European
Preliminary Report

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1. THE SUSTAINABLE BUILDING SECTOR: MAIN CHARACTERISATION

1.1. The construction sector in the EU: an introduction

The construction sector establishes relevant macro-objectives that are of significance to the built environment and the construction sector encompassing the economy as a whole, cities and urban areas, EU climate change policy, resource efficiency, the management of natural resources and the circular economy.

Construction is one of the biggest industrial sectors of the EU economy, comprising enterprises primarily engaged in the construction, renovation, maintenance and demolition of buildings and in civil engineering projects. This industry also has an important multiplier effect on other sectors, contributing to about **9% of EU GDP** (EC 2016). It is also a **key component of its employment sector**, providing around **18 million direct jobs** in Europe (EC 2016). From the perspective of employment, according to ILO (2015) the construction industry has recovered from the economic crisis and "is expected to increase its output in the coming years worldwide, due to increased urbanisation, a housing backlog, infrastructure renewal and the rising demand for water and energy. This will generate employment". Due to its consistency, housing also represents the **largest direct expense for European households** (an average annual cost per household of € 9,600 or 27% of direct annual spending).

At the same time, the building sector is one of the key consumers of energy in Europe. Indeed, the built environment accounts for around **40% of EU energy consumption** (in two decades and since 1990s in the EU-27, Switzerland and Norway it increased from around 400 Mtoe to 450 Mtoe) (BPIE 2011) and **36% of total green-gas emissions**. It was estimated that in 2013 in the EU there were **233 million residential and commercial buildings** (ECORYS/Copenhagen Resource Institute 2014): residential ones represent the majority of the total EU building stock, covering approximately 75% of the total floor area in square metres, the other uses being retail (7%), offices (6%), education (4%), hotels and restaurants (3%), healthcare (2%) and others (3%) (BPIE 2011). The age characteristics of the EU stock of buildings, together with the ratio between building renovation and replacement, are relevant variables to consider in order to assess their energy and environmental performance (JRC-IPTS 2015): currently about 35% of EU buildings are over 50 years old (BPIE 2011) and there is more interest in better using existing building assets, through renovation interventions, than in building new ones. It is estimated that by improving the energy efficiency of buildings, total EU energy

consumption could be reduced by 5% to 6%, while CO_2 emissions could be lowered by about 5%.

Furthermore, as recently clearly stated by the EC COM(2015) 614 outlining the principles of the **circular economy**[1], the building sector is also a major consumer, of materials, presenting overwhelming elements of **structural waste** due to low productivity levels, under- or over-utilisation of the buildings themselves, energy consumption (as already stated) and waste of products because of end-of-life and toxic materials (Ellen MacArthur Foundation 2015).

In this overall picture it is crystal clear that the greening of the building sector mainly relies on energy efficiency interventions, including those concerning the enhancement of renewable energy sources.

1.2. Economic, social and environmental benefits of sustainable building

The development of sustainable building is pursued to deliver different kinds of benefit, related to the economic, social and environmental pillars (WGBC 2013).

Economic benefits concern energy-saving issues (the reduction of consumers' energy bills and public finances) and include the overall opportunities for businesses, not only those involved in construction itself, but all those offering technologies, materials and services directly and less directly involved in the building value chain. Likewise, economic benefits pertain to the great employment creation potential associated with green building activities. Furthermore, according to the findings of recent studies (Cambridge Econometrics 2015) a number of other benefits related to energy efficiency interventions in buildings include increased value (investors are willing to pay rental and sales premiums for properties with better energy performance) (Cambridge Econometrics 2015, WGBC 2013). In the framework of the circular economy approach, finally, other positive economic effects are related to the decrease in waste of construction materials and land-fill from demolition (Ellen MacArthur Foundation 2015).

As for the **social pillar**, the beneficial economic effects on households and companies due to the reduction in energy bills deliver increased disposable income and

[1] The Circular Economy is an industrial economy approach covering the whole cycle (from production and consumption to waste management and the market for secondary raw materials) with the aim to produce no waste and pollution.

consequently also act as a tool to **contrast fuel poverty**[2]. Other social benefits relate to **health** (both physical and mental) and wellbeing, particularly of vulnerable residents such as children (better heated buildings lower mortality as well as morbidity rates due to cold living[3] which can also can have detrimental mental health impacts) (Cambridge Econometrics 2015). As for **wellbeing**, one issue relates to occupants' satisfaction (better comfort due to hot water availability, sanitation arrangements, indoor air quality, etc.), another one increased workers' productivity (decreased turnover, less sick leave and better morale) due to the technical features of green buildings (including ventilation systems, less toxic materials and furnishings, improved illumination through day-lighting, improved maintenance, etc.) (WGBC 2013, Too L., Too E. 2011).

From the **environmental** point of view, the benefits of the greening of the building sector mainly concern the decrease in carbon emission (worldwide the buildings sector was responsible for 6.4% of the total increase in greenhouse gas emissions in the period 2000-2010) (UNDP 2015) through reduced energy and water use and lower long-term operational and maintenance costs.

1.3. Factors hindering the greening of the building sector

Factors holding back initiatives promoting the greening of buildings have been identified in shortages of skills (which, in turn, affect labour productivity and quality of work), deficiencies in the supply of skills and relevant training, discouraging of investments due to associated up-front costs of green buildings and information asymmetries (among clients, policy-makers, builders, etc.) (ILO 2011). From another perspective, barriers that hinder the uptake of renovation measures in the stock of existing building (which offer the biggest potential in energy savings) were organised by BPIE (BPIE 2011) into different categories, including:

- financial barriers (lack of funds or access to finance; payback expectations/investment horizons; competing purchase decisions and price signals);
- institutional and administrative ones (regulatory and planning regimes; institutional and structural factors, multistakeholder issues);

[2] At EU level, fuel poverty results from the combination of three different factors: low household income, poor heating and insulation standards, and high-energy prices. According to EU_SILC data, in 2013 the share of the total EU population not able to keep their homes adequately warm was 10.8%, the issue not being confined to countries with colder climates (Cambridge Econometrics 2015).

[3]According to the World Health Organization across Europe, there were an estimated 250,000 excess winter deaths annually (Cambridge Econometrics 2015, WGBC 2013).

- hindering factors concerning awareness, advice and skills (lack of advice or information; awareness of energy savings potential/benefits; skills and knowledge related to building professionals)
- barriers related to the separation of expenditure and benefit (as above, concerning information, awareness of potential/benefits, skills and knowledge related to building professionals).

2. EU POLITICAL FRAMEWORK FOR GREEN BUILDING

2.1. Regulatory and legislative framework

At European level, it is the **2000 Green Paper entitled: *Towards a European strategy for energy supply security*** to raise the issue of the increase in EU energy consumption, on the one hand, and the issue of insufficient domestic production to cover energy needs, on the other. From this starting point, the Green Paper refers, in the face of the 'demand', to a real change in consumer behaviour, whose energy demand must be directed – through the leverage of tax instruments – to consumption that is more rational and respectful of the environment (with particular attention paid to the transport and construction sectors). For the 'supply' side the priority is detected in the fight against climate change and the development of renewable energies.

Therefore, the **2002/91/EC Energy Performance of Buildings Directive** – otherwise known by the acronym **EPBD** – is adopted in this direction. EPBD moves from fact that "The energy used in the residential sector and tertiary, composed for the most part of buildings, represents over 40% of the final consumption of energy in the Community. Since this is a growing industry, its energy consumption and hence also its carbon dioxide emissions are expected to rise", together with the finding that "Buildings have an impact on long-term energy consumption, all new buildings should therefore meet minimum energy performance...".

The EPBD, therefore, sets out the following key requirements for Member States: a) a general framework for a methodology for calculating the integrated energy performance of buildings; b) minimum standards on the energy performance of new buildings and large existing buildings undergoing 'major renovation'; c) energy certification for both new and existing buildings whenever they are constructed, sold or rented out; d) the implementation of an inspection and assessment regime for air-conditioning and medium- and large-sized heating systems or, in the case of the latter, the development of information campaigns on the subject.

In **2005,** the Commission adopted the **Green Paper on Energy Efficiency or Doing More With Less**. This establishes Annual Energy Efficiency Action Plans at national level. Such plans might identify measures to be taken at national, regional and local level and subsequently monitor their success both in terms of improving energy efficiency and their cost-effectiveness. This programming tool is introduced by **Directive 2006/32/EC of 5 April 2006 on energy end-use efficiency and energy service**, which requires Member States to transmit to the Commission a first National Plan of Action on energy efficiency (NEEAP) by 30 June 2007, a second before 30 June 2011, and a third by 30 June 2014, illustrating the energy-efficiency improvement measures to achieve the energy-savings targets set at Community level.

In **2009,** two directives see the light of day: **Directive 2009/28/EC of 23 April 2009 on the promotion of energy from renewable sources** and **Directive 2009/125/EC of 21 October 2009 establishing a framework for the setting of specific ecodesign requirements for energy-related products**.

The first directive, together with the Dir. 2009/29/EC of the same date, introduced the **2020 Climate and Energy package**, known as the "20-20-20" targets (within the growth plan of the Europe 2020 Strategy). The Climate and Energy package is a set of binding legislation, which aims to ensure that the European Union meets its ambitious climate and energy targets for 2020. These targets set three key objectives for 2020: a 20% reduction in EU greenhouse gas emissions from 1990 levels, raising the share of EU energy consumption produced from renewable resources to 20%, a 20% improvement on EU energy efficiency compared to 1990 levels.

For this purpose, each Member State is required to adopt a *National Renewable Energy Action Plans* (NREAP) including sectoral targets for electricity, heating and cooling, and transport.

A further set of targets for 40% reductions below 1990 levels have been proposed by the EU for 2030, together with the long-term objective of reducing greenhouse gas emissions by 80-95% below 1990 levels by 2050.

A distinctive feature of the second directive (also known as the eco-design directive) is to introduce Community specifications for the eco-design of so-called "energy-related products", that is, any good that has an impact on energy consumption during use, which is placed on the market and/or put into service.

On 19 May 2010, a recast of the Energy Performance of Buildings Directive (EPBD recast) was adopted by the European Parliament and the Council of the European Union –

Directive 2002/91/EC – in order to strengthen the energy-performance requirements and to clarify and streamline some of the provisions from the 2002 Directive it replaces.

Directive 2002/91/EC of 19 May 2010 on the Energy Performance of Buildings establishes minimum-cost optimal-energy performance requirements for new buildings, for major renovation of buildings and for the replacement or retrofit of building elements (e.g. heating and cooling systems, roofs, walls). Member States shall draw up national plans for increasing the number of "nearly zero-energy buildings" (nearly zero-energy building means a building that has a very high energy performance, as determined in accordance with Annex I. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced onsite or nearby¨).

Finally, the European Parliament and the Council approved the **Energy Efficiency Directive 2012/27/EU**, amending Directives 2009/125/EC and 2010/125/EC. The new Directive on energy efficiency relies on upgrading the efficiency of central government buildings as an exemplary role.

The **Energy Performance of Building Directive (2010/31/EU)** identifies the following spheres of activities through which to reduce the energy consumption of buildings:

- energy performance certificates are to be included in all advertisements for the sale or rental of buildings;
- EU countries must establish inspection schemes for heating and air-conditioning systems or put in place measures with equivalent effect;
- all new buildings must be nearly zero-energy buildings by 31 December 2020 (public buildings by 31 December 2018);
- EU countries must set minimum energy performance requirements for new buildings, for the major renovation of buildings and for the replacement or retrofit of building elements (heating and cooling systems, roofs, walls, etc.);
- EU countries have to draw up lists of national financial measures to improve the energy efficiency of buildings.

The **Energy Efficiency Directive (2012/27/EU)** identifies the following spheres of activities through which to reduce the energy consumption of buildings:

- EU countries make energy-efficient renovations to at least 3% of buildings owned and occupied by central government;
- EU governments should only purchase buildings which are highly energy efficient;
- EU countries must draw up long-term national building renovation strategies, which can be included in their National Energy Efficiency Action Plans.

2.2. EU policy frameworks for building a resource-efficient economy

As we said, the construction system is very complex and its evolution under the profile of green building is a key factor in securing the transition to a "green" resource-efficient economy. Many of the social, economic and environmental potential benefits of green building at EU and national level encompass urban policy, climate-change policy, management of natural resources and the circular economy. The following programmes, strategies and instruments were identified as they are of significance to the green building sector and for their broader relevance in the transition to a sustainable economy (JRC-IPTS, 2015):

i) Climate change policy:

- **The 7 ST Environmental Action Programme (2013)** reinforces the 2020 objective of creating a "low-carbon and resource-efficient economy". The 7 ST Environmental Action Programme sets out objectives to reduce the overall impact of resource use. Priority Objective 8 of the EAP seeks to enhance the sustainability of the cities of the EU and to place environmental sustainability at the core of urban development strategies.
- **EU Strategy on adaptation to climate change (2013)** the strategy sets out a framework and a mechanism for taking adaptation measures to deal with climate impacts and their economic, environmental and social costs. The strategy highlights the need for the "climate proofing" of cities as well as physical infrastructure and assets.

ii) Urban policy:

- Thematic Strategy for the Urban Environment (2006)
- The Urban Dimension of EU policy (2014)

iii) Resource efficiency:

- The Raw Materials Initiatives (2011)
- The Roadmap to a Resource Efficient Europe (2011)
- The Clean Energy Package (2016)

iv) Circular economy:

- The Ecodesign Directive (2009)
- The EU action plan for the Circular Economy (2015)

v) The management of natural resources:

- The legal sourcing of timber (2010)
- The EU forest strategy (2013)
- The blueprint for forest-based industries (2013)
- The blueprint to safeguard Europe's water resources (2012)

vi) Construction products and manufacturing:

- The Construction Products Regulations (2011)
- The Industrial Emissions Directive (2010)

vii) Construction and demolition waste:

- The Waste Framework Directive (2008)
- The Landfill Directive (1999)

viii) Indoor air pollution:

- The EU environmental and health strategy (2003)

2.3. Relevant initiatives in support of green building

Initiatives directly supporting green building

In 2012, the **EU Strategy for the sustainable competitiveness of the construction sector** (COM/2012/433) was defined as part of the Europe2020 Initiative, focused on the promotion of favourable market conditions for sustainable growth in the construction sector. Five areas were addressed: financing, skills and qualifications, resource efficiency, regulation and market access.

