SUSTAINABLE CONSTRUCTION:
REALISING THE OPPORTUNITIES FOR BUILT ENVIRONMENT PROFESSIONALS

RICS Europe




CONTENTS

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FOREWORD

This paper discusses key issues and challenges concerning sustainable development in the construction sector and seeks to improve our understanding of the role of RICS members and their practices in an ever changing marketplace. Moreover, it aims to encourage dialogue concerning the necessary changes that need to be undertaken by practitioners and professionals to adopt necessary new approaches and practices.

RICS Europe Sustainability Task Force was set up in 2011 to support the RICS policy objective of advancing the transition towards a sustainable built environment and by providing insights and impartial advice to all those having an interest in property so as to be able to achieve "the optimal use of land and its associated resources to meet social and economic needs" (RICS Royal Charter 1881).

Members of the group are leading surveyors from various European countries and represent a cross-section of different professional backgrounds, including quantity surveying, building surveying, facility management, planning, valuation and research. The Task Force seeks to improve the training, education and continuous professional development of RICS members, and encourage sustainability to become a mandatory competence for all members.

The Royal Institution of Chartered Surveyors [RICS] and its members have an unrivalled global expertise in understanding property investment, planning, construction and management. Its members cover a particularly wide spectrum of work and professional competence that is constantly evolving to reflect the latest developments in property and construction. As a professional body, RICS has a vital role enforcing codes of conduct, encouraging best practice as well as ensuring the optimum training, education and continuous professional development of its members.

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15 July 2013

EXECUTIVE SUMMARY

This report by leading built environment professionals presents the views on key sustainability issues that are likely to affect the construction sector in the near future. The report highlights the particular influences of various market and regulatory developments, ranging from new build to retrofitting, through embodied carbon, Building Information Modelling [BIM] and valuation, which in common with all innovations, present both challenges and great opportunities for the whole industry and particularly the industry's professionals. Understanding these relationships fully will become more important as the EU moves towards achieving its stated energy and carbon reduction targets.

What is common to all these issues is the requirement to manage information more effectively during a building's life-cycle. Built environment professionals routinely gather and discard information – information that is in fact immensely valuable for owners to make the right decisions when considering the improvement of the sustainability aspect of their buildings. The procurement and delivery of reliable, accurate, understandable and translatable data can be put to many uses. These include regulatory compliance, planning, cost management, operation, maintenance as well as essential investment and financial decision-making. However, a significant part of what is currently lacking is the system of organising and controlling this building information.

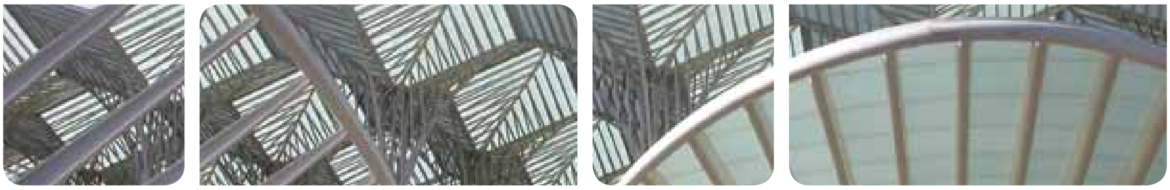
Complying with environmental and sustainability requirements is a complex and far reaching task. This paper first considers the regulatory landscape in Europe to clarify both new and existing requirements for buildings in terms of:

- minimum energy performance levels,
- how these can be defined, measured and actually achieved.

However, as the EU is moving towards *zero energy buildings*, whole-life carbon accounting and building energy management becomes increasingly more significant which in turn raises concerns about the need for robust, common metrics, clearly assigned responsibilities and necessary skills to deliver this task. The use of Building Information Management [BIM] tools will help the processing, assessment, translation and sharing of the collected data, and most importantly, enable more efficient working practices and stakeholder collaboration.

Finally, more accessible sustainability related performance information is essential to improve the links with the investment, lending and insurance communities, together with its wider social and economic benefits. The role of valuation professionals and property valuation are key components to provide feedback on the environmental and social aspects of building performance in respect of sustainability.

Built environment professionals need to be aware of new technical, policy and legal developments as they occur, but more importantly they need to learn about the concepts underpinning sustainability in both the legislative and practical senses.
RICS has already undertaken and is continuing to undertake considerable work in assisting members to further develop their knowledge and implement the necessary skills to capitalise on the potential of these new opportunities.



1. INTRODUCTION

Key issues concerning both EU climate and energy policy during the next 20 years will focus on the reduction of carbon emissions and improving the efficiency of Europe's building stock. This will assist in mitigating both climate change and provide some security concerning uncertainties associated with the supplies from major non-European oil and gas producing countries.

The construction sector is a very important 'engine' within the European economy. It plays a considerable social, economic and environmental role, creating nearly 10% of GDP and employing nearly 14 million operatives in small and medium sized enterprises. The EU requires a carbon reduction target by 2050 of 80% of the levels existing in 1990, and with an annual turnover of €1.208bn it is estimated that an investment of €940bn will be required to achieve this.

The construction industry has the greatest potential impact on sustainability by the way we design, construct and operate our buildings. Four numbers that highlight this are that the construction and use of buildings are responsible for 42% of the EU's final energy consumption, 35% of carbon emissions, 30% of water consumption and over 50% of all extracted materials.[1]

An incrementally sustainable approach to construction is being driven and imposed upon the industry's professionals, contractors and their clients. This is happening through policy and legislative changes and the increasing demands by clients and building users. To achieve this goal, technological, environmental and policy imperatives will require extensive changes to continue to be made within the sector, particularly by its professionals.

This raises significant questions as to whether they are sufficiently equipped to provide the necessary skills and competencies to institute the required changes. Whereas the growing impact of climate change on the future building sector has been the focus of recent reports and studies, less consideration has been given to the industry's organisation and skills requirements.

1 EC Roadmap (December 2012) announcing the communication of sustainable buildings.

Growing European government commitments to environmental programmes will ensure that the demands on construction sector skills and services are invariably going to increase.

As a consequence of government regulation and incentives, the need for skilled workers and professionals capable of improving the environmental sustainability of all properties has already created a spike in demand for their services. Increasing consumer awareness has required the provision of more accurate and digestible information by clients wanting to reduce the carbon footprint of their properties. The skills demanded include a mix of established existing competencies as well as new that relate to emerging technologies and processes, together with meeting compliance requirements that are specific to the construction industry.

In this report, members of RICS Europe Sustainability Task Force discuss some of their views on the main sustainability issues that are likely to affect the construction sector in the near future. This document highlights the particular influences of various market and regulatory developments, ranging from new build to retrofitting, through embodied carbon, Building Information Modelling [BIM], sustainability and valuation, which in common with all innovations, present challenges and exciting opportunities for the whole industry and particularly its professionals.

RICS members can and do appreciate that with evolving trends in both the markets and practice areas their role becomes more strategic and position themselves ahead of the curve so as to be best placed to add value to their clients' property throughout its life cycle. Contributors to this report represent some of the leading chartered surveyors in Europe who have identified skill and knowledge gaps concerning sustainable construction together with recommendations to help resolve them.

