ENV1.1

Climate action and energy

Objective

Our objective is to consistently design buildings in a life cycle-oriented manner in order to minimise the emission of climate-impacting greenhouse gases, the consumption of energy and material resources, and other impacts on the environment throughout all stages of a building's life.

Benefits

Life cycle-oriented building design helps the commissioning parties and designers to make climate-based and environmentally-oriented decisions. Variants that consider both the climate and environmental effects of the building operation and structure can be compared using comprehensive balancing procedures and optimal solutions can be identified. By applying the balancing method, relevant climate, energy and environmental indicators of the building are disclosed, e.g. to financial institutions.

Contribution to overarching sustainability goals

Prospect

The relevance of the criterion of environmental quality will continue to increase. The reference values are adapted to new solutions and future needs.

Share of total score

	SHARE	IMPORTANCE FACTOR
Office **Education** **Commercial building** **Healthcare buildings** **Assembly buildings**	**10.4%**	10
Shopping centres **Consumer market** **Residential** **Hotel**	**10.0%**	10
Logistics **Production**	**9.6%**	10

EVALUATION

It is recognised if the life cycle assessment method is used with a focus on greenhouse gas reduction in the planning of buildings and is optimised with the help of variant considerations (indicator 1). There is a motivation to quantitatively determine and provide balancing results as well as comparative calculations with defined benchmarks and according to the specified balancing method (indicator 2). In addition, "Agenda 2030 Bonuses" are recognised if building stock is preserved, greenhouse gas emissions are optimised through building-induced mobility or a balanced CO_2 balance can be calculated for the building over its entire life cycle. A maximum of 100 regular points can be credited in the criterion. A maximum of 130 points can be achieved, including bonuses. Note: If a good performance and thus a high score of evaluation points is demonstrated in indicator 2 or via bonuses offered in the criterion, the evidence for points in indicator 1 can be foregone.

MINIMUM REQUIREMENT

FOR ALL BUILDINGS: Disclosure of life cycle assessments (indicator 2.1.1). For buildings that are not yet designed for net greenhouse gas neutral operation at the time of completion, a climate action roadmap for carbon neutral operation, with the target year being according to national targets ("Klimaschutzfahrplan Klimaneutraler Betrieb – Zieljahr gemäß nationaler Ziele"), must be available (indicator 2.4.1).

FOR PLATINUM CERTIFIED BUILDINGS: Disclosure of life cycle assessments (indicator 2.1.1). For buildings that are not yet designed for net greenhouse gas neutral operation at the time of completion, an ambitious climate action roadmap for carbon neutral operation ("Ambitionierter Klimaschutzfahrplan Klimaneutraler Betrieb") must be available (indicator 2.4.2).

NO.	INDICATOR	POINTS
1	**Optimisation of the CO_2 balance in the planning process**	**max. 10**
1.1	**Integration of life cycle CO_2 balances into the planning process**	
1.1.1	**Life cycle CO_2 balance in early project phases:** In early project phases (determination of basic principles, definition of needs, site assessment, preliminary planning or design planning) climate action-oriented life-cycle assessments are developed and incorporated into the decision-making process for the project.	
	■ For building operation (including energy demand for use), at least two of the following variants are evaluated: upscale energy standard, net greenhouse gas neutral operation, prepared net greenhouse gas neutral operation, reduction of demand = eco-sufficiency standard. Other variants worth considering – see method.	+5
	■ At least three of the following variants are evaluated for the structure: optimised/reduced use of material quantities/lightweight construction, use of CO_2 -reduced material types/materials, optimised/reduced use of building technology (low tech/simple construction), circular construction method with consideration of the pre-use and post-use phases, longer-lasting building service life and optimised service life of building components, reduced available space (eco-sufficiency standard). Other variants worth considering – see method.	+5

1.1.2 Life cycle CO_2 balance in approval and detailed design:

Life cycle CO_2 balances are determined regularly during design (adjusted to the respective planning status) and communicated in the planning team according to the specific planning issues and communicated internally (differentiated according to operational and building-related emissions).

- For building operation (including energy demand for use), at least two of the following variants are evaluated: upscale energy standard, net greenhouse gas neutral operation, prepared net greenhouse gas neutral operation, reduction of demand = eco-sufficiency standard. Other variants worth considering – see method. +5
- At least three of the following variants are evaluated for the construction work: optimised/reduced use of material quantities/lightweight construction, use of CO_2 - reduced material types/materials, optimised/reduced use of building technology (low tech/simple construction), circular construction method with consideration of the pre-use and post-use phases, longer-lasting building service life and optimised service life of building components, reduced available space. Other variants worth considering – see method. +5
- Transport/logistics and construction site processes are optimised in terms of their greenhouse gas emissions with the help of variant calculations. +2.5

1.2 AGENDA 2030 BONUS – Preservation of building stock and optimisation of mobility

1.2.1 Climate action through preservation of building stock **+5**

At least 50% of the original area of an existing building is integrated into the new building. The greenhouse gas reduction achieved through this measure has been calculated.

1.2.2 Optimisation of mobility **+2.5**

The greenhouse gas emissions of the building-related mobility are optimised as part of the planning and are quantitatively determined.

---

2 Comparative values for life cycle CO_2 balance **max. 100**

2.1 Disclosure of life cycle CO_2 and energy balances

2.1.1 Minimum requirement: Disclosure of life cycle assessments

- Calculated life cycle assessments for greenhouse gas emissions and non-renewable primary energy are available for the realised building according to the defined format. 5

2.2 Accounting scope life cycle: Evaluation of the life cycle CO_2 balance of the completed building

2.2.1 The results of the life cycle CO_2 balance fall below the target, reference or limit values (points can be interpolated linearly):

- Upper target value (= 0.5 * reference value) 70
- Target value (= 0.75 * reference value) 60
- Reference value 50
- Limit value (= 2.25 * reference value) 0

2.3 AGENDA 2030 BONUSES – Lowest life cycle CO_2 balance, Climate Action Roadmap Life cycle and climate action through dimensional stability

2.3.1 Accounting scope life cycle – Lowest life cycle CO_2 balance **+5**

The results of the life cycle CO_2 balance fall below the "upper target value" defined in indicator 2.2.1 and are thus at least 50% below the reference value.

2.3.2 Climate Action Roadmap Life cycle – carbon neutral buildings **+10**

A plausible climate action roadmap in accordance with the "Framework for carbon neutral buildings and sites" is available for the building for the accounting scope "operation and construction" (life cycle), which mathematically proves that a balanced CO_2 balance is achieved by the year 2045 (see indicator 1.2) and a cumulative GHG value of 0 kg is not exceeded (“carbon neutral building over the life cycle").

