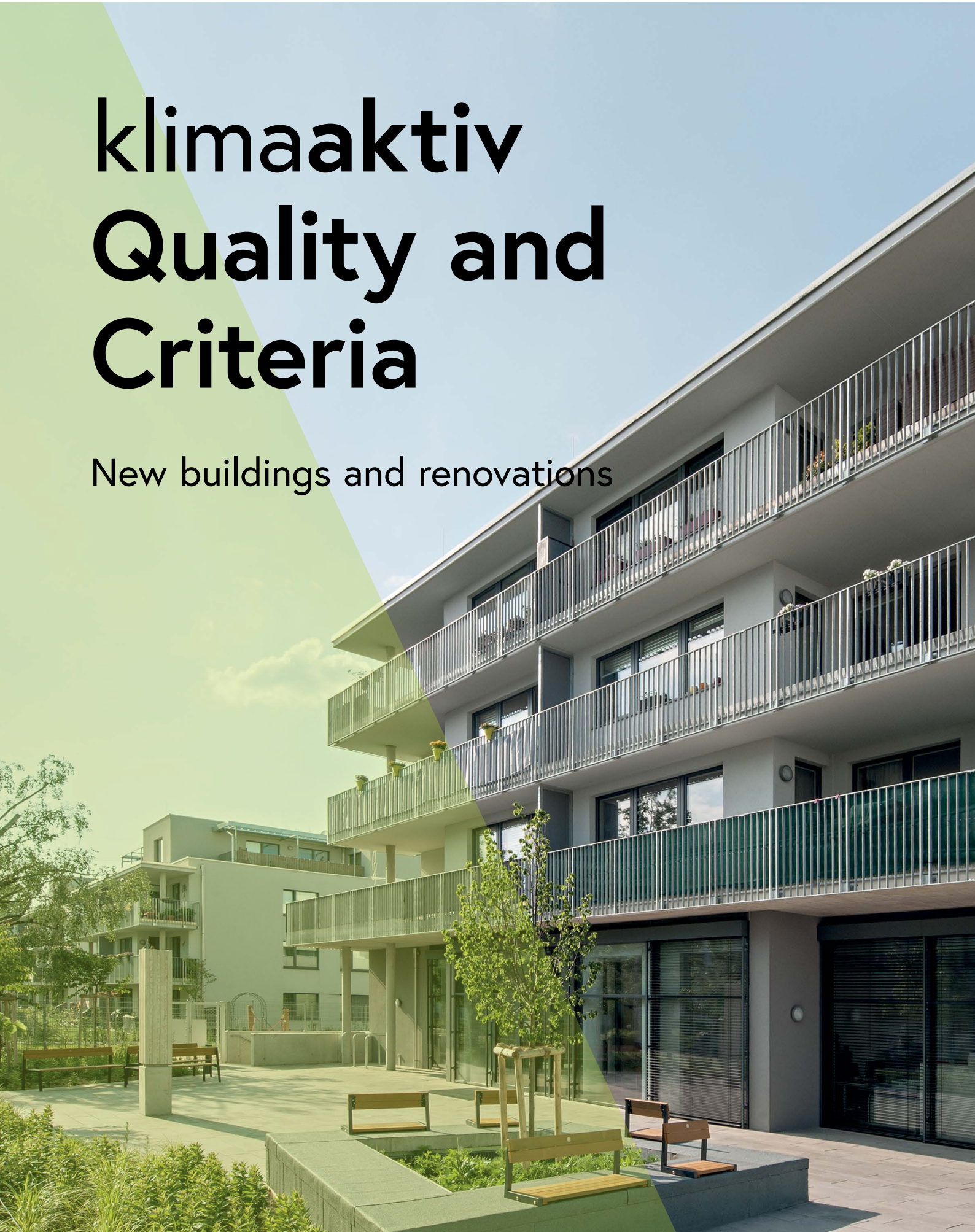


klimaaktiv Quality and Criteria

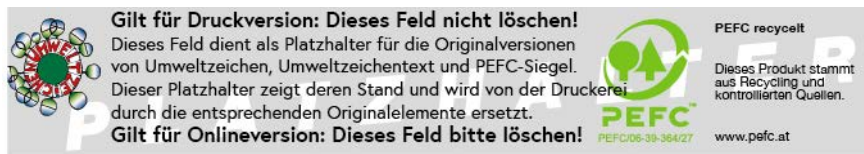
New buildings and renovations



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klimaaktiv – the Austrian climate protection initiative

To open up the road to a sustainable climate future, the Austrian Federal Government's climate and energy strategy #mission2030 defines clear goals. The central aim of **klimaaktiv** is to launch climate-friendly technologies and services commercially and to disseminate them rapidly. Restructuring our society toward sustainability is a complex, dynamic process that can succeed only if more and more individuals take an active part and demonstrate that this paradigm shift leads to a secure future.

klimaaktiv, the participatory climate-protection movement launched by the Federal Ministry for Sustainability and Tourism (BMNT), with its extensive networks, supports the paradigm shift toward a sustainable society. In the four theme areas Building and Renovating, Conserving energy, Renewable sources of energy and Mobility new answers are made comprehensible, quality standards are set, the stakeholders' knowledge and capabilities are augmented and firms, communities and households are offered advice.

klimaaktiv Building and Renovating

The programme **klimaaktiv** Building and Renovating is a key element in the Federal Government's climate and energy strategy #mission2030 in connexion with energy-efficient new starts and high-quality renovation in Austria.

The construction industry has a vital part to play in protecting the climate: when a new building is put up or an existing building renovated, decisions with implications for several decades are taken, as regards comfort, resource consumption, energy demand and long-term affordability. Right now we are constructing and renovating the buildings in which we shall be living well beyond the year 2050. **klimaaktiv** buildings in Austria demonstrate: it works!

To promote climate-friendly new buildings and renovations the BMNT has developed the **klimaaktiv** building standard, which is available for residential and non-residential buildings and provides practical information for property development, architects and builders, housing corporations and agencies administering grants for residential building in the provinces, and also for anyone building, renovating or using a house. Detailed information (in German) is to be found at klimaaktiv.at/bauen-sanieren.

The central reception point for all questions to do with **klimaaktiv** Building and Renovating is ÖGUT – the Austrian Society for Environment and Technology. The programme management team is backed up by partners in each province; these firms and institutions are ready to answer any question on declaring and assessing buildings, and give the programme a firm foothold in the region concerned.

As against the complete catalogue of criteria, this brochure presents a condensed overview of the **klimaaktiv** criteria for the building standard for residential new buildings and renovations as of 2017. It makes no claim to completeness, and cannot be seen as a stand-alone guide to declaring buildings on the **klimaaktiv** declaration platform.

The **klimaaktiv** building standard provides comprehensive guidance, making it possible both to plan and to control implementation better for sustainable construction and renovation. With the **klimaaktiv** building standard you can also apply for more generous grants; details (in German) are to be found at umweltfoerderung.at.