Starting in 2013 the Public-Private-Partnership between the EC and the private sector represented by the Energy Efficient Buildings Association (E2BA) – promoted by the European Construction Technology Platform – launched the industry-driven research

and demonstration programme **Energy-Efficient Building (EeB)**[4]. The aim of this initiative is to support the creation of a hi-tech building industry, which turns energy efficiency into a sustainable business, fostering EU competitiveness in the construction sector on a global level (EC 2016).

In July 2014 the Communication **Resource efficiency opportunities in the building sector (COM 214 445)** was released by the EC, the main objectives of this initiative being to promote a more efficient use of resources consumed by new and renovated commercial, residential and public buildings, and to reduce their overall environmental impact throughout their full life cycle. To help bring resource efficiency gains, designers, manufacturers, contractors, authorities and users need useable and reliable information to inform their decision-making. This initiative aimed at addressing this information deficit by proposing a set of clearly defined and measurable indicators for the assessment of the environmental performance of buildings.

In 2016, the EC DG Growth and the EASME (Executive Agency for Small and Medium-Sized Enterprises) set up the **European Construction Sector Observatory (ECSO)**, a tool which provides policymakers and stakeholders with analysis and assessments of market conditions and policy developments in the construction sector. The ECSO website[5] provides access to industry data and analysis, concerning the performance of EU-28 MS in relation to the five thematic objectives of the Construction 2020 Strategy.

In the same period, the **EU Building Stocks Observatory**[6] was also set up. It helps monitor and steer the energy performance of buildings across Europe, supporting the implementation of the EPBD.

Moreover, in the framework of the *Clean Energy for All Europeans Package* (COM/20167860) of November 2016 the non-legislative initiative **Smart Financing for Smart Buildings** (COM/20167860 Annex 1) was activated, which aims at unlocking private finance in order to accelerate the renovation of EU buildings. It is organised in three main pillars: financial de-risking based on a more effective use of public funding; technological/technical de-risking through the aggregation of projects and assistance for project development; behavioural de-risking by providing information to investors to reduce the perceived risk of energy renovation projects.

For the implementation of the EPBD the ***European Committee for Standardisation (CEN)***[7] defined a set of **European standards** dealing with the thermal performance of

[4] http://ec.europa.eu/research/industrial_technologies/energy-efficient-buildings_en.html
[5] https://ec.europa.eu/growth/sectors/construction/observatory_it
[6] http://ec.europa.eu/energy/en/eubuildings

buildings and building components, ventilation, light and lighting, heating systems, building automation, controls and building management (EC 2016).

EU Cohesion Policy and Structural Funds

Since its planning (2000-2006), EU Cohesion Policy was intended to promote growth, competitiveness and employment, mostly through **structural funds**. In the 2007-2013 programme aid funds for environmental projects have tripled. 105 billion euros will be invested in the "green economy" which represents more than 30% of the regional policy budget[8]. The following spheres of activity were identified according to information collected about investment of cohesion funds in environmental projects and jobs

- eco-innovation in SMEs,
- railway systems,
- promotion of clean urban transport,
- renewable energies
- energy efficiency
- co-generation
- energy management
- waste disposal
- water management
- promotion of biodiversity and environmental protection
- integrated projects for urban and rural renovation
- rehabilitation of industrial premises and polluted soil
- risk prevention

A substantial part of this endowment (€54 billion) will be allocated to help Member States comply with EU environmental legislation. Furthermore, almost half of the Member States (Austria, Bulgaria, Czech Republic, France, Germany, Hungary, Italy, Poland, Portugal, Romania, Slovakia, Slovenia and the UK) have introduced indicators related to the reduction of greenhouse gases in their cohesion policy programmes.

[7] https://www.cen.eu/about/Pages/default.aspx

[8]Press Release IP/09/369, Brussels, March 9 2009. http://europa.EU/rapid/pressReleasesAction.do?reference=IP/09/369&format=HTML&aged=0&language=ES&guiLanguage=en

The priorities of the Structural Funds 2014-2020 are: the development of innovation; the enhancement of the competitiveness of SMEs and the transition to a low-carbon economy in all sectors and, in particular, the intelligent management of energy and the development of energy efficiency in public infrastructure and in housing.

Articles 7 and 8 on sustainable urban development illustrate the many applications that will be supported by the Structural Funds. The funds taken as a whole are substantial: they amount to 352 billion euros allocated to the various objectives (see the table below).

It is a significant amount that can double up with national funds and enable substantial investments to the order of 25 billion in seven years.
A more detailed analysis on sustainable building development potential should be made by analysing in detail at the national level.

Table 1 – Total EU allocations of Cohesion Policy 2014-2020

Total EU allocations of Cohesion Policy 2014-2020* (million €, current prices)

	Cohesion Fund	Less Developed Regions	Transition Regions	More Developed Regions	Outermost and northern sparsely populated regions	European Territorial Cooperation		Youth Employment Initiative (additional allocation)	Total
						Cross-Border Cooperation	Transnational Cooperation		
BE	-	-	1.039,7	938,6	-	219,0	44,2	42,4	2.283,9
BG	2.278,3	5.089,3	-	-	-	134,2	31,5	55,2	7.588,4
CZ	6.258,9	15.282,5	-	88,2	-	296,7	43,0	13,6	21.982,9
DK	-	-	71,4	255,1	-	204,2	22,7	-	553,4
DE	-	-	9.771,5	8.498,0	-	626,7	338,7	-	19.234,9
EE	1.073,3	2.461,2	-	-	-	49,9	5,5	-	3.590,0
IE	-	-	-	951,6	-	150,5	18,3	68,1	1.188,6
EL	3.250,2	7.034,2	2.306,1	2.528,2	-	185,3	46,4	171,5	15.521,9
ES	-	2.040,4	13.399,5	11.074,4	484,1	430,0	187,6	943,5	28.559,5
FR	-	3.407,8	4.253,3	6.348,5	443,3	824,7	264,6	310,2	15.852,5
HR	2.559,5	5.837,5	-	-	-	127,8	18,3	66,2	8.609,4
IT	-	22.324,6	1.102,0	7.692,2	-	890,0	246,7	567,5	32.823,0
CY	269,5	-	-	421,8	-	29,5	3,3	11,6	735,6
LV	1.349,4	3.039,8	-	-	-	84,3	9,3	29,0	4.511,8
LT	2.048,9	4.628,7	-	-	-	99,9	13,9	31,8	6.823,1
LU	-	-	-	39,6	-	18,2	2,0	-	59,7
HU	6.025,4	15.005,2	-	463,7	-	320,4	41,4	49,8	21.905,9
MT	217,7	-	490,2	-	-	15,3	1,7	-	725,0
NL	-	-	-	1.014,6	-	321,8	67,9	-	1.404,3
AT	-	-	72,3	906,0	-	222,9	34,4	-	1.235,6
PL	23.208,0	51.163,6	-	2.242,4	-	543,2	157,3	252,4	77.567,0
PT	2.861,7	16.671,2	257,6	1.275,5	115,7	78,6	43,8	160,8	21.465,0
RO	6.935,0	15.058,8	-	441,3	-	364,0	88,7	106,0	22.993,8
SI	895,4	1.260,0	-	847,3	-	54,5	8,4	9,2	3.074,8
SK	4.168,3	9.483,7	-	44,2	-	201,1	22,3	72,2	13.991,7
FI	-	-	-	999,1	305,3	139,4	21,9	-	1.465,8
SE	-	-	-	1.512,4	206,9	304,2	38,1	44,2	2.105,8
UK	-	2.383,2	2.617,4	5.767,6	-	612,3	253,3	206,1	11.839,9
Interregional cooperation									571,6
Urban innovative actions									371,9
Technical assistance									1.217,6
EU28	**63.399,7**	**182.171,8**	**35.381,1**	**54.350,5**	**1.555,4**	**7.548,4**	**2.075,0**	**3.211,2**	**351.854,2**

** breakdown by category of allocations subject to transfers between categories at the request of the Member States*

Practical support initiatives

To help EU Member States properly implement the Energy Performance of Buildings Directive **(2010/31/EU) and to achieve energy-efficiency targets, the European Commission has established the following practical support initiatives:**

- **Concerted Action EPBD**: a forum launched by the Commission to promote dialogue and the exchange of best practices between countries when it comes to reducing energy consumption in buildings.
- **BUILD UP Skills**: an initiative to help craftsmen, on-site construction workers and systems installers in the building sector. Its aim is to increase the number of qualified workers across Europe able to undertake energy-efficient building renovations and help construct nearly zero-energy buildings.
- **BUILD UP Web Portal**: the Build Up Portal (www.Buildup.eu) brings together European experts on energy reduction in buildings. The aim is to share information, to exchange best working practices and knowledge, and to transfer tools and resources.

In order to drive improvement in resource efficiency in the construction sector through a common EU approach to assessment, in 2015 – in close cooperation with industry stakeholders and the public sector – the European Commission began to develop a framework of indicators with the intention of creating a flexible system of indicators, to be incorporated into new or existing assessment schemes, or to be used on their own by different stakeholders. In September 2017, the **voluntary reporting framework LEVEL(s)** was set up[9] (to be tested for next two years), aimed at providing a common "sustainable" language for the building sector: a set of simple metrics for measuring the sustainability performance of buildings throughout their life cycle, focusing on areas such as greenhouse gas emissions, resource and water efficiency as well as health and comfort. The name given to this framework refers to the different levels at which it can be used.

Furthermore, in 2016 the European Commission launched a **"Fitness Check"** for the Construction Sector[10], which aims at assessing the impact of EU legislation on it, through the evaluation of the **relevance, effectiveness, efficiency, coherence and EU added value of the legislative framework**. The policy areas of Internal Market, Energy

[9] http://ec.europa.eu/environment/eussd/buildings.htm
[10] https://ec.europa.eu/growth/sectors/construction/fitness-check_en

Efficiency, Environment and Health and Safety are investigated, through the analysis of 15 EU legislative texts.

Finally, In order to encourage the use of Building Information Modelling (BIM) in public works, the **EU BIM Task Group** (gathering the collective experience of public policy makers, public estate owners and infrastructure operators from over twenty European countries) in July 2017 drafted the ***Handbook for the Introduction of Building Information Modelling in the European Public Sector***[11].

3. MAJOR TRENDS IN THE SUSTAINABLE CONSTRUCTION ECONOMY

3.1. Economic trends in the construction sector

The financial and economic crisis had a major impact on the construction sector in nearly all EU Member States (MS). According to data and statistics provided by EUROSTAT (2017), the **downturn in activity for construction** within the EU28 lasted longer than for industry: in the period 2007-2017 the EU-28 index of production for construction[12] fell from a peak in February 2008 to a low in March 2013, a decline that left construction output 26.2% lower than it had been. Trends concerning the **construction of buildings** – the dominant part of construction output – showed a slightly greater magnitude in the contraction from February 2008 to March 2013, totalling 26.9% in the EU-28[13].

This long and deep downturn in construction activity was **widespread within the EU-28**: EUROSTAT (2017) highlights that during the 2012-2016 period all but five EU MS experienced at least two years of contraction in construction output (in this framework Italy and Portugal each recorded five consecutive negative annual rates of change in their construction activity; in Italy it was even longer, extending back to 2008).

[11] http://www.eubim.eu/handbook/

[12] According to EUROSTAT the *index of production for construction* is a business-cycle indicator which measures the monthly changes in production of buildings (residential and non-residential) and of civil engineering (roads, railways, bridges, tunnels, utility projects). Available at http://ec.europa.EU/eurostat/statistics-explained/index.php/Glossary:Production_in_construction.

