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COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

ON RESOURCE EFFICIENCY OPPORTUNITIES IN THE BUILDING SECTOR

RESOURCE EFFICIENCY OPPORTUNITIES IN THE BUILDING SECTOR

1. INTRODUCTION

The construction and use of buildings in the EU account for about half of all our extracted materials[1] and energy consumption[2] and about a third of our water consumption[3]. The sector also generates about one third of all waste[4] and is associated with environmental pressures that arise at different stages of a building's life-cycle including the manufacturing of construction products, building construction, use, renovation and the management of building waste.

The main objectives of this initiative are to promote a more efficient use of resources consumed by new and renovated commercial, residential and public buildings and to reduce their overall environmental impacts throughout the full life cycle. Resourse use is determined in large part by design decisions and choices over construction materials. To help bringing resource efficiency gains, designers, manufacturers, contractors, authorities and users need useable and reliable information to inform their decision-making. This initiative addresses this information deficit by proposing a set of clearly defined and measurable indicators, for the assessment of the environmental performance of buildings.

2. REDUCING RESOURCE USE IN BUILDINGS

Consumption of resources and related environmental impacts throughout a building's life cycle can be reduced by:

- Promoting better design that weighs resource use against the needs and functionality of the building and considers scenarios for deconstruction;
- Better project planning which ensures a greater use of resource and energy efficient products;
- Promoting more resource efficient manufacturing of construction products by, for example, using recycled materials, reusing existing materials and using waste as a fuel;
- Promoting more resource efficient construction and renovation by, for example, reducing construction waste and recycling/re-using materials and products so that less is sent to landfill.

The recycling or reuse of materials or even whole products is increasingly important as a means to improve the efficient use of **materials** and to avoid negative impacts associated with virgin material. However, the overall balance depends to a large extent on the existence of an efficient recycling system at local, regional or national level which presents an attractive and cost-efficient alternative to landfill. The attractiveness of recycling alternatives is governed by the length of transport distances to recycling sites, achieving the necessary level of purity of the recycled materials and recycling and production processes.

1 COM (2011) 571
2 COM (2007) 860
3 COM (2007) 414
4 Study on "Management of CDW in the EU": http://ec.europa.eu/environment/waste/pdf/2011_CDW_Report.pdf

Energy consumption in the use phase from heating and lighting is covered by various EU regulations[5][6][7][8]. Energy used in the manufacture of construction products and the construction process also plays a major role in the overall environmental impact of a building. Studies show that between 5-10% of total energy consumption across the EU is related to the production of construction products[9]. In addition, the embodied greenhouse gas emissions of a building are increasing[10] and can comprise a significant share of total greenhouse gas emissions. The entire life-cycle of a building must be considered if the environmental impacts are to be tackled effectively. Otherwise, impacts may be overlooked or additional problems created in other parts of the life cycle. For example, some solutions to improve the energy efficiency of a building in the use phase could make later recycling more difficult and expensive.

Reducing life-cycle costs

Buildings that are designed and constructed to reduce life-cycle environmental impacts deliver direct economic benefits such as lower operational and maintenance costs,[11,12,13] slower depreciation and a higher asset value[14,15]. In addition, there are also positive social impacts like improved health and productivity. Currently, most certified buildings are high-end commercial and public buildings (e.g. prestigious hotels and offices) because of the additional administrative and certification costs which should rather be seen in the context of the longer-term benefits. As awareness amongst designers, suppliers and manufacturers grows, costs have fallen as the supply chain adapts to new requirements and practices. In France, a study by QUALITEL has concluded that the extra cost for constructing sustainable residential buildings as opposed to standard ones has gone from 10 % in 2003 to below 1% today[16]. This trend has also been noted in the UK[17].

3. TOWARDS A COMMON EUROPEAN APPROACH TO ASSESS THE ENVIRONMENTAL PERFORMANCE OF BUILDINGS

Current status

The Roadmap to a Resource Efficient Europe[18] proposed that buildings should be renovated and constructed with greater resource efficiency which would require policies looking at a

