High Performance Buildings
High Level Strategy Group

November 2021

I. New Urgency for Key Imperatives

The United Nations High Performance Building Initiative (HPBI) has become even more urgent given recent events:

- The Intergovernmental Panel on Climate Change reported not only that the climate is changing, but that the impacts are widespread and are intensifying rapidly well beyond expectations. The impending environmental catastrophe will impact all life on earth if left unchecked.
- The World Meteorological Organization warned that atmospheric concentrations of CO2 were at levels that have not been experienced in 3-5 million years.
- A study by German researchers indicated that the ocean current system that circulates warm water to northern Europe and colder water south has suffered an almost complete loss of stability. A breakdown of the system would transform the climate of the northern hemisphere.
- Research has shown a steady movement north of the jet stream with a risk it will migrate beyond its historic limits by 2060, with dramatic consequences for northeast US and Western Europe.
- Assessments have concluded that climate change is driving alarming losses in global biodiversity and rendering the planet much worse off than is generally understood. Humanity faces "a grim and 'ghastly future' unless extraordinary action is taken soon."
- News of climate-driven wildfires and drought in the US, drying rivers and reservoirs, historic storms and floods in Europe and China, and the worst hurricanes since 1850 all reinforced these messages – human-kind is driving an accelerating extinction-level event.
- The COVID pandemic also has brought new urgency to the HPBI. The pandemic has put in stark relief the dangers of poverty for equitable outcomes and social cohesion and highlighted the potential benefit of truly collaborative approaches among nations and communities.

Improving the performance of buildings and the built environment is essential for attaining the goals of the 2030 Agenda for Sustainable Development. Stated broadly, the 2030 Agenda outlines the world's *quality of life* aspirations. The 2030 Agenda goes well beyond decarbonization, but the climate crisis is existential and immediate as the world has moved beyond key tipping points. Buildings and the built environment are a critical but under-exploited opportunity to deliver on sustainability and development in an integrated way. Failure to exploit that nexus will lock in a built environment that both intensifies the climate crisis and undermines efforts for a globally shared and basic quality of life.

Mitigation of carbon to reduce the perils of climate change, adaptation to climate change, and priorities newly highlighted by the COVID-19 pandemic all demand an immediate focus on the built environment.

There is consensus that achieving high energy performance in the built environment will require a holistic approach as the basis of a protocol for action. A protocol will need to demonstrate that "high performance" can address the dynamics of the relationship between buildings and poverty, hunger, health, education, gender equity, water and sanitation, energy and energy access, decent work and economic growth, industry, innovation, resilience, safety, infrastructure, oceans, ecosystems and justice. The protocol will need to reflect a spectrum of strategic priorities and their application in countries facing a range of socio-economic realities. The question of how each variable may shift as the various SDG-related goals are calibrated against one another will require attention.

The issues involved in a truly holistic approach to buildings in the built environment are complex and need to be explored fully to arrive at a well-designed building protocol. The nature of such a comprehensive project to develop a protocol and enable strategic actions is in tension with the urgency of the climate crisis and the imperative to curtail emissions of greenhouse gases to a "sustainable carbon budget". The built environment must play its role starting immediately. Embodied carbon along with operational carbon resulting from the energy used in the built environment represents 40% of the carbon challenge and must be 40% of the solution. These investments represent a great opportunity as well to address inequities and improve quality of life at least cost.

II. High-Level Strategy Group

UNECE has assembled a High-Level Strategy Group (HLSG) to undertake a specific set of tasks. The members of the HLSG are recognized thought leaders in the field of buildings and the built environment. Through their activities they can support messaging coming from the HPBI through press releases, blogs, on-line interviews, and key articles and reports. The objective of the communications strategy is to raise the importance of the built environment for addressing climate change and the 2030 Agenda in the consciousness of the public, of industry, of city and community officials, and of governments.

The current membership of the HLSG is focused on high performance buildings, notably the performance of building development, design, engineering and operations. However, there is a need to embrace thought leaders from the other dimensions of the built environment, notably mobility, energy supply, information and communications technology, water management, and other building services (*e.g.*, food and waste). A near-term objective for the HLSG will be to recruit a fully representative thought leadership group.

The ultimate goal for the HLSG will be to achieve sufficient consensus among HPBI partners to provide a coherent, consensus-based protocol with strategic actions tailored to countries' needs. The HLSG will be asked to provide immediate strategic counsel to policy makers, industries, and international institutions.

1. Develop a protocol and an action plan for the built environment to address the full spectrum of outcomes that must be realized.
2. Lay out an action plan to accompany development of the protocol to address urgent, near-term goals, since endorsement of a protocol through a political process will take time.
3. Identify baselines and objectives, offer quantification and integrating solutions, and propose prioritized recommendations to deliver the required outcomes.
4. Identify effective approaches to dissemination and deployment for each of the required outcomes.
5. Prioritize the value of investment in the built environment to secure social justice, equity, and resilience.

