Asset Management
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CREDIT SUISSE

greenproperty Handbook

The first comprehensive Swiss quality seal for sustainable real estate under the ESG approach
(ESG: Environmental, Social and Governance)

green property®

Quality seal of approval for sustainable property
A Credit Suisse Initiative

ESG stands for environmental (E), social (S), and governance (G). More information is available at credit-suisse.com/am/esg.
For further information about the ESG investment criteria, please visit credit-suisse.com/esg.

Foreword

The International Energy Agency estimates that real estate is responsible for a third of all CO_2 emissions, 40% of energy consumed, and 50% of all natural resources consumed. As one of the leading building owners in Switzerland, Credit Suisse takes its responsibility seriously and has long since been setting benchmarks in sustainable real estate. Credit Suisse Asset Management Global Real Estate developed the **greenproperty quality seal** with renowned engineering and planning company Amstein + Walthert AG in 2009.

Credit Suisse Asset Management Global Real Estate developed the greenproperty quality seal with the renowned engineering and planning company Amstein + Walthert AG back in 2009.

greenproperty was the first holistic standard for sustainable real estate in Switzerland – setting new standards for sustainability in new buildings. Ecological, economic, and social criteria are evaluated based on five different aspects. These include the use purpose, infrastructure, energy consumption, materials used, and life cycle of a real estate property. This handbook will guide you through the certification process. It provides a step-by-step explanation of the requirements for obtaining the quality seal in the gold, silver, or bronze category.

A revised version with new standards was published in June 2019, ten years after the initial launch of the quality seal. This version recognizes customary market quality seals as an aid for undergoing certification for the greenproperty quality seal.

greenproperty celebrated its 100th quality seal in fall 2018, and a total market value in excess of CHF 6 billion. Our aim is to work with you to establish high-quality, sustainable building design nationwide. The greenproperty quality seal supports increased transparency and efficiency in the certification process.

For further information on greenproperty, visit credit-suisse.com/greenproperty. You can find everything you need to know about the initiatives adopted by Credit Suisse Asset Management Global Real Estate in the area of sustainability at credit-suisse.com/am/esg.

Credit Suisse Asset Management (Switzerland) Ltd
Global Real Estate

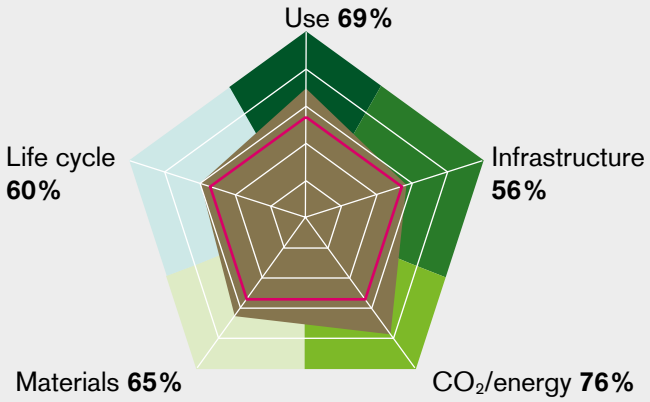
We have opted for the masculine form in the interests of better readability; the masculine form also refers to the feminine form.

Contents

Overview of the five aspects

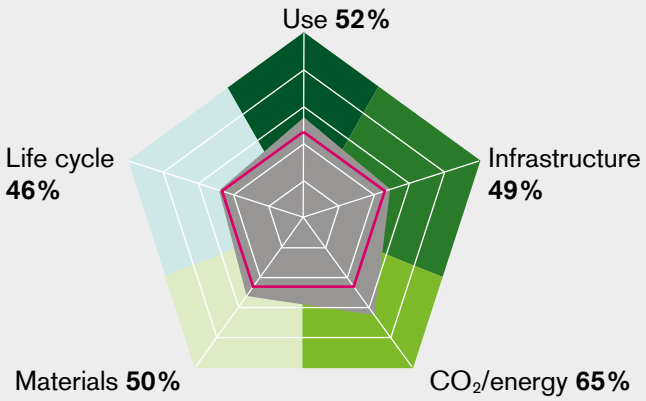
Gold rating

- The following Minergie®-Eco exclusion criteria detailed in the "Requirement specifications and implementation guidelines for new buildings" (Vorgabenkatalog und Umsetzungshinweise für Neubauten), version 1.4 (January 2018) have been met:
  - NA1.010 Harmful substances in buildings
  - NA1.020 Chemical wood preservatives in interiors
  - NA1.030 Biocidal products
  - NA1.040 Formaldehyde emissions from construction materials
  - NA1.050 Solvent emissions from construction and auxiliary materials
  - NA2.010 Assembly and sealing work
  - NA2.020 Heavy-metal-containing components exposed to weathering (roofing, facade, and finishing materials)
  - NA2.030 Lead-containing materials
  - NA2.040 Wood selection
  - NA2.050 Recycling (RC) – Concrete
- A minimum fulfillment **rate of 55%** has been achieved for all greenproperty aspects and
- Minergie® certification has been obtained or
- Platinum certification has been obtained under the Sustainable Construction Standard Switzerland (Standards Nachhaltiges Bauen Schweiz – SNBS) or from the German Sustainable Building Council (Deutsche Gesellschaft für Nachhaltiges Bauen – DGNB) or the Leadership in Energy and Environmental Design (LEED)



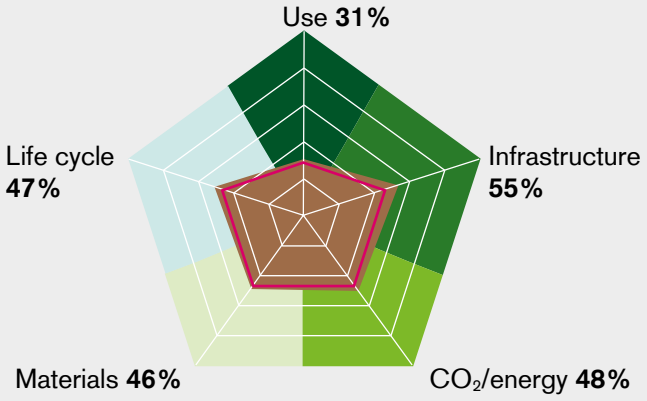
Silver rating

- A minimum fulfillment **rate of 45%** has been achieved for all greenproperty aspects and
- Minergie® certification has been obtained or
- SNBS, DGNB, or LEED gold certification has been obtained



Bronze rating

- A minimum fulfillment **rate of 45%** has been achieved for four of the five greenproperty aspects
- A fulfillment rate of at **least 30%** has been achieved in all of the greenproperty aspects



■ ■ ■ Assessment of sample project
□ Minimum requirement

General information

greenproperty does not provide for any minimum requirement in any of the individual criteria. This method is conceived as a means of enabling as objective, but as project- and context-specific an assessment as possible. There are nonetheless some points that should be kept in mind and without which certification should not be possible:

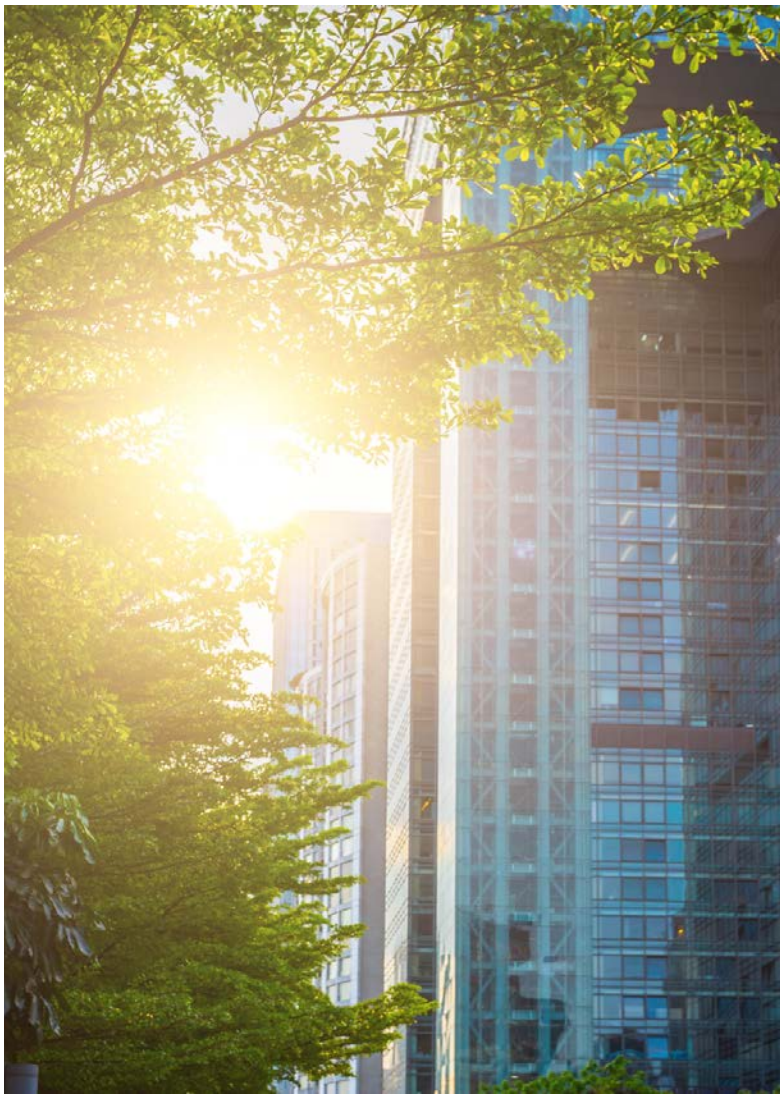
- The “Use” aspect is largely determined by decisions at the project definition stage (determining procedures, residential mix, ground floor uses, semipublic spaces, participation, soundproofing, etc.), but also by the earlier project stages (planning in relation to architecture and urban planning, use of daylight, etc.). If a project is not assessed using the sustainability criteria set out in greenproperty until a later stage, any potential for optimization will be severely restricted. At this point, even the required minimum degree of fulfillment of 30% for a bronze certification cannot be achieved.
- The same also applies to all other aspects: the earlier the sustainability aspects are incorporated in the project definition and subsequent planning, the better the prospects for goal achievement.
- Indicators whose rating depends on the property or location are referred to as “situation indicators”; sometimes results can be improved by employing measures appropriate to the property.
- One or more measures are set out for each of the indicators; these are intended as guidance for project participants, guiding them toward the construction of a sustainable building through each individual planning stage.
- The natural weighting is calculated using the top-down method: 20% per aspect, 4% per criterion, and, depending on the number of indicators, 1% to 4% for each indicator.

Innovation

In each of the aspects, there is a sixth criterion, “innovation”, that can help improve the degree of fulfillment by 5% within each aspect.

The relevant measures are defined and published once a year by Credit Suisse Asset Management Global Real Estate’s innovation group. Implementing one measure for each of the aspects promotes the use of technically tried-and-true innovations available on the market. You can find out more about the latest innovations at greenproperty.ch

Measures defined at the time of the beginning of the first application for certification, whether provisional or Definitivee, can be selected. Switching to newly published innovations later on in the course of the various project stages is not possible.



Additional explanations

Energy data:
See separate calculation instructions in the help documents.

Situation indicator
- This term refers to indicators that are assessed depending on the property or location.
- Some situation indicators can be improved by employing measures suitable for the property, such as rehabilitating existing contaminated sites or offering lacking neighborhood infrastructure.

Use-specific indicator
- This term refers to indicators that are dealt with and assessed differently depending on the type of use (office, residential, commercial).

Basic fit-out
- Basic fit-out
- This refers to indicators that relate only to the building in its basic construction.

Tenant fit-out
- Specifications that refer to the tenant fit-out alone are avoided wherever possible. However, a tenant fit-out must be assumed for the assessment of the following indicators (only where the tenant is still unknown):
  - 1.5.1 Daylight
    → Cautious assumptions regarding room arrangement and surface colors
  - 2.2.2 Infrastructure for bikes
    → Office: number of bike parking spaces dependent on number of employees
  - 2.2.3 Motorized private transportation
    → Office: number of parking spaces dependent on number of employees
- Specifications for the following indicators are to be transferred to the tenant contractually where possible. Otherwise the evaluation should be carried out on a worst-case scenario basis.
  - 1.3.1 Social contact
    → Meeting places such as recreation areas, break rooms, a cafeteria, etc.
  - 1.3.2 Spatial identity
    → Ensuring semipublic uses: community meeting, museum, day care center, store, café, restaurant, medical practice, skybar, semipublic roof terrace
  - 3.2.2. Degree of self-sufficiency, electricity
    → In order to factor in any internal electricity consumption by tenants, evidence must be supplied of an end consumer pool agreed contractually in the rental agreement
  - 3.5.3 Household appliances
    → Office: household appliances should be selected according to how the indicator is assessed
  - 4.3.4 Pollutant input
    → Requirements should be fulfilled according to how the indicator is assessed (interior fittings material selection)
  - 4.5.1 Water consumption
    → Requirements should be fulfilled according to how the indicator is assessed (generally in the basic fit-out anyway)

Objective
- Description of the overriding aim of the indicator

Assessment table
- Definition of the measures under evaluation and a scale for measuring the degree of fulfillment (not fulfilled/partially fulfilled/fulfilled)

Reasoning
- In all cases, the assessment (not fulfilled/partially fulfilled/fulfilled) should be documented with reasoning provided in the comment field of the online tool.
- If several measurements are listed and the degree of fulfillment is assessed based on the number of measures implemented, then the client should specify these measures (e.g. in the comment field of the online tool).
- The use of “not applicable” or “N/A” should be avoided. Instead, a measure is deemed “fulfilled” if it is not applicable (e.g. if natural stone is not used in construction). In turn, individual indicators are only assessed in relation to the applicable units.

Required evidence
- In order to assess the degree of fulfillment for certification, evidence must be submitted. This is split into “provisional” and “definitive” evidence.
- Required evidence must be provided for each indicator.
- Where several documents or documents with multiple pages are concerned, the required evidence applicable to these measures should be referenced precisely in the explanation section.
- When it comes to the definitive certificate, where the “old” documents still apply, these should be filed again in the online tool under the indicator. If these are no longer up to date, revised documents should be attached.
- To aid the retrieval of this information it is advisable to keep a list of all required evidence including the date/version of the respective document. When it comes to definitive application, this list can be used as a basis for inquiring the validity of this documentation of their respective issuers.

More information
- Principles, standards, literature, links, etc., providing further information regarding the indicator are listed at the end.

Review process

Obtaining the greenproperty quality seal involves a multistage review process.

A web-based database solution will guide you through the entire review process. It offers intuitive user guidance and automated processes and, dispensing with the physical sending of documents, has been geared toward sustainable processes. Access to the database is guaranteed from any location, and data archiving is particularly useful for analyses and reporting data. Stakeholders in the process receive automatic e-mails to inform them when they need to deal with a file. This boosts efficiency.

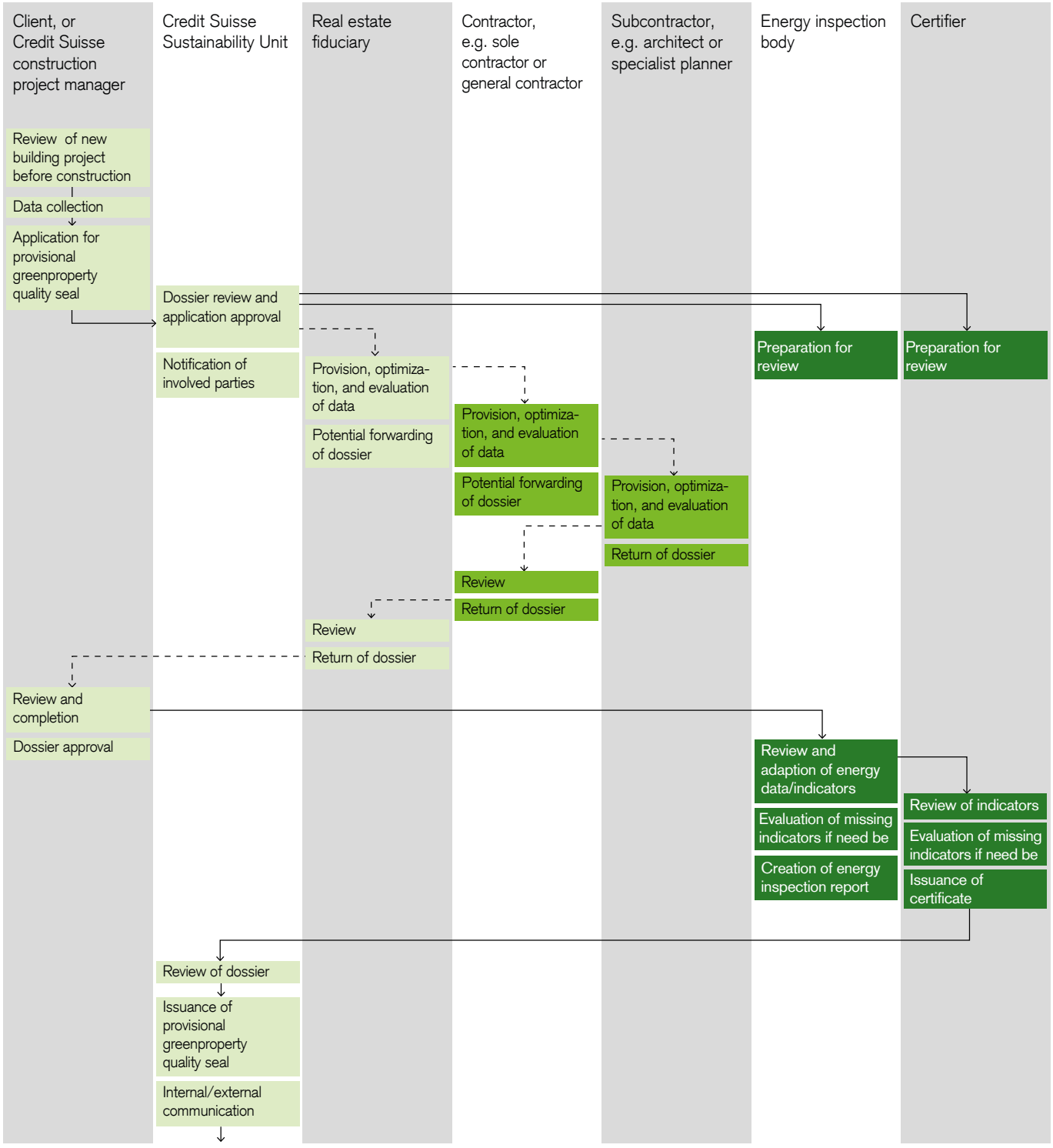
The process looks as follows:

1. The **client or construction project manager from Credit Suisse Asset Management Global Real Estate** submits an application to the sustainability unit before start of building.
2. The **Credit Suisse Sustainability Unit** reviews the application, informs the parties involved, and releases the file for processing.
3. The **real estate fiduciary** registers the property data and uploads the documents. He evaluates the indicators and initiates optimization measures for the project to ensure the desired quality seal can be obtained.
   The real estate fiduciary can forward the dossier to the contractor, for example the sole contractor or general contractor, for data entry.[1]
4. The **contractor, this could be a sole contractor or general contractor,** can edit the file. They fill out the missing property data and upload the necessary documents. They also evaluate the indicators and initiate optimization measures for the project to ensure the desired quality seal can be obtained.
   In some cases, the contractor will forward the dossier to the subcontractor, for example the architect or specialist planner.
5. The **subcontractor, for example an architect or specialist planner,** receives a link via e-mail. This will grant them access to the dossier, so they can further process it. Once completed, the dossier is returned to the Credit Suisse Asset Management Global Real Estate client for review.
6. The **client** reviews the dossier and completes it.
7. The **energy inspection body** reviews, changes where applicable, and evaluates the energy data as well as the allocated indicators. It compiles the energy inspection report.
8. The **certifier** reviews all indicators and evaluates any missing indicators. The certifier issues the provisional certificate, provided all details are accurate and plausible.
9. The **Credit Suisse Sustainability unit** checks that all data has been provided and awards the provisional quality seal in the gold, silver, or bronze category before the start of building.
10. The **construction phase begins.** The provisional certification provides valuable information so that necessary amendments can be made to obtain the desired quality seal.
11. The **client** submits the application for the Definitivee quality seal following completion of the construction work.
12. The **certification process is consistent** with the provisional certification process. Indicators are sometimes measured differently; however, the stakeholders involved remain the same. See points 2 to 8.
13. The **definitive quality seal in the gold, silver, or bronze category will be awarded after the full process has been completed.** The relevant greenproperty badge is affixed to the building. The greenproperty quality seal is indicated, and the benefits displayed. Measures for sustainable management are implemented.