[13] For more details access the EUROSTAT - *Figure 4: Index of production, construction, EU-28, 2007-17*, available at http://ec.europa.eu/eurostat/statistics-explained/index.php/Industry_and_construction_statistics_-_short-term_indicators

Table 2 – Annual growth rates for constructions: index of production, 2012-2016

Country	2012	2013	2014	2015	2016
Austria	3.4	0.4	-1.7	-1.6	0.5
Belgium	-1.0	-2.1	-0.7	-2.4	0.2
Bulgaria	-0.6	-3.9	7.2	10.8	-16.6
Croatia	-12.1	-4.6	-7.3	-1.0	2.5
Cyprus	-21.0	-18.9	-21.6	0.2	13.0
Czech Rep.	-7.4	-6.8	4.3	7.1	-6.1
Denmark	0.9	-0.7	4.3	4.4	5.6
Estonia	16.7	-0.1	-2.1	-3.4	2.6
Finland	-0.9	-3.2	0.4	5.9	6.1
France	-5.2	0.6	-2.2	-4.7	-0.3
Germany	-1.1	-0.3	2.7	-2.2	0.8
Greece	-33.4	-8.2	15.3	3.1	22.7
Hungary	-6.5	8.4	13.5	3.0	-18.8
Ireland	-2.4	11.3	8.2	7.9	18.5
Italy	-13.4	-10.3	-6.7	-1.9	-0.3
Latvia	14.4	7.4	7.9	-1.2	-17.9
Lithuania	-7.2	11.7	16.5	-3.5	-9.6
Luxembourg	-3.7	-4.2	3.6	-1.5	3.8
Malta	1.7	1.9	2.4	15.9	-3.8
Netherlands	-8.1	-5.2	4.3	8.5	7.0
Poland	-5.0	-10.1	4.1	-0.3	-14.0
Portugal	-16.2	-16.0	-8.9	-2.3	-3.3
Romania	1.4	-0.7	-6.6	10.6	-4.8
Slovakia	-12.4	-5.2	-4.2	17.9	-10.7
Slovenia	-16.8	-2.6	19.5	-8.1	-17.8
Spain	-5.5	1.4	17.4	1.8	5.2
Sweden	-6.1	-3.2	1.3	11.6	10.9
United Kingdom	-7.5	1.6	8.8	4.1	2.4
Total EU-28	-5.8	-1.8	3.1	0.9	1.4

Source: EUROSTAT 2017

By 2016, construction output in Cyprus, Slovenia, Portugal, Ireland and Greece was less than half the level in 2007. During the overall period 2007-2016, construction output declined by more than one fifth in half of the all MS. In 2016, six MS (Malta, Finland, Sweden, Germany, Poland and the United Kingdom) showed higher activity than there had been in 2007 (EUROSTAT 2017).

Nevertheless, according to the ILO (2015) at present and worldwide **global construction output has recovered from the crisis** and it is expected to grow in the coming years, due

to increased urbanisation, a housing backlog, infrastructure renewal and the rising demand for water and energy.

Grey economy

It needs to be underlined that a large amount of the activities in the construction sector are carried out within the framework of a somewhat **grey economy** (if not directly informal), which is difficult to detect but nevertheless well established. The *BUILD UP Skills* national reports have tried to estimate the size of the grey economy that varies greatly across the countries and proves to be a difficult exercise. Some examples provided in the *EU Overview Report* report the following:

- in *Bulgaria*, according to the Bulgarian Construction Centre "the relative share of construction companies which operate in the non-formal sector had reached the level of 15/20% within a period of 10 years";
- in *Poland* it was estimated that for the year 2010 construction and installation services, on the one side, and maintenance, repair and installation works, on the other one, were going to contribute respectively 16.8% and 13.9% of the total Polish grey economy (representing 2,1% of the Polish GDP);
- in *Spain* it is estimated that the GDP generated by the construction sector in 2009 relied upon activities belonging to the grey economy for 29.3% (BUILD UP Skills 2014).

Small-sized enterprises

Construction activity is primarily **local**, the sector being **fragmented** and mainly composed of **micro-companies**. According to information collected by the EBC (2016) concerning EU-28 countries in 2015 and 2016, 91.9% of more than 3 million companies engaged in the construction sector have less than 10 employees each, while only 1% have more than 50 employees (even though these companies are engaged in 40% of the total activities) (ITC ILO 2014). Small and medium construction enterprises employ 83% of the total workforce of the sector (EBC 2016).

A few examples from a number of EU countries (based on the last available data) are quite representative from this point of view (BUILD UP Skills 2014):

- in *Belgium* two-third of the businesses are one-person companies and 21% of them have 1 to 4 employees;
- in *Bulgaria* micro-companies with less than 9 employees are 83.8%, while those with more than 250 are 0,3%

- in *France* 58% of companies involved have no employees, while 36% are micro-companies (1-9 employees);
- in *Germany* in 2011 two-thirds of the companies operating in skilled building, fitting and finishing trades operated with less than 5 employees, 18.9% had 5-9 employees and 9% had 10-19 employees.
- in *Romania* 86% of the companies are micro-companies(1-9 employees);
- in *Spain* over 90% of the businesses in the construction sector have no salaried employees or fewer than 10.

3.2. Employment trends in the construction sector

As mentioned above, the construction sector has been hit particularly hard by the global economic and financial crisis in many countries, given its strong dependency on access to credit (ILO 2015). Enterprises and workers have been affected in terms of fewer contracts for projects and worse levels of employment, while job losses concerned all workers, from engineers and architects to electricians and masons. Currently employment trends greatly vary across Europe and if in construction they have more or less recovered after the crisis in Northwestern Europe, it is not like that in Eastern and, above all, Southern European countries. As a matter of fact, these have faced major decreases: for instance, in the 2008-2013 period, employment in the construction sector decreased 58.5% in Greece, 55% in Spain and 44% in Portugal (ILO 2015).

The following table presents **employment data in the construction sector** in the period 2010-2016 in the countries of the partners of the BROAD project.

Table 3 – Employment in the construction sector in 2010-2016 (selection of countries)

	Belgium		Germany		Italy		Poland		Spain	
	Persons/ 1,000	% total employ.	Persons/ 1,000	% total employ.	Persons/ 1,000	% total employ.	Persons/ 1,000	% total employ.	Persons/ 1,000	% total employ.
2010	322.7	7.1	2529.8	6.2	1889.0	7.7	1256.7	8.1	151.4	8.4
2011	337.5	7.3	2576.8	6.2	1791.2	7.3	1278.9	8.2	103.9	7.3
2012	324.9	7.0	2623.6	6.2	1699.9	7.0	1253.3	8.0	161.3	6.3
2013	329.7	7.1	2685.2	6.4	1553.2	6.6	1184.5	7.6	129.5	5.7
2014	325.1	7.0	2731.8	6.4	1484.1	6.2	1186.6	7.5	993.5	5.5
2015	323.3	6.9	2742.2	6.3	1468.3	6.1	1206.7	7.5	137.7	5.8
2016	335.1	7.1	2759.0	6.3	1403.8	5.8	1223.0	7.6	1073.9	5.6

Source: our elaboration based on OECD data (25/09/2017)

Despite its adverse effects, with an increased number of bankruptcies and higher rates of unemployment, displacing more than **18 million direct jobs** (EC 2016) **the building sector still remains a major employer in the EU** (ILO 2015a, 2015b) **and often even the largest** (for instance last available data concerning the construction industry in *Bulgaria* reports that the building workforce involves about 7% of all those employed, standing out as the biggest industrial employer in the country; in *Finland* approximately 10% of the gross national product is used in construction) (BUILD UP Skills 2014)**.**

The current **18 million direct jobs** are distributed in more than **3 million enterprises** (mainly micro ones: 98% of them employed less than 20 workers – EBC 2016), present in the EU-28 MS as follows.

Table 4 – Enterprises in construction industry in 2016

Country	Total number of enterprises	Country	Total number of enterpriseS
Austria	34,000	Italy	529,000
Belgium	113,000	Latvia	7,000
Bulgaria	19,000	Lithuania	10,000
Croatia	3,000	Luxembourg	2,000
Cyprus	7,000	Malta	6,000
Czech Rep.	320,000	Netherlands	153,000
Denmark	30,000	Poland	160,000
Estonia	8,000	Portugal	47,000
Finland	42,000	Romania	77,000
France	433,000	Slovakia	3,000
Germany	365,000	Slovenia	18,000
Greece	85,000	Spain	407,000
Hungary	89,000	Sweden	102,000
Ireland	47,000	United Kingdom	209,000
Total EU-28		**3,326,000**	

Source: FIEC 2017

Finally, it is worthy stressing that according to the findings of recent studies on the economic and social impact of energy-efficiency investment (Cambridge Econometrics 2015), **energy-efficiency measures deliver** positive output effects, not only in terms of GDP (ranging from 0.8% to 1.3%) but also in terms of **positive net employment effects** (according to the intensity of the measures). Some examples concerning the building sector are provided in the box below.

Box 1 – Energy-efficiency investment effects on employment

POLAND

A study on the employment impact of deep building renovation in *Poland* estimates that a programme costing between €2.2bn and €7bn in 2010 prices and saving between €0.6bn and €1.3bn of energy in 2010 prices could generate between 86,000 and 254,000 additional jobs per year in 2020, depending on the intensity and depth of the building renovation scenarios.

USA

According to another study carried out as for the *USA* by the American Council for an Energy Efficient Economy (ACEEE), $1m of investment in a labour-intensive industry such as construction (especially in refurbishment and installation of EE measures in building) supports, on average, 20 construction jobs compared to just 14 in less labour-intensive manufacturing sectors.

ESTONIA

In *Estonia* it was estimated that in renovating apartment buildings €1m of investment could create directly and indirectly 17 jobs (10 in onsite construction activities and between one and six respectively in consultancy and manufacturing activities).

Source: Cambridge Econometrics 2015

Employed workers' characteristics

The majority of employed workers in the construction sector are **low and medium-skilled**, the high-skilled ones numbering below 10% (ITC ILO 2014). In 2010, medium-skilled labour accounted for 52% of the workforce and were expected to reach 56% by 2025 (the high-skilled being expected to increase by 6%, while thee low-skilled were estimated to decrease by 10% in the same period, according to CEDEFOP scenarios) (ETUC 2013). Examples from national reports provided by *BUILD UP Skill Initiative* account for:

- 63% of low-skilled workers in *UK* in 2009;
- 46% of low-skilled workers in *France* in 2010 for those employed in the building sector;
- 56.5% of employees of the construction sector in *Spain* having a level of education equivalent to the first stage of secondary education (usually targeting students aged 12-16) or lower;
- 84% of craftsmen and onsite workers having a vocational education and training qualification in *Germany*.

Despite some recent increases in **female participation** in the workforce, the building sector is a typically male-dominated area. According to the ILO (2015a), women are sometimes employed in family companies, but often without receiving direct payment. Indeed, rates of female participation in the West European construction sector stand at

7.5%, while paid female workers in the sector are 1%. Of course, the situation varies widely across countries: *BUILD UP Skills* national report from *France* reported 1.6% of females in the building workforce, while in *Germany* their presence amounted to 5.6%. It is worth stressing that in *Greece* the presence of women in the construction sector increased between 2009 and 2013 (ILO 2015a).

As for the **age of the workforce**, according to *BUILD UP Skills* national reports the majority of workers are aged between 25 and 54; some countries specifically nighlight the issue of an **ageing workforce** (in *Sweden*, for instance, in the period from 1999 to 2009 the 55+ age group of workers grew from 16.8% to 21.4%). ILO (2015a) also focuses on the demographic dynamics occurring in many countries and causing an increased rate of retirement of construction workers, with the resulting need to train and hire new ones (see below), since experienced workers are usually replaced by less experienced ones.

Another issue relevant to the composition and characteristics of the construction workforce relates to **migrant workers**. Some European countries report difficulties in retaining highly specialised building workers (*Romania* and *Estonia*, for instance), while some Northern countries (*Finland*, *Sweden* and *Norway*) in recent years have seen an increase in foreign workers. In contrast, due to the economic crisis, migrant workers left countries such as *Spain* and *Ireland*.

Labour shortages

In spite of the employment loss (for both skilled and low-skilled workers) in the construction sector due to the crisis, according to the findings of the *BUILD UP Skills* national reports (BUILD UP Skills 2014), in the long run most countries will face at least a **slight shortage of relevant workers** (the median of the highest estimates refers to one-fifth of the current workforce)[14]. Indeed an increase in the number of employees is expected for 2015-2025, reaching nearly 19 million workers (7.5 million employees will be necessary in order to replace those leaving the workforce due to retirement, migration or mortality) (ETUC 2013).

The findings of the calculations carried out by some countries taking into account workers' occupations (ISCO) among those with highest demand in the labour market include (BUILD UP Skills 2014):

[14] In *Germany* additional craftsmen and onsite workers needed by 2020 amount to 90,000, in *Italy* 100,000, while in *Spain* 166,000 workers are needed. No data is available for *Belgium* and *Poland* (BUILD UP Skills 2014).

- Electricians/electrical equipment installers;
- Carpenters/joiners;
- Plumbers;
- RES installers;
- Bricklayers;
- Insulation workers.

A number of issues that could affect the future supply of workers in the sectors, making the amount greater than current estimates, were also highlighted, including:

- Growth of the industry;
- Emigration of workers out of the country;
- Demographic trends (low birth rates);
- Occupational flexibility of the workforce;
- Changes in educational qualifications and workforce supply;
- Health and safety issues;
- Age;
- Level of implementation of government policy action;
- Changes in regulatory frameworks.

The foreseen labour shortages mainly affect **changes in the demand for skills** related to the transition to the greening of the building sector (ILO 2012). Indeed at present many employers face difficulties in finding qualified people to work in green building (as is currently happening in *Finland*, for instance) (BUILD UP Skills 2014*)* due to the fact that skill requirements change as green building technologies and practices are introduced or changed (ILO 2012, 2015a). Closing **skills gaps** (see below) is therefore all the more important in order to avoid labour shortages. It is worth remembering, however, that this sector has historically been characterised by very poor working conditions and consequent high turn-over rates (qualified workers moving to other sectors or countries in order to find better employment opportunities), offering an opportunity for totally unskilled workers (or people in irregular situations) or even an entrance to the labour market.

3.2. The value chain of the construction sector

The issue of occupation in green building greatly relies on its value chain. In 2012, the ILO underlined that the greening of the building sector should be framed in the **wider value chain that produces and improves buildings**. The ILO organised this value chain into six different clusters also including those businesses involved in the production and distribution of building products and materials, the delivery of professional services (architectural and engineering consultancies), clients, organisations in charge of control and enforcement functions, financing, research, education and policymaking. The six clusters relate to:

- conceiving, planning, designing and advising;
- construction, installation and maintenance;
- controlling;
- enabling;
- manufacturing and distribution;
- green building clients.

