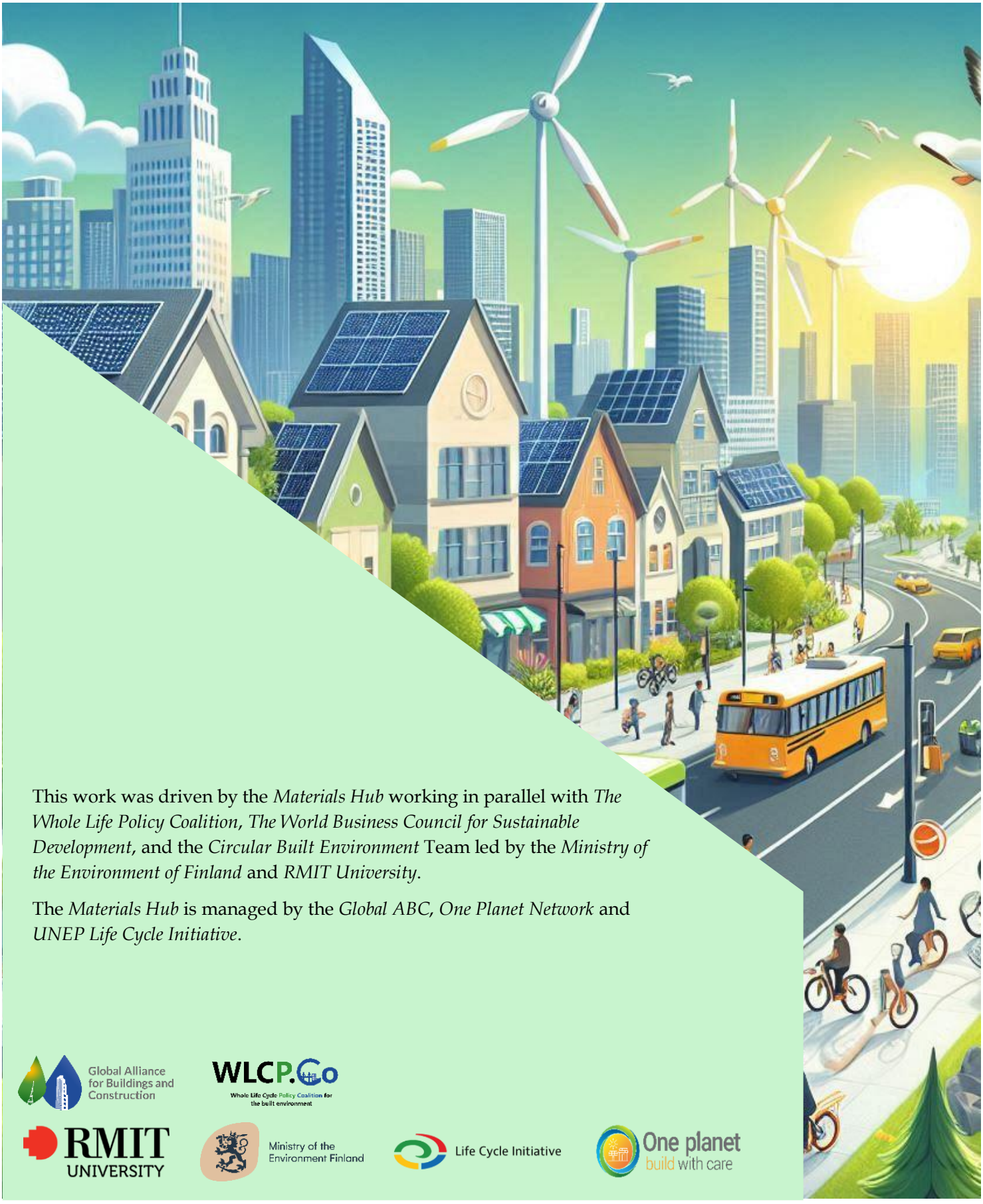
10 Whole Life Cycle Recommendations for The Buildings Breakthrough



This work was driven by the *Materials Hub* working in parallel with *The Whole Life Policy Coalition*, *The World Business Council for Sustainable Development*, and the *Circular Built Environment* Team led by the *Ministry of the Environment of Finland* and *RMIT University*.

The *Materials Hub* is managed by the *Global ABC*, *One Planet Network* and *UNEP Life Cycle Initiative*.