This concludes the greenproperty process.
The sustainability of the real estate will of course continue to be inspected; energy consumption will, for example, be reviewed and monitored on an annual basis. Building operation will be optimized and renovations performed where necessary.

[1] On an exceptional basis, steps 3 to 5 may be omitted if neither a real estate fiduciary nor a contractor have been commissioned.

Review process, provisional



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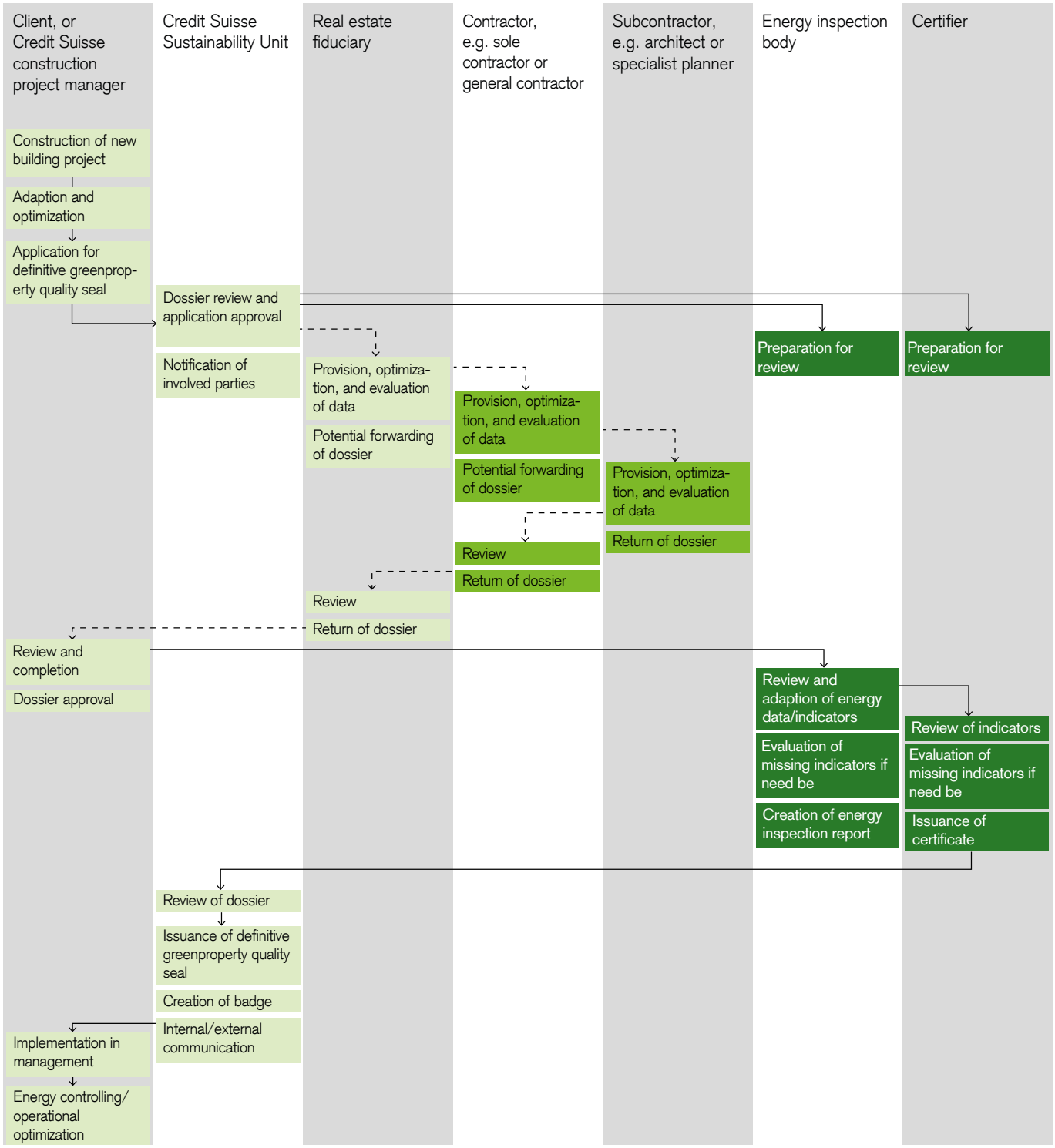
Review process, definitive



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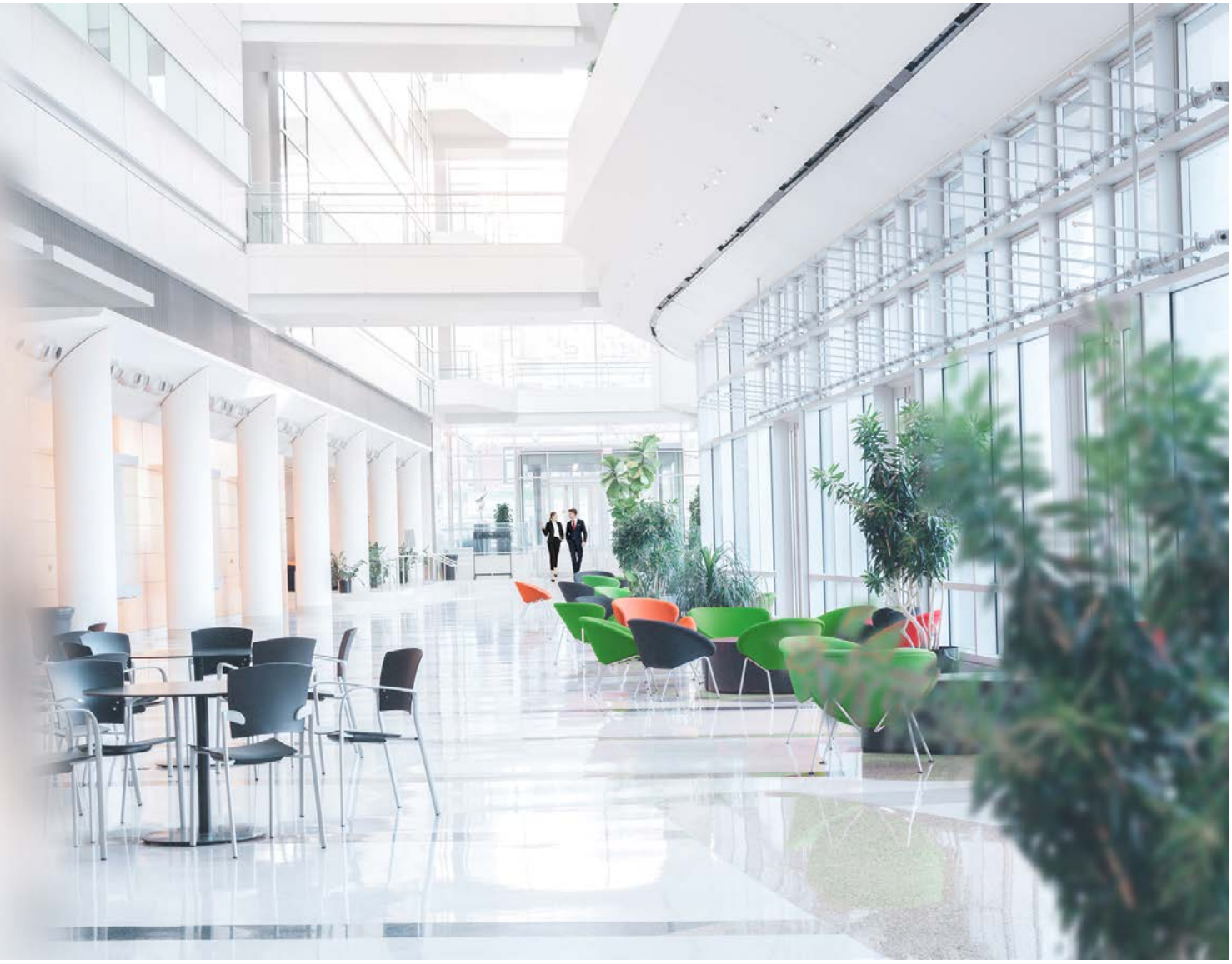
Structure

The five greenproperty aspects of sustainability

1 Use



1.1 Planning

1.1.1 Participation

Objective: involvement of relevant stakeholder groups to generate high building acceptance and optimization of building efficiency

Measure 1 (M1): participation of local stakeholders
A construction project can gain wider support and acceptance by involving local stakeholders in the planning process. This enables better community-oriented projects and reduces the risk of complaints, thereby contributing to socially and economically sustainable solutions. Success and the greater effectiveness associated with this will only come into play if the various stakeholders are involved early on in the design and planning stage and their suggestions channeled into decision-making processes.

Local stakeholders are, in particular:
- Local residents
- Local business owners
- Local organizations/associations/representatives of different population groups

Information measures:
Local stakeholders can be kept up to date on planning and the construction process through participation. This could be in the form of meetings, workshops, information events, etc., and associated flyers, posters, building site tours, building site newsletters, etc.

Measure 2 (M2): coordination with overall objectives
The interests of local stakeholders are depicted in existing overall visions; projects should therefore be adapted to these. The building should bear a connection to broader visions, whether that of the community, city, municipality, region, canton, or confederation.

These visions need not necessarily have an explicit geographical connection. These could also be visions for promoting the location with the intention of concentrating certain sectors, or else social visions aimed at supporting certain uses or mixing/concentrating uses.

Overall visions include, in particular:
- City/municipality development concepts
- Master plans
- Design plans, etc.

More information
- Swiss Society of Engineers and Architects (Schweizerischer Ingenieur- und Architektenverein – SIA), SIA 112/1: "Sustainable construction – Buildings – Terminological standard for SIA 112" (Nachhaltiges Bauen – Hochbau – Verständigungsnorm zu SIA 112) (2017)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Is the participation of local stakeholders guaranteed (M1)? ▪ Is the project aligned with overall objectives (M2)?	Fulfilled	▪ Participation (M1) and ▪ Overall objectives (M2)
		Partially fulfilled	▪ Participation (M1) or ▪ Overall objectives (M2)

Required evidence

	Provisional	Definitive
Residential Office Commercial	Participation (M1): ▪ Final planning permission with list of complaints filed ▪ List of local stakeholders involved ▪ List of information measures (meetings, workshops, events, etc., including supporting documents such as agendas, minutes, flyers, posters, etc.) ▪ Documentation of feedback from meetings, workshops, events, etc., and any subsequent actions Overall objectives (M2): ▪ Current overall vision (e.g. city/municipality development concepts, design plans)	Participation (M1): ▪ Local stakeholders kept up to date on the construction process (posters, building site tours, building site newsletters, information events, etc.)

1.1.2 Structural density

Use-specific indicator
Basic fit-out
Objective: a high structural density and thus a lower land area usage and a lower land usage per capita (sufficiency)

The floor area ratio, defined as the ratio of eligible floor area to eligible land area, is an ideal indicator for structural density. A floor area ratio of less than 0.4 would be equivalent to a single-family housing area. Settlements with an open building structure, as were erected all too often in urban conurbations during the postwar era, have floor area ratios of around 1. Urban residential areas range from 1 to 1.5, more densely populated 19th century urban block perimeter developments score 2, and medieval city centers that have grown over the course of history have a floor area ratio of almost 4.

A higher density does not undermine the quality of outdoor spaces and the need for privacy. Only once a certain degree of density has been achieved, is diversity and a healthy mix of uses possible.

Over the course of half a century, living space per capita in Switzerland grew by almost 30% from 38 to 48 m^2. Residences must be above a minimum size to ensure good usability. From a land usage point of view and, bearing in mind the requirement for economical use of land, once a certain size has been reached, each additional square meter added is redundant and runs counter to the objectives of a sustainable development. To measure structural density, but also to limit the land usage per capita, the envisaged residence sizes are reviewed to see whether they are within the range of the housing evaluation system defined by the Swiss Federal Office of Housing (Bundesamt für Wohnungswesen – BWO).

Measure 1 (M1): assessment of the floor area ratio
A high building density reduces land area usage. The building area or floor area ratio is assessed.

Measure 2 (M2): minimization of land usage per capita (residential)
Land usage per capita is assessed to ensure efficiency and sufficiency in the design of floor plans.

Average dwelling sizes	
1 room	5 to 45 m^2
2 rooms	50 to 55 m^2
3 rooms	70 to 80 m^2
4 rooms	90 to 100 m^2
5 rooms	110 to 125 m^2
6 rooms	130 to 145 m^2
7 rooms	155 to 170 m^2

Only the floor area ratio is assessed for office and commercial uses.

The maximum floor area ratio permitted by law can be exceeded by using comprehensive site developments, design plans, and compliance with certain standards.

More information
- Building and zoning regulations of the municipality
- BWO: housing evaluation system, K15/net living space

Assessment

	Requirement	Degree of fulfillment	
Residential	▪ Is the floor area ratio as high as it can be (M1)? ▪ Is the land usage per capita (dwelling size) as low as possible (M2)?	Fulfilled	Floor area ratio (M1): ▪ The floor area ratio is greater than 1.25 or greater than the maximum permitted in the municipality and Land usage (M2): ▪ 50% of the residential units are within the specified range with regard to dwelling size
		Partially fulfilled	Floor area ratio (M1): ▪ The floor area ratio is between 0.75 and 1.25 and Land usage (M2): ▪ 20% to 50% of the residential units are within the specified range with regard to residence size
Office Commercial	▪ Is the floor area ratio as high as it can be (M1)?	Fulfilled	Floor area ratio (M1): ▪ The floor area ratio is greater than 1.25 or greater than the maximum permitted in the municipality
		Partially fulfilled	Floor area ratio (M1): ▪ The floor area ratio is between 0.75 and 1.25

Required evidence

	Provisional	Definitive
Residential	Floor area ratio (M1): ▪ Volume and area calculated in accordance with SIA 416; derived from existing floor area ratio Land usage (M2): ▪ Floor plan excerpts for dwelling sizes	Floor area ratio (M1): ▪ Revised documents Land usage (M2): ▪ Revised documents
Office Commercial	Floor area ratio (M1): ▪ Volume and area calculated in accordance with SIA 416; derived from existing floor area ratio	Floor area ratio (M1): ▪ Revised documents or ▪ Municipality certification for additional utilization

1.1.3 Procedure

Basic fit-out
Objective: high architectural quality and consideration of sustainability criteria as early as the architecture competition stage

There is a direct correlation between the well-being of building users and architectural design quality. In addition to functionality and economic efficiency, high-quality architecture also plays a key role in the conservation of climate and resources.

Measure 1 (M1): running an architecture competition or study commission
Architectural quality is difficult to quantify. In contrast to direct contracts, architecture competitions or study commissions can contribute significantly to effective structural solutions.

- Competitions must be conducted in line with SIA 142 (2009) and study commissions in line with SIA 143 (2009).
- Alternatively, building owners may select competition processes based on their own criteria provided the following conditions are met:
  - The decision board must feature at least three architects, including landscape architects.
  - The objectivity of the decision board must be ensured (no professional, family, or economic links or dependencies between the jury and participants).
  - The qualifications of the expert evaluators must match those of the participating planning teams, and they must dispose of sufficient proof of qualifications (e.g. membership of the SIA or the Federation of Swiss Architects [FSA – Bund Schweizer Architekten, BSA], experience as a jury member, owner of an architectural firm, regular participation in competition and study commissions).

Measure 2 (M2): consideration of sustainability criteria and involvement of a sustainability expert
Integrating the topic of sustainability in the architecture competition process enables a holistic approach. Either the relevant sustainability criteria are factored into the architecture competition program, or a defined method of evaluation is used. A sustainability expert is included in the jury to assess the sustainability criteria or enlisted as a consultant for the evaluation.

More information
- Coordination Conference for Public Sector Construction and Property Services (Koordinationskonferenz der Bau- und Liegenschaftsorgane der öffentlichen Bauherren – KBOB): "Guidelines for the procurement of planning services" (Leitfaden zur Beschaffung von Planerleistungen) (March 2018)
- KBOB: "Sustainable construction: terms for planning services (building construction)" (Nachhaltiges Bauen: Bedingungen für Planungsleistungen (Hochbau)) (July 2017)
- City of Zurich Building Construction Department: "Contract award procedure" (Vergabeverfahren) (November 2017)
- SIA 142: Regulations for Architecture and Engineering Competitions (2009)
- SIA 143: Regulations for Architecture and Engineering Study Commission (2009)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Was an architecture competition/study commission carried out (M1)? ▪ Were sustainability criteria taken into account and was a sustainability expert enlisted (M2)?	Fulfilled	▪ Architecture competition/study commission (M1) and ▪ Sustainability criteria and expert (M2)
		Partially fulfilled	▪ Architecture competition/study commission (M1)

Required evidence

	Provisional/definitive
Residential Office Commercial	Architecture competition/study commission (M1): ▪ Program Sustainability criteria and expert (M2): ▪ Architecture competition program with consideration of sustainability criteria ▪ Architecture competition evaluation method ▪ Jury and enlisted sustainability expert: list of roles and qualifications

1.2 Target groups

1.2.1 Barrier-free architecture

Use-specific indicator
Basic fit-out
Objective: elimination of disadvantages for people with disabilities in constructed living spaces

With regard to this objective, the Swiss Federal Act of December 13, 2002, on the Elimination of Discrimination against People with Disabilities (Disability Discrimination Act, DDA – Behindertengleichstellungsgesetz, BehiG; SR 151.3) and the Ordinance of November 19, 2003, on the Elimination of Discrimination against People with Disabilities (EPDO – Behindertengleichstellungsverordnung, BehiV; SR 151.31), require new buildings and renovations comprising more than eight residential units or 50 workplaces and buildings open to the public (stricter cantonal or municipal requirements apply in some cases) to be barrier-free. Generally speaking, barrier-free structures increase the attractiveness of buildings for all groups of people. The constructed living space should be made accessible – without any great difficulty or the need for outside help – to people who are restricted in mobility in terms of motor or sensory skills in the short term or long term, either from birth, due to an accident, following an illness, or due to any age-related afflictions, as well as people carrying heavy loads or shopping carts or strollers. Aspects of barrier-free construction are set to become more and more important in future as a result of demographic change.

