

**ENERGY EFFICIENCY IN THE BUILT ENVIRONMENT**  
Session of the 25<sup>th</sup> Committee on Sustainable Energy

**Proposal to the Committee**

**A Holistic Building Standard Framework**  
Proposal for Global Transformation of Buildings in the Built Environment

Presented by

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## **A Holistic Building Standard Framework**

### **Proposal for Global Transformation of Buildings in the Built Environment**

#### **Background**

**In the Summer 2014 a group began to meet informally to talk about sustainable buildings and energy.**

The group was diverse – including individuals from science, policy, industry, finance, diplomacy, advocacy, and a few other segments of the stakeholder community. The diversity was our effort to move beyond the siloed character of our thinking, toward a more comprehensive perspective. The group has gained participants since 2014, now including individuals from more countries, regions and perspectives. It continues to grow and needs to grow. But even in its first days it was marked by a serious effort to bring together the array of talents and backgrounds that will be necessary to achieve sustainability in buildings and energy.

**The group began by asking the question whether, on our current trajectory of progress in building energy consumption, sustainability was likely to be achieved within a reasonable period.** Somewhat surprisingly, the consensus view was that it would not be – despite progress of which we were all proud. Compared to the world’s point of departure things were much better. Compared to the goal of genuine sustainability, none of us thought we were close or likely to get there any time soon.

**That consensus was a bit of a revelation. It obviously suggested the need for a fresh look at fundamentals and the sense of urgency in our work.** Several opportunities occurred to share our thinking with sustainable energy staff at the UNECE, and that led to an invitation to present something more formally to the Committee on Sustainable Energy. We welcomed that opportunity and set about to organize a presentation.

**A series of discussions followed, culminating in a roundtable workshop hosted by Richard Yancey, Executive Director of the Building Energy Exchange in New York,** and organized through a collaboration of the **North American Passive House Network and the Sustainable Systems Study Group established at the Penn State campus at the Philadelphia Navy Yard.** The roundtable explored the idea of presenting for consideration a new basic framework for the world’s building standards.

**Our intention was *not* to interfere in the work of the countries, provinces, cities and communities around the world that set their own formal standards or codes for buildings,** nor to offer a technical standard, a task for which there are very capable organizations at work today. Rather, we wanted to propose ***principles that would constitute a transformational framework*** for thinking about buildings and energy. We wanted to address the *fundamentals*, and do so in a manner that would assist the UNECE in its work to shed light on a new path – or better, *paths* – out of our present situation and toward genuinely sustainable buildings. That intention is the animating idea of the Proposal found in the pages that follow and by which we hope the Proposal will be judged.

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*I think we need a clear goal. That said, all pathways to the goal are not equal. So there should be principles. Comfort and health. Cost effectiveness. Resilience. You could pile more principles on but you would lose focus and impact. From this goal and supporting principles, you can build guidance, standards and tools.*