Global Alliance for Buildings and Construction

WLCP.Co Whole Life Cycle Policy Coalition for the built environment

RMIT UNIVERSITY

Ministry of the Environment Finland

Life Cycle Initiative

One planet build with care

Contents

Foreword

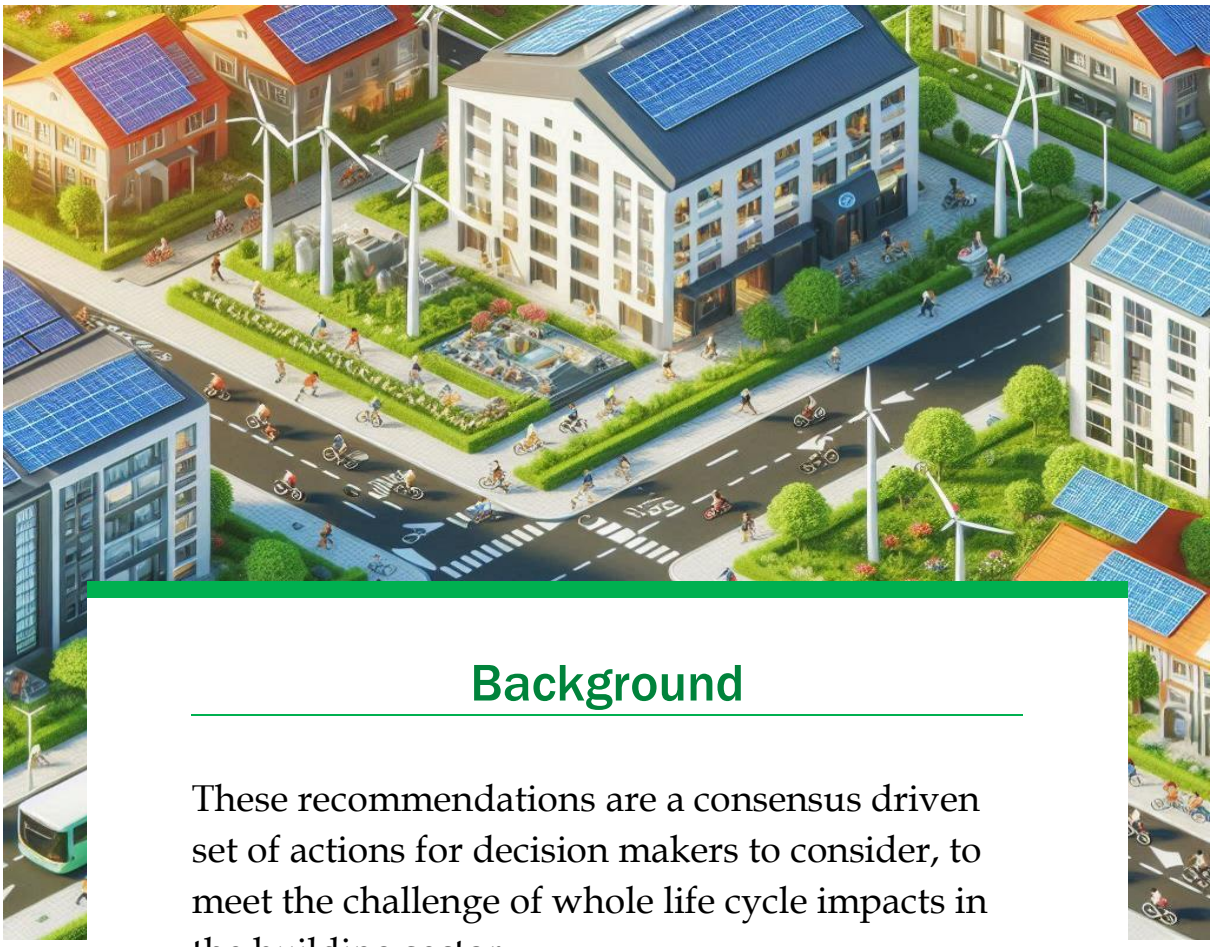
Buildings and construction stand at a pivotal moment in the fight against climate change. The "*10 Whole Life Cycle Recommendations for the Buildings Breakthrough*" offer a comprehensive, consensus-driven pathway to address the sector's pressing challenge: reducing emissions across the entire life cycle of buildings. These recommendations are the result of extensive collaboration, spearheaded by the members of the Materials Hub, hosted by the Global Alliance for Buildings and Construction (GlobalABC), in partnership with UNEP'S One Planet Network and UNEP Life Cycle Initiative, as well as its two parallel working groups: Whole Life Cycle Policy Coalition, led by Department of Energy Security and Net Zero (DESNZ) from the United Kingdom and the World Business Council for Sustainable Development (WBCSD), and Circular Built Environment, led by the Ministry of the Environment Finland and RMIT university.

Launched at the first-ever *Buildings and Climate Global Forum* in March 2024, the 10 recommendations are designed to promote Whole Life Cycle (WLC) and circularity related policy thinking on the global stage. They highlight the need for the Buildings Breakthrough target "*near-zero emission and resilient buildings are the new normal by 2030*" to address emissions at every phase of a building's existence.

While progress in decarbonization and energy efficiency investments have been significant, it has been outpaced by continued growth in construction. Notably, half of the buildings anticipated by 2050 have yet to be built, keeping the sector off track in achieving the 2050 decarbonisation targets. Since embodied emissions from construction materials are a largee and growing part of total emmissions, and broadening efforts beyond operational emissions to address the entire life-cycle of buildings is essential. Reducing emissions linked to material extraction, production, usage, disposal or reuse strengthens the well-being and resilience of our buildings and communities, and is also critical to achieving the goals of the *Declaration de Chaillot* and Paris Agreement.

At the core of these recommendations lies the ambition to bridge the gap between current practices and future needs. They underscore the importance of existing WLC initiatives and circular economy practices while identifying areas where additional tools and investments are needed. The recommendations take a bold step towards transforming the buildings and construction sector at both national and local levels, accelerating the Buildings Breakthrough commitments toward a fully decarbonized and resilient built environment.

Gulnara Roll - Head of Global Alliance for Buildings and Construction



Background

These recommendations are a consensus driven set of actions for decision makers to consider, to meet the challenge of whole life cycle impacts in the building sector.

They were built through extensive stakeholder engagement with over 100 academic, policy and industry professionals from over 42 countries.

The recommendations aim to promote Whole Life Cycle policy thinking on a global stage, and to raise awareness on the significance of addressing Whole Life Cycle impacts in implementing the Buildings Breakthrough objectives. This will help to progress towards the Paris Agreement goals through near-zero emissions and resilient buildings.

Summary

1. DEFINITION OF NEAR ZERO EMISSIONS AND RESILIENT BUILDINGS
Develop and adopt policies to deliver Near-Zero Emissions Buildings through the use of Life Cycle Assessments and ensure international alignment and harmonisation on the definitions of Near Zero Emissions and Resilient Buildings considering nuances of local context.