Measure: confirmation of barrier-free buildings
The standard for the construction of barrier-free buildings is SIA 500 (2009), which sets out the relevant requirements. The requirements for barrier-free buildings vary depending on the type of building use.

Full implementation of SIA standard 500 is ideally evidenced by **certification from a qualified expert body** or, at the very least, an independent **description of the measures implemented.**

Where a **description of the measures implemented** is provided, evidence must be provided of implementation of the following topics in line with SIA standard 500:
- Access
- Elevators
- Aisle widths
- Doors (open faces, vestibules, etc.)
- Ramps
- Maneuvering areas
- Step-free corridors
- Restrooms (adaptable for ease of access, showers, grab handles, doors)
- Storage rooms and laundry facilities (residential)
- Room width and area (residential)
- High-contrast steps and stairs (commercial)
- Signage and entrance glazing

More information
- SIA 500: “Barrier-free buildings” (Hindernisfreie Bauten) (2009)
- DDA
- EPDO
- Barrier-free Architecture – Switzerland’s Expert Body (Hindernisfreie Architektur – Die Schweizer Fachstelle): “Housing construction, adaptable for ease of access” guideline (Richtlinie Wohnungsbau, hindernisfrei – anpassbar) (1992 issue, revised in 2009) (Special Building Ordinance of the Canton of Zurich of May 6, 1981 [Besondere Bauverordnung vom 6. Mai 1981; BBV I; regulation number 700.21], attached)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Have the requirements of SIA 500 relating to the use of the building been complied with and evidenced?	Fulfilled	▪ Confirmation from a qualified expert body (e.g. Procap)
		Partially fulfilled	▪ Full description of the measures implemented to meet the requirements of SIA 500

Required evidence

	Provisional	Definitive
Residential Office Commercial	▪ Confirmation from a qualified expert body (e.g. Procap) or ▪ Description of the measures implemented to meet the requirements of SIA 500 as per the list of topics or ▪ Declaration of intent regarding the implementation of measures under SIA 500 and means of evidencing these	▪ Confirmation from a qualified expert body (e.g. Procap) or ▪ Description of the measures implemented to meet the requirements of SIA 500 as per the list of topics

1.2.2 Integration and mixing

Use-specific indicator
Basic fit-out
Objective: to offer a wide range of different residential, office, and commercial real estate for lively, mixed neighbourhoods

In addition to structural density, room programme and the utilisation concept play a vital role in achieving urbanity and high diversity.

When it comes to housing projects, the variety of types and sizes of residence is assessed with a view to create a range of choices for as many user groups as possible and taking their needs into consideration.

For office properties, an assessment is made with regard to what extent the use layout would allow to make adaptations in the event of a change in tenant, ensuring the needs of several smaller rental parties could also be met, thus lowering the risk of vacancy.

Commercial properties are examined for suitability in terms of visibility and context and, for instance, as to whether they meet the requirements for the designation of an anchor tenant. The retail market is faced with structural change and increased pressure in this era of online trade. Retailers must therefore offer innovative concepts or forgo retail spaces from the outset, if, for example, similar offerings in the neighborhood have been left vacant, difficult to lease, and unused.

Residential:

Offer a variety of types of housing based on the following distinguishing features:

Measure 1 (M1): varied housing types
- Apartments, penthouses, workshops, lofts, studios, cooperative apartments, cluster apartments
- Number of rooms per residence:
  – 1.5-, 2.5-, 3.5-, 4.5-, 5.5-bedroom residences
- Residence sizes:
  – significant variance of sizes within housing types

Measure 2 (M2): housing for the elderly
1.5- to 3.5-bedroom residences, barrier-free/disabled-access; elevator, disabled-access; balcony/terrace, no steps; space in front of toilet/washbowl, at least 120 × 120 cm

Office:

Enable flexibility with regard to the number of users (single- or multi-tenant) aided by the following measures:

Measure 1 (M1): building depth for flexible uses
- Building case 1: standard (outer wall to outer wall)
  – 10.00 m ≤ existing building depth ≤ 16.50 m
  – 12.50 m ≤ existing building depth ≤ 14.50 m
- Building case 2: access core (outer wall to core)
  – 5.00 m ≤ existing building depth ≤ 8.25 m
  – 6.25 m ≤ existing building depth ≤ 7.25 m

Measure 2 (M2): divisibility of rented sections
Can larger rented sections be split up with minimum effort and without restricting the usability and comfort (e.g. daylight)? Are sanitary units accessible within a short distance of all working zones?

Measure 3 (M3): possibility of several main entrances or addresses
Where the building structure is very long, are there plans for several main entrances or addresses as well as global locking?

Commercial

Measure 1 (M1): shopping center with large retail area
Only applicable to shopping centers/malls: Is at least one large retail space (1,000 to 3,000 m^2) suitable for a grocery store (e.g. Migros or Coop) available on the basement or first floor? Food sector anchor tenants increase the frequency of passers-by, something surrounding smaller stores can benefit from.

Measure 2 (M2): context to avoid vacancies
Has context been considered in the planning or is context factored in? If there are difficulties marketing ground floor spaces in the surrounding area and a high level of vacancies (judging by advertising portals), then there is little point in developing similar spaces.

Measure 3 (M3): attractiveness and visibility of retail spaces
Have the visibility and attractiveness of retail spaces been taken into account?

(If spaces are on the basement level: Is there an atrium or anything similar? If retail spaces are difficult to access: Are there lounge and seating areas?)

Assessment

	Requirement	Degree of fulfillment	
Residential	▪ Are there plans for a variety of housing types (M1) and elderly housing (M2) in the project?	Fulfilled	▪ At least 4 different types of housing (M1) and ▪ At least 1 of which housing for the elderly (M2)
		Partially fulfilled	▪ At least 3 different housing types (M1)
Office	▪ Does the project allow for a variety of different types of office space in terms of building depth (M1), divisibility (M2), and several main entrances/addresses (M3)?	Fulfilled	▪ 3 out of the 3 measures have been implemented
		Partially fulfilled	▪ 2 out of the 3 measures have been implemented
Commercial	▪ Does the project allow for a variety of different types of retail space in terms of sales space (M1), context (M2), and visibility (M3)?	Fulfilled	▪ 2 out of the 3 measures have been implemented
		Partially fulfilled	▪ 1 out of the 3 measures has been implemented

Required evidence

	Provisional	Definitive
Residential	Housing types (M1), housing for the elderly (M2): ▪ All floor plans necessary for demonstration (to a scale of at least 1: 200), including designation of areas	Housing types (M1), housing for the elderly (M2): ▪ Revised documents
Office	Building depth (M1), divisibility (M2), several main entrances/addresses (M3): ▪ All floor plans necessary for demonstration (to a scale of at least 1: 200), including designation of areas	Building depth (M1), divisibility (M2), several main entrances/addresses (M3): ▪ Revised documents
Commercial	Retail space (M1), attractiveness and visibility (M3): ▪ All floor plans necessary for demonstration (to a scale of at least 1: 200), including designation of areas Context (M2): ▪ Market surveys, advertisement list/excerpt	Retail space (M1), attractiveness and visibility (M3): ▪ Revised documents Context (M2): ▪ Revised documents

1.3 Space design

1.3.1 Social contact

Situation indicator/use-specific indicator
Basic fit-out/Tenant fit-out
Objective: promoting social contact using meeting places

Meeting places in the building or within the direct vicinity (in outside spaces) can help to promote social contact. If there are no meeting places in the directly adjacent surroundings, it is all the more important to have such places available in the building or on the premises.

In residential construction, the well-being and integration of inhabitants can be improved by facilities such as communal areas and so-called semiprivate spaces. This practice has long been established in cooperative residential construction.

Many companies foster their internal communication culture by setting up informal zones.

It is well worth providing basic facilities in communal spaces. Planning should also focus on design and accessibility in order to foster acceptance and encourage use of the spaces.

In addition to interior spaces, the design of the outdoor area plays just as important a role in facilitating social contact. Varied playgrounds for different age groups, communal outdoor seating areas (covered and uncovered), private gardens in housing construction, and inviting break areas are helpful means of achieving this.

Residential:

Measure 1 (M1): communal spaces or meeting places inside
- Communal spaces
- Meeting places such as large staircases with stairwells, entrance halls, forecourts, multifunctional areas and rooms (e.g. drying rooms/laundry rooms with view/access to outdoor areas or access area)

Measure 2 (M2): communal spaces or meeting places outside
- Communal gardens
- Playgrounds
- Outdoor seating areas

Office/commercial:

Measure 1 (M1): communal spaces or meeting places inside
- Meeting places
- Recreation areas
- Break rooms
- Cafeterias

Measure 2 (M2): communal spaces or meeting places outside
- Outdoor seating areas

More information
- SIA 112/1: “Sustainable construction – Buildings – Terminological standard for SIA 112” (Nachhaltiges Bauen – Hochbau – Verständigungsnorm zu SIA 112) (2017)
- SIA 2050: “Sustainable spatial development – Municipal and regional planning – Supplements to SIA standard 111” (Nachhaltige Raumentwicklung – Kommunale und regionale Planungen – Ergänzungen zur Norm SIA 111) (2015)
- BWO: housing evaluation system, K12/multipurpose and communal areas

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Are there communal spaces/meeting places inside (M1) and outside (M2)?	Fulfilled	▪ 1 communal space/meeting place inside (M1) and ▪ 1 communal space/meeting place outside (M2)
		Partially fulfilled	▪ 1 communal space/meeting place inside (M1) or ▪ 1 communal space/meeting place outside (M2)

Required evidence

	Provisional	Definitive
Residential Office Commercial	Interior (M1) ▪ All floor plans necessary for demonstration (to a scale of at least 1: 200), including designation of areas Outdoor area (M2) ▪ Site plan (to a scale of at least 1 : 500), including outdoor area design, open spaces, and access	Interior (M1): ▪ Revised documents ▪ Photos Outdoor area (M2): ▪ Revised documents ▪ Photos

1.3.2 Spatial identity

Use-specific indicator
Basic fit-out/Tenant fit-out
Objective: identification of residents/employees and promotion of community life

One aim of sustainable development is to promote community life and a functioning local supply. A dense network of public offerings means that everyday affairs can be dealt with in the vicinity and helps users to identify with their neighborhood, ultimately contributing to their well-being. This indicator assesses how the building contributes to the development of the local community on the basis of the public uses envisaged in the project.

The project is also assessed with regard to identity-forging elements that demonstrate quality of some form in the creation of context, architectural expression, or the urban development of the setting.

Measure 1 (M1): range of public/communal uses
- Stimulating community life: number of uses available to the community, for example community meetings, a communal roof terrace
- Public uses: museums, day care centers, stores, cafés, restaurants, medical practices, skybars
- In retail spaces: public spaces

Measure 2 (M2): identification-forging element
Qualitative assessment (identification elements):
- Urban planning (quality of the volumetric layout and structural density)
- Outdoor space design
- Treatment of existing infrastructure
- Diverse development possibilities in outdoor space
- Identity-forging elements (shape, color, etc.)
- Degree of innovation (technical: facade, roof; design: layout, division)

More information
- KBOB: fact sheet 1.4.30, "Spatial identity, recognition" (Räumliche Identität, Wiedererkennung) (November 27, 2017)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Are there plans for a range of public/communal uses in the project (M1), and does the project foster residents' identification with the neighborhood (M2)?	Fulfilled	▪ At least 1 offering (M1) and ▪ At least 1 specific identification element (M2)
		Partially fulfilled	▪ At least 1 offering (M1) or ▪ At least 1 specific identification element (M2)

Required evidence

	Provisional	Definitive
Residential Office Commercial	Range of offerings (M1): ▪ All floor plans necessary for demonstration (to a scale of at least 1: 200), including designation of areas Identification elements (M2): ▪ Site plan (to a scale of at least 1: 500), including outdoor area design, open spaces, and access; incorporated/planned vegetation must also be described in more detail	Range of offerings (M1): ▪ Revised documents Identification elements (M2): ▪ Revised documents

1.4 Indoor comfort

1.4.1 Indoor climate

Use-specific indicator
Basic fit-out
Objective: stimulating the productivity and well-being of users with a high-quality indoor climate and thermal comfort by installing suitable air-conditioning technology

Besides a comfortable indoor climate, a high-quality indoor space also requires an environment that protects and fosters health and well-being. Health, well-being, and productivity are the main focus here.

Great importance is attributed to the health of users of the building in particular. Health is an important growth market and has long since pervaded all areas of life and consumer sectors, even the working world, where it is referred to as corporate health.

Measure 1 (M1): summer heat protection (temperature)
Minergie®: summer heat protection in line with the Minergie® standard: compliance with either version 1, 2, or 3.

Measure 2 (M2): CO_2 concentration
Ventilation concept in line with SIA standard 180 in the preliminary project or at least a use agreement regarding the RAL standard in the specifications/building description, etc.

- It should be ensured that, under everyday-use conditions, the CO_2 concentration remains below the threshold value for indoor air quality RAL 3 (residential property) or RAL 2 (office/commercial property) in line with SIA standard 382/1.
- Ventilation calculations: for guidelines on the recommended mechanical ventilation rates for different room types depending on default configuration, see SIA standard 382/1, SIA 2024, or SIA 2023.

Measure 3 (M3): humidity

- Active supply-air humidification or
- Active humidification using air humidification systems (e.g. evaporators, air washers) or
- Passive humidification using moisture recovery (e.g. plate heat exchangers with moisture recovery, rotors with sorption)

More information

- Minergie®-Eco: "Requirement specifications and implementation guidelines for new buildings" (Vorgabenkatalog und Umsetzungshinweise für Neubauten), version 1.4 (January 2018)
- SIA 180: "Heat protection, moisture protection, and indoor climate in buildings" (Wärmeschutz, Feuchteschutz und Raumklima in Gebäuden), chapter 5 – "Heat protection in summer" (Wärmeschutz im Sommer) (2014)
- SIA 382/1: "Ventilation and air-conditioning systems – General principles and requirements" (Lüftungs- und Klimaanlagen – Allgemeine Grundlagen und Anforderungen) (2014)
- SIA 2024 "Space usage data for energy and building technology" (Raumnutzungsdaten für die Energie- und Gebäudetechnik) (2015)
- SIA 331.151 (Swiss edition of European Standard SN EN 410): "Glass in building – Determination of luminous and solar characteristics of glazing" (Glas im Bauwesen – Bestimmung der lichttechnischen und strahlungsphysikalischen Kenngrössen von Verglasungen) (2011)
- SIA 382.701 (SN EN 13779): "Ventilation for non-residential buildings – Performance requirements for ventilation and room-conditioning systems" (Lüftung von Nichtwohngebäuden – Allgemeine Grundlagen und Anforderungen für Lüftungs- und Klimaanlagen und Raumkühlsysteme) (2007)
- SIA 2023: "Ventilation in residential buildings" (Lüftung in Wohnbauten) (2008)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Have the criteria related to temperature (M1), CO_2 concentration (M2), and humidity (M3) been fulfilled?	Fulfilled	▪ At least 3 out of the 3 measures have been implemented
		Partially fulfilled	▪ At least 2 out of the 3 measures have been implemented

Required evidence

	Provisional	Definitive
Residential Office Commercial	Temperature (M1): ▪ Minergie® certification form: summer heat protection; versions 1, 2, or 3 CO_2 concentration (M2): ▪ RAL standard use agreement (in specifications/building description, etc.) or ▪ Ventilation concept (description/diagrams) and ▪ Airflow rate calculations under SIA 382/1, SIA 2024, or SIA 2023 Humidity (M3): ▪ Ventilation concept (description/diagrams)	Temperature (M1): ▪ Revised documents CO_2 concentration (M2): ▪ Ventilation concept (description/diagrams) and ▪ Airflow rate calculations under SIA 382/1, SIA 2024, or SIA 2023 and ▪ Ventilation commissioning logs or ▪ Results of CO_2 indoor air measurements under Minergie®-Eco Humidity (M3): ▪ Revised documents ▪ Ventilation system datasheets

1.5 Visual and acoustic comfort

1.5.1 Daylight

Use-specific indicator
Basic fit-out/Tenant fit-out
Objective: ensuring an adequate and comfortable supply of daylight and an undisturbed view from all permanently used indoor areas.

The electricity requirement for lighting is determined by the use of daylight and this by the shape, direction, and configuration (brightness) of the rooms and facades as well as the position and size of the windows.

Daylight has a stimulating effect on people, it synchronizes their internal body clock; increased amounts of daylight foster these health effects.

Minergie®-Eco evaluates the daylight quality in typical building rooms using daylight analysis. This can be done using the Minergie®-Eco daylight analysis tool or other daylight tools (Dial, Lesosai, ReluxEnergy CH).

Measure: ample daylight provision
Daylight analysis using Minergie®-Eco (calculation of the daylight fulfillment rate)

More information
- SIA 342.019 (SN EN 14501): "Blinds and shutters – Thermal and visual comfort – Performance characteristics and classification" (Abschlüsse – Thermischer und visueller Komfort – Leistungsanforderungen und Klassifizierung) (2005)
- SIA: ReluxEnergy CH calculation and certification tool
- Minergie®-Eco: daylight tool
- Bine Information Service: Daylight usage in buildings (Tageslichtnutzung in Gebäuden)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Does the project meet the Minergie®-Eco daylight analysis requirements?	Fulfilled	▪ Average fulfillment rate of at least 70% and ▪ Percentage of main usable area with a fulfillment rate of less than 50% is less than 20%
		Partially fulfilled	▪ Average fulfillment rate of at least 50% and ▪ Percentage of main usable area with a fulfillment rate of less than 50% is less than 20%

Required evidence

	Provisional	Definitive
Residential Office Commercial	▪ Daylight analysis calculation (building project)	▪ Revised documents

1.5.2 Sound insulation

Use-specific indicator
Basic fit-out
Objective: ensuring a building's sound insulation requirements are met in order to protect users against noise from both external and internal sources

Noise disrupts sleep and relaxation, reduces mental capacity, and hampers verbal communication. There is a link between risk of illness and increasing sound levels. Disruptions due to outside noise should therefore be minimized and noise pollution from different building units avoided (e.g. airborne noise, footstep sounds, emissions from building technology systems).

Measure 1 (M1): ensuring sound insulation requirements are met
Sound insulation can be guaranteed by means of official certification and/or a sound insulation concept.

A sound insulation concept must contain the following:
- Needs assessment/sound insulation requirements of users or a target user group regarding:
  - External noise situation (noise pollution from outdoor areas, noise impact of open windows)
  - Protection from external sources where building envelope is sealed (airborne noise, vibrations, radiated structure-borne sound)
  - Protection from internal sources from other building units (airborne noise, footstep sounds, noises from building technology systems and fixed installations in the building)
  - Sound insulation within the same building unit
- A definition of sound insulation requirements for key components on the basis of the information above (sound insulation concept, list of requirements and measures, etc.)
- A concept for as-built checks

Measure 2 (M2): requirements for airborne and footstep sounds
The statutory or increased requirements under SIA 181 for airborne and footstep sounds transmitted between building units have been complied with.