6. Explore how the multitude of built environment options converge on a holistic and global concept of a sustainable built environment while delivering quality of life at the local, "grassroots" level.
7. Advocate for the *criticality* of the built environment for climate change mitigation and adaptation, and for progress across the sustainable development goals for global progress.

III. Enhancing SDG's with Proofs and Metrics for the Built Environment

The HLSG's mission is to develop and deploy an evidence-based building performance protocol. The concept note that launched the high-level strategy group is attached as Annex 1. A critical outcome of the work will be tangible metrics of performance.

Nine propositions have emerged thus far from the group to guide development of the protocol:

1. Invest in existing buildings and existing community infrastructure as a priority
2. Set rigorous, community-relevant standards for all new development.
3. Focus on reductions in energy demand and in both carbon emissions and embedded carbon.
4. Ensure energy access, reliability and affordability.
5. Ensure water management, access, reliability, and affordability.
6. Ensure waste management *and* a circular material economy.
7. Ensure access to fresh, non-polluted air.
8. Increase low or no-carbon energy supply to meet building energy requirements.
9. Improve social equity.

The HLSG is being asked to develop proposals on proofs and metrics of performance around these propositions, drawing on the expertise of its membership and outside experts, as needed. The organization of activities will depend on the availability of members and other experts to address specific topics. The HLSG will convene as needed to establish consensus on the various issues. A draft research outline on the nine propositions is attached below as Annex 2.

IV. Options and Strategies for More Immediate Impact

The first activities of the HLSG will focus on the outcomes expected of the built environment and establish globally applicable and quantifiable targets for those outcomes. The results of that work should be shared broadly with expert communities and with governments to solicit feedback and reactions, to raise awareness, and to prepare the way for development of and agreement on the protocol under development. The HLSG can assist countries as they develop and implement their plans to achieve their goals and commitments under the 2030 Agenda for Sustainable Development and the Paris Agreement on Climate Change.

As part of UNECE's broader High Performance Buildings Initiative, the HLSG will act in concert with the network of International Centres of Excellence (acting at local professional, regulatory, and political levels), the Global Building Network (addressing research and education gaps), and the work of the Industry Leadership Group (providing proofs of concept and case studies). The HLSG will provide guidance and advice to align all three areas of activity and communicate the results to policy makers, industry leaders, and other leading stakeholders (see Annex 3).

Depending on available resources, the HLSG may wish to develop specific funded projects to complement the activities of the membership and to provide further proofs of concept.

ANNEX 1

United Nations
High Performance Buildings Initiative
High Level Strategy Group

UNECE is pursuing its **High-Performance Buildings Initiative** that aims to transform buildings and the built environment to deliver quality of life worldwide. The transformation will break the historic link between development and growing carbon emissions as a critical step in delivering the goals of the 2030 Agenda.

The Initiative comprises three elements: supporting **transformational building science research and education**; deploying a "community of practice" globally through a network of implementation-focused **International Centers of Excellence**; and an industry leadership group to support **proofs of concept** in multiple jurisdictions on the transformations that are within reach.

The UNECE has assembled a **High Level Strategy Group (HLSG) of thought leaders** to provide strategic guidance to the overall Initiative and to explore, develop, and promote a protocol on the built environment to support the 2030 Agenda and the Paris Climate Agreement.

Exploration phase: the Group will examine key outcomes expected from proper management of the built environment:

Energy and climate action (affordable clean energy)
Resilience (affordability, weather - heat, cold, wind, natural disasters)
Health (comfort, indoor/ outdoor air pollution, disease)
Social justice, equity, employment
Water (deluge, drought, contamination, sanitation)
Resources (land use, materials, waste)
Mobility
Technology access (including digitalization)
Systemic effectiveness and technical efficiency

The first challenge will be to explore whether these outcomes reflect the full spectrum. Once there is consensus on the outcomes, the Group will explore targets for each, recognizing that each country will have its own starting point and its own perspectives on objectives and pathways. The outcome of this exploration will be an indicative set of objectives to which countries should be prepared to commit.

The **development phase** of the Group's work will focus on preparing a menu of concrete policies and actions that could assist countries in achieving their objectives and commitments.

Finally, the **promotion phase** would involve wide deployment and dissemination of the full slate of policies and actions using local, national, regional, and international platforms to accelerate the contribution of the built environment to quality of life globally.

The final outcome of this work will be an **internationally agreed protocol for high performance buildings** and the built environment that sets out outcomes, targets, policies, and actions to support governments' commitments and objectives.