2. BACKGROUND

2.1 European context

EU climate and energy policy is increasingly focussing on reducing greenhouse gas (GHG) emissions and improving energy efficiency, whilst maintaining the security of energy supplies and supporting growth, competitiveness and jobs. These objectives are sometimes conflicting and need to be achieved through innovation, cost effectiveness and resource efficiency.

Central to this policy are three combined climate and energy goals that are targeted to be achieved by 2020:
- 20% GHG reduction
- 20% increase in renewable energy sources
- 20% energy saving.

Whereas the carbon reduction and renewable energy targets are binding, the energy savings target is not. Recent studies indicate that, despite the adoption of landmark energy efficiency legislation the EU is still falling short of meeting the 20% energy saving target.

A sustainable construction industry plays a crucial role in reaching the EU's target GHG reduction of 80-95% by 2050. The achievement of a competitive low carbon economy by 2050[2] will require a contribution by the building sector of approximately 40/50% cost-efficient reduction by 2030 and an approximately 90% by 2050. Meeting the 80% reduction target by 2050 will require 80% of the existing building stock to be refurbished; that is the equivalent of one building every minute for the next 40 years.

2 European Commission (2011) A Roadmap for moving to a competitive low carbon economy in 2050

2.2 Size of markets

The European construction industry is complex and fragmented, but as previously noted is a highly important contributor to the EU's economy.

It provides 9.6% of the EU 28 GDP, 51.5% of gross fixed capital formation and employs 14 million people, mainly in SMEs. It has a turnover of €1,208 bn per annum[3] and an estimated €940 bn investment is estimated to be required to achieve an 80% carbon reduction by 2050. This sector emphatically plays a considerable social, economic and environmental role within Europe.

The fragmented nature of the industry is due to a diverse supply chain involving a network of multiple professional actors spanning over countries having their own particular customs and regulations. Each construction project is 'unique' requiring basically the creation of a new 'product' with limited repetition or re-use opportunities. This makes the implementation of a common protocol of good practices difficult and the take-up of innovation rather slow.[4] As the sector is investment-led, it is therefore highly vulnerable to economic influences, as has been witnessed by the various periods of 'boom and bust' recently experienced within the EU economy.[5]

The construction sector is the biggest single industrial employer in Europe with 14.6 million operatives. This represents 7% of total employment

3 FIEC (2011) Statistical Report No.54, and Opinion of the European Economic and Social Committee CCMI/106 on the Sustainable Competitiveness of the Construction Sector, March 2013

4 Ecorys (2010) Sustainable Competitiveness of the Construction Sector and its Enterprises

5 RICS (2013) Construction sectors and roles for Chartered Quantity Surveyors, Information Paper (IP 36/2013)

and 30.7% of industrial employment.[6] The construction sector has 3.1 million companies of which 95% have fewer than 20 employees. The predominance of small firms makes it more difficult to introduce wide-scale initiatives and new working practices, as it is generally only the larger companies that have the necessary management resources to invest improving the competencies of their workforces.

Buildings represent the second largest untapped sector for cost-effective energy savings after the energy sector. There is a huge potential for energy savings in the renovation (or retrofit) of existing building stock in the EU and globally. In the EU27, together with Switzerland and Norway, there are some 25 billion sq. m of useful floor space, with about half of this space in the North and West of Europe and 36% and 14% in the South and Central/East regions respectively. Given that annual growth rates in terms of new build are some 1% annually, the existing building stock in the EU (split between 75% residential stock and 25% non-residential) will be a primary focus for energy efficiency measures in the years to come. It ought also be realised that 92% of existing building stock will likely still be present in 2020 and 75% in 2050.[7]

2.3 European and Member State legislation

While the exact type and focus of fiscal and legislative measures will vary between countries, there is an overall trend towards tighter regulation, the majority of which focuses on the environmental side of sustainability. Regulation for Member States is increasingly being driven by EU legislation rather than domestic measures at the individual country level. Construction professionals should be aware of both existing measures and potential future legislation, as these may have severe impacts on the profession during the entire life cycle of the property.

This last decade has seen the introduction of a series of buildings-related regulations. The most important of which have been the Energy Performance of Buildings Directive (EPBD) and its recast directive. The EPBD sets the legislative scene for Member States and local regulations, such as minimum energy performance requirements for new buildings and major renovations; the issuing of energy performance certificates; and lays out objectives for moving towards nearly zero energy buildings. The recently adopted Energy Efficiency Directive (EED) aims to help the EU achieve its 2020 energy efficiency goals by requiring national strategies for building renovations and promoting deep renovations.

The challenge lies less in the design of legislation and more in the implementation at the national level. The effectiveness of policies made at EU level is greatly influenced by the rules that the Member States enact and the monitoring of the application of these laws. Legislation and its implementation, though ambitious, are often riddled with ambiguity, e.g. regarding definitions of what constitutes 'nearly zero-energy buildings' and inconsistent energy performance certificates. This is largely because the legislation deals with a very complex sector and some flexibility in terms and requirements is necessary given the differences of national circumstances concerning climate, legal background, construction types, markets and ownership structures.

The importance of energy efficiency on the policy agenda, despite the regulatory uncertainty, has risen significantly in recent years. In the future further regulatory requirements are inevitable. Attention is expanding beyond the initial primary focus on energy performance and, to a lesser extent, on carbon emission and resource efficiency. Increasingly stringent legislative requirements will change the specification of new buildings and refurbishments and will result in substantial increases in investment in energy efficiency measures, while the existing stock that cannot be retrofitted at economic cost will become obsolete and depreciate.

6 2011 figures, Opinion of the European Economic and Social Committee CCMI/106 on the Sustainable Competitiveness of the Construction Sector, March 2013
7 See: BPIE (2011) Europe's Buildings under the Microscope

3. NEW BUILD

Improvements to the energy performance of buildings need to be focused both on new development and on the existing building stock.

Energy use in buildings accounts for a significantly high proportion of total energy use and greenhouse gas emissions in Europe. While the potential for improvement in the existing building stock is considerable – especially as much of the stock is old, performs poorly in terms of energy efficiency, and will not be replaced for many decades (see next section). New development plays a key role in reducing national energy consumption and GHG emissions. New development will accumulate progressively to become the significant proportion of the total building stock by 2050[8], when stock built from 2015 onwards could represent some 25-30% of the total. New build also offers significantly greater potential to innovative and introduce low-energy design approaches and technologies that can be designed-in from the outset rather than having to be retrofitted to an existing (and frequently sub-optimal) structure.

3.1 The concept of 'nearly zero energy' (nZEB)/zero carbon buildings

Article 2 of the EPBD recast defines an nZEB as: 'a building that has a very high energy performance. The nearly zero or very low amount of energy required should to a very significant extent be covered by energy from renewable sources, including renewable energy produced on-site or nearby'. Progress by Member States in the development of national plans and in defining nZEB for their own particular national context has been slow.

