently updated based on monitoring;
- successes are shared with stakeholders.

This platform will be open to organisations who feel engaged by the sketched developments and wish to play an active role in shaping skills between 2013 and 2020.

List of abbreviations and definitions

Abbreviation	Meaning
BBL	Professional coaching path (on-the-job training makes up at least 60% of total curriculum)
BCP	Professional competency profile
BOL	Professional training path (on-the-job training makes up between 20 and 60% of total curriculum).
BPV	On-the-job training
BUS-NL	BuildUpSkills Netherlands
CREBO	Central Professional Education Registry
EPBD	Energy Performance of Buildings Directive
EVC	Previously gained competencies
HSB	Timber frame construction
HTK	High Temperature Cooling
KBB	Knowledge Centre for Professional Training and Business. Within the scope BUS-NL these include Fundeon, Kenteq, Savantis and Hout en Meubel
KD	Qualification file
LTV	Low Temperature Heating
OCW	Ministry of Education, Culture and Science
PAC	Joint Committee
PI	Post-initial
RES	Renewable Energy Sources
ROC	Regional Training Centre

Term	Meaning
BCP+	Within the scope of BUS-NL; upgrading existing professional competency profiles for use in post-initial training in order to be able to develop retraining.
BCP (Professional competency profile)	Professional competency profiles provide descriptions of experienced professional workers and are used to draw up qualification files.
Crebo code	A unique code for every qualification in a qualification file for administrative purposes in education.
Zero-energy building	The energy consumption of the building and its installations is equal to or less than the sustainably generated energy. <i>Note: In BUS-NL this definition has been adopted. At this time there is not yet a generally accepted definition of a zero-energy building. Discussions are ongoing.</i>
Initial training	Training people receive before entering the labour market; within the scope of BUS-NL this refers to the connecting further education courses in intermediate vocational education
Qualification	A qualification is <u>one</u> profession in a qualification file.
Qualification file	A qualification file describes what a participant in education should know and master at the end of a (intermediate vocational training) course. A qualification file describes the level of starting professional workers (school leavers).
Qualification structure	List of all the qualification files of the relevant KBB.
Joint committee	Organisation that consults to determine the content of intermediate vocational training. For every KBB the joint committee is the designated meeting platform between organised business and vocational education institutions. The objective of a joint committee is to find consensus on the contents of the qualification files.
Prefab	Abbreviation of 'prefabricated'. In the context of zero-energy construction, this refers to constructing building elements that are later taken to the building site and fitted there.
Post-initial training	Training received after leaving initial training.

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1 Introduction

The Netherlands pursues an active energy policy. Its three main objectives are: energy supply must be (1) reliable, (2) affordable and (3) sustainable. On a national level, we are working towards achieving 16% sustainable energy and a 20% CO₂-reduction by 2020.

National energy policy and strategy

- Covenants
- Innovation Agenda Energy for the Built Environment
- Municipal Climate Agreement
- Top sector Energy
- Second National Energy Efficiency Action Plan
- Vision Document on Housing [“Woonvisie”]

Meeting these targets is a challenge for the construction and installation sector, as for the related supply industry.

All the more so, if we consider current economic circumstances.

One of the preconditions for meeting the said targets is the availability of sufficient trained staff on the construction site in the lead-up to

2020. In particular, there is a need for people who are able to deliver as a team in compliance with very strict requirements.

BuildUpSkills Netherlands (abbreviated as BUS-NL) is a joint initiative by all relevant partners in the Netherlands to cooperate in fulfilling this condition as quickly as possible.¹

BUS-NL focuses on *additional, post-initial* education and training of skilled labour and other site staff, such as construction workers and installers.

The chief focus is on the following professions:

- Renovation and upgrading of thermal shells in existing buildings (including restoration), and application of thermal shell technology in new buildings.
- Selection, maintenance, fine-tuning and replacement of both energy efficient and power generating installations (RES) in existing and new buildings.
- Construction site supervisors who are capable of giving effective instructions, checking and validating work on thermal shells and energy systems.
- At (middle) management level: advisors, calculators, constructors, etc.

In order to establish adequately what is needed to achieve the desired situation from where we stand now, the first step in this project was to research the status quo in the Netherlands. Subsequently, we looked at the workforce required.

The next few paragraphs in this introductory chapter provide a summary of the status quo analysis, both in quantitative and qualitative terms. The full analysis may be found in the BUS-NL status quo report: <http://netherlands.buildupskills.eu/sites/default/files/Build up skills - Rapport Status Quo.pdf>

1.1 Status quo

1.1.1 The market

Taking a look at the Dutch construction sector, we see that a large number of companies in the sector are SME's. There are only a few large companies. Many companies form temporary partnerships in order to tackle larger and complex assignments. Almost one third of the work is subcontracted. Most companies are regionally active, and only a small number operate in the whole of the Netherlands.

Euroconstruct and TNO, i.a., expect major growth from the sustainability work required on the existing building stock. Several factors contribute: stimulation subsidies granted by the Dutch government and the rapidly growing array of energy saving installations and building materials, further enhanced by what the international market has to offer.

Demand is also changing. The Energy Label for New Buildings empowers clients to monitor the energy performance of buildings. This provides valuable opportunities for innovative construction and installation businesses which specialize in sustainable renovation. The same applies for new buildings, even of this market is slack. Businesses which fail to keep up with developments and the more traditional construction companies will drop out.

¹ A Dutch consortium which includes OTIB, ISSO, SBR, Fundeon, Kenteq, Hibin and MBO vocational training services, modelled after European BUILD UP Skills - an initiative undertaken by the IEE (intelligent Energy Europe).

When we look at the concepts for zero-energy buildings developed over the past few years, it becomes clear that the core of the work will be twofold: on-site locating, fitting, and assembly of prefab construction elements, and focus on insulation technology (insulation and airtightness) modifications and installation technology concepts for zero-energy buildings. Existing buildings offer the best opportunities for sustainability gains in absolute terms, being cost savings for households/users, as investment potential for the sector and possibly for reductions of CO₂-emissions:

Table 1.1 Average energy consumption (gas and electricity) of homes in the Netherlands:

	2005	2006	2007	2008
Average household gas consumption [m ³]	1,664	1,643	1,560	1,625
Average household electricity consumption [kWh]	3,397	3,402	3,521	3,558

However, implementation of sustainability in existing buildings is far more challenging in technical and equipment terms than in new construction. Generally, regulations for new construction are stricter than for existing buildings (Buildings Decree 2012). Owners of existing buildings gauge investments in sustainability usually against returns (higher income, lower ownership costs), while sitting tenants check the charging on of these investments against the returns (lower energy costs and increased comfort).

For an extensive statistics on the construction and energy sectors, please refer to Chapters 3 and 5 of the BUS-NL status quo report, see <http://netherlands.buildupskills.eu/en/national-project>

1.1.1 Education

Looking at initial training, the basis of intermediate vocational education (MBO) and adult education is formed by professional qualifications and descriptions. The development cycle of qualification files, curricula, training materials and exams that follows the description of the professional content has a 3-year turnaround time. Programmes and exams in initial MBO education may still lag behind somewhat on the latest needs and developments in the market. The slow pace at which new developments are absorbed into MBO education is to some extent unavoidable and even wise. But lagging too far behind the rapid developments in sustainable construction would jeopardise the basis that intermediate vocational education offers young people for executive and supervisory professions in the construction trade.

Some recent developments in vocational education respond to a wish to include recent developments in sustainable construction in the qualification files. For example, it is advisable for all parties involved to anticipate on the action plan of the Ministry of OCW to substantially reduce the number of qualifications at MBO level and place them in a domain structure.

This domain structure creates the possibility of an integrated approach of construction and installation techniques. The action plan also makes it possible to include professional profile tasks in the files for industry-specific professions and specialisations. The plan furthermore leaves room for making choices as possible enhancement of the curriculum based on individual training plans that education institutes and participants define together.

1.2 Obstacles

1.2.1 In construction

The main short-term obstacle to achieving the 2020 sustainability objectives is the current economic crisis. When we focus on the construction sector, we find that sustainability aspects are not included as a matter of course in renovation plans for existing buildings. It is often unclear who should take the lead. The responsibility for implementing energy saving measures is often left to the client and the government.

Also, the economic potential of sustainability (in long-term operations) is not generally appreciated, and quality has often fallen short of the client's demands. The latter has affected the reputation of both the construction and the installation sector.

There is also a continuing failure to cooperate across disciplines, in spite of considerable progress over the past few years. Building zero-energy buildings requires adjusted work processes; BUS-NL sees a central role for quality, in relation to standards and measuring methods.

1.2.2 In education

The training courses in the installation and construction sectors are ill matched to the demands and wishes that practice with throw up over the next few years, even though many demands and wishes have already been included in post-initial training. This was shown by national research conducted in the context of a European-wide programme. See <http://netherlands.buildupskills.eu/en/national-project> In order to be able to build zero-energy buildings in 2020, the vocational training courses must modernise the content of their education significantly. An obstacle with the post-initial training courses is that they are often not well-known among the target group.

Educators also need retraining. The MBO institutes are also faced with a shortage of teachers in Construction, Installation, Finishing and (property) maintenance due to ageing. Together with the falling numbers of students, this is one of the main worries.

1.3 Required workforce in 2020

1.3.1 Skills gap

(Initial) construction and installation training currently places too much emphasis on the individual construction and installation work and not enough on the realisation of the final project in the context of the building. There should be more focus on detail, evaluation, collaboration and ambassadorship for sustainable solutions. There is a shortage of education and follow-up training courses that embed specific developments and 'soft skills' and comprehensive preparation and execution in the curriculum.

1.3.2 New specialisations

Through a number of steps - including an inventory of the available supply of post-initial education - BUS-NL has created a detailed picture of professional specialisations and new professions that result from the wish to realise zero-energy buildings. The recognised specialisations are then linked to a list (drawn up by BUS-NL) of existing basic professions.

For the construction field, this means for example that the profession 'glazier' will be enriched by specialisations like 'high-grade insulated glass specialist', 'sun blocking window film specialist' and 'switchable glass/smart glass specialist'.