More information
- Minergie®-Eco: "Requirement specifications and implementation guidelines for new buildings" (Vorgabenkatalog und Umsetzungshinweise für Neubauten), version 1.4 (January 2018)
- SIA 181: "Sound insulation in buildings" (Schallschutz im Hochbau) (2006)
- D 0189: "Component documentation: sound insulation in buildings – Summary of measured components" (Bauteildokumentation Schallschutz im Hochbau – Zusammenstellung gemessener Bauteile) (2005)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Is a sound insulation concept or sound insulation certification in place (M1), and has the concept or certificationi been implemented? ▪ Have the statutory or increased requirements for airborne and footstep sounds been complied with (M2)?	Fulfilled	▪ Sound insulation guaranteed with a sound insulation concept (M1) and ▪ Increased requirements for airborne and footstep sounds complied with (M2)
		Partially fulfilled	▪ Sound insulation guaranteed with a sound insulation concept (M1) or ▪ With sound insulation certification and ▪ Statutory requirements for airborne and footstep sounds complied with (M2)

Required evidence

	Provisional	Definitive
Residential Office Commercial	Assurance of sound insulation (M1) and that requirements for airborne and footstep sounds (M2) have been met: ▪ Sound insulation concept or sound insulation certification	Sound insulation (M1): ▪ Revised documents Requirements for airborne and footstep sounds complied with (M2): ▪ Documentation of as-built checks on building by a building physicist or on-site construction management (with logs) or ▪ Acceptance measurements of key components and installations in line with Minergie®-Eco (measurement report with measurement logs)

2 Infrastructure

2.1 Location

2.1.1 Basic services

Situation indicator/use-specific indicator
Objective: range of basic services in the direct vicinity

One key criterion for prospective tenants when looking for housing is the accessibility of shopping facilities and services. If these are too far away, for example a distance of more than ten minutes on foot, tenants tend to use a car for everyday needs, thus increasing use of resources.

The quality of a location increases with the local availability of educational institutions and childcare options. Proximity to educational institutions and childcare facilities is a key requirement for working parents.

Where commercial uses are concerned, the emphasis is on a wide range of catering options accessible on foot.

Measure 1 (M1): educational and/or childcare options:
- After-school childcare facilities (day care center, after-school care)
- Kindergarten and primary schools

Measure 2 (M2): everyday goods stores and/or catering options
- Grocery stores
- Specialist grocery stores (bakeries, butcher shops, greengrocers, kiosks, etc.)
- Restaurants
- Cafés
- Cafeterias
- Takeouts

Measure 3 (M3): specialist goods stores and/or services
- Medical practices
- Post offices
- ATM machines or online banking
- Clothing stores/outlets
- Specialist stores
- Hairdressers
- Pharmacies

Assessment

	Requirement	Degree of fulfillment	
Residential	▪ Are a range of basic services for childcare/education (M1), everyday goods/catering options (M2), and specialist goods/services (M3) available in the vicinity?	Fulfilled	▪ At least 1 childcare facility/education institution (M1) within 10 minutes on foot and ▪ At least 2 everyday goods stores (M2) (1 of which is a grocery store) within 10 minutes on foot and ▪ At least 3 specialist goods stores/services (M3) (1 of which is a post office/automated parcel booth) within 10 minutes on foot
		Partially fulfilled	▪ At least 1 childcare facility/education institution (M1) within 15 minutes on foot and ▪ At least 1 grocery store (M2) within 10 to 15 minutes (distance on foot) and ▪ At least 2 specialist goods stores/services (M3) within 10 to 15 minutes on foot
Office	▪ Are a range of basic services for everyday goods/catering options (M2), and specialist goods/services (M3) available in the vicinity?	Fulfilled	▪ At least 3 catering options (M2) (1 of which is a grocery store) within 10 minutes on foot and ▪ At least 3 specialist goods stores/services (M3) within 15 minutes on foot
		Partially fulfilled	▪ At least 1 catering option (M2) within 10 minutes on foot and ▪ At least 1 specialist goods store/service (M3) within 15 minutes on foot
Commercial	▪ Are a range of basic services for everyday goods/catering options (M2), and specialist goods/services (M3) available in the vicinity?	Fulfilled	▪ At least 2 catering options (M2) (1 of which is a grocery store) within 10 minutes on foot and ▪ At least 2 specialist goods stores/services (M3) within 15 minutes on foot
		Partially fulfilled	▪ At least 1 catering option (M2) within 15 minutes on foot

Required evidence

	Provisional/definitive
Residential Office Commercial	Childcare/education (M1), everyday goods/catering (M2), and specialist goods/services (M3): ▪ Overview maps (via maps.search.ch), screenshots with superimposed points of interest, Google Maps map view

2.1.2 Recreation/leisure

Situation indicator
Objective: leisure and recreation for different age groups in the direct vicinity

A diverse range of culture and leisure offerings in the vicinity, accessible either on foot or by bike or using public transportation contributes to a reduction in motorized private transportation.

Culture and leisure offerings of a public or semipublic nature:

Measure 1 (M1): cultural offerings
- Museums
- Cinemas
- Theaters
- Operas
- Community meetings, etc.

Measure 2 (M2): local recreational offerings
- Parks
- Woods
- Riverbanks
- Lakes, etc.

Measure 3 (M3): leisure offerings
- Swimming pools
- Sports facilities, etc.

More information
- Federal leisure travel strategy: Leisure mobility (Freizeitmobilität)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Is there an extensive range of cultural (M1), recreational (M2), and leisure (M3) options available in the nearby area?	Fulfilled	▪ 1 cultural (M1), recreational (M2), and leisure (M3) option each within 15 minutes on foot, 20 minutes by bike, or 15 minutes by public transportation (only cultural offerings [M1])
		Partially fulfilled	▪ At least 2 options from 2 different areas: cultural (M1), recreational (M2), and leisure (M3) can each be reached within 15 minutes on foot, 20 minutes by bike, or 15 minutes by public transportation (only cultural offerings [M1])

Required evidence

	Provisional/definitive
Residential Office Commercial	Culture (M1), recreation (M2), leisure (M3): ▪ Overview maps (via maps.search.ch), Google Maps map view

2.2 Mobility

2.2.1 Public transportation

Situation indicator
Objective: promotion of sustainable mobility with good public transportation connections

The property's connections to public transportation are of crucial importance to sustainability. Enabling a sustainable way of life for the residents and users of a building requires that they have the option of making all day-to-day journeys without the use of motorized private vehicles.

Measure: location with good public transportation connections
The public transportation quality class depends on the type of transportation and timetable, stop categories, and distance to the stop. Public transportation quality classes are a key indicator when it comes to evaluating access to public transportation. They are calculated as part of an automated process based on data from the electronic timetable of the Swiss Employers' Association of Transport Companies (Arbeitgeberverband Schweizerischer Transportunternehmungen) (HaCon timetable data information system – HAFAS). The geocatalog at map.geo.admin.ch is used as a basis for this.

This data can be taken from a geoinformation system (GIS) map of the location or from Google Earth. Planners have usually already provided this data themselves in the building description. In addition to the distance to the closest public transportation stop, the frequency and thus convenience and everyday usability of rail, tram, and bus connections are also key criteria.

More information
- Federal Office for Spatial Development (Bundesamt für Raumentwicklung – ARE): Web-GIS ARE
- ARE: traffic development in Switzerland (Verkehrserschliessung in der Schweiz)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ How well is the property connected to public transportation?	Fulfilled	▪ Public transportation quality class A: very well-connected
		Partially fulfilled	▪ Public transportation quality class B or C: well- to moderately-connected

Required evidence

	Provisional/definitive
Residential Office Commercial	▪ GIS map extracts of the public transportation quality class of the property in question

2.2.2 Infrastructure for bikes

Use-specific indicator
Basic fit-out/Tenant fit-out
Objective: promoting and facilitating the use of bikes

Cycling plays a crucial role in environmentally conscious private transportation. Particularly where short distances are involved, making the switch from car to bike can contribute significantly to the facilitation of environmentally friendly and energy-efficient mobility. Here, it is not just the quantitative, but also qualitative aspects that determine user acceptance and/or choice of transportation mode.

Measure 1 (M1): sufficient number of bike racks
Promoting and facilitating the use of bikes requires a sufficient number of qualitatively adequate bike racks on the premises.

Both the statutory guidelines and the recommendations of the Swiss Federal Roads Office (FEDRO – Bundesamt für Strassen, ASTRA) ("Bike parking. Recommendations for planning, realisation , and management" [Veloparkierung. Empfehlungen zu Planung, Realisierung und Betrieb] handbook, first edition, 2008) should be taken into consideration in accordance with the excerpt below when calculating the number of bike racks:

Figure 1: Overview of reference values for required number of bike racks

Usage/function	Visitors Clientele	Residents Employees
Residential	Included in the residents benchmark	1 bike parking space per room
Service businesses		
Customer-intensive	3 bike parking spaces per 10 workplaces	2 bike parking spaces per 10 workplaces
Little visitor traffic	0.5 bicycle space per 10 workplaces	
Retail		
Shops for everyday necessities	2–3 bike parking spaces per 100 m2 of retail space	2 bike parking spaces per 10 workplaces
Other shops	0.5–1 bike parking space per 100 m^2	
Shopping centers	1–2 bike parking spaces per 100 m^2 of retail space (dependent on usage mix)	
Commercial and industrial	0.5 bike parking space per 10 workplaces	2 bike parking spaces per 10 workplaces
Mixed usage	Needs must be identified separately for each type of usage and cumulated	

source: based on FEDRO. "Bike parking. Recommendations for planning, realisation , and management" [Veloparkierung. Empfehlungen zu Planung, Realisierung und Betrieb] handbook, first edition, 2008)

If the number of workplaces is not known, the following assumptions can be made based on SIA 2039 (2011) or SIA 2039 (2016):
- Office: individual space per employee (full-time equivalent, FTE) = 35 m^2 ERA/WB
- Specialist store: individual space per FTE = 90 m^2 ERA/WB
- Grocery store: individual space per FTE = 60 m^2 ERA/WB
- For additional uses, see SIA 2039 (2016), chapter 4.1 "Average values 2015" (Durchschnittswerte 2015)

Terms:
- workplace (WB)
- Energy reference area (ERA)

If the number of bike racks is not known, this can be ascertained based on the space taken up by the bike area. The space taken up per bike rack is 1 m^2 of two thirds of the ground area.

Measure 2 (M2): high-quality bike racks
The following elements are relevant to assessing the **qualitative aspects:**

Location:
- The parking racks are located close to destinations (entrances/main entrances) and positioned on the way to these (in the building or next to the building).
- Bike racks are easily accessible (e.g. separate traversable ramps for access points on the basement floor, threshold- and barrier-free, and preferably even with the ground).
- To ensure protection against theft, 70% of the bike racks are located within a locked area.

Requirements:
- Space is available for specialist bikes such as those with trailers or strollers and for walkers (relevant to residential buildings only).
- Electric charging stations are available for e-bikes.

Type of facility/equipment:
- The outdoor parking facility allows bikes to be connected to the frame with a standard lock.
- Facilities for long-term users (residents/employees) must be weatherproof; open facilities have been chosen for short-term parkers (visitors).
- There are at least two showers (relevant to office/commercial buildings only); there is at least one changing room per shower facility.

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	■ Are a sufficient number of bike racks available (M1)? ■ Are bike racks of an appropriate quality available (M2)?	Fulfilled	■ The planned number of bike racks (M1) meets the requirements in Figure 1and ■ At least 5 out of the 7 qualitative aspects (M2) have been implemented
		Partially fulfilled	■ The planned number of bike racks (M1) meets the statutory requirements and ■ At least 3 out of the 7 qualitative aspects (M2) have been implemented

Required evidence

	Provisional	Definitive
Residential Office Commercial	Number of bike parking racks (M1): ■ Bike parking rack calculation by architect ■ Regulations/statutory requirements for bike parking racks ■ All floor plans necessary for demonstration (to a scale of at least 1 : 200), including designation of areas; the bike parking spaces are marked on the floor plans Quality of bike parking racks M2: ■ All floor plans necessary for demonstration (to a scale of at least 1 : 200), including designation of areas; the bike parking spaces are marked on the floor plans	Number of bike parking racks (M1): ■ Revised documents Quality of bike parking racks (M2): ■ Revised documents ■ Documentation of bike park equipment with photos ■ Excerpts from the specifications document

More information

- Cantonal building law and building ordinances for bike parking
- FEDRO: "Bike parking. Recommendations for planning, realisation , and management" (Veloparkierung. Empfehlungen zu Planung, Realisierung und Betrieb) handbook, first edition (2008)
- FEDRO
- Bicycle Conference Switzerland (Velokonferenz Schweiz)
- German Cyclists' Association (national association) (Allgemeiner Deutscher Fahrrad-Club [Bundesverband] e. V. [ADFC]): position paper "Bike parks in public spaces" (Fahrradparken im öffentlichen Raum) (August 2010)
- ADFC: "Guidance for planning bike parking facilities" (Hinweise für die Planung von Fahrrad-Abstellanlagen) (October 2010)
- ADFC: Technical guidelines TR 6102, "Recommended bike parking facilities" (Technische Richtlinie TR 6102, Empfehlenswerte Fahrrad-Abstellanlagen) (July 18, 2011)
- SIA 2039: "Mobility – Energy consumption depending on building location" (Mobilität – Energiebedarf in Abhängigkeit vom Gebäudestandort) (2016)
- SIA 2024: "Space usage data for energy and building technology" (Raumnutzungsdaten für die Energie- und Gebäudetechnik) (2015)

2.2.3 Motorized private transportation

Use-specific indicator
Basic fit-out/Tenant fit-out
Objective: to reduce the number of parking spaces and design parking spaces for different forms of mobility

The necessary conditions should be created to enable car-free living, working, and shopping, and the amount of parking spaces created should be restricted to the minimum required by building regulations. Fewer parking spaces mean fewer underground structures and, above all, can contribute to a switch in user behavior in favor of public transportation and nonmotorized transportation. Rentability also plays an important role: checking the market value can help avoid vacancies.

Measure 1 (M1): reducing the number of parking spaces for cars
The number of parking spaces is defined based on the statutory regulations of the relevant municipality. A minimum and maximum number of parking spaces are generally stipulated by law.

Where there is a failure to comply with the minimum obligatory parking spaces required by law (in accordance with standard statutory regulations or else special building regulations or design plans), a mobility concept is generally required. Using an appropriate form of mobility management to contribute to reduced demand for parking spaces can reduce the investment and costs required to create and manage these parking spaces.

The mobility concept sets out the envisaged parking spaces, appropriate mobility measures, the controlling procedure, and a fallback option to employ in the event that the objectives set out in the mobility concept are not met.

Measure 2 (M2): offering parking spaces with infrastructure for electromobility
In the interests of promoting electromobility, parking spaces with electric charging stations should be made available.

Measure 3 (M3): offering parking spaces for different mobility forms
Parking spaces should be set up to facilitate car-sharing and parking space pooling to enable different forms of mobility.

More information
- Cantonal parking space ordinances, regulations
- City of Zurich Civil Engineering and Disposal Department: Low-traffic mobility concept guidelines (Leitfaden Mobilitätskonzept autoarme Nutzungen)
- Energy Switzerland (EnergieSchweiz): "Mobility management in new site planning processes. Handbook. Anchoring mobility management" (Mobilitätsmanagement in Planungsprozessen von neuen Arealen [MIPA], Handbuch: Verankerung des Mobilitätsmanagements)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Is there a reduced number of parking spaces (M1)? ▪ Are there parking spaces with electric charging stations (M2)? ▪ Are there parking spaces for car-sharing or pooling services (M3)?	Fulfilled	▪ Reduced number of parking spaces (M1) and ▪ Parking spaces with infrastructure for electromobility (M2) and ▪ Parking spaces for car-sharing or parking space pooling (M3)
		Partially fulfilled	▪ Restricted to minimum number of parking spaces (5% tolerance range) (M1) and ▪ Parking spaces with infrastructure for electromobility (M2)

Required evidence

	Provisional	Definitive
Residential Office Commercial	Number of parking spaces (M1): ▪ Mobility concept (when minimum number of mandatory parking spaces required by law is not met) ▪ Planning permission ▪ Parking space calculation by architect ▪ Statutory requirements/regulations on parking spaces ▪ Special use planning Electromobility parking spaces (M2) and parking spaces for different mobility forms (M3): ▪ All floor plans necessary for demonstration (to a scale of at least 1 : 200), including designation of areas ▪ Mobility concept	Number of parking spaces (M1): ▪ Revised documents Electromobility parking spaces (M2) and parking spaces for different mobility forms (M3): ▪ Revised documents

2.3 Security

2.3.1 Natural hazards

Situation indicator
Objective: to choose a building location that is not exposed to any natural hazards and to implement protective measures for at-risk locations

Given its topography, Switzerland is exposed to a variety of natural hazards that may under certain circumstances have an impact on building structures. The effects of climate change are increasing the risks posed by natural phenomena in Switzerland. Increased temperatures, rising snowfall levels, and changes in precipitation levels are seeing the risk of floods, avalanches, landslides, and slumps increase.

Measure 1 (M1): choose a building location free from natural hazards
Cantons maintain GIS map portals containing data on natural hazards. The exposure of the location can be deduced from the map. If there are no entries, the criterion is graded as "not fulfilled".

Measure 2 (M2): protective measures where there is exposure to risk
Protective measures must be taken if the location is exposed to risk.

More information
- Swiss Federal Office for the Environment (FOEN – Bundesamt für Umwelt; BAFU): Natural hazards (hazard maps)
- Hazard maps on cantonal geoportals

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Is the building location classed as safe in the cantonal natural hazard map (hazard register) (M1)? ▪ If risks are present, have protective measures been implemented for any potential risks (M2)?	Fulfilled	▪ Building location not exposed to any risk or negligible risk (M1)
		Partially fulfilled	▪ Building location exposed to low risk, residual risk, or moderate risk (M1) and ▪ Protective measures have been implemented (M2)

Required evidence

	Provisional	Definitive
Residential Office Commercial	Building location (M1): ▪ Natural hazard map excerpts Protective measures (M2): ▪ Planned protective measures: description, plan excerpts	Building location (M2): ▪ Revised documents ▪ Photos of the protective measures implemented

2.3.2 Sense of security

Use-specific indicator
Basic fit-out
Objective: avoiding hazardous situations in both the indoor and outdoor areas of the building

A high sense of security contributes considerably to the comfort and well-being of users. Measures aimed at increasing the sense of security also tend to generally reduce the risk of attacks by others.

Measure 1 (M1): safe play areas and open spaces (residential properties)
Play areas and open spaces are safely accessible from the residences, linked-up by safe paths, and safeguarded against road traffic.

Measure 2 (M2): short and well-visible paths
Relevant paths from the street and from the residence and/or the office to bike racks/parking areas, car parking lots, mailboxes, or laundry rooms are short and well visible.

Measure 3 (M3): adequate lighting in outdoor areas
Adequate-lit semipublic areas, outdoor paths, building entrances, bike racks, and parking spaces. Key elements and step nosing lit; facial recognition should be guaranteed (recommendation from standard SN EN 12464-1 and DIN EN 12464-2).

Measure 4 (M4): adequate lighting in indoor areas
Indoor access routes adequate-lit. Key elements and step nosing lit; facial recognition should be guaranteed (recommendation from standard SN EN 12464-1 and DIN EN 12464-2). Lighting is ensured by optimum use of natural light, and artificial lighting is regulated depending on daylight.