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The klimaaktiv building standard

High-quality renovation and energy efficiency in new buildings are essential if climate protection is to be effective long-term. The klimaaktiv assessment system for buildings therefore places energy efficiency and renewables centre stage. Assessment also takes health, comfort and the environmental impact of the construction materials employed into account. Cost-effectiveness and affordability throughout the building's service life play a part here, as do the suitability of the site and arrangements for environmentally sound mobility. klimaaktiv thus contributes significantly to implementing #mission2030.

The klimaaktiv catalogue covers all the criteria for the building standard; it exists for diverse types of building (with a distinction between new buildings and renovation) – residential accommodation, offices, educational and sports facilities, centres for functions, medical facilities and hospitals, hotels and B&Bs, supermarkets, retail and wholesale trading premises, large and small-scale industry. The criteria are publicly accessible and available free of charge.

The klimaaktiv building standard marks out buildings which combine top performance as regards energy and ecology with professional implementation. The klimaaktiv criteria are grouped in four assessment categories.

A Location and quality assurance

Choosing the location and defining the quality levels to be demonstrated provide the foundation for a building that operates sustainably. Here infrastructure facilities and environmentally sound mobility at the location are just as important as life-cycle costs, achieving air-tightness or registering the energy consumption data.

B Energy and supply systems

Modest energy demand, low CO₂-emissions and a lower primary energy rating than in run-of-the-mill buildings are critical for achieving top klimaaktiv quality. Compliance with the standard can be calculated either to OIB-guideline 6 (2015) or to PHPP (Version 9).

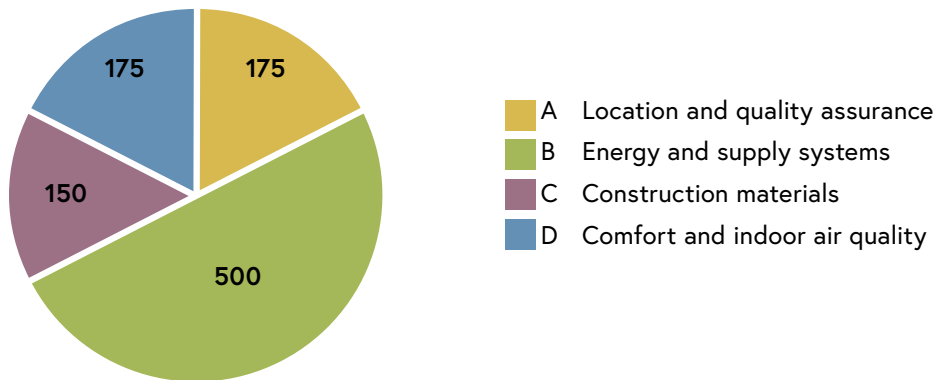
C Construction materials

Materials specially harmful to the climate and substances of very high concern are ruled out; employing environmentally friendly materials is rewarded. Ecological improvements, from producing a building all the way to disposing of it, are taken into account for klimaaktiv.

D Comfort and indoor air quality

In summer-proof buildings with interiors constructed from low-emission materials, the indoor climate is pleasant and indoor air quality is good. Points are awarded for providing a ventilation system with heat recovery.

klimaaktiv criteria – point allocation



Buildings in klimaaktiv quality are assessed and their quality assured by means of a straightforward 1000-point system.

The klimaaktiv criteria are grouped in the four assessment categories location and quality assurance, energy and supply systems, construction materials, and indoor air quality and comfort. Maximum points attainable are defined both for the individual criteria and for the four assessment categories; these maxima are listed in the tabular overview in the jacket flap. The energy category carries the most weight here.

On the basis of the criteria an individual combination of features that make sense for the building in question can be selected. A total of 1000 klimaaktiv quality points can be notched up. For the basic level, klimaaktiv Bronze, all the essential klimaaktiv criteria must be satisfied – these are considerably more demanding than the usual targets applying in the market for new buildings and renovation, inter alia as regards energy efficiency and primary energy demand. Three quality levels exist:

- Bronze: buildings that satisfy all essential criteria
- Silver: buildings that satisfy all essential criteria and score at least 750 points
- Gold: buildings that satisfy all essential criteria and score at least 900 points

The klimaaktiv building standard makes the quality of a building measurable and transparent. It is available for the declaration levels “Planning”, “Implementation” and “Use”.

klimaaktiv criteria for residential buildings New buildings and renovation

klimaaktiv catalogue of criteria Building and renovating

section	title	Essential criterion	Points scored
A	Location and quality assurance		up to 175
A 1.	Infrastructure and environmentally sound mobility		up to 60
A 1. 1	Infrastructure close to the site	E	2 to 30
A 1. 2	Environmentally sound mobility		0 to 50
A 2.	Proof of quality for planning and implementation		up to 130
			OIB PHPP
A 2. 1	Cost-effectiveness		15 to 30
A 2. 2	Quality assurance – energy demand calculation and consumption forecast		30 to 40 50 to 60
A 2. 3	Building envelope airtight	E	0 to 30
A 2. 4	Monitoring energy consumption	E ≥ 1000 m ²	0 to 40
B	Energy and supply systems		up to 500
			OIB PHPP
B 1.	Heating energy demand	E	100 to 200 150 to 250
B 2.	Primary energy demand	E	25 to 100 25 to 100
B 3.	CO ₂ -emissions	E	50 to 200 75 to 200
B 4. a	Overall energy efficiency factor OIB		25 to 75
B 4. b	Photovoltaic PHPP		10 to 50
C	Construction materials		up to 150
C 1.	Materials		up to 90
C 1. 1	Avoiding HFC	E	5
C 1. 2	Avoiding substances of very high concern		5
C 1. 3	Avoiding PVC	E	5 to 60
C 1. 4	Employing products with seal of environmental approval		0 to 40
C 2.	Design and building		up to 100
C 2. 1	Ecological index of building - BG1 / BG3	E	0 to 50/75
C 2. 2	Disposal indicator EI10		0 to 50
D	Comfort and air quality indoors		up to 175
D 1	Thermal comfort in summer	E	15 to 50
D 2	Convenience ventilation		60
D 3	Employing low emitting materials		0 to 60
D 4	Indoor air quality	E ≥ 2000 m ²	0 to 40
		Total	1.000

A Location and quality assurance

A1 Infrastructure and environmentally sound mobility

Selecting a site for a new building or deliberately deciding to renovate an existing building has far-reaching implications for possible future damage to the environment in the field of mobility. The more amenities within easy walking distance, the happier the residents are. Traffic-related emissions can be avoided, private cars are needed less often, and the quality of life in the surroundings improves.

A 1.1 Infrastructure close to the site

Where it is possible to cover everyday needs within a radius of 500 m to 1000 m, food shops, doctors' surgeries, schools and so on can be reached on foot or by bicycle.

