GREENING THE BUILDING SUPPLY CHAIN

ACTION FRAMEWORK
This action framework is part of UNEP-SBCI’s *Greening the Building Supply Chain* report. The report evolved from the work of UNEP-SBCI’s Task Force on Greening the Building Sector Supply Chain, launched in October 2012. Comprised of UNEP-SBCI partners and other experts representing public and private sector organizations, the Task Force’s mission was to identify opportunities for achieving greater resource efficiency in the building sector supply chain, and provide recommendations to UNEP-SBCI for a specific focus in development of future work programmes.

As the building sector creates demand for construction materials, logistics and transport, packaging, and waste management, among others aspects, the sector and its supply chain contribute, at a large scale, to consumption and production patterns which impact on key environmental aspects such as carbon, energy, water and waste.

The business case for green building is largely established on tangible benefits associated with energy efficiency, which can now be easily measured and monetized. As the green building market matures so does the ability to understand the complexity of our sector and identify ways that we can improve our overall system efficiencies. However, while the need to understand and reduce energy consumption and greenhouse gas emissions from buildings during their operation has become increasingly recognized, efforts related to the resource use in the building supply chain appear to be less advanced.

Few systematic attempts have been made to assess existing options to reduce the environmental impacts of a building and its components over its entire life-cycle. For this reason a Task Force on Greening the Building Supply Chain was established under UNEP-SBCI to identify opportunities for achieving greater resource efficiency in the building sector supply chain and contribute towards wider socio-economic goals, and to provide recommendations to UNEP-SBCI for a specific focus in development of future work programmes.

Consistent with the Task Force Mission and Goals, this Report was specifically produced to define prioritisation of green interventions for study by UNEP-SBCI and partners in future work programmes, and to support the development of a Sustainable Buildings and Construction programme under the 10 Year Framework of Programmes on Sustainable Consumption and Production.

The Report also maps the interdependencies upstream and downstream of the construction site, allowing the various stakeholders to gain insight into their role and on how they impact on the overall system.

Given the large range of buildings’ typologies and the associated distinctive supply chains, for this Report, a specific scope was chosen. It focuses on new and existing public and private offices as a representative building type. These buildings’ delivery and management process (the way in which they are designed, delivered occupied and maintained) is divided in five stages: Concept Definition, Design, Construction, In Use and End of Life. For each stage of this process green intervention taken by stakeholders in the supply chain are described and linked with five core environmental aspects (energy, carbon, materials, waste and water).

These aspects were selected as they are generally recognized by the industry to have the highest global impact over the life cycle of buildings. Four main green interventions categories are defined in the Report: Regulatory and control mechanisms, Economic or market-based instruments, Fiscal instruments and incentives and Support, information and voluntary action. For each green intervention case studies are presented to provide concrete and successful examples.

The building delivery and management process presented in the Report shows that challenges to greening the building supply chain begin with the complexity of the stakeholders relationships. A variety of stakeholders from materials suppliers to capital providers are involved at various stages of the process, each with their own specific role and at the same time with overlapping responsibilities.
The barriers each stakeholder faces, ranging from lack of knowledge to financial or technological risk to lack of communication with other stakeholders, among others, are not easily overcome and require a systematic and comprehensive approach. Likewise, potential green interventions to address these barriers are also wide-ranging and include financial instruments, voluntary support programmes and regulatory actions, in addition to the required maturity of the market.

The Report also introduces an “Intensity Analysis Methodology” based on an LCA approach aimed at improving the understanding of environmental impacts of selected materials and providing indications about potential entry points for green interventions within the building materials supply chains. Aluminium, Brick, Cement, Flat glass, Mineral wool, Plaster board, Polystyrene, Polyurethane, Steel (rebar and structural), and Timber (structural) were selected for the resource intensity analysis.

These material groups have been considered based on the mutual specific resource use and environmental impacts associated with the product group and based on the current production and potential future production volumes increase. A heat map sample, looking at the relative environmental impacts of the selected construction materials, was also developed to visualize the results of the selected intensity analysis method.

The developed methodology shows that it is possible to illustrate resource intensities resulting from material production and that it is possible to develop heat maps highlighting the main environmental impacts associated with the production stage of single building materials.