5 2010/31/EU
6 2012/27/EU
7 2009/125/EC
8 2010/30/EU
9 "Resource efficiency in the building sector", Ecorys and Copenhagen Resource Institute, Rotterdam May 2014 (http://ec.europa.eu/environment/eussd/pdf/Resource efficiency in the building sector.pdf) AND "Energy use and environmental impacts of the Swedish building and real estate management sector", Toller, S. et al, Journal of Industrial Ecology, 2011, Vol. 15, Nr 3
10 "HQE Performance, Premières tendencies pour les bâtiments neufs (Association HQE 2011) ISBN 978954110107" AND Swedish study referred to above.
11 Smart Market Report, (2013) http://www.worldgbc.org/files/8613/6295/6420/World_Green_Building_Trends_SmartMarket_Report_2013.pdf
12 Parker, J. (2012) The Value of BREEAM, A BSRIA report
13 The business case for green buildings, (2013), http://www.worldgbc.org/activities/business-case/
14 From obsolescence to resilience - 2013, Jones Lang LaSalle, , www.joneslanglasalle.co.uk
15 www.rehva.eu/publications-and-resources/hvac-journal/2013/012013/energy-efficiency-strategy-at-the-portfolio-of-a-property-owner/
16 Ana Cunha Cribellier, Responsable du Développement International, QUALITEL – CERQUAL
17 Future of sustainable housing, KN5211 BRE May 2013
18 COM (2011) 571

wide range of environmental impacts across the entire life-cycle. The "Strategy for the Sustainable Competitiveness of the Construction Sector and its Enterprises"[19] reiterated that resource efficiency was among the main challenges that the sector faces in the period up to 2020. The strategy also indicated that the Commission "will propose approaches to mutual recognition or harmonisation of the various existing assessment methods, also with a view to making them more operational and affordable for construction enterprises, the insurance industry and investors".

While there are several instruments which have an impact on buildings and construction products such as the Energy Performance of Buildings Directive[20], the Energy Efficiency Directive[21], the Construction Products Regulation[22], the EU Emissions Trading System[23], the Industrial Emissions Directive[24], the Waste Framework Directive[25] and the Landfill Directive[26], they focus on different resources and parts of the life-cycle and for the time being they are not designed to provide an overall life-cycle approach.

At **national level**, a few Member States are preparing policies linked to life-cycle information. There is a risk that the indicators they eventually develop will differ, leading to an unnecessarily complex business environment. On the other hand, the current interest can be seen as an opportunity to co-ordinate diverging national approaches, to develop comparable data and to share best practice. Within the context of the Communication on the "sustainable competitivness of the construction sector[27] the Commission has proposed to improve the mutual recognition of environmental assessment methods to offer additional business opportunities to small and medium sized enterprises (SMEs) in the construction sector.

Also in the **private sector**, the environmental performance of buildings is often not assessed to any significant extent via voluntary commercial multi-criteria certification schemes. Less than one percent of buildings in Europe are certified via such schemes[28]. Uptake is hampered by presumed high certification costs and also by the uncertainity as to whether an assessment scheme will be required by the final client and if so, according to which specific scheme. The fact that there is no established comparability between the different schemes also adds to the uncertainty and complexity for businesses.

In summary, there is a lack of reliable, comparable and affordable data, methods and tools on which the operators in the supply chain can analyse and benchmark the environmental performance of different solutions. Meaningful decisions regarding supply chain risk, market opportunities and internal investment priorities are consequently difficult to make. Consumers suffer from the absence of adequate guidance on how to incorporate environmental considerations into their purchasing decisions and this makes it difficult to

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19 COM (2012) 433

20 2010/31/EU, also, there is currently a voluntary common EU certification scheme for the energy performance of non-residential buildings under development, in line with the article 11 (9) of this directive

21 2012/27/EU

22 Regulation 305/2011/EU

23 2003/87/EC

24 2010/75/EU

25 2008/98/EC

26 1999/31/EC

27 COM (2012) 433

28 "Resource efficiency in the building sector", Ecorys and Copenhagen Resource Institute, Rotterdam May 2014 (http://ec.europa.eu/environment/eussd/pdf/Resource efficiency in the building sector.pdf)

develop trust and confidence in the market. As much as 79% of interviewed Europeans claim that this would be an important factor in their decision-making, if they were provided with the information.[29]

Steps forward – need for objective and reliable data

To enable professionals, decision makers and investors throughout the EU to use life-cycle aspects, they need empirical based, reliable, transparent and comparable data[30], which in turn will have to be based on clear indicators for building performance which combine the objectives of different public and private requirements.

While different national and commercial schemes may have reasons to diverge slightly in their approaches (e.g. specific materials or climatic considerations), a common framework of **core indicators**, focusing on the most essential aspects of environmental impacts should nonetheless be established. This will allow comparability and provide consumers and policy makers with easier access to reliable and consistent information.

