2019 Report on the
UNECE High-Performance Buildings Initiative

Background

Buildings are central to meeting the sustainability challenge. In the developed world, buildings consume over 70% of the electric power generated and 40% of primary energy and are responsible for 40% of CO₂ emissions from the energy services they require. In Europe, 75-90% of today’s buildings will be in use in 2050. Developing countries will need to accommodate 2.4 billion new urban residents by 2050. Renewable energy technology alone cannot meet these requirements, despite recent improvements. The energy performance of buildings must be managed. The capability to meet the challenge exists today.

High performance buildings are key to achieving the 2030 Agenda. They help deliver on many of the Sustainable Development Goals in areas including:

- promoting sustainable urban development by recognizing buildings as complex systems embedded in community, city, and country-level energy networks
- tackling poverty by reducing energy bills
- accelerating the sustainable energy transition by improving the efficiency with which buildings’ energy services are provided, and
- supporting climate action by reducing the energy requirements of buildings to a point at which residual needs can be met by no or low-carbon energy sources.

UNECE launched the high performance buildings initiative to deploy its Framework Guidelines for Energy Efficiency Standards in Buildings and its Geneva UN Charter on Sustainable Housing with the aim of accelerating the transformation of the world’s building stock. The initiative focuses on capacity development and impact in the field, developing:

- the intellectual, material and financial resources to educate, advocate and advise for transformation to high performance buildings;
- the outreach required to create a worldwide urban shift to truly sustainable buildings.

The ultimate objective is to improve health and quality of life within the built environment while simultaneously decarbonizing building-related energy requirements. Architects, building contractors, and engineers are those who are perfecting building envelopes – getting the materials and design right and then ensuring perfect construction techniques. Systems professionals deliver heating, ventilation, and air conditioning as well as plug-in loads. Energy suppliers are essential if we are to ensure no- or low-carbon solutions meet the systems’ needs. Energy can be provided on-site through a distributed energy services model – imagine rooftop solar or on-site storage – or through some sort of network connection. A fourth community delivers on ICT – the information and communications technology that connects a building to its built environment.

Rather than address efficiency or quality on a component-by-component basis, the Framework Guidelines deal with a building as a complex system in its own right, one that is embedded into a community then into a city then into a regional or national network. ICT connects all the parts and

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allows for system-wide optimization that enables full participation by both consumers and intermittent energy resources. Until now, each of the four communities have been operating as stand-alone contributors. Getting them to act together enables an integrated approach, unlocking the potential of buildings to make the ambitious vision of the 2030 Agenda a reality.

**HPBI comprises three pillars aimed at radical reduction of the global carbon footprint of buildings and dramatic improvement in the health and quality of life provided by buildings.**

**Objectives and Targets**

The High-Performance Buildings Initiative aims to achieve the following objectives:

- **Moving the dial on building energy performance:** grow the number of localities with building codes aligned with UNECE Framework Guidelines; ensure most new buildings are certified compliant; reduce by 60% the average energy requirement per square meter in the new building “fleet” and by 10% for existing buildings.
- **Moving the dial on GHG emissions and indoor air quality:** reduce by 40% CO₂ emissions associated with meeting buildings’ energy service needs; increase by 10% the amount of carbon “stored” in buildings; improve indoor air quality and reduce pollution-linked health issues.
- **Improving the global supply chain for the construction business:** enhance “carbon storage” by increasing embedded carbon in buildings and building products and by reducing waste.
- **Extending the network:** recruit new centres of excellence and academic institutions to accelerate uptake of high-performance best practices.

**Criteria for International Centres of Excellence on High Performance Buildings**

The International Centres of Excellence on High Performance Buildings (ICE-HPB) is a collaborative network of organisations focused on supporting their local industry in the rapid development of next generation of buildings consistent with United Nations Framework guidelines for energy efficiency standards in buildings. Centres provide education, training, and other critical resources to regional building industry practitioners, while sharing these resources globally through collaboration with other network participants.
Mission
Advance the rapid transition to high performance buildings, locally and around the world, in support of the United Nations Sustainable Development Goals and Paris Climate Accord, while fostering a thriving building industry that creates healthy, comfortable, and sustainable buildings everywhere for everyone.