2.3.3 Climate action through dimensional stability/eco-sufficiency **+5**

Significant greenhouse gas reductions are achieved through clearly defined and measurable eco-sufficiency measures. Quantitative data are available for measures such as increased density of use and quantified data on the reductions achieved. A prerequisite for the bonus is that the effects cannot be represented or cannot be sufficiently represented by other indicators in the criterion, as they use alternative needs-based reference variables.

2.4 Accounting scope operation: Climate Action Roadmap and net greenhouse gas-neutral operation — max. 15

2.4.1 Climate Action Roadmap Carbon neutral operation – target year according to national targets: 5

Minimum requirement (for buildings that are not operated in a carbon neutral manner): For buildings that are not operated in a net greenhouse gas neutral manner, a plausible climate action roadmap in accordance with the "Framework for carbon neutral buildings and sites" is available for the accounting scope "operation”, which demonstrates which measures will be used to achieve a balanced CO_2 balance for building operation by the national target year for net greenhouse gas neutrality (“carbon neutral building")

2.4.2 Ambitious climate action roadmap – carbon-neutral operation 10

Minimum requirement for Platinum: A plausible climate action roadmap in accordance with the "Framework for carbon neutral buildings and sites" is available for the building for the accounting scope “operation", which demonstrates which measures will be taken to achieve a balanced CO_2 balance for the building operation as soon as possible (2030 or, in exceptional cases, 2035) (“carbon neutral building")

2.4.3 Net greenhouse gas neutral/carbon neutral building (accounting scope “operation"): The building is designed to be operated in a net greenhouse gas neutral manner in accordance with the accounting rules of the DGNB "Framework for carbon neutral buildings and sites". 15

2.5 Accounting scope construction work: CO_2 reduced construction work — max. 20

2.5.1 CO_2 reduced manufacturing phase:

The fossil greenhouse gas emissions (GWP_{fossil}) of the production (modules A1 - A3) of the structure fall below the building type-specific values (points can be interpolated linearly).

- Upper target value 20
- Target value 10
- Reference value 5
- Limit value 0

2.5.2 AGENDA 2030 BONUS - Lowest CO2 emissions of the manufacturing phase **+2.5**

The fossil greenhouse gas emissions (GWP_{fossil}) of the construction (modules A1 to A3) fall below the upper target value of 3.75 kg CO_2e/m^2_{NSA} * a defined in indicator 2.5.1 and are thus at least 50% below the reference value.

3	**Comparative values of other life cycle assessment indicators**	**max. 20**
3.1	**Evaluation of further life cycle assessment indicators**	**max. 20**
3.1.1	The results of the life cycle primary energy balance (non-renewable) fall below the target, reference or limit values (points can be interpolated linearly):	
	■ Upper target value (= 0.5 * reference value)	10
	■ Target value (= 0.75 * reference value)	7.5
	■ Reference value	5
	■ Limit value (= 2.25 * reference value)	0
3.1.2	The weighted results of other environmental indicators fall below the target, reference or limit values (points can be interpolated linearly).	
	■ Upper target value (= 0.5 * reference value)	10
	■ Target value (= 0.75 * reference value)	7.5
	■ Reference value	5
	■ Limit value (= 2.25 * reference value)	0

SUSTAINABILITY REPORTING

The following key metrics can be taken from the application of the criterion:

NO.	KEY METRICS/KPI	UNIT
KPI 1*	Greenhouse gas emissions of structural part in the building's life cycle (sum of modules A1 – A3, B4, C3, C4)	[kg CO2e/m² NSA a] and [kg CO2e/m² GFA a] and [kg CO2e/use reference unit]
KPI 2*	Greenhouse gas emissions during operation and use (sum of modules B6.1, B6.2 and B6.3)	[kg CO2e/m² NSA a] and [kg CO2e/m² GFA a] and [kg CO2e/use reference unit]
KPI 3*	Greenhouse gas emissions of the recycling potential and the effects of exported energy (modules D1 and D2, separately)	[kg CO2e/m² NSA a] and [kg CO2e/m² GFA a] and [kg CO2e/use reference unit]
KPI 4*	Primary energy demand non-renewable, structural part in the building's life cycle (sum of modules A1 – A3, B4, C3, C4)	[kWh/m² NSA a] and [kWh/m² GFA a] and [kWh/use reference unit]
KPI 4*	Primary energy demand non-renewable, in operation and use (sum of modules B6.1, B6.2 and B6.3)	[kWh/m² NSA a] and [kWh/m² GFA a] and [kWh/use reference unit]
KPI 6	Primary energy demand according to GEG (German Buildings Energy Act)	[kWh/m² NSA a]
KPI 7	Final energy demand according to GEG	[kWh/m² NSA a]

KPI 8	Renewable energy self-sufficiency rate according to monthly balance method according to GEG	[kWh /m² NSA a]
KPI 9	Building mass according to LCA	[kg/m²NSA a] and [kg/m²GFA a]
KPI 10	Detailed building components list/catalogue with units of measure, material and LCA data set allocation, useful lives	[-]
KPI 11	Life cycle assessment results for environmental indicators AP, EP, POCP	[-]
KPI 9	Life cycle assessment results for environmental indicators AP, EP, POCP	[-]

APPENDIX A – DETAILED DESCRIPTION

Relevance

In all phases of their life cycle, buildings cause emissions and require resources, from production (e.g. through the production of construction materials and building products) to use (e.g. through building operation and maintenance processes) to end of life (e.g. through reprocessing of materials or deconstruction). Emissions to air, water and soil lead to a variety of environmental problems. These include global warming in particular, but also other problems such as summer smog, forest dieback and fish mortality, and the over-fertilisation of water bodies and soils. Life cycle-oriented building design supports building owners and planners in making decisions in favour of climate-based and environment-friendly as well as resource-saving solutions. The most important objective of the criterion is to contribute to the achievement of the climate goals.

II. Further explanation

III. Method

With the help of life-cycle assessment data, emissions and resource consumption are calculated over the entire life cycle – for production, operation, use and end of life – and can thus be incorporated into decisions throughout the planning process. Benchmarks can be used to evaluate the results of life-cycle assessments. If possible, the life-cycle assessment of a building should be developed as early as the planning phase. It can serve as an important tool for optimising the environmental quality of the building.

Indicator 1: Optimisation of the CO_2 balance in the planning process
Indicator 1.1: Integration of life cycle CO_2 balances into the planning process
The objective of indicator 1.1 is to present LCA results transparently from an early design phase, adapted to the respective context or the time and scope of planning, and to integrate them into the decision-making process.