According to these clusters of the green building value chain, the ILO identified the **core green building occupations**.

Table 5 – Core occupations per clusters of the green building value chain

CLUSTERS	CORE GREEN BUILDING OCCUPATIONS PER CLUSTER		
CONCEIVING, PLANNING, DESIGNING AND ADVISING	• Construction company managers and business functions • Architects and civil/structural/environmental engineers • Architectural technicians and technical drawing specialists • HVAC, electrical, mechanical, sanitary, renewable energy and building services engineers/designers • Surveyors • Energy, water efficiency and waste management analysts, consultants and advisers		
CONSTRUCTION, INSTALLATION AND MAINTENANCE	• Building site supervisors, site engineers, architects		
	Conservation	*Insulation/ weatherisation*	• Bricklayers, carpenters, plasterers, glaziers, masons, roofers, painters/decorators – semiskilled occupations that assist
		Efficient heating and cooling	• Plumbers and heating installers/maintainers • HVAC installers • Electricians and IT technicians
		Conservation of electric power (other than electric heating and cooling)	• Electricians and installers of energy management systems (at domestic level, mostly responsible for helping individual householders to choose energy-efficient appliances and lighting technologies)
		Water conservation	• Plumbers
	Building level renewable energy (and high efficiency energy) systems	*Heating/cooling*	• Installers/maintainers of solar thermal systems • Installers/maintainers of wood pellet and other biomass heating systems • Installers/maintainers of mass heating (large building or district) and combined heat and power (CHP) systems • Heat pump Installers/maintainers
		Electricity	• Installers/maintainers of solar photovoltaics (PV) • Installers/maintainers of small-scale wind energy systems

CONTROLLING	• Energy auditors • Inspectors, certifiers and quality controllers
ENABLING	• Policy makers • Urban planners • Financing • Educators and information providers • Researchers
MANUFACTURING AND DISTRIBUTION	• Manufacturers and distributors of green building materials and products • IT&system technicians
GREEN BUILDING CLIENTS	• Developers • Energy managers, facilities managers and building managers • Public servants working in procurement and management of buildings • Householders and tenants

Source: ILO 2011

Recently, tackling the issue of transformational change in the construction sector, BPIE (2016) highlighted the **complexity of the dynamic relations** of the different players involved as suppliers in the construction value chain. In a high-level frame of the construction value chain – divided into four main areas: preparation and design, execution, user phase and disposal and recycle – the supply players involved in the "execution" area are identified according to their core-activities:

- On-site execution (also concerning operation and maintenance activities), involving contractors and subcontractors and installers (HVAC, electricity, RES, etc.);
- building services, concerning architectural, engineering, energy and building management services;
- building supply activities, concerning providers of raw and building materials, installations and buildings equipment and machinery.

In this proposed frame, other non-construction players – directly or indirectly involved in it – are also referred to, such as onsite providers and purchasers (for energy, ICT, water and sewage, etc), service economies (financial, real estate, communication and cleaning sectors), etc.

To complete the picture BPIE (2016) further emphasises the issue of the **complexity of the demand side of the construction value chain**, referring to very diversified segments which include: building typologies, users, owners, user status, type of work, construction approach, financing methods, energy performance, climate zone, building codes, etc. (for each segment further sub-classifications can be identified). Furthermore, to better finalise the contribution of all those involved in the provision of value in the

construction of buildings, the relevance of the **end-use functionality of buildings** is focused on, concerning three main areas: shelter (live, work, play, sleep, etc.); comfort (indoor air quality, thermal environment, solar-lightening, etc.); identity.

3.3. Skill needs and training

Skill needs in the construction sector

It is widely acknowledged (ILO 2011, 2012, 2015a, EUROFOUND 2012, BPIE 2011, BUILD UP Skills 2014, Cambridge Econometrics 2015, CDEFOP/OECD 2015, ETUC 2013) that the greening of the construction sector leads to a movement towards **more skilled jobs**[15], a cause of labour shortages, as already stressed: according to BPIE (2011) and Cambridge Econometrics (2015), for instance, in the near future there will be demands for new skills for technicians, managers and operators both in the design and construction stages. These demands are to be framed in the context of the overall systemic weakness of the EU workforce detected by CEDEFOP (2009) a few years ago and still undermining the current scenario. Particularly relevant to industrial competitiveness and green jobs in general appears to be a lack of scientific, technological, engineering and mathematical (STEM) skills (Cambridge Econometrics 2015)[16].

Skills demands have to be contextualised, since they depend heavily – among other issues – on the energy characteristics of European building stocks and the required level of retrofitting standards (it was stressed, for example, that building stock in Central and Eastern Europe is less energy efficient, due to the fact that many of them were constructed at a time of cheap energy costs). Similarly it is stated that the skills gap is likely to be larger in countries where the technical potential for energy savings is greater (newer Member States such as Bulgaria, Romania and the Baltic states) (Cambridge Econometrics 2015).

Tackling the issue of **skills shortages** for the greening of the building sector, apart from skills needs relating to specific occupations (see below), in 2011, ILO identified a set of **"core skills for green buildings"**[17] needed by workers in all areas. These core skills refer to:

[15] According to the ETUC the construction sector "is moving towards a more sophisticated labour-force" (ETUC 2013).

[16] The lack of STEM skills was recently restated during the Symposium entitled "Green Growth, Green Jobs: Integrating Environmental and Employment Policies in the EU", Brussels, 17 June 2015.

[17] The ILO document specified in a footnote that *"'core skills/core employability skills' refers to non vocational/non-technical skills or competencies that are needed to perform at work and in society. They apply to work in general, rather than being specific to an occupation or industry".*

- Adaptability to change, due to the rapidity of changes;
- Environmental awareness;
- Interdisciplinary skills (crossing traditional occupational boundaries at individual level and fostering an ability to work with people trained in other disciplines);
- Team-working, coordination and leadership skills;
- Interpersonal and negotiation skills (to allow workers tto adequately communicate in all possible different working environments, from construction sites to people's homes);
- Problem solving and critical thinking;
- Business and marketing skills;
- Foreign languages.

It is worth remembering that under the ILO (2011) approach, there exists a **dynamic relationship between green building practice and skills**: the latter are thought about as part of a dynamic system within which available skills and the underpinning capabilities interact with ongoing green building practices.

More recently the *BUILD UP Skills EU Overview Report* (2014), based on the analysis of data and information collected in thirty national reports, reported that overall data suggests it is more urgent to **up-skill the existing workforce**, **rather than retrain it**, highlighting the importance of the issue of **continuing education** of the workforce. Due to technological innovations affecting existing occupations, the working activities of the latter are enriched with new meanings and contents, very dependent, in turn, on a **continuous adaptation of workers' skill sets**. Furthermore, evidence collected in the *BUILD UP Skills EU Overview Report* demonstrates that the overall need for training the workers involved is higher than the estimated future labour demand (more than 3 million workers are estimated to require up-skilling on energy efficiency or renewable energy sources by 2020).

According to the *EU Overview Report* the **occupations with the most urgent training needs (additional training)** on average comprise: bricklayers and stonemasons, carpenters and joiners, plumbers and pipe fitters, insulation workers, building and related electricians and roofers. **Occupations mentioned less often** include: glaziers, concrete placers, concrete finishers and related workers, plasterers, floor layers and tile setters, electrical mechanics and fitters.

The Danish Technological Institute (2009) identified specific management-level shortages in planning skills and knowledge of procurement forms and social, negotiation

and communication skills. At the level of workers, specific needs were detected concerning: skills in green solutions (regarding solar thermal energy, rainwater harvesting, air-source heat pumps, etc.); and literacy, numeracy and ICT skills. Skills required for low-qualified workers included knowledge about different trades (and the associated materials and technologies) and basic reading, writing and arithmetic.

Skills gaps related to occupations have been identified worldwide by the ILO research (2011). Some overall or EU-related suggestions are reported in the following paragraphs, organised under the six clusters of occupations in the green building sector (see above*).*

Box 2 – Skills gaps per occupation in the green building sector

Conceiving, planning, designing and advising occupations
The highest amount of skills deficiencies was identified in this area. In many countries, both architects and civil engineers lacked the skills to work in green building. Many skills gaps among construction professionals concerning building retrofitting projects were detected. A lack of knowledge of life-cycle analysis of building materials and products was identified.

Construction, installation and maintenance
Major skills gaps were identified at the operational level concerning the construction of green buildings, such as installing and maintaining green building technologies. Many gaps were acknowledged referring to future needs (as for instance those related to installing insulation).

Controlling occupations
Country-level research showed a growing requirement for skills in this area (assessment of works against planning requirements and building regulations; proper installation of specific technologies; adherence of broad-based retrofitting projects to building regulations and project plan and design; assessment of new and retrofitted buildings against green building standards).

Education, research, financing and policymaking occupations
The need for upgrading skills among educators, instructors and trainers was identified. Skills needs concerning other areas (research, finance and policymaking) occurred only in a sporadic way.

Manufacturing and distribution occupations
These two areas resulted as too large to define cross-cutting skills gaps. Since distributors of green building materials and products also act as advisers and trainers to builders and construction professionals, they need to up-skill their customer-facing staff, to better equip them to provide advice.

Green building clients
Three areas requiring development of skills were identified: green procurement, energy management, and householders and building owners.

Source: ILO 2011

Apart from specific skills needs related to different occupations**, requirements for additional knowledge, skills and competences are also present across the construction industry,** and transferable skills – such as leadership, learn to learn, project

management, foreign languages – are all considered the most important for workers in SMEs (BUILD UP Skills 2014).

These overall pictures (above all those provided by the *BUILD UP Skills EU Overview Report*) on the different needs of targeted workers account for **insufficient current CVET (continuing vocational education and training) provisions** with respect to EE and RES in the building sector (BUILD UP Skills 2014). The need for a change in the skills sets also leads to a **transformation of existing occupations** (occurring in most if not all of them), rather than the emergence of completely new ones (even though, of course, some potential new occupations do exist). This transformation depends greatly on the technological innovation processes inserted in the work activities, which require the adaptation of existing skills sets.

Training of the building workforce

From the point of view of **EU policy for training the building workforce**, obviously the issue of skills and jobs is very present in the various strategic documents concerning the building sector. Improvement of the human-capital basis of the sector represents, for instance, a key component of the EC COM(2012) 433 *Strategy for the sustainable competitiveness of the construction sector and its enterprises*, while the EC COM(2011) 109 *Energy Efficiency Plan* directly refers to the *BUILD UP Skills Initiative* as an instrument supporting Member States in assessing training needs for the construction sector, defining relevant solutions to meet them and developing training schemes.

Indeed, under the framework of the Intelligent Energy Europe (IEE) programme (the instrument to support EU energy efficiency and renewable-energy policies) the previously mentioned ***BUILD UP Skills Initiative*** was launched in 2011 in order to unite forces and increase the number of qualified workers in the building workforce across Europe. The Initiative focuses on continuing education and training of craftsmen and other onsite workers in the building sector and is organised into three main components, concerning: national qualification platforms and roadmaps to 2020 (based on the identification of main skills gaps and training needs of the workforce at national level); the introduction of new and upgrading of existing qualification and training schemes; Europe-wide support activities (CEDEFOP/OECD 2015).

In parallel, the **framework for vocational education and training is evolving**, with Member States referring to the European Qualification Framework (EQF) that acts as a translation device to relate different countries' national qualification systems to a common European framework of reference. As stated by the *BUILD UP Skills Initiative*

itself "the objective is to facilitate the understanding and comparisons of the qualifications levels of different countries and different education and training systems". Furthermore, this creates opportunities to develop qualification schemes in line with the EQF and use other instruments such as the ECVET (European Credit System for Vocational Education and training) voluntary credit system (CEDEFOP/OECD 2015).

In order to support the training of the building sector workforce, different **EU instruments** have been provided, such as the Leonardo da Vinci strand and the Lifelong Learning Programme (2007-2013) for projects on vocational education and training (some of them directly focusing on the building sector); the European Social Fund also supports projects related to vocational training and lifelong learning opportunities, while a number of training projects were funded under Intelligent Energy Europe (BUILD UP Skills 2014).

Barriers to training and lifelong learning activities for the workforce of the building sector were identified – looking at the 30 national reports drafted by countries participating in the *BUILD UP Skills Initiative* – in the administrative, legal and policy-related areas (the fragmented and unstable political environment, for instance), in the market (considered small and characterised by few demands for energy efficiency and RES solutions), at the economic and financial level (due to lack of funding, their short-term availability, etc.), in education and training (low quality, limited supply not adapted to labour-market demands, underdeveloped training infrastructures and materials) and also due to cultural and linguistic issues (concerning the presence of foreign building workers) (CEDEFOP/OECD 2015).

3.4. Drivers, changes and innovations in the green building economy

The main tendencies of the green building sector are referred to in the present paragraph considering:

- **compliance with the requirements of the Energy Performance of Buildings Directive (EPBD)** concerning minimum energy performance (MEP) and energy performance certificates (EPCs);
- the **drivers of change** in the construction sector, taking into account **factors affecting the development of green building** discussed in recent relevant documents;
- a number of **industrial innovation opportunities** for the construction sector;
- orientation towards the **reduction of structural waste** in the built environment, in the framework of the circular economy approach.