Facilities in the following eleven categories are taken into account: restaurants, local supermarkets, leisure and cultural facilities, nursery schools, schools, medical facilities, service providers, public administration, public cycle or pedestrian links to the site. One facility in each category is counted.

Minimum requirement

The criterion is satisfied if there are at least two facilities out of the eleven categories within a radius of 1000 m; this is worth 2 points.

Scoring

Each relevant infrastructure facility within a radius of 500 m scores 5 points. Each infrastructure facility between 500 m and 1000 m from the site scores 1 point.

2 to 30 points

Intermediate values are derived by linear interpolation.

Essential criterion

Proof of compliance: Map of the building's surroundings with the existing infrastructure facilities within a radius of 500 m / 1000 m marked in and identified, plus explanatory text.

A 1.2 Environmentally sound mobility

Motorized private transport and the CO₂-emissions it causes are critical for climate protection in Austria. Unless transport-related emissions are significantly reduced, Austria cannot meet its medium to long-term climate protection targets. Alongside having local supermarkets and social and recreational facilities close by, it is particularly important for klimaaktiv that the best possible provision is made for well-organized, environmentally sound mobility.

0 to 50 points

The following measures score:

- number of cycle stands (up to 15 points)
- cycle stand quality (up to 10 points)
- distance from nearest stop in public transport system (up to 10 points)
- service quality of public transport from that stop (up to 10 points)
- incentives for electric-powered vehicles (up to 20 points)
- As an alternative to the previous measures: implementing a comprehensive strategy to promote environmentally sound mobility (50 points)

Basic information (in German) on the “klimaaktiv mobil” programme is also available at klimaaktiv.at/mobilitaet.

A 1.2a Individual measures

Cycling

klimaaktiv promotes providing an adequate number of accessible, easy-to-use cycle stands with protection against theft.

Minimum requirement

For each accommodation unit, space for one bicycle in a cycle stand to the standard recommended by klimaaktiv is on hand. Any additional cycle parking is assessed separately by number (up to 15 points) and quality (up to 10 points).

Number 0 to 15 points

Quality 0 to 10 points

Proof of compliance: Cycle parking marked in with dimensioning in plan of building (layout plan, site plan) as proof of compliance with the technical requirements. On completion of building: short report with evidence of number of bicycle spaces, plus photo documentation of implementation.

Local public transport

klimaaktiv assesses the distance to local public transport stops and the service interval in public transport at peak periods.

Minimum requirement

The criterion is satisfied if the nearest public transport stop is at most 1000 m away.

Points for quality are given if a service runs at least once an hour at peak periods.

Distance 0 to 10 points

Quality 0 to 10 points

Proof of compliance: Plan of surroundings with public transport stop marked in, plus copy of clockface timetable in force.

Electric-powered vehicles

In assessing buildings, klimaaktiv takes providing charging equipment at the building for electric-powered vehicles into account, both bicycles and cars.

Minimum requirement

- Charging points are provided for at least ten per cent of the cycle spaces.
- Charging points are provided for at least ten per cent of the car parking spaces.
-

Bicycle 0 to 5 points

Car 0 to 15 points

Proof of compliance: Charging points marked in layout plan. Short report on number, plus photo documentation of implementation on completion.

A 1.2b Tailor-made strategies (as an alternative to A.1.2a)

As an alternative to the measures described, it is also possible to develop and implement comprehensive mobility strategies for the given building.

Minimum requirement

For an alternative mobility strategy to qualify, suitable documentation (descriptive text, plans, technical conception) is necessary. The documents must show credibly that the measures envisaged are as good as or better than individual measures as per section A 1.2a.

50 points

Proof of compliance: Submitting a tailor-made mobility strategy for the building in question. On completion, documentation on the implementation of this strategy.

A 2 Proof of quality for planning and implementation

How good the building turns out to be depends very largely on the quality of planning and implementation. In the case of energy-efficient buildings the following aspects are specially important: taking life-cycle costs into account, testing whether the building envelope is airtight, and arranging for instrumentation to record energy consumption.

A 2.1 Cost-effectiveness

In many cases steps to improve energy efficiency are not taken simply because the cost of constructing the building is considered in isolation, while the positive effects of such steps on overall costs throughout the building's service life are ignored. Calculating life-cycle costs helps in assessing the energy strategy for the building and making it more cost-effective. To do this, a comparison is made between an improved design (from the energy angle) and a baseline version. Given the life-cycle costs for the energetically relevant construction elements, it can be ascertained which extra expenditure on steps to improve energy efficiency can be made up for by reduced operating costs. As an alternative to assessing the entire building, individual elements can be assessed separately.

15 to 30 points

Proof of compliance: To establish conformity klimaaktiv offer a special tool (econcalc) free of charge. Other programmes can also be employed to investigate cost-effectiveness, though. The resulting files must be uploaded.

Download: Tool for investigating cost-effectiveness (in German)

klimaaktiv.at/tools

A 2.2.1 Quality assurance – energy demand calculation

As experience with instrumented projects shows, buildings' actual energy consumption can be forecast well if validated methods of calculation are employed and the calculations are impartially quality-assured.

The goal is to assure the quality of the energy demand calculations by checking them in detail.

Checking is performed:

- either on the OIB energy pass, by a qualified specialist independent of the energy-pass calculator
- or on the PHPP calculation, by a recognized test centre for passive-house certification.

OIB 30 points

PHPP 50 points

Proof of compliance:

OIB: quality assurance report by a qualified specialist independent of the energy-pass calculator

PHPP: certificate that the PHPP calculation has been checked by a test centre authorized by the Passive House Institute.

A 2.2.2 Consumption forecast (in addition to A 2.2.1)

A consumption forecast is meant to estimate actual subsequent consumption levels as accurately as possible, so it should model the expected conditions of use as closely as possible (i.e. indoor temperature setpoints, average occupancy/indoor loads, hot-water consumption, modified times of use, etc.).

The forecast covers the following indicators:

- end-use energy demand for heating and hot water
- end-use energy demand for auxiliary power (for heat supply and ventilation systems)
- CO₂-emissions
- generating renewable energy/PV electricity

10 points

Proof of compliance: Consumption forecast including representation of expected conditions (by means of PHPP, OIB energy pass or simulation).

A 2.3 Building envelope airtight

The aim is to avoid leaky building envelopes, since these are among the most frequent causes of structural damage due to damp, and also increase heating energy requirements. With proper planning and implementation, making the building envelope airtight needs to involve little costs. Clients benefit from a diminished risk of structural damage, better soundproofing and significant energy savings.

Minimum requirement

New starts: $n_{50} \leq 1,5 \text{ h}^{-1}$ (0 points)

Renovation: $n_{50} \leq 2,0 \text{ h}^{-1}$ (0 points)

Maximum score

New starts: $n_{50} \leq 0,5 \text{ h}^{-1}$ (30 points)

Renovation: $n_{50} \leq 1,0 \text{ h}^{-1}$ (30 points)

0 to 30 points

Intermediate values are derived by linear interpolation.