More information
- DIN EN 12464-2: "Light and lighting – Lighting of work places – Part 2: Outdoor work places; German version FprEN 12464-2:2013" (Licht und Beleuchtung – Beleuchtung von Arbeitsstätten – Teil 2: Arbeitsplätze im Freien; Deutsche Fassung FprEN 12464-2:2013) (also applicable to residential properties) (2013)
- SN EN 12464-1: "Light and lighting – Lighting of work places – Part 1: Indoor work places" (Licht und Beleuchtung – Beleuchtung von Arbeitsstätten – Teil 1: Arbeitsstätten in Innenräumen) (also applicable to residential properties) (2003)

Assessment

	Requirement	Degree of fulfillment	
Residential	▪ Have measures been implemented for play areas/open spaces (M1), short paths (M2), outdoor lighting (M3), and indoor lighting (M4)?	Fulfilled	▪ 3 out of the 4 measures have been implemented
		Partially fulfilled	▪ 2 out of the 4 measures have been implemented
Office Commercial	▪ Have measures been implemented for short paths (M2), outdoor lighting (M3), and indoor lighting (M4)?	Fulfilled	▪ 3 out of the 3 safety measures have been implemented
		Partially fulfilled	▪ 2 out of the 3 measures have been implemented

Required evidence

	Provisional	Definitive
Residential Office Commercial	Play areas/open spaces (M1) ▪ Site plan (to a scale of at least 1 : 500), including outdoor area design, open spaces, and access Short paths (M2) ▪ Site plan (to a scale of at least 1 : 500), including outdoor area design, open spaces, and access Outdoor lighting (M3) ▪ (Outdoor) path lighting concept Indoor lighting (M4) ▪ (Indoor) path lighting concept	Play areas/open spaces (M1) ▪ Revised documents or ▪ Photos Short paths (M2) ▪ Revised documents Outdoor lighting (M3) ▪ Revised documents Indoor lighting (M4) ▪ Revised documents

2.4 Immission

2.4.1 Radiation

Situation indicator
Basic fit-out
Objective: protection against ionizing radiation and reduction of nonionizing radiation

Radon
Uranium is found in varying concentrations in all underground areas. The natural decay of uranium gives rise to products including radium and radon. The decay of radon atoms produces radioactive radon decay products that float in the air we breathe. These accumulate on objects and dust particles in indoor areas. If inhaled, the radioactive particles end up in the lungs where they are deposited in the lung tissue. This can lead to lung cancer.

The Swiss Federal Office of Public Health (FOPH – Bundesamt für Gesundheit; BAG) therefore recommends that radon measurements and any relevant structural measures be carried out for areas with higher radon concentrations.

In 2018 the previous threshold value of 1,000 Bq/m^3 was replaced by a reference value of 300 Bq/m^3 for the annual radon gas concentration calculated in "rooms where people regularly spend several hours a day". However, the FOPH recommends aiming for as low as possible a level. Minergie®-Eco stipulates that radon concentrations in main use areas do not exceed a value of 100 Bq/m^3.

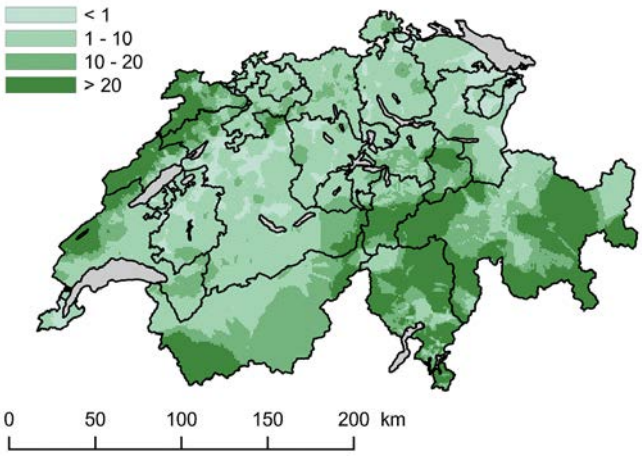
Electrosmog
Nonionizing radiation (NIR) occurs wherever an electrical current is flowing and wherever magnetic or electrical fields are present. Nonionizing radiation is also referred to using the collective term electrosmog.

Electrical power supplies, electrical devices and appliances, and radio communications generate nonionizing radiation. Depending on intensity, this electrosmog can be harmful to human health. In addition to external radiation sources, internal sources such as WLAN or cordless phones should also be taken into consideration.

Measure 1 (M1): reducing radon exposure
Measures are being taken in consultation with the radon unit of the relevant canton or the FOPH to ensure that the radon concentration in main use areas does not exceed a value of 100 Bq/m^3.

Figure 2: Radon map of Switzerland
The radon map indicates the probability [%] of exceeding the reference value of the radon concentration of 300 Bq/m^3 in a building.

Probability (%) of exceeding the reference value:



Source: Federal Office of Public Health, 2018
Source: bag.admin.ch/bag/en/home/gesund-leben/umwelt-und-gesundheit/strahlung-radioaktivitaet-schall/radon/radongebiete-ch.html

Measure 2 (M2): reducing electrosmog
In line with Minergie®-Eco:
- an NIR zone plan (low frequency [LF] of 50 Hz) with rooms assigned to use zones (A or B) has been created for the entire building; or
- main lines (including line routes) and vertical cabling are not routed through rooms of use zones A or B, and distribution boxes and racks for high-current installations are not positioned in rooms of use zones A or B;
- the cables laid in rooms of use zones A are round cables (no individual wires, no ribbon cables); fixed transmission antennas for wireless in-house communications are not installed in the rooms of use zones A.

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Have radon measures been coordinated with the FOPH or the radon unit of the relevant canton (M1)? ▪ Have electrosmog measures been implemented (M2)?	Fulfilled	▪ Radon measures (M1) have been agreed and ▪ 2 electrosmog measures (M2) have been implemented
		Partially fulfilled	▪ Radon measures (M1) have been agreed and ▪ 1 electrosmog measure (M2) has been implemented

Required evidence

	Provisional	Definitive
Residential Office Commercial	Radon (M1): ▪ List of planned measures to reduce radon exposure Electrosmog (M2): ▪ NIR zone plan (low frequency, LF) with main lines, vertical cabling, and high-current distribution systems marked out ▪ NIR zone plan (high frequency, HF) with antennas marked out or concept illustrating maximum radiation exposure ▪ Electrical installation plan (construction project), product datasheet (where available)	In general: ▪ Photo documentation of measures implemented Radon (M1): ▪ Photo documentation of measures implemented or ▪ Results of indoor air measurements for radon in line with Minergie®-Eco if the building is in an area with a probability of more than 10%, otherwise the radon map of the FOPH applies Electrosmog (M2): ▪ Revised documents ▪ Results of the acceptance measurements (NIR LF of 50 Hz) in line with Minergie®-Eco

More information

- Minergie®-Eco: "Requirement specifications and implementation guidelines for new buildings" (Vorgabenkatalog und Umsetzungshinweise für Neubauten), version 1.4 (January 2018)
- FOPH: Radon map of Switzerland
- Swiss Federal Office of Topography (Bundesamt für Landestopografie – swisstopo): Interactive radon map
- FOPH: Constructional measures against radon
- FOPH: Advice from radon specialists
- Swiss Federal Office of Communications (OFCOM – Bundesamt für Kommunikation; BAKOM): Location of ratio transmitters
- FOPH: Electromagnetic fields (EMF), UV, laser, and light
- City of Zurich Health and Environment Department: Electrosmog, NIR
- City of Zurich Building Construction Department: "Nonionizing radiation planning guidelines" (Planungsrichtlinie Nichtionisierende Strahlung PR-NIS) (August 8, 2011)
- Swiss Ordinance of December 23, 1999 on Protection against Non-ionising Radiation (NIRO; Verordnung vom 23. Dezember 1999 über den Schutz vor nichtionisierender Strahlung – NISV; SR 814.710) (as of July 1, 2016)

2.4.2 Noise

Situation indicator/Use-specific indicator
Basic fit-out
Objective: reducing outdoor noise pollution (noise immissions)

Noise pollution
The Swiss Noise Abatement Ordinance of December 15, 1986 (NAO – Lärmschutz-Verordnung vom 15. Dezember 1986; LSV; SR 814.41) sets out the primary aspects of noise abatement. The regulations on sound insulation in buildings are stipulated by SIA standard 181.

This criterion investigates the outdoor noise exposure of the project based on the location's noise pollution. immissions come from different noise sources. The daytime noise levels from road, rail, and air traffic are assessed. The relevant values are contained in the noise report or the GIS.

Measure: outdoor areas with no noise pollution
The property's private outdoor areas (balconies, loggias, seating areas, terraces, etc.) are not in any areas exposed to noise (the threshold values for residential areas apply, with no concessions for business).

Suitable measures are being used to reduce noise exposure in outdoor living areas (ground adaptations, noise barriers, outdoor spaces directed toward side furthest from noise, etc.) in noisy areas.

"Daytime" limit values under the NAO (as of April 1, 2018):

	Impact threshold	Planning value
Sensitivity level II	60 dB(A)	55 dB(A)
Sensitivity level III	65 dB(A)	60 dB(A)

More information
- swisstopo
- Noise exposure register of the cantonal enforcement authorities (roads, trains, airports)
- FOEN: Noise
- Civil Engineering Department, Building Department, Canton of Zurich: Noise & Sound
- Association of Cantonal Noise Protection Experts (Vereinigung kantonaler Lärmschutzfachleute; Cercle Bruit, CB)
- NAO
- International Organization for Standardization, ISO 1996-1:2016: "Acoustics – Description, measurement and assessment of environmental noise – Part 1: Basic quantities and assessment procedures" (March 2016)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Are private outdoor living areas free from exposure to noise?	Fulfilled	▪ Levels are below the planning value or ▪ Levels are below the impact threshold and a noise reduction measure
		Partially fulfilled	▪ Levels are below the impact threshold or ▪ A noise reduction measure has been implemented

Required evidence

	Provisional	Definitive
Residential Office Commercial	▪ Noise report or certification of noise exposure with GIS printout (e.g. via map.geo.admin.ch) ▪ Site plan (to a scale of at least 1 : 500) with first floor	▪ Revised documents

2.4.3 Outside air

Situation indicator
Basic fit-out
Objective: low indoor air pollution level

High levels of air pollution are harmful to the health of residents and employees. Air pollution results primarily from road traffic.

Measure 1 (M1): reduction of nitrogen dioxide (NO2) air pollution
Nitrogen dioxide air pollution should be reduced.

NO2 impact threshold (Article 2(5) of the Swiss Ordinance on Air Pollution Control of December 16, 1985 [OAPC – Luftreinhalte-Verordnung vom 16. Dezember 1985 ; LRV; SR 814.318.142.1]):
- Long-term exposure limit value: annual average 30 µg/m³ (EU: 40 µg/m³, World Health Organization [WHO]: 40 µg/m³)

Measure 2 (M2): reduction of fine particulate matter (PM10) air pollution
Exposure to PM10 air pollution should be reduced. If the limit values for PM10 are exceeded, measures such as the use of filters in systems with supply and exhaust air will be necessary.
PM10 impact threshold (Article 2(5) OAPC):
- Long-term exposure limit value: annual average 20 µg/m³ (EU: 40 µg/m³, WHO: 20 µg/m³)

More information
- Cercl'Air: Fine particulate matter map
- FOEN: Table of the current situation of the National Air Pollution Monitoring Network (NABEL)
- swisstopo: GIS of the canton of Zurich: 2020 PM10 emissions/2020 NO_2 emissions
- Ostluft – air quality monitoring for the cantons of eastern Switzerland and the Principality of Liechtenstein: annual average nitrogen dioxide (NO_2) values projected for 2010
- Environmental departments of Central Switzerland: air quality statistics for Lucerne, Nidwalden, Obwalden, Schwyz, Uri, and Zug
- Canton of Fribourg: Fine particulate matter
- Office of Waste, Water, Energy, and Air of the canton of Zurich (WWEA; Amt für Abfall, Wasser, Energie und Luft – AWEL): Air quality, PM10 fine particulate matter
- GI – Gutes Innenraumklima
- Swiss Society of Building Technology Engineers (Schweizerischer Verein von Wärme- und Klima-Ingenieuren – SWKI): SWKI Guideline VA104-01, "Hygienic standards for ventilation and air-conditioning systems" (Hygiene-Anforderungen an Raumlufttechnische Anlagen und Geräte)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Is NO_2 pollution within the allowed long-term limit values (annual average) (M1)? ▪ Is PM10 pollution within the allowed long-term limit values (annual average) (M2)?	Fulfilled	▪ $NO_2 \leq 30$ µg/m³ and ▪ PM10 ≤ 20 µg/m³
		Partially fulfilled	▪ $NO_2 \leq 30$ µg/m³ or ▪ PM10 ≤ 20 µg/m³

Required evidence

	Provisional	Definitive
Residential Office Commercial	NO_2 air pollution (M1): ▪ NO_2 concentration of the respective location (documentation, e.g. NO_2 map excerpt) PM10 air pollution (M2): ▪ PM10 concentration of the respective location (documentation, e.g. PM10 map excerpt) ▪ Measures planned in event of failure to comply with limit values	NO_2 air pollution (M1): ▪ Revised documents PM10 air pollution (M2): ▪ Revised documents ▪ Measures implemented

2.5 Outdoor space

2.5.1 Infiltration/retention

Basic fit-out
Objective: enhancing the water absorption capacity of the ground and relieving urban drainage systems

Options for relieving urban drainage systems and reducing the damage associated with heavy rainfall include infiltration (permeable materials) and retention (aboveground and belowground retention). Roof area greening should be provided for buildings without outdoor areas.

Legal regulations may stipulate that local circumstances render the infiltration of unpolluted wastewater impossible (groundwater protection area, groundwater table depth, contaminated sites/suspected contaminated sites, percolation into soil and subsoil). In this case, retention systems should be used to facilitate delayed discharge into surface water.

It is highly likely that climate change is increasing the frequency and impact of both heavy rainfall and heat waves. Varied and natural green spaces with a high degree of biodiversity and biomass boost the ground's water absorbency, thus contributing to groundwater regulation. These also have a cooling effect on the environment during evaporation.

Retention systems aid water retention in the sense that they increase the portion of water evaporated or delay discharge to infiltration systems, surface water, or sewage systems. Maximizing the biomass on the active soil layer (e.g. by planting shrubs) can increase the portion of water evaporated. The more water is evaporated, the greater the impact of evaporation cooling, a phenomenon that contributes positively to tempering climate change.

Measure 1 (M1): construction of infiltration systems
- Aboveground infiltration systems in the form of an active soil layer (e.g. with a grass-covered channel or ruderal area) will ensure that as much rainwater as possible is infiltrated.
- Anything that cannot be retained in aboveground infiltration systems (groundwater protection area, groundwater table depth, contaminated sites/suspected contaminated sites, percolation into soil and subsoil) will, where percolation allows, be routed to belowground infiltration systems.

Measure 2 (M2): construction of retention systems
- Aboveground retention systems such as rooftop greening, ponds, swimming ponds, rainwater retention basins, retention channels, ditches, controlled damming, etc., are provided.
- Anything that cannot be retained aboveground should be routed to belowground retention systems.

More information
- Swiss Water Association (Verband Schweizer Abwasser- und Gewässerschutzfachleute – VSA): Guidelines on the infiltration, retention and drainage of rainwater in urban areas (Richtlinie zur Versickerung, Retention und Ableitung von Niederschlagswasser in Siedlungsgebieten) (2002)
- Cantonal guidelines and working aids

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Have infiltration (M1) and retention (M2) measures been implemented?	Fulfilled	▪ Infiltration (M1) and ▪ Retention measures (M2) have been implemented
		Partially fulfilled	▪ Infiltration (M1) or ▪ Retention measures (M2) have been implemented

Required evidence

	Provisional	Definitive
Residential Office Commercial	Infiltration (M1): ▪ Site plan (to a scale of at least 1 : 500) with first floor ▪ Declaration of intent or planned measures Retention (M2): ▪ Site plan (to a scale of at least 1 : 500) with top view of roof and indication of retention areas ▪ Declaration of intent or planned measures	Infiltration (M1): ▪ Revised documents ▪ List of measures implemented or ▪ Photos Retention (M2): ▪ Revised documents ▪ List of measures implemented or ▪ Photos

2.5.2 Biodiversity

Basic fit-out
Objective: creation of attractive natural outdoor spaces and green spaces

Attractive natural outdoor spaces enhance the quality of life of users, reduce leisure mobility, increase the rentability of residential and office buildings, and reduce maintenance costs.

Green spaces provide ventilation and cooling in outdoor areas. Trees cast shadows, produce oxygen, and absorb CO_2 and fine particulate matter. Rooftop greening can, for example, reduce roof surface temperatures from 70°C to 30°C, with a corresponding effect on the indoor climate. Given the cooling effect and high water absorbency, a natural outdoor area design is regarded as a climate change adaption measure.

Developing an outdoor space concept or a comparable planning basis can prove useful for landscape architects when it comes to planning attractive and natural outdoor spaces. An outdoor space concept contains the analysis of the environment and the definition of target values, indigenous and locally suited target species, corresponding indigenous and locally suited plant communities (e.g. flower meadows, dry grasslands), structures and elements (e.g. ponds, branch piles), soil materials to be incorporated (e.g. gravel, mixed substrate), small-animal traps to be avoided, and bird protection. The concept also defines where which habitats (plant communities, structures, and elements) should be situated, including roof and facade areas.

Property with surrounding areas

Measure 1 (M1): natural outdoor space design
At least one third of the surrounding area (plot area minus the building surface area corresponds to the surrounding area) has a natural design.

This includes still or flowing waters including banks, shrubs, or hedges with indigenous species, woods, indigenous trees and groups of trees, tall fruit trees, species-rich meadows, ruderal areas, fallow land, marshes, sparsely vegetated areas such as gravel and marl sections, dry walls, piles of stones, woodpiles, deadwood habitats (including wild beehives), natural green flat roofs (extensive or intensive roof vegetation with a substrate thickness of at least 10 cm); green facade areas with climbing plants can count instead of a roof area.

Measure 2 (M2): native species
The majority of species are native (checklist in Flora Helvetica) and locally suited. Any exceptions to this should be justified. There are no blacklisted species and no species on the watch list present on the premises.

Measure 3 (M3): outdoor area maintenance concept
A maintenance concept is in place and in use; it details maintenance measures, responsibilities, time frames for maintenance measures, tools to be used, and any training. Any staff training on how to maintain natural areas has taken place/is underway.

Measure 4 (M4): elimination of small-animal traps
Any obstacles in the form of insurmountable barriers for small animals (e.g. fences which extend to the ground that form a barrier to hedgehogs) have been eliminated.

Aids are provided to help fauna emerge small-animal traps such as shafts, basement windows, etc.

Measure 5 (M5): bird protection
The Minergie®-Eco requirements relating to the collision risk for birds have been complied with, and the recommended measures implemented (e.g. films for birds, avoiding glazing at a 90°C angle).

Property without surrounding areas (or a completely enclosed outdoor area, e.g. in city centers)

Measure 1 (M1): rooftop greening
At least 40% of the roof area is covered with intensive or extensive vegetation in accordance with SIA 312, with a substrate thickness of at least 10 cm.

Measure 2 (M2): no invasive species
There are no blacklisted species and no species on the watch list present on the premises.

Measure 3 (M3): facade greening
Facade greening (extending from the ground) is present.

Measure 4 (M4): bird protection
The Minergie®-Eco requirements relating to the collision risk for birds have been complied with, and the recommended measures implemented (e.g. films for birds, avoiding glazing at a 90°C angle).