In early planning phases (service phases 2-4), an LCA model suitable for the decisions should be set up for this purpose (Indicator 1.1.1) and a minimum scope of defined or freely developed variants should be considered. Variants are evaluated and compared qualitatively or quantitatively in terms of their climate impact. In this context, both building-related and use-related greenhouse gas emissions are assessed in a transdisciplinary manner. For the evaluation, specific calculations, generic parameters (typically expected results) or adequate checklists can be used to review the climate impact of options and variants in the decision-making process. Information from various specialist planners (e.g. structural engineers, HVP planners, building physics planners, energy planners) should be included in the determination of the variants.

At least two of the following variants are to be evaluated for the building operation/use:

- High energy standard (significantly below legal minimum standards regarding energy efficiency)
- Net greenhouse gas-neutral operation
- Prepared net greenhouse gas-neutral operation
- Reduction in demand = eco-sufficiency standard

Beyond these minimum variants to be considered, site-specific conditions, maintenance-optimised options, the condition of the building envelope and technical equipment or intelligent measurement and monitoring equipment can

be included, for example. Alternatively, the evaluated variants can be oriented towards the defined action area of the DGNB framework.

At least three of the following variants will be evaluated for the structure:

- Optimised/reduced use of material quantities/lightweight construction
- Use of CO_2-reduced material types/materials
- Optimised/reduced use of building technology
- Circular construction method with considerations of the pre-use and post-use phases
- Longer service life of buildings and optimised service life of building components
- Reduced available space

Beyond the minimum variants to be considered, the adaptability of the building or the efficiency of the building shape can be considered, for example. Alternatively, the evaluated variants can be oriented towards the defined action area of the DGNB framework.

Variants should be identified in early (indicator 1.1.1) as well as later planning phases (indicator 1.1.2) and can thus be included separately in the evaluation. For the evaluation, specific calculations, generic parameters (typically expected results) or adequate checklists can be used to review the climate impact of options and variants in the decision-making process. The following applies to indicators 1.1.1 and 1.1.2: The findings are presented and explained to the planning team and are demonstrably incorporated into decision-making processes.

If transport/logistics and construction site processes are optimised with the help of CO_2 balances, additional points can be achieved. The calculations represent the life cycle modules A4 (transports to the construction site) and A5 (construction site processes) with sufficient accuracy. The results of carbon foot printing of the actually realised logistics/transport and construction site processes are available for evaluations. If a DGNB construction site certificate is sought, indicator 1 of criterion 2-BS is applicable as proof of points achieved.

Expenditures or expected revenues exceeding the accounting scope "building" can be included in the life cycle optimisation according to indicator 1.1.1 or 1.1.2. Note: The climate action-oriented optimisation of outside facilities is assessed in SOC1.6. In the calculations/optimisations, deviating conventions such as reference periods or reference values can be used. The balancing for the operational phase of the building should be determined across the basic regulatory scope of consideration. This includes, for example, a differentiated consideration of the energy demand relevant to the use of the building in or on the building or at the site (KIT, supply, production, (effect) lighting, etc.) as well as the complete energy demand of the building technology (lifts, escalators, etc.) or similar.

In order to determine the life-cycle assessment results during the design phase and to communicate these to the planning team, target values (adapted to the planning status) should be defined, which are compared with the actual values in different design phases. It is recommended to choose simple tools/indicators at the beginning of the planning, such as statistical characteristic values of the construction work or energy consumption-related benchmarks.

Indicator 1.2: AGENDA 2030 BONUS – Preservation of building stock and optimisation of mobility
Indicator 1.2.1: Climate action through preservation of building stock
If at least 50% of the original area of an existing building is integrated into the new building, the bonus can be awarded. In addition, the greenhouse gas reduction/saving achieved by this measure must be calculated. The savings can be calculated using a reference scenario or assumptions about a replacement construction measure based on characteristic values.

Indicator 1.2.2: Optimisation of mobility

The indicator provides incentives to address the issue of mobility and its impact on the climate. The greenhouse gas emissions of the building-related mobility are optimised as part of the planning and are quantitatively determined. In the context of optimisation and assessment, the mobility-related greenhouse gas emissions are either determined quantitatively and compared with reference values, or they are optimised and assessed on the basis of qualitative characteristics that describe demonstrable effects. The quantitative or qualitative assessment shows that improvements are achieved in terms of greenhouse gas emissions compared to conventional mobility solutions. The calculation results are available in quantitative form and can be used by the DGNB for benchmarking.

Indicator 2: Comparative values for life cycle CO_2 balance

Indicator 2.1: Disclosure of life cycle CO_2 and energy balances

Indicator 2.1.1: Disclosure of life cycle assessments

The objective is to disclose or submit the results of life-cycle carbon footprints (also “CO_2 balance") and primary energy balances to the DGNB for publication and further use by the DGNB. If no results are provided, the building cannot be certified. The disclosure must be made in the documentation format defined by the DGNB (see evidence below). The content of the format corresponds to a "QNG-compatible" presentation of the results with the reference value area (NSA(R)) and the second reference value "person" (or alternative adequate reference values) as well as the primary and final energy demands of the realised building and the reference building according to the GEG.
The balancing for the crediting of points in this indicator can be done using two different procedures:

- Life cycle CO_2 and energy balance according to QNG (= according to indicator 2.2.1)
- Life cycle CO_2 and energy balance according to a "simplified" procedure (e.g. according to the "DGNB Version 2018" balance procedure plus the base amount for CG 400 according to the QNG method)

Note: The latter method is not applicable for crediting points in the indicators that require the use of the "QNG method".

Indicator 2.2: Accounting scope life cycle: Evaluation of the life cycle CO_2 balance of the completed building

Indicator 2.2.1: For the realised building, a life cycle assessment is available based on the calculation method "Accounting rules of the QNG for residential buildings" or "Accounting rules of the QNG for non-residential buildings". In order to best reflect the environmental effects of the realised building, the data basis for determining the LCA should reflect the actual products, materials, components, etc. used. For this purpose, environmental product declarations (EPDs) according to DIN EN 15804 are to be used for the products, materials, components, etc. actually installed.
The results for the global warming potential (to be determined as the environmental indicator "GWP100") shall be made available to the DGNB in a consolidated format (see indicator 2.1.1) and all documents according to the documentation requirement QNG and evidence according to this criterion shall be submitted in an auditable form.

If refrigerants are used, either proof must be provided via indicator 2.4.4 that only natural refrigerants are used or the "Special calculation rule F gases to the LCA accounting rules of the QNG" must be applied. The latter means the inclusion of the use of refrigerants in the balancing according to indicators 2.1.1 and 2.2.1.