Compliance with the EPBD

The EPBD constitutes the main policy tool to drive energy efficiency in the built environment, which accounts for around 40% of EU energy consumption and 36% of total greenhouse-gas emissions (EC 2008). As previously mentioned, compliance with the EPBD is therefore strategic in order to achieve the full energy efficiency and carbon-savings potential of buildings. The paths undertaken by different Member States (MS) across EU-28 towards full compliance at national level provide a useful picture to understand the green building sector at present, as well as providing glimpses of future directions. Recently the DG Energy of the European Commission delivered a study (ICF International-EC/DG Energy 2015) focusing on the compliance with national legislations the different MS put in place in order to achieve the requirements of EPBD. To this end, for each MS, national frameworks and systems were analysed, relevant data pertaining to the year 2014 collected, and reasons and factors driving different compliance rates were identified.

Compliance rates were analysed referring to **minimum energy performance (MEP)** and **energy performance certificates (EPCs)**, according to the EPBD items in the following box.

Box 3– MEP and EPCs requirements

MEP requirements:

(A1) – application of minimum energy performance standards for new buildings
(A2) – application of minimum energy performance standards for existing buildings undergoing a major renovation
(A3) – application of minimum energy performance standards for retrofitted building elements

EPCs requirements:

(B1) – production of EPCs for buildings or building units that are constructed, sold or rented out to a new tenant
(B2) – production of EPCs for public buildings occupied by a public authority and frequently visited by the public
(B3) – showing of or **(B4)** handing over a valid EPC of buildings or building units that are constructed, sold or rented the new tenant or buyer
(B5) – inclusion of EP/EPC indicator in advertisement when a building is offered for sale or rent
(B6) – display of EPCs in large buildings frequently visited by the public (B6)

Source: ICF International-EC DG Energy 2015

As for compliance with MEP, the results of the study revealed that: a high proportion of MS reporting data for new buildings (A1) provided values well above 80%; compliance rates for requirements concerning major renovations (A2) were slightly lower than those concerning new buildings; retrofitted building elements (A3) scored the lowest level of reported data.

The study also identified factors potentially relevant in influencing levels of overall compliance with MEP, including: the mechanisms used for applying the MEP requirements; scope of MEP requirements; the penalty framework; and the support structures.

The findings concerning compliance with energy performance certificates (EPCs) suggest that:

- (B1) – The EPC production in the rental market is less well monitored and controlled than in the market concerning new construction and building sales sectors. The legal systems for checking compliance with the use and issue of

EPCs in sales and new constructions do not exist for a large proportion of tenancy agreements in most MS;

- Very little data from MS was available to report rates of compliance for production (B2) and display (B6) of EPCs in large buildings frequented by the public. Further sources of information for the study suggest that compliance checking systems for this requirement are quite under developed;
- Very little data on compliance rates was provided by representatives of MS concerning the showing (B3) and handing over (B4) of a valid EPC to new tenants or buyers. Reported data varied greatly, from under 10% in Poland to over 80% for around ten MS;
- Only nine MS reported compliance rates concerning the inclusion of EP/EPC indicator in advertisements in the commercial media. The overall checked data varied greatly across countries, from 13% in Estonia to 100% in Austria.

According to the study findings, compliance levels concerning EPCs seems to rely greatly on the following four elements: the qualified experts' licence to operate; software and database systems in place; prevailing penalty frameworks; and the compliance checking system and characteristics of the independent control system.

Apart from the above-listed factors, which are potentially relevant in influencing levels of overall compliance with MEP and EPCs, other factors affecting compliance rates were identified and referred to in the report as overall **framework conditions**.

Framework conditions **influencing MEP compliance** comprise:

- Political control and localised implementation;
- Social and cultural factors;
- Financial factors including fuel prices and fiscal support;
- Owner occupation;
- Enforcement;
- Costs of compliance to the construction sector;
- Influence of construction sector skills and competence levels on compliance;
- Loss of skilled workers from the sector;
- Knowledge sharing and good practice guidance.

Framework conditions **affecting EPC compliance** include:

- Property type and ownership rate, building density and property values;
- Public awareness and understanding of the EPC;
- Incentives to act;

- EPC calculation methodology ;
- EPC control system;
- Regional variations.

Factors affecting the building sector and drivers of change

As already suggested in the previous paragraphs, **future directions** for building sector activities derive from the outcomes and interactions of different economic, environmental, cultural, social, political and technical factors, at European as well as at national and local levels. These factors include, among others, energy-efficiency policies, measures and regulations, the strengthening of industrial and modular processes in the building sector (Ellen MacArthur Foundation 2015; Rugiero S. et al. 2014), the transformation of the overall power market in Europe towards one that is more decentralised and interconnected where buildings could become active players in the energy systems (BPIE 2015), infrastructure renewal and the needs of developing "megacities" (ETUC 2013), urbanisation and globalisation processes, customers' and end-consumers' demands for sustainably built-environments, etc.

An attempt to organise all possible factors affecting the building sector was carried out at the beginning of 2016 by BPIE, according to which the construction sector and the building component within it are presently seeing robust changes, due to dynamics shaping the overall world economy, referred to as *global megatrends*. The megatrends and drivers of change that can in some way impact on the future of the functioning of the construction value chain have been organised into nine main areas, within which the drivers of change have been listed.

Table 6 – Drivers of change per megratrends

MEGATRENDS	DRIVERS OF CHANGE
CLIMATE CHANGE	Legislation and support measures to reduce emissions from buildings
	Environmentally conscious consumers
DEMOGRAPHIC CHANGE	Ageing population
	Increasing number of under-occupied dwellings
	Growing number of small and blended families
	Increasing (awareness of) fuel poverty
	Replacement demand of 60% in the construction sector by 2020 – reduced flow of younger workers in the workforce
DIGITAL AND BROADER TECHNOLOGY REVOLUTION	Advanced automation, 3D printing and industrial processes on- and off-site
	Mass adaptation to smartphone technology and connected devices (internet of things)
	Time- and place-independent work
	Non-construction actors enter the construction value chain (e.g. electric vehicles, utilities, ICT)
ECONOMIC CRISIS	Stricter requirements for (mortgage) loans
	Higher caution for investments in buildings
	Social polarisation makes it increasingly difficult for vulnerable people to find decent housing at affordable prices
	90% of social housing is in need of (energy) renovations
ENERGY SUPPLY	Legislation and support measures to reduce energy demands from buildings
	Grid parity and widespread adaptation of renewable energy technologies (e.g. solar systems will be at a grid parity in up to 80% of the global market within 2 years)
	The energy market is changing (decentralisation, decarbonisation. More complex, open…)
	Electrification of heating and cooling
GLOBALISATION	Unfair competition at the international level due to higher standards of the European construction value chain
	Limited access to international markets – reluctance to open public procurement to European construction companies
RESOURCE AND ENVIRONMENTAL DEPLETION	Legislation and support measures (EU, national and regional levels) to increase resource efficiency
	General awareness of resource and environmental depletion, cradle to cradle and local economies
URBAN REDEVELOPMENT	High and increasing degree of urbanisation (more than 2/3 of the European population)
	Threatened biodiversity and increased risk of both flooding and water scarcity because of urban sprawl and soil sealing
	Non-capital cities in Central and Eastern Europe and old industrial cities in Western Europe facing the threat of economic stagnation or decline
MIGRATION	Migration within the EU
	Immigration to the EU

Source: BPIE 2016

Some more in-depth reflections upon the different drivers of change listed above are provided in relevant documents issued in the last years. For instance, the definition of the baseline scenario on resource efficiency in the building sector carried out by ECORYS (2014) took into account the population factor, household size, floor area for buildings and housing deprivation in Europe as **drivers of the demand for buildings**. Indeed, the study reports that a projection towards 2030 indicates that the European population will continue to grow (by 2030 approximately 21 million more inhabitants than in 2010), and these inhabitants need to be housed and enabled to access services, which leads to a demand for buildings and potential expansion of the built environment. **Household size and dwellings** also provide information about the demand for buildings: during the last two decades (1990-2010), the number of persons per household in the EU-27 constantly decreased. The **total floor area of buildings** trend (derived from extrapolations concerning the average floor area of dwellings, the dwelling floor area per capita and the average floor area of new dwellings) is increasing, while the reduction of the severe levels of **housing deprivation** in Europe relies greatly on renovations, as a way to cope with the issue.

As for the **technological dimension**, according to the ILO (2015) advancement in the overall construction industry relies on three trends affecting both work and employment practices:

- **off-site construction**, which allows companies to control costs, improve quality and efficiency and export better (modular construction techniques, for example, can reduce total construction costs by 30-60%) (Ellen MacArthur Foundation 2015). This is likely to increase in coming years, further integrating with the manufacturing industry, involving the creation of new skilled jobs in manufacturing plants, in the assembly of factory-made components and in the integration of these with traditionally crafted components;

- **green technology** adoption, driven by ongoing urbanisation processes and higher environmental standards (greenhouse-gas emissions, efficient use of natural resources and water), in order to improve the sustainability and the cost effectiveness of materials and construction-related processes;

- **nanotechnology** already applied in buildings (from nano-particle paints used in order to prevent corrosion to thermo-chromic glass to regulate the lighting) which can reduce the costs for companies due to the effects on the usability, versatility, endurance, strength and weight of materials.

Industrial innovation opportunities

As already outlined, it is widely acknowledged that the development of the building sector relies heavily on **industrial innovation**. From this perspective, it is worthwhile reporting the most recent work carried out by BPIE (2016)[18] investigating different types of **innovation** (product, service, process, marketing and organisational) already being delivered in the construction value chain. The authors' opinion is that such industrial innovations could be further developed so as **to foster structural change** in the sector, which is deemed to be characterised by a low level of innovation compared to others. As a matter of fact, product innovation is considered particularly poor (above all among service industries involved in the construction value chain compared to manufacturing firms), while process innovation is more widely applied (probably due to a larger amount of SMEs providing services in the onsite execution segment).

According to BPIE (2016), on one side the adoption of innovation opportunities depends greatly on a number of interlinked challenges, including: the uncertain economic and policy outlook (which makes it difficult to invest in innovation); the need to manage new risks related to new processes and products of innovative projects; the need to balance collaboration to protect knowledge. On the other side, the extreme diversification of the demand side asking for high-energy performing, flexible, smaller, easy-to-use, lifelong, multigenerational and affordable housing concepts, requires a proactive innovation strategy for European players in the construction value chain. BPIE analysed in depth and from different perspectives (innovation potential, value to be captured, impact on players in the value chain, enabling measures and best practices and pilot projects) four specific industrial innovation opportunities in the construction sector: prefabricated systems for deep-energy retrofits of residential buildings; advanced insulation materials for building envelopes; building interaction with the energy system; and building automation and control technologies.

Innovative solutions concerning *"Prefabricated systems for deep-energy retrofits of residential buildings"* were identified in:

- Customisation of prefabricated elements per project;
- Robotics, 3D scans and simulations to measure the building and execute the assembly fitting perfectly;
- New cooperative business models between design, production, assembly and customers;

[18] This paragraph on Industrial innovation opportunities relies on data, information and reflections presented in BPIE 2016.

- Third party to aggregate renovation projects.

"Advanced insulation materials for building envelopes" copes through the following innovative solutions:

- Evolution from a single material or product to a system solution that includes fixings, finishing, etc.;
- System solutions leading to reduced labour costs;
- Design and execution guidelines, training, etc., bringing super insulating materials to relevant players in the construction value chain.

To foster innovation in *"Building interaction with the energy system"* the following should be considered:

- Third-party business models aggregating the interactions of the buildings with the energy system;
- Communication interface and steering programme customised to the needs and wishes of the building occupants;
- Smart controls and household appliances enabling building occupants to modulate their energy use.

To conclude with the example provided, innovation potential for *"Building automation and control technologies"* includes the following solutions:

- Organisational and service innovation overcoming the mismatch between the construction sector and building automation to optimise energy consumption with dynamic and self-learning control systems;
- Product innovative solutions integrating building automation in existing buildings;
- Marketing innovation to raise awareness among architects, installers and end-users on energy-saving potential and other benefits such as safety and comfort.

These changes are related to a wide process of industrialisation in construction.

As analysed by Girmsheid (2005), industrialisation in construction has the following characteristics:

Table 7 – Characteristics of industrial production and parallels to construction production

Characteristics of industrial production	Demands on industrialised construction
Centralised production	Pre-fabrication of components at the factory
Mass production/increasingly variable production	Development of variable basic types
Production based in standardised solutions and manufacture of variations	Standardisation of components but still maintaining flexibility of design
Specialisation	Focus on specific market segments
Integration of planning, production and marketing	Interaction of building design, production planning, production/construction
Optimised processes and organisation	Optimisation of the planning and production processes in terms of automation and mechanisation

Source: Girmsheid (2005)

Reducing structural waste in the built environment

In order to draft prospective tendencies in the building sector it is also essential to refer to the effects of the requirements deriving from the principles of the **circular economy** outlined in the 2015 EC Directive. With regard to this issue the study carried out by the Ellen MacArthur Foundation (2015) drew attention to **structural waste within the built environment**: 10-15% of building materials are usually wasted during construction; 50% of residential dwellers in Europe report living in too much space; 20-40% of energy used in existing buildings could be easily saved; 54% of demolition materials are land-filled. To counteract this structural waste the development of the building sector should seek to cope concretely with the principles of the circular economy, consequently fostering positive effects in terms of GDP and occupation rates (apart from the environmental benefits).

In the framework of the Ellen MacArthur study four main **factors accounting for waste** in the building sectors were identified.

- **Low productivity of the sector**, that witnessed severe stagnation and which is too conservative and cautious about new technologies (thus affecting how builders use resources). The sector is characterised by high levels of skill mismatches, due to the fact that the majority of the companies are locally based

and fragmented, small or micro-enterprises that find it difficult to access the necessary complex knowledge skills.