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	■ Have measures been implemented to encourage an attractive and natural outdoor space?	Fulfilled	**With surrounding areas** ■ Bird protection measure (M5) and another 3 out of the 5 measures have been implemented **Without surrounding areas** ■ Bird protection measure (M4) and another 2 out of the 4 measures have been implemented
		Partially fulfilled	**With surrounding areas** ■ 2 out of the 5 measures have been implemented **Without surrounding areas** ■ 2 out of the 4 measures have been implemented

Required evidence

	Provisional	Definitive
Residential Office Commercial	**Implementation in property with surrounding areas** Natural design (M1), species (M2): Site plan (to a scale of at least 1 : 500), including outdoor area design, open spaces, and access; the incorporated/planned vegetation must also be described in more detail; outdoor area design with details of planned/incorporated vegetation or ■ Precertificate from the Nature & Economy Foundation (Stiftung Natur & Wirtschaft) Maintenance concept (M3): ■ Maintenance concept Small-animal traps (M4): ■ Site plan (to a scale of at least 1 : 500), including outdoor area design, open spaces, and access; outdoor area concept with details of planned/incorporated means of eliminating small-animal traps Bird protection (M5): ■ Completed Minergie®-Eco certificate form "Minergie-Eco certificate of compliance with bird protection requirement specification N/MG6.010" (Nachweis Minergie-Eco Vorgabe N/MG6.010 Vogelschutz) and, where necessary, opinion of the Swiss Association for the Protection of Birds (Schweizer Vogelschutz – SVS) **Implementation in property without surrounding areas** Rooftop greening (M1), species (M2): ■ Top view of roof (to a scale of at least 1 : 200) Facade greening (M3): ■ Facade plans (to a scale of at least 1 : 200) Bird protection (M4): ■ Completed Minergie®-Eco form "Minergie-Eco certificate of compliance with bird protection requirement specification N/MG6.010" (Nachweis Minergie-Eco Vorgabe N/MG6.010 Vogelschutz) and, where necessary, opinion of the SVS	**Implementation in property with surrounding areas** Natural design (M1), species (M2): ■ Revised documents ■ Plant lists or Certificate from the Nature & Economy Foundation Maintenance concept (M3): ■ Revised documents Small-animal traps (M4): ■ Revised documents Bird protection (M5): ■ Revised documents ■ Photos **Implementation in property without surrounding areas** Rooftop greening (M1), species (M2) ■ Revised documents ■ Plant lists Facade greening (M3) ■ Revised documents Small-animal traps (M4): ■ Revised documents Bird protection (M5): ■ Revised documents ■ Photos

More information

- SIA 312: "Rooftop greening" (Begrünung von Dächern) (2013)
- Recommendations of the Swiss Ornithological Institute Sempach (Schweizerische Vogelwarte Sempach)
- Blacklisted species and watch list
- Konrad Lauber, Gerhart Wagner, Andreas Gygax. Flora Helvetica. Checklist of indigenous species. 6th edition (2018)
- Nature & Economy Foundation: Certification
- Minergie®-Eco: "Requirement specifications and implementation guidelines for new buildings" (Vorgabenkatalog und Umsetzungshinweise für Neubauten), version 1.4 (January 2018)
- Minergie®-Eco: "Minergie-Eco certificate of compliance with bird protection requirement specification N/MG6.010" (Nachweis Minergie-Eco Vorgabe N/MG6.010 Vogelschutz) (January 2016)
- Swiss Ornithological Institute Sempach

3 CO_2/energy

3.1 Architecture/ concept

3.1.1 Building

Objective: use of architecture to facilitate low energy consumption in the construction and operation of the building

Measure 1 (M1): compact building
The dimensions of the building influence the need for embodied energy in the sense that less embodied energy is expended when developing certain usable areas in more compact buildings.

The building envelope ratio (ratio of thermal building envelope to the energy reference area) is usually indicated in the SIA 380/1 energy certificate. The building envelope accounts for roughly 40% of the overall costs of a project. The construction of compact buildings also pays off from an economic point of view.

The more compact the building, the smaller the building envelope ratio and the lower the energy loss per m^2 of energy reference area (the building envelope quality remains the same).

The cost of artificial lighting is once again increased in buildings with greater depths. These correlations were investigated based on total energy balances throughout the development and usage stage in the book Climate as a Design Factor. The building envelope ratio values can be taken from the Minergie® applications.

Measure 2 (M2): percentage of facade glazing (proportion of glass)
In addition to the compact design of the building, the proportion of openings on the facade (ratio of glazed to facade surface) has an impact on the energy consumed in the construction and running of the building. Solar gains contribute to a reduction in the consumption of heating energy in winter. But excessive glazing can also lead to losses or higher room temperatures in summer; significantly hotter summers are expected, especially in light of climate change. Considerable energy is consumed in the production of glass; the higher the glass portion, the more embodied energy is consumed. Then again, a sufficiently high glazing percentage enables good use of daylight, especially in office buildings, and therefore less need for energy for artificial lighting.

Degrees of openness (glazing percentages) considerably below the standard of 50% are recommended in residential buildings. However, all uses are taken into account when determining facade glazing percentages. Lower degrees of openness are also advisable in office buildings given the effects of climate change.

More information
- Book Climate as a Design Factor and the freely available associated publication, Lucerne University of Applied Sciences and Arts (HSLU) (July 9, 2014)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Does the architecture of the building (compact design [M1], facade glazing percentage [M2]) contribute to low energy consumption?	Fulfilled	▪ Building envelope ratio (M1) < 1 and ▪ Facade glazing percentage (M2) < 50%
		Partially fulfilled	▪ Building envelope ratio (M1) < 1.5

Required evidence

	Provisional	Definitive
Residential Office Commercial	Compact design (M1): ▪ Minergie® application/certification form or ▪ SIA 380/1 heating energy requirement calculation Facade glazing percentage (M2): ▪ Excerpt of plan showing facade with glazing percentage	Compact design (M1): ▪ Revised documents Facade glazing percentage (M2): ▪ Revised documents

3.1.2 Summer heat protection

Use-specific indicator
Objective: to factor summer heat protection into design and achieve low energy consumption in summer as a result

Summer heat protection and thermal component activation impact on the energy consumed in the running of the building.

Any transparent or translucent parts of the building envelope exposed to the sun in summer must be equipped with effective solar protection, such as outside shutters, for example.

Buildings with solid interior structural components are sufficiently thermally inert where the interiors do not feature carpeted flooring, wood paneling, raised floors, or double ceilings.

Structures made entirely of wood border on the lower limit of thermal inertia and therefore require very effective solar protection. In case of any doubt, a combination of measures should be used.

Measure: effective structural summer heat protection
This is assessed based on the Minergie® application.

The following elements contribute to effective summer heat protection in line with method 1 of SIA standard 180 (2014): The list of the individual measures should be understood as a planning aid.

- Facade glazing percentage of less than 5% of the net floor area (NFA) of the room
- Room depth of more than 3.5 m, distance of at least 7 m from opposing windows
- Maximum roof heat transfer coefficient of U = 0.2 W/(m^2-K)
- Movable outer solar protection with a wind resistance class of 6 in line with SIA standard 342, Annex B.2, for all windows
- Maximum solar energy transmittance (g_{tot}) through the window (glazing and solar protection) of 0.1
- High heat storage capacity of building construction in line with SIA standard 180
- Efficient nighttime cooling in line with SIA standard 180

More information

- SIA 180: "Heat protection, moisture protection, and indoor climate in buildings" (Wärmeschutz, Feuchteschutz und Raumklima in Gebäuden) (2014)
- SIA 382/1: "Ventilation and air-conditioning systems – General principles and requirements" (Lüftungs- und Klimaanlagen – Allgemeine Grundlagen und Anforderungen) (2014)
- Minergie® "Summer" certificate

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Is summer heat protection guaranteed?	Fulfilled	▪ Minergie® version 1; overall evaluation of standard cases (without cooling) or ▪ Minergie® version 2; external verification that criteria under SIA 382/1 have been met (without cooling) or ▪ External verification that criteria under SIA 382/1 have been met and the limit value curve has been exceeded for no more than 100 hours

Required evidence

	Provisional	Definitive
Residential Office Commercial	▪ Minergie® certification form: summer heat protection; versions 1, 2, or 3	▪ Revised documents

3.1.3 Efficient hot domestic water distribution

Use-specific indicator
Objective: low hot domestic water storage and distribution losses

The amount of energy required to heat hot domestic water is becoming an increasingly important factor in overall energy costs in modern energy-efficient buildings. In addition to user behavior, structural decisions at the planning stage play a major role in this area.

Measure 1 (M1): efficient positioning of sanitary units
Roughly one third of the energy used to heat hot domestic water is attributable to storage, distribution, and emission losses.

These can be reduced by the condensed arrangement of sanitary units and kitchens **AND** thus shorter distribution pipelines. In addition, the type of hot domestic water storage (centralized/decentralized) and the distribution concept (e.g. number of continuously heated ascending pipelines) are relevant to the degree of usage.

Measure 2 (M2): low hot domestic water loss rate
The hot domestic water loss rate determines the ratio of heat loss to the heat required for hot domestic water. SIA standard 385/2 stipulates mandatory limit and target values and the calculation methodology, which is based on rough drafts and detailed planning:

- Hot domestic water loss rate limit = 50%
- Hot domestic water loss rate target = 40%

More information

- SIA 385/2: "Systems for domestic hot water in buildings – Hot water needs, requirements, and overall design" (Anlagen für Trinkwarmwasser in Gebäuden – Warmwasserbedarf, Gesamtanforderung und Auslegung) (2015)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Are the sanitary units **AND** kitchens arranged in a condensed manner (M1)? ▪ Is the hot domestic water loss rate low (M2)?	Fulfilled	▪ Compact arrangement of sanitary units/kitchens (M1) and ▪ Hot domestic water loss rate (M2) < 40%
		Partially fulfilled	▪ Compact arrangement of sanitary units/kitchens in some areas (M1) and ▪ Hot domestic water loss rate (M2) < 50%

Required evidence

	Provisional	Definitive
Residential Office Commercial	Arrangement of sanitary units (M1): ▪ Architectural floor plans Hot domestic water loss rate (M2): ▪ Rough draft or detailed planning for hot water loss rate in line with SIA 385/2 (2015)	Arrangement of sanitary units (M1): ▪ Revised documents Hot domestic water loss rate (M2): ▪ Revised documents

3.1.4 Energy and control concept

Basic fit-out
Objective: efficient building energy supply and a means of system regulation tailored to building operations

Measure 1 (M1): energy concept
A building's technical systems can only be run efficiently if, when investing in systems, the benefits to be gained over the entire life cycle are taken into account and the environment in which the building will be constructed is considered. For instance, have existing or potential composite heating networks in the area been taken into consideration? Is there potential for making use of waste heat? Is there potential for using renewable energies with increased price stability instead of traditional energy sources?

After the project development and strategic planning stages, it should generally be clear from a design perspective which systems and system components are most suitable to ensure economical running of the building. An energy concept defines the building's energy supply, the conversion and distribution of energy within the building, approaches to reducing energy consumption, and the technology systems installed within the building.

Devising an energy concept generally involves the following:
- Obtaining specifications/objectives from the building owner
- Investigating and documenting different solution options
- Final conclusions and recommendations for the building owner
- Decision by the building owner

Measure 2 (M2): definition of a control strategy
The size of the property and the variety of uses should be taken into account when it comes to the complexity of the control system. A clear control strategy will be required. There must be a clear separation of the relevant control circuits from one another. The allocation of supplied areas and how these are operated (with or without influence by users) should be documented (e.g. by using functional plans).

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Does the energy concept enable the economical operation of the systems and system components (M1)? ▪ Is there a clear control strategy (M2)?	Fulfilled	▪ Energy concept (M1) and ▪ Control strategy (M2)
		Partially fulfilled	▪ Energy concept (M1) or ▪ Control strategy (M2)

Required evidence

	Provisional	Definitive
Residential Office Commercial	Energy concept (M1): ▪ Principle of hydraulic diagram for heating and cooling ▪ Functional diagram for ventilation and ▪ Energy supply and ventilation concept ▪ Functional plans ▪ Interface document for basic fit-out/tenant fit-out or ▪ Building description with notes on the above mentioned topics Control strategy (M2): ▪ Control concept/control system description	Energy concept (M1): ▪ Revised documents Control strategy (M2): ▪ Revised documents

3.2 Self-supply

3.2.1 Heat used on-site

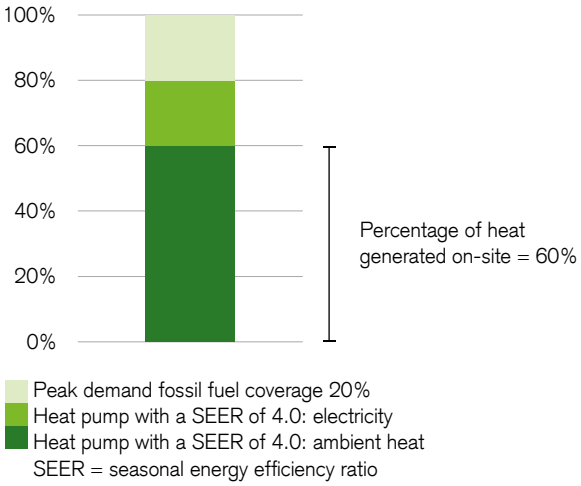
Basic fit-out
Objective: as high as possible a percentage of renewable, local energy to cover the heat requirement for space heating and hot domestic water

The use of ambient heat and local waste heat is of particular significance. In this case, final energy generated on-site also refers to waste heat (including district heat from waste incineration plants) and ambient heat sourced from outside the site perimeter, for example sea water as well as wood, pellets, biomass, or biogas produced in and sourced from Switzerland.

Measure: use of renewable energy generated on-site
This is used to rate the degree of self-sufficiency according to norm SIA 380 for the property's total electricity consumption based on the current accounting method (only direct self-supply is taken into account).

Pellets are regarded as energy generated partially (50%) on-site. Pellets with a Swiss Wood Mark of Origin (Herkunftszeichen Schweizer Holz, HSH) are regarded as energy generated fully (100%) on-site.

Calculation example for heat used on-site (e.g. heat pump with peak demand covered by fossil fuel)



More information
- SIA 380: "Calculation of the energy efficiency of buildings" (Grundlagen energetische Berechnung von Gebäuden) (2015)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ What is the percentage of renewable energies generated on-site (without electricity) in relation to the overall final energy consumption for space heating and hot water?	Fulfilled	▪ >70%
		Partially fulfilled	▪ 50% to 70%

Required evidence

	Provisional	Definitive
Residential Office Commercial	▪ Minergie® application/certification form and ▪ Detailed summary of energy sources/district heat or ▪ SIA 380/1 heating energy requirement calculation and ▪ Documentation of heat generation, including detailed summary of energy sources/district heat ▪ Where available: calculation of the seasonal energy efficiency ratio (SEER) for heat pumps (e.g. WPesti, SIA-TEC tool)	▪ Revised documents ▪ Minergie® certificate of execution ▪ Minergie® certificate

3.2.2 Degree of self-sufficiency electricity

Basic fit-out/Tenant fit-out
Objective: on-site production and use of renewable electrical energy

Building owners already have a whole range of options at their disposal for producing their own electricity on-site. Pricing arrangements enable attractive prices on a project-specific basis and technically and administratively simple feed-in processes. Renewable electrical energy can be produced using photovoltaics, biogas, wind, and water.

Measure: use of renewable electricity generated on-site
Measures should be employed to boost internal consumption (load management, storage facilities/batteries), so as high as possible a percentage of renewable electricity produced on-site can be used to cover in-house needs. This is used to rate the degree of self-sufficiency according to norm SIA 380 for the property's total electricity consumption based on the current accounting method (only direct self-supply is taken into account).

Notes on tenant fit-out
In order to factor in any internal electricity consumption by tenants, evidence must be supplied of an end consumer pool agreed contractually in the rental agreement.

More information
- SIA 380: "Calculation of the energy efficiency of buildings" (Grundlagen energetische Berechnung von Gebäuden) (2015)
- Minergie Schweiz: PVopti tool
- Energy Switzerland (EnergieSchweiz): "Guidelines for on-site private consumption, application in line with the Swiss Energy Act (EnA – Energiegesetz; EnG) and the Swiss Energy Ordinance (EnO – Energieverordnung; EnV) as of January 1, 2018" (Leitfaden Eigenverbrauch, Anwendung gemäss EnG und EnV ab 1. Januar 2018)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ How large is the planned/calculated degree of self-sufficiency (current accounting method) for electricity in % of the property's total electricity consumption?	Fulfilled	> 25%
		Partially fulfilled	10% to 25%

Required evidence

	Provisional	Definitive
Residential Office Commercial	▪ Certificate of the degree of self-sufficiency under SIA 380, e.g. with PVopti ▪ Declaration of intent, building description	▪ Certificate of the degree of self-sufficiency under SIA 380, e.g. with PVopti ▪ Where tenants are supplied, evidence of end consumer pool contract is required

3.3 Greenhouse gases

3.3.1 CO_2 emissions in operation

Use-specific indicator
Basic fit-out
Objective: minimal greenhouse emissions in all aspects of operation

Calculating greenhouse gas emissions helps to evaluate the climate impact of the energy supply. Greenhouse gases emitted into the atmosphere (CO_2 emissions) contribute to climate change. The areas with the greatest potential for reducing greenhouse gas emissions are traffic, heating, hot domestic water consumption, and diet.

Measure: reducing greenhouse gas emissions from operation
The CO_2 emissions from all energy used to run the building are calculated in accordance with SIA standard 2031. There could therefore potentially be minimal differences in the key figures for the calculation in line with Minergie®. The necessary input data can be taken from the Minergie® certification form.

In addition to heating and hot water, the new Minergie® key figure also takes into account electricity used for lighting and operating equipment (which includes all other built-in appliances and electrical installations), as well as electricity produced in-house. Default values are given for lighting and operating equipment; these can be reduced using a selection of key optimization measures. In the case of purpose-built structures, the default value for lighting is replaced by the design value calculated under SIA 387/4.

More information
- SIA 2031: "Energy certification for buildings" (Energieausweis für Gebäude) (2016)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Are CO_2 emissions (total energy consumption) as low as possible?	Fulfilled	Greenhouse gas emissions class A
		Partially fulfilled	Greenhouse gas emissions class B

Required evidence

	Provisional	Definitive
Residential Office Commercial	▪ Minergie® application/certification form or ▪ SIA 380/1 heating energy requirement calculation and ▪ Documentation of heat generation ▪ Where available: calculation of the SEER for heat pumps (e.g. WPesti, SIA-TEC tool ▪ Automatic assessment is performed after inputting the energy data in the online tool	▪ Revised documents ▪ Minergie® certificate of execution ▪ Minergie® certificate

3.4 Primary energy

3.4.1 Energy consumption index, operation

Use-specific indicator
Basic fit-out
Objective: minimal energy consumption in all aspects of operation

Energy labels are available for many consumer goods, household appliances, and vehicles. They improve transparency and give a clear indication of the energy efficiency of the relevant product. Likewise, the aim of the energy certificate for buildings is to improve transparency and promote the efficient use of energy in buildings. Identifying the percentage of primary energy sources used helps to facilitate a resource-focused evaluation of energy supply.

Measure: reducing primary energy consumed in operation
The total amount of energy used to run the building is calculated in accordance with SIA standard 2031. There could therefore potentially be minimal differences in the key figures for the calculation in line with Minergie®. The necessary input data can be taken from the Minergie® certification form.