Points for the results of the life-cycle CO_2 balance can be awarded (linearly interpolable) depending on whether the value falls short of the target value, upper target value, reference value or limit value. The following applies here:

- Upper target value = 0.5 * reference value
- Target value = 0.75 * reference value
- Reference values see Table 1
- Limit value = 2.25 * reference value

Note: If the value falls below the upper target value, bonus points can be claimed as a lump sum according to

indicator 2.3.1.

Table 1: Reference values for results of life cycle CO_2 balances for different building types

BUILDING TYPE/ USE	REFERENCE VALUE LIFE CYCLE CO_2 BALANCE, REFERENCE VALUE FOR INDICATOR 2.2.1	CONSTRUCTION WORK (MODULES A1 – A3, B4, C3 – C4), SUBTOTAL FOR REFERENCE VALUE FOR INDICATOR 2.2.1.	OPERATION AND USE (MODULES B6.1, B6.2 AND B6.3), SUBTOTAL FOR REFERENCE VALUE FOR INDICATOR 2.2.1	UNIT
Residential	24			kg CO_2e /m^2_{NSA} * a
Non-residential LCA Class 1 (K1), e.g. administrative buildings, schools	Not available	12.0	Project-specific reference value for operation	kg CO_2e /m^2_{NSA} * a
Non-residential LCA Class 2 (K2), e.g. laboratory buildings, event buildings	Not available	12.5	Project-specific reference value for operation	kg CO_2e /m^2_{NSA} * a
Non-residential LCA Class 3 (K3), e.g. hospitals	Not available	13.5	Project-specific reference value for operation	kg CO_2e /m^2_{NSA} * a
Non-residential LCA Class 4 (K4), e.g. enclosed storage rooms, production facilities	Not available	9.0	Project-specific reference value for operation	kg CO_2e /m^2_{NSA} * a
Non-residential LCA Class 5 (K5), e.g. sports halls	Not available	10.5	Project-specific reference value for operation	kg CO_2e /m^2_{NSA} * a
Further classes follow (if applicable)				

Note: Building assignment to LCA classes is regulated in the QNG manual “Sustainable building quality seal **–** Annex 1".
The project-specific value for the operation and use of the building is to be determined for each individual project in accordance with the QNG rules of the "Requirement values – operation and use-related share". Module B6.1 corresponds to the operational, regulated energy expenditure, module B6.2 to the operational, non-regulated energy expenditure and B6.3 to the user and use-related energy expenditure.

If no refrigerants or only natural refrigerants as set out in AMEV Refrigeration 2017 Tab. 4 and refrigerants classified as future-proof until 2030 as per AMEV Refrigeration 2017 Tab. 3 are used in technical installations, emissions from leakages and disposal do not have to be included in the balancing. If, in deviation from this, refrigerants of other types are used, these must be included in the life cycle CO_2 balance for indicators 2.1.1 and 2.2.1 in Module B1. The reference values defined in 2.2.1 apply unchanged. The balancing shall follow the "Special calculation rule F-gases

to LCA accounting rules" of the QNG Handbook. This requirement applies to all technical installations that use refrigerants that do not meet the above requirement (natural refrigerants according to AMEV Refrigeration 2017 Tab. 4 and refrigerants classified as future-proof until 2030 according to AMEV Refrigeration 2017 Tab. 3), i.e. split and multi-split, VRF, refrigerators, chillers, heat pumps etc.

Indicator 2.3. AGENDA 2030 BONUSES – Lowest life cycle CO_2 balance, Climate Action Roadmap Life cycle and climate action through dimensional stability

Indicator 2.3.1: Accounting scope life cycle – Lowest life cycle CO_2 balance

If the value falls below the upper target value determined in indicator 2.2.1, bonus points can be claimed as a lump sum in this indicator.

Indicator 2.3.2: AGENDA 2030 BONUS – Climate action road life cycle

A plausible climate action roadmap in accordance with the "Framework for carbon neutral buildings and sites" is available for the building for the accounting scope "operation and construction", which mathematically proves that a balanced CO_2 balance is achieved by the year 2045 and a cumulative GHG value of 0 kg is not exceeded (“carbon neutral building/carbon neutral over the life cycle"). The determination is made according to the rules of the "Framework for carbon neutral buildings and sites". The requirements for the climate action roadmaps for the operation of the building described for the indicators in 2.4 also apply to this bonus. In addition, the following life cycle modules shall be included in the calculation of greenhouse gas emissions according to life cycle balancing rules as described:

- Modules A1 to A3: Are to be recorded completely in accordance with QNG rules, etc.
- Modules A4 and A5: Are to be included and estimations can be expected
- Modules in B6 (energy input for regulated and unregulated operation and use): expected future (dynamically adjusted) energy data sets up to the year 2045 are to be expected. Data on this is available in Ökobau.dat for electricity, the emission factors are to be interpolated linearly.
- Modules B4 (replacement) and as well as C3 (waste treatment), C4 (disposal) and D (reuse, recovery or recycling potential): future (dynamically adjusted) data sets up to the year 2045 are also to be expected. If dynamically adjusted data are not available for this, data can be calculated in modules B4 that represent the current state of the art or use plausible time-dependent reductions that comprehensibly represent the decarbonisation of systems or processes. If no temporally and dynamically adjusted data are available for modules C3 to C4 (waste treatment and disposal) and D1 (recycling potential), they can be estimated with valid assumptions or omitted if justified by the long-term decarbonisation roadmaps and expected developments of corresponding industrial processes.
- Module D2, which depicts the "effects of exported energy", is to be explicitly included in the accounting scope of this indicator in deviation from the accounting method for indicators 2.1.1 and 2.2.1. The determination of these greenhouse gas emissions, potentially avoided by third parties as a result of renewable energy supplied/exported to the surrounding energy grid, includes the renewable energy generated at the building or close to the building and delivered to third parties. The calculation is carried out in accordance with the DGNB framework using "time dynamically adjusted electricity credits" (with electricity mix emission factors); an analogous procedure is to be applied for exported heat (see also "Framework for carbon neutral buildings and sites"). The temporal dynamic mapping of the changes (decarbonisation) of the energy system must be included in the calculation. Therefore, current data of the "electricity mix scenarios" for the years 2030, 2040 and 2050 of Ökobau.dat or according to the framework are to be used in the calculation of D2 in the Climate Action Roadmap Life Cycle.