Criteria for ICE-HPB Designation
1. Committed to the objectives of the Framework Guidelines, including dissemination, training, and education
2. Committed to the objectives of and active engagement across the network of International Centres of Excellence and the Global Building Network
3. Established as a going concern/legal entity with strong relationships in the local buildings communities
4. Must have (local) political support and visibility
5. In compliance with norms and requirements regarding potential conflicts of interest
6. Demonstrated competency and capacity in the areas of high-performance buildings and training
7. Self-funded
8. Must have physical infrastructure (or access to it), including organizational infrastructure and a regional ecosystem that primes the centre for success, and demonstrated delivery mechanism
9. Committed to an agenda relevant to the local region based on an agreed menu of activities and projects

Terms of Reference for International Centres of Excellence on High Performance Buildings

Activities and Projects
The mission of an ICE-HPB designated by the UNECE is to connect real estate and design professionals to energy efficiency solutions through education, exhibitions, demonstrations, resources, and research. The ICE-HPB identifies opportunities, navigates barriers to adoption, brokers relationships, and showcases best practices and shares resources globally through the ICE-HPB network.

The ICE-HPBs help building developers, owners, operators, and designers save energy and reduce building-based carbon emissions through implementation and adoption of energy efficiency measures and best practices. Their activities directly support players in achieving their climate action agendas and deploy and disseminate the UNECE Framework Guidelines for Energy Efficiency Standards in Buildings.

The activities and projects of an ICE-HPB will include:
1. Convening dialogue amongst local and international industry leaders to identify challenges, share best practices and build a growing and diverse community of practice;
2. Gather and disseminate knowledge directly, and through partner organizations, including education and training, exhibits, case studies, research, demonstrations, and the production of industry focused print and on-line resources;
3. Catalyze design and construction industry tools and training development, and identify potential barriers to adoption and implementation; and
4. Foster public demand and support for best practices through recognition and awards, open houses and tours, public events, and demonstrations.
Activities of the International Centres of Excellence on High Performance Buildings

In 2017 UNECE adopted the Framework Guidelines for Energy Efficiency Standards in Buildings. On 10 July 2018, the Building Energy Exchange (BE-Ex) of New York City signed a Memorandum of Understanding with UNECE to become an International Centre of Excellence on High Performance Buildings, and on September 13, 2019, UNECE and Pittsburgh’s Green Building Alliance (GBA) signed a Memorandum of Understanding launching Pittsburgh’s International Centre of Excellence on High Performance Buildings. Additional centers are underway in Vancouver, British Columbia; Wexford, Ireland; Sophia, Bulgaria, and Brussels, Belgium. The network will expand as other communities join.

Results obtained

BE-EX

The Building Energy Exchange is a centre of excellence dedicated to reducing the effects of climate change by improving the built environment. BE-Ex accelerates the transition to healthy, comfortable, and energy efficient buildings by serving as a resource and trusted expert to the building industry.

In just the last year (October 2018-October 2019), BE-Ex has developed over 60 programs, events, and trainings, reaching over 3,000 people.

BE-Ex has enjoyed more than 20,000 visitors since our opening in 2015.

This year’s programs included over 20 deliveries of BE-Ex’s Passive House Primer - an engaging, one-hour seminar on Passive House fundamentals and their application in the NYC market. This training is offered free of charge both here at BE-Ex and at offices across New York City and the surrounding region.

Additionally, in the last 12 months, BE-Ex has produced over 20 educational resources (case studies, reports, and tech primers), including numerous programs and tools focused on NYC’s Climate Mobilization Act.

In 2020 BE-Ex will be launching a new exhibit, Anatomy of an Energy Efficient Building, which aims to demystify energy efficiency by making building energy systems and key efficiency solutions digestible and interesting.

Green Building Alliance (GBA)

GBA hosts Greater Pittsburgh’s International Center of Excellence on High Performance Buildings in an effort to advance rapid transition to high performance buildings locally and internationally, while fostering a thriving building industry that creates healthy, comfortable, and sustainable buildings for all.

GBA works with stakeholders including building owners and operators, K-12 educators and facility managers, academics and researchers, architects, engineers, contractors, community members, and government officials to create health and vibrant places. GBA fosters networks of professionals to advance sustainability in our region, including the International Living Future Collaborative, the Emerging Professionals, and the Women+ in Green network. GBA convenes the Pittsburgh 2030 District - the largest in the world with over 700 buildings committed to reducing their energy use, water use, and transportation emissions by 50% by the year 2030, while improving indoor air quality.
The International Center of Excellence is an extension of GBA’s existing programming, technical assistance, trainings, and outreach activities with an opportunity to scale these efforts to realize greater impact. Over the next few months, GBA will establish a Center of Excellence advisory board and convene a series of workshops with local partners and stakeholders to better align regional activities and initiatives.