2. ALIGNMENT OF WHOLE LIFE CARBON STANDARDS
Develop and align universal principles and standards to enable more consistent, transparent, and comparable methodologies and frameworks to assess and report Whole Life Carbon and, in future, the broader sustainability performance of buildings.

3. ACCESSIBLE AND HIGH-QUALITY DATA
Support global initiatives to establish and share open source environmental and social data on resource use and buildings to enable accessible, full scope Life Cycle Sustainability Assessments and better inform associated decision making.

4. BENCHMARKS FOR BUILDING EMISSIONS
Develop voluntary benchmarks for whole life cycle environmental impacts of buildings, with a clear and binding pathway towards making them mandatory.

5. INTEROPERABLE PRODUCT STANDARDS
Require interoperability of standards for accounting environmental impacts of materials and products using consistent metrics across global and regional markets to ensure performance-based decisions on materials use.

6. COMMON LANGUAGE AND DIVERSE CONTEXTS
To identify and leverage opportunities for mutual actions to decarbonize buildings, join global networks and facilitate further exchange between international stakeholders to identify commonalities and acknowledge different needs within a diverse global context.

7. DRIVE INVESTMENT
Drive investment into near-zero buildings by developing and championing policies that increase the market demand for low carbon solutions and near-zero buildings, and leading by example with Whole Life Carbon requirements in public procurements.

8. PRIORITISE RETROFITTING
Value the extension of the life of the existing building stock and building retrofit to serve changing needs through data collection and monitoring, policies, guidelines, capacity building and economic incentives, as long as it maintains or improves efficiency and reduces life cycle emissions.

9. MATERIAL CIRCULARITY
Promote circularity and the use of sustainable circular building materials, components, and products and appliances when constructing, dismantling, renovating or refurbishing buildings, through data transparency and accessibility, policy tools and market instruments.

10. DESIGN FOR CIRCULARITY
Promote long service life of new buildings, through spatial planning and design requirements addressing building circularity, material efficiency and data transparency, to reduce resource use and whole life cycle emissions.

Recommendation 1: Definition of Near Zero Emissions and Resilient Buildings

Develop and adopt policies to deliver Near Zero Emissions Buildings through the use of Life Cycle Assessments, and ensure international alignment and harmonisation on the definitions of Near Zero Emissions and Resilient Buildings considering nuances of local context.

- **Harmonising the definitions for near-zero emissions and resilient buildings** can allow for comparison and accountability of actors when designed to work for new and existing assets. This should be internationally agreed to ensure alignment between countries with a reasonable balance struck between prescriptive standards and globally flexible standards. The alignment of nomenclature as well as the use of unified definitions and indicators should be adopted in policy with international stakeholders in mind to simplify standards and assessments. International alignment must be nuanced and undertaken with a view to being representative across nations and be flexible enough to account for regional disparities.

- **Accurate measurement of emissions** is required to achieve Near Zero Emissions Buildings. Policies should be adopted which require Life Cycle Assessments, with an initial focus on greenhouse gas emissions as the impact factor. Governments should also move towards giving additional consideration to other indicators such as biodiversity and circularity when decision making. Costs and skills will need to be taken into account as they represent a significant barrier to progress. High quality data and international benchmarks can remove barriers to producing lower cost, faster assessments, thereby growing international capacity.

- **Resilience to climate change** is a key requirement for a building stock that is fit for purpose in 2030. The changing requirements of buildings need to be considered when developing targets for near zero emission buildings to include resilience to extreme weather conditions and the ability to secure healthy indoor comfort levels in the face of rising external temperatures and heatwaves, without extreme energy use. Further adaptation to climate change should be considered when developing global principles for Near Zero Emission and Resilient Buildings through the Buildings Breakthrough.

Recommendation 2: Alignment Of Whole Life Carbon Standards

Develop and align universal principles and standards to enable more consistent, transparent, and comparable methodologies and frameworks to assess and report Whole Life Carbon and, in future, the broader sustainability performance of buildings.

- **Consistency in assessing Whole Life Carbon** is essential to obtain accurate data and reduce emissions to Paris-aligned targets. National methodologies and frameworks should be developed based on international collaboration to ensure comparable outcomes. Both private and public whole life cycle initiatives are rising, creating emerging expertise but also potential for effort duplication, confusion, and at times a lack of clarity in what is being assessed. However, this growing expertise presents a valuable opportunity for accelerating whole life carbon policy if it can be coordinated and given direction towards shared principles and common standards.

- **Shared principles and international standards** are required to address increasing concern on environmental and social impacts of human activities. Additionally, the nature and equity emergency need to be addressed in line with the climate emergency. Similarly to Whole Life Carbon, principles and standards should be developed to assess and report consistent, transparent and comparable Life Cycle Sustainability Assessments, under a universal alignment. Doing both in parallel enables governments to generate the synergies essential to tackling environmental and social impacts from a systemic view; avoiding the creation of silos which can prevent meaningful change.

- **Harmonisation of methodologies and tools** are important to allow for in-depth comparison and dialogue between countries, including a timeline and a staged approach for different countries. This can be done through international collaboration and developing open source tools with agreed methodology with in-built accessibility for less technical audiences. This should be accompanied by capacity building and training for necessary stakeholders. Life Cycle Assessments are a foundational tool in addressing building impacts and should be incorporated into government approaches accordingly. The high cost of some standards or tools needs to be addressed and the costs and benefits of these clearly outlined for the public.

