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RESEARCH TOPIC

Energy Efficiency of Buildings

We develop solutions and technologies that allow buildings to consume less energy and to be more comfortable, healthy and functional

Energy Efficiency of Buildings

We focus on:

- Technological concepts and performance assessment methods for complex façade systems
- Natural and hybrid ventilation, and passive cooling strategies
- Daylighting, shading systems, and thermal effects of light
- Indoor environmental quality: measure, perception, and development of personal comfort systems
- Modelling of occupant behaviour and evaluation of user-building interactions
- Strategies for energy optimisation in the management of buildings and clusters of buildings

Detailed Description

Our building experts at Eurac Research work to make energy efficient buildings possible as affordable, comfortable, healthy, and functioning places, with a high market value and minimum need of non-renewable energy in the life cycle, exploiting optimised management strategies in the buildings cluster domain. They support the construction and renovation of public and private buildings driven by reduction of energy demand and at the same time enhancement of the indoor environmental quality in a user-centred and context-tailored approach. To achieve this, our researchers study technologies that exploit the full potential of the natural resources surrounding the building, creating architectural and technological solutions for ventilation and natural lighting. We also develop concepts for innovative and multi-functional façade systems, which integrate systems to produce energy from renewable sources and ventilation devices to improve interaction of the building with the energy networks acting on the demand profiles. Finally, we study models to reduce the technical risk related to renovation measures for buildings and building stock, developing tools for data and information processing as well as for optimum management of the operational phase.
Thanks to this research, manufacturers of building components and systems, design firms and builders can benefit from innovative technological and architectural retrofit solutions; investors and owners have detailed analyses of business models and financing schemes at their disposal; energy managers and facility managers are able to monitor actual performance with ad hoc tools; administrators and policymakers benefit from methodological approaches and tools to reduce the energy consumption of whole building stock.
The laboratories also test the performance of prototypes of multifunctional façades, evaluate the interaction between façade systems and the indoor environment, study the comfort perception to develop models, control strategies and technology solutions.

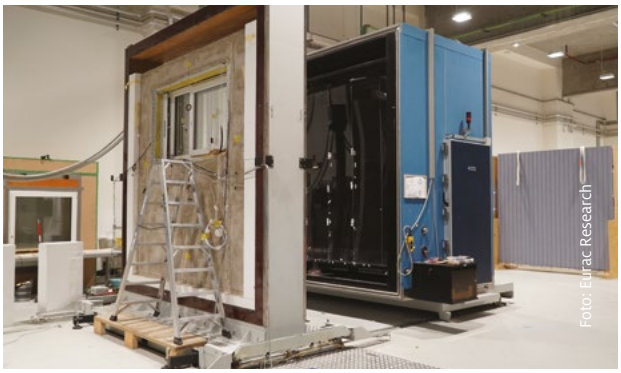
Some of our latest achievements:

As part of a European research consortium, our researchers recently coordinated a project to reduce the energy consumption of shopping centres. We established ventilation and natural-lighting solutions; developed continuous commissioning platform for performance monitoring in the building operation phase; and created methodologies to analyse the indoor comfort in transition spaces. Together with research organizations and companies, our experts developed novel assessment approaches for envelope system and designed a cross-border industry-driven competence centre in the complex façades sector, coordinated the creation of a web-based platform on energy-efficient buildings with useful data for different possible services and market players and researched optimised technology packages, new tools and strategies to encourage large scale deep renovation of existing buildings, also providing reliable business models to support their applications.

The services we offer:

- Development of technological concepts for architectural and envelope systems, performance analysis of a building and assessment of its value and costs throughout its life cycle
- Modelling and simulation of building and building clusters: general approach, uncertainty analysis, multi-objective optimisation, calibration
- Evaluation of reliability and performance of the building as an energy system: measurement and verification records, procedures for laboratory analysis on sub-systems and building components
- Analysis of building stock built in specific regional contexts, to define transformation scenarios focusing on the nearly-zero energy balance target
- Laboratory testing aims to:

  > verify the thermal and energy performances and management of solar gains of components and envelope systems such as windows and doors, opaque walls and façade modules, under stationary and dynamic conditions
  >
  > optimise the performance of constructive solutions and innovative technologies to increase energy efficiency and comfort in buildings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