However, such a task is particularly challenging given multiple data quality issues, including differences between data sets stemming from different sources, data scarcity issues concerning materials production and consumption, as well as variable system boundaries regarding materials upstream processes, transport and manufacturing between different producers.

The Report provides general recommendations as well as detailed UNEP-SBCI specific recommendations for the development of actions linked with the different green interventions that can or could occur in both the building delivery and management process, and the material supply chains. These recommendations range from the promotion and facilitation of additional research on a precise green intervention previously identified in the Report, to the individuation of potential opportunities for collaboration both within and outside UNEP.

Finally recommendations are provided to further refine the intensity analysis method and the heat map approach tested in the Report identifying opportunities to better understand relative impacts of materials. Overlaying heat maps with other relevant data such as scarcity and other risk maps that relate the heat maps to the selected material origin (e.g. combine heat maps information information of freshwater use in different stages in the supply chain with water scarcity maps).

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**TOOLS FOR GREEN INTERVENTIONS**

**BUILDING LEVEL**
- Green building rating tools
- Life cycle assessment and costing
- (Green) BIM

**MATERIAL, PRODUCT AND COMPONENT LEVEL**
- EPDs and product certification

**CORPORATE LEVEL**
- Reporting/disclosure
GENERAL RECOMMENDATIONS

- More research is needed on good examples of effective collaboration models for public green building policies and more documented examples of effective case studies, including in rapidly developing regions where the greatest amount of construction activity will take place in the next years.
- The effectiveness of green performance guarantees in practice should be assessed, including the existing tools and technical monitoring systems (for water, energy and waste) that are applied.
- Further study the penetration of certification systems in value chain, and document successes and examples where pursuit of certification has had market impact and/or created transformation.
- Conduct mapping of life-cycle tools in combination with impact assessments and case studies, in order to improve the tools’ application and help stakeholders more strategically implement them throughout the building sector supply chain.
- Facilitate the international up-scaling and implementation of life-cycle tools and initiatives to allow for use by SMEs and in developing countries.
- Determine the impact of life-cycle initiatives/tools, assess the real costs and benefits and how those could potentially be improved through standardisation and green interventions.

UNEP-SBCI RECOMMENDATIONS

1. More progressive public green building policies
   - Document and highlight the impact of best practices, synthesize and disseminate information and advocate for better public policies through UNEP efforts with governments. The 10YFP programme provides a significant opportunity for mainstreaming sustainable building public policies.
   - Promote and facilitate through the work of UNEP-SBCI additional research and identify which government policy instruments (procurement, labelling, standards, incentives) and support structures can encourage green improvements in the design and construction phase and also encourage the private sector to develop relevant initiatives.
   - Promote and highlight in UNEP-SBCI’s relevant work with governments and local authorities the benefits of model regional building codes that mandate high energy performance, materiality of low toxicity, and materiality of high regional content. These codes can offer climatological benchmarking and regional durability guidance.

2. Private sector green building policies
   - Provide through the UNEP-SBCI a platform for stakeholders in the building and construction sector to engage in developing and implementing strategies for the systematic application of green interventions throughout the building supply chain. This platform can help to build consensus for the development of international metrics for resource efficiency and sustainability of materials.
   - Facilitate through collaboration with UNEP-SBCI partners and other networks capacity building for private-sector resource efficient building practices. There is a significant opportunity to improve private/private knowledge transfer targeted at SMEs in the sector in collaboration with UNEP’s Business and Industry Unit.

3. Favorable financing terms for green buildings
   - Strengthen and increase collaboration between UNEP-SBCI and UNEP-Finance Initiative to develop strategies and approaches to address financing barriers for energy and resource efficiency in the building and construction sector and align relevant metrics.
4. Alternative procurement models for green buildings
  o Engage UNEP-SBCI industry partners to document best practices including alternative procurement methods, and highlight results and lessons learned in relevant 10YFP programme activities.
  o Identify and assess sector-specific approaches to procurement that result in improved resource efficiency through UNEP-SBCI engagement with sustainable and green procurement initiatives, including UNEP-Sustainable Public Procurement Initiative.
  o Encourage the adoption of standard contract types, or contractual frameworks, that have been proven effective, reasonable and legally robust in major world markets and document through relevant UNEP initiatives and partners.