Indicator 2.3.3: Climate action through dimensional stability/eco-sufficiency

Significant greenhouse gas reductions are achieved through clearly defined and measurable eco-sufficiency measures. Quantitative data are available for measures such as increased density of use and quantified data on the

reductions achieved. A prerequisite for the bonus is that the effects cannot be represented or cannot be sufficiently represented by other indicators in the criterion, as they use alternative needs-based reference variables e.g. number of users, beds, workplaces or others.

An increased use density can be demonstrated if a use-specific threshold value ($TH_{UDpermiss}$) is reached or fallen short of for the building. With a high density of use, lower greenhouse gas emissions are achieved in relation to the users than in a building with a lower density of use. For the residential, office and hotel use types, thresholds shown below or other reasoning can be used. For other types of use, alternative reasoning based on comparable methods and claims can be used. In preparation for sufficient operation, a (simple) monitoring procedure must also be established that allows the assumptions made for achieving the bonus to be checked in the actual operation/use of the building.

The following applies for determining the threshold value: The threshold value $TH_{UDpermiss}$ for the use density is determined as an average value of the building units BU planned in the building and the appropriate use densities $UD_{permiss}$. Appropriate use densities for different building units are provided for the residential, office and hotel use types. The building units to which the use densities refer are, in the case of residential, the number of living rooms per flat; in the case of offices, a distinction is made between the units of cellular offices (1-4 persons) and open-plan offices, each with a minimum floor space; in the case of hotels, the single and double rooms are assessed as building units, differentiated by hotel categories (stars). For all other types of use, the threshold value does not apply for the time being.
The permissible threshold value $TH_{UDpermiss}$ for the building is calculated with the percentage share PS (in %) of the respective building units BU in the building and their appropriate use density UDpermiss. The actual use density value VUD_{actual} results from the percentage share (PS) of the respective use units in the building and their planned areas A. If the quotient of VUD_{actual} and $THUD_{Apermiss}$ is less than or equal to 1, the threshold value is met.

FORMULA 1:

$VUD_{actual} = ABU_1 * PS_1 + ABU_2 * PS_2 + \ldots$
$TH_{UDpermiss} = UD_1 * PS_1 + UD_2 * PS_2 + \ldots$
$VUD_{actual}/TH_{UDpermiss} \leq 1$ Bonus reached

WITH:

VUD_{actual}	:= existing average value of the density of use
$TH_{UDpermiss}$	:= permissible average threshold value of the use density
UD_n	= Use density for the respective building unit in m²
PS_n	:= percentage share of the respective building units in the building
A_{BUn}	:= planned areas of the respective building units in m²

Table 2: Residential areas for use density threshold ND_n

FLATS WITH	THRESHOLD ND_{ZUL}	BARRIER-FREE ND_{ZUL}	WHEELCHAIR ACCESSIBLE ND_{ZUL}
1 living space	50 m²	55 m²	60 m²
2 living spaces	60 m²	70 m²	70 m²
3 living spaces	75 m²	90 m²	105 m²
Per additional living space	15 m²	+ 5 m²	+ 10 m²

Table 3: Office space for use density threshold ND_n

WORKPLACE IN	THRESHOLD $UD_{PERMISS}$
Cellular office up to 4 persons	10 m²
Open plan office from 5 persons	15 m²

Table 4: Thresholds for hotel rooms ND_n

*	SINGLE ROOM	DOUBLE ROOM
1	8 m²	12 m²
2	12 m²	16 m²
3	14 m²	18 m²
4	16 m²	22 m²
5	18 m²	26 m²

Indicator 2.4: Accounting scope operation: Climate Action Roadmap and net greenhouse gas-neutral operation

For indicators 2.4.1., 2.4.2 (climate action roadmaps) and 2.4.3. (net greenhouse gas neutral operation) applies:
The determination of the$_{CO2\ balance}$ for the accounting scope “operation” is to be carried out in accordance with the accounting rules set out in the “Framework for carbon neutral buildings and sites" of the DGNB. Above all, the following applies:

- For indicator 2.4.3 net greenhouse gas-neutral building, the following simplified calculation method (deviating from the framework) applies to demonstrate a balanced CO_2 balance of operational, user and occupancy-related energy. If the building uses completely renewable energy sources in the annual balance to cover all operational, user and occupancy-related energy requirements or if the CO_2 emissions from the energy requirements are smaller than the CO_2 weighted annual sum of the renewable energy produced on site, the requirement "net greenhouse gas-neutral building" is considered to be fulfilled. For exported energy (module D2), all requirements and regulations described in indicator 2.2.2 apply.
- For the recognition of points in indicator 2.4.3, a climate action pass with all mandatory information for the accounting scope “operation" in accordance with the DGNB's “Framework for carbon neutral buildings and sites" must also be submitted.
- If no thermal dynamic simulation is used to determine the energy demand, it is recommended to adapt the legal calculation methodology to realistic parameters. One methodology for evaluating a realistic calculation tool is the data quality index as described in the framework. This evaluates technical, spatial and temporal aspects to give a realistic energy/CO_2 calculation.
- The following applies to indicators 2.4.1 and 2.4.2 (climate action roadmaps for operations): According to the framework, specific CO_2 emission factors can be used to calculate the CO_2 balance for planned purchases of green power or other renewable energy sources, but all requirements for energy source suppliers set out in the framework must be complied with (see in particular Chapter 5 "Use and creditability of renewable energy sources" on pages 15 to 17). In addition, the requirement to purchase green power or comparable externally purchased renewable energy sources only applies to new buildings as the last measure of all action areas, and a specific CO_2 emission factor is to be included in the climate action roadmap and calculated into the CO_2 balance.
- For the climate action roadmaps for operation, the determined CO_2 emissions of the accounting scope "operation" must also be below the building-specific decarbonisation path (or can be offset over

time according to regulations in the framework).

- Note: Neither for the accounting scope “operation” nor for the accounting scope “operation and construction” can the purchase of CO_2 compensation certificates or comparable mechanisms be credited in the CO_2 balance.
- The climate action roadmap is presented to the building owner before the construction project begins.

For buildings that are not operated in a net greenhouse gas-neutral manner at the time of completion, a climate action roadmap must be drawn up and submitted that specifies the year of national net greenhouse gas neutrality as the latest target year. The climate action roadmap shows which measures can be taken to make the building carbon-neutral. The submission of the climate action roadmap is a minimum requirement for the certifiability of any building that is not operated in a net greenhouse gas-neutral manner at the time of certification.