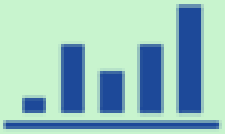
Recommendation 3: Accessible And High-Quality Data

Support global initiatives to establish and share open source environmental and social data on resource use and buildings to enable accessible, full scope Life Cycle Sustainability Assessments and better inform associated decision making.

- **High quality data** is essential to enabling robust and transparent decision-making in the face of increasing risk and uncertainties. Leaders of public and private institutions should recognize the value of publicly available, disaggregated data. Governments should provide support to develop local databases to improve the environmental performance of local industries as well as push to align local, national and international standards and databases wherever feasible. Accordingly, policymakers should incentivise the tracking and reporting of high-quality data through schemes, such as tax credits and climate change agreements. Expanding the tracking of data further along the supply chain could require incentives such as grants or penalties or cost uplifts. Governments and industry would both benefit from improved access to high-quality data which can inform science-based decision making for reducing resources use and whole life cycle sustainability performance of buildings and building stocks.

- **The development of consistent data standards** such as FAIR (Findable, Accessible, Interoperable, Reusable) data is essential to understand real environmental and social impacts across the whole life cycle of buildings and set realistic targets. Policy makers and institutions should actively support the establishment and operation of platforms where data is collected and shared publicly following FAIR data principles. Governments should work to agree on these standards and integrate them into general practice where possible. Governments and industry would need to work towards removing barriers to data sharing to make common standard setting easier.

- **Open-source life cycle data initiatives** can enable streamlined collaboration between policy, research and industry stakeholders, increase innovation and reduce the resource demand associated with their development and maintenance. By facilitating increased data collaboration between stakeholders through open licensing and joint management of decentralised data, policy makers can increase data security and improve accessibility. Governments can further remove barriers for accessing and using data relevant to the assessment of resource use and environmental impacts of construction products and buildings, by providing incentives to share the data publicly without affecting commercial interests. In some cases, the necessary data on construction products and buildings is already collected by government agencies and industry bodies but not retained or made available; the benefits of making that data available represent a significant potential return for minimal investment.



Recommendation 4: Benchmarks For Building Emissions

Develop voluntary benchmarks for whole life cycle environmental impacts of buildings, with a clear and binding pathway towards making them mandatory.

- **Developing context-based voluntary benchmarks** is important to ensure a clear pathway for target development that considers the impact of regional conditions. By developing accessible voluntary benchmarks with defined escalating targets to meet over time, governments can establish a clear pathway to near-zero in the building sector. Benchmarks should be based on current market practice and projected future needs to provide a clear direction of travel. These should be accompanied by the open-source tools, capacity building and training required for stakeholders to understand and meet the benchmarks. By enhancing awareness and providing support, governments can enhance the capability of industry to meet targets. Concurrently, political will should be harnessed to move towards making these targets mandatory overtime. Conflation of existing standards could present a barrier to the development of new standards, causing potential confusion, if they are not considered in the design of benchmarks.

- **Collaboration between countries** is important when developing and delivering benchmarks in order to establish a country and regional specific timeline and staged approach. This staged approach can take into consideration the different levers that are effective in different countries based on their context. This can be supported through promotion of government/industry alliances to enhance local understanding and collaboration. Aligning these internationally, presents an opportunity to remove significant barriers to new policy and international collaboration taking into account trade-offs in place-based approaches.

- **Representative and reliable data** will be essential to appropriate target setting when deploying benchmarks and producing a representative set of life cycle assesments's on buildings conducted in each country/region and across varying local context. Develop country specific life databases that include primary data from the construction industry of that country, as it would highlight the environmental performance improvement efforts in different industries in the respective country. Through monitoring and evaluating the real-life performance of the buildings to ensure that they meet the benchmarks. There are potential increases to the cost of data collection, especially where more targets are needed. Highly fragmented value chain of buildings and construction are a barrier to consistent standard setting.

Recommendation 5: Interoperable Product Standards

Require interoperability of standards for accounting environmental impacts of materials and products using consistent metrics across global and regional markets to ensure performance-based decisions on materials use.

- **Material neutrality and comparability** is important, so that life cycle assessments can be used to make the optimal material choice to reduce overall emissions. Governments should support initiatives through funding that drives interoperability of emissions accounting standards for different materials, particularly steel, cement, aluminium, insulation, glass and timber. For traditional and local materials where there are no existing standards, governments should aim to develop high-level guidance on emissions assessments.

- **Products containing reused or recycled materials** will become increasingly common in a circular economy. Policymakers should ensure circularity is considered in national standards for product emissions and raise this with standard developers. Keeping track of the carbon footprint of waste or re-used products can be achieved by prioritising open and transparent standards.

- **Certification** of low carbon materials is essential to ensure methodological consistency in carbon accounting. Demand for verified standards should be prioritised through procurement guidelines, legislation or incentives. Where possible alignment should be sought on global material and product verification / certification. Certification may vary depending on the local setting, and common principles should be followed such as using a third party and providing minimum information.

Recommendation 6: Common Language And Diverse Contexts

To identify and leverage opportunities for mutual actions to decarbonize buildings, join global networks and facilitate further exchange between international stakeholders to identify commonalities and acknowledge different needs within a diverse global context.

- **Common Understanding**, information sharing and alignment on definitions for "Green", "lean" or "near-zero" used in different countries is essential to making near-zero buildings the new normal for 2030. Governments should support initiatives that develop a common lexicon for near-zero buildings suitable for different regional contexts and construction practices. They should also incentivise developing and emerging economies to participate by providing funding to travel, ensuring equal opportunity for engagement and learning. Platforms such as the Buildings Breakthrough could be used to disseminate this common lexicon. Though the international engagement required to achieve this will be significant and require some compromise, it should act to streamline future collaboration and joint initiatives.