8 See the European Commission's Roadmap 2050, http://www.roadmap2050.eu/

The idea of nZEB buildings has been debated by policy makers and practitioners for many years, but no generally accepted definition has yet been agreed. Current difficulties include:

- How energy (and related GHG emissions) is assessed – specifically, whether energy relates mainly to what is termed *regulated use* (i.e. that covered by existing Building Regulations relating to energy used for space heating, cooling/ventilation, lighting, hot water, etc) or whether some unregulated uses should also be included (relating to the use of 'plug-in' equipment such as IT, and covering other 'small power' uses such as lifts, etc)
- The extent to which so-called *allowable solutions* (such as investing in off-site renewable sources of energy; or reducing embodied carbon – see later chapter) are to be permitted.

Currently, there is uncertainty about how the requirement for nZEB new buildings from 2021 will be implemented across Europe. But while the definition of nZEB remains vague, the intention is clear for all new buildings to be designed to be considerably more energy efficient than currently required by existing regulation.

3.2 Designing for nZEB – key issues

Numerous examples exist across Europe of buildings designed and constructed to very low (and, arguably, to 'zero') energy consumption standards. Many designers, contractors and others involved in the design and delivery of the built environment have the technical know-how and ability to create high-performing buildings that are attractive, cost effective and easy to operate and maintain. However, such standards are not the norm across the construction industries of the European Union. There are a number of reasons for this. First, capability and know-how is not uniform across all EU Member States; second, there are also significant variations in capability within EU countries, even in those with a strong tradition and considerable experience of designing buildings for low/zero energy. Third, there can be significant financial and institutional barriers to the take up of low/zero energy buildings. In the absence – at least up to this point – of clear policy and legislative requirements for nZEB, these barriers can provide a powerful disincentive for improving the energy performance of new (and existing) buildings.

RICS and its members have key roles to play in encouraging the removal of these barriers and in developing improved capabilities to respond positively to the challenge of designing and constructing highly effective nZEB. To put this in context it is important to understand the key features of nZEB and the current barriers to wider uptake.

Measuring energy in buildings

While there are uncertainties over the definition of nZEB, there are also differences between and within EU Member States in how the energy performance of buildings is measured. A simple measure of kilowatt hours (kWh) per unit (square metre) of floor area per year (kWh/m2/annum) is becoming widely accepted. Alternatively, this may be expressed in terms of GHG, more usually as kilograms of carbon dioxide equivalent (kgCO2e/m2/annum), but difficulties and uncertainties remain, over:

- How floor area is calculated. The concept of Gross Internal Area (GIA) is widely used across the EU but is not universally accepted
- Which energy uses are particularly included. Especially for benchmarking purposes, it is essential to have clarity and agreement about the end-uses being measured. Whether unregulated uses (see above) are included has a highly significant impact on measured energy performance calculations.
- How building occupancy is assessed. In terms of both occupancy hours in any given period, as well as the density of use (i.e. the number of people accommodated, per unit of floor area). These all need to be understood when assessing and comparing the energy performance of buildings.
- Differences between predicted and actual energy uses. Generally, predictions of building energy performance at design stage make assumptions about energy end-uses (they may typically ignore unregulated uses, for example) and building occupancy. They also account for other factors such as how well the building will be constructed (in terms of airtightness, systems efficiency, etc.) and operated, and even external factors such as weather. Because all of these factors vary considerably once the building is in use, it is usually very difficult to compare predicted with actual energy performance in any meaningful way. Differences between predicted and actual energy performance need to be understood, and comparisons between different buildings need to be made consistently on a similar basis.

Low or zero energy in buildings

Alongside developments at a policy level in the EU, progress has also been made in defining a low-energy – if not quite zero-energy – target. Across the EU and, to a lesser extent, in other regions also, the Passivhaus[9] approach is becoming increasingly widely used. This approach initially developed for housing but applicable to many non-domestic buildings also, achieves low energy consumption through specifying high levels of building fabric insulation and air tightness, supplemented by mechanical ventilation and heat recovery. The Passivhaus standard for space heating is a maximum of 15 kWh/m2/annum, and for total primary energy use (heating, hot water and electricity) is a maximum of 120 kWh/m2/annum.

Passivhaus sets a demanding target, particularly for non-domestic buildings. While there are upwards of 30,000 buildings already constructed across Europe that meet the standard, there are many practical difficulties in achieving it in the offices sector in particular which has increasing demands for cooling/air conditioning and high levels of varying equipment type and usage. Nonetheless, there are a growing

9 The Passivhaus standard is explained at http://www.passivhaus.org.uk/

number of examples of new office buildings that achieve very low energy consumption (e.g. some 53 kWh/m2/annum). However, it should be noted that these buildings are typically low - rise, naturally ventilated and located away from city centres, while air-conditioned commercial offices in dense urban locations have a considerable lower energy performance (c.170-200 kWh/m2/annum, depending on the mix of fuel used)[10].

Achieving Passivhaus and lower standards approaching the nZEB concept - particularly in certain categories of non-domestic buildings including city centre offices – will require innovation in building technology, the adoption of renewable energy sources and, indeed, changes in how buildings are used and operated. RICS members have a key role to play in understanding the potential effectiveness, costs, economics and market acceptability of new approaches to low energy buildings.

Designing for low/zero energy

Real low energy performance depends on buildings that are well designed, constructed, commissioned, operated/used and maintained during their life. The important point is how well these key links in a chain stretching from the building designer through to the end-user are connected. Design without due regard for how the building is to be constructed and used will perform poorly; equally, great design proposals that are poorly constructed and operated ineffectively will not achieve the best performance[11].
Low and zero energy buildings will adopt the following key principles:

- A good understanding of the energy needs and likely uses of occupants [and noting different occupants of the same building during its life will invariably have different energy profiles], and how these may need to change into the foreseeable future. In particular, building clients and their professional advisers need to understand the difference between predicted performance that may be based on standardised assumptions about 'regulated' energy only (see above) and likely actual performance that includes all end uses. It is important to set targets for the latter as well as the former. This is developed further in a discussion on the 'performance gap' in the next section on Existing Buildings.
- A good understanding of the interaction between a building's fabric and systems, particularly heating, ventilating and cooling (HVAC) – and also lighting – systems. Mixed mode systems in particular – where natural ventilation is supplemented mechanically to boost air flow – are a good example of how Passivhaus techniques can help replace full air-conditioning.
- Strategies for renewable sources of energy: These can be in the form of renewable heat (for example, heat generated in district heating schemes for a particular development) or electricity (generated via solar or wind technologies, for example). A key consideration in the definition of nZEB will be the extent to which individual buildings can connect to near- or off-site renewable sources to reduce their fossil fuel-based energy consumption and carbon emissions. Additionally, RICS members will need to be aware of the availability of incentives to promote the uptake of these technologies (preferential feed in tariffs, renewable heat incentives and other preferential loans) as these have a major impact on cost-effectiveness.

The generally accepted strategy for achieving low/zero energy performance is to tackle energy efficiency and renewable energy in order of priority. Figure 1 illustrates the key components of the approach. An important point is that zero energy, for most buildings, will rely on connections to off-site renewable sources (e.g. large-scale renewable sources, such as offshore wind; or indeed a decarbonised electricity grid[12]).