Essential criterion

Proof of compliance: For each klimaaktiv building compliance with the minimum thresholds in an air-tightness test to ÖNORM EN ISO 9972, procedure 1 (as-used condition) must be demonstrated.

A 2.4 Monitoring energy consumption

Recording the actual consumption levels is a way to check previous consumption forecasts. Energy consumption monitoring helps with cost controlling and can be employed to track down possible defects, e.g. in engineering systems, and eliminate them if need be. Here it is essential to record the relevant energy consumption data separately by storage medium and by application.

Minimum requirement

Installing instrumentation with which the following energy consumption data can be recorded at least per year:

- consumption of fuel employed
- heat meter for solar collector facility
- general-purpose power consumption (detached residence: total power consumption)
- electricity meter for PV facility
- heat meter for entire heating system (for apartment houses)
- ventilation system power consumption (for apartment houses)
- typical temperatures (indoors and outdoors) and humidity levels (for detached houses)

0 to 40 points

Essential criterion

from 1000 m² conditioned GEA upward

Proof of compliance: Confirmation that the requirements for recording the consumption data will be fulfilled and the survey sheet for total consumption will be passed on to the occupants.

Download:

- official form (as confirmation)
- tool for recording consumption data

klimaaktiv.at/formblaetter

B Energy and supply systems

In the klimaaktiv criteria demand for and supplying heat play a central part. The aim is to minimize buildings' energy consumption and their emissions of greenhouse gases and pollutants; so demand for heat should be reduced, the energy supply system be made more efficient and an energy source be chosen that has little impact on the environment. The criteria therefore specify much stricter maximum permissible values than OIB-guideline 6, 2015 does. Occupants enjoy increased comfort and are pleased with the reduction in energy costs.

Important note:

- Heating systems burning oil or gas are no longer permitted in new starts and in the case of thermal renovation involving replacing the heat generation system. The rules about exceptions are provided in the 2017 catalogue of criteria for residential buildings.
- The energy consumption ratings can be calculated as per OIB-guideline 6 or as per PHPP. Whichever is chosen, it must apply to all criteria in Chapter B. Values calculated as per OIB-guideline or as per PHPP, respectively, can be compared only to a limited extent, since the respective calculations involve differences in the areas specified, indoor sources of heat, occupancy figures, etc.
- Where the specific reference heating energy demand $HWB_{Ref, RK}$ is calculated as per OIB-guideline, the energetic effect of convenience ventilation systems with heat recovery has been ignored since the 2015 version. This effect is taken into account only for calculating the indicators PEB_{SK} , $CO2_{SK}$ (climate on site) and $f_{GEE,SK}$.

B 1 Heating energy demand

The heating energy demand ($HWB_{Ref,RK}$ | HWB_{PHPP}) is the quantity of heat needed per square metre and year in a building to maintain the indoor temperature at 20 degrees Celsius. Reducing the heating energy demand plays a vital part in minimizing energy consumption and emissions of greenhouse gases and pollutants. At the very least klimaaktiv buildings must not exceed a maximum permissible value; in calculations as per OIB this value is a function of surface-area-to-volume ratio (SA/V).

Requirements as per OIB

Minimum requirement for new starts:

$HWB_{Ref,RK}$ at most 22 kWh/m^2_{GEA} (SA/V ratio $\leq 0,2$)

$HWB_{Ref,RK}$ at most 40 kWh/m^2_{GEA} (SA/V ratio $\geq 0,8$)

Minimum requirement for renovation:

$HWB_{Ref,RK}$ at most 32 kWh/m^2_{GEA} (SA/V ratio $\leq 0,2$)

$HWB_{Ref,RK}$ at most 50 kWh/m^2_{GEA} (SA/V ratio $\geq 0,8$)

Top score

New starts: $HWB_{Ref,RK}$ at most 22 kWh/m^2_{GEA}

Renovation: $HWB_{Ref,RK}$ at most 32 kWh/m^2_{GEA}

Anforderungen PHPP

Minimum requirement

New starts: HWB_{PHPP} at most $30 \text{ kWh/m}^2_{HGEA}$

Renovation: HWB_{PHPP} at most $40 \text{ kWh/m}^2_{HGEA}$

Top score

New starts: HWB_{PHPP} at most $15 \text{ kWh/m}^2_{HGEA}$

Renovation: HWB_{PHPP} at most $25 \text{ kWh/m}^2_{HGEA}$

OIB 100 to 200 points

Points are scored independently of surface-area-to-volume ratio (SA/V).

Intermediate values are derived by linear interpolation.

Essential criterion

Proof of compliance as per OIB: Proof of compliance uses the specific reference heating energy demand $HWB_{Ref,RK}$ as per OIB-guideline 6,2015 and the standards in force. The energy pass must be attached. In the case of buildings classified at the declaration levels Silver and Gold, the degree of shading must be calculated in detail.

PHPP 150 to 250 points

Points are scored independently of surface-area-to-volume ratio. Intermediate values are derived by linear interpolation.

Essential criterion

Proof of compliance as per PHPP: Calculation is performed with PHPP Version 9 or later. Heat recovery effects from convenience ventilation are taken into account here. The complete PHPP Excel file must be uploaded as proof of compliance.

B 2 Primary energy demand

A holistic approach to calculating primary energy demand includes transport distance and the energy consumed in producing energy storage. Primary energy demand comprises the entire energy requirement, renewable and non-renewable, for operating buildings; it depends on the following factors:

- End-use energy demand
- Efficiency of the technical systems employed
- Primary energy factor of the energy storage employed (taking upstream process chains such as generating electricity in power stations into account)

Demand for the following energy applications is taken into account:

- space heating
- providing hot water
- auxiliary power for heating, solar and ventilation systems
- power for domestic applications
- minus electricity generated by PV (OIB only)

Requirements as per OIB

Minimum requirement

New starts: PEB_{SK} at most $115 \text{ kWh/m}^2_{GEA}$

Renovation: PEB_{SK} at most $175 \text{ kWh/m}^2_{GEA}$

Top score

New starts: PEB_{SK} at most 60 kWh/m^2_{GEA}

Renovation: PEB_{SK} at most 90 kWh/m^2_{GEA}

25 to 100 points

Intermediate values are derived by linear interpolation.

Essential criterion

Proof of compliance as per OIB: The specific total primary energy rating PEB_{SK} is calculated as per OIB-guideline 6, 2015 and the standards in force for the climate on site. As proof of compliance the complete energy pass must be uploaded.