- **Developing understanding** of the variety in international construction practices, including both traditional and cutting-edge high-tech approaches, is key to facilitating international cooperation and cross compatibility of practices. By supporting investment in research to develop case studies, governments can better understand the Whole Life Carbon of different typologies of buildings, identify low carbon construction practices and materials in each country or region, and contribute these to a global database. This improved visibility of regional differences can accelerate the uptake of best practice in government and industry. Better understanding could allow for increased parity in standards reducing barriers to technology exchange and trade.

Recommendation 7: Drive Investment

Drive investment into near-zero buildings by developing and championing policies that increase the market demand for low carbon solutions and near zero buildings, and by leading by example with whole life carbon requirements in public procurements.

- **Promoting international collaboration** for financing of near zero buildings is a powerful tool in driving greater investment. This can be done by adopting a common taxonomy which recognises the long-term economic benefits gained from near-zero buildings and developing public-private partnerships to invest in near-zero buildings and evaluate their success. Governments have an opportunity to lead by example by requiring new standards and assessments on public projects; this can also act as an effective testing ground for further improvement of developing practices.

- **Evaluation tools** to evaluate the long-term cost and environmental impact of public procurement are essential to furthering investment. By introducing green procurement frameworks which require whole life carbon assessments of new buildings and retrofits, governments can increase the availability of data. These tools need to be designed to incentivise demand for low carbon solutions while prioritising performance.

- **Evaluating informal construction** is a key barrier that needs to be overcome in order to better understand the environmental impacts of the building sector. It is currently more difficult to evaluate the environmental impact of informal construction and this needs to be addressed in policy and regulation. By developing strong ties between local and national governments actors can increase their capacity to understand the extent, typology and impact of local construction, and develop policies to reduce their environmental footprint. Governments should initially prioritise quick win opportunities which will differ based on the local context.

Recommendation 8: Prioritise Retrofitting

Value the extension of the life of the existing building stock and building retrofit to serve changing needs through data collection and monitoring, policies, guidelines, capacity building and economic incentives, as long as it maintains or improves efficiency and reduces life cycle emissions.

- **Develop policy and guidelines** to allow flexible use of existing spaces for different purposes. Through planning instruments, regulation and guidelines designed to support data transparency, the mapping of vacant spaces in the building stock and the identification of opportunities for alternate use of existing building stock, governments can build capacity to extend the life of buildings and improve operational flexibility. Policies and capacity building can support incremental construction including temporary use of buildings, renovation, refurbishment, flexible conversions, infill, and extensions of existing buildings, extending building uses while maintaining or adding value.

- **Strengthened data** is key to supporting technical solutions and easing the complexity of retrofitting. Government should develop ways to measure vacancy rates to maximise occupancy and have clear pathways to move towards requiring deconstruction audits and life-cycle assessments of buildings to better understand a building's capacity to reuse construction materials, products, components, and appliances. This data can enable existing buildings to be accurately valued.

- **Economic incentives** can support refurbishment over new construction where it maintains or improves efficiency and performance of buildings. Through the design and implementation of economic incentives for sensible retrofitting over building new, governments can create a clear business case for industry to re-utilise existing stock. Properly deployed economic incentives can strengthen the case for maximising occupancy and retrofitting to help realise the potential value of the existing building stock.

Recommendation 9: Material Circularity

Promote circularity and the use of sustainable circular building materials, components, products and appliances when constructing, dismantling, renovating or refurbishing buildings, through data transparency and accessibility, policy tools and market instruments.

- **Data transparency and accessibility** for key building materials, components, products, and appliances can empower decision makers across the value chain to better assess the potential benefits and impacts of choices. This can be done through the use of pre-demolition audits, material passports, certification, standards, and regulation supporting the environmental performance of new buildings and future reuse of deconstructed buildings. Easy access to data can enable performance-based decision making and empower the reuse of building materials, products, components, and appliances over multiple lives.

- **Standards, regulations, and policies** can enable the pathways necessary for the utilisation of circular and sustainable materials. This includes addressing certification requirements of materials, empowering sustainable manufacturers through low carbon regulation and industrial symbiosis on production and developing standards and frameworks for promoting sustainable procurement and safe and non-toxic material re-use. These measures can address source emissions through supply side measures and resource efficiency, thereby extending producer responsibility to promote closed loops and recovery of raw materials. However, international engagement is needed to align standards and ensure the fundamental pathways for the buildings and construction sector are streamlined.

- **Developing market instruments** can support market readiness and establishment of secondary markets to promote reused building materials, products, components, and appliances. Government can lead by example to support the development of market instruments for the creation of secondary markets to balance supply and demand. Finance, fiscal incentives and capacity building can support the development of secondary markets.

Recommendation 10: Design For Circularity

Promote long service life of new buildings, through spatial planning and design requirements addressing building circularity, material efficiency and data transparency, to reduce resource use and whole life cycle emissions.

- **Design and planning** can promote long service life of new buildings and construction. Flexibility for multiple uses, lightweight design, easy retrofitting, optimised use of space and designing for disassembly can deliver material efficiency and circular buildings. Whilst designing in such a way buildings must also consider emissions performance as a priority. Capacity building, transparency of data, policy, tools, and incentives should be used to retain embodied carbon in new buildings.

- **Data underpinning monitoring and evaluation** can inform changing design and operational needs, and improve material use efficiency. Life cycle sssessments at the outset of planning and design for new buildings combined with material passports support decisions for future reuse of materials, products, components, and appliances. The current lack of data complicates the reuse of materials and prevents informed decision making.