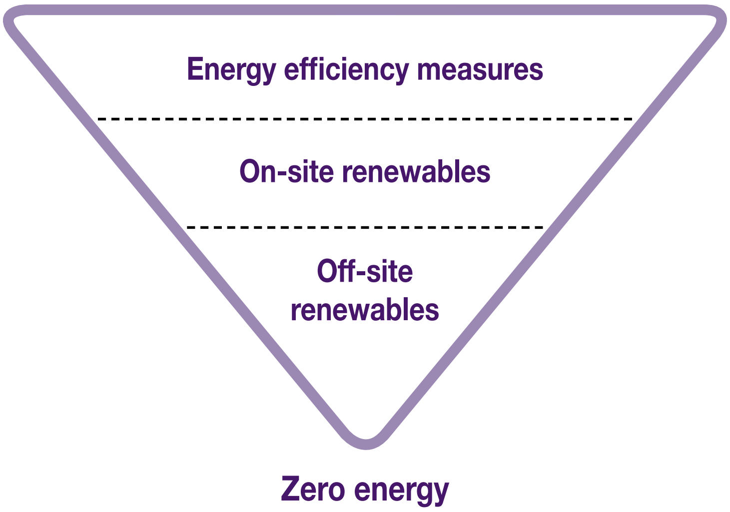
Contribution of on-site renewables could potentially be highly significant (estimated between 30 and 60% of total energy needs), especially if biofuel/biomass sources, including biofuel trigeneration [combined cooling heating and power], can be used. However, this contribution will typically be considerably lower because of site restrictions and other constraints

10 Clark (2013), p.45

11 Bordass, W., Cohen, R. and Field, J. (2004) 'Energy Performance of Non-Domestic Buildings: Closing the Credibility Gap', Building Performance Congress, Frankfurt, April 19-24.

12 The EC's Roadmap 2050 programme identifies targets and scenarios for European grid decarbonisation - see http://www.roadmap2050.eu/reports

Figure 1 Achieving zero energy buildings*



such as those on biofuel delivery and storage, and air quality emissions standards[13].

Barriers to uptake

An important barrier to the uptake of design approaches geared towards nZEB is a lack of awareness and knowledge among client advisers of the implications – and in particular the costs and benefits – of these approaches in different situations. The next section on Existing Buildings considers barriers in more detail, but it may be noted here that considerable guidance now exists to help advisers assess the business case for low/zero energy buildings, including guidance produced by RICS[14], the World Green Building Council[15] and independent consultants also[16].

13 Clark (2013), p.177
14 Royal Institution of Chartered Surveyors (RICS) (2012) Supply, Demand and the Value of Green Buildings. London: RICS.
15 World Green Building Council (WGBC) (2013) The Business Case for Green Buildings: A Review of the Costs and Benefits for Developers, Investors and Occupants, WGBC, available at www.worldgbc.org
16 Morris, P. (2007) Cost of Green Revisited: Reexamining the feasibility and cost impact of sustainable design in the light of increased market adoption, San Francisco: Davis Langdon, available at http://www.davislangdon.com/upload/images/publications/USA/The%20Cost%20of%20Green%20Revisited.pdf

3.3 Opportunities for RICS members

RICS members are in a very strong position to contribute significantly to the achievement of the EU nZEB target. In particular, surveyors can advise:

- on the investment potential of low/zero energy buildings
- property and construction clients on appropriate strategies and approaches to the achievement of low/zero energy on individual development projects
- clients on the legislative context for low/zero energy buildings at both EU and national levels
- on the availability and operation of incentive schemes and beneficial property/building taxation arrangements
- on assessments of costs and benefits of low/zero energy buildings and their key features and measures to assist with client/design team decision making and option appraisal
- on the essential benefits of low/zero energy design to help create effective management and delivery of projects that achieve this standard.

* See, for example, Zero Carbon Hub (2013) Zero Carbon Strategies for tomorrow's new homes, London: Zero Carbon Hub. Available at http://www.zerocarbonhub.org/resourcefiles/ZeroCarbonStrategies_web.pdf




4. EXISTING BUILDINGS

There is considerable debate in Europe about the depth of renovation needed to improve energy efficiency in existing buildings. Whilst many in the construction industry are pushing for deep levels of renovation, in order to move existing buildings close to the nZEB standard required from 2021 for new buildings[17], others are questioning whether the industry is sufficiently skilled to meet these requirements and whether the potentially very high cost of achieving this level is both justified and more importantly, affordable.

4.1 Deep renovation

At the European Union level, the Energy Performance of Buildings Directive (EPBD, 2002/91/EC) and its recast (EPBD recast 2010/31/EU) is perhaps one of the most ambitious programmes ever created for the renovation of existing buildings. The Directive defines a 'major renovation' as one where the total cost of the renovation is more than 25% of the value of the building (excluding land value), or more than 25% of the building envelope undergoes renovation.

This raises the issue of what is meant by 'renovation' or 'retrofit'. Beyond the discussion on terminology[18], both terms would imply (at building level at least) either an improvement to the building envelope and/or a building's mechanical systems. However, as the Global Buildings Performance Network [GBPN] suggests, the term 'DR' (to represent 'deep renovation' or 'deep refurbishment'[19]) also implies a substantial improvement in the energy performance of a building. Indeed the most recent EU guidance on the subject suggests deep renovation means an improvement in energy performance in a building of at least 80%.[20]

Global evidence suggests that it is possible to achieve significant (50%-70%) reduction in the energy use of existing buildings with 'deep' measures. A 'standard' renovation, however, is likely to achieve only 20%-30% energy savings, which would be insufficient to meet the long terms carbon emissions target of 50% by 2050 in the buildings sector[21]. In the residential sector, DR includes window upgrades; internal and external insulation measures; and air and ventilation efficiency improvements. In commercial buildings DR includes envelope upgrades; replacement and reconfiguration of HVAC and heating/cooling systems; better control systems; and lighting improvements.

Clearly DR may also occur as part of a planned refurbishment cycle rather than in its own right, particularly as refurbishment cycles are of the order of 30-40 years whereas energy efficiency improvements operate over longer periods of 60-80 years. In addition, DR may also create enhanced benefits in existing buildings in the form of increased productivity; increased property and asset values; carbon emissions reductions; and increased employment opportunities[22].

Work by BPIE on deep renovation scenarios (covering the EU27, Switzerland and Norway)

17 BPIE (2011) Principles For nearly Zero-energy Buildings
18 'Renovation' tends to be used in Europe, whereas the term 'retrofit' is perhaps more common in the USA and Australasia, although the latter term is also used in the UK. See Dixon and Eames (2013) 'Scaling up: the challenges of urban retrofit' in Building Research & Information, Volume 41, Issue 5, pp. 499-503, Special Issue on Urban Retrofitting: http://www.tandfonline.com/toc/rbri20/current#.UjmMubU9h8F

19 The term 'deep renovation' is also important to recognise because there has been an increasing focus on Renovation Roadmaps in MS. Article 4 of the EU's recent Energy Efficiency Directive (EED) (2012/27/EU) requires that by 30 April 2014 long term national strategies to stimulate cost effective deep renovations of buildings should be in place (Policy Partners, 2013).
20 European Parliament (2012) Report on the proposal for a directive of the European Parliament and of the Council on energy efficiency and repealing Directives 2004/8/EC and 2006/32/EC
21 GBPN (2013)
22 Urge-Vorsatz, D. (2012) Energy End Use: Buildings

Table 1 Examples of barriers to deep renovation (adapted from BPIE, 2011a)	
Financial	Access to finance
	Payback/investment horizon
	Competing purchase decisions
	Price signals (energy costs)
Institutional/administrative	Regulatory and planning issues
	Institutional (risk aversion)
	Structural (age of stock)
	Multi-stakeholder issues (multiple ownership)
Awareness, advice and skills Separation of expenditure and benefit ('split incentive')	Information barrier
	Awareness of benefits
	Skills and knowledge shortages in building professionals

suggest a total energy cost savings of €1300bn for end users to 2050 which would require a total investment of €940bn (on a Present Value basis) over the same period to cover materials and labour[23]. The economic, environmental and social benefits of such an investment programme are therefore considerable.