The submission of an "ambitious climate action roadmap" is a minimum requirement for the certifiability of buildings that are not operated in a net greenhouse gas-neutral manner at the time of certification for a Platinum Award. The climate action roadmap outlines the measures that can be taken to make the building carbon-neutral as quickly as possible, i.e. by 2030 at the latest. By way of derogation, an "ambitious climate action roadmap" can be claimed for the year 2035 in indicator 2.4.2 (as fulfilment of the minimum requirement for Platinum) if the building has solar roof surface areas of less than 10% of the gross floor area. Furthermore, exceptions to the target year 2030 can only be made in cases where all options to produce (and temporarily store) energy oneself have been exhausted, i.e. cannot be economically represented via a calculation of the life cycle costs, the buildings are described as highly efficient according to the applicable standard and there is a non-resolvable obligation to use heat, electricity or cooling from a supplier. In these cases, a Climate Action Roadmap 2035 can be claimed as a minimum requirement for a Platinum certificate.

Indicator 2.5 Greenhouse gas-reduced construction work (production phase)
Indicator 2.5.1: CO_2-reduced construction work (manufacturing phase):
The greenhouse gas emissions resulting from the combustion or use of fossil fuels during the production (modules A1 - A3) of a structure must be massively reduced in the next few years in order to mitigate climate change. In order to promote technologies, solutions and materials that significantly reduce greenhouse gas emissions in construction, with a focus on the emissions of the next few years, the indicator positively assesses an undercutting of the fossil greenhouse gas intensity (GWP_{fossil}/m^2_{NSA} * a) caused by the use of fossil energy sources and resources in modules A1 to A3 compared to today's standard (reference value). The applicable reference value for modules A1 to A3 is shown in Table 5. The scope and calculation rules of the life-cycle assessment correspond to the specifications according to indicator 2.2.1 with the deviation that only the life cycle modules A1, A2 and A3 may be used for the evaluation.

To determine the environmental indicator "GWP_{fossil}" required for the evaluation, the following can be used

- either a calculation using DIN EN 15804-A2-compliant data from Ökobau.dat
- or alternatively, the "GWP_{biogen}" can be determined separately for the building (e.g. via the biogenic carbon content of the products/materials used via the factor 3.67 (proportion of molar mass carbon in carbon dioxide, in kg C/kg CO_2)) and subtracted from the "GWP_{total}" value according to indicator 2.2.1
- or, alternatively, via a separately calculated “$GWP_{total,\ without\ biogenic\ raw\ materials}$" value without including data sets that represent a high material share of renewable raw materials.

Points for the results can be awarded (linearly interpolable) depending on whether the value falls short of the target value, upper target value, reference value or limit value. The following applies here:

- Upper target value = 0.5 * reference value
- Target value = 0.75 * reference value
- Reference values see table 5
- Limit value = 1.5 * reference value

Table 5: Reference values for results of life-cycle assessments for the environmental indicator GWP_{fossil} for modules A1 - A3 for different building types

BUILDING TYPE/ USE	CONSTRUCTION WORK MANUFACTURING (MODULES A1 - A3), REFERENCE VALUE FOR INDICATOR 2.5.1 (GWP_{FOSSIL})	UNIT
Office, education, residential, commercial building, shopping centre, hotel, production, consumer markets	8.4	kg CO_2e /m^2_{NSA} * a
Healthcare buildings, assembly buildings, laboratory buildings	9.2	kg CO_2e /m^2_{NSA} * a
Logistics	5.9	kg CO_2e /m^2_{NSA} * a

The reference values are derived from DGNB analyses in which modules A1 to A3 were considered separately, using defined project types and designs. The reference value includes an allowance for CG 400 in the case of office etc. as well as consumer market etc., derived from studies and calculation rules for defining the QNG requirement values for LCA ("base amount CG 400 (premium)" * 0.5 with the justification that modules C are negligible for CG 400 components and a one-time replacement takes place within 50 years). For logistics, the reference value is reduced by a factor of 0.7 compared to office, etc., as evaluations by the DGNB justify this. The reference value for healthcare buildings and assembly buildings has been calculated using the total "base amount", as these buildings typically have a high proportion of technical fixtures.

Indicator 2.5.2: Lowest CO_2 emissions of the manufacturing phase

The fossil greenhouse gas emissions (GWP_{fossil}) of the construction (modules A1 to A3) fall below the "upper target value" defined in indicator 2.5.1 and are thus at least 50% below the reference value. The bonus points described in this indicator can be claimed as a lump sum under this condition.

Indicator 3.1: Evaluation of the other results of the life cycle assessment

Indicator 3.1.1

For the realised building, a life cycle assessment is available based on the method "Accounting rules of the QNG for residential buildings" or "Accounting rules of the QNG for non-residential buildings". The data for primary energy input, non-renewable, shall be provided in a consolidated format to the DGNB (see indicator 2.1.1) and all documents according to documentation requirement QNG shall be provided in an auditable form.

Points for the results of the life cycle primary energy balance can be awarded (linearly interpolable) depending on whether the value falls short of the target value, upper target value, reference value or limit value. The following applies here:

- Upper target value = 0.5 * reference value
- Target value = 0.75 * reference value
- Reference values see table 5
- Limit value = 2.25 * reference value

Table 5: Reference values for results of life cycle primary energy balances for different building types

BUILDING TYPE/USE	REFERENCE VALUE OF LIFE CYCLE PRIMARY ENERGY BALANCE, FOR INDICATOR 3.1.1	CONSTRUCTION WORK (MODULES A1 – A3, B4, C3 – C4), FOR INDICATOR 3.1.1.	OPERATION AND USE (MODULES B6.1, B6.2 AND B6.3), FOR INDICATOR 3.1.1	UNIT
Residential	96			kWh_{bu} /m^2_{NSA} * a
Non-residential LCA Class 1 (K1), e.g. administrative buildings, schools		35.6	Project-specific reference value for operation and use	kWh_{bu} /m^2_{NSA} * a
Non-residential LCA Class 2 (K2), e.g. laboratory buildings, event buildings		37.2	Project-specific reference value for operation and use	kWh_{bu} /m^2_{NSA} * a
Non-residential LCA Class 3 (K3), e.g. hospitals		39.6	Project-specific reference value for operation and use	kWh_{bu} /m^2_{NSA} * a
Non-residential LCA Class 4 (K4), e.g. enclosed storage rooms, production facilities		26.5	Project-specific reference value for operation and use	kWh_{bu} /m^2_{NSA} * a
Non-residential LCA Grade 5 (K5), e.g. sports halls		30.6	Project-specific reference value for operation and use	kWh_{bu} /m^2_{NSA} * a
Further classes follow, if applicable				

The project-specific value for the operation and use of the building is to be determined for each individual project in accordance with the QNG rules of the "Requirement values – operation and use-related share". Module B6.1 corresponds to the operational, regulated energy expenditure, module B6.2 to the operational, non-regulated energy expenditure and B6.3 to the user and use-related energy expenditure.