Requirements as per PHPP

Minimum requirement

New starts: PEB_{PHPP} at most $150 \text{ kWh/m}^2_{HGEA}$

Renovation: PEB_{PHPP} at most $180 \text{ kWh/m}^2_{HGEA}$

Top score

New starts: PEB_{PHPP} at most $90 \text{ kWh/m}^2_{HGEA}$

Renovation: PEB_{PHPP} at most $125 \text{ kWh/m}^2_{HGEA}$

25 to 100 points

Intermediate values are derived by linear interpolation.

Essential criterion

Proof of compliance as per PHPP: The specific primary energy rating (including renewable and non-renewable energy sources) is calculated as per PHPP Version 9 or later. As proof of compliance the entire PHPP Excel file must be uploaded.

B 3 CO₂-emissions

Using low-emission energy sources can help a lot with climate protection. Proof of compliance is based on the specific CO₂-emissions. Demand for the following energy applications is taken into account:

- space heating
- providing hot water
- auxiliary power for heating, solar and ventilation systems
- power for domestic applications
- minus electricity generated by PV (OIB only)

Requirements as per OIB

Minimum requirement

New starts: CO_{2SK} at most 16 kg/m²_{GEA}

Renovation: CO_{2SK} at most 24 kg/m²_{GEA}

Top score

New starts: CO_{2SK} at most 6 kg/m²_{GEA}

Renovation: CO_{2SK} at most 8 kg/m²_{GEA}

OIB 50 to 200 points

Intermediate values are derived by linear interpolation.

Essential criterion

Proof of compliance as per OIB: Proof of compliance uses the specific CO₂-emissions as per OIB-guideline 6, 2015 and the standards in force. The energy pass must be attached.

Requirements as per PHPP

Minimum requirement

New starts: CO₂ at most 22 kg/m²_{HGEA}

Renovation: CO₂ at most 28 kg/m²_{HGEA}

Top score

New starts: CO₂ at most 9 kg/m²_{HGEA}

Renovation: CO₂ at most 12 kg/m²_{HGEA}

PHPP 75 to 200 points

Intermediate values are derived by linear interpolation.

Essential criterion

Proof of compliance as per PHPP: Calculation is performed with PHPP Version 9 or later. Here the Austrian CO₂-conversion factors as per OIB-guideline 6, 2015 apply.; these are not implemented in PHPP, but must be downloaded. The complete PHPP Excel file must be uploaded as proof of compliance.

B 4a Overall energy efficiency factor OIB

The overall energy efficiency factor (f_{GEE}) is the ratio of the building's end-use energy demand to the end-use energy demand baseline value for a building meeting the standards of 2007. An f_{GEE} of 0.75, say, indicates that the building in question is 25 % more efficient than a 2007 baseline building.

Minimum requirement

New starts: $f_{GEE,SK}$ at most 0.85

Renovation: $f_{GEE,SK}$ at most 0.95

Top score

New starts: $f_{GEE,SK}$ at most 0.55

Renovation: $f_{GEE,SK}$ at most 0.65

25 to 75 points

Intermediate values are derived by linear interpolation.

Proof of compliance: Calculating the overall energy efficiency factor $f_{GEE,SK}$ as per OIB-guideline 6, 2015 and the standards in force. As proof of compliance the complete energy pass must be uploaded.

B 4b Photovoltaic PHPP

PV facilities generate electricity from the most immediately accessible source, sunlight, the most valuable of all energy storage. A PV facility is taken into account only if it is connected to the grid, has been scaled with a suitable calculation programme and is installed on a building, outhouse etc. (not in an open space). The facility scores in line with its specific annual yield, expressed in kWh/a per square metre of surface area it occupies.

Minimum requirement

Annual yield of 20 kWh_{End} PV electricity per square metre of surface area occupied.

Top score

Annual yield of 75 kWh PV electricity per square metre of surface area occupied.

10 to 50 points

Intermediate values are derived by linear interpolation.

Proof of compliance: Calculation of the PV facility's yield with a suitable programme, taking regional climate data and the extent to which the PV modules are overshadowed into account, plus technical data sheets for the components selected, plans and details of the surface area occupied as per PHPP manual.

C Construction materials

C 1 Materials

Alongside the criteria for energy efficiency, criteria for construction materials are also of vital importance for buildings to klimaaktiv standard. The criteria for construction materials are mainly concerned with the environmental impact of building. In klimaaktiv buildings employing materials harmful to the climate is ruled out.

Assessing construction materials involves five main aspects:

- Ruling out materials harmful to the climate (e.g. materials containing HFC) and substances of very high concern
- Avoiding materials that suffer from weaknesses at some point(s) in their life cycle (e.g. PVC)
- Rewarding the use of materials with excellent properties throughout their entire life cycle (products with a seal of environmental approval)
- Making the ecologically soundest use of construction materials over the building's entire life cycle (assessment via ecological indicators, taking non-renewable primary energy consumption, greenhouse gas potential and acidification potential into account)
- Employing designs that simplify dismantling and recycling

C 1.1 Avoiding HFC

All fully and partly halogenated organic compounds with more greenhouse gas potential than carbon dioxide are ruled out for the areas of application defined below.

Minimum requirement

The following product groups must be free of HFC:

- XPS insulation panels
- expanding foams, cleaning agents, marking sprays and similar products in pressurized dispensers based on PUR/PIR
- PUR/PIR insulating materials (particularly if recycled PUR/PIR is involved)

5 points

Essential criterion

Proof of compliance: Documentation in the form of manufacturer's certificate with detailed product data sheet. Products listed under this criterion in the klimaaktiv criteria platform baubook.at/kahkp or awarded the Austrian seal of environmental approval as per umweltzeichen.at satisfy the requirements.

C 1.2 Avoiding substances of very high concern

Substances that can have serious effects on the environment or on human beings' health are listed by the European Chemicals Agency ECHA as candidate SVHCs. Some flame retardants used in insulation materials count as SVHCs and should therefore be avoided.

Minimum requirement

For all foamed-plastic insulation materials the following critical flame retardants are ruled out:

- hexabromcyclododecane (HBCD)
- brominated diphenylether
- tetrabrombisphenol A
- short-chain chloroparaffins C10-13
- halogenated phosphoric acid esters

5 points

Proof of compliance: Documentation in the form of manufacturer's certificate with detailed product data sheet. Products listed under this criterion in the klimaaktiv criteria platform baubook.at/kahkp or awarded the Austrian seal of environmental approval as per umweltzeichen.at satisfy the requirements.

C 1.3 Avoiding PVC

The starting product for PVC (vinyl chloride, classified as carcinogenic throughout the EU) and some of the additives required are environmentally questionable. Various other halogenated organic compounds should also be avoided, because they involve ecological drawbacks in the production cycle and/or at the disposal/recycling stage and may emit toxic gases in fires.