For the profession of 'carpenter' BUS-NL distinguishes eight specialisations, such as 'on-site installer of prefab HSB façade elements' and 'on-site prefab roof specialist' and 'on-site fitter of prefab wooden frame façade parts'.

In the insulation technology field emerging specialisations have also been identified. For example, within the profession 'e-installation mechanic' the specialisations 'sustainable light specialist', 'solar energy specialist' and 'domotica specialist' have developed. In the field of cooling technology BUS-NL distinguishes 'ventilation specialist', 'high-temperature cooling (HTK) specialist', and 'solar energy specialist'.

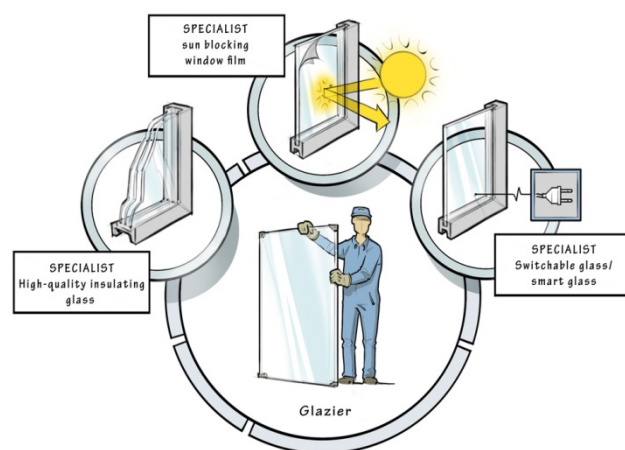


Fig. 1.1 Development of existing basic professions into new professions

A comprehensive overview of the most relevant specialisations for the professional fields is provided in paragraph 3.2.

Due to the developments in the field of sustainable construction, demand for specialisations around insulation and prefab elements has grown to such an extent that BUS-NL wonders if the following three professions may be missing from the range of professions in construction: 'Construction insulation technician' and 'fitter and installer of prefab elements in construction'.

Remarks There is a BCP for 'installer of wooden prefab elements (KBB Stichting Hout en Meubel).

1.3.3 Upskilling starts in 2013

If we intend to achieve the required minimum levels for the use of renewable energy in the built environment before 2015, it appears that we have to give extra momentum to upskilling of construction workers as early as the second half of 2013. Initially, this concerns training some 50,000 - 70,000 people. If both the construction and installation sector going forward to 2015 make all possible efforts to ensure realising the objectives, this will encourage businesses and consumers to invest in sustainability of buildings and using renewable energy. Good reason then for parties to do their bit in the realisation of the objectives BUS-NL has set for the next 7 years.

1.3.4 Market research

At the end of 2012 the BUS-NL consortium commissioned a market research to be able to determine how the market is moving towards the 2020 objectives. Initially, qualitative research was started among a group of companies that are considered industry leaders in terms of their contributions to realising the 2020 objectives. These companies, 'the market', comprised clients, manufacturers and suppliers and executing parties.

Based on in-depth interviews a quantitative study was then launched among 900 companies (again comprised of clients, manufacturers and suppliers and executing parties). The interviewees were mainly educated to MBO level.

The study conducted can be sketched as follows:

Desk research	Qualitative research	Quantitative research	Analysis, reporting and advice
<i>Activities:</i>	<i>Activities:</i>	<i>Activities:</i>	<i>Activities:</i>
Study existing research reports, like 'analysis of the national status quo' and 'innovatiemotor'	20 in-depth telephone interviews with all market parties on their expectations for 2020 and actions planned/taken	Programming the survey and then conduct it by telephone among 900 companies	Data analysis in SPSS and processing data into information in PowerPoint report
<i>Output:</i>	<i>Output:</i>	<i>Output:</i>	<i>Output:</i>
Initial qualitative insight into status quo of market and technologies	Deeper insight into market situation in terms of 2020 objectives in order to develop effective questionnaire	Reliable data on public awareness of objectives and (perceived) obstacles and benefits	Insight into position on adoption curve and advice on the best policy to inform and engage the sector

Fig. 1.2 Market research in outline

After the study, the research findings were discussed with industry leaders not interviewed before, about the objectives for 2020 in order to check the findings with their views.

The findings of the market research study are included in (the appendices of) this report. All the results of the study can be downloaded from www.buildupskills.nl (only in Dutch)

1.4 Purpose and methodology of preparation of Roadmap

1.4.1 Objective and scope

The objective of the BuildUpSkills (Pillar I) project is to identify and quantify the demand for workers who are skilled in realising zero-energy buildings. These are relevant professions and competency levels in the construction, installation, finishing and maintenance sectors. Based on this, changes that must be made to the present system are discussed, including concrete measures to meet these needs.

This report is the result of the following activities of the BUS-NL project:

- Workpackage (WP3), Set up of the Roadmap
- Workpackage (WP4), Endorsement

With these reports, the objective mentioned above is pursued in the Netherlands by developing a National Roadmap 2020 (Ch 5).

In the preparation of the National Roadmap a method has been developed to keep the information on the status quo (WP2) up to date. See also the appendix on Monitoring.

1.4.2 Methodology in preparation of Roadmap

The composition of the project team (OTIB, ISSO, SBR, Fundeon, Kenteq, Hibin and MBO-Diensten) has directly affected the choice of methodology. All partners are knowledgeable of the developments in their construction 'patch', all have a direct relationship with the relevant market factors, possess a great deal of know-how and also have extensive networks.

Before BuildUpSkills, most partners had rarely collaborated with each other in projects. This is because the Dutch construction industry is divided into a number of clearly distinct sectors: construction (subdivided into B&U 'Civil and utility construction' and GWW 'groundwork, road and hydraulic engineering'), the installation sector, initial education and retraining courses.

The fact that the partners were well-versed in the issues generated effective cross-fertilisation, provided the right partners were collaborating. This approach also improved relations between the partners, which in itself can be considered a success. It also provides a solid basis for future platform activities initiated by BUS-NL.

After (October 2012) the definitive Dutch status quo report was presented, the consortium immediately started developing and endorsing a National Roadmap. In outline the following activities have been performed in this context:

Workshop WP3.1 en WP3.2 ('brown paper session')

- Identify required and lacking professions and skills
- Determine required adjustments of professional profiles
- Measures to boost demand for labour
- Opportunities to stimulate demand for training
- Record aspects that form obstacles to demand for education

Workshop WP3.3

- Take stock of existing methods and processes for testing and examination
- Investigate possibilities of quality assurance in evaluations
- Think about structures/systems that promote innovation in education and testing

Market research (follow-up on initial results from workshop WP3.2)

- Determine how the market moves towards 2020 objectives (paragraph 1.3.4).

Extensive reports on the workshops have been produced, which sketch the contours of the follow-up:

Reports

Based on the partial results from the workshops and the market research, in early 2013 a start was made on the WP-3 report based on the European template.

The following reports were prepared in this context:

January 2013 : Draft report (v1) evaluating and processing of registration of partners

February 2013 : Draft report (v2) for IEE Europe

March 2013 : Draft report (v3) March for endorsement purposes

April 2013 : Report finalised, basis for Working Conference (18 April 2013)

WP4 Endorsement

In the first quarter of 2013 one-on-one discussions were held by almost all market parties. To broaden and strengthen support (endorsement) the Roadmap actions thus developed were clustered and linked to the parties involved, generating an effective and efficient action plan.

Pillar II

The definitive report also forms the basis for the next phase of the BuildUpSkills project, pillar II. This concerns the execution of actions laid down in the National Roadmap, focusing on the introduction of new and/or upgrading of existing qualification schemes, education and/or training for the benefit of post-initial education.

The member states must submit their application for the first tender, pillar II no later than 30 April 2013. The application is being prepared by the Dutch consortium.

2 National energy objectives 2020

A major contribution is expected of the construction sector in Europe in the realisation of the following European objectives for 2020 (based on 1990):

- 20% reduction of energy consumption;
- 20% reduction of CO₂-emissions;
- 20% share of renewable energy in meeting energy needs.

The Dutch energy policy is matched to the European objectives. In this area, the Netherlands pursues an active policy with three objectives in terms of the energy supply. It must be as (1) reliable, (2) affordable and (3) sustainable as possible.

The energy objectives of the Dutch policy for 2020 were laid down in 2007 in the Clean & Energy Efficient [Schoon & Zuinig] government programme: 20% sustainable energy, 30% CO₂-reduction compared to 1990 and 2% energy savings per year.

In the government coalition agreement 'Bruggen Slaan' (2012), the targets for energy savings were adjusted. Instead of Clean & Energy Efficient programme, targets were set at 16% sustainable energy and 20% CO₂-reduction by 2020. For 2050 the objective is for energy supply to be fully energy neutral, and power generation to be 100% sustainable.

A more detailed description of the Dutch energy policy is set out in Chapter 4 of the status quo report on <http://netherlands.buildupskills.eu/en/national-project>

2.1 Energy policy NL - Energy savings buildings

National regulations on energy saving are related to the EU Energy Performance of Buildings Directive, EPBD, revised in 2010 (2010/31/EU).

The EPBD originally follows on from the 2002/92/EG directive that was transformed via the Decision to implement the directive on the energy performance of buildings (BEG) and the Regulation on Energy Performance of Buildings (REG).

The implementation is conducted through the 'Energy & the Built Environment' programme of Agency NL, contracted by the ministries of VROM/WWI and the National Energy Efficient Action Plans (NEEAPs).