A single framework with core indicators will:

- Allow easier communication of information to professional and non-experts;
- Provide reliable and comparable data to be used in decision-making covering the entire life-cycle of buildings;
- Enable the setting of clear objectives and targets, including system boundaries, for building performance, complementing already existing European legislation on buildings[31];
- Increase awareness of the benefits of sustainable buildings among actors engaged in providing buildings, as well as private and public clients, including users of buildings;
- Facilitate the effective transfer of good practices from one country to another;
- Reduce the cost to assess effectively and communicate the environmental performance of buildings;
- Provide public authorities with access to core indicators and to a critical mass of relevant data on which to base their policy initiatives, including Green Public Procurement;
- Widen the market for sustainable buildings to more countries than current trends indicate and to other buildings sectors such as non-residential buildings and, eventually, to the residential market.

The advantages for building sector professionals (including SMEs) are:

- Architects, designers, manufacturers of construction products, builders, developers and investors, will be able to benefit from competitive advantages based on environmental performance;
- Manufacturers of construction products will only have to provide product information needed for building assessment in one way, resulting in cost savings[32];

29 Flash Eurobarometer 367 - TNS Political & Social (July 2013)

30 Commission Recommendation 2013/179/EU on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations

31 In addition, also to support the future development of Sustainable cities criteria as described in the 7th Environment Action Programme, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:354:0171:0200:EN:PDF

32 This often needs to be done in different formats, with a significant cost for manufacturers. This has been confirmed by Construction Products Europe, Glass for Europe and Eurima. See also Pacheco-Torgal F. et al., Eco-efficient construction and building materials, Woodhead Publishing Ltd, 2013, ISBN 0857097679

- Architects and builders will be supported via greater information on both product and building level, with reduced costs when incorporating sustainability aspects[33];
- Developers will more easily be able to compare performance of projects[34];
- Investors, property owners and insurers will be able to improve the allocation of capital and to integrate environmental risk into their decisions.

Steps forward – selecting reliable indicators

In collaboration with stakeholders, the Commission will develop a framework consisting of core indicators, including their underlying methods, to be used to assess the environmental performance of buildings throughout their life-cycle. Based on existing policies, regulations and data[35] at EU and national level, and without pre-empting the results of future work, this process should as a minimum investigate the following areas[36]:

- Total energy use, including operational energy[37] (based on existing legislation) and embodied energy of products and construction processes
- Material use and the embodied environmental impacts[38]
- Durability of construction products
- Design for deconstruction
- Management of construction as well as demolition waste (CDW)
- Recycled content in construction materials
- Recyclability and reusability of construction materials and products
- Water used by buildings[39]
- The use intensity of (mostly public) buildings (e.g. flexible functionality for different users during different times of the day)[40]

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33 This is expected to be further supported by building information modelling tools, guiding the design by calculating function and performance of a building depending on design, material choice etc. These tools take environmental aspects into account to a very limited extent. It is expected that such aspects would be part of the continuous development of these tools if the uncertainty regarding how to assess and report environmental performance was removed.

34 Developers work with different commercial certification schemes due to varying client demand.

35 Waste Data Centre (http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/introduction); Natural Resources Data Centre (http://epp.eurostat.ec.europa.eu/portal/page/portal/data_centre_natural_resources/introduction); Resource Efficiency Scoreboard (http://epp.eurostat.ec.europa.eu/portal/page/portal/europe_2020_indicators/ree_scoreboard); European Platform on Life Cycle Assessment (http://eplca.jrc.ec.europa.eu/)

36 The Public Consultation organised in relation to this initiative concluded on the listed areas. Indoor comfort was not included in the consultation but has been emphasised by stakeholders.

37 While the use phase depends on design and construction as well as on the behaviour of the occupants, the latter is not the focus of this initiative.

38 When appropriate, also taking into account the use of green infrastructure elements such as green roofs and green walls, COM(2013)249, http://ec.europa.eu/environment/nature/ecosystems/index_en.htm

39 See footnote on energy use above.

40 In order to adapt the need for further built environment (e.g., use empty instead of new buildings, use buildings for more than one purpose, build buildings to be adapted to new functions or changing needs)

- Indoor comfort

Considering the wide range of buildings in the EU as well as differences in constructing new builings or renovating existing ones, the framework will not cover all aspects of the environmental performance, but comprise the indicators that after the consultation with stakeholders have been identified as the ones with the highest environmental impact in the EU.