1. **Education and Networking Event Highlights from June 2018 to June 2019:**
   - 99 educational and networking events for 3,400 professionals from a variety of backgrounds
   - Offer trainings in LEED, GPRO Operations and Maintenance,

2. **Certified Passive House Designer and Certified Passive House Tradesperson**
   - Provide Passive House Lunch and Learns for businesses and government agencies to increase the knowledge and demand for these trainings and practices

3. **Technical Assistance Highlights from June 2018 to June 2019:**
   - 1000+ hours of technical consultations on 165 regional projects, buildings, and future developments
   - 550 buildings benchmarked for 2030 District energy, water, and transportation goals
   - 40 K-12 Schools benchmarked to 2030 energy and water goals

4. **Green and Healthy Schools Academy Highlights from June 2018 to June 2019:**
   - 31 schools/districts actively participated in Green & Healthy School Academy activities
   - 10 mini-grant projects funded and implemented to advance sustainability in schools
   - 8 school projects linked to funding and financing
   - 5 school projects provided technical assistance
   - 78 Participants in School Sustainability Culture Program workshops
   - 108 educators participated in professional development
   - 225 youth engaged in learning and civic engagement opportunities
   - 4 educators participated in Drawdown Teacher Cohort, and 18 lessons and curriculum on Drawdown created

5. **Sustainable Communities Highlights from June 2018 to June 2019:**
   - 16 neighborhoods, communities, and municipalities engaged in discussions on sustainable communities
   - 12 developments, buildings, and places provided technical support through the Uptown EcoInnovation District
   - 9 communities empowered as eco-districts or other community framework
   - 2 comprehensive neighborhood plans underway that incorporate the UN Sustainable Development Goals in the process

6. **2030 District Highlights from 2018:**
   - 542 buildings with committed 85.1m sq ft for reporting
   - 23.5% energy reduction from the 2003 baseline
   - 18.6% water reduction from the 2013 baseline
   - 26% reduction in transportation emissions from the 2013 baseline
   - $38.5 million in dollars saved; over $115M saved since 2012
   - 225 District affiliate buildings with 7.1m square footage reporting
   - 20,310 Make My Trip Count survey participants
   - 300+ properties tracking Indoor Air Quality metrics through performance and best practices
   - 969 event attendees at 2030 Partner Meetings, Bridge to 2030, and Progress Report Reception
ZEBx (Vancouver, Canada)

The Zero Emissions Building Exchange (ZEBx) is a collaborative platform that strengthens the public, private and civic capacities for zero emission buildings in Vancouver and British Columbia. We are an industry hub that facilitates knowledge exchange and catalyzes action to accelerate market transformation.

Vancouver has one of the most progressive set of policies around zero emission buildings and industry is being challenged to respond quickly and innovatively. By 2025, the City of Vancouver will require most new buildings to be near zero emissions and all new buildings to be zero emissions by 2030. Under the BC Energy Step Code, all new buildings in BC will be built to net zero energy ready standards by 2032 or sooner. ZEBx is dedicated to supporting the industry through this transition, acting as a catalyst that builds capacity by convening and advancing solutions from leaders and early adopters that are building tomorrow’s buildings, today.

A total of 35 events were delivered in 2018-2019, reaching over 2,830 participants.

Demonstrations
- BC Housing: Build Smart - Key Considerations for High-Performance Walls Webinar
- CORE Energy Recovery Facility
- International Brussels Tour
- James Dean’s Open House (PHC partnership)

Workshops
- Heat Pumps for Domestic Hot Water
- High-Performance Curtain Wall

Conferences
- BuildEx
- Passive House Conference

Dialogues
- BE-Ex livestream: Carbon Neutral by 2020
- BE-Ex livestream: Passive House Towering in NYC
- High Density Passive House
- PHPP User’s Group/Passive House Technical Group x4 (PHC partnership)

Community
- Communities of Practice
- Community Lunch ‘n’ Learn
- High-Performance Developers Dinner
- Inclusion in Passive House x2 (PHC partnership)
- Industry Christmas Party
- Industry Cluster Pecha Kucha
- LFV Earth Day Celebration
- Passive House Intro for Kids
- Passive House Socials x10 (PHC partnership)
- ZEBx Launch
EDUCATION DELIVERED
Through our ZEBx led and partnered education, we delivered over 16,930 participant training hours, totalling over 620 education participants.

Passive House Canada Partnered
• Exam Prep - Passive House Designer/Consultant Exam x3
• Intro to Passive House High Performance Buildings x4
• Passive House Design and Construction x10
• Understanding and Working with PHPP x7

Industry Partnered
• HVAC in Large Passive House Buildings
• Passive House Building Certification

PROGRAMS DELIVERED
• C40’S Women4Climate Mentorship Program - https://www.c40.org
• NearZero - http://nearzero.ca
• ZEBx Case Studies - https://zebx.org/resources/#case-studies