Table 2.1 - Overview of implementation of EU Directives in Dutch policy

EU Directive	Implementation by the Netherlands
Directive 2002/92/EC(2002);	Decision to implement the Directive on Energy Performance of Buildings (2006)
	Regulation on Energy Performance of Buildings (REG) (2006)
	Decision on Energy Performance of Buildings (BEG) (2006)
	National Energy Efficiency Action Plan
	NEEAP-1 (2007)
	Work programme Clean & Energy Efficient [Schoon & Zuinig] (2007)
	Lente-akkoord (2008-2015)
2010/31/EU revised EPBD (2010)	Implementation through the Energy & Built Environment programme of NL Agency
	Second National Energy Efficiency Action Plan NEEAP-2 (2011)
	Energy Label (2008)
	Building Decree, EPC requirement

The EPBD requires all EU member states to take the following measures:

- Energy performance shall be calculated in accordance with methodology for the calculation of integral energy performance of buildings (as laid down in EPG: NEN 7120);
- Minimum requirements for energy performance of new buildings and of existing large buildings which are undergoing major renovation (laid down in the EPC index: Building Decree 2012)
- Energy certification of buildings (laid down in EI index: Energy Label)
- Regular checks of hot water boilers and air conditioning systems in buildings and once-only full review of heating installations with boilers older than 15 years (yet to be approved).

2.2 Energy policy NL - Renewable energy sources

National regulations on the application of renewable energy are related to the EU Directive for the Promotion of the Use of Energy from Renewable Sources, or the RES Directive (2009/28/EC) in short.

The implementation is currently being done through Agency NL. The accreditation system for curricula and exams in the field of small-scale sustainable energy applications was drawn up by KBI commissioned by Agency NL. This refers to installation of (small-scale) applications for solar energy (electricity and heat), heat pumps and shallow geothermal systems, biomass burning boilers and heaters. As of 1 January 2013 the national registry of accredited courses and exams can be inspected on www.qbisnl.nl.

2.3 Contribution from construction

The built environment (utility and residential) generates 34% of total CO₂-emissions. Together, industry, utility buildings and residential houses represent a huge potential for CO₂-reduction and energy savings. The ambition for the total built environment is a CO₂-emissions reduction of between 6 and 11 Mt /year in 2020.

3 Demand for skilled personnel in the construction sector

(Initial) construction and installation training currently places too much emphasis on the individual construction and installation tasks and not enough on the realisation of the final project in the context of the building. There should be more focus on detail, evaluation, collaboration and ambassadorship for sustainable solutions. There is a shortage of education and follow-up training courses that embed specific developments and 'soft skills', and comprehensive preparation and execution in the teaching programme.

In determining the missing, yet to be developed skills of the professions within the scope of BUS-NL, the key question is:

which existing professions are impacted most by more sustainability in the built environment?

3.1 Existing professions

In the status quo analysis the professions in the construction and installation sectors were identified that touch on the objectives of BUS-NL. The Dutch BuildUpSkills website (<http://www.buildupskills.nl>) presents this overview of professions in the construction and installation sectors that are connected to zero-energy building.

Of the professions at the various MBO levels listed in this overview, the following are most relevant in the context of BUS-NL:

Installation

- E-installations and service mechanic E-installations (solar energy, sustainable light, control technology/domotica, Power Quality and monitoring).
- Engineering installation mechanic and Engineering service mechanic (heat pump, energy generation, low temperature systems, ventilation systems, monitoring and solar energy, thermal).
- Cooling mechanic and cooling service mechanic (ventilation systems, monitoring, high temperature cooling systems and solar energy, cooling).
- Roof mechanic (solar energy, wind energy).
- Draftsman (all installations)
- Work planner (all installations)

Construction

- Carpenter (foundations, floor, façade, roof, window fittings, windows and doors, fitting, joints).
- Bricklayer (insulation, protecting insulation and construction from damp, wall/roof joints, roof openings, and anchoring to foundation beam).
- Roofer (roof insulation, protecting insulation and construction, fitting and insulating roof extensions).
- Works planner (preparation of construction parts and joints).
- Executor (supervision of construction parts and joints).

Finishing and (property) maintenance

- Glazier (fitting glass to windows, doors and window fittings).
- Plasterer (insulation of outside façade wall and inner leaf).
- Ceiling and wall mechanic (inner leaf insulation)
- Painter.
- Floor fitter.

Notes on the origin of the profession selection:

An inventory was made of professions that are found in the construction and installation sectors in the Netherlands. A list was made of the profession titles that feature in the professional competency profiles (BCP) and qualification files (KD). In addition to the primary profession titles in competency profiles, alternative names are also included as mentioned in the professional competency profiles. In terms of the qualification files, names of professions have been used as they figure in the titles of those files as well as names of professions used to describe job options after completion of education (education differentiation).

As there are many synonyms and, in addition, a number of homonyms to denote certain professions, this inventory initially takes into account only those professions which appear in the titles of the qualification files and the professional competency profiles.

Furthermore, for practical purposes, professions have been clustered by area of expertise and by level. For BUS-NL, this has resulted in practical overview, whereby all occupations found in a single matrix cell are backed by a database containing names of professions.

The complete overview shows only construction and installation professions or groups of professions which are directly related to meeting the target of realising zero-energy buildings. For many professions this relationship is obvious (like carpenters and roofers). For other professions, an explanation is needed: a scaffold builder, for instance, when fixing his scaffolding, must be aware of the building's thermal shell and careful to leave it intact or repair it if necessary. The areas of expertise which have been coloured black have the closest links to BUS-NL. These are the areas requiring most effort in order to achieve the desired level for the workers in these professions.

The overview presents professions which cover a number of occupations in a separate table. These are professions which embrace more than one area of expertise. See also

<http://netherlands.buildupskills.eu/sites/default/files/Occupations%20in%20Construction-%20and%20Installationsector.xls>

3.2 Specialisations and new professions

To get an idea of existing professional specialisations and new professions emerging as a result of the ambition to realise zero-energy buildings, the following three steps were taken:

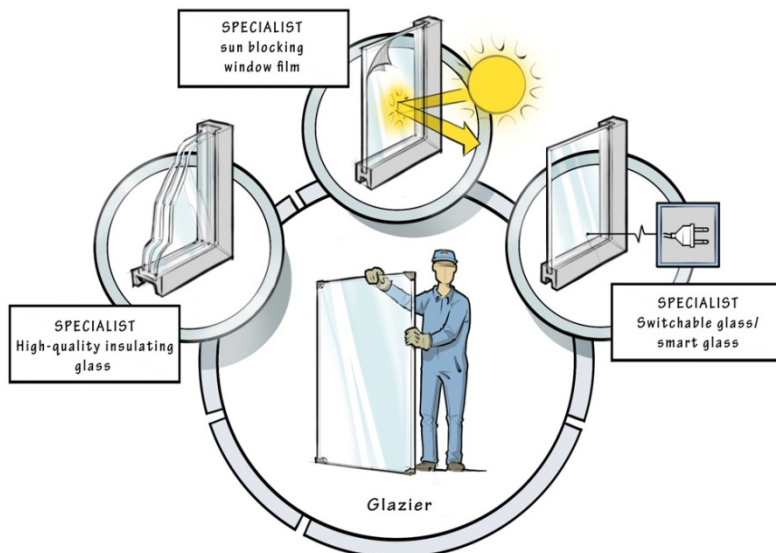
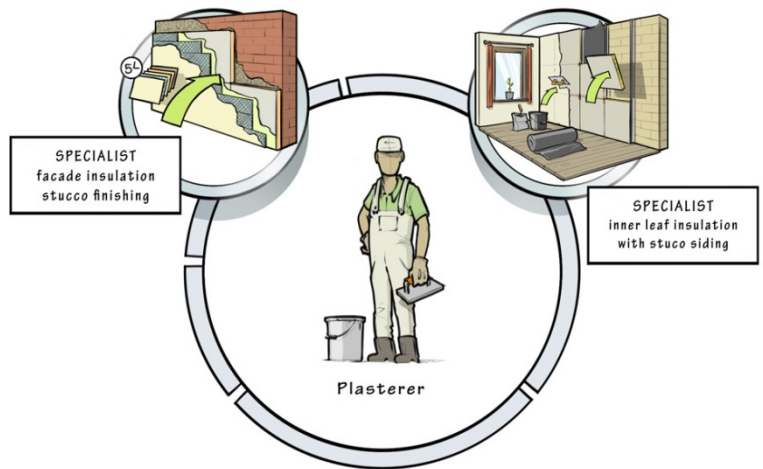
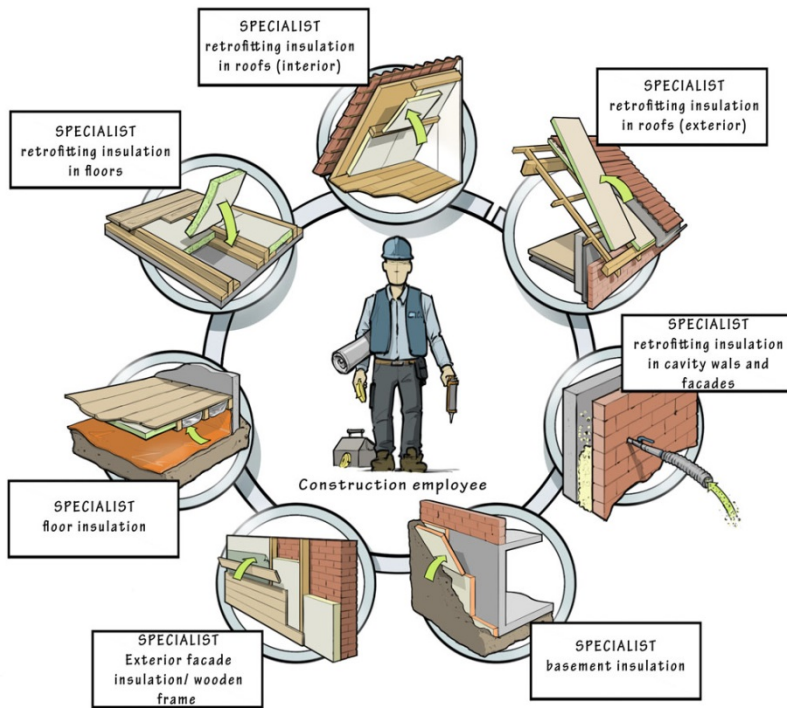
1. An inventory was made of available post-initial training and education which is directly related to the zero-energy buildings target. To understand the gap, relevant courses which prepare for specialised, new occupations (but which have not yet been assimilated in initial education) have been clustered into 'specialisations'.
2. Based on construction and technical installation concepts for zero-energy buildings, we identified specialisations which are necessary for the successful implementation of these concepts, following specific and detailed procedures, and for the correct use of materials, systems and working methods.
3. We looked at outreach of specialisations in practice, and how they are portrayed in commercials along highways and on the Internet.