In addition to heating and hot domestic water, the new Minergie® key figure also takes into account electricity used for lighting and operating equipment (which includes all other built-in appliances and electrical installations), as well as electricity produced in-house. Default values are given for lighting and operating equipment; these can be reduced using a selection of key optimization measures. In the case of purpose-built structures, the default value for lighting is replaced by the design value calculated under SIA 387/4.

More information
- SIA 2031: "Energy certification for buildings" (Energieausweis für Gebäude) (2016)
- SIA 385/2: "Systems for domestic hot water in buildings – Hot water needs, requirements, and overall design" (Anlagen für Trinkwarmwasser in Gebäuden – Warmwasserbedarf, Gesamtanforderungen und Auslegung) (2015)
- SIA 387/4: "Electricity in buildings – Lighting: calculation and requirements" (Elektrizität in Gebäuden – Beleuchtung: Berechnung und Anforderungen) (2017)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Is the total energy used to run the building (as assessed under SIA 2031) as low as possible?	Fulfilled	▪ Energy efficiency class A
		Partially fulfilled	▪ Energy efficiency class B

Required evidence

	Provisional	Definitive
Residential Office Commercial	▪ Minergie® application/certification form or ▪ SIA 380/1 heating energy requirement calculation and ▪ Documentation of heat generation ▪ Where available: calculation of the SEER for heat pumps (e.g. WPesti, SIA-TEC tool) ▪ Automatic assessment is performed after inputting the energy data in the online tool	▪ Revised documents ▪ Minergie® certificate of execution ▪ Minergie® certificate

3.5 Electricity

3.5.1 Ventilation

Use-specific indicator
Basic fit-out
Objective: efficient use of electricity in ventilation and air-conditioning technology

Key factors in low energy consumption are reasonable room and comfort standards as well as appropriate ventilation and air-conditioning technology.

Only the permanent installations will be assessed where basic fit-outs are concerned.

Residential:

Measure 1 (M1): use-dependent control
Use-dependent control of airflow rates (manual, variable settings for each individual residence)

Measure 2 (M2): minimum airflow rate
Maximum airflow rate of 1 m^3/m^2 NFA per hour (in line with SIA standard 2024), otherwise relevant justification required for higher airflow rates

Measure 3 (M3): energy-efficient drive system
Drive with efficiency class IE4/EC motor or energy efficiency class A ventilation unit

Office/commercial:

Measure 1 (M1): minimum airflow rates
Minimum airflow rates in accordance with SIA standard 2024 (e.g. in the case of an office: 36 m^3 per person per hour), otherwise relevant justification required for higher airflow rates and no increase for thermal functions

Measure 2 (M2): energy-efficient drive system
Drive system with efficiency class IE4

Measure 3 (M3): drive control
System pressure-dependent fans controlled by pressure sensors in the duct network

Measure 4 (M4): low pressure loss
To ensure minimal pressure loss, short horizontal distribution channels should be used (horizontal access of no more than 30 m from the rise duct) and all ducts should be as square as possible (installation height in suspended ceiling/hollow floor at least 40 cm)

More information
- SIA 382/1: "Ventilation and air-conditioning systems – General principles and requirements" (Lüftungs- und Klimaanlagen – Allgemeine Grundlagen und Anforderungen) (2014)

Assessment

	Requirement	Degree of fulfillment	
Residential	▪ Have the ventilation unit and distribution system been designed with minimum electricity consumption in mind? Have use-dependent control (M1), airflow (M2), and an energy-efficient drive system (M3) been implemented?	Fulfilled	▪ 3 out of the 3 measures have been implemented or ▪ Window ventilation (manual or automated) with demand-controlled air extraction system
		Partially fulfilled	▪ 2 out of the 3 measures have been implemented
Office Commercial	▪ Have the ventilation unit and distribution system been designed with minimum electricity consumption in mind? Have measures been implemented for minimum airflow rates (M1), an energy-efficient drive system (M2), drive control (M3), and pressure loss (M4)?	Fulfilled	▪ 3 out of the 4 measures have been implemented or ▪ Window ventilation (manual or automated) with demand-controlled air extraction system
		Partially fulfilled	▪ 2 out of the 4 measures have been implemented

Required evidence

	Provisional	Definitive
Residential	Use-dependent control (M1): ▪ Description of regulation/control Airflow rate (M2): ▪ Ventilation concept (description/diagram) and ▪ Airflow rate calculations under SIA 382/1 or SIA 2024 Energy-efficient drive system (M3): ▪ System description/diagram detailing the efficiency of the drive type	▪ Revised documents
Office Commercial	Minimum airflow rates (M1): ▪ Airflow rate design Energy-efficient drive system (M2): ▪ System description detailing the efficiency of the drive type Drive control (M3): ▪ System diagram, control system description Low pressure loss (M4): ▪ Floor plans with identifiable ventilation risers (to a scale of at least 1 : 200) and ▪ Cross-sectional plan indicating installation height	▪ Revised documents

3.5.2 Lighting

Use-specific indicator
Basic fit-out
Objective: saving lighting electricity by using efficient light sources and intelligent lighting control

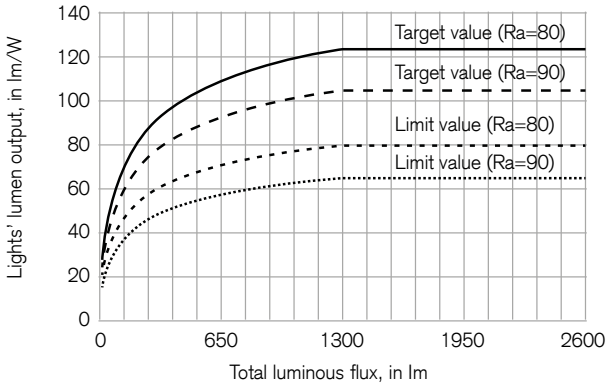
In Switzerland, around CHF 10 billion are spent on electricity every year. A total of 12% of all electricity consumed in Switzerland is attributable to lighting.

Energy-efficient lighting and optimized light control can potentially save up to 50% of lighting electricity costs.

Measure 1 (M1): energy-efficient lights
Only the permanent installations will be assessed where basic fit-outs are concerned.

Lighting efficiency must be at least compliant with the target value according to SIA 387/4;2017, section 4.2.2, figure 3. If conventional lamps with separate light sources are used (e.g. E27 socket), only the illuminant is assessed.

Figure 3 Limit and target values for the lights' lumen output ηv,Lo in lm/W



Source: SIA 387/4, 2017
For illustrative purposes only.

Measure 2 (M2): controlled lighting
Controlled lighting refers to the use of practical control installations (situation-appropriate use of motion sensors, daylight control, automatic timers) or a light management system.

In residential buildings, this is generally a motion sensor with integrated daylight sensor.

More information
- SIA 387/4: "Electricity in buildings – Lighting: calculation and requirements" (Elektrizität in Gebäuden – Beleuchtung: Berechnung und Anforderungen) (2017)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Will energy efficiency be used for permanent and general lighting (corridor, basement, etc.) (M1)? ▪ Will general lighting be controlled (M2)?	Fulfilled	▪ Energy efficiency (M1) and ▪ Light control (M2)
		Partially fulfilled	▪ Light control (M2)

Required evidence

	Provisional	Definitive
Residential Office Commercial	Energy-efficient lights (M1): ▪ Floor plans electrical and lighting design ▪ Datasheets of the lights used with details of total luminous flux and lights' lumen output (lm/watts) ▪ Building description Controlled lighting (M2): ▪ Datasheets/documentation for the control system used or ▪ Building description	Energy-efficient lights (M1): ▪ Floor plans electrical and lighting design ▪ Datasheets of the lights used with details of total luminous flux and lights' lumen output (lm/watts) Controlled lighting (M2): ▪ Datasheets/documentation for the control system used

3.5.3 Household appliances

Use-specific indicator
Basic fit-out/Tenant fit-out
Objective: purchase of energy-efficient equipment and appliances

Selecting the right equipment and appliances will ensure optimum performance and reduce the energy consumption in the building. When purchasing household appliances such as refrigerators, dishwashers, or washing machines, the energy label should be checked for information relating to the energy consumption of appliances.

Measure: installation of energy-efficient household appliances
Household appliances are deemed "energy efficient" if they are listed among the top 10 appliances at www.topten.ch, are included in the corresponding appliance category or belong to at least the same efficiency class (energy label) as that assigned to the majority of the 10 best appliances. The status at the time the respective certification application is submitted is authoritative.

- Energy-efficient refrigerator and freezer
- Energy-efficient dishwasher
- Energy-efficient washing machine
- Energy-efficient tumble dryer

More information
- Topten
- SIA 2056: Factsheet on electricity in buildings – energy and power requirement or Minergie®
- SFOE: The energy label for household appliances

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Are the household appliances (for refrigeration, washing up, laundry, drying, and cooking) energy-efficient?	Fulfilled	▪ The majority[1] of the appliance models installed are energy-efficient
		Partially fulfilled	▪ At least half[2] of the appliance models installed are energy-efficient

Required evidence

	Provisional	Definitive
Residential Office Commercial	▪ Building description or appropriate documentation ▪ Dated screenshot of homepage www.topten.ch of installed appliance categories	▪ Product datasheets for installed appliances ▪ Dated screenshot of homepage www.topten.ch of installed appliance categories

[1] The majority = all household appliances with the exception of one.
[2] Where there is an uneven number of household appliance models installed, "half" refers to the number rounded down.

3.5.4 Electricity product

Basic fit-out
Objective: reduction of greenhouse gas emissions by using electricity from renewable energy sources.
The total electricity requirement (general electricity + tenant electricity) is assessed here.

If the standard product (basic) is purchased from an energy supply company, and if this company supplies renewable and/or domestic electricity, this may be declared here accordingly, assuming that the tenants also purchase the standard product.

Please note: this does not apply to energy data collection which determines the assessment of the indicators 3.3.1 CO_2 emissions in operation and 3.4.1 Energy consumption index, operation.

If an end consumer pool, distribution network operator, internal electricity consumption+ or similar is implemented (purchase agreement of at least two years), the defined electricity product can also be declared accordingly.

Measure 1 (M1): electricity product from renewable energy sources
Electrical energy from renewable energy sources boasts better primary energy factors and greenhouse gas emission coefficients than the average electricity used in Switzerland (Swiss consumer mix). Opting for an electricity product from renewable energy sources is therefore advisable.

A good indicator of the quality of the electricity supply is a certificate that confirms that production is guaranteed to have originated from renewable or environmentally friendly energy.

Measure 2 (M2): electricity product from domestic energy sources
Electricity from domestic energy sources contributes to local value creation and reduces dependency on imports. Purchasing electricity from domestic energy sources (Swiss electricity) supports this.

More information
- Association for Environmentally Sound Energy (Verein für umweltgerechte Energie – VUE): naturemade

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Is an electricity product (general electricity and heating electricity) consisting of renewable (M1) and domestic (M2) energy sources used?	Fulfilled	▪ Electricity product with an electricity mix of 100% renewable energy sources (M1) and ▪ 100% domestic energy sources (Swiss electricity) (M2)
		Partially fulfilled	▪ Electricity product with an electricity mix of >90% renewable energy sources (M1)

Required evidence

	Provisional	Definitive
Residential Office Commercial	Renewable energy sources (M1), domestic energy sources (M2): ▪ Declaration of the basic product supplied by the energy supply company or, if the owner also supplies the tenant electricity within the framework of an end consumer pool, internal electricity consumption+ or similar, declaration of the product to be ordered (declaration of intent).	Renewable energy sources (M1), domestic energy sources (M2): ▪ Declaration of the basic product supplied by the energy supply company or, if the owner also supplies the tenant electricity within the framework of an end consumer pool, internal electricity consumption+ or similar, declaration of the product ordered and purchase agreement of at least two years.

4 Materials

4.1 Contaminated sites

4.1.1 Contaminated sites on the premises

Situation indicator
Objective: utilization or rehabilitation of contaminated sites and no buildings on greenfield sites

Contaminated sites are parts of the soil or groundwater that have become contaminated or polluted, generally as a result of intensive industrial use of the grounds or human negligence and failings. Contaminated sites are registered on the map of polluted sites of the respective canton's GIS; the causes of these and degree of contamination are categorized (landfill, industrial site, accident site, and sphere of potentially harmful effects and impacts)

Measure 1 (M1): use of previously developed land
Housing is taking up more and more space in Switzerland and causing extensive urban sprawl. Building on greenfield sites should be avoided, either by rehabilitating brownfield sites (e.g. commercial and industrial wastelands) or rebuilding.

Measure 2 (M2): rehabilitation of contaminated sites
Sites contaminated by old waste deposits pose a health risk to future users and increased potential for environmental damage. The necessary contaminated site rehabilitation is a financial risk for investors.

The reclamation of contaminated sites is rewarded given the significant role it plays in greater structural density and a reduction in urban sprawl.

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Has land use been minimized by rebuilding or building on previously developed land (M1)? ▪ Have contaminated sites been rehabilitated (M2)?	Fulfilled	▪ Use of previously developed land (M1) and ▪ **Complete** rehabilitation of contaminated sites (M2)
		Partially fulfilled	▪ Use of previously developed land (M1) and ▪ **Complete** rehabilitation of contaminated sites (M2) or ▪ Use of previously developed land without any site contamination (M1)

Required evidence

	Provisional/definitive
Residential Office Commercial	Land use (M1): ▪ Aerial picture Contaminated sites (M2): ▪ GIS ▪ Rehabilitation concept/geological report

4.2 Embodied energy

4.2.1 Greenhouse gas emissions during construction

Use-specific indicator
Basic fit-out
Objective: lowest possible greenhouse gas emissions during construction of the building

The embodied energy and CO_2 emissions that are invested in a building in the form of construction materials and technology are gaining in importance. A holistic building energy assessment takes into account the non-renewable primary energy and greenhouse gas emissions during construction as equal parameters alongside energy consumption and emissions in operation. A comprehensive assessment can be obtained by incorporating the full life cycle of the building.

Measure: Calculation and compliance with the limit values for greenhouse gas emissions during construction
Various factors have an influence on greenhouse gas emissions during building construction and help to reduce the need for greenhouse gas emissions:

- Excavation that ends above the groundwater table
- Decision as to whether existing building structures can be reused (renovation instead of new buildings)
- Spacious and compact volume, open-plan where possible
- Minimal underground constructions
- Need for space reduction; space-efficient layouts allowing for high occupancy
- Simple support structure with appropriate spans
- Appropriate glazing percentage
- Resource-light design
- Appropriate facade cladding (resistant, reduced mass)
- System separation for good accessibility and ease of replacement (windows, building technology, sun protection)
- High use flexibility
- Moderate use of glass and metal facades
- Moderate use of building technology
- Resistant and low-maintenance construction materials and components
- Short transportation distances

More information

- SIA 2032: " embodied energy in buildings" (Graue Energie von Gebäuden) (2010)
- Minergie®-Eco: Calculation of embodied energy and greenhouse gas emissions for Minergie-ECO, Minergie-P-ECO and Minergie-A-ECO structures (version 1.3 dated March 31, 2021 or newer)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Were greenhouse gas emissions during construction calculated according to Minergie®-Eco and was compliance ensured with the applicable limit values? The currently applicable limit values are used.	Fulfilled	▪ Under limit value 1 (Minergie®-Eco)
		Partially fulfilled	▪ Under limit value 2 (Minergie®-Eco)

Required evidence

	Provisional/definitive
Residential Office Commercial	▪ Calculation of greenhouse gas emissions during construction with the "Pre-project embodied energy calculation tool" from Minergie®-Eco or a calculation tool with at least the same level of accuracy The limit values applicable in each case are specified in the Minergie-ECO tool. The currently applicable tool version and application guide (calculation of embodied energy and greenhouse gas emissions for Minergie-ECO) are used.

4.3 Environmental impact

4.3.1 Recycling

Basic fit-out
Objective: systematic deconstruction according to ecological aspects

Measure 1 (M1): ecological dismantling
Reusing entire components and recycling building materials helps to save raw materials and often energy during the site preparation stage. Existing site structures should therefore be dismantled using a systematic approach before the new building is erected. Where existing buildings need to be dismantled, a corresponding dismantling concept with details of the reuse, recycling, or disposal of the various material types accumulated and their respective quantities must be provided, as well as evidence of proper implementation. The concept should also contain a certificate of disposal from the respective canton.

If a building constructed before 1990 needs to be dismantled, a preliminary building inspection for asbestos, polychlorinated biphenyls (PCB), and phencyclidine (PCP) must be conducted in line with Minergie®-Eco guidelines (Minergie®-Eco exclusion criteria).

Measure 2 (M2): avoiding forest clearing/carrying out replanting
Another factor that plays a role when it comes to both dismantling and new buildings is the preservation of large trees. This contributes to the identity and biological diversity of a place. If larger trees do have to be felled, replacement trees should be planted.

More information
- Minergie®-Eco: "Requirement specifications and implementation guidelines for new buildings" (Vorgabenkatalog und Umsetzungshinweise für Neubauten), version 1.4 (January 2018)
- SIA 430: "Disposal of construction waste" (Entsorgung von Bauabfällen) (1993)
- Leaflets of the Construction Materials Recycling Switzerland (arv Baustoffrecycling Schweiz – arv)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Has dismantling been carried out in line with the ecological dismantling concept and have pre-1990 buildings been subjected to a preliminary building inspection for asbestos, PCB, and PCP in line with the Minergie®-Eco guidelines (M1)? ▪ Were no larger trees felled (M2)? If larger trees were felled, has an equal amount of replacement trees been planted?	Fulfilled	▪ Dismantled (M1) and ▪ No tree felling, or in the case of tree felling: replacement of any felled trees (M2)
		Partially fulfilled	▪ Dismantled (M1) or ▪ No tree felling, or in the case of tree felling: replacement of any felled trees (M2)

Required evidence

	Provisional	Definitive
Residential Office Commercial	Dismantling (M1): ▪ Report on preliminary building inspection in line with Minergie®-Eco ▪ Ecological dismantling plan Tree felling/replanting (M2): ▪ Site plan (to a scale of at least 1 : 500), including outdoor area design, open spaces, and access, aerial photo, photos of existing condition	Dismantling (M1): ▪ Revised documents ▪ Photos of the dismantling stage, disposal documents, cantonal certificate of disposal Tree felling/replanting (M2): ▪ Photos of replanting

4.3.2 Raw materials

Use-specific indicator
Basic fit-out
Objective: local, sustainable, and fair raw material extraction in the interests of reducing the costs of transporting raw materials, preventing the overuse of resources, and preventing child labor

Measure 1 (M1): local raw material extraction
Locally produced timber and timber products (Swiss Wood Mark of Origin) are particularly sustainable because this renewable raw material is extracted and processed locally.

The use of natural stones from EU countries is not subject to any restriction (the European conformity mark (CE) of the relevant product can be submitted as proof).

If the origin of timber and natural stone products is evidenced as mentioned above, measure 2 "Sustainable and fair raw material extraction" is also deemed to have been complied with.

Measure 2 (M2): sustainable and fair raw material extraction
Timber that does not originate from Switzerland must originate from certified production (label of the Forest Stewardship Council [FSC], Programme for the Endorsement of Forest Certification Schemes [PEFC], or an equivalent label).

As a general rule, only natural stone that has been produced without the use of child labor and forced labor may be used. Natural stone of noncertified origin from outside the EU should not be used. Natural stone of certified origin from outside the EU (e.g. the Business Social Compliance Initiative [BSCI] Code of Conduct, Fair Stone, ISO 14001, SA8000®) may be used.