4.2 nZEB and existing buildings

Whilst the focus of the recast Energy Performance of Buildings Directive (EPBD) is on new buildings, Member States must also create a national plan for increasing the number of nZEBs which also includes existing buildings. These plans must include:

- An nZEB definition (see section 3);
- Intermediate targets for the energy performance of new buildings by 2015; and
- Details of how nZEBs (new and existing) will be promoted.

As noted in section 3, the current definition of nZEB is not very clear in terms of either the specific energy performance requirements or the precise contribution of renewables. There is also flexibility for Member States to provide varying definitions of nZEBs including whether, for example the definition should cover both regulated (heating and lighting) and non-regulated (other uses such as computers) uses – see section 3.

23 BPIE (2011) Europe's Buildings under the Microscope

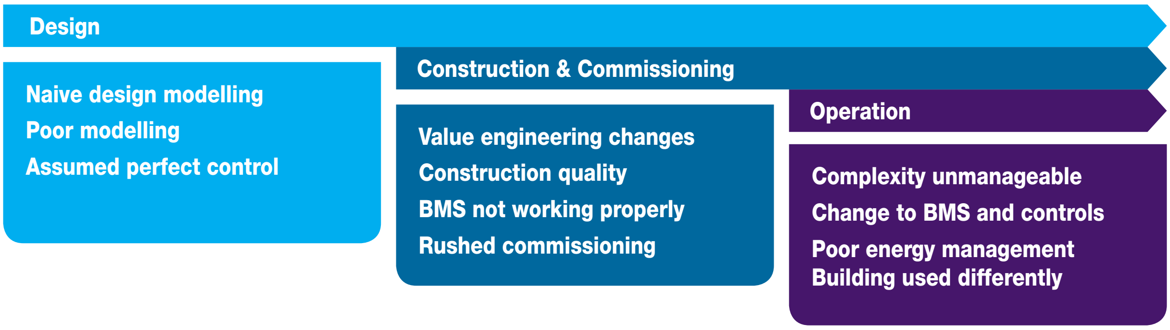
4.3 Tackling the barriers and challenges of deep renovation and nZEB

The implications of deep renovation and nZEB are substantial. For example, deep renovation faces a variety of barriers and challenges which need to be overcome. The key barriers include financial; institutional and administrative; raising awareness; improving advice and skills; and overcoming the split incentive (Table 1).

There is also a key challenge around the extent to which the market is willing to take up such measures and this revolves around inefficiencies in the supply chain; quality of workmanship and the resultant disturbance when renovation is undertaken (BPIE, 2011a). Nonetheless, if planned strategically, deep renovation projects can be successful. Indeed, best practices found that the most successful residential retrofit projects included detailed project planning and site management; a good knowledge and understanding of the retrofit supply chain; and an ability to work closely with occupiers.

In order to overcome these barriers and challenges a range of additional policy measures need to be put in place which include harmonising data collection on energy performance; establishing an EU Deep Renovation Fund; and increasing skills and awareness in the construction industry. Similarly, the practicalities of the nZEB definition need addressing, not least the lack of an explicit definition. How can an nZEB definition, for example, take account of differing climate, building geometries and usage

Figure 2 Factors which affect the performance gap (adapted from Arup, 2013)



conditions? How can we properly define and set the extent of the renewables share?[24]

Both deep renovation and nZEB also raises issue of scale, given the moves towards city-level renovation/retrofit of existing buildings and low carbon plans in the EU and globally—for example, how can large scale deep renovation work alongside nZEB for a city? What needs to be in place for a city-level action to be taken?[25] This also raises issues of long term finance and the need for a 'programme' aggregator to integrate the key stakeholders in a city level renovation/ retrofit project.

There are other issues which must be confronted in an urban context when considering deep renovation or nZEB. Most examples of possible measures tend not to consider the unique nature of the built environment in most cities or large urban conurbations which should be factored into any suggestions of achieving a level of deep renovation. For example, most inner city properties will not have the wind speeds necessary for wind turbines because of the close packing of properties. Similarly many city properties will not have sufficient ground for ground source heat pumps; biofuel would create problems of delivery as this would have to be delivered by motor transport and unless this is was potentially carbon free, this would contribute to the overall transport carbon emissions.

Against the background of the overwhelming focus of regulators and markets on energy performance and short term carbon reduction as the driver for sustainability, it is important that we maintain an understanding of the broader characteristics which make places sustainable over long periods of time. The longevity and usefulness of buildings is a common concern for both owners and occupants, from large corporations to homeowners. With thoughtful planning and design, even complex buildings can become highly versatile and able to accommodate changes over time be that prompted by technology, function or behaviour.

An additional factor to be considered is the value of heritage properties. Many such properties have had a use long beyond their original planned life and they make up an essential part of the unique landscape for that setting and therefore, with improvements, can continue to contribute to their local environment. The value of the built environment, for example, in the UK alone is estimated at over €7 Trillion and it would be sensible to manage the upgrade of the part made up from the heritage sector to take into account the need for this to be carried out in a way sympathetic to their character for the sake of current and future generations.

ICOMOS sets out the internationally approved principles of building conservation, to which RICS adheres to ensure that members recognise the need to maintain the historical, social and aesthetic value of the building so that the level of intervention is appropriate and sympathetic to the overall building both now and its future

Besides these strategic challenges there is also an important operational challenge to consider. There is substantial evidence that buildings do not perform as well as anticipated at the design stage. Post-occupancy evaluations showed that actual energy consumption in buildings was often twice as much as predicted. Essentially this 'performance gap' is the difference between (i) the energy consumption predicted in design in the early phases of the production of a building; and, (ii) the actual consumption once the building is completed and occupied.

The performance gap can, of course, apply to both new and existing buildings, and is the result

24 BPIE (2011) Europe's Buildings under the Microscope and BPIE (2011) Principles for Nearly Zero-Energy Buildings
25 See for example the Sustainable Energy Action Plans submitted by the Covenant of Mayors, an initiative that involves more than 2,000 councils, including major European cities.

Figure 3 Key phases in a retrofit programme (adapted: Ma et al, 2012)

of failures in the three key elements of design, construction and operation in the procurement process (see Figure 2).