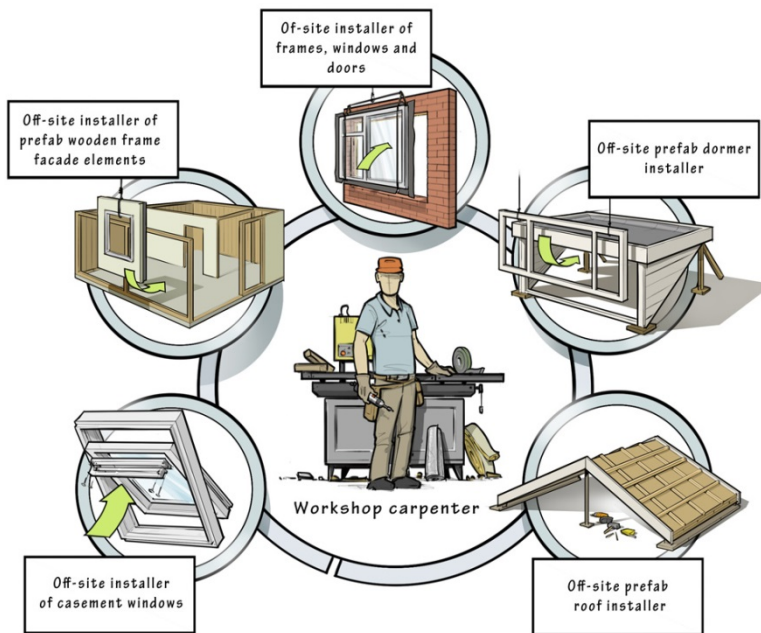
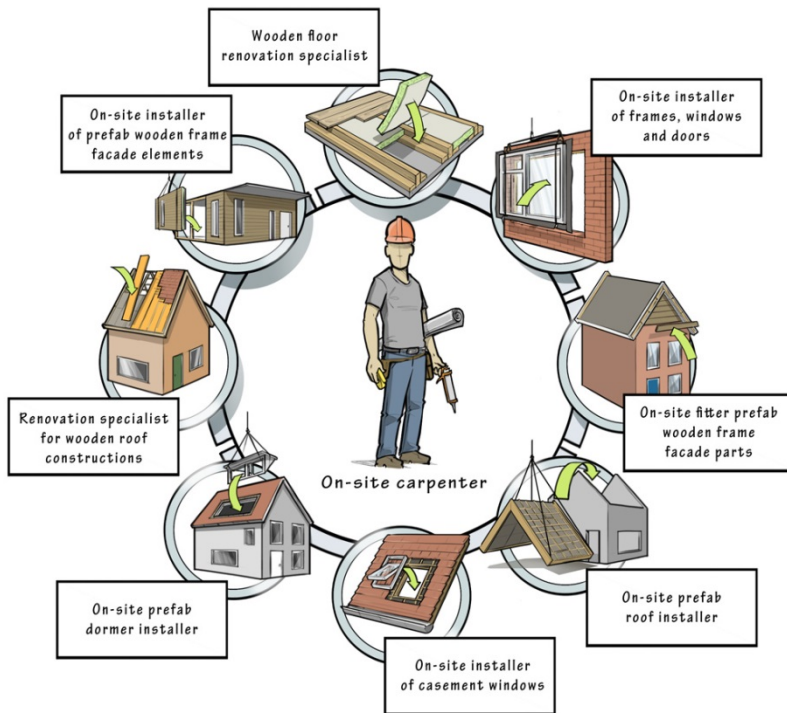
The identified specialisations were then linked to basic professions in the professional qualification structure (MBO level 2-3). This was done because over 40% of workers entering the construction sector are qualified school leavers. Also, the target group description for post-initial training refers to the basic professions.

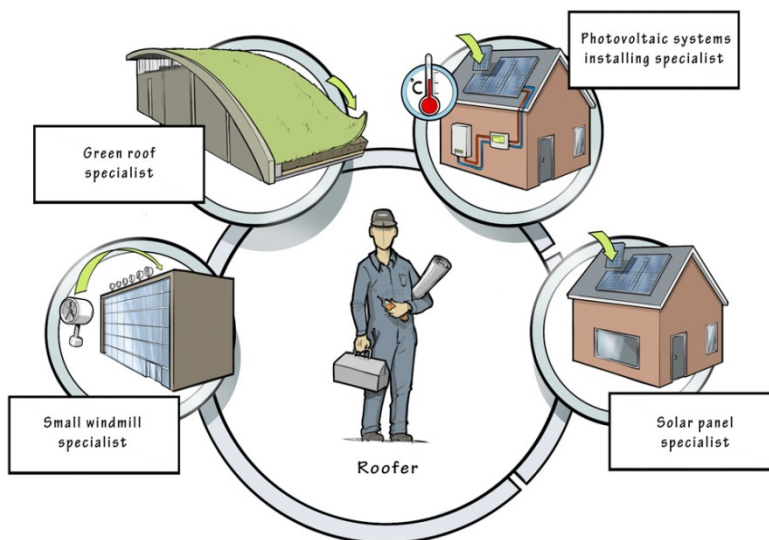
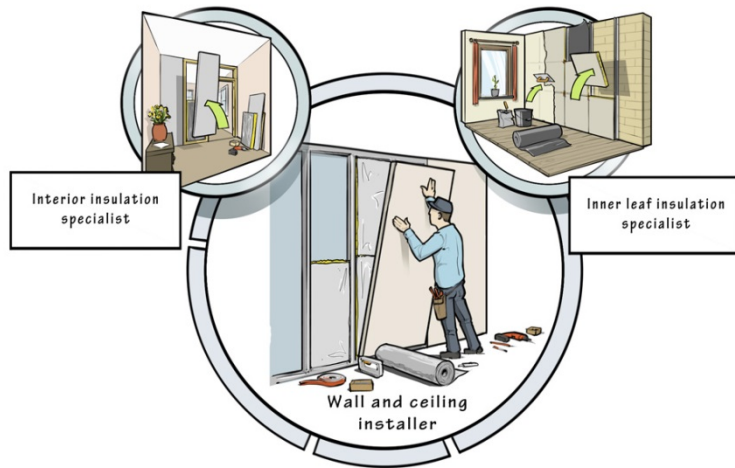
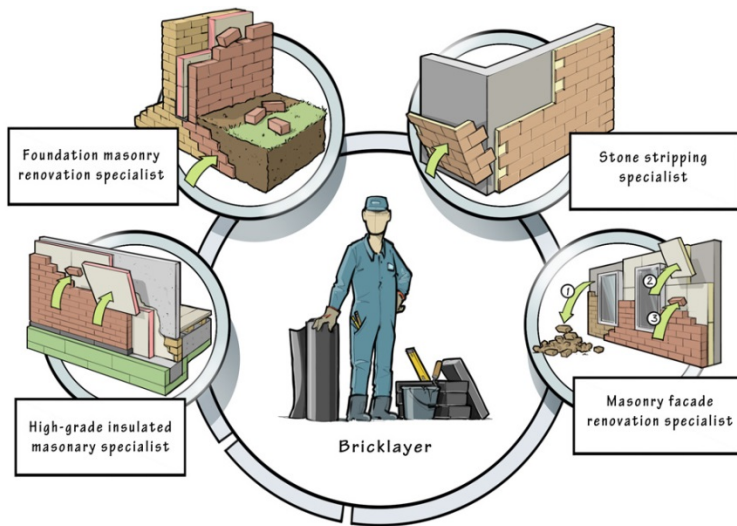
The most relevant specialisations for operating in the fields of construction and technical installation are shown in the figures below.