5. Green incentives in permitting process
  o Promote and highlight to governments and local authorities the benefits of incentives in the permitting process. UNEP-SBCI partners, including Green Building Councils are well positioned to support development of comprehensive policy packages to promote green buildings, and other policy instruments, including regulatory, economic/market based, fiscal instruments and incentives, and information/voluntary actions.
  o Further examine and document benefits and results of incentive programmes during the permitting process. UNEP-SBCI partners can share experiences and case studies to document results and promote successful incentive programmes.

6. Green/sustainable private procurement
  o Promote and facilitate through UNEP-SBCI partners the development of supporting criteria for private procurement policies that include green or sustainable standards.
  o Engage with relevant international agencies, UNEP initiatives and building industry associations to assure that suppliers have the training and skills needed to meet green/sustainable procurement standards and improve their green performance through time.

7. Green/sustainable public procurement
  o Support and promote through collaboration between UNEP-SBCI and UNEP Sustainable Public Procurement Initiative the mainstreaming of sustainable public procurement (SPP) as a policy tool for sustainable buildings and construction in government policy at local and national levels.
  o Facilitate through the activities of UNEP-SBCI and partners the development of supporting criteria for SPP, and align sector criteria with national and regional criteria (such as EU GPP) to provide harmonization and consistency across markets.
  o Work in collaboration with other UNEP initiatives and building industry associations to assure that SMEs have the training and skills needed to gain access to GPP/SPP, and to measure the impact of GPP/SPP in the building sector through the development of specific building related indicators.

8. Green facilities management
  o Develop a UNEP-SBCI watching brief and document best practices in green facility management and work with industry associations and relevant organizations (such as national Green Building Councils) to develop guidance and training to support green operations.
  o Highlight and promote through UNEP-SBCI and partners the importance of best practice commissioning and encourage the adoption of standards for commissioning.
  o Work with and through UNEP-SBCI partners to promote and demonstrate more sustainable facilities management policies and practices.
  o Identify collaboration with UNEP-SBCI partners to update the “Energy Efficiency in Buildings – Guidance for Facilities Managers” to include resource optimization and wider efficiency gains.
9. Benchmarking and follow-up

- Support UNEP-SBCI partners and related networks in efforts to benchmark performance and conduct additional research and continuous data-gathering. UNEP-SBCI can play a significant role in the synthesis and dissemination of information, especially through the 10YFP programme, to promote adoption of performance standards.
- Engage with other non-governmental and multi-lateral organizations to accelerate the adoption of enabling protocols, conventions, and tools required to improve interoperability, thus supporting when needed national-scale market participants (e.g., national green building councils) and promote through UNEP-SBCI. Important issues include data specification (e.g., metrics), metadata, space and building identification, and harmonization of reporting protocols. These are pre-competitive issues that ultimately enable diverse, efficient markets by making it easier to identify and communicate about the performance of buildings and portfolios.

10. Green leases

- Identify and promote through UNEP-SBCI and partner networks best practices in facility management, including green leases and comprehensive policy toolkits in partnership with other organizations for industry uptake.
- Demonstrate leadership through UNEP-SBCI partner promotion and utilization of green leases, and share lessons and results through the initiative’s network.

11. Green criteria in asset valuation

- Strengthen partnership between UNEP-SBCI and UNEP Finance Initiative (UNEP-FI) to develop financial tools and case studies evidencing the market value of high performing green buildings.
- UNEP-SBCI, UNEP-FI and respective partners, including RICS, to collectively promote the development of training materials aimed at valuation professionals that encourage the factoring of green criteria into valuation processes, through initiatives such as RenoValue. Collaboration should promote the development and update of standards to include green criteria and LCC approaches in asset valuation.

12. Green building rating tools

- Support continued UNEP-SBCI partner development and implementation of certification systems as one of various policy tools to guide delivery of green buildings, and work with GBC networks to identify measures that address resource efficiency in supply chain.
- Support efforts of the WGBC to harmonize rating tools and provide international consensus, while considering local context, and encourage UNEP-SBCI partners to support such efforts.

