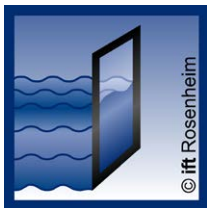


Climate-proof building

Climate adaptation + climate protection with climate-resilient, recyclable and sustainable windows, doors and facades



Content

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Climate adaptation + climate protection with climate-resilient, recyclable + sustainable windows, doors + facades

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Heatwaves in summer and the risk of localised heavy rainfall almost all year round - that is the current situation. This is why more and more municipalities are drawing up heat protection plans and "flash flood maps" that show the risk of flooding at a local level for each residential area and each street. Similarly property owners, builders and investors are looking for ways to protect their own four walls from the climate extremes that now occur regularly. With this in mind, the construction industry should not wait and see, but prepare professionally for the sustainable and "climate-proof" remodelling of existing buildings.

Better protection for your own four walls against heat and flooding is a strong motive for investing in high-quality building elements. The purchasing power is widely available and can be utilised. This is an opportunity for competent and sales-orientated specialist companies to become active themselves, win customers and thus defy the construction crisis. More and more people are also att-

aching great importance to the sustainability of products when making purchasing decisions, especially the affluent group of "silveragers", who often own a property and now want to make it fit for old age. .

There are good opportunities for active and forward-looking manufacturers, installation companies and traders of building elements to convince potential building owners and renovators with climate-resilient building elements. Climate-proofed building products must be efficient, sustainably produced, free from harmful substances, resilient to climate extremes and recyclable. However, transparent assessment systems for these criteria do not yet exist. With the "climate.proof.build" initiative, ift Rosenheim has developed an assessment methodology that provides a transparent statement on the "climate safety" of building components based on recognised rules and standards. The assessment includes criteria of the product and the company (production). Manufacturers with a claim to sustainable

business practices can use the "climate.proof.build" label for effective advertising and with legal certainty in accordance with the EU's "Green Claim Directive".

In addition to reducing energy consumption and CO₂ emissions during the use phase, greater attention must also be paid to the consumption of resources during production ("grey energy") and the recyclability of building materials in order to accelerate the transition to a circular economy. The requirements and assessment criteria must be adapted so that planners, manufacturers and building owners can make a reliable decision in favour of suitable building



Fig. 1 Buildings and cities must be energy-optimised and climate-resilient in order to slow down climate change and withstand the consequences of extreme weather conditions.

products. This requires simple and reliable classification and labelling at product level in order to be able to make an informed decision on construction products when planning and tendering.

1 Market trends in sustainability and CO₂ efficiency

The following aspects and technologies are advantageous in the construction and energy modernisation of buildings:

1. Energy-efficient building envelope with high thermal insulation so that energy-efficient heating technology based on renewable energies can be optimally utilised.
2. Building products must be easily replaceable and the materials used (frames, glazing, seals, fittings, etc.) must be fully recyclable and easy to separate (circular economy).
3. Lowest CO₂ emissions during the production, utilisation and dismantling of building materials.
4. The composition and properties of the materials should be easily available for the entire period of use (databases, QR code, transponder, etc.).
5. Large proportion of transparent surfaces in northern and central Europe for good daylight quality and optimum utilisation of free solar energy.
6. Effective and adaptive solar shading (roller shutters, external venetian blinds, switchable glazing, etc.) to optimise the use of solar gains during the heating period and protect against overheating.
7. Easy-to-use ventilation systems (openable windows) to provide occupants with fresh air and prevent rooms from overheating by cooling them down at night. In addition, sensors and actuators are useful for windows to protect/warn against rain and wind.
8. Intelligent (smart) connection to the heating and building technology (i.e. windows open - heating off)
9. Windows and doors in the basement and ground floor must provide adequate protection against flooding caused by localised heavy rainfall and pressing water in critical installation positions (flood resistance).
10. The structures and materials must become more resistant to higher wind loads (storms) and surface temperatures (up to 70 °C in intense sunlight and heat periods especially with dark surfaces).

The necessary reduction in CO₂ emissions in the building sector can only be achieved through radical savings in energy consumption and the increased use of renewable energies for heating (and in some cases for cooling). The necessary measures must focus much more on existing buildings than has been the case to date. This is because the

majority of CO₂ emissions are caused by a large stock of older buildings in energy efficiency classes E to H, which at 250 kWh/m² consume 800% more energy than a modern class A building with 30 to 50 kWh/m² (equivalent to German level "KfW Efficiency House 55"). The big lever is therefore to increase the energy modernisation rate with energy-efficient building elements that make the use of regenerative heat sources such as heat pumps suitable in the first place. Modern windows, façades and glazing have already reached a level where the solar gains on the east, west and south sides during the heating period exceed the energy losses via these surfaces to allow to heat the building. This means that modern thermal insulation windows are a regenerative heat source without any system technical supplying technical devices.

Installation has a major influence on the thermal insulation, function and usability of building elements, particularly in the case of building renovation, and must therefore be planned professionally. A lot of detailed information can be found in the installation guide [21]. The following aspects must be taken into account for the refurbishment market:

- Reassessment of the building physics equilibrium, as new windows change the airtightness and surface temperatures on the building component and the reveal.
- Identify and optimise critical thermal bridges by insulating the reveals if the U-value of the external wall is $U_{AW} > 1.0 \text{ W}/(\text{m}^2\text{K})$.
- Consideration of possible changes to the structural conditions (window sills, reveals, shutters etc.), taking into account monument protection, effort/costs, avoidance of dirt, etc.
- If more than 1/3 of the windows in a building or residential unit are replaced, a ventilation concept must be drawn up in Germany in accordance with DIN 1946-6.

1.1 National and European requirements

In order to achieve the national and European climate targets, the requirements for the building sector would actually have to be adapted. The minimum energy requirements should be based on the EPBD (European Performance of Buildings Directive), which defines stricter energy requirements for buildings.

Due to increased construction costs, reduced state funding and other political reasons, the originally planned intensify of the thermal insulation standard in the updated German Building Energy Act was completely dropped. All that remained were the stricter requirements for heating systems. Changes are no longer expected in the current legislative period. The technically sensible proposals of a brief report [1] by the Federal Ministry of Economics and