- **Under- or over-utilisation of buildings**. On one side, the available data show that in some cases buildings are underutilised (the EU-27 has 25 billion square metres of floor space, a large quantity of which is empty, while during working hours only 35-40% of European offices are used). On the other side, the demand for buildings is increasing (11 million European households are facing severe housing deprivation, as previously mentioned).
- **Energy consumption**. Despite numerous regulations and improvements, buildings are still very energy spending, compliance with the EBPD is still coming up against obstacles (as mentioned above). As already pointed out, for instance, passive and zero-net-energy buildings are already present in segments of the market, but are still a minority of new buildings.
- **End-of-life waste and toxic materials**. Waste generated in the construction sector in Europe accounts for 25-30% of overall waste. It is unattractive due to the presence of toxic elements in demolition materials (such as paints, fasteners, adhesives and wall-covering material), which cannot be easily removed.

Taking into account these factors directly affecting structural waste in the construction sector, according to the circular economy principles **six levers that could transform the built environment** were suggested, concerning:

- **Industrial production and 3D printing** – industrialisation has great untapped potential (moving towards factory-based industrial processes, companies can already reduce costs by 30% and shorten delivery times by 50%); new technologies such as those concerning 3D printing are already revolutionising the construction sector;
- **Energy generation and use,** through better energy efficiency and the distributed production of renewable energy. Apart from alternative construction methods, interventions to reduce energy consumption are already available, from insulation to smart homes (just to provide one example, the use of energy-management tools, such as connected devices, lighting controls or smart thermostats, is growing at a rate of 20% per year). As previously outlined, buildings could also become active players in the power-market systems, as energy producers and not just consumers (BPIE 2015).
- **Shared residential space** – across Europe a large amount of common spaces are proposed in new development projects and in the framework of the growing sharing economy, allowing for the reduction of the costs of communal services and fostering changes in lifestyles, becoming more community oriented.
- **Shared and virtual office space** – new flexible forms of work organisation, including smart working, are increasing in Europe (to safeguard workers'

wellbeing on one side and the productivity of companies on the other), fostering a better utilisation of buildings and office spaces (currently under-utilised, as mentioned above).

- **Modularity and durability** – the lack of flexibility in building and room configurations represents a barrier to the best use of floor space in the framework of a housing market characterised by changing needs which sometimes prove unsuitable (older people looking to downsize or homeowners looking for retrofitting interventions to change the organisation of their homes). In this scenario, technical tools that can deliver modular interventions in older buildings are also fostering the durability issue.
- **Urban planning** can contain the urban sprawl phenomenon still present in Europe (where urban areas grew 5.75% between 1990-2000 and up to 6.1%, in the period 2000-2006) fostering compact urban growth, a better use of inner-city vacant land and a shift in land-use patterns.

4. SOCIAL DIALOGUE AND SUSTAINABLE CONSTRUCTION

4.1. Industrial relations in the construction sector in Europe

To better understand the role of social dialogue in support of green building it is necessary to consider **the degree of the social partners' involvement in industrial policies at a general level**. Considering the general state of social dialogue – for all sectors – Eurofound (2014) underlines two key points:

a. there is a deep influence of the institutional characteristics of the industrial relations regimes at country level;
b. there is an approach which tends more to the formulation of horizontal policy initiatives rather than in targeted, sectoral ones.

The Eurofound report, adopting a previous analytical framework from Visser (2008), presents five groups of countries in relation to their industrial relations regime:

a. The Nordic corporatist regime (Sweden, Denmark, Finland) with a highly institutionalised role for social partners, with a high degree of involvement of both employer organisations and trade unions. Participation of social partners in the Nordic countries is mostly mandatory on both tripartite standing committees and ad-hoc committees, as well as in hearings, consultations and conferences. An example of tripartite social partner involvement is represented by the so-called 'growth committees' in the Danish regions, which include not only the social partners, but also NGOs and research institutions.
b. The social partnership regime in Centre-West Europe (Germany, Austria, Netherlands, Belgium, Luxembourg) characterised by an institutionalised role of the social partners. Policy formulation and implementation involves employer organisations and trade unions. Participation of the social partners is made possible through ad-hoc consultation, participation in high-level groups, standing committee meetings and other instruments.
c. The liberal pluralism regime or Anglosphere model (United Kingdom, Ireland, Cyprus and Malta) emphasises a more limited role for the social partners and the involvement is driven by specific themes or agendas.
d. In the polarised pluralism regime (Italy, Spain, Portugal, France and Greece), the role of the social partners is more irregular, highly politicised and the social partners are involved in both standing and ad-hoc committees, but these are not tripartite committees.
e. It is still unclear whether all or some of the new Member States from Eastern Europe will assimilate any of these regimes (Bulgaria, Czech Republic, Estonia,

Latvia, Lithuania, Hungary, Poland, Romania and Slovakia). Their industrial relations regimes differ in the strength of unions, the autonomy of the social partners, state intervention, and the place of social dialogue at national level and in companies, and social dialogue is less institutionalised.

Therefore, first of all, regarding the green economy, it is clear that an improvement of the social dialogue about these topics is strictly related to the specificity and the strengthening of general industrial relations regimes at national and sectoral level.

In the specific case of the **construction sector**, regarding the **state of labour and business representation**, Eurofound (2015) underlines three main factors that should be considered to better understand the obstacles and opportunities for social dialogue at branch level:

a. At national level, q pronounced pluralism characterises the associational systems of both labour and business. This high associational fragmentation arises from a pronounced differentiation in terms of the labour market along numerous well-demarcated occupations (which affects the associational 'landscape' on the side of organised labour) and business activities (which affects primarily the business side) within the sector.
b. Union densities in the sector tend to be relatively low, due mainly to the high labour turnover and the large incidence of non-standard and migrant work.
c. Collective bargaining coverage is highly polarised. Although 12 of the 23 countries with available data record high rates of collective bargaining coverage of 80–100%, five countries record rates well below 10%. High collective bargaining coverage can be found almost exclusively among the 'old' Member States (with the notable exceptions of Hungary and Slovenia), whereas extremely low rates are found in the Baltic countries, Bulgaria and Poland. Overall, collective bargaining coverage rates in the construction sector tend to increase with the predominance of multi-employer arrangements and a significant use of extension practices.

In particular, the same report, Eurofound (2015) collects information about the membership and representativeness of the social partners in the construction sector, even if some relevant information is missing regarding considering the countries involved in our project.

Table 8 – Domain coverage, membership and density of trade unions in construction, 2011/2012/2013

Country	Trade union	Type of membership	Domain coverage[a]	Membership		Density	
				Active members	Members active in sector	Sector density (%)	Sectoral domain density in relation to overall domain density
IT	FILLEA CGIL*	voluntary	SO	353,000	291	25.07.00	>
	FILCA CISL*	voluntary	SO	302,067	n.a.	n.a.	n.a.
	FENEAL UIL*	voluntary	SO	n.a.	n.a.	n.a.	n.a.
	UGL COSTRUZIONI*	voluntary	n.a.	n.a.	n.a.	n.a.	n.a.
	FESICA*	voluntary	n.a.	n.a.	n.a.	n.a.	n.a.
ES	MCA-UGT*	voluntary	O	1,200,000	n.a.	n.a.	n.a.
	FECOMA-CCOO*	voluntary	O	n.a.	n.a.	n.a.	n.a.
	ELA-HAINBAT*	voluntary	SO	19,99	n.a.	n.a.	n.a.
	FCM-CIG*	voluntary	SO	n.a.	n.a.	n.a.	n.a.
BG	FITUC*	voluntary	O	4,12	2,298	1.06	n.a.
	FCIW-Podkrepa*	voluntary	O	6	1	0.07	n.a.
DE	IG BAU	voluntary	O	297,763	n.a.[d]	n.a.	>
	IG Metall	voluntary	SO	n.a.	25	1.05	<
	CGM*	voluntary	SO	89,4	n.a.	n.a.	n.a.
PL	Budowlani*	voluntary	O	12,5	4	0.04	<
	SBiPD*	voluntary	O	8,5	2	0.02	n.a.

*Notes: * Domain overlap with other sector-related trade unions. [a] Domain coverage: C = Congruence; O = Overlap; SO = Sectional Overlap; S = Sectionalism; [b] Figure includes non-active members; [c] Union representative contacted refused to give (part of) the requested information; [d] Answer deliberately refused; n.a. = not available; n/a = not applicable.*
Source: Eurofound, 2015 (EIRO/EurWORK national correspondents (2013–2014), administrative data and estimates)

Table 9 – Domain coverage and membership of employers' and business organisations in construction

Country		Domain coverage[a]	Membership				
			Type	No. of companies	Companies in sector	No. of employees	Employees in sector
IT	ANCE*	C	voluntary	20	20	145	145
	ANAEPA*	S	voluntary	66	66	64	64
	CNA UNIONE COSTRUZIONI*	SO	voluntary	65,171	60,172	90	83
	ANIEM*	O	voluntary	6	3,2	60	32
	FIAE*	n.a.	voluntary	n.a.	n.a.	n.a.	n.a.
	CLAAI*	SO	voluntary	107,93	8,35	74,53	1,58
	ANCPL*	SO	voluntary	1200	400	40	20
	FEDERLAVORO E SERVIZI*	SO	voluntary	5,3	1,12	185	12,9
	AGCI SPL*	SO	voluntary	2,788	n.a.	10,41	n.a.
	AGI*	S	voluntary	n.a.	n.a.	n.a.	n.a.
ES	CNC	O	voluntary	n.a.	n.a.	n.a.	n.a.
BG	BCC	O	voluntary	2,036	1,689	27	23
DE	ZDB*	C	voluntary	n.a.	n.a.	n.a.	n.a.
	HDB*	S	voluntary	n.a.	n.a.	n.a.	n.a.
	ZVDH	S	voluntary	7,4	7,4	55	55
	BV Farbe	SO	n.a.	42,754	n.a.	197,5	n.a.
	ZVSHK	S	voluntary	52,5	52,5	334	334
	BV Steinmetze	SO	n.a.	2,1	n.a.	11	n.a.
	BV Gerüstbau	S	voluntary	n.a.	n.a.	n.a.	n.a.
	BI Gerüst	S	compulsory	n.a.	n.a.	n.a.	n.a.
	DA	SO	voluntary	520	430	n.a.	7,5
PL	ZRP*	SO	voluntary	n.a.	21,2	700	31,5
	KPB UNI-BUD*	n.a.	voluntary	n.a.	n.a.	n.a.	n.a.

Notes: Data for 2011, 2012 or 2013 as available.

** Domain overlap with other sector-related employer/business organisations; ** No information on domain overlaps provided; a Domain coverage: C = Congruence; O = Overlap; SO = Sectional Overlap; S = Sectionalism; b Compulsory until autumn 2013; c FIEC suggests 250,000 employees employed by member companies; d Figure doubtful; e Rough estimate provided by EBC; f Figure questioned by EBC; n.a. = not available.*

Source: Eurofound, 2015 (EIRO/EurWORK national correspondents (2013–2014), administrative data and estimates)

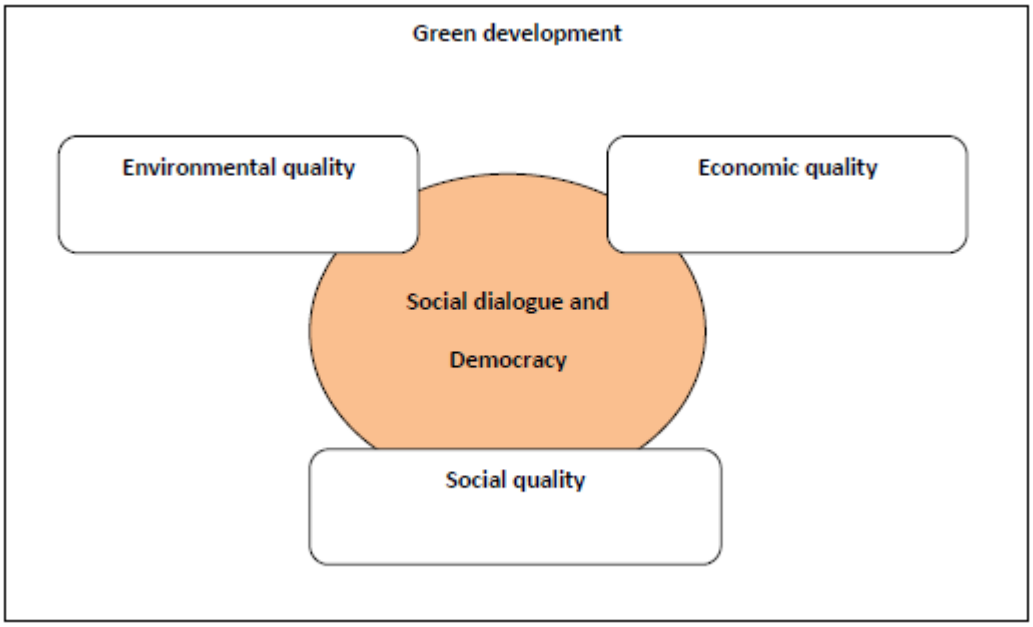
Considering **tripartite dialogue**, the report shows that genuine sector-specific tripartite bodies have been established in eight countries (Belgium, Bulgaria, Denmark, Finland, Malta, Poland, Spain and the UK), The legal basis of these tripartite bodies is either a statute or an agreement between the parties involved and the scope of their activities generally focuses on the following topics: health and safety problems (such as one body each in Bulgaria, Denmark, Finland and Malta); training issues (as is the case of one body each in Belgium, Denmark and Malta, and two bodies in the UK). However, it needs to be considered that other tripartite bodies reports are not taken into account by the Eurofound report because they are cross-sectoral and not focused specifically on the construction sector.

