BUILD UP Skills – Greece

D4.1 Occupational & Functional Map for the building workforce regarding the RES and EE

Further information

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

More details on the IEE programme can be found at http://ec.europa.eu/intelligentenergy

Occupational & Functional Map (OFM) for the occupations in construction, installation and maintenance jobs in green buildings

Definitions

An **Occupational Map** is essentially a report describing the main features and characteristics of an industry or sector. It gives a picture of the sector in terms of its coverage and boundaries, providing information on the numbers employed, industry trends, job titles and job roles. In this way it contributes to the context and background for the development of **national occupational standards** for a sector.

Occupational Standards are benchmarks of performance. They provide the means for assessing performance in a job: they are work-related statements of the ability, knowledge, understanding and experience that an individual should have to carry out key tasks effectively. Anyone in an occupation covered by Standards can use them to determine what level of competence is required and, more importantly, whether their own performance meets that industry expectation.

The development of an Occupational Map is an important first stage in the process of developing a national framework, as it analyses the professional areas covered. In particular, it examines the structure of the professional area, the occupations within it and explores current and future skills requirements.

The next stage in developing Occupational Standards is developing a **Functional Map**. The functional map gives an overview of the types of major work activities which are carried out within an industry or sector. It describes the outcomes of the work in broad terms. The development of a functional map begins with the definition of the industry. The next stage is to define the key functions that may be carried out by the industry and the process is continued until the functions or activities identified can be carried out by an individual rather than by a team or organisation.

Distinction between Occupational and Functional Maps

At the outset there has to be a clarification of the distinction between the two mapping exercises, as there is plenty of scope for confusion and misunderstanding, as well as appreciating the different methodologies employed to produce the two maps. To help this understanding, without going into a great deal of analytical detail, it might be helpful to consider functions or activities that cover all occupational areas and those that are specific to one area or discipline.

It is also important to concentrate initially on the functions or activities rather than job roles or organisational structures. In due course and as part of the mapping processes, will emerge national standards and vocational qualifications ‘fit’ with an organisation; to try and do it the other way round not only compromises the effort but invalidates the mapping processes.

In BUS-GR, the competencies required to work in the "Green Buildings" sector in Greece (but also across Europe) – either in the case of performing energy efficient building renovations or in the construction of new "nearly zero energy buildings" (NZEB) - have been clearly identified through a combination of desk research using identified sources, and consultation with representatives of the corresponding professions in Greece. The Functional Map developed on the frame of the BUS-GR Project clearly defines the functions required to work effectively in the so called "Green Buildings sector", as well as the competencies/skills that construction workers should possess for performing energy efficient retrofitting of existing buildings and new constructions.

In order to develop the Occupational and Functional map a lot of valuable information was derived from the following sources:

1. The study "Skills and Occupational Needs in Green Building" (ILO, 2011), which resulted from a joint EC - ILO (International Labour Office) project on Knowledge sharing in early identification of skill needs. The project covered over 30 countries worldwide – both developed and developing. It was supported by the EU Programme for Employment and Social Solidarity – PROGRESS (2007-2013) and implemented in the framework of the Green Jobs Initiative – a partnership between the ILO, UNEP, IOE and ITUC. The study draws on a number of country case studies and a survey of ILO constituents including governments, employers' and workers' organisations. The findings were validated through a focus group discussion and an experts' workshop.

2. The "EU Skills Panorama Analytical Highlight". The Analytical Highlight has been developed from a combination of European, international and national sources and provides illustrative examples of available skills information (website: http://euskillspanorama.ec.europa.eu).

3. The Directive 2009/28/EC of the European Parliament and of the Council (of 23 April 2009) on the promotion of the use of energy from renewable sources, and especially the Annex IV (Certification of installers) of this Directive as regards the skills/ competencies of the small scale RES systems in buildings.