Minimum requirement

flooring and wall coverings free of PVC

Assessment

- flooring and wall coverings (5 points)
- foil, sealing sheets, barrier layers etc. and sealants (5 points)
- pipes for water and waste water (10 points)
- halogen-free fitting accessories for electrics (20 points)
- windows, doors (10 points)
- solar shading and/or screening on building (10 points)

5 to 60 points

Essential criterion to some extent

Proof of compliance: Documentation in the form of manufacturer's certificate with detailed product data sheet. Products listed under this criterion on the klimaaktiv criteria platform baubook.at/kahkp satisfy the requirements. In the case of flooring and plastic pipes the criterion is satisfied by (inter alia) products granted the Austrian seal of environmental approval umweltzeichen.at.

C 1.4 Employing products with environmental approval

The aim here is to minimize harmful effects of construction materials on health and the environment by selecting ecologically upgraded products. Points are awarded for using materials that satisfy high environmental standards. Here the following seals of approval are recognized:

- Austrian seal of environmental approval, umweltzeichen.at
- natureplus, natureplus.org
- IBO seal of approval, ibo.at/de/produktpruefung

Assessment

For each tested material incorporated in at least 80 % of the area of the following elements 5 points are awarded: outside wall, inside wall/partition, dropped ceiling, roof/top floor, slab foundation/basement ceiling. A maximum of 15 points can be awarded per element.

If the future owners/tenants have a free choice of interior fittings, the standard fittings offered by the property developer must be taken as a basis for assessment.

0 to 40 points

Proof of compliance: Test certificates or listings of the products approved on the relevant test centres' websites.

Products listed under this criterion in the klimaaktiv criteria platform baubook.at/kahkp satisfy the requirements. Points are awarded for using products with the following seals of approval: natureplus, IBO, Austrian seal of environmental approval. Details of other seals of approval on request.

Download: Fact sheet on recognized seals of environmental approval (in German). klimaaktiv.at/formblaetter

C 2 Design and building

C 2.1a Ecological index of building - BG1 / BG3

The ecological impact of erecting a building to current construction standards is of the same order as the ecological impact of heating a passive house for 100 years. That is why minimizing the ecological impact is a vital part of ecological construction. How minimizing the ecological impact works can be seen from "Ökoindex 3" for the entire building. The less non-renewable sources of energy are employed and the fewer greenhouse gases etc. are emitted in producing the construction materials, erecting the building and then maintaining it, the lower the value of the OI3 index.

The OI3 index employs three indicators:

- greenhouse potential (over 100 years with 1994 as base year)
- acidifying potential
- consumption of non-renewable energy resources

Minimum requirement

$$OI3_{BG3,BZF}/OI3S_{BG3,BZF} \leq 800$$

Top score

$$OI3_{BG3,BZF}/OI3S_{BG3,BZF} \leq 300$$

0 to 75 points (detailed proof of compliance)

Intermediate values are derived by linear interpolation.

Essential criterion

As an alternative, C 2.1b.

Proof of compliance: Calculation and documentation via Eco2Soft.

Plans, layers of construction, documentation of service life for component layers, calculation of reference area (see Glossary).

Renovation: For the Bronze level (declaration to basic criteria) the essential criterion counts as satisfied if the renovated part of the building comprises more than 50 % of the conditioned GEA and the existing building is more than 20 years old.

C 2.1b Ecological index of thermal building envelope AB1 (as an alternative to C 2.1a)

As a simplification, the ecological index can also be calculated for the thermal building envelope only (including fireproof floors). In this case one-third fewer klimaaktiv points are awarded. Here life cycle assessment is ignored. In contrast to audit boundary 0 (used for assessment in earlier klimaaktiv catalogues), the structures must be inventoried completely (i.e. including seals, roofing, curtain facades, etc.) for audit boundary 1.

Minimum requirement

$$OI3_{BG1,BGF}/OI3S_{BG1,BGF} \leq 280$$

Top score

$$OI3_{BG1,BGF}/OI3S_{BG1,BGF} \leq 60$$

0 to 50 points (simplified proof of compliance) Intermediate values are derived by linear interpolation.

Minimum requirement

As an alternative, C 2.1a.

Proof of compliance: Calculation and documentation via physics-of-buildings programmes such as Archiphysik, GEQ, etc. or Eco2Soft.

C 2.2 Disposal indicator EI10

At 10 million tonnes, waste from the building sector makes up a large proportion of total waste in Austria. Here the aim is to achieve construction materials, design and buildings with satisfactory properties as regards dismantling, utilization, waste disposal and recycling. The disposal index is the volume of all element structures and layers accumulating throughout the building's life cycle, weighted by waste disposal and recycling properties. The disposal index can be calculated together with the ecological index OI3 either for audit boundary 1 – BG1 (thermal building envelope including fireproof floors) or for audit boundary 3 – BG3 (entire structural shell).

Minimum requirement

$$EI10 \leq 45.0 \text{ (for new buildings and renovation)}$$

Top score

$$EI10 \leq 20.0 \text{ (for new buildings and renovation)}$$

0 to 50 points

Intermediate values are derived by linear interpolation.

Proof of compliance: Calculation and documentation of disposal index EI/EI10 by means of the programme Eco2Soft. The EI manual V2.0, 2016 edition, contains a detailed description of the method (in German).

D Comfort and air quality indoors

D 1 Thermal comfort in summer

People find accommodation with properly insulated walls and high-quality windows – as in klimaaktiv buildings, for instance – particularly pleasant in winter. A separate criterion is listed to ensure that klimaaktiv buildings provide above-average comfort in summer, spring and autumn. With glazing, thermal mass, ventilation options, solar shading and other factors the duration of overheating can be minimized.

How hot a building gets depends on a number of factors, including window size, orientation and quality, solar shading options, standard to which the envelope has been insulated, thermal mass and ventilation choices. With suitable calculation methods the influence of these factors can be quantified with suitable calculation methods as early as the planning stage.

With intelligent planning overheating can be avoided in summer, spring and autumn; so thermal comfort can be improved at the hottest time of year, and there is no need to invest in air-conditioning equipment and using it to consume electricity.

15 to 50 points

Essential criterion

Proof of compliance

Proof of compliance can be delivered by various routes with differing scoring:

- Simplified proof of compliance (permissible only for detached and semi-detached residences): proof of provision of outside, adjustable solar shading with an F_c value ≤ 0.32 (for a glazing energy transmittance of 0.50) or an F_c value ≤ 0.27 (for an energy transmittance of 0.70)
- Calculated proof of compliance with summer-proof standard to ÖNORM B 8110-3 for all critical rooms in a building
- PHPP proof of compliance: overheating limited to between 3 and at most 10 % of hours' use per annum (proof of compliance as per PHPP sheet "Summer", overheating threshold 25 °C)
- Dynamic thermal building simulation: it must be shown that the temperature exceeds the comfort ceiling of 26 °C for at most 3 % of hours' use per annum (maximum score)

D 2 Convenience ventilation

Convenience ventilation provide benefits, both energy-wise and as regards indoor air hygiene. Air exchange can be adjusted to requirements, ensuring excellent air quality in all rooms. Ventilation systems constantly remove pollutants, carbon dioxide and excess humidity – and the air supplied from outdoors is purified by high-grade filters.