*Sean Pander, Green Building Manager  
City of Vancouver*

## **Proposal**

### **The Goal**

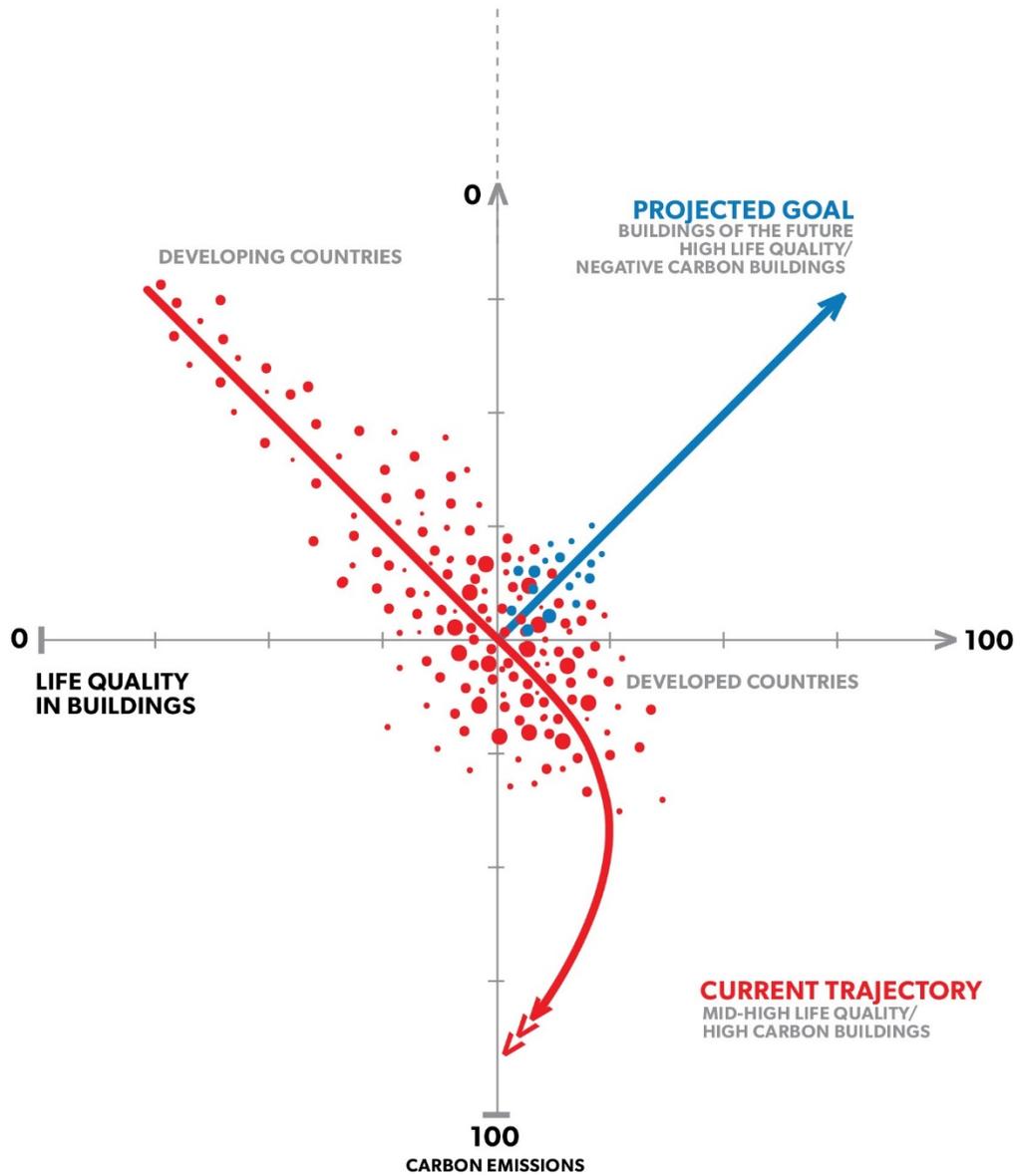
**The United Nations Sustainable Development Goals and the COP 21 Agreement on carbon emissions are inspiring and set the vision of a sustainable future. At the same time, they are an implicit warning: the world is heading into very serious challenges.** The Goals and the Agreement are efforts to turn a large ship heading in a deeply problematic direction. The quest for sustainability is built on recognition that we are at present living lives that are unsustainable. It is important to let the full weight of that recognition settle into the imagination. If anyone is looking for the proverbial “burning platform” to inspire action, we have it.

**Buildings are central to the challenge.** In the developed world, they consume over 70% of the electrical power generated. Global development means growing the number of buildings geometrically. The energy they consume today is predominately from carbon based fuels. Despite improvement in renewables technology and the like, the same will be true tomorrow – unless something can be done to bring the energy required to run buildings closer to what can be supplied by non-carbon energy affordably, securely and resiliently.