13. Life cycle assessment and costing

- Support the development of life-cycle based indicators that may be needed to facilitate measuring resource efficiency and performance in the building and construction sector. These indicators are also required to identify points of leverage and the areas of highest energy efficiency/energy/carbon mitigation potential in the supply chain, including how building developers and owners can influence the performance of construction materials producers and manufacturers. Attention should be given to indicators, which have reached already international consensus, for example those based on the Environmental Product Declarations (EPDs, CEN TC 350).
Strengthen collaboration between UNEP-SBCI, its partners and the UNEP Life-Cycle Initiative and the International Resource Panel to adapt life-cycle design and de-materialisation models for implementation in building sector. There is a significant opportunity to assist countries to establish baseline data and support inter-operability of national life-cycle inventories of their building materials, as well as to adapt life-cycle modelling and design tools for use by designers and regulators. UNEP-SBCI to collaborate with Life Cycle Initiative on a sector-specific programme on LCA in building sector, with specific focus on access to data and interoperability of databases. The programme should develop policy tool-kits that will provide enabling frameworks, metrics and reporting protocols that can be delivered through the 10YFP programme.

14. (Green) BIM

- Promote the use of practical tools, such as BIM, to facilitate life cycle decision making and supply chain collaboration early in the design process, improve construction and procurement processes, but also facility management, to maximize resource efficiency potential over the building life cycle.
- Engage with SPP and other relevant initiatives to promote and encourage Green BIM in procurement in appropriate circumstances.

15. EPDs and product certification

- Support through the UNEP-SBCI network the greater adoption and application of EPDs in the sector, and review efforts at the national and international levels related to EPDs to assure consistency in measurement and application.
- Support efforts to harmonize standards through collaboration among UNEP-SBCI, its partners and networks and standard organisations (e.g. CEN and ISO).

16. Reporting/disclosure

- Collaborate with reporting and disclosure organizations and with private sector organizations representing the target group of companies and its final audience to foster and coordinate development of the ‘tools’ allowing for greater transparency and harmonization with international standards and relevant benchmarks. Such cooperation is necessary to arrive at a less burdensome and more meaningful set of tools to measure, benchmark and consequently drive investments and action in green and sustainability.
- Elaborate with other concerned entities within UNEP and outside a reporting component for the building sector, notably in the context of corporate sustainability reporting.
MATERIALS’ INTENSITY ANALYSIS RECOMMENDATIONS

- Compile life cycle data and EPD data for selected construction materials and product groups with a geographical coverage representative of the global production.

- Determine the most relevant energy and materials flows and processes (contribution analysis) in a cradle-to-gate perspective individually for (not between) the different materials and products before and after aggregation to impact categories independently for selected countries/global regions. The result would be one heat map per material/product group allowing to identify: i) the important aspects and life cycle stages in the production stage per country/region and ii) to what extent there are differences between the production processes in different countries/regions.

- Compare performance data of best available techniques and emerging techniques for determining specific room for improvements, e.g. from technology transfer.

- Overlay heat maps with other relevant data such as scarcity and other risk maps that relate these heat maps to material/component origin (e.g. combine heat maps information of freshwater use in the different stages in the supply chain with water scarcity maps).

- Develop heat maps of absolute national/regional resource uses/environmental impacts due to selected construction materials/product groups. This would indicate the absolute and relative importance of the selected materials/product groups for resource use/environmental impacts on a regional scale.

- Analyse tools that support the designers in performing environmentally conscious design decisions (e.g. guidelines and checklists, one-score screening indicators, full life cycle assessment, process simulation software, databases on materials, etc.) building upon life cycle data used in the construction sector to support the selection of construction materials/products and type of construction.

- Identify activities (i.e. green interventions) and actors with similar goals (cf. examples) and analysis of strategic partnerships.

About UNEP-SBCI
The United Nation’s Environment Programme’s Sustainable Buildings and Climate Initiative (UNEP-SBCI) is a partnership of major public and private sector stakeholders in the building sector. The Initiative works in cooperation with other international organizations to promote sustainable building policies and practices worldwide. The Initiative provides a common platform, develops tools and strategies, establishes baselines, and demonstrates through pilot projects.
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Promoting Policies and Practices for Sustainability