Essentially the performance gap arises because of poor assumptions when predicting energy consumption at design stage, failures in construction and commissioning, and a lack of monitoring post occupation[26]. There are a number of ways in which the gap may be overcome and better feedback loops introduced into the process by:[27]

- Soft Landings Approach to design, procurement and operation.[28]
- Building performance data – better and more systematic collection of data in a rigorous and consistent way to inform design, modelling, benchmarking.
- Improved Energy Models – using building performance feedback reflecting the in use characteristics of buildings.
- Stronger regulatory framework – more focus on operational aspects of buildings instead of asset ratings (such as the current Energy Performance Certificates).

It has been argued strongly that in commercial buildings mandatory operational ratings would provide greater transparency, and highlight the potential gaps between predicted and actual energy performance more clearly than is currently the case with EPCs. This would also act a further driver for the commercial property market to move faster to increase energy efficiencies in the sector.

26 CIBSE (2012) Carbon Lites: The Performance Gap and Arup (2013) The Performance Gap: Causes and Solutions, Green Construction Board. See also www.carbonbuzz.org
27 See Arup (2013) The Performance Gap: Causes and Solutions, Green Construction Board
28 Soft Landings is a process which involves designers and constructors to improve the operational performance of buildings and provide feedback to project teams. It requires designers and constructors to remain involved with buildings beyond practical completion, and ensure the occupiers understand how to best use their buildings.

4.5 Opportunities for RICS members

Transforming the existing or legacy stock of buildings presents huge challenges in what is essentially a fragmented industry. Additionally, the success of any deep renovation project is affected by a complex interaction between policies and regulations; client resources and expectations; key technologies; building information; human factors and other uncertainties.[29]

Yet the sector offers great opportunities for RICS members. In a typical deep renovation project there will be typically five stages (see Figure 3).

The role for RICS members may include advice within the project setup and pre-survey stage (including target setting and survey work) as well as input into energy auditing and building performance assessment, through to identifying retrofit options (including risk assessment and economic analysis), site implementation and post retrofit monitoring.

Property and facility managers within corporate businesses and the public sector, or providing advice to those organisations, will also play a vital role in planning and managing deep renovation programmes, and this will require the ability to develop a strong business case. In such cases decision support tools can help identify the most appropriate interventions[30].

Moreover, in large scale city retrofit programmes there will be further opportunities for RICS members to be involved in higher level strategic planning and management of renovation measures, working with key stakeholders. Indeed, across individual building, community level and city level the asset value implications of renovating to higher energy efficiency standards will also be an area of potential work.

29 Ma et al. (2012) 'Existing building retrofits: methodology and state of the art', Energy and Buildings, 55, 889-902
30 Strachan and Banfill (2012) 'Decision support tools in energy-led, non-domestic building refurbishment', Facilities, Vol 30, No 9/10, 374-395

5. EMBODIED CARBON

Construction professionals are at the heart of construction project information handling and management. Currently, most work is carried out on financial costing, but the construction industry needs to adapt its existing skills into other forms of quantitative study, such as carbon measurement and/or shadow costing techniques as the measurement of carbon, whether embodied, operational or end of life becomes more significant as the effects of climate change become more apparent.

Embodied carbon in particular, whilst at the present time is a relatively small percentage of the whole life carbon of a building, in relation to operational carbon, will become increasingly important as the EU moves towards nZEB. It can be argued that the legislative drive to reduce operational carbon and energy use, with measures such as high thermal mass, increases the emissions associated with embodied energy, and could ultimately be counter-productive.

Studies show that as design moves towards the nZEB/ Passiv levels of energy use, the embodied carbon becomes increasingly significant for two reasons:[31]

- as a proportion of a building's whole life, carbon can equate 70%
- embodied carbon is emitted in a short burst during the construction phase and unlike operational carbon cannot be mitigated during the working life of the building.

Many of the cost effective measures to reduce operational emissions have been adopted already making compliance with stricter energy efficiency standards increasingly expensive, whereas achieving embodied carbon reductions is often both simpler and cheaper than achieving operational carbon savings.

Therefore, without adopting a whole life carbon approach, there is a danger that decisions are made about a potential project which will ignore the effect of embodied carbon, dealing only with operational carbon. This tends to favour new buildings which are perceived as more energy efficient and therefore carbon efficient, instead of the refurbishment of existing buildings.

Existing buildings have large amounts of 'spent embodied carbon', i.e. that has been previously emitted during the original construction and this will be discounted from the whole carbon calculations, potentially swinging the balance back from new build to refurbishment of an existing asset.

In both new and existing buildings most of the embodied carbon is contained in a few major elements, usually around the building structure and fabric, so concentration on these significant items are key decisions for designers and their advisors. The RICS research paper, *Redefining Zero*, provides clear examples of a methodology and a case study for reducing embodied carbon through design choices.

Developing carbon accounting and management skills will give participants a commercial advantage as more and more contracts are being let with additional requirements over the traditional economic targets for minimising environmental effects through quantifying and reducing carbon, minimising waste and other resource efficient measures, and improving social factors. This in turn will increase corporate responsibility performance of the industry as well as help meeting overall carbon reduction targets.

However, managerial or organisational barriers can

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31 Heinonen, Säynäjoki and Junnila (2011) 'A Longitudinal Study on the Carbon Emissions of a New Residential Development', *Sustainability*, 3, 1170-1189

stop this, with non-financial responsibilities often being unclearly defined within organisations. Therefore, there is a need to further explore and overcome barriers to effective information management and release potential improvements in the construction processes.

The responsibility of carbon data management varies greatly between contractors to contractor and projects. It is often an added extra function which concentrates on the construction phase, including up to award of building accreditation such as BREEAM, DGNB, HQE, LEED or other schemes.

Whole life costing can be a driver to plan and implement carbon management and the end use of the project is a useful starting point. If carbon management starts with the end life of the project being constructed, whether it is demolition or reuse, working backwards through the life of the constructed asset can give a building user drivers and objective to more effectively manage carbon.

Carbon is a useful key measurable factor through the life of a project, but the scope of any monitoring needs to be defined at project commencement, including the conceptualisation, enabling, design and procurement functions or carbon data can be collected with no overall goals set. Therefore, we need to improve our understanding of the whole life embodied carbon in buildings, e.g. how the embodied energy needs to be brought into the design decisions made in developing projects in order to ensure that operational efficiency is not prioritised over embodied carbon which could lead to a reduced design life and increased embodied carbon as the buildings are replaced more frequently. The construction and property industry also needs to be able to assess and value the carbon impact of existing buildings and be able to retrofit and operate these more effectively in the future.

Whilst the concept of embodied carbon is well established, a usable common methodology for assessing the whole carbon or energy of buildings is some way away. Consequently, the present situation is characterised by wide discrepancies in reported embodied carbon figures which often results in misallocation of environmental and financial resources to measure carbon can vary greatly. Standards currently in use include CEMARS certification [Certified Emissions Measurement And Reduction Scheme] and the energy management systems to ISO 50001:2011 are focused on corporate wide accredited certification and focus on energy use, not embodied carbon.

To look at the data involved in such certification, the skills required to deliver the function within the organisation which the responsibility lies varies. Responsibility for carbon management within an organisation can be with an environmental manager, facilities or estates managers or the finance departments, with no construction specific skills requirement being in place.