Case Studies

Below are a selection of case studies slected from amongst over 40 submissions which represent instances where the priciples of the 10 WLC Recommendations for the Buildings Breakthrough are undertaken in practise. These showcase the practical application and real terms imapct of the 10 WLC Recommendations for the Buildings Breakthrough when correctly deployed. We hope that these show the value of the recomendations and inform similar action.

Implementing Roadmaps for Senegal, India, Bangladesh and India

Data Automation for U.S. Wood Products

Streamlining Decarbonization: Sidac as an Accessible LCA Solution for Buildings

KA13 (Kristian Augusts gate 13)

Booster du Réemploi

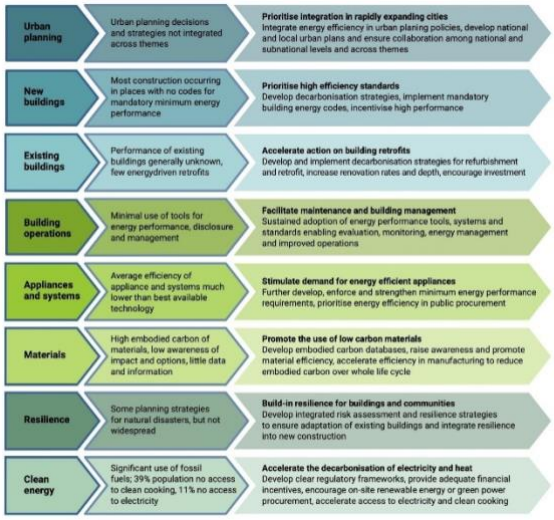
Little Finlandia

These case studies are a small sample of our larger collection which can be found on our case studies website:

Efforts have been made to verify these case studies, however we cannot guarantee authenticity or be held responsible for incorrect or mischaracterised information.

Implementing Roadmaps for Senegal, India, Bangladesh and India

WLC Recommendation 1



Summary: The built environment is responsible for the vast majority of greenhouse gas emissions worldwide, estimated at 79% of total emissions (UNOPS 2022). The Transforming the Built Environment through Sustainable Materials Project responds to the urgent need to decarbonize the buildings and construction sector by 2050. The project seeks to support countries in developing roadmaps for lowering building emissions across the construction value chain and is now being implemented in Ghana, Senegal, India and Bangladesh and moving to other countries.

Type of project: Strategy, Roadmap

Website: https://globalabc.org/climate-action-roadmaps-buildings-and-construction

Approach for Rec 1: Resilience to climate change

Implementer/ type of organisation/country: Ministry of Works and Housing, Ghana and United Nations

Project stage: Ongoing (has several actions with different timelines)

Environmental and socio-economic impacts: The project will bring in broad positive environmental impacts once the roadmap is implemented.

How is the project pushing learning and understanding of Whole Life Cycle in the built environment? The roadmaps consider a wide range of elements relevant to the impacts of buildings on the environment. As the roadmaps are being implemented in different countries, they are disseminating the concept of Whole Life Cycle impacts to various different contexts.

How does the project implement rec 9: These roadmaps exist for each continent and develop a definition of Near Zero Emission and Resilient buildings considering the difference for new builds and existing buildings, proposes concepts to measure resilience, operational emissions from energy and appliance use, and emissions from construction and materials. They can be instrumental in understanding the nuances for local contexts.

Written by: Joshua Mativi, UNEP, Melanie Jans-Singh, DESNZ.

Data Automation for U.S. Wood Products

WLC Recommendation 3

Awaiting access for photo

Summary: The American Wood Council (AWC) has developed an online data collection platform, the AWC Life Cycle Survey, that acts as a central data hub for the entire U.S. wood products industry's life cycle impacts data. The platform collects manufacturing data which can be used in ISO-21930-compliant Life Cycle Assessments and Environmental Product Declarations. The platform produces automated queries to allow efficient, quicker data analysis. AWC has received funding from the US EPA to further develop the platform into an automated EPD generator and will begin that phase of the project in 2025.

Type of project: Other

Website: awc.org/sustainability/

Approach for Rec 3: Development of publicly available and disaggregated local databases.

Implementer/ type of organisation/country: American Wood Council, North America.

Project stage: Ongoing (has several actions with different timelines)

Environmental and socio-economic impacts: Wood products are inherently low in embodied carbon compared to other structural building materials, and their use incentivizes healthy forest management practices and forests not being converted to other uses.

How is the project pushing learning and understanding of Whole Life Carbon in the built environment? Since the start of the project in 2023, AWC has collected ata from over 200 manufacturers, and developed 3 regional EPDs. This will lead to increased data representativeness for wood products

How does the project implement rec 3: The Life Cycle Survey and EPD Generator projects are directly related to REC 3, Accessible and High-Quality Data. AWC recognizes quality data and robust metrics as imperative in the effort to decarbonize the built environment. By improving data collection and automating the analysis of said data, AWC is working to provide publicly available, verified reports at scale.

Written by: Anna Ostrander, AWC; contributor: Melanie Jans-Singh DESNZ

Streamlining Decarbonization: Sidac as an Accessible LCA Solution for Buildings

WLC Recommendation 5

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Summary: Sidac, the Information System for Environmental Performance in Construction, is Brazil's innovative LCA system for construction, offering a user-friendly digital platform that integrates an LCI database, inventory tools, EPD auditing, and a comprehensive digital EPD database. Initially focused on carbon and energy footprints, it requires primary data for direct emissions but remains affordable for SME enterprises. Sidac enables the online publication of verified simplified EPDs, providing accessible LCA data and tools to help reduce CO2 emissions and energy use Brazil's social housing program. The system is now prepared to accept data from manufacturers and issue verified streamlined Environmental Product Declarations (known as dDAP). **Type of project:** Database, tool, roadmap

Website: sidac.org.br

Approach for Rec 5: **Certification**

Implementer/ type of organisation/country: CDBS Brazilian Council for Sustainable Development, Brazil.