**The goal we propose is framed by such facts. The chart below is meant to be illustrative of the situation.** It is not data based, though we should assemble and analyze the data required to gain scientific certainty about the situation it is intended to illustrate. That situation can easily be summarized. Development depends on harnessing energy generated largely from carbon based fuels to improve the quality of life – for our purposes today, life *in buildings* within the built environment. As countries develop, their buildings move along a trajectory defined by increased energy consumption and carbon emissions to gain better life quality in buildings.

### CARBON EMISSION - LIFE QUALITY IN BUILDING INDEX DATA TO BE AGGREGATED AT CITY LEVEL

● REPRESENTS A LARGE COMMUNITY OR CITY



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**It is now evident that development thus understood cannot be sustainable.** The developed world has very good buildings compared to those from its past – though they are hardly perfect from a life quality standpoint. However, the impact of the carbon/energy equation that now supports them is already deteriorating the quality of life within buildings. That deterioration will get much worse. The specifics are overshadowed by the overarching fact that the buildings we have or plan to build are not designed for the world to which their energy needs are giving rise. And the consequences will be compounded as temperatures rise, coastlines recede, resilience challenges multiply, and costs escalate.

**After several generations of dramatic improvement, the quality of life within buildings is just now beginning decline in the developed world. The consequences for the developing world will be heartbreaking and worse.** No sooner will their buildings go up than they will be at risk of them being outstripped by the conditions under which they operate. Aspirations conceived and labored for over generations will begin to erode on the very threshold of achievement. It is not that they will not have buildings, but that they will have buildings that serve them and the world ever more badly, buildings that stand but *fail to perform* on critical criteria of health, comfort, safety, endurance, resilience, affordability, and so forth.

**As the SDGs and the COP 21 Agreement suggest, and as building science demonstrates, such a future is not necessary. It is within our capacity to create a world of high life quality, low energy buildings. To do so should be our defining goal.** The life quality can be *much better* than achieved almost anywhere to date. They can be cost effective. Their energy requirements can be *ultra-low, even negative*. Communities if not all buildings can be carbon neutral. Many buildings can be carbon-negative, acting as generators, supported by energy storage, and supplying the energy needs of higher energy demand buildings as well as other energy requirements of the community.

**Taking the steps required to meet the goal of high life quality/negative carbon buildings will transform buildings, and with them the entire development equation. Our experience is that cities will be central to doing so.** In the United States, we went from approximately 80 percent rural to 80% urban in a little more than 100 years. The developing world is moving at least as fast. Today the percentage of their population living in cities is up to 50; it will be 75 percent by 2050. The UN thinks the number of megacities with population over ten million will jump from 35 today to 41 by 2030. Cities are where the people are – and will be.

Ultimately, the goal is sustainable cities. The foundation on which those cities can be built is sustainable buildings. And the foundation of sustainable buildings is high life quality/carbon negative performance, assured over the life cycle of the building. We turn now to the principles on which such buildings can be conceived, delivered, managed, enjoyed, and retired.

# A Holistic Building Standard Framework

## Proposal for Global Transformation of Buildings in the Built Environment

### The Principles

**The collection of principles required for an era of truly sustainable buildings is vast.** It involves the accumulated and emerging products of building science, materials science, digital science, and more. It also includes the accumulated lessons learned and best practices of owners, designers, engineers, builders, managers, policy makers, and more. Contemplating the body of knowledge encompassed, we are impressed most by the scope and depth of the paradigm shift required for sustainability.

**Our effort here is to set down those principles we think most fundamental and the primary clusters into which they can be ordered.** These cannot be prescriptive. They cannot succeed if they tell others *what* to do. Nor does any one person or group *know* what to do in the vast diversity of circumstances and conditions experienced around the world. Rather, the principles need to be axioms for guidance, broadly suggestive of the criteria planners, builders, and the entire building delivery and management chain will find helpful as they innovate their way to sustainability.