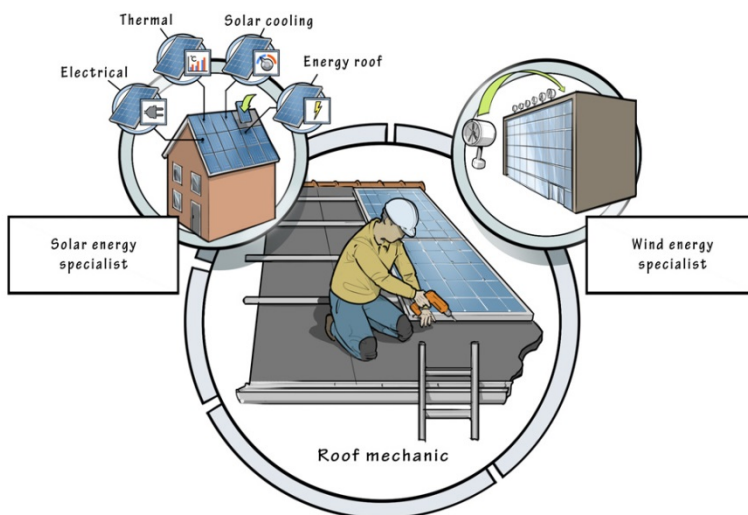
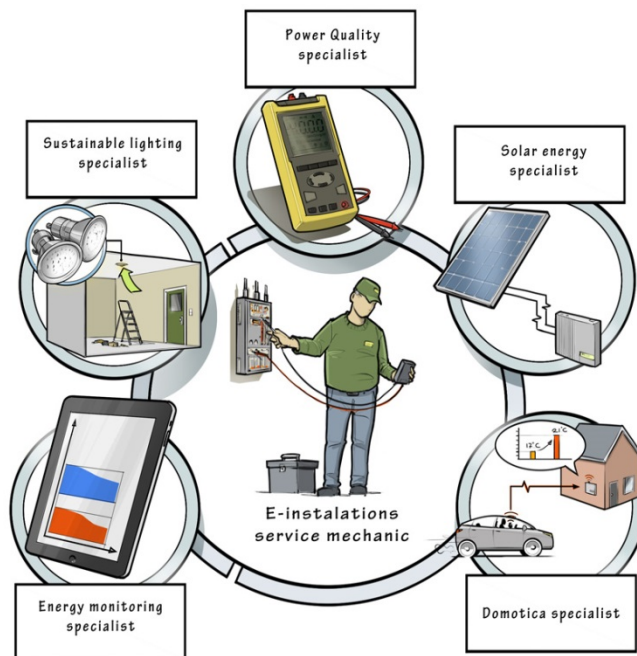
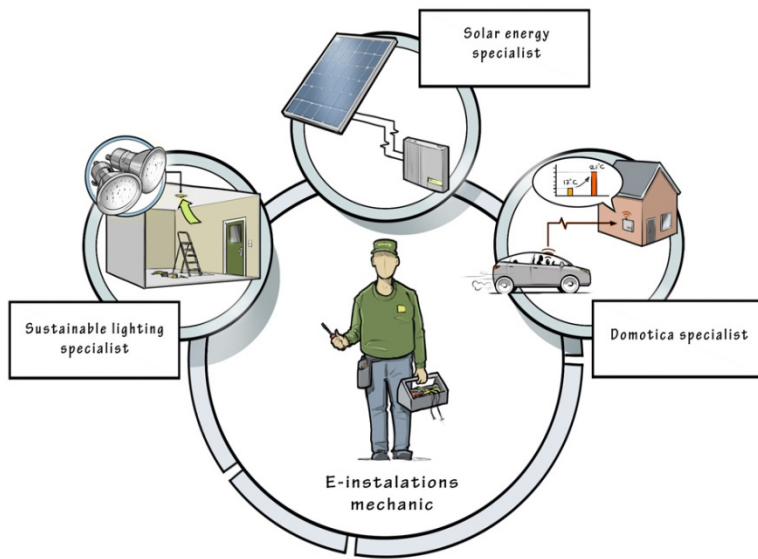
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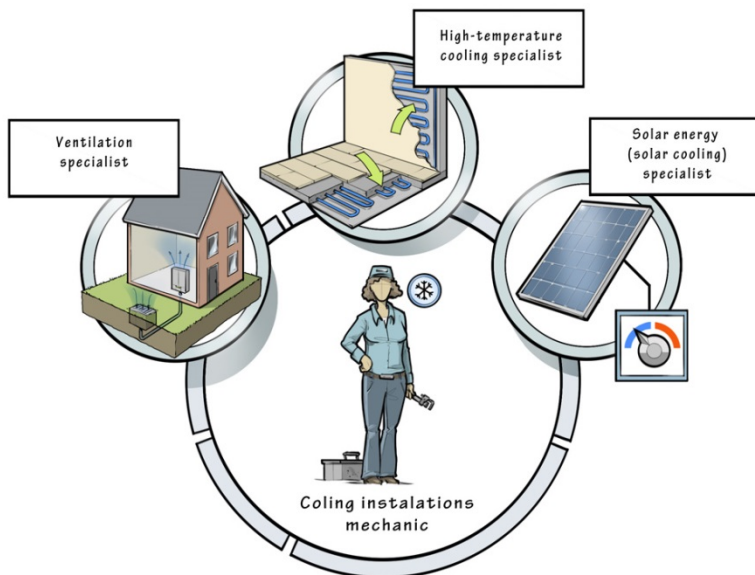
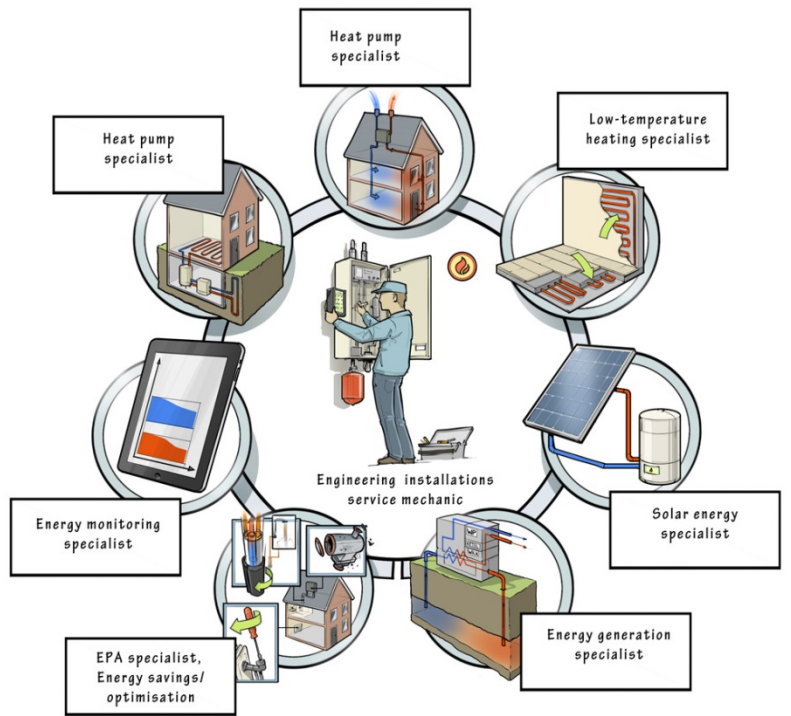
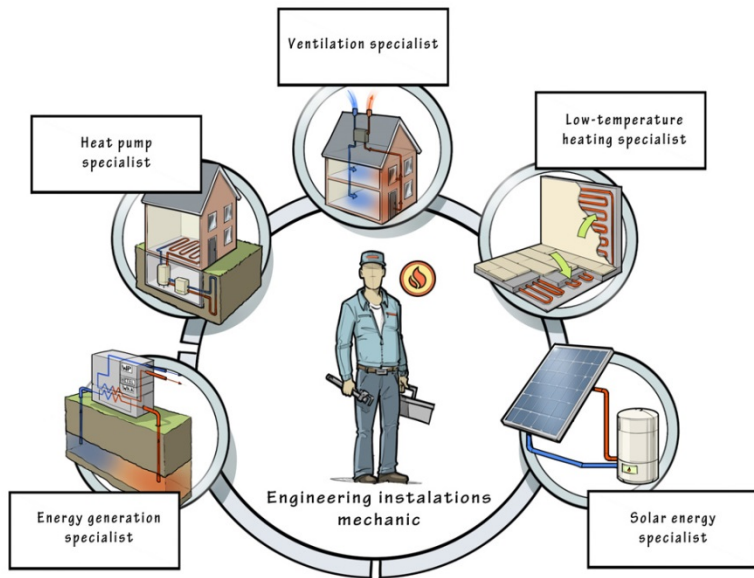
For this reason, for cross-profession professions (which by and of themselves comprise more than one craft) such as supervisor, executor, and work planner we have not drawn up specialisations.

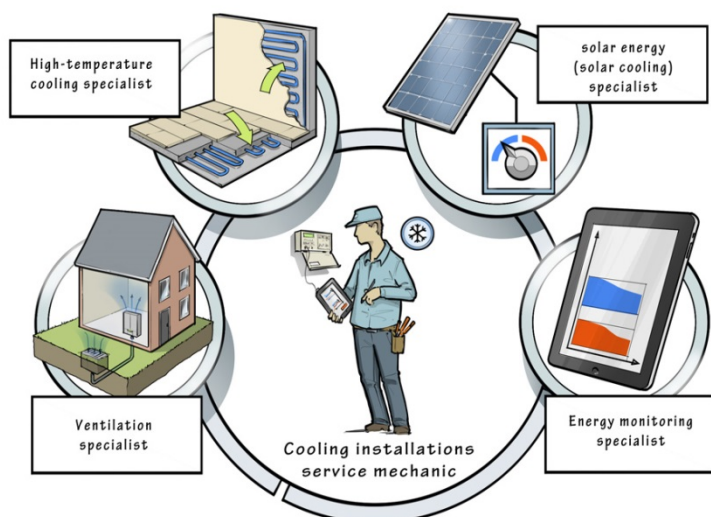












3.2.1 Potentially missing professions

A number of specialisations are not easily linked to an existing professional competency profile. This is true in particular of specialisations in the fields of insulation and prefab elements.

Insulation specialist

In the list of construction professions derived from professional competency profiles, the profession of insulation specialist or retrofitter of insulation (airtight construction) does not feature. Specialisations in this field are numerous, however. In Belgium, by way of contrast, a professional competency profile was recently developed for insulation specialist for basic foundations, walls and roofs. This profile focuses on retrofitting insulation in dwellings or buildings and corresponds to tasks performed by insulation retrofitters working for Dutch companies which are members of VENIN.

Mistakes are often made in installing insulation in both new housing and renovated buildings. The proneness to mistakes in this area justifies recognition of the profession of insulation specialist, in particular with a view to meeting the 2020 targets. Currently in practice, it is not always clear who is responsible for the correct fitting of insulation material.

Because insulation performance is becoming increasingly important, fully trained professionals responsible for the correct installation/application of insulation and sealing materials should be present on every construction site. This assumes that such professionals have been fully trained.

Fitter and installer of prefab parts in construction

The list of professions derived from professional competency profiles does not include the profession of fitter and installer of prefab parts. Because manufacture of (components for) roofs, floors and façades is shifting to factories and a lot can go wrong in the surrounding construction, it seems advisable to train professionals specifically for such tasks. They would then bear responsibility for the correct fitting and installing of prefab parts in new buildings and renovation projects. Training could include specialisations for stone-like and wooden prefab elements.

3.2.2 Post-initial training and professions

The summarising tables 3.1 and 3.2 show which basic professions currently exist and which specialisations will be necessary to achieve the 2020 objectives.

The 'initial' column lists the relevant qualification files and qualifications from initial training.

The specialised professions require post-initial training. The tables show the availability of these trainings as well as whether this availability will be sufficient in the future. For example, there will be training courses for the solar energy specialisation for E-installations service mechanics, but not enough. This is because the technology for harnessing electricity from solar cells is developing rapidly (new development: transparent window fittings containing solar cells). The final column shows these estimated shortages of training courses.

A '+' means a surplus, '-' a shortage and '=' means: good balance.