Annex 2

Research Outline

Enhancing SDGs with additional proofs and metrics for the Built Environment

1. **Invest in existing buildings and existing community infrastructure as a priority**

% and total EUI reductions in existing residential and commercial building stock
(kwh/m2, per occupant served?)
% of time that buildings can 'environmentally surf' with no external energy for conditioning
(heating, cooling, ventilation, lighting).
% reduction in carbon intensity of energy requirements

[Ensure perfection is not the enemy of the good, but also not accept long-term sub-optimal performance; get building industries involved]

Assess Indicator 7.xx: Energy intensity measured in terms of primary energy and GDP
Assess Indicator 11.xx: Total expenditure (public and private) per capita spent on preservation and conservation

Additional contributions from UNECE 2018 document:

https://unece.org/DAM/energy/se/pdfs/eneff/publ/Mapping_of_EE_Standards_in_Buildings_09.08.2018/Info_doc_4_EE_standards_mapping.pdf

UNECE member States should ensure their building energy codes for all types of buildings are in line with high performance principles.

UNECE member States should specify national energy efficiency targets based either on primary or final energy consumption, on primary or final energy savings, or on energy intensity or energy productivity.

UNECE member States should prioritize research into the challenges of the energy performance gap in existing buildings and data collection on actual energy use.

2. **Set rigorous, community-relevant standards for all new development.**

% of new buildings meeting net zero goals?
% *and* total EUI reductions for Energy use in:

- Conditioning demand (envelope upgrades) 15 kwh/m2/year passive house standard and 25 kwh/m2/yr for retrofits
- Conditioning delivery (building system efficiencies) and operational goals
- Plug loads (minimum energy performance standards and tech innovations)
- Embodied carbon/energy in materials and purchases
- Water-Energy Nexus

Assess Indicator 7.xx: Investments in energy efficiency as a percentage of GDP for infrastructure and technology to sustainable development services
Assess Indicator 12.2.1: Material footprint, material footprint per capita, per GDP

Assess Indicator 11.xx: Average share of the built-up area of cities that is open space for public use

UNECE member States should **strengthen requirements for insulation, ventilation and technical installations:**

- Give more attention to air-tightness of the envelope;
- Ensure inclusion of the requirements for air conditioning, lighting, active solar, renewables and natural lighting;
- Make mandatory the requirement for the inspection of boilers and air-conditioning systems to improve the quality and precision of Energy Performance Certificates in multi-apartment buildings;
- Follow a holistic approach in building energy codes based on overall building performance, including requirements for technical systems such as HVAC and lighting.

3. Focus on reductions in energy demand and in both carbon emissions and embedded carbon

Carbon indicators for embedded carbon, on-site operational carbon, and net carbon intensity of energy supply.

4. **Ensure Energy Access, Reliability and Affordability**

- $/per-citizen-served in existing infrastructures (and # served) for energy, water, mobility, environmental quality, health
- % of citizens with quality of life without cars, access to jobs, food, education, services (Transit Oriented Development)
- % of citizens with access to recreational green space, adequate tree canopy and reduced paving.

- % of population with access to electricity
- % of population with continuous electricity
- % of population with affordable electricity (% of income spent, % subsidized)

Assess Indicator 7.xx: Proportion of population with access to electricity. [N.B. need to define "access", and electricity is not the only relevant energy vector].

5. Ensure Water Access, Reliability and Affordability (3 metrics)

- % of population with access to safely managed potable water
- % of population with access to reliable
- % of population with affordable water (% of income spent, % subsidized)
- Exposure to floods
- Exposure to drought

Assess Goal 6 Indicators:

6.xx Proportion of population using safely managed drinking water services
6.xx Proportion of bodies of water with good ambient water quality
6.xx Change in water-use efficiency over time
6.xx Freshwater withdrawal as a proportion of available freshwater resources

6. Ensure Waste Management and a Circular Material Economy

Assess Indicator 6.xx: Proportion of wastewater safely treated
6.xx Proportion of population using safely managed sanitation services

Assess Indicator 11.xx: Proportion of urban solid waste regularly collected and with adequate final discharge

7. Ensure Access to Fresh, Non Polluted Air (PM; ozone, methane, indoor air quality, other)

Assess Indicator 11.xx: Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities

8. Increase low or no-carbon energy supply to meet building energy requirements

- % of total energy demand met by renewables
- % of total energy demand met by net low or no-carbon energy supply
- $ invested in distributed renewables
- % community ownership of renewables for long term equity

Assess indicator: 7.3 Renewable energy share in the total final energy consumption. [Renewables as share of TFC only works for local generation; wrong indicator for renewables that use the grid]; [renewables are not the only solution to net carbon intensity of buildings' energy services]

9. Improve social equity

% and number of homeless

- % of homes owned vs leased for long term equity
- Elimination of redlining loan practices and % of equitable loans?

[are these the right or only indicators of social equity?]

Assess Indicator 11.xx. Proportion of urban population living in slums, informal settlements or inadequate housing

ANNEX 3
High Performance Buildings Initiative