In 2012, RICS published an information paper entitled *Methodology to calculate embodied carbon of materials*, which is an important attempt to clarify the link between embodied and operational carbon by addressing the lack of consensus on exactly how embodied carbon should be defined and calculated. This paper is practice based information that provides users with the latest information and research and is designed to make carbon calculation more accessible particularly to the quantity surveying community. Work continues to expand the scope of the measurement methodology in order to cover whole carbon accounting across the life cycle of a building.

Construction professionals, especially Quantity Surveyors, are encouraged to develop carbon management skills led by professional bodies, such as RICS, based on international standards which will allow construction professionals to become empowered to lead on carbon management, thus increasing their employability in carbon management which will become ever more vital to construction projects over time.

6. THE SUSTAINABLE BENEFITS OF BIM

The adoption and implementation of Building Information Modelling [BIM] has been proven to unlock more efficient working practices, stakeholder collaboration and visualization for design, construction and maintenance of built assets. When managed effectively, these processes and technologies provide a platform for the project team to efficiently drive down project waste and cost, which can be regarded as key sustainable benefits, positively influencing the overall environmental impact of a project. As a mechanism for increased project efficiency, and given the inefficiencies in traditional project working practices, BIM can be regarded as a sustainable solution for an unsustainable industry, providing an industry solution for assisting the government in meeting reduction targets for CO2 emissions.

Increasingly, the industry is adopting BIM processes and there is a willingness to push BIM technological and process boundaries. Initially conceived as a graphical presentation of geometric information in a model, today BIM models are extended to include scheduling information, cost data, sustainability, operation information, and more. Leading experts in the field suggest that BIM will render many of today's architecture, engineering and construction jobs unrecognisable in the close future. Surveyors and other construction professionals concerned with project/cost management and future operation and maintenance are therefore now learning about the potential impact of BIM on their work.

6.1 Facilitating project transparency, understanding and risk mitigation

The importance of BIM as a delivery tool for current and future projects is now regarded as a paramount. It is seen as fundamental for enabling all project stakeholders to manage the increasing amount of data and complexity in a project.

With industry adoption, the core BIM benefits are currently being explored and capitalised upon across the whole project/asset lifecycle for both new and existing assets. With the ability to enable increased integration, collaboration, visualisation and analysis from very early within the project, the benefits derived by stakeholders' understanding in the concept and design stages of a project enables greater control and influence of project risk and waste reduction.

To understand how this is achieved it is first necessary to recognise the key issues which plague traditional project delivery and their negative influence on efficiency. By virtue of a project stakeholder's contractual relationship and lack of a centralised building database, traditional industry working practices generally create systemic barriers to communication – information silos – and inefficient approaches to project delivery. For the first time, BIM enables the process and technology to remove these barriers and provide a truly "open", integrated and collaborative platform for project delivery across the whole project/asset lifecycle.

BIM processes and technology when used to advance project delivery are enabling more accurate and efficient approaches to design, cost, programme, construction and sustainability management, especially when using a collaboratively designed 3D model containing rich object data as a foundation for stakeholder visualisation and analysis in a virtual environment. The ability for all project stakeholders to better visualize the design by using 3D is proving to be a very powerful method for achieving accuracy and continuity in design / project understanding, as well as being a key factor in the identification and mitigation of project risk.

6.2 Facilitating sustainable design

The importance of sustainable design has increased in recognition and implementation during the last

20 years; however, using traditional methods, sustainable design can prove costly given the levels of human intervention and interpretation of the project, required for achieving client and regulatory environmental benchmarks. With the advent of BIM, the process of sustainable design has improved, with BIM platforms leveraging a more feasible, efficient and accurate approach to environmental analysis. This is achieved through the use of secondary modelling tools (plug-in software) which enabling sustainable design experts to undertake Virtual Building Performance analysis and simulate environmental scenarios within the 3D BIM model, as the design advances.

The level of environmental analysis is dependent on the client / regulatory sustainability requirements for the project; however, current environmental analysis software tools have the capability to test lifecycle, energy, water and lighting scenarios within the virtual BIM model. Additional sustainable benefits can be achieved through the synchronisation of the environmental analysis tools with regional "Green Building Rating Systems" (BREEAM, DGNB, HQE, LEED and other schemes) to enable increased control of environmental performance factors influencing the overall green rating of the asset.

Using plug-in software tools, environmental experts are able to test the BIM model in the early stages of design to quickly understand the potential environmental impacts of a project or design. This early identification, assessment and understanding of project environmental factors enable quick and efficient mitigation of negative environmental impacts from the project or design driving positive sustainable solutions. These benefits are not exclusive to the design stage of a project, during the operational phase it is recognised that BIM provides the ability for monitoring of building performance during operation.

6.3 Facilitating integrated project delivery and lean construction management

Recent changes in project delivery driven by industry productivity decline and benefits achieved from integrated practices have given rise to a new project delivery mechanism called Integrated Project Delivery [IPD]. IPD, is essentially a contractual framework with provides a single integrated platform for collaborative working practices which enables alignment of risk, reward and goals between the project stakeholders. All with a focus of optimizing project performance in the reduction of waste and increase in project efficiency.

The integrated framework employed by IPD is set-up to promote efficiencies within the project, in contrast to traditional non-integrated framework structure which has proved wasteful and inefficient. While facilitating IPD, a BIM platform leverages the full value of IPD by providing the necessary collaboration technologies which enable stakeholder collaboration, a core aspect of IPD, which in-turn provide the sustainable benefits from efficiency and waste reduction, achieved through increased client empowerment, removal of traditional trade barriers and problem resolution methodologies.

Lean construction management and its core principles akin to BIM and IPD also seeks to eliminate project waste and increase project efficiency to profitably deliver a project to a client's needs. For lean construction management this is achieved through process engineering for value delivery, flow management, just-in-time delivery and continuous improvement. As with Sustainable Design and IPD, BIM provides a platform in the realisation of lean management critical success factors and goals which require the control of design development targets, reduction of design changes and process iterations.

The RICS is developing international guidance, training and qualifications in BIM. These initiatives will help to connect BIM over the whole project life cycle from land measurement, through the construction process and ultimately to facilities management and corporate real estate strategy. This technology, and the standards and training that are rapidly evolving to support it, will act as a catalyst to examine new ways of working and help to develop the collaborative culture necessary to improve sustainable project performance.

7. VALUATION AND INVESTMENT IN SUSTAINABILITY

Economic value, the valuation process, and valuation professionals are central to unlocking investment in improved sustainability. The sustainable development of property cannot be reduced simply to technical matters of improving the performance of buildings and the construction industry. Linkages need to be drawn with the investment, lending and insurance industries, as well as with the larger social and economic agendas and policies. The role of valuation professionals and property valuation is essential in informing investment with regard to lending and financing decisions. Ideally, valuers provide property market actors with essential feedback on the environmental and social aspects of building performance as well as its various interrelations with financial performance and property value.

Current mainstream financing options are being both driven and limited by a business model focused on commercial returns and prudent lending decisions. Homeowners, developers and investors are being challenged when securing financing for sustainability improvements, frequently because the valuation reports do not properly record the added value these improvements would create.