Table 3.1 Basic professions and specialisations in construction

Basic profession	Post-initial		Initial		Retraining	
Construction sector (B)	Professional profile (BCP)	Specialisations and skills	Qual. file (crebo)	Qualifications (crebo)	Availability	Estimated shortage
On-site carpenter	Finishing carpenter / allround carpenter / new building carpenter / workshop carpenter	On-site installer of casement windows	22010	94920 / 94931 / 94932 / 94933	Available	=
		On-site installer of prefab wooden frame façade elements			Available	=
		Wooden floor renovation specialist			Available	+/=
		Renovation specialist for wooden roof constructions			Available	=
		On-site prefab dormer installer			Available	=
		On-site prefab roof installer			Available	-
		On-site fitter of prefab wooden frame façade parts			Available	=
		On-site installer of frames, windows and doors			Available	-
Bricklayer	Allround bricklayer / new construction bricklayer	Masonry foundation renovation specialist	22009	93901 / 93902 / 94821 / 94822 / 94823	Available	=
		Stone stripping specialist			Available	=
		Masonry facade renovation specialist			Available	=
		High quality insulation masonry specialist			Available	=
Roofer	Allround roofer / roofer / roof mechanic	PV systems installation specialist	22004	93841 / 93846 / 93845	Available	-
		Photovoltaic systems installing specialist			Available	-
		Green roof specialist			Not available	-
Glazier	Glazier	High-grade insulating glass specialist	22036	94480 / 94490	Available	-
		Specialist sun blocking window film			Not available	-
Plasterer	Plasterer	Exterior façade insulation specialist (stucco)	22032	93600 / 91501 / 91502	Available	-
		Specialist inner leaf insulation with stucco siding			-	
Workshop carpenter	workshop carpenter	On-site installer of casement windows	22010	94920 / 94931	Available	-
		On-site installer of prefab wooden frame façade elements			Available	-
		On-site prefab dormer installer			Available	-
		On-site prefab roof installer			Available	-
		On-site installer of frames, windows and doors			Available	-
Ceiling and wall installer	Allround installer modular walls and ceilings	Specialist insulation inner leaf	22028	95170	-	-
		Specialist insulation façades inner leaf			-	-
Construction worker	covers multiple profession designations	Specialist retrofitting insulation in floors	covers multiple crebos	94920	Available	-
		Specialist retrofitting insulation in roofs			Available	-
		Crawl space retrofitting insulation specialist			Available	-
		Specialist in retrofitting insulation in cavity walls and façades			Available	-
		Exterior façade insulation specialist			Available	-
		Basement insulation specialist			Available	-
Floor fitter	Cast floor specialist	Floor insulation and finishing specialist	22029	95150	Available	-

Table 3.2 Basic professions and specialisations in installation

Basic profession	Post-initial		Initial		Retraining	
	Installation sector (I)	Professional profile (BCP)	Specialisations and skills	Qual. file (crebo)	Qualifications (crebo)	Availability
I10 - E-installations mechanic	Installation mechanic / electro-technical installation mechanic	Sustainable lighting specialist	22048	94271 / 94281	Not available	-
		Solar energy specialist			Available	-
		Domotica specialist			Not available	-
I11 - E-installations service mechanic	Service engineer / electro-technical installation mechanic	Sustainable lighting specialist	22049	94321	Not available	-
		Solar energy specialist			Available	-
		Domotica specialist			Not available	-
		Power quality specialist			Not available	-
		Energy monitoring specialist			Not available	-
I12 - Engineering installation mechanic	Installation mechanic residential construction	Heat pumps specialist	22048	94272 / 94282	Available	=
		Ventilation specialist			Available	=
		LTV specialist			Available	=
		Solar energy specialist			Available	=
		Energy generation specialist			Not available	-
I13 - Engineering installation service mechanic	Installation service mechanic / maintenance mechanic	Heat pumps specialist	22049	94323 / 95472	Available	=
		Ventilation specialist			Available	=
		High temperature cooling specialist			Available	=
		Solar energy specialist			Available	=
		Energy generation specialist			Not available	-
		Energy monitoring specialist			Not available	-
		EPA specialist, Energy savings/optimisation			Available	=
Cooling installations mechanic	(first) cooling installations mechanic / inspection mechanic cooling installations	Ventilation specialist	22048	94274 / 94284	Available	=
		High-temperature cooling (HTK) specialist			Not available	-
		Solar energy specialist			Available	=
I17 - Cooling installations service mechanic	(first) cooling installations mechanic / inspection mechanic cooling installations	Ventilation specialist	22049	94322	Available	=
		High-temperature cooling (HTK) specialist			Not available	-
		Solar energy specialist			Available	=
		Energy monitoring specialist			Not available	-
I18 - Roof mechanic	Roof mechanic	Solar energy specialist	22048	93843 / 94283	Available	=
		Wind energy specialist			Not available	-

Table 3.1 and 3.2 have been detailed in appendix I, which lists and explains per profession:

- which technology and phase of the innovation system is applicable;
- whether retraining is available;
(Note: due to the volume, the details on the available retraining is set out in a separate table in appendix I)
- whether some form of retraining quality assurance has been organised;
- the priorities in terms of adjustments of professional profiles, qualifications and courses.

3.2.3 Relationship of BCPs with initial training for the professions

In the preparation of the overview of professions explained above, professional competency profiles (BCP) have been used, which form the basis of the initial MBO training (construction and installation).

These BCPs are on average eight to twelve years old. As such, they lag behind recent developments in the professional field. In view of these developments it is desirable that MBO education makes knowledge and skills relevant for the realisation of low-energy and sustainable buildings a key plank of its curriculum.

Although concepts like sustainable building, heat loss, energy (consumption), CO₂-reduction, insulation and other concepts related to sustainable building are still scarce in professional practice, they must still be related to the BCPs. The BCPs in the installation sector will be updated in 2013.

A key issue here is that a BCP is not a theoretical document. It establishes the activities of experienced professionals. It does not describe future activities, but present-day activities. If activities do not (yet) figure or scarcely figure in practice, they will also not figure in the BCP. Since the BCP describes the fully skilled professional, this is also a good benchmark for post-initial education and measuring and evaluating informal learning (EVC).

Figure 3.1 clarifies the development of professions and the need to innovate (new knowledge in) BCPs on an ongoing basis. Three knowledge levels are distinguished:

- existing knowledge, visible in activities aimed at maintaining the curriculum;
- new knowledge, visible in the innovation of the curriculum;
- future knowledge, visible in activities aimed at discovering which new knowledge will be needed in the future.

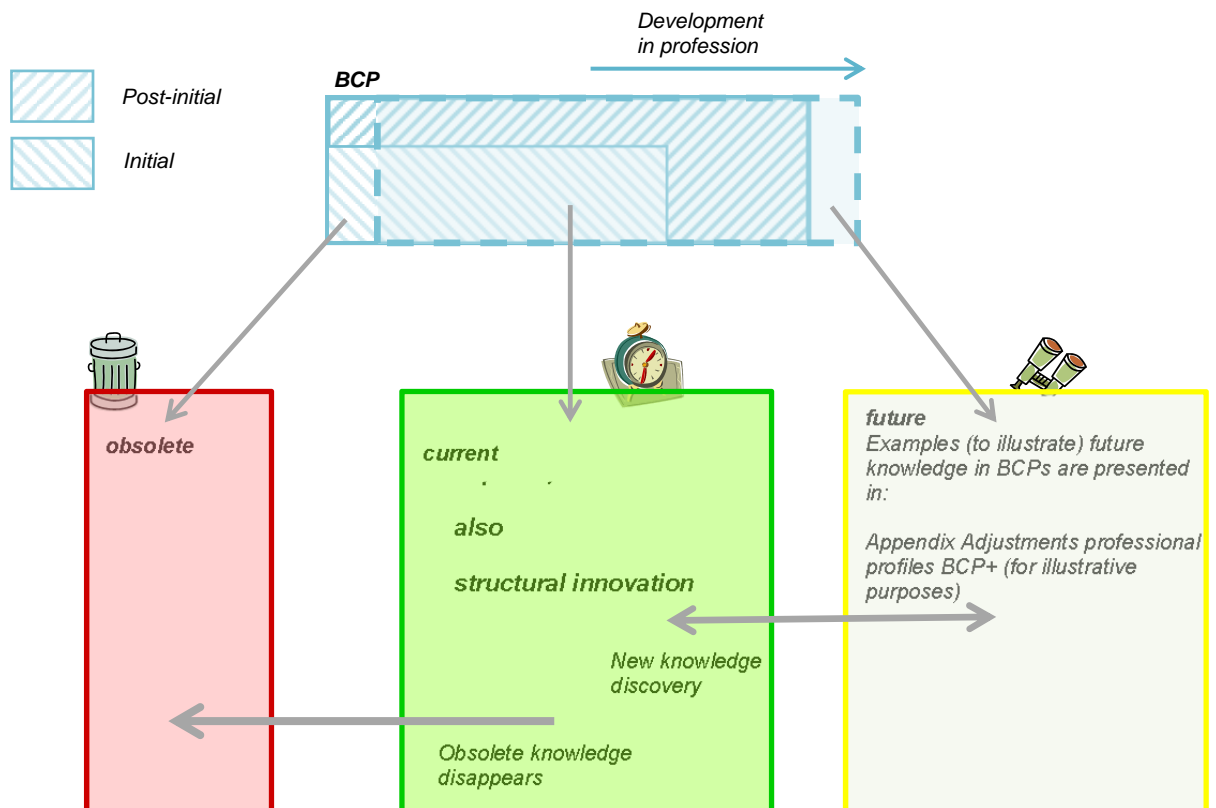


Fig. 3.1 Process of knowledge development in professional profiles

Here, we group under 'post-initial' learning both targeted retraining by means of training and courses and informal learning from colleagues in the workplace (on-the-job training). Learning takes place partly in a focused way, but to a considerable extent also unfocused and permanently. Informal learning has been found to be a significant component in 'life long learning'.

In order to bring out the potential cross-fertilisation between post-initial and initial education, for illustrative purposes adjusted professional competency profiles (BCP+) have been drawn up for the future professions aimed at realising (near) zero-energy buildings. For details by profession, see Appendix III.

Obviously, preparing BCP+ profiles also has consequences for MBO teachers. Due to ageing, MBO institutes already struggle to recruit new construction and technical installation teachers. Indeed, ageing is one of the main concerns in professional construction training.