The aim is for the convenience ventilation recovery to function perfectly, with a high level of acceptance among users.

- The system is dimensioned to match needs, and tuned during commissioning.
- Minimum incoming air temperature is at most 3 °C below room temperature, at least 17 °C.
- Outdoor air filter at least ePM1(50%) or better to ISO 16890
- Control in the space occupied is available for at least three operating levels.
- The system ensures constant high air quality without draughts (speed of air movement indoors ≤ 0.1 m/s).
- There is no objectionable operating noise.
- The system is matched to other building services.
- The system is straightforward to operate.

60 points

Proof of compliance

- Confirmation that the requirements are satisfied (tick requirements listed in official form)
- Dimensioning to match needs: PHPP specification on ventilation, worksheet on planning or equivalent
- Product data sheet, dimensioning calculations, equipment configuration, type and location of air outlets
- On completion: tuning log

Download: Fact sheet on convenience ventilation, Quality guidelines for building services

klimaaktiv.at/bauen-sanieren

klimaaktiv.at/erneuerbare

D 3 Employing low emitting materials

The aim is to ensure high indoor air quality by employing products low on emissions and pollutants. So the extent to which such products are employed in the following categories is assessed:

- Laying materials
- Flooring (wood and wood-based materials, elastic or textile flooring, coatings on flooring and floor fills)
- Wood-based materials
- Coatings (interior wall paints and primers, coatings on wood and metal)
- Bituminous primers, paints and adhesives

In each product category up to 12 points can be awarded for new starts and up to 8 points for renovation.

Performing a pollutant audit for renovation (20 points)

Surveying existing buildings provides an opportunity to track down pollutants that may be on hand and to clean up the elements affected.

D 4 Indoor air quality

Indoor air quality reveals how successfully those involved in construction have avoided products that emit VOCs and formaldehyde.

Minimum requirement

VOC at most 3.000 µg/m³ (target: max. 1000 µg/m³)
Formaldehyd at most 0,10 mg/m³

Top score

VOC at most 250 µg/m³
Formaldehyd at most 0,03 mg/m³

0 to 60 points

Proof of compliance: Products listed under this criterion in the klimaaktiv criteria platform baubook.at/kahkp satisfy the requirements. A number of seals of approval exist that are accepted as proof of compliance for particular groups of products (e.g. the Austrian seal of environmental approval or natureplus). Details of ways of proving compliance are defined in the full version of the klimaaktiv catalogue for residential buildings. If the future owners/tenants have a free choice of interior fittings, the standard fittings offered by the property developer must be taken as a basis for assessment.

For pollutant audits in existing buildings a survey report as per recommendations in ÖNORM EN ISO 16000-32, details of radon or mould measurements carried out (if appropriate) and reports on renovation measures implemented must be submitted.

0 to 40 points

Essential criterion

from 2000 m² conditioned GEA upward

Proof of compliance: VOCs are determined either by means of thermodesorption to ISO 16000-6 or by means of solvent desorption to ÖNORM M 5700-2. As regards formaldehyde, samples are assessed to ISO 16000-3.

The way to a klimaaktiv building

Step by step to a seal of approval:

For a building to be approved in line with the klimaaktiv criteria, it must be successfully assessed on line (the so-called building declaration). There are separate on-line platforms for residential buildings and non-residential buildings. These are available free of charge once the user has registered. A building is assessed in a series of steps:

Step 1: registering on the building platform

- If you wish to declare a klimaaktiv residential building for the first time, register free of charge on the klimaaktiv building platform baubook.at/kahg (in German).
- Once you have registered, you will be guided through the declaration procedure step by step and receive all the information you need. A declaration in progress can be interrupted at any time, continued later or aborted.

Step 2: defining your project

- First you must indicate whether the building is at the planning stage, has been completed or is already in use.
- All boxes marked with a * must be filled in. Once all the necessary entries have been made and the required proofs of compliance have been uploaded, a green tick will appear in the relevant status box as confirmation.

Step 3: completing the declaration

- Once all the necessary entries have been made on the five input sheets and all the necessary proofs of compliance have been uploaded, a green tick will appear in the overview. Now the declaration can be concluded. This automatically ends data input, and the file is passed on to the province's plausibility checker.

Step 4: plausibility check

- The plausibility checker and you each receive confirmation by email that your building is to be checked.
- If proofs of compliance or data in the declaration are insufficient, you will be informed of this via an email tool and can revise your declaration before resubmitting it for checking. If the checking process is successful, the project is given the green light.

Step 5: publishing the project

- Details of all klimaaktiv buildings are published on the building database klimaaktiv-gebaut.at (in German).

Step 6: badge and certificate

- Once your building has been completed, you will receive a certificate and a badge from the klimaaktiv programm management.

N.B.: almost all common types of non-residential building can be klimaaktiv declared on a special platform: klimaaktiv.baudock.at (in German).

Austrian Green Planet Building



The "Austria Green Planet Building" Award supports Austrian architects, building consultants, construction companies and technology enterprises by promoting their outstanding buildings for climate protection abroad. The content requirements for this Award correspond to the klimaaktiv quality criteria for Building and Renovating.

Austrian expertise and technologies are recognized worldwide

In Austria, 16 percent of greenhouse gas emissions come from buildings, worldwide about one third. In terms of population, Austria is the country where you can find the world's most passive houses. Austria's environmental technology sector ranks among global front-runners: Particularly in terms of innovations such as using biomass for energy, solar thermal energy and hydropower, as well as in rail technology and sustainable building technologies.

The "Austria Green Planet Building" Award is especially dedicated to the challenges of climate protection and to particularly energy-efficient buildings. The "Austria Green Planet Building" Award is a cachet for high quality in the field of sustainable construction and communicates the comprehensive skills of the Austrian construction industry abroad. Outstanding architecture, the highest level of competence in energy-efficient construction and competent construction companies ensure high-quality buildings.

Public patronage ensures highest credibility

Austrian Green Planet Building is a joint initiative of the Federal Ministry for Sustainability and Tourism, the Federal Ministry of Transport, Innovation and Technology, and ADVANTAGE AUSTRIA of the Austrian Federal Economic Chamber. Through this cooperation credibility is achieved for sustainable construction "from Austria". In addition, this cooperation opens up the core competences of the founding organizations for the Austrian architecture and planning offices, construction and technology companies. Detailed information and all quality criteria are to be found at agpb.at

klimaaktiv buildings – Good Practice

klimaaktiv buildings make an active contribution to climate protection combining comfort with low energy costs and high quality in construction/renovation. The projects presented here give some idea of the great variety of klimaaktiv residential buildings. Complete project descriptions are to be found in the building database at klimaaktiv-gebaut.at (in German).