Indicator 3.1.2:
If the weighted results of other environmental indicators fall below the target, reference or limit values for the life cycle boundary “construction work”, points (linear interpolable) can be recognised. For the realised building, a life cycle assessment based on the method "Accounting rules of the QNG for residential buildings" or "Accounting rules of the QNG for non-residential buildings" shall be submitted, which shows the environmental indicators eutrophication potential (EP), acidification potential of soil and water (AP, formation potential for tropospheric ozone (POCP) as a result. The data is provided to the DGNB in a consolidated format (according to indicator 2.1.1). All documents shall be

submitted in an auditable form in accordance with the documentation requirement QNG.

Table 6: Reference values for results of environmental indicators calculated by life cycle assessments

BUILDING TYPE/USE	POCP	UNIT	AP CONSTRUCTION WORK (MODULES A1 - A3, B4, C3 - C4).	UNIT	EP CONSTRUCTION WORK (MODULES A1 – A3, B4, C3 – C4)	UNIT
Residential and non-residential construction work: Modules A1 - A3, B4, C3 - C4	0.0042	C_2H_4e /m^2_{NSA} * a	0.037	SO_2e /m^2_{NSA} * a	0.0047	PO_4^{3-} /m^2_{NSA} * a
Operation and use of electricity: B6.1, B6.2 and B6.3	$POCP_{electricity}$ = 0.000056 * kWh final energy electricity	C_2H_4e /m^2_{NSA} * a	$AP_{electricity}$ = 0.00073 * kWh final energy electricity	SO_2e /m^2_{NSA} * a	$EP_{electricity}$ = 0.00012 * kWh final energy electricity	PO_4^{3-} /m^2_{NSA} * a
Operation and use of heat: B6.1, B6.2 and B6.3	$POCP_{heat}$ = 0.000013 * kWh final energy heat	C_2H_4e /m^2_{NSA} * a	AP_{heat} = 0.000076 * kWh final energy heat	SO_2e /m^2_{NSA} * a	$POCP_{heat}$ = 0.0000085 * kWh final energy heat	PO_4^{3-} /m^2_{NSA} * a

In the calculation of the reference values for operation and use, the emission factors for electricity and heat demand (final energy of the reference building) listed in Table 6 are to be used. These represent the respective emission factors of electricity and the combustion of natural gas for heat production (taken from Ökobau.dat). The emission reference values for electricity, heat (determined on a project-specific basis) and the construction work (static, see above) are to be added to the respective life cycle reference value.

Points for the results of environmental indicators from a life cycle assessment, weighted according to Table 6, can be awarded (linearly interpolable) depending on whether the value falls short of the target value, upper target value, reference value or limit value. The following applies here:

- Upper target value = 0.5 * reference value
- Target value = 0.75 * reference value
- Reference values see Table 6
- Limit value = 2.25 * reference value

For the calculation of the points of the weighted environmental impacts for indicator 3.1.2, the partial points are to be determined individually for each environmental indicator via the target, reference and limit values with the help of the specifications for reference value determination in Table 6. Afterwards, the partial points (PP) are to be weighted using the weighting keys from Table 7. The sum of the weighted partial points is the sum of the points possible in the indicator.

FORMULA 2:

Points (indicator 3.2.1) $EIP_{weighted} = PP_{POCP}*G_{POCP} + PP_{AP}*G_{AP} + PP_{EP}*G_{EP}$

Table 7: Weighting of environmental indicators: Weighting factors for determining the weighted environmental impact potential ($EIP_{weighted}$)

	EP	AP	POCP
Weighting factor G	0.3	0.3	0.4

APPENDIX B – EVIDENCE

I. Required documentation

The documentation below represents a selection of the types of evidence that can be provided. The selected evaluation of the individual indicators must be documented comprehensively and plausibly on the basis of the submitted documents.

Indicator 1: Life cycle assessments in planning

- Confirmation by the auditor and other specialist planners involved in the planning that life-cycle assessments were used in the planning, and proof of commissioning
- Excerpts from life-cycle assessment comparisons with clear reference to the building
- Brief description of the methodology used, the scope of the consideration
- The evidence must show a reference to the service phases
- Confirmation from those involved in the planning team that the LCA results have been communicated (e.g. via planning protocols)
- Confirmation by the auditor that life-cycle assessments have been determined for relevant decisions, via proof of commissioning
- Presentation of the considered alternatives

Indicator 2: Comparative values for life cycle CO_2 balance

- Presentation of results according to Table 8
- Basic data according to Table 9

Additional information in the presentation of results:

- Modules D1 and D2 (to be shown separately)
- Primary energy demand according to GEG requirement/reference value
- Final energy demand according to GEG requirement/reference value
- GHG emission data shall also be reported per person or with an alternative reference value

Documents:

- 1) Area calculation (NSA (Regular Case), GFA (Regular Case))
- 2) Evidence of completeness of buildings coverage according to defined system boundaries
- 3) Evidence of completeness of life cycle coverage according to defined system boundaries
- 4) Description of relevant constructions with layered structure (e.g. building components catalogue)
- 5) Naming of data bases/data sets used
- 6) Material inventory and parts list for components and building services
- 7) Calculation results for energy demand are based on the GEG without generated BIPV and/or wind power. The calculated share of the generated BIPV and/or wind power electricity in kWh, which is used to cover the building energy demand, shall be calculated and reported separately.
- 8) Calculation results of the life-cycle assessment
- 9) Additionally, in the case of self-generated electricity: Size of the installation in m², orientation and roof pitch (for PV), output in kWp, battery storage available yes/no, energy generated in kWh/a taking into account local conditions, self-used share in % and in kWh/a to cover electricity demand B6.1 and B6.3, share of energy supplied to third parties in % and in kWh/a, share of grey emissions (GWP) per exported kWh in kg CO2-eq./kWh, emissions potentially avoided with third parties in kg CO2-eq./a
- 10) Additionally, in the case of CHP: Output/generated energy of the installation in absolute terms in kWh electricity and heat, self-used share of electricity in % and in kWh/a to cover electricity demand B6.1 and B6.3, self-used share of heat in % and in kWh/a to cover heat demand B6.1, determination

of system factors for primary energy and GWP emissions according to the conventions of DIN EN 18599-1, taking into account the distribution key according to final energy generated, share of energy heat/electricity supplied to third parties in % and in kWh/a, share of grey emissions (GWP) per exported kWh in g CO2-eq./kWh, emissions potentially avoided by third parties in kg CO2-eq./a