Table: Core occupations in green buildings construction, installation and maintenance

Energy related areas of interest	EE/RES applications in green buildings	Involved occupations	Main functions / tasks	Key (new) skills required related to EE/RES
Energy (and water) conservation / Energy efficient technologies	Insulation/weatherization / air tightness	Bricklayers, masons	In many countries where most housing is built with bricks or blocks, increasing activity in retrofitting (as well as in new buildings construction – of the NZEB type) will lead to a higher demand for this occupation. The basic activity of bricklaying will not change, but bricklayers may become involved in installing insulation, thus requiring some additional training.	Improved knowledge and skills to contribute to the energy efficiency of buildings in the building process (for example, the ability to install energy efficient insulation systems, correctly use and dispose of materials and chemicals, efficiently use energy and water), and knowledge and skills to apply green technologies and new materials and to meet the energy auditing and certification requirements.
		Roofers	The effectiveness of roof or attic insulation is a major contributor to high energy conservation standards in all buildings of one or more stories. It is generally in the competence of roofers to install insulation as an	Increased activity in green building will require that roofers develop skills in applying advanced technologies such as: ➢ new insulation products, ➢ green roofs, or ➢ roof structures capable of carrying solar panels.

			integral part of the roof.	
		Insulation installers, plasterers	Installing insulation on external walls is one of the main activities in retrofitting of buildings for energy efficiency. In some cases the work is done by people from a specific occupation (specific occupation in its own right). In others, it may be done by people from a range of occupations. Dry wall installers may be required to move panels and walls to improve ventilation according to plans. They may also get involved in installing insulation on the interior of a building as an alternative to external wall insulation. Plasterers have a role in finishing insulation work, and in some areas get involved in installing insulation themselves.	Fitting insulation: ➢ Understanding the importance of air circulation and the avoidance of creating areas prone to condensation; ➢ Understanding the range of insulants available and their applicability to traditional structures; ➢ Application of insulation to internal loft and enclosed spaces in traditional structures; ➢ Correct fitting of insulation in traditional structures and detailing. Internal wall insulation: ➢ Assessing appropriateness of intervention; ➢ Vapour barriers unsuitable for traditional structures; ➢ Understanding the effects of thermal mass; ➢ Understanding the consequences of

				intervention on interior volume and detailing; ➢ Replacement of finishes and facings; ➢ Understanding the legal status of the building and applicable planning controls. External wall insulation: ➢ Understanding planning controls; ➢ Technical performance and effect on substrate with respect to vapour permeability of the wall; ➢ Visual and aesthetic effects; ➢ Effect on rainwater goods, eaves and roof lines; ➢ Understanding the legal status of the building and applicable planning controls.
		Painters, decorators	Painters and decorators are frequently involved in retrofitting and new construction projects, as	As above (in case that insulation is fitted by these groups of professionals).

			many insulation solutions need to be painted. In some cases, painters and/or decorators install insulation.	
		Woodworkers, carpenters, joiners	Work on the exploitation and conversion of sawn wood and wood-based products in exterior constructions and building construction demands. A carpenter uses mainly wood and wood-based products for the construction of shelters, kiosk, fences, wooden frames for buildings, doors, windows, wooden facades, stairs, kitchen and bedrooms cabinets, etc. Carpenters are not involved in furniture production, although there might be an overlap with furniture makers in the kitchen furniture sector and in the construction of small wooden articles for	In the case of joinery: ➢ Fitting double glazed units in timber sashes ➢ Fitting secondary glazing ➢ Fitting brush strips ➢ Understanding the legal status of the building and applicable planning controls

			household uses.	
		Glaziers	Windows make a substantial difference to heat gain and loss from buildings, and the choice of windows can make a significant difference to a building's energy efficiency. Glaziers work mainly in the construction sector, including work on new building and repairs or refurbishment of existing buildings. It is a skilled occupation requiring: - Manual skills - Mathematical skills - Attention to detail - Concentration - Accuracy and spatial skills	Glaziers should be: ➢ able to advice on window choice, and ➢ skilled in installing energy efficient glazing solutions.
		Assemblers and installers of aluminium fittings	Processing of aluminium architectural profile in order to manufacture and place in buildings frames and other custom made aluminium alloy	Enhanced skills related to the: ➢ Use of tools and equipment for cutting materials to specification. ➢ Use of various hand tools for assembling, installing and

