Expression of interest for research cooperation

Description of institution

Interested institution:	Cracow University of Technology
Department carrying out the proposed research	**Department of Building and Building Physics** Institute of Building Materials and Structures Faculty of Civil Engineering
Address and webpage	Warszawska 24, 31-155 Kraków, Poland www.bud.pk.edu.pl
Contact person (name, e-mail address, phone)	Tomasz Kisilewicz, e-mail: tkisilew@pk.edu.pl, phone: +48 12 628 2397

Research offer

Brief description of the department (key research facilities, infrastructure, equipment)
(up to 1000 characters)

Research equipment of Department of Building and Building Physics
Building Thermal Physics:
The main and unique thermal research facility of the department is the climate chamber with hot-box, sample dimension 1.8 by 1.8 m. This chamber is not only used for a standard steady state testing but also for dynamic tests (e.g. PCM use efficiency). Besides, we use dozens of tools that belong to standard research equipment, as thermal imaging cameras, thermal conductance meters, scanner 3D Smarttech3D, thermal comfort meter etc.
Building and Architectural Acoustics Laboratory:
Sound absorption of materials (incl. smal scale samples - Impedance Tube). Sound insulation of materials and composite panels (incl. small scale samples - Impedance Tube). Sound absorption of materials for scale model tests. Scale model testing for architectural acoustics (concert halls, theatres, auditoriums, etc)

Scientific area

☐	Chemistry	☐	Social Sciences and Humanities
☐	Economic Sciences	x	Information Science and Engineering
☐	Environment and Geosciences	☐	Life Sciences
☐	Mathematics	☐	Physics

Research field

(up to 500 characters)

Low energy building: passive solar energy use, rational window sizing strategy, passive measures of indoor climate control to avoid overheating, influence of thermal storage on heating and cooling demand, use of PCM to reduce demand on cooling energy, air tightness of building. Integrated approach to low energy building design. Design tools for low energy integrated design.
Thermal refurbishment of the existing buildings: reduction of thermal losses, air tightness control, maximization of solar gains, moisture aspects of thermal refurbishment, building shell diagnostics in-situ, protection against overheating.
Modeling and simulation of building components and the whole objects (EnergyPlus). Experimental testing in climate chamber and in-situ. Infrared diagnostics and testing. Quantitative infrared testing. Speech intelligibility in rooms. Relations between sound insulation and thermal properties of materials. Sound focusing in rooms - prediction and measurements methods. Acoustical design of buildings. Product development (sound absorption and sound insulation). Simulations of noise emission in building interiors. Room acoustical simulations. BREEAM / LEED certification in acoustics.

The proposed research/project description

(up to 1000 characters)

Integrated building design of near-zero energy buildings.
In-depth revitalization of existing buildings (with particular emphasis on big slab buildings), including: architectural, functional, structural, thermal and acoustic aspects.
Prediction method of natural air exchange rate in buildings by means of gas tracing testing and local climate data.
Passive measures of winter and summer comfort in the refurbished buildings.
Modern facade systems: double, BIPV (Building integrated photo-voltaics), PCM, heat exchanging and hygrothermal functions.
Combined sustainable proposal: refurbished building and novel heating furnace fueled by waste pellets (with Norwegian firm Serigstad).

Additional information (key Persons and Expertise; additional trainings, research programme, other)

(up to 1000 characters)

Department of Building and Building Physics closely cooperates with building industry, represented by the producers of thermal and acoustic insulation, ETICS systems, roof windows, ceramic and lightweight concrete blocs, etc.