- Scenario calculation results, CO_2 equivalent energy demand, user and/or construction
- Presentation of the balanced CO_2 balance/carbon neutrality in accordance with the "Framework for carbon neutral buildings and sites"
- Climate action roadmap (accounting scope "operation") with climate action certificate according to "Framework for carbon neutral buildings and sites"

Table 8: Presentation of results

(PARTIAL) ACCOUNTING ITEMS	PRIMARY ENERGY USED IN KWH PENE/M²NSA A	GREENHOUSE GAS EMISSIONS GWP100 IN KG CO2 EQUI./M²NSAA
Calculated value for the structural part (Sum of modules A1 - A3, B4, C3, C4) and partial values for building components of CG 200 old building components of CG 300 - new construction building components of CG 400 – plinths building components of CG 400 – large-scale equipment installations for the generation/use of renewable / non-renewable energy (proportionally)		
Calculated values for the part operation and use (sum of modules B6.1, B6.3 minus own fraction of renewable energy) and partial values for B6.1 B6.3 Own fraction of renewable energy		
Requirement value 1 (PLUS) for the structural part and operation & use (total)		
Requirement value 1 (PREMIUM) for the structural part and operation & use (total)		
Compliance with the requirement (none/1/2)		

Table 9: Basic data of the building

BASE DATA OF THE BUILDING	UNIT
State in which the site is located	

Completion year	
Net room area (NRF(R)) according to DIN 277: 2021-08	m²
Gross floor area (GFA(R)) according to DIN 277: 2021-08	m²
Gross volume (GV) according to DIN 277: 2021-08	m²
Living space	
Commercial area	
Number of upper floors	
Number of basements	
Number of car parking spaces in the building	
Number of residential units in the building	
Number of workplaces in the building	
Type of commercial area in the building	
Greenhouse gas emissions of structural part in the building's life cycle (sum of modules A1 – A3, B4, C3, C4)	kg CO_2 equi. / m² $_{NSA}$ a kg CO_2 equi. / m² $_{GFA}$ a
Greenhouse gas emissions during operation and use (sum of modules B6.1, B6.2 and B6.3)	kg CO_2 equi. / m² $_{NSA}$ a kg CO_2 equi. / m² $_{GFA}$ a
Greenhouse gas emissions of structural part, operation and use in the building's life cycle (total)	kg CO_2 equi. / m² $_{NSA}$ a kg CO_2 equi. / m² $_{GFA}$ a
Requirement value 1 for greenhouse gas emissions in the building life cycle	kg CO_2 equi. / m² $_{NSA}$ a
Requirement value 2 for greenhouse gas emissions in the building life cycle	kg CO_2 equi. / m² $_{NSA}$ a
Compliance with the greenhouse gas emissions requirement (none/1/2)	
Primary energy demand non-renewable, structural part in the building life cycle (sum of modules A1 to A3, B4, C3, C4)	kWh CO_2 / (m² $_{NSA}$ a) kWh CO_2 / (m² $_{GFA}$ a)
Primary energy demand non-renewable in operation and use (sum of modules B6.1, B6.2 and B6.3)	kWh CO_2 / (m² $_{NSA}$ a) kWh CO_2 / (m² $_{GFA}$ a)
Primary energy demand non-renewable, structural part, Operation and use (total)	kWh CO_2 / (m² $_{NSA}$ a) kWh CO_2 / (m² $_{GFA}$ a)
Requirement value 1 for primary energy demand, non-renewable in the building life cycle	kWh CO_2 / (m² $_{NSA}$ a)
Requirement value 2 for primary energy demand, non-renewable in the building life cycle	kWh CO_2 / (m² $_{NSA}$ a)
Compliance with the primary energy demand requirement (none/1/2)	
Primary energy demand according to GEG (German Buildings Energy Act)	kWh / (m² * a)
Energy quality of the building envelope Hr'	W / (m² * a)
Renewable energy self-sufficiency rate according to monthly balance method according to GEG	kWh / (m² * a)
Building mass according to LCA	kg / (m² $_{NSA}$ a) kg / (m² $_{GFA}$ a)
Proportionate building mass of renewable raw materials according to LCA-	kg / (m² $_{NSA}$ a) kg / (m² $_{GFA}$ a)
Documentation of the refrigerants used (designation/filling quantity in kg)	
Recycling potential (module D1)	

Effects of exported energy (module D2)
Primary energy demand according to GEG requirement/reference value
Final energy demand according to GEG requirement/reference value

Indicator 2.3: Lowest life cycle CO_2 balance, climate action roadmap, life cycle and climate action through dimensional stability

- Presentation of results according to Table 8
- Calculation basis for the climate action roadmap life cycle
- Calculation results for compliance with threshold values or alternative argumentation and presentation of the greenhouse gas reductions achieved

Indicator 2.4: Accounting scope operation, climate action roadmap and net greenhouse gas neutral operation

- Presentation of the balanced CO_2 balance/carbon neutrality in accordance with the "Framework for carbon neutral buildings and sites"
- Climate action roadmap (accounting scope "operation") according to DGNB framework
- Climate action pass in accordance with the “Framework for carbon neutral buildings and sites"

Indicator 3. Comparative values of other life cycle assessment indicators

- Life cycle assessment results and calculation basis

APPENDIX C – LITERATURE

I. Version

Change log based on 2023 version

PAGE	EXPLANATION	DATE

II. Literature

- Rahmenwerk für klimaneutrale Gebäude und Standorte. Deutsche Gesellschaft für Nachhaltiges Bauen e. V., 2020
- QNG-Handbuch, Stand Januar 2023: https://www.nachhaltigesbauen.de/austausch/beg/
- DIN 277-1: 2016-01 Grundflächen und Rauminhalte im Bauwesen – Teil 1: Hochbau. DIN Deutsches Institut für Normung e. V. Berlin: Beuth Verlag, 2016.
- DIN 276-1: 2008-12 Kosten im Bauwesen – Teil 1: Hochbau. DIN Deutsches Institut für Normung e. V. Berlin: Beuth Verlag, 2008.
- DIN EN 15804: 2014-07 Nachhaltigkeit von Bauwerken – Umweltproduktdeklarationen – Grundregeln für die Produktkategorie Bauprodukte. Berlin: Beuth Verlag, 2014
- DIN EN 15978: 2012-10 Nachhaltigkeit von Bauwerken – Bewertung der umweltbezogenen Qualität von Gebäuden – Berechnungsmethode. Berlin: Beuth Verlag, 2012
- GEG 2020: Gebäudeenergiegesetz November 2020
- Bundesministerium für Verkehr, Bau und Stadtentwicklung (BMVBS): Baustoff- und Gebäudedaten. Ökobau.dat. Berlin