			constructions for the exterior protection and appearance as well as the interior arrangement of a building. In Greece, the specific occupation has become one of the most important trades in building construction industry as aluminium and metal alloys are materials increasingly used in building constructions, especially for architectural needs and applications.	fixing components, products and accessories in the most energy efficient and air-tight way. ➢ Understanding the legal status of the building and applicable planning controls ➢ Provide consultation to customers for selecting the most appropriate for their cases products (simple systems, with thermal break, hybrid).
	Efficient heating& cooling	Plumbers and heating systems installers/ maintainers	The broad area of 'green plumbing' encompasses the occupations of plumbers and heating installers/maintainers. It focuses particularly on installing efficient heating systems, making existing heating systems more efficient, and installing solar water heating systems. This can be extended to cover the installation of heat pumps using geothermal or	Skills and knowledge to: ➢ discuss the benefits of sustainability for clients and the broader community as a whole ➢ provide advice to clients on water and energy saving plumbing appliances and systems ➢ report on existing plumbing systems and make recommendations for environmentally sustainable improvements

			inertial ground temperature, and biomass heating systems.	➢ identify and discuss state and local government incentives and initiatives available to clients who adopt sustainable plumbing systems.
		HVAC (heating, ventilation and air conditioning)installers	These occupations install the whole HVAC system which, owing to technology differences may require different skills set from the ones of heating systems installers in houses. The installer should be able to perform load calculations, measure airflow, and do full commissioning and maintenance work following installation.	HVAC installers need: ➢ backgrounds in electrics, in plumbing, and in installation of ducting; ➢ specialized knowledge such as an understanding of temperature and humidity, and the ability to make relevant measurements; ➢ knowledge of energy efficiency standards for equipment and green building standards.
		Electricians and IT technicians	Electricians are (or should be) required to install the electrical parts of plumbing systems (electric water heating, heat pumps, small-scale CHP systems), including controls. In the case of larger buildings, controls can be complex and	In this case, basically to be able to work as a team with the other members of the crew (plumbers, heating systems installers, HVAC installers)

			require specialist IT technicians to install them.	
	Conservation of electric power(other than electric heating & cooling)	Electricians and installers of energy management systems	Electricians have important roles in green building, having the main responsibility for installing a range of new technologies, and being involved in installing the supplies of electric power and the control systems required for others. There is evidence of a new "occupation" in installation and maintenance of photovoltaic systems emerging herein, which undertakes both structural work and electrical work associated with the installation.	The new skills required are directly related to the many innovations that can be applied through the specification and installation of new electrical technologies, ranging from choice of light bulbs to motion-sensor light switching, and other electricity-saving devices to smart meters. At the domestic level, good communication skills are necessary, as electricians are mostly responsible for helping individual householders to choose energy efficient appliances and lighting technologies.
	Water conservation	Plumbers	In this specific case 'green plumbing' focuses particularly on using water more efficiently. This can be extended to cover rainwater harvesting, and	Skills for the specification, installation and maintenance of: ➢ rainwater harvesting systems; ➢ systems for using the "grey

			recycled water. Ecological or green sanitation has multiple objectives: reducing water use, improving health and environmental quality and promoting nutrient recycling. It is based on four building blocks: source-separation, containment, sanitization and recycling.	water" (any household wastewater with the exception of toilet water); ➢ well-controlled sanitation systems. Also skills to implement and monitor environmental and sustainable water management policies and procedures, and to promote contained, sustainable systems, where buildings collect and re-use water and energy supply as well as receive them, and dispose of waste sustainably.
Building level renewable energy (and high efficiency energy) systems	Heating/cooling	Installers/maintainers of solar thermal systems	The installer/maintainer of solar thermal systems is responsible for the installation and maintenance of solar thermal systems of hot water production, mainly in buildings and swimming pools. Demand for this occupation is high in countries where weather conditions are good enough, and latitudes are low enough to make the	The installer of solar thermal technologies is responsible for placing the structure of the panels in the right place and at the correct angle to maximize solar gain throughout the year. This implies a basic understanding of mathematics and physics to make the necessary calculations. Once the structure is fixed to the exterior of the building, these workers make the

			technology a reasonably reliable source of heat, such as Greece.	necessary connections with the interior plumbing system. A base of skills in plumbing is therefore also essential. In some cases, they also have to install circuits and electrical equipment including controls for solar heating, which requires electrical knowledge. Installers may also be responsible of the maintenance of the system, but in some cases, optimizing solar thermal systems to maximize efficiency requires additional training. The client should be instructed on efficient and safe use of the system installed. Good communication skills are therefore necessary. Counselling and marketing skills are also very relevant for this occupation. These workers should be able to advise the client on the best solution, and in some cases sell particular products.