Steps forward – framework development

The framework with core indicators and their underlying methods will also:

- Present guidance concerning its implementation, in particular requirements for data quality and reliability, encouraging third party verification;

- Include the necessary guidance for the use of the indicators;

- Suggest relevant benchmarks of building performance, beyond energy efficiency;

- Allow for translation of technical indicators into information useful for the financial community wherever necessary.

The framework has to be flexible so that it can be integrated in existing and new assessment schemes, or be used on its own. It should be rigorous enough to drive improvement in performance and allow for comparison between buildings.

The framework with core indicators, and effective data collection and sharing, will be agreed on in cooperation with stakeholders and Member States. The process will take about two years with consultation periods with stakeholders to ensure proper participation. It will partly be based on existing work, such as the technical standard EN15978[41] as well as existing voluntary commercial certification schemes for buildings, including the work of Sustainable Building Alliance[42]but also on relevant research projects[43] and developments at the international level.

The intention is to make the framework free to use in decision-making at different stages, but also to make use of it in policy-setting at various levels. Therefore, the framework should allow for:

- Being incorporated as a module in assessment schemes next to their larger sets of indicators; or

- Being used on its own, as an affordable solution initially for non-residential and later on by residential buildings, once experience has been gained.

4. TOWARDS A BETTER FUNCTIONING MARKET FOR RECYCLED CONSTRUCTION MATERIALS

41 http://www.en-standard.eu/csn-en-15978-sustainability-of-construction-works-assessment-of-environmental-performance-of-buildings-calculation-method/

42 http://sballiance.org/

43 Such as FP7 projects SuPerBuildings (http://cic.vtt.fi/superbuildings/) and OPEN HOUSE (http://www.openhouse-fp7.eu/about_project/related_projects)

Within the framework, special attention will be given to increasing the use of recycled materials and the reduction of construction and demolition waste (CDW). CDW makes up a third of total waste generated in the EU[44]. A large majority of CDW is recyclable but with the exception of a few Member States recycling up to 90%, the average recovery for EU27 is just below 50%[45][46].

Recycling CDW can lead to significant resource and environmental benefits. For example, metals see an overall reduction of impacts of more than 90% for aluminium and copper and about 15% for low-alloyed steel[47]. Concrete is the most used material in buildings and its recycling reduces natural resource depletion and landfilling of waste. Concrete can often be recycled at demolition or construction sites close to urban areas where it will be reused thereby reducing transport demand with savings in cost and related emissions[48].

Recycling enables savings for other materials as well. For flat glass (used for windows etc), one tonne of recycled material results in savings of 1200 kg of virgin material, 25% of energy and 300 kg of CO_2 emissions (directly linked to the melting process)[49]. There are similar savings in terms of energy and CO_2 emissions for recycled glass wool[50]. For stone wool, the gains may be in the order of 5% with regard to energy consumption and related emissions[51]. As for gypsum, life-cycle assessments have shown typical reductions in global warming potential, human toxicity and eutrophication of about 4-5% when producing a board with 25% recycled content as opposed to only using virgin material[52].

Apart from environmental benefits, there can be economic opportunities for manufacturers when using recycled material. As an example, the flat glass industry in the EU sees a market price for recycled glass of about 60-80 EUR/tonne, sufficiently below the 90 EUR/tonne necessary to compete with virgin material. In the case of glass, there is thus often an economic benefit for manufacturers to use recycled material. Still, market demand for recycled material is rarely met.

Recycling material results in job growth in deconstruction, sorting and recycling of construction materials. This is typically local work and would create job opportunities throughout Europe.

Despite the potential for significant economic and environmental benefits of recycling of CDW, large parts are still landfilled or backfilled (filling of voids after construction or excavation activities). Currently, it is mainly metals that are recycled due to their high value and existing markets.

Recycling of many other parts of CDW often faces barriers related to two distinct market failures: the environmental damage cost is neither internalised in the landfill fees nor in the cost of virgin materials, which can result in recycled material being more costly than virgin

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44 Study on "Management of CDW in the EU": http://ec.europa.eu/environment/waste/pdf/2011_CDW_Report.pdf

