PEEB
PROGRAMME FOR
ENERGY EFFICIENCY
IN BUILDINGS

WHAT IS AN ENERGY EFFICIENT BUILDING?

PEEB´s Criteria for Buildings

The building sector consumes about half of the electricity worldwide, representing an energy reduction potential of 60% for heating and cooling needs (IEA 2016). Using air conditioners and electric fans for cooling account for nearly 20% of the total electricity used in buildings worldwide today, and is projected to triple by 2050 under a Business as Usual (BAU) scenario (IEA 2018). Measures to reduce energy consumption can provide ample win-win opportunities. They contribute massively to the fight against global warming, while leading to a reduction in capital and operation costs and improved thermal comfort. Energy savings can be achieved through climate responsive and passive design features, appropriate and ambitious technologies and an optimized facility management throughout the entire building life cycle.

The Programme for Energy Efficiency in Buildings (PEEB) facilitates technical and financial support to large-scale programmes in the building sector in developing and emerging countries. PEEB focusses primarily on new construction, but energy retrofit projects for existing buildings may also qualify.

As minimum criteria, Projects shall:

- Adhere at least to the existing building codes and regulations in the respective countries,
- Apply the most efficient locally available technologies and systems and
- Demonstrate the possibility for large-scale replication and duplication.

This document outlines PEEB´s basic criteria for energy efficient buildings. They serve as a compass or guidance for decision-making, as generally not all criteria may be fulfilled in one single project. This is a living document and will be updated or amended as needed.

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BUILDING NORMS AND REGULATIONS

- As a prerequisite, Projects must acknolwegde and adhere to the existing construction guidelines, building codes and regulations in the respective countries.
- In the second place, Projects should pursue more ambitious energy saving goals compared to conventional buildings of the same building type and located in a similar climate and, thus, aiming at a higher level than the existing building codes and standards.

BUILDING DESIGN

- Projects shall apply bioclimatic and passive solar building design features based on the local climate conditions and building culture aimed at reducing future energy demand. Approaches may include:
  - **Orientation and shape:** Appropriate building orientation maximising the use of natural daylight and natural ventilation according to function and time of the day and suitable building shape regarding form and grade of compactness,
  - **Adaptation to (urban) micro-climate:** Designing with respect to the microclimate of the site due to surrounding factors such as open spaces, vegetation, water bodies, proximity of other buildings, concrete and asphalt roofs and pavements, contributing to reduce or limit the urban heat island effect, for example through green roofs, lighter-coloured and high reflectance surfaces and limiting the rain run-off.
  - **Building envelope:** Ensuring control of air flow, heat flow and moisture infiltration into the building by choosing climate appropriate building materials and insulating roofs and walls, optimal positioning of openings (e.g. use of natural daylight), using high performance windows and/or natural ventilation in accordance with climate conditions,
  - **Solar protection:** Shading to avoid direct solar radiation into the building or on its exposed areas to minimise the heat gain and, thus, avoiding the need for artificial cooling to achieve thermal comfort.
- Projects shall respect the local building design, culture and contribute to the local cultural diversity and, thus, to the sustainable urban development of cities and human settlements.
- The building design shall be functional, optimizing the building floor area for the different uses of the project and allow for a flexible and adaptable use throughout the life span of the building, and thus, reducing the need for additional floor area.

ENERGY AND RESOURCE EFFICIENCY

- Projects shall apply **highly efficient technologies, systems and appliances** which are appropriate for the local conditions, such as as climate, adequate operational and maintenance costs and acceptance by users.
- If building typology and climate conditions allow, projects may integrate the use of on site or nearby **renewable energies**, such as solar or geothermic energy, for water heating, space cooling and/or heating, and/or electricity generation for the building.

- Projects shall aim for a **low water footprint** by adopting options such as efficient water distribution systems; low water-consuming devices, rainwater harvesting and use, and innovative wastewater reuse/recycling technologies.
- Projects shall focus on the use of locally available and sustainable building materials and systems in the first place and imported materials and systems only in the case of non-availability at local level and if so, with a focus on contributing to the introduction of new sustainable materials or systems to the local market.
- Projects shall apply materials and systems with a low carbon footprint throughout the entire **product life-cycle**, i.e. as little as possible energy used to extract raw resources, process materials, assemble product components, transportation to the building site, construction techniques, maintenance and repair and, deconstruction and disposal.