		Installers/maintainers of wood pellet and other biomass heating systems	A biomass heating systems' installer-superintendent undertakes maintenance, repair or new installation of boilers using biomass fuels (wood chips, pellets, and logwoods). In their tasks also the control, cleaning and maintaining of the boiler and the other parts of a central heating installation are included. In the case of biomass boiler and stove installers training as a plumber, pipe fitter, heating engineer or technician of sanitary and heating or cooling equipment is a prerequisite.	Skills for installers/maintainers of wood pellet and other biomass heating systems are centred on traditional plumbing skills, and supplemented by knowledge of the characteristics of biomass fuels, the ability to calculate heat loads, an understanding of relevant legislation and regulations, as well as good knowledge of any European standards for technology and biomass fuels. For example, it is very important for them to understand and determine moisture content, calorific value, bulk density and energy potential of biofuels. It is also important to have knowledge of locally available fuel supplies, including types of fuel, suppliers and pricing
		Heat pump installers/maintainers	Heat pump installers/ maintainers require a background in plumbing, drilling, geology and basic construction, with some knowledge of electrics. For this purpose, training	Specific skills necessary for the heat pump installers include: ➢ basic understanding of the physical and operation principles of a heat pump, including characteristics of the heat pump circle, and

			as a plumber or refrigeration engineer and the possession of basic electrical and plumbing skills (cutting pipe, soldering pipe joints, gluing pipe joints, lagging, sealing fittings, testing for leaks and installation of heating or cooling systems) is considered as a prerequisite.	the efficiency of the system, determination of efficiency indicators, i.e. the coefficient of performance (COP) and seasonal performance factor (SPF); ➢ understanding of the components and their function within a heat pump circle, including the compressor, expansion valve, evaporator, condenser, fixtures and fittings, lubricating oil, refrigerant, superheating and sub-cooling and cooling possibilities with heat pumps, ➢ knowledge of under floor heating, ➢ soil classification, ➢ rock classification as related to thermal conductivity, ➢ drawing site plans, ➢ copper pipe work, ➢ above ground pressure pipe work, ➢ plus commissioning, testing, and maintenance.

		Installers/maintainers of mass heating (large building or district) and combined heat and power (CHP) systems	While many green building skills requirements are quite generic, the main capital equipment in mass heating and combined heat and power systems is typically installed by the supplier, which can take responsibility for developing the specific skills required.	Installation of these systems requires people skilled in plumbing and/or heating installation, who may need some additional training (in most of the case, system specific).
	Electricity	Installers/maintainers of solar photovoltaic (PV) systems	Installers and maintainers of photovoltaic solar systems need a foundation in electrical systems as well as basic construction and mechanical skills to do their work. The installer is responsible for identifying a suitable location for solar photovoltaic panels, installing them at the place chosen, and making the necessary indoor connections. They perform the maintenance of the installation according to code	Skills in health and safety at work are important for these workers, since much of their work is done on roofs. As in the case of solar thermal, PV installers/maintainers need to explain the operation of the installation, and how to ensure the best performance and basic maintenance to the user. If there is a smart meter present that will allow surplus electricity to be fed to the grid, the installer needs an understanding of what is required to connect to it, even if

			requirements for photovoltaic installations. They also take responsibility for preventive maintenance.	the final connection may be made by someone else.
		Installers/maintainers of small scale wind energy systems	Although it is not so frequent to see small wind turbines installed in buildings (commercial or for residential use) yet, small scale wind energy systems in a technology that is expected to grow in the residential and tertiary markets in the medium to long-term. Installers/maintainers of small-scale wind energy systems should have a background in electrics and general construction.	Skills specific to a wind energy system installer include: ➢ understanding of wind turbine placement, ➢ ability to recognise the good wind speeds regimes, ➢ understanding of the effects of turbulence, and ➢ knowledge of any regulations on wind turbine design or construction. There is a need for these workers to be able to read topographic maps and aerial photographs, and select appropriate anchor types based on soil type. It is also important that they should be computer literate, understand wind speed calculators, be able to estimate electrical load and energy use, and be able to make the necessary connections using

				appropriate standards appropriate to the electrical tension. If there is a smart meter present that will allow surplus electricity to be fed to the grid, the installer needs an understanding of what is required to connect to it, even if the final connection may be made by someone else.