Project stage: Ongoing. To accelerate market adoption of Sidac, CBCS, the platform operator, is collaborating with industry associations to establish collaborative Low Carbon Journeys, where companies will learn by doing the entire process together. The first group participating in this initiative consists of 28 concrete block producers.

Environmental and socio-economic impacts: This project aims to reduce environmental impacts, addressing climate change, which disproportionately affects vulnerable and marginalized groups. However, the assessment needs expansion. Currently, issuing dDAPs only involves prerequisites related to fiscal and labor formality, issues still unresolved in the country, such as illegal mineral exploitation.

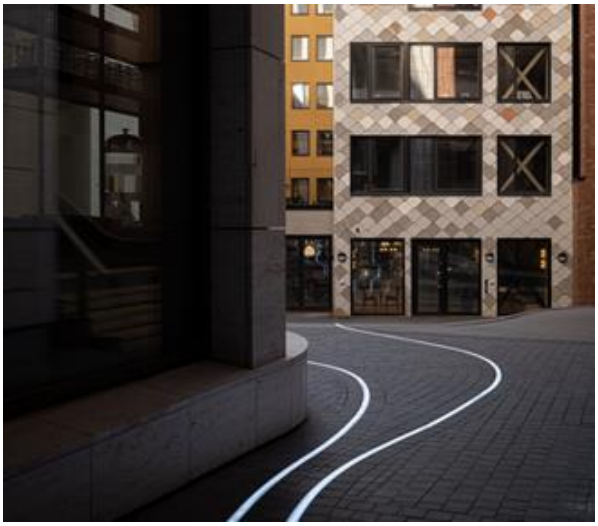
How is the project pushing learning and understanding of Whole Life Carbon in the built environment? Since the start of the project in 2023, AWC has collected ata from over 200 manufacturers, and developed 3 regional EPDs. This will lead to increased data representativeness for wood products

How does the project implement rec 5: The tool streamlines the life cycle approach to reduce the costs of producing life cycle data, making it more accessible. This project also supports Recommendation 3 (Accessible High Quality Data). It explicitly presents the uncertainty arising from the use of generic data.

Written by: Clarice Degani, CBCS; contributor: Melanie Jans-Singh, DESNZ

KA13 (Kristian Augusts gate 13)

WLC Recommendation 8



Summary: KA13 (Kristian Augusts gate 13) is a groundbreaking project with reuse as the overarching goal. A modest office building from the 1950's has been preserved instead of demolished and redeveloped with a new 8-storey extension using mostly reused building materials. The project is a first in Norway's modern history to extensively employ the reuse of building materials. It sparked a movement within the construction industry, bringing attention to the regulatory challenges of implementing a circular economy. As a result, the government has revised national regulations to facilitate reuse. The project significantly reduced its environmental footprint by achieving an 80 per cent reuse rate of building materials, cutting CO_2 emissions by 70% compared to traditional construction methods. The project also showcased the practicality of circular economy principles.

Type of project: Building project – Renovation of a commercial building

Website: https://mad.no/prosjekter/kristian-august-gate-13

Architect: Mad arkitekter

Developer: Entra

Circular economy related project type: Use of reused or recycled content in new products and buildings

Approach for Rec 8: Stregthened data → deconstruction audits or Life cycle assessment

Project stage: Completed (2017-2021)

Environmental and socio-economic impacts: The project reduces environmental impacts by minimizing waste, conserving materials, and cutting CO_2 emissions, while promoting a circular economy. Socio-economically, it creates jobs, supports local businesses, and fosters new startups in circularity, serving as a model for future sustainable development.

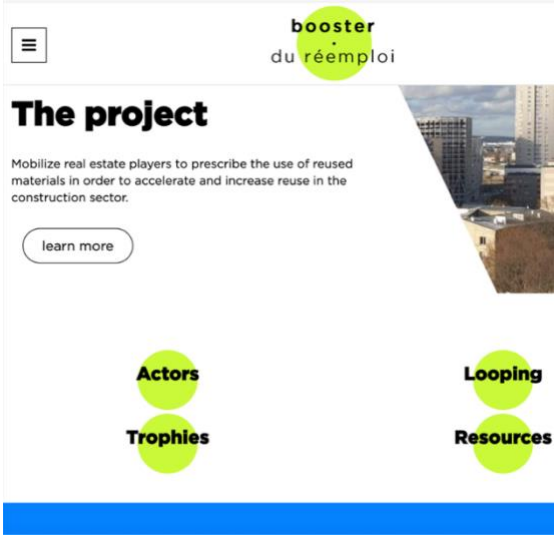
How is the project pushing learning and understanding of circularity in the built environment? The KA13 pilot project promotes learning and understanding of circularity in the built environment by serving as a practical demonstration of reuse. It integrates innovative reuse strategies and materials, offering real-world examples for industry professionals and stakeholders. All experiences and the process have been documented in a report that is publicly available.

How does the project implement Recommendation 8: A predominance of materials used in KA13 came from donor-buildings within a short distance. The project reused concrete slabs from old government facilities and steel structures from warehouses, with the windows coming from an incorrect order made for a different project. The railings are sourced from an old swimming hall and the facade cladding consists of panels from various projects around Oslo. Old radiators, doors, wall coverings and even furniture was saved from the original building and carefully restored.