INDOOR ENVIRONMENTAL QUALITY

- Projects shall achieve an adequate indoor air quality with a minimum ventilation airflow to ensure a sufficient fresh air supply to keep occupants healthy and to protect the building condition especially adverse effect from moisture.
- Projects shall apply low emitting indoor equipment, materials and furnishings to reduce concentrations of chemical contaminants that can damage air quality, human health, productivity, and the environment.

FACILITY MANAGEMENT

- Projects shall provide permanently installed connected metering systems for monitoring the total energy (electricity, heat, gas, others) and water consumption of the entire facility.
- Projects should additionally include, where appropriate, intelligent building systems for the rational use of energy and water (e.g. lighting, cooling and heating).
- Projects shall apply materials and systems which provide an optimum performance with a minimum of long-term operation and maintenance efforts and costs. Taking into account local conditions, maintenance and repair works shall be manageable without the need for importing parts or expertise.

URBAN SUSTAINABILITY AND RESILIENCE

- Projects shall contribute to a sustainable local urban planning and/or regional development planning, being integrated in the existing urban structure or located in future urban or regional development corridors.
- Projects shall be integrated into existing or potential new public transport infrastructure, including soft mobility options (e.g. walking, cycling) and / or shall provide a good accessibility to clean mobility infrastructures to the occupants.

- Projects shall pursue the efficient land use of the available city area and/or building development zone, applying the principles of compact building design and mixed use as well as considering brownfield re-development or re-densification of inner-city areas when relevant.
- Projects shall respect the local environmental protection, disaster prevention and climate adaptation planning to avoid building in natural disaster risk zones, to ensure resilience to events such as flooding, (e.g. near river or coastal zones) landslides, earthquakes or fires and to respect urban fresh air corridors.

REFERENCES

ADEME and Partners. Tropical Buildings. Bioclimatic Architecture in the Tropics. http://www.tropicalbuildings.org/system/pages/images/000/000/004/original/Need_for_Bio_Climatic_Architecture.pdf?1471082185

Economic Commission for Europe (UNECE). Framework guidelines for energy efficiency standards in buildings. Global transformation of buildings in the built environment: Framing the design, delivery and operation of buildings as integrated, thermodynamic and environmental systems. 2017.
https://www.unece.org/fileadmin/DAM/hlm/documents/2017/ECE_HBP_2017_3.en.pdf
https://www.unece.org/hk/housing-and-land-management/projects/ee-standards-for-buildings.html

Economic Commission for Europe (UNECE). The Geneva UN Charter on Sustainable Housing. 2015
https://www.unece.org/fileadmin/DAM/hlm/documents/Publications/EN_Geneva_UN_Charter_on_Sustainable_Housing.pdf

International Energy Agency (IEA). IEA Building Energy Efficiency Policies Database.

https://www.iea.org/beep/

International Energy Agency (IEA). Transition to Sustainable Buildings. Strategies and Opportunities to 2050. 2013.
https://www.iea.org/publications/freepublications/publication/Building2013_free.pdf

International Energy Agency (IEA). The Future of Cooling. Opportunities for energy-efficient air conditioning . 2018.

https://webstore.iea.org/the-future-of-cooling

Intergovernmental Panel on Climate Change (IPCC). Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Chapter 9: Buildings. 2017
https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_chapter9.pdf

World Green Building Council. About Green Building. 01.04.2019.
https://www.worldgbc.org/how-can-we-make-our-buildings-green

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CONTACT

Publisher
Programme for Energy Efficiency in Buildings (PEEB) Secretariat

c/o Agence Française de Développement (AFD)
5 Rue Roland-Barthes
75012 Paris, France
E info@peeb.build
T +33 (0) 1 53 44 35 28

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Contact
Christiana Hageneder
christiana.hageneder@giz.de

Author/Editor
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