**Indeed, *inspiring innovation* is the primary operational goal.** The world's diversity demands solutions adapted to time, place and circumstances. The global situation demands a new direction – toward a sustainable building/energy equation. Innovation – in on-the-ground creative design, adaptation, and management – is *the* link between those two demands. It is *the* fuel of sustainability.

The most elemental principles of the sustainable buildings of the future can be clustered under four headings:

#### I. **Strategic – Buildings must be:**

- Science-based: designed, constructed, and managed on demonstrable knowledge
- Consensus-based: sought by the populations they serve
- Community-based: integrated with their built environment life-cycle
- Market-based: cost effective and profitable to activate private investment
- Data-based: performance monitored and performance improvement feedback loops
- Performance-based: evaluated by genuine outcomes, not component prescription

#### II. **Design – The conception and delivery of buildings must be:**

- Holistic: comprehensively ordered for goals incorporating sustainability
- Systemic: building organization based on building systems and sub-systems
- Integrated: leveraging interior and exterior system and sub-system opportunities
- Collaborative: engaging all stakeholders in design process under “master builder”
- Economic: high performance buildings at equal or lower cost compared to 2016
- Sustainable: materials, equipment, construction, management and retirement practices

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#### **III. Management – Building must be maintained over their life-cycle:**

- Code driven: local adoption of advanced global-sustainable building standards
- Professionalization: training-based and with ethos of sustainability & social responsibility
- Work-force: trained in technology/skills for construction, design and maintenance
- Data-linked: advanced building information management capacity
- Oversight: ongoing performance evaluation and improvement
- City-scaled: information analysis, enforcement, and incentives at city level

#### **IV. Best Practices**

- Modeling: science based performance prediction and analysis
- Commissioning & Recommissioning: publicly disclosed building performance verification
- Benchmarking: comparative performance analysis
- Valuation: ensuring building energy performance is incorporated in asset value
- Financing: motivating capital to support a new building paradigm
- Life-cycle: long term analysis, improvement, and investment in building performance

#### **Next Steps**

**The Committee on Sustainable Energy is today confronted with a situation for which the word “crisis” would not be inappropriate.** It is weighted with vast responsibility. With the responsibility comes vast opportunity – which only the very optimistic would say will be easily harvested. You have your work cut out for you, and your Council of Experts will be an invaluable resource.

**The work is eminently doable.** Change of the depth and scale required is a profound challenge, but the capabilities to get to a new world of buildings and energy in in hand or within reach. The stakes are high, the risks substantial, but the gains for the entire world are inestimable.

#### **Our commitment to you is simple:**

- We will provide intellectual resources through a public private sector dialogue to advance your efforts to transform the world’s building marketplace;
- We will seek material resources on your behalf to develop and implement your plans;
- We will be engaged with you in programs to disseminate and educate building stakeholders worldwide; and
- We will sign on for the long haul.

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**The immediate road ahead is marked by a series of meetings between now and June 2017 to develop and ratify a building standard framework.** The UNECE process is moving forward parallel to other global initiatives on standards that envision the future of buildings in ways similar to those entertained here. We think these efforts can be mutually reinforcing. Educational options need to be developed so that action can be taken quick when you have selected the path and the vehicle. Information and analysis remain to be assembled. A global network of like-minded individuals and institutions can be activated, community organizations alerted, and the wide range of talent that will want to support your work brought onto the field.

**The Committee's leadership will be decisive and comes at a critical moment.** The United Nations Sustainable Development Goals and the COP 21 Agreement on carbon emissions have defined the ultimate goals. They are among four historic agreements reached in 2015, the two others providing a new Framework for Action on Disaster Risk Reduction and an Agenda for Action on Financing Development. Taken all together these agreements provide the outlines of a sustainably and equitably developing world, a vision long cultivated and long sought.

**That overarching vision is attainable but at risk. Meeting, addressing and reversing that risk will require all stakeholders to assume responsibility.** We will look to the public-private sector dialogue that the Committee has invited as the platform on which that responsibility can be most effectively executed.