Apartmenthouse, Die Drei Schwestern, Wien

Promoter: WBV-GPA: Wohnbauvereinigung für Privatangestellte

Architecture: Kirsch ZT GmbH

klimaaktiv Gold with 902 points

Foto: Herta Hurnaus



T431, Apartmenthouse,

St. Anton Mooserkreuz, Tirol

Promoter: Alpenländische Gemeinnützige Wohnbauges.m.b.H

Architecture: Arch. Raimund Rainer ZT GmbH

klimaaktiv Gold with 909 points

Foto: Alpenländische Gemeinnützige Wohnbauges.m.b.H



Apartmenthouse Defreggerstraße,

Innsbruck, Tirol

Promoter: Innsbrucker Immobilien GmbH Co KG

Architecture: Architekturbüro

klimaaktiv Gold with 901 points

Foto: Innsbrucker Immobilien GmbH & Co KG



Apartmenthouse, Vogelweide Nord OB 309,

Wels, Oberösterreich

Promoter: Welser Heimstätte

Architecture: Bachner Roth ZT

klimaaktiv Gold with 930 points

Foto: Herbert Leindecker



**Passive-house renovation Am Sportplatz 4,
Hörbranz, Vorarlberg**

Promoter: Errichtergemeinschaft AS4

Architecture: Gerhard Zweier

klimaaktiv Gold with 990 points

Foto: Eckhart Drössler



Renovation Kaiserstraße 7, Vienna

Promoter: Kongregation der Lazaristen

Architecture: Kronreif_Trimmel & Partner ZT GmbH

klimaaktiv Gold with 940 points

Foto: Kurt Hörbst



Apartmenthouse, Maria Anzbach, NÖ

Property developer:

Wohnungseigentumsgemeinschaft

Architecture: DI Willibald Eigner

klimaaktiv Bronze

Foto: J. Mayer



**Renovation a Apartmenthouse, Gleisdorf,
Steiermark**

Promoter: Projekt Rathausgasse 38

LIM Projektentwicklungs GmbH&CoKG

Architecture: Baumeister Leitner,

Planung & Bauaufsicht GmbH

klimaaktiv Gold with 955 points

Foto: Baumeister Leitner GmbH



Semi-detached house, Inzing, Tirol

Promoter: private

Architecture: DI Matthias Wegscheider

klimaaktiv Gold with 933 points

Foto: DI Matthias Wegscheider

Glossary and list of abbreviations

CO₂-emissions

Carbon dioxide emitted per annum, based on the building-specific usage profile per m² conditioned gross floor area. The value is derived from the shares of end-use energy demand by energy storage, multiplied by the corresponding conversion factors for CO₂-emissions.

conditioned

heated/cooled/humidified/ventilated

Convenience ventilation

Ventilation system that constantly supplies fresh air to living rooms, bedrooms and children's rooms at the right temperature.

E110

The disposal index is a yardstick for the disposal and recycling properties of the elements/structures under consideration, accumulating throughout the building's life cycle.

EMICODE EC1/EC1plus

Seal of approval from the Gemeinschaft emissions-kontrollierter Verlegewerkstoffe (Association of Emission-controlled Laying Materials), helps to assess and select adhesives, putty, primers, sealants etc. particularly low on emissions.

f_{GEE'} overall energy efficiency factor

The overall energy efficiency factor is used to compare the building in question with a fictitious reference building; it is the ratio of the end-use energy demand for that building to the end-use energy demand for a building with similar facilities with the 2007 target values (as a reference value).

GEA (BGF)

The gross external area (GEA) comprises the sum total of all floor areas on all levels of a building including all structural areas (walls, columns, etc.). See designingbuildings.co.uk/wiki/Gross_external_area_GEA, for instance.

g_{tot} value

The energy reduction factor for movable solar shading is always calculated in conjunction with the energy transmittance of the glazing. The smaller g_{tot} is, the more effective the solar shading.

Heat recovery

Collective term for techniques of utilizing the heat in exhaust air or effluent.

HWB

Heating energy demand ("Heizwärmebedarf" in German)

OI3 Index/Ökoindex (in German)

The Ökoindex indicates the ecological impact involved in erecting or renovating a given building. The lower the OI3 Index, the better.

OIB

The Österreichisches Institut für Bautechnik (Austrian Institute for Structural Engineering) issues guidelines (in German) to harmonize the rules applying to buildings in Austria.

Passive House Planning Package PHPP

The planning tool from the Passivhausinstitut in Darmstadt covers (inter alia) calculating energy audits, planning convenience ventilation and estimating the standardized heating load.

Primary energy rating

The primary energy rating of a facility (such as a biomass boiler) comprises both the actual energy rating and the energy expended in the process chain upstream. For instance, the energy expended in felling the trees and transporting the timber is taken into account.

PV facility

A PV facility converts insolation (solar irradiance) into electricity. The facility's electrical rating is given in W_{peak} ; that is the power delivered by the facility with insolation at right angles to its surface and a cloudless sky. In conjunction with the additional parameter values for climate, size, orientation and roof slope it can be used to calculate the total yield per annum.

Reference area

Conditioned gross floor area in $m^2 + 0.5 * \text{gross floor area of buffer spaces in } m^2$

TFA

The treated floor area (TFA) is defined in relation to the floor area. In the planning package PHPP the TFA is employed as a reference value throughout, so as to obtain comparable values for heating energy demand.

Thermal bridge

Thermal bridges are points of increased heat loss, typically found at the corners of outside walls (geometrical thermal bridge) or where highly heat-conductive materials such as steel are (incorporated structural thermal bridge).

U value

Coefficient of heat transfer, specifies the heat loss in watts (equivalent to joules per second) on a square metre (e.g. wall surface) per degree Celsius of difference between inside and outside.

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aee-intec.at

Bau. Energie. Umwelt Cluster
Niederösterreich

bauenergieumwelt.at

e7 Energie Markt Analyse GmbH
e-sieben.at

ConPlusUltra GmbH
conplusultra.com

Grazer Energieagentur
grazer-ea.at

About klimaaktiv

klimaaktiv is the climate protection initiative of the Federal Ministry for Sustainability and Tourism. Since 2004 the Initiative has covered all the key fields of technology central to using energy sustainably, focussing on Building and Renovating, Building and Renovating, Conserving energy, Renewable sources of energy and Mobility.

Full details of information and consulting services for households, firms and communities are available at klimaaktiv.at (in German). General information in English is to be found at klimaaktiv.at/english.

The programme klimaaktiv Building and Renovating promotes climate-friendly and energy-efficient new building and high-quality renovation in Austria. With the Initiative's building standard a single nationwide, neutral, transparent seal of approval for sustainable, climate-friendly building has been created. The list of criteria constitutes a system for energy efficiency, but also the quality of materials and structures and key aspects of convenience and air quality indoors, are assessed and evaluated objectively. Detailed information (in German) is to be found at klimaaktiv.at/bauen-sanieren.

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