45 Implementing EU waste legislation for green growth, DG ENV (2011)

46 Management of CDW in the EU http://ec.europa.eu/environment/waste/pdf/2011_CDW_Report.pdf

47 OVAM Ecolizer 2.0 Ecodesign Tool http://www.ecodesignlink.be/images/filelib/EcolizerEN_1180.pdf

48 The Cement Sustainability Initiative, World Business Council for Sustainable Development, ISBN 987-3-940388-49-0

49 Glass for Europe, http://www.glassforeurope.com/images/cont/187_987_file.pdf

50 EURIMA

51 EURIMA

52 WRAP Technical report, Life cycle assessment of plasterboard, April 2008, 1-84405-378-4

material; and the split incentives in the CDW value chain where the cost of dismantling, separation and processing the waste is mostly born at the phase of demolition while the potential benefits from using the recycled materials generally accrue at the production phase. These market failures, together with gaps in the waste management infrastructure in a large number of Member States prevent investment in deconstruction and separation operations, and landfilling or backfilling remain preferred alternatives. Demolition companies thus face uncertainty regarding demand even if the price of recycled materials could guarantee profits for the manufacturer. Markets do not develop economies of scale and the amount of recycled materials supplied does not correspond to the potential demand from construction products companies. In some cases, technologies enabling recycled materials that meet all the technical, safety and environmental requirements for construction products are still lacking. Moreover, the adequate certification procedures attesting that recycled material meet all necessary requirements are sometimes missing.

The Commission will investigate how these systemic barriers can be overcome. While the revision of different parts of European waste legislation is aimed at further simplifying the waste *Acquis* and to ensure coherence between different pieces of waste legislation, the present Communication instead explores policy measures to stimulate creation of markets with recycled materials derived from CDW. The revision of waste legislation and the actions presented here are thus complementary as a successful creation of markets for recycled material will naturally strongly support the implementation of the different parts of waste legislation. This can play an important role, also considering the fact that the European Commission plans to assess the feasibility of further restricting landfill of CDW.

In relation to this, best practices show that some Member States have succeeded in diverting CDW from landfilling and backfilling and have increased recycling. Targeted policies that combine market based and regulatory measures bring about especially visible benefits[53].

5. SUMMARY CONCLUSION

While the interest in improving resource efficiency in the construction sector is growing at national and at EU level, different national public and private approaches are increasing the complexity of the working environment for all stakeholders. The lack of common objectives, indicators and data, and the lack of mutual recognition of different approaches could soon undo progress made to date and lead to distortions in the internal market for professionals in the field of planning, designing, constructing and manufacturing.

Therefore, the Commission will invite stakeholders (in particular: public authorities, social partners, investors, insurers, architects, contractors, demolition operators, manufacturers, recyclers and providers of assessment schemes) to:

- Discuss objectives and indicators for assessing the sustainability of buildings (2014-2015);

- Discuss the practical implementation of a framework containing core indicators

[53] Del Rio Merino, M., Gracia, P. I., Azevedo, I. S. W. (2010) Sustainable construction: CDW reconsidered. Waste Management and Research. 28: 118-129. DOI: 10.1177/0734242X09103841 and UK case (p.170) http://ec.europa.eu/environment/enveco/taxation/pdf/annexes_phasing_out_env_harmful_subsidies.pdf

(2014-2015);

- Contribute to the development of this framework (2015-2016).

In addition, the Commission will:

- Promote the exchange of best practice and will collaborate with Member States on measures that:
    - divert CDW from landfilling and backfilling, either through increased charges or regulatory measures;
    - as appropriate, integrate external environmental cost in the price of virgin materials for construction products in order to stimulate increased use of secondary raw materials.
- Explore options for measures to ensure that recycled materials meet necessary quality and safety requirements, through standardisation and certification;
- Explore how benchmarks for content of recycled materials in construction products and buildings can stimulate demand for recycled materials. The initial focus will be on priority materials (such as concrete with its high volume and thermal insulation with its energy intensive production) with gradual expansion to all recyclable CDW. Benchmarks and targets can be promoted i.a. for use in Green Public Procurement and in environmental management schemes in the construction sector;
- Study specific waste streams of CDW to identify opportunities for the valorization of CDW;
- Develop specific tools/guidelines for assessment of buildings prior to demolition and renovation with a view to optimal use of CDW.

As complementary actions, the Commission will support:

- Research and innovation in the area of recycling and production of construction materials from CDW via Horizon 2020.
- Demonstration projects via instruments such as Horizon 2020, COSME, LIFE+ and Structural Funds that showcase how collaboration between public authorities and the private sector can create viable markets with recycled materials. The Commission will therefore support projects in areas such as:
    - design for deconstruction;
    - recyclability audits of buildings designated for demolition or reconstruction;
    - development of on-site CDW separation techniques and practices;
    - development of technologies for processing CDW into high quality recycled

materials;

- incentivising producers of construction products to use recycled material;
- development of collaborative schemes between demolition and construction product sectors, to share cost and benefits of CDW recycling.