In the European residential market, existing Energy Performance Certificate [EPC] recommendation reports provide limited information on the benefits of energy efficient and renewable energy interventions. In addition, wide-spread data evidence on improved financial performance and value enhancement effects of energy efficient refurbishment activities and renewable energy installations is not yet easily and conveniently available. This lack of transparency represents the most significant barrier to understanding and communicating the link between property value and energy efficiency and renewable energy.

However, within some sub-markets and countries property pricing is increasingly distinguishing between buildings that exhibit different sustainability-related features and associated physical or operational performance[32].

But for the majority of local or sub-markets it is arguably still a long way to have enough information to empirically support a valuer's decision to differentiate values based on the full range of sustainability criteria; matters relating to location, site, building specification and configuration, documentation and letting specifics. Nevertheless, the momentary lack of evidence in many local markets does not mean that the positive relationship between a building' sustainability performance and its rental and/or selling price do not exist. As such, there is a growing recognition that buildings which are not resource efficient and low carbon in both operation and location and which do not feature built-in flexibility to anticipate changing occupier needs will not be future proofed in market value terms.

As consequence, the sustainable development discourse highlights both the often qualitative nature of the valuation exercise and, as a result, the importance of transparency of the valuation process. In addition, market participants increased awareness for sustainability issues imposes new requirements, duties but also business opportunities to the profession. Clients increasingly want to be informed about the sustainability-related performance aspects of property asset and the likely value implications.

The valuation profession has responded to this: for some time the profession is undertaking efforts to better integrate sustainability considerations into the valuation process. The publication of the RICS information paper, *Sustainability and commercial*

32 For an overview of latest empirical evidence, see: European Commission 2013, DECC 2013, and WGBC (2013)

property valuation (VIP13) in 2009 represented a milestone in this context as it was one of the first attempts of a valuation standard setting body to advise professionals on how to cope with the issue of sustainability in valuation practice.

The subsequent publication of the 2011 Information Paper (IP 22, UK only) covers residential valuation and advanced the debate further as it encourages valuers to expand their basic data collection procedures to include a record of any sustainability features, even if they do not currently have an impact on market value.

Similar advice and associated recommendations have now also been produced by other professional organisations but also by groups of individual practitioners and researchers (see Table 2 below).

As a consequence - while basic valuation methods

Table 2: Existing sustainability related guidance, guidelines and requirements for valuers

Title							
	VIP 13	IP 22	VIP 13 (Australia)	EVS 2012 (Information paper on sustainability and valuation)	ImmoWertV	NUWEL	RICS Guidance Note
Description							
Publisher	RICS	RICS	RICS Oceania	TEGoVA	BMVBS	CCRS	RICS
Year of Publication	2009	2011	2011	2012	2011	2011	2013 (planned)
Application: Property type	Commercial Property	Residential Property	Commercial Property	All	All	All	Commercial Property
Application: country / region	Global	UK	Australia	Europe	Germany	Germany, Austria, Switzerland	Global
Coverage of sustainability issues	broad	broad	broad (but focus on energy)	broad	Energetic quality	broad (detailed listing of issues)	broad (detailed listing of issues)
Degree of compulsion / bindingness	informative	informative	informative	informative	mandatory	informative	recommended good practice
Character: generic requirements / detailed recommendations	generic	generic	detailed	generic	-	detailed	detailed
Recommendations for valuation reports	-	-	x	-	-	x	x
Recommendations on the extension of the data collection process	-	x	x	-	-	x	x

> Finally, the role of the valuers needs to be briefly discussed in connection with the sustainable development discourse: not always but during the past decades, valuation and valuation professionals have been seen as some kind of 'passive element' which analyses and reflects the market but under no circumstances takes influence or even leads the market. However, some professionals start realising that simply 'reflecting the market' may no longer be 'good enough'.

remain unchanged – sustainability issues are increasingly embedded into the traditional "canon" of value-relevant factors.

But even though existing sustainability-related advice and recommended practices for valuers are important, they are as yet not mandatory requirements enforced by professional organisations but are of informative character only. It is therefore likely to assume that most valuers would hesitate to truly modify their practices as well as to extend their data collection procedures as this could be seen as unpaid extra-work.

The RICS Guidance Note on *Sustainability and commercial property valuation* may close this gap as it is intended to be included in an updated version of the RICS Red Book and will represent recommended best practice on how to deal with the issue of sustainability in valuation practice. RICS members may only deviate from the content of a Guidance Note if they have very good reasons for doing so and if they explain these reasons within a valuation report.

The Guidance Note contains detailed recommendations for the extension of the standard data collection process. In addition, the Guidance Note imposes pressure on valuation clients as valuation professionals will be requested to ask their clients for certain sustainability related performance information (e.g. on energy and water consumption, etc.), which will in return increase the demand for up-to-date performance information and data within the industry.

But the implementation of the provisions of the Guidance Note can only be properly achieved providing these are accompanied by dedicated training and life-long-learning requirements. As a result, RICS but also other professional bodies are undertaking efforts to further develop and offer respective training and educational courses for practitioners (and aspiring) valuers.

Finally, the role of the valuers needs to be briefly discussed in connection with the sustainable development discourse: not always but during the past decades, valuation and valuation professionals have been seen as some kind of "passive element" which analyses and reflects the market but under no circumstances takes influence or even leads the market. However, some professionals start realising that simply "reflecting the market" may no longer be "good enough". For example, Hill et al. argue that "whilst valuation, as a professional skill, may need to be as highly regulated as it currently is, […] the constraints on valuers on shaping the market seem anachronistic, hindering innovation, the development of new knowledge and the growth of an investment market for sustainable development."[33]

And even if most valuers would refrain from seeing themselves as "market shapers" it needs to be acknowledged that valuers are key professional participants for successful market transformation as they exercise an influence on the market through the type and quality of services they provide. They also exercise influence solely by asking their clients certain kinds of questions; e.g. concerning energy performance certificates, utilities data and performance documentations. Requesting this kind of information from valuation clients not only increases the demand for such certificates and documentations but also sensitises market participants for sustainability-related performance aspects, characteristics and attributes of the buildings in the market place.

33 Hill, S., Lorenz, D., Dent, P. and Lützkendorf, T. (2013) 'Professionalism and ethics in a changing economy', Building Research & Information, Vol. 41, No. 1, p. 16

8. CONCLUSIONS AND OUTLOOK

Property and construction professionals are faced with many challenges concerning improving environmental outcomes resulting from increasingly onerous climate change targets and pressures to improve the security of fuel supply through energy efficiency. These include the design and construction of high performance buildings and the design vs. operational performance gap, maintenance, management and retrofitting or upgrading of existing properties and the impact these have on the valuation of property for management and investment.

RICS has clear roles in these areas including education, training, professional standards and leadership. This selection of points clearly indicates that the profession must ensure that it understands this emerging area of expertise, and that it positions itself to offer authoritative advice and leadership as academic work is translated into practical advice.

RICS is able to play a very important role in providing market and professional intelligence on these developments to members. At the same time, it can represent the potential role of built environment professionals to governments and other organisations that are formulating the development of knowledge and policy in these areas across Europe.

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