Moreover, several experiences of tripartite dialogue are implemented at local level, with many differences related to the situation of social dialogue and the economic and social context.

4.2. The role of social dialogue in support of the green economy

In the debate between the social partners on the green economy the "environmental" quality of the production is strictly related to the "economic" aspects, especially considering the competitiveness of companies and territorial economies, and to the "quality" of the social life, considering several factors such as: decent work and fundamental rights, quality of work, social inclusion, social justice and social progress. Moreover, at a general level, social dialogue and democracy are considered as basic drivers to address, support and govern sustainable development with the cooperation of government, social partners and civil society.

Figure 1



Sustainable development for the social partners

The International Trade Union Confederation in the 2nd World Congress (ITUC, 2010) affirms to be committed "*to promoting an integrated approach to sustainable development through a just transition where social progress, environmental protection and economic needs are brought into a framework of democratic governance where labour and other human rights are respected and gender equality achieved*" and it "*recognises the importance of union-led initiatives in building membership in the green economy; green workplace projects to cut workplace emissions and energy use by engaging union members in the challenge of climate change; union-led environmental education and training programmes; and new rights for union workplace environment representatives to information and training on environmental issues. Collective bargaining and collective agreements are important tools for trade unions to facilitate a just transition towards a low emission society. A precondition for democratic involvement of trade unions in climate policies is that the principles of ILO Conventions No. 87 and No. 98 be fully respected*".

UNEP, ILO, IOE, ITUC, *Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World*, September 2008.

"We define green jobs as work in agricultural, manufacturing, research and development (R&D), administrative, and service activities that contribute substantially to preserving or restoring environmental quality. Specifically, but not exclusively, this includes jobs that help to protect ecosystems and biodiversity; reduce energy, materials, and water consumption through high efficiency strategies; de-carbonise the economy; and minimise or altogether avoid generation of all forms of waste and pollution. [..] Green jobs need to be decent work; i.e. good jobs which offer adequate wages, safe working conditions, job security, reasonable career prospects, and worker rights." (UNEP, ILO, IOE, ITUC, 2008)

ITUC, *Resolution on combating climate change through sustainable development and just transition*, 2nd World Congress, Vancouver, 21-25 June 2010

Also at European level, the ETUC resolution in 2010 (A Sustainable New Deal) affirms that "*from the*

Several studies (Eurofound, 2009; 2015; UNEP, 2011; Laurent & Pochet, 2015, Galgóczi (ed), 2012; Vitols & Heushmid (eds), 2012; Coats (ed) 2011) help to better understand the role of social dialogue in relation to the "green economy" and the "just transition" issues.

The green economy requires the adaptation of institutional and governance frameworks at all levels, considering:

a. **European social dialogue at general and sectoral level**: promoting regulations, sharing joint strategies, promoting exchange processes between social partners in different Member States, promoting the funding of research and greener activities. In particular focusing on the national differences towards the green economy (Eurofound, 2009), it needs to reduce the East-West and, albeit to a lesser extent, the South-North divide of the level of engagement and mobilisation of social partners and governments which reflects the diversity of the national priority list.

b. **National social dialogue**: promoting regulations, promoting national plans to improve the green economy, supporting the affirmation of a green debate at branch levels, funding research and greener activities, supporting training.

c. **Regional level**: in each European country, there are also different contexts and approaches, which need to be considered to evaluate the best way to support a green transition, so great importance is placed on local resource-based approaches and participatory local planning.

d. **Company level**: supporting changes regarding working processes and final products and services; supporting joint labour-management committees and similar bodies can provide a contribution to identify ways to improve green transitions; specific union representatives (i.e. the "union environmental representative" in Italy and Spain). As analysed by Eurfound (2013) companies are more often likely to manage rather than anticipate green change. Most management approaches, both autonomous and collaborative, are applied to skills development and career and employment security dimensions, and only a few to other dimensions (such as health and wellbeing and work-life balance). However, most companies are likely to use conventional approaches (for example, participation in formal discussions, amendment of current partnership agreements, provision of (traditional) internal training courses, and not engage in eco-innovations in technology, processes and products (for example, new types of training, such as onsite training for large construction sites, innovative partnership agreements with education providers, new ways of involving employees in green change processes).

Certainly, it is important to consider **the relationships among these several levels and their mutual influence**. OECD (2014) analysed the diffusion of several decentralised experiences of training and skills improvement at local and branch level with public-private partnerships, which have grown into systematic policy development. The report underlines that a good **combination of top-down coordinated policies and bottom-up initiatives** can support the greening transition more effectively.

At the same time, it is important to consider that a "green economy" requires **cooperation between several players** considering the role not only of government and the social partners but also of other institutions, associations and individuals such as: universities and research institutes, vocational schools and private education providers, employment agencies, suppliers of products/services, consultants and experts, costumers' associations, environmental associations and so on.

4.3. Position of social partners with regard to green building

Focusing the analysis on the orientations of the social partners at European level, we can better understand their convergences and specificities for the improvement of the green economy and green building. Here follows a selection of the most recent recommendations proposed by the social partners.

European Trade Union Confederation (ETUC)

According to the **ETUC "Resolution on a Sustainable New Deal for Europe and towards Cancun" (2010),** the five pillars of a just transition to a low-carbon European economy are as follows:

- Dialogue between governments and key stakeholders, including the social partners.
- Green and decent jobs through investment in (new) low-carbon technologies, R & D and innovation.
- Green skills developed by active strategies of government training, allowing a shift towards a low-carbon economy.
- Respect for human and labour rights: democratic decision-making and the enforcement of these rights are essential to ensure a fair accommodation of interests of workers and communities at all levels.
- Strong and effective social protection systems.

In the recent **"Declaration on industrial policy, energy and the fight against climate change" (2014),** ETUC underlines some important elements to support a just transition:

- 'Just Transition' should be an integral part of the policy framework, which the EU will adopt to organise the transition to a low-carbon economy beyond 2020. The notion of 'Just Transition', which the trade union movement has advocated for many years, aims to integrate employment demands into European and international climate policies – both quantitatively and qualitatively, including training, worker participation, social protection and trade union rights.

- There can be no question of establishing a hierarchy between maintaining quality employment in Europe and combating climate change.
- Re-industrialisation is a fundamental objective for the future of Europe, but it must not be at the expense of regulations that protect workers and citizens. Low-cost competitiveness based on deregulation and social dumping must be replaced by competitiveness based on quality, innovation and investment. Funding for innovation, research and development in sustainable industrial technologies must be urgently and dramatically increased.
- An ambitious investment plan and a regulatory framework enabling the public authorities to play an active role in industrial redeployment, particularly via state-aid policies that allow the development and long-term survival of industrial projects in Europe, and the jobs associated with them.
- Synergies to be developed between the 2030 climate and energy package and industrial policy: reducing greenhouse gas emissions by 80 to 95% by 2050 (compared with 1990 levels) and financing low-carbon technology pilot projects in Europe
- Clear energy-efficiency targets are the main shortcoming of the European Commission's proposal for 2030
- Common European energy policy: the challenges of supply, energy dependency, environmental protection and access to energy require a policy based on better market regulation, support for innovation and funding for the upgrading of energy generation and distribution infrastructure
- Considering the ETUC document “New Path for Europe” (2013) as a necessary precondition to pursue climate change objectives, considering: cooperation on tax avoidance, evasion and tax havens through comprehensive information sharing and cooperation between national tax authorities and harmonisation of the corporate tax base; financial market reform to rebalance the EU economy; greater cooperation between national authorities, civil services and public authorities to promote long-term quality public services; involvement of social partners in strengthening social dialogue, collective bargaining and worker participation, particularly in relation to economic governance processes at national and EU level, education and training and labour market reform; promotion, respect and enlargement of European social standards so as to fight job insecurity and promote decent, quality jobs.

Beyond the debates on a just transition, which are at the heart of the trade union agenda and have served as a bridge with other social movements to support green

development, such as the **Spring Alliance** and the **European Environmental Bureau** with the NGO social platform organisations.

In **March 2016,** the ETUC participated in the informal **Coalition for Higher Ambition** calling on EU leaders to act to transform the outcomes of the 2015 Paris Agreement into reality through the development of a robust and ambitious European policy framework, to allow Europe to become a net zero-carbon economy and create the needed jobs, growth and competitiveness. In **January 2016,** the Confederation had already declared its concerns (apart from commitment) regarding the **Paris Agreement**, referring to: a worrying gap between the collective ambition of keeping global warming below 1.5°C and the aggregate effect of the individual contributions; vagueness about finance; the failure to secure a clear commitment from the parties that they will design and implement their climate policies in full respect for human rights and promoting a just transition for the workforce as well as decent and quality jobs[19] (it is worthwhile recalling the previous 2015 ETUC key **demands for the Climate COP21**: legal commitments for all parties based on shared but differentiated responsibilities; equity as a cornerstone; participation of all groups being promoted and acknowledged; respect for human rights and workers' rights[20]).

In **June 2017,** the ETUC presented its **position on the Energy Union and EU 2030 climate and energy package[21]**. Taking into account recent developments, it reiterated the need for a just transition towards a low-carbon economy, making a number of concrete proposals to implement it.

- As for the acknowledgment of affordable energy as a fundamental right, the ETUC urged the EU to take decisions concerning the prohibition of electricity disconnections, social tariffs for low-income households, energy poverty.
- The Confederation also outlined the need to strengthen the democratic oversight of the electricity and gas markets and to take into account the workers of the various sectors that depend on energy policies in the definition of EU energy policy, beyond the perspective of consumers and producers. In this framework, the ETUC demanded the integration – into the governance of the Energy Union – of a social and employment strategy addressing issues such as employment, social protection, skills and lifelong learning, notably through the national plans for climate and energy.

[19] *ETUC Declaration on the Paris agreement on climate change*, 15 January 2016

[20] *ETUC key demands for the Climate COP 21*, Position adopted by the Executive Committee of 17-18 June 2015

[21] *ETUC Position on Energy Union and EU 2030 climate and energy package: taking stock of recent developments*, Adopted at the Executive Meeting of 14 and 14 June 2017

- The need for the operational translation of the principles of the European just transition policy was also stressed.
- Additional suggested actions concern the need for European industry to deploy innovative technologies to achieve the energy and climate targets, which also constitute drivers for investments and jobs in the fostered re-industrialisation process of the EU.

Further relevant positions include, among others: the signing of the European Social Partners **Statement on tapping the potential from greening the economy for jobs creation** (**May 2017**) and the promotion of the Common appeal **The Europe we want: just, sustainable, democratic and inclusive** addressing European leaders on the occasion of the 60th anniversary of the Treaty of Rome (**March 2017**).

Current ETUC positions on a selection of issues relevant to sustainable construction are available on its website.

- From the point of view of **sustainable development and climate change**, the ETUC "demands a sustainable investment strategy to support the decarbonisation of Europe's industries and economy as well as a strategy to translate the 2030 Sustainable Development Goals into strong policies" [22].
- As for **climate change and energy policy**, the Confederation "calls for an EU just transition strategy based on a just transition fund, as well as a governance framework that involves trade unions and encourages MS to anticipate changes facing the workforce due to decarbonisation"[23].
- Referring to the **UN Climate Change Conference** (**COP 21**), the ETUC committed itself and its affiliates[24] to transforming the Paris Agreement into long-term progress for the planet, for workers and their communities, in order to maintain and create quality employment, promote workers' participation and social dialogue, provide training for workers, strengthen social protection systems, and respect workers' rights.
- Furthermore, the ETUC "supports the objectives of the Energy Union and an EU **energy policy** based on solidarity, sustainability, security of supply and affordability, and monitors its implementation carefully"[25].

[22] https://www.etuc.org/issue/sustainable-development-0
[23] https://www.etuc.org/issues/climate-change
[24] https://www.etuc.org/issue/cop21
[25] https://www.etuc.org/issue/energy-climate-change

European Federation of Building and Woodworkers (EFBWW)

Like other European labour federations, the EFBWW has been working with other social partners and environmental NGOs to pressure the EU to move more quickly in implementing Europe's 2020 targets.

On **20 June 2011**, the European Federation of Building and Woodworkers (EFBWW) participated in the **Climate Action Network Europe (CAN)**, created in 2011, with the aim of enhancing climate action through EU social dialogue. CAN is Europe's largest coalition working on climate and energy issues. With over 120 member organisations in more than 30 European countries, and more than 700 Non-Governmental Organisations (NGOs) at global level, working to promote government, private sector and individual action to limit human-induced climate change to ecologically sustainable levels.

In addition, the EFBWW is involved in the project **"Build Up Skills"** which is a strategic initiative to boost education and training of craftsmen and other onsite construction workers and systems installers in the building sector, to boost continuing or further education and training of craftsmen and other on-site construction workers and systems installers in the building sector. The final aim is to increase the number of qualified workers across Europe to deliver renovations offering a high-energy performance as well as new, nearly zero-energy buildings.

As analysed by John Calvert **(2011)** while the EFBWW articulates the collective voice of European labour on climate change, as we might expect, there is considerable variation in the degree to which its national affiliates have developed effective responses to the challenge of global warming. Analysing three countries (Germany, Denmark and UK) unions play a major role in shaping the organisation of labour and the training of the workforce – through state-mandated arrangements as in Germany, or voluntary, as in Denmark – and they have also had the ability to influence the way their industries have responded to the challenge of climate change. Conversely, where their role is marginal, as in the UK, their ability to contribute to the development of the climate-change policies of their industry has been, correspondingly, very limited. So, unions can make a positive contribution, but only if they have the resources and influence to support a just transition.