Teachers in intermediate vocational training are indispensable in introducing the latest developments in initial vocational training.

Their task is to educate students to a level of knowledge and skill that allows them to be deployed in realising zero-energy buildings.

In short: an up-to-date teacher corps that educates future students for the construction and installation sectors is a major precondition for realising the EU '20-20-20' objectives.

One solution may be to take measures to specifically work towards anchoring new knowledge. This may be achieved by fostering closer connections at the regional level between schools and businesses aimed at exchanging up-to-date and new knowledge. Based on these connections, teachers will experience the practice in business more frequently. For this measure to be successful, it must however be included in the job description of the teachers.

4 Barriers, measures and priorities

This chapter summarises the identified barriers to BUS-NL's desired objectives. For each barrier, measures are proposed or advice given to overcome the barrier. Appendix IV provides all details per barrier and advised measure.

Based on endorsement discussions with market parties these actions have been clustered, resulting in an effective and efficient action plan. In Chapter 5, the parts discussed in this chapter are developed into a Roadmap towards 2020. In this Roadmap, the actions are visually grouped so that their location in time, priority and stakeholders are clear at a glance.

4.1 Methodology used

For every barrier-measure combination the following aspects are detailed in appendix IV:

Categories

For an initial clustering, the following categories were used.

<i>Category:</i>	<i>Action concerns:</i>
A = Initial education	Initial 2020
B = Post-initial education	Post-initial BuildUpSkills
C = Teachers/workplace trainer	Initial 2020, post-initial BuildUpSkills
D = Education participants/students	Initial 2020, post-initial BuildUpSkills
F = Labour market mobility/certification	Initial 2020, post-initial BuildUpSkills
G = Monitoring	Platform BuildUpSkills
H = Interdisciplinarity/soft skills	BuildUpSkills
I = Workforce (also self-employed)	BuildUpSkills
J = Funding	Platform BuildUpSkills
N = Continuity	Platform BuildUpSkills
Q = Teaching material development	Initial 2020, post-initial BuildUpSkills

For clarity, for every category is stated which actions:

- are of primary importance for *BuildUpSkills*
- have been recognised as important for the realisation of the 2020 objectives. Barrier-measure combinations in this category often benefit from the results of the BuildUpSkills actions. For this reason, they have been included as a recommendation.
- are of primary importance for *BuildUpSkills Platform*

Actors

All the relevant actors to be involved in the execution of the proposed measure.

Action level

Per barrier/measure the following levels are distinguished:

- Macro: action refers to the level of statutory requirements or the education system
- Meso: action refers to the level of school, MBO technical college, practice, etc.
- Micro: action refers to the level of team, teachers, supervisors, etc.

Type of action

Distinction between actions that result in changes to the (education) system and actions that result in changes to education(al content).

SWOT analysis

A SWOT analysis has been made of all barrier/measures, addressing the following issues:

- Strengths of the measure (Strengths)
- Weaknesses van de measure (Weaknesses)
- Probability* of successfully achieving the BUS-NL objectives with the measure (Opportunities)
- Threats* to the realisation of the BUS-NL objectives (Threats)

*Opportunities and threats are considered macro level measures, so they are developments in society that respond to the possibilities (opportunities) or impediments (threats) to realising BUS-NL's objectives.

4.2 Recommendations and measures per category

In the summarising overview 4.1 all barriers and proposed measures and recommendations are presented per category.

Table 4.1 Barriers and measures per category

Category	Name of measure
A1.1 - Initial education	Develop shorter cycle for embedding innovations
Barrier	Recommendation/measure
The development cycle of qualification files, curricula, training materials and exams that follows the description of the professional content runs approximately 6 years. Integration of new developments like technological innovations in qualification files requires special attention.	In addition to the formal development and maintenance cycle of the qualification structure, a shorter cycle should be developed for each of the phases in the formal main cycle so that innovations and relevant feedback reach education sooner, both initial and post-initial (see also measure B4.2).
A2.1 - Initial education	Development of teaching/exam products
Barrier	Recommendation/measure
Programmes and exams in the initial MBO education lag behind the latest needs and developments in the market. The curriculum may contain more content than the exams, for example through optional modules that are not tested/do not need testing. This is possible in consultation with the joint committee (PAC)	Updating of current education by using the space / flexibility provided in files and execution (= optional part). In case of sufficient support, joint development of Dutch training materials and exam products instead of earch for himself
A2.2 - Initial education	Further training/retraining arrangements
Barrier	Recommendation/measure
Programmes and exams in initial MBO education lag behind the latest needs and developments in the market	Develop short arrangements ('fast tracks') for students who can/want to move up to higher levels (HBO).
A2.3 - Initial education	Development of career paths
Barrier	Recommendation/measure
Programmes and exams in the initial MBO education lag behind on the latest needs and developments in the market	Develop logical career paths in order to a) fill the gap between what education delivers and the skills businesses need, b) get a worker to the desired and required level
A3.1 - Initial education	Using PI education for new BCPs
Barrier	Recommendation/measure
Education in the construction, installation finishing and maintenance sectors is ill matched to the demands and wishes that practice with throw up over the next few years, Constructing zero-energy buildings initially requires adjusted work processes. (transferred from E.9.1) The quality of the work often does not meet the client's demands/wishes.	Many demands and wishes have already been included in (the exit qualifications of the) post-initial education. These use initial education to develop BCPs raise sense of urgency of improving the quality of construction and installation among executors in construction and installation (transferred from E.9.1)
A10.1 - Initial education	Development of new BCPs/qualifications
Barrier	Recommendation/measure
Insufficient insight in the specific activities and competencies needed to realise the 20-20-20 objectives. E.g., the set of construction professions omits: 'insulation specialist' and 'fitter and installer of prefab elements in construction'.	Investigate further which activities and competencies are needed and whether they should be classified under new or existing professions and qualification files.

Table 4.1 cont'd. Barriers and measures per category

Category	Name of measure
B4.1 - Post-initial education	Better marketing in course catalogues
Barrier	Recommendation/measure
Target group still largely unaware of post-initial training courses (esp. installation sector?).	Better marketing in course catalogues (and clearer links BCPs and accreditation). E.g. as in the Scholingsfonds Bouw catalogue. Raise awareness among employers and employees, work towards improving learning culture. Include courses in Lifelong Learning initiatives and programmes
Category	Name of measure
B4.2 - Post-initial education	Develop craftsmanship qualification structure
Barrier	Recommendation/measure
The development cycle of industry qualification documents, curricula, training materials and exams that follows the description of the professional content is too long.	Develop an industry qualification structure for craftsmanship (post-initial education) including developments in the EE/RES field, taking the already employed fully skilled professional as a benchmark. In addition to the formal development and maintenance cycle, develop a second cycle to introduce innovations into education earlier
Category	Name of measure
C5.1 - Teachers/workplace trainers	Train the trainer programmes
Barrier	Recommendation/measure
Educators also need retraining. Teachers are often unfamiliar with developments in construction practice The MBO institutes are faced with a shortage of teachers in Construction, Installation, Finishing & Maintenance due to ageing.	Organise train-the-trainer sessions to increase the capacities of qualified suppliers (relation with action 19) and guarantee sufficient regional availability. In partnership with business, teachers should periodically spend time in the construction/installation practice.
Regional availability not guaranteed	Set up (regional) flex pools with experts from business. Measures apply to both initial and post-initial
Category	Name of measure
D7.1 - Education participants/students	Promotion campaigns for careers in construction/installation sector
Barrier	Recommendation/measure
Influx decline	
Actors	Action level
Overview of involved actors Requires joint action by sector and education.	Macro (education system/statutory) Meso (RTC/School/College)
Category	Name of measure
F11.1 - Labour market mobility/certification	Organise mobility of craftsmen in the EU
Barrier	Recommendation/measure
Too few possibilities for influx into the sectors from outside NL NL craftsmen are not mobile	Focus on mobility of employees in construction and installation sectors and finishing/maintenance sectors in EU (also in relation to actions for upgrading BCPs and accreditation/certification)
Category	Name of measure
F12.1 - Labour market mobility/certification	Possibilities for personal certification
Barrier	Recommendation/measure
Learning should not be limited to initial education, but must be a continuous activity (Life long learning). Quality in post-initial education is insufficiently guaranteed.	Research into and taking stock of forms of personal and sector certification. Align with IDW / EQF
Category	Name of measure
F19.1 - Labour market mobility/certification	Possibilities for personal certification
Barrier	Recommendation/measure
The quality of the (post-initial) education supply is highly diverse and there is no standardised accreditation. These circumstances hinder obtaining sustainability competencies.	Develop quality guarantees for post-initial education (see also relationship with category B)

Table 4.1 cont'd. Barriers and measures per category

Category	Name of measure
G13.1 - Monitoring	Develop monitoring tool
Barrier	Recommendation/measure
Tools are not in place to provide quick insight into developments and the consequences of developments	Develop tool(s) to monitor: craftsmanship development result of actions keeping status quo report up-to-date technical developments (Innovatiemotor). identification of and monitoring innovations.
Category	Name of measure
H15.1 - Interdisciplinarity	Development of interdisciplinary education
Barrier	Recommendation/measure
In construction there is a high degree of specialisation, and professions are still strongly pigeon-holed, whereby cross-discipline activities or education are not encouraged or indeed actively discouraged.	Far more attention for the required soft skills and more integrated education in the construction and installation sectors Relates to actions concerning the professional competency profiles, see Cat. A
Category	Name of measure
I.16.1 - Workforce	(Innovative) workforce retraining
Barrier	Recommendation/measure
Workforce & lack of retraining	On-the-job learning paths (greater role for informal learning), possibly linked to personal and industry certification (item 12) Promotion of participation & development of innovative forms of schooling
Category	Name of measure
J20.1 - Funding	ESF en O&O funding
Barrier	Recommendation/measure
Insufficient financial compensation for additional education efforts	Use possibilities: ESF-funding O&O funds Business (in cash or in kind)
J26.1 - Funding	Link funding to craftsmanship
Barrier	Recommendation/measure
No benefits for participant	Relate funding to performance and craftsmanship: Premium/bonus for skilled worker Upskilling as part of assignment! (if possible paid by client) If possible, link to monitoring effect BUS-NL
Category	Name of measure
N25.1 - Continuity	Guarantee continuity BUS-NL Platform
Barrier	Recommendation/measure
Too many initiatives and fragmentation to bring about energy transition	Spread message of BUS-NL in various bodies. Get them to join BUS-NL platform as market party Guarantee continuity of BuildUpSkills Platform
Category	Name of measure
Q31.1 - Developing training material	Development of teaching/exam products
Barrier	Recommendation/measure
Keep existing course material up to date Lack of teaching and course material on sustainable development/maintenance of property	Keep course materials up to date based on analysis of availability and up-to-dateness, or develop if lacking. (closely connected to A1.1, but short cycle in area of teaching materials) Secure this in a modern publishing formula. Bring together in knowledge base, to be easily available to both initial and post-initial education