Written by: Noora Khezri, MAD Arkitekter; contributor: Emma Lappalainen, Finngroup Consultants

Booster du Réemploi

WLC Recommendation 9



Summary: The Booster du Réemploi (Re-use Booster) is a mass collective action to implement reused materials in building projects. It supports public and private contracting authorities in prescribing reuse, and also works with the various players in the value chain, from the production/ reconditioning of materials (manufacturers, channels) to their implementation on worksites (companies and subcontractors). Lastly, it contributes to the improvement of these systems through its exchanges with public players. More than 50 partners are involved in the project such as insurance companies, engineering offices, reuse platforms. Each company commits €25,000 per year for 3 years.

Type of project: Other

Website: https://boosterdureemploi.immo/

Circular economy related project type: Design for disassembly, reuse and easy to recycle

Approach for Rec 9: Standards, regulations, and policies → Sustainable procurement

Implementer/ type of organisation/country: A4MT, business/company, France

Project stage: Ongoing (has several actions with different timelines)

Environmental and socio-economic impacts: 115,000 tonnes of CO2 eq. saved in 3 years, equivalent to the impact of a new 150,000m2 building.

How is the project pushing learning and understanding of circularity in the built environment?
The mass collective action supports public and private contracting authorities in prescribing reuse, and also works with the various players in the value chain, from the production/ reconditioning of materials (manufacturers, channels) to their implementation on worksites (companies and subcontractors).

How does the project implement rec 9: The Booster du Réemploi helps project owners to implement materials reuse in their projects.

Written by: Elise Dupire, A4MT, Contributor: Emma Lappalainen, Finngroup Consultants

Little Finlandia

WLC Recommendation 10: Design for Circularity

Summary: Little Finlandia is a temporary wooden event center that replaces Finlandia Hall during its refurbishment. The temporary building is designed and built with modules and it will be disassembled, transported to a new site and built again when the refurbishment is ready. The design uses whole trees - local pines with intact branches - as part of the load-bearing structure. The project shows that minimally unprocessed natural trees can be used as structural pillars and that a building designed and built for disassembly can also meet high aesthetic standards.

Type of project: Building project, commercial building

Website: https://www.jaakkotorvinen.com/portfolio/pikkufinlandia

Architect: Architects Jaakko Torvinen, Havu Järvelä and Elli Wendelin in collaboration with Pekka Heikkinen and Architects NRT

Location and area: Helsinki, Finland, 2 675 m2 (floor area)

Circular economy related project type: Design for disassembly, reuse and easy to recycle

Approach for Rec 10: Design and planning → To support incremental construction

Implementer/type of organisation/country: City of Helsinki, local government, Finland

Project stage: Completed in 2022

Environmental and socio-economic impacts: The main building material is wood, which is a renewable carbon sequestering and storing material. The building uses low-value top logs as part of a long-life building product. The building creates a human-scale space for passers-by, has a café and gallery open to all, and will later be converted into a school in another location. The building was designed by architecture students early in their careers.

How is the project pushing learning and understanding of circularity in the built environment: The project highlights how temporary buildings can also be realized to a high aesthetic and structural standard. It promotes wood construction and shows that wood can be used also with minimal processing. The project provides new learnings for design for disassembly and for transportable buildings.

How does the project implement rec 10: The building is designed to be disassembled and rebuilt in the next location, where it can be converted for another purpose. The joints are designed to be openable, and the geometry of the elements is simple, allowing for rearrangement. The building uses low-value wood components with minimal processing.

Written by: Jaakko Torvinen, architect; contributors: Emma Lappalainen, Finngroup Consultants and Matti Kuittinen, Aalto university

WLC Learning and Training Resources

To underline the importance of reducing embodied emissions and implementation of measures like the 10 WLC Recommendations for the Buildings Breakthrough outlined in this report, the C40 Cities Climate Leadership Group supplies a succinct international overview:

Why cities need to address the construction sector's hidden emissions

For more detailed reading and training materials on whole life carbon in the built environment, see the resources below. All resources are free and open source unless otherwise specified:

For Policy Makers

WLC Guidance

- A whole life carbon buildings playbook: A policy guide for cities – A WLC framework of actionable interventions and tools by the C40 Cities Climate Leadership Group.
- C40 Clean Construction Policy Explorer – An interactive dashboarding presenting existing examples of how cities are approaching Net Zero objectives from the C40 Cities Climate Leadership Group.
- Circular practices in buildings and construction to achieve the sustainable development goals – A Book exploring the role of the sustainable buildings and construction (SBC) program in addressing the challenges of climate change, pollution, and biodiversity loss.

Training Activity

- Embodied Carbon Curriculum –Training from the Royal institute of Australian Architects
- LCA e-learning – Courses addressing business and government perspectives from UNEP's Life Cycle Initiative Team.
- Clean Construction E-Learning – Courses aiming to raise awareness on construction's climate impact from the C40 Cities Climate Leadership Group.

For Clients and Construction Professionals

WLC Guidance

- Whole Life Carbon Client Guide – A guide to consider the importance of WLC for clients, by the Royal Institute of Chartered Surveyors (RICS).
- Achieving a decarbonized and climate-resilient built environment – A report on why and how cities tackle both climate and emission impacts from buildings, by the C40 Cities Climate Leadership Group.

Training Activity

- Circular economy in the built environment – Two-day intensive course offered by RMIT University, contact the university directly for access.
- Information System for Environmental Performance in Construction (Sidac) – Calculation tool quantifying the environmental impact of construction products.

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