At global level, the European Federation of Building & Wood Workers (EFBWW) with the Building and Wood Workers International (BWI) produced a **Joint Position paper in May 2015** with the aim of addressing green development in these sectors. This report underlines the importance of allocating resources to promote:

- An economically and socially just transition that respects the diverse cultures of the peoples of the world.

- Vocational training and apprenticeships to assist the dislocated and next generation of workers to be able to use and maintain the new climate smart technology.
- Strengthening and enforcement of all social standards in voluntary forest certification systems, focusing particularly on human rights and workers' rights.
- Collective action to protect workers, their families and communities from the ravenous appetite of neo-liberal trade policies which only consider profits and that hinder local development and promote fossil fuel consumption
- A political agenda that: through regulation, public procurement, and direct financing allows for a quicker uptake in energy- and health-driven building retro fitting and the introduction of locally sensitive building design and construction.
- Supports public investments in energy-smart infrastructure targeted to assist those in high-risk geographic areas or members of higher-risk social groups in order to reduce the dislocation from climate-induced migration.
- Recognises the social injustice of neo-liberal "austerity" plans and the massive global inequality of wealth that results from such policies along with the opportunity costs of not investing in climate-smart technologies, vocational training and human rights.
- Targets aid and assistance to gender-based policies to capitalise on the transition to a lower-carbon lifestyle as an opportunity to promote and achieve gender equity.
- That enacts polluter-pays fees and carbon taxes while reducing costs for lower or no carbon emitters.
- In addition, the report underlines the importance of building alliances in support of tripartite dialogue among governments, employers' and workers' associations, to cooperate with political and community-based organisations.

In **November 2015**, the EFBWW expressed its position in the framework of the **Public Consultation on the Energy Performance of Buildings Directive**[26]. Starting from welcoming the ambition of the European Commission to act as a facilitator in transforming the European building stock to improve its energy performance and on the terrain of the discussion with the Federation affiliates, several obstacles and challenges were identified to improving energy performance in buildings common across the MS, focusing around four main issues:

[26] EFBWW, *Public consultation on the Energy Performance of Buildings Directive. EFBWW POSITION*, Novembre 2015.

a) the prevalence of asbestos in buildings that are liable for renovation to improve their energy performance;

b) the demand for providing sufficient qualifications to employees and companies to secure high-quality renovation outcomes;

c) the need to guarantee affordable housing after conducting said renovation measures especially to low-income tenants;

d) the need to enable owners and contractors to conduct renovation measures that address these challenges through adequate funding.

In **April 2016,** the EFBWW and FIEC drafted a **Multi-annual Action Programme for the Sectoral European Social Dialogue of the Construction Industry 2016-2019**[27]. Under five priorities for the period 2016-2019 the multi-annual programme foresaw the following actions:

1. **Demographic changes: taking into account an ageing workforce**
2. **Initiatives for youth employment**
    a. Updating, promoting and further developing the "Youth initiatives" website[28]
    b. Increasing the number and the quality of apprenticeships
    c. Developing responsible entrepreneurship
3. **Vocational training**
    a. Anticipating skills needs
    b. Validation of informal and non-formal training
    c. Facilitating the mutual recognition of qualifications
    d. Exchange of best practices on EU instruments
    e. "Greening" of the economy and of jobs
    f. Taking up the challenge of the current refugee crisis through training
4. **Fostering a culture of H&S**
    a. Assessment of EU H&S legislative framework
    b. Better collaboration between stakeholders for improving the quality and safety of earth-moving machines on construction worksites
    c. Improving the safety culture in our sector

[27] https://circabc.europa.eu/sd/a/c32e6ecd-979c-4b7a-bcff-9b9578e95ea0/Constr-WP-2016-2019.pdf
[28] www.constrcution-for-youth.eu

d. Health and safety for all types of workers

e. Harmonisation of statistics on H&S

f. Addressing potential new hazards (e.g. nano-products)

g. Collaboration with the OSHA Agency

5. **Improving the functioning of the labour market**

a. Posting of workers

b. Combating undeclared work

c. Fighting against social fraud

d. Analysis of changes in social-dialogue models

e. Strengthening industrial relations and the capacity of social partners

f. Third-country companies in the EU labour market

g. Internal Market Package

European Construction Industry Federation (FIEC)

In **September 2011,** FIEC published a set of proposals named "Financing Solutions in Housing – A view from the construction industry". The paper identifies the main barriers to renovation activity in the housing stock as inertia, low awareness of the benefits of investment and pay-back periods, difficult access to credit and split incentives between owner and tenant.

In **September 2012**, FIEC joined the **Renovate Europe Campaign promoted by EuroACE**, a European Alliance of Companies for Energy Efficiency in Buildings. The Renovate Europe Campaign, composed of major international companies and trade associations, calls for a roadmap to be drawn up on how to triple the annual renovation rate of the EU building stock from the current 1% to 3% by 2020 and to ensure that the aggregate result of those renovations leads to an 80% reduction of the energy demand of the building stock by 2050 as compared to 2005. Partners in this campaign shared a set of key recommendations to achieve this goal:

- Awareness of the untapped potential in the existing EU building stock to save energy and money, reduce fuel poverty and improve health is growing. But more focus, priority-setting and commitment are needed from decision makers. Most legislation in place at EU and national level currently addresses new buildings. More commitment is needed to implement existing legislation and give existing buildings the same ambitious legal frameworks as those in place for new buildings at EU, national, regional and local levels.

- Considering that 75% of global energy consumption occurs in cities, local leaders should be given the appropriate means to control related emissions, especially in the building sector, which accounts for 40% of overall energy consumption. Cities can also act as role models for citizens by refurbishing their own building stock.
- The EU has matched its political ambitions for energy efficiency with funding to make it happen. In the funding period 2014-2020, the European Structural Fund is likely to more than double the funding available to co-finance national investments in energy efficiency – including buildings. The European Investment Bank allocated €500 million to energy-efficiency projects related to buildings in 2012, and has pledged in 2013 to support the implementation of the EPBD – including existing buildings. Now is the time to link political ambition and funding with action: Lets Renovate Europe Now.
- Despite the funds that will be made available at EU level, availability of concrete financing models remains the main obstacle in many Member States to unlocking the vast economic, environmental and societal benefits tied up in the EU building stock at local/regional level. The Renovate Europe campaign helps share successful examples of national renovation roadmaps and local funding models that encourage investment in energy-efficient renovation.

In **2014**, the FIEC **"Reaction to the energy efficiency communication COM (2014)"** proposes some recommendations:

- Effective implementation of existing legislation, including taking action on infringements
- Reinforcement of the measures in the Energy Performance in Buildings Directive (EPBD)
- Although FIEC agrees that strengthening market surveillance will help ensure a level playing field, FIEC also stresses the importance of taking into account regional climatic differences that exist within the European Union. In addition, FIEC proposes avoiding prescribing energy-efficiency measures on a very detailed level.
- The EU needs to invest further in research and development in this field, in order to accelerate the uptake of promising new construction methods and energy-efficient products
- Accelerate and finance upfront investments.
- Weighing ambition against cost: energy-saving system costs should not hurt consumers too much

- The challenge of achieving energy savings should not be placed disproportionately on the construction industry. Other industries – especially energy-intensive industries – must be targeted as well.
- Avoid duplication of existing measures.

In **November 2015**, faced with the forthcoming COP21, FIEC defined its **Manifesto for Climate Change** including *10 Proposals*:

- Promote energy efficiency of Europe's built environment;
- Strengthen the resilience of cities and territories to climate change;
- Promote low-carbon and climate-resilient infrastructure and buildings;
- Encourage contractual innovation;
- Promote technical and technological innovation;
- Focus financing on sustainability;
- Strengthen network interconnectivity;
- Support training and upgrading of skills;
- Engage with the circular economy.

Immediately after (**December 2015**), FIEC joined the **Global Alliance for Buildings and Construction**[29] (launched by France and UNEP during the COP 21) aimed at: supporting and accelerating the implementation of Intended Nationally Determined Contributions (INDCS); strengthening members' technical, human, institutional and legal capacities; mobilising adequate funding; raising awareness towards building-sector potential in reducing GHS emissions; defining a carbon-neutrality strategy for buildings and the construction sector.

In **January 2016,** FIEC stated its **support for the Circular Economy Action Plan**, stressing that BIM could be a huge boost for the circular economy. In the same year, the Federation drafted – together with the EFBWW – the **Multi-annual Action Programme for the Sectoral European Social Dialogue of the Construction Industry 2016-2019** (see previous paragraph).

The **Clean Energy Package** was welcomed by FIEC (**March 2017**) which nevertheless identified some specific details for further comment and requests for clarification, including the meaning of "industrial production" in construction and an emphatic request for the inclusion of the industry in the proposed Clean Energy Industrial

[29] https://globalabc.org

Forum[30]. In the same month, the Federation expressed its position on the **revision of EPBD** (promoted by the EC-DG ENER). Acknowledging that "this long-awaited document aims to improve the rate of renovation of the existing building stock, by requiring Member States to address residential and non-residential buildings in their long-term building strategies" FIEC "cautioned against premature use of Energy Performance Certificates to measure improvements in energy performance before and after renovation"[31].

In **May 2017,** FIEC presented its **BIM Manifesto** (Making BIM a global success) which, apart from summarising the challenges posed by it, explains what the industry can do to help facilitate its uptake, asking for support from EU policy makers in order top allow this tool to be adopted by industries and SMEs. The objectives of the BIM Manifesto are: "to establish the (digital) construction industry as a main player in developing key concepts and policies such as smart cities, efficient infrastructure and smart homes (and as a key player in their delivery), using an integrated information platform that gives a holistic view of the construction project in question; to improve the sector's productivity, competitiveness, customer satisfaction and image, by advocating both; top-down digital transformation, facilitated by the EU and national governments through policy and investment/EU funding; bottom-up digital transformation driven by the construction industry itself (as opposed to other interested players such as the IT industry)"[32].

European Builders Confederation (EBC)

Past **June 2016** the **EBC Annual Congress** focused on the use of BIM in SMEs (**Innovation in construction: BIM for SMEs**[33]) as an innovative process for the construction industry, highlighting some specific needs for its implementation in Europe:

- addressing the needs and expectations of micro-, small- and medium-sized enterprises in how to design a European standardised approach to BIM;
- promoting the adoption of BIM to facilitate higher energy efficiency and lower life-cycle costs of buildings;
- promoting BIM training programmes that are not based on the use of a specific software, but are rather targeted to guide all construction professionals towards the digital transition of the construction sector;

[30] FIEC, Annual Report 2017
[31] Idem
[32] FIEC, Making BIM a Global Success, Brussels, 2017
[33] http://www.ebc-construction.eu/index.php?id=ebc_annual_congress_2016

- ensuring the soft-landing of public procurements changes with regard to the transition from traditional methods to BIM-based ones[34].

Referring to these needs, some comments and recommendations were also outlined:

- Provide a different picture with regard to the use of BIM tools;
- Ensure a soft transition from traditional public-procurement methods to BIM-based ones;
- Integrate SME representation into the EU BIM Task Group;
- Develop BIM tools that can be adapted to the building renovation market;
- Promote the adoption of BIM to facilitate higher energy efficiency and lower life-cycle costs of buildings;
- Ensure SME representation in the standardisation process of BIM;
- Develop well-designed and economically accessible digital model tools for construction SMEs;
- Ensure that the use of digital-model tools will not constitute grounds for exclusion of micro-enterprises/SMEs and will not be prescriptive for particular products;
- Avoid the definition and introduction of the role of BIM manager as solely responsible for the management of BIM projects;
- Provide BIM trainings to construction workers and entrepreneurs in response to industry needs;
- Investigate the position of insurance providers with regard to the use of digital-model tools.

In **November 2016,** the EBC welcomed the **Clean Energy Package** as an important step towards an energy-efficient Europe.

In **2017**, the EBC stated that the **revision of the Energy Efficiency Directive (EED) and the Energy Performance of Buildings Directive (EPBD)** offer a major opportunity for jobs and growth in Europe's SMEs[35]. More specifically:

- regarding the EED revision, the EBC recommended policy makers: establish a long-term regulatory and financial framework to kick-start a massive retrofitting of existing buildings or the replacement of obsolete and inefficient equipment;

[34] EBC, *Building Information Modelling BIM. The road to a SME-friendly implementation in Europe*, Position Paper, 13 June 2016
[35] EBC, *Annual Report 2016-2017*, Brussels, 2017

continue to ensure ambitious energy savings through obligation schemes and alternative measures; take into account energy poverty in private and social/public housing;

- as for the EPBD revision, the EBC recommended: supporting and promoting public and private financing schemes for energy efficiency; ensuring the dissemination of best practices regarding the aggregation of small energy renovation projects; including regular maintenance of heating and air-conditioning systems in the Directive; lowering the kW-threshold indicating the need for a regular inspection and maintenance of heating and air-conditioning systems; ensuring that MS link their financial measures for energy-efficiency improvements in buildings to relevant, transparent and proportionate methods that indicate the improvements in energy performance; facilitating the aggregation of SMEs in groups and consortia; strengthening on-the-job training.

In the same year, referring to the 2015 **Clean Energy Package** and the works carried out by the Environment Committee of the European Parliament in **January 2017** concerning the **revision of the Waste Framework Directive and the Landfill Directive**, the EBC outlined the need to make the transition environmentally, economically and technically feasible so as to avoid the risks for the competitiveness of SMEs due to the lack of accompanying measures, in the face of the new 2030 and 2015 construction and demolition waste targets.

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