5 Action plan - Roadmap

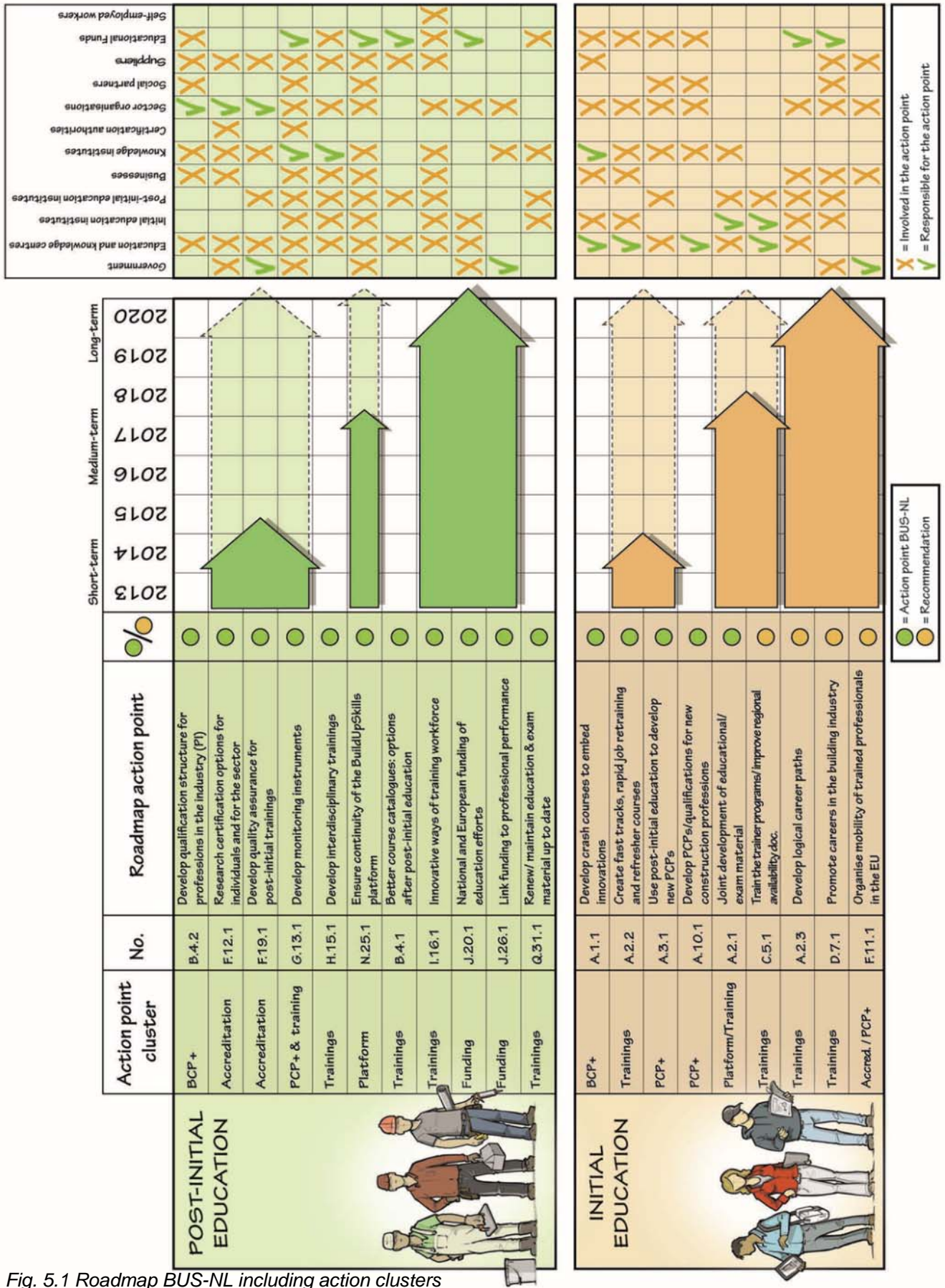


Fig. 5.1 Roadmap BUS-NL including action clusters

5.1 Methodology used

In figure 5.1 the main actions (vertical red arrows) within the scope of BUS-NL are located in time (horizontal green arrows) in the direction of the year 2020.

Based on priority, distinctions are made between short-term (2013-2014), medium term (2015-2017) and long-term actions (2018-2020).

The scheme also shows which relevant market parties are involved. Parties that have a major responsibility for or can wield strong influence in the realisation of the objectives of BUS-NL are marked V. Other parties involved are marked X.

Connections between vocational training and practice

In the Dutch vocational education system there are very strong links between vocational training and the actual business practice in the labour market. These connections are anchored at all levels, from the development of the qualification structure and corresponding qualification files up to the execution of the education by learning companies accredited by knowledge centres. This is best illustrated by the Professional coaching path (BBL): the BBL participant has an employment contract, is an employer in the full meaning of the word and thus earns a wage right from the beginning. Within the construction education, the professional coaching path is most prevalent. Indeed, the industry believes that workmanship can best be learnt in professional practice, and encourages BBL by means of compensation paid to the employers of these students. This group of students and the educational segment related to them (teacher teams, management, account managers) in fact forms a physical connecting link between initial vocational education and practice.

This connection is also apparent in figure 5.1. Many actions not only come back to a common framework (professional competency profiles, qualification structure), but are also developed jointly by partners and eventually find equal application in both the post-initial (green shaded) and the initial (blue shaded) segment of the education market, or differ only in the eventual interpretation for the target group (student/mature).

In the Dutch context, there are especially opportunities to link initial and post-initial education and thus strengthen exchange of expertise, manpower and resources.

This is not the only reason why joint development leads to an efficient process. Helping to update initial vocational training following on from the actions for the post-initial segment leads to a guaranteed structural outflow of competent (sustainability) professional workers to the labour market.

5.2 Clustered actions

Based on endorsement discussions, reactions from market parties (February/March 2013) and also for the follow-up of the Roadmap (i.a. Pillar II), in figure 5.1 the separate actions are clustered and linked to the parties involved. This concerns the following action clusters (red arrow: high priority)

BCP+: All actions aimed at upgrading the professional profiles (BCPs) for use in post-initial education (actions, green shading) and their use in developing professional profiles and qualifications in initial educations (actions, blue shaded).

Actions: B.4.2 and G13.1 (post-initial), A.1.1, A3.1, A.10.1 and F.11 (initial)

Accreditation: All actions on the shaping of certification of persons and companies and ensuring quality assurance of education.

Actions: F12.1 and F.19.1 (post-initial)s

Education: All actions concerning developing education, education itself and the teaching materials. This refers both to what is available and to what will be newly developed.

Actions: G13.1, H15.1, B.4.1, I.16.1 and Q.31.1 (post-initial), A.2.1, A.2.2, A.2.3, C5.1 and D.7.1 (initial)

Platform: All activities of the BUS-NL Platform, formation during the April 18 Working Conference.

Actions: N25.1 (post-initial) and A.2.1 (initial)

Funding: All actions aimed at guaranteeing funding for educational activities and the (financial) promotion of performance-oriented craftsmanship.

Actions: J20.1 and J.26.1 (post-initial)

6 Conclusions

From 'consciously incompetent'...

The status quo analysis (WP2) and the detailing of BUS-NL's Roadmap (WP3) show that the Dutch workforce in the built environment is insufficiently skilled to realise zero-energy buildings. Indeed, a large part of the working population is as yet entirely ignorant of this. Many construction errors are due to such ignorance¹.

to 'consciously competent'...

In Chapter 5 of this report, in a Roadmap the measures are outlined that must be taken between 2013 and 2020 to move from consciously incompetent to consciously competent.

One of the main drivers for this is the conclusion that in order to realise the 2020 objectives successfully and at high quality, upskilling will be needed for at least 150,000-200,000 craftsmen in the construction and installation sectors.

Key measures in the Roadmap concerning the education in the construction sector (construction, installation, finishing and maintenance) are:

- developing a sector qualification structure for craftsmanship based on the upgraded professional competency profiles (BCP+), to be used to further develop post-initial retraining;
- developing multidisciplinary courses and education;
- guaranteeing the quality of post-initial education and persons/companies;
- updating of existing and development of new attractive teaching materials and forms of training.

Due to the strong links between initial and post-initial education in the Dutch situation, it would be wise and therefore desirable to carry out a number of the above-mentioned measures in parallel with actions for initial intermediate vocational education.

For example, the findings of the BCP+ profiles may be used to further develop BCPs for initial education. The same applies to embedding innovations in BCPs. Updating and keeping up to date teaching materials for initial education plays an important role in this.

Finally, we concluded that the execution of the Roadmap actions will be viable provided the following preconditions are met:

- there is a national and broadly supported platform from which actions are planned, coordinated and monitored;
- there is sufficient funding for the execution of the measures.

Based on the above, there can be no doubt about the importance of starting BUS-NL Pillar II as early as possible.

Performance of actions laid down in the National Roadmap, focusing on the introduction of new and/or upgrading of existing qualification schemes, education and/or training for the benefit of post-initial education.

¹ Status quo measurement construction and installation sector in relation to the European 2020 objectives for BuildUpSkillsNL, USP 2013

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