More information
- Minergie®-Eco: "Requirement specifications and implementation guidelines for new buildings" (Vorgabenkatalog und Umsetzungshinweise für Neubauten), version 1.4 (January 2018)
- FSC Switzerland
- Swiss Natural Stone Association (Naturstein-Verband Schweiz): Labels in the natural stone sector (Labels in der Natursteinbranche)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Use of local timber (Swiss Wood Mark of Origin) and local natural stone (Central Europe/EU) (M1)? ▪ Have raw materials been extracted sustainably and fairly (corresponding proof of origin or certificates) (M2)?	Fulfilled	▪ Local raw material extraction (M1)
		Partially fulfilled	▪ Sustainable/fair raw material extraction (M2)

Required evidence

	Provisional	Definitive
Residential Office Commercial	Local raw material extraction (M1) and sustainable/fair raw material extraction (M2): ▪ Declaration of intent or building description	Local raw material extraction (M1): ▪ Evidence of origin of local timber (Swiss Wood Mark of Origin) and natural stone used Sustainable/fair raw material extraction (M2): ▪ Certificates for all non-European timber (FSC, PEFC) or timber products and natural stone used (BSCI Code of Conduct, Fair Stone, ISO 14001, SA8000®, etc.)

4.3.3 Recycled concrete

Use-specific indicator
Basic fit-out
Objective: resource conservation and optimization of material efficiency in the construction industry by using recycled concrete

At around 15.5 million tons, waste from the construction and dismantling of buildings is the largest type of waste from the perspective of the quantity generated. It consists largely of mineral materials, such as concrete or bricks. If these materials are properly sorted, they can be reused after treatment. Concrete demolition waste and mixed rubble are the main components here.

Measure: use of recycled concrete
The processing of concrete and mixed rubble to form recycled aggregates for the production of concrete plays an important role in the sustainable management of construction materials in the construction industry. This can help reduce the amount of materials to be disposed of and conserve natural sand and gravel resources. Recycled concrete refers to concrete as defined under SIA standard 2030 and SN EN 206-1 (national annex). The percentage of recycled concrete relates to all concrete constructions, including filling, coating, and foundation concrete (Minergie®-Eco exclusion criteria).

Basic requirement:
The distance between the concrete recycling plant and the building site must be no more than 25 km. If there is nowhere to acquire recycled concrete within a 25 km radius of the building site or if the recycled material has to be transported further than 25 km to the concrete plant, the criterion is met.

More information
- Minergie®-Eco: "Requirement specifications and implementation guidelines for new buildings" (Vorgabenkatalog und Umsetzungshinweise für Neubauten), version 1.4 (January 2018)
- KBOB/eco-bau/Association of Private, Professional Building Owners (Interessengemeinschaft privater, professioneller Bauherren – IPB): "Concrete from recycled aggregates" (Beton aus rezyklierter Gesteinskörnung) (2007/2)
- SIA 2030: "Recycled concrete" (Recyclingbeton) (2010)
- SIA 262.051+A1 (SN EN 206+A1): "Concrete – Specification, performance, production, and conformity" (Beton – Festlegung, Eigenschaften, Herstellung und Konformität) (2013)

Assessment

	Requirement	Degree of fulfillment
Residential Office Commercial	▪ What percentage of the structural components eligible for construction using recycled concrete (in line with Minergie®-Eco) is made out of recycled concrete?	Fulfilled ▪ ≥50%

Required evidence

	Provisional	Definitive
Residential Office Commercial	▪ List or sketch of structural components for which recycled concrete was used, with details of the percentage ▪ Minergie®-Eco "Certificate of availability of recycled concrete" (Nachweis über Verfügbarkeit von Recycling-Beton), if recycled concrete cannot be used or cannot be used for certain strength grades	▪ Revised documents ▪ List of quantities sorted by concrete type used or delivery slip for all concrete deliveries ▪ Compositions of the concrete plant with recycled concrete percentage

4.3.4 Pollutant input

Use-specific indicator
Basic fit-out/Tenant fit-out
Objective: minimizing the input of pollutants into the environment

Certain substances and preparations pose a potential risk to the environment during production, use, transportation, and processing on the building site or disposal due to their material properties or composition constituents. Inputs of pollutants into groundwater, surface water, soil, and the air are harmful to the environment.

The following measures contribute to reducing the input of pollutants into the environment:

Measure 1 (M1): no heavy metal in structural components exposed to weathering
No heavy metal should be used for structural components exposed to weathering (roofing, facade, and finishing materials) (Minergie®-Eco exclusion criteria).

Measure 2 (M2): no use of fixative or filling foam for cavity spaces
The use of fixative or filling foam for assembly, sealing, or filling cavity spaces is excluded (Minergie®-Eco exclusion criteria).

Measure 3 (M3): no use of material containing lead
The use of material containing lead is excluded (Minergie®-Eco exclusion criteria).

Measure 4 (M4): no use of artificial foam insulation materials with halogenated propellants
Where artificial foam insulation materials without halogenated propellants are used, all insulation materials recorded during the SIA standard 380/1 calculations (heat insulation) and the primary insulation materials for building technology are inspected.

Measure 5 (M5): no use of electrical installations with flame retardants or halogenated plastics
No halogenated plastics (e.g. PVC and polyvinylidene fluoride [PVDF]) and no halogenated flame retardants in the electrical installations fitted by the building contractor – these include empty ducting for installation, cables (sleeve and insulation), wiring sockets, cable ducts, as well as various distribution, fuse, and device boxes.

Measure 6 (M6): no use of wood preservatives with active agents
Compliance with SIA standard 265/1 must be ensured where wood preservatives are to be used outside of heated interiors, and any wood preservatives used must bear the Lignum quality seal for active agent-free wood preservatives.

Measure 7 (M7): no use of joint sealant with fungicidal active ingredients
Permanently elastic joint sealants must not contain any fungicidal active ingredients, the only exception to this being wet area applications (e.g. sanitary silicone).

Notes on tenant fit-out
Guidelines on products and substances used in the tenant fit-out must be defined and set out contractually in the rental agreement.

More information
- SIA D 093: "Declaration of the environmental characteristics of construction products under SIA 493 – Explanation and interpretation" (Deklaration ökologischer Merkmale von Bauprodukten nach SIA 493 – Erläuterung und Interpretation) (1997)
- Lignum: Healthy construction with wood (Gesundes Bauen mit Holz), resource 2: product list
- SIA 380/1: "Heating energy consumption" (Heizwärmebedarf) (2016)
- SIA 265/1: "Timber construction – Supplementary requirements" (Holzbau – Ergänzende Festlegungen) (2018)
- Minergie®-Eco: "Requirement specifications and implementation guidelines for new buildings" (Vorgabenkatalog und Umsetzungshinweise für Neubauten), version 1.4 (January 2018)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Have measures been implemented with regard to heavy metals (M1), fixative/filling foams (M2), lead (M3), halogens (M4), flame retardants (M5), wood preservatives (M6), and fungicides (M7) to minimize the input of pollutants into the environment by materials?	Fulfilled	▪ Measures have been implemented for heavy metals (M1), fixative/filling foams (M2), and lead (M3) and ▪ An additional 2 measures have been implemented
		Partially fulfilled	▪ 3 measures have been implemented

Required evidence

	Provisional	Definitive
Residential Office Commercial	Heavy metals (M1), fixative/filling foams (M2), lead (M3), halogens (M4), flame retardants (M5), wood preservatives (M6), and fungicides (M7): ▪ Building description, sustainability concept, or other description	Heavy metals (M1), fixative/filling foams (M2), lead (M3), halogens (M4), flame retardants (M5), wood preservatives (M6), and fungicides (M7): ▪ Material and product declarations, datasheets ▪ Notice of ban on the use of certain products/substances in the conditions precedent ▪ Tender specifications, tender documents in relation to products to be used ▪ Excerpt from the contracts for work and services relating to substance bans

4.4 Indoor air quality

4.4.1 Indoor air pollutants

Use-specific indicator
Basic fit-out
Objective: promoting the health and well-being of the user by providing pollution-free indoor air

Indoor air quality has a major impact on well-being given that people spend up to 90% of their time indoors. A poor indoor climate can cause a number of physical symptoms such as fatigue, headaches, malaise and dizziness, difficulty concentrating, irritation of the eyes, etc. Moreover, contaminants like formaldehyde and some solvents have a carcinogenic effect. The key factors that impact on indoor air quality are emissions from certain sources in the building (materials, products) and fresh air renewal.

Minergie®-Eco rates the quality of indoor climates based on the following measures, among others:

Measure 1 (M1): no formaldehyde emissions from construction materials
No formaldehyde emissions from construction materials (Minergie®-Eco exclusion criteria).

Measure 2 (M2): no total volatile organic compounds (TVOCs) from construction materials and supplies
No solvent emissions (TVOCs) from construction and auxiliary materials (Minergie®-Eco exclusion criterion).

Measure 3 (M3): no use of biocidal coating materials
No use of biocides or biocidal coating materials (film preservation) in heated interiors (Minergie®-Eco exclusion criterion).

Measure 4 (M4): no use of chemical wood preservatives
No use of chemical wood preservatives in heated interiors. The dip-coat priming of wooden windows to protect against blue stains is excluded from this (Minergie®-Eco exclusion criterion).

Measure 5 (M5): no use of joint sealant with fungicides
No use of permanently elastic joint sealants with fungicidal active ingredients, the only exception to this being wet area applications (e.g. sanitary silicone).

Measure 6 (M6): no use of respirable mineral fibers
Respirable mineral fibers: construction materials that could emit respirable fibers (e.g. mineral fiber insulation materials) do not come into direct contact with indoor air.

More information
- Minergie®-Eco: "Requirement specifications and implementation guidelines for new buildings" (Vorgabenkatalog und Umsetzungshinweise für Neubauten), version 1.4 (January 2018)
- Lignum: Healthy construction with wood (Gesundes Bauen mit Holz)
- FOPH: Formaldehyde
- KBOB/IPB: "Ensuring a high-quality indoor climate" (Gutes Innenraumklima ist planbar) (2004/1)
- eco-bau: Eco products

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	■ Is indoor air free from pollutants, and have measures been implemented with regard to formaldehyde (M1), TVOCs (M2), biocides (M3), wood preservatives (M4), fungicides (M5), and respirable mineral fibers (M6)?	Fulfilled	■ Indoor air measurements have been conducted for formaldehyde (M1) and TVOCs (M2), and the requirements under Minergie®-Eco have been complied with and ■ At least 2 more of the 4 measures have been implemented
		Partially fulfilled	■ At least 3 out of the 6 measures have been implemented

Required evidence

	Provisional	Definitive
Residential Office Commercial	Formaldehyde (M1), TVOCs (M2), biocides (M3), wood preservatives (M4), fungicides (M5), respirable mineral fibers (M6): ■ Building description, sustainability concept, or other description detailing the measures to be implemented	Formaldehyde (M1): Formaldehyde emissions from construction materials ■ Results of the formaldehyde indoor air measurements under Minergie®-Eco or ■ Product datasheets,(1) safety datasheets, or test certificates for the construction products used, including details of the adhesive type and/or formaldehyde emission of the product TVOCs (M2): TVOCs from construction and auxiliary materials ■ Results of the TVOC indoor air measurements under Minergie®-Eco or ■ Current product datasheets(1) from the Association of the Swiss Paint and Varnish Industry (Verband der Schweizerischen Lack- und Farbenindustrie – VSLF) ■ Declarations or safety datasheets for the products used Biocides (M3), wood preservatives (M4), fungicides (M5), respirable mineral fibers (M6): ■ Excerpt from the contract for work and services (substance bans) ■ Current product datasheets(1) or safety datasheets for the materials and substances used

[1] Evidence can also be provided using certificates or labels:
All measures:
■ "eco-1" or "eco-2" eco-bau grading
Formaldehyde (M1):
■ Lignum product list referencing the wood-based materials being used and the place of use and/or in which the use case is listed under "Recommended products and applications for use in interiors" (Produkte- und Anwendungsempfehlungen zur Verwendung im Innenraum)
TVOCs (M2):
■ Floor laying materials and joint sealants: EMICODE® EC1, EC1PLUS labels
■ Paints and varnishes: category A or B of the ecolabel issued by the Swiss Paint Foundation (Schweizer Stiftung Farbe), natureplus, or an equivalent label

4.5 Water

4.5.1 Water consumption

Use-specific indicator
Basic fit-out/Tenant fit-out
Objective: reducing drinking water consumption by sanitary facilities in buildings by using water-saving installations and water recycling systems

Drinking water is a precious commodity, even in Switzerland, the moated castle of Europe. In the Swiss Plateau, water frequently has to be sourced from lakes and sterilized, purified, and processed into drinking water as part of a laborious process. The groundwater table cannot be lowered as and when required without causing dramatic changes to the ecosystem.

Around 150 l of drinking water is consumed per person, per day in residential areas. About a third of that is attributable to toilet-flushing. For office and administrative buildings, the average consumption is approximately 30 to 50 l per employee, per working day.

The aim of this criterion is to reduce drinking water consumption and wastewater quantities using technical and planning measures.

Measure: water-efficient equipment and fittings
Products designed to enable an efficient use of water are selected for sanitary installations and tap fittings as well as washing machines and dishwashers.

Water-efficient equipment and fittings:
- Toilet flushing systems:
  - Flush volume: less than 5 l per flush
  - Set minimum volume flush (two-volume flush, water-saving button)
- Urinals:
  - Waterless urinals (office, commercial property)
  - 1 l urinals (office, commercial property)
- Bathroom fittings (toilet):
  - Bathroom fitting (toilet; residential property): less than 8.3 l per min.
  - Bathroom fitting (toilet; office, commercial property): less than 1.9 l per min.
- Bathroom fittings (shower; including shower head):
  - Bathroom fitting (shower; residential property): less than 9.5 l per min.
  - Bathroom fitting (shower; office, commercial property): less than 7 l per min.
- Bathroom fittings (heavily frequented or public facilities):
  - Bathroom fitting with proximity sensor automation and electricity consumption: less than 0.3 W, timer-controlled shower fittings (office, commercial property)
- Kitchen fittings:
  - Kitchen fitting (residential property): less than 8.3 l per min.
  - Kitchen fitting (office, commercial property): less than 7 l per min.
- Washing machines:
  - Washing machine (residential property): less than or equal to 40 l per wash cycle
  - Washing machine (commercial property): less than or equal to 7.5 l per kg
- Dishwashers: Guide value for excellent water efficiency: 6 to 7.5 l per wash cycle
  - Dishwasher (residential property): less than or equal to 12 l per wash cycle
  - Dishwasher (commercial property): less than or equal to 5 l per dish rack

More information
- Swiss Gas and Water Industry Association (SGWA – Schweizerischer Verein des Gas- und Wasserfaches; SVGW): W3 D, “Directive for drinking water installations” (Richtlinie für Trinkwasserinstallationen) (2013 edition)
- Swiss standard SN 592000: “Systems for property drainage – Planning and design” (Anlagen für die Liegenschaftsentwässerung – Planung und Ausführung) (2012)
- SIA 385.068 (SN EN 246:2004-03): “Sanitary tapware – General specifications for flow rate regulators” (Sanitärarmaturen – Allgemeine Anforderungen für Strahlregler) (2004)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Have products designed to enable an efficient use of water been used for sanitary installations and tap fittings as well as washing machines and dishwashers?	Fulfilled	▪ The majority[1] of the appliance models/fittings installed are energy-efficient
		Partially fulfilled	▪ At least half[2] of the appliance models/fittings installed are energy-efficient

Required evidence

	Provisional	Definitive
Residential Office Commercial	▪ Planning documents/declaration of intent to use water-saving installations	▪ Product datasheets indicating throughput/flush volumes ▪ Photo documentation

[1] The majority = all appliance models/fittings with the exception of one.
[2] Where there is an uneven number of appliance models/fittings installed, "half" refers to the number rounded down.

5 Life cycle

5.1 Efficiency/flexibility

5.1.1 Space efficiency

Use-specific indicator
Basic fit-out
Objective: efficient and economical use of space within the building

Spatial indicators refer to the geometric proportions of building units and provide information relating to the usage of real estate and the corresponding use efficiency.

Measure: ensuring efficient use of space
The ratio of aboveground main usable area to aboveground floor area is used as a measurement variable for spatial efficiency. Omitting the belowground usable area allows topographic restrictions to be excluded; only the lit rentable space in constant use is calculated in relation to aboveground floor area. Given the life cycle costs, area used aboveground is ultimately of greater significance than underground areas which are often left unfinished and therefore less maintenance-intensive.

More information
- pom + Consulting Ltd.: FM Monitor

Assessment

	Requirement	Degree of fulfillment	
Residential	▪ Is spatial efficiency as high as it can be?	Fulfilled	▪ >75%
		Partially fulfilled	▪ 72% to 75%
Office	▪ Is spatial efficiency as high as it can be?	Fulfilled	▪ >85%
		Partially fulfilled	▪ 80% to 85%
Commercial	▪ Is spatial efficiency as high as it can be?	Fulfilled	▪ >95%
		Partially fulfilled	▪ 90% to 95%

Required evidence

	Provisional	Definitive
Residential	▪ Calculation of volume and area under SIA 416, detailing the aboveground main usable area (MUA) and floor area (FA) by use	▪ Revised documents
Office	▪ Calculation of volume and area under SIA 416, detailing the aboveground MUA and FA by use	▪ Revised documents
Commercial	▪ Calculation of volume and area under SIA 416, detailing the aboveground MUA and FA by use	▪ Revised documents

5.1.2 Use flexibility

Use-specific indicator
Basic fit-out
Objective: ensuring high user acceptance and the long life span of a building by planning for maximum flexibility with a view to conversion

Optimum flexibility of use, i.e. simple structural adaptability of the layout structure in line with changing usage needs over the entire life cycle, reduces the risk of vacancy and contributes to user acceptance in the long term, the extension of the life span, and a reduction in life cycle costs, and thus to the economic success of the property.

Flexibility and the option of conversion constitute a key issue for the future for most building types when it comes to social change. Demographic change, Work 4.0, and digitalization are set to change the requirements placed on buildings dramatically. This criterion is becoming more and more important and will need to be adapted to future technological possibilities.

Residential

Measure 1 (M1): flexibility in design
- Avoidance of load-bearing inner walls where possible.

Measure 2 (M2): flexibility in building technology
- Arrangements and connections for ventilation, cooling, heating, and water/wastewater can be adapted using simple measures, or without any structural measures, where the layout is to be changed or redesigned.
  - This is deemed fulfilled if the criterion of "Accessibility of horizontal building technology installations" under Minergie®-Eco is met.
  - Horizontally routed ventilation and sanitary installations can be accessed, repaired, dismantled, replaced, and upgraded with minimal effort.

Measure 3 (M3): flexibility in layout and facade design
- The facade and layout are designed in such a way that, for the majority of residences
  - a flexible room layout is possible and the number of rooms within a residence can be adjusted using removable and/or additional partition walls without any installation difficulties (the walls must be marked on the plans); or
  - a versatile floor plan is afforded by at least one movable room divider measuring at least 120 cm in width (e.g. sliding, folding, double doors or movable furniture).

Office

Measure 1 (M1): flexibility in design
- Conversion-friendly support structure: primarily supports; load-bearing inner walls and earthquake walls (indoors) avoided as far as possible.
- Partition walls can be installed on every facade axis of the structural grid without intervention in the ground or the ceiling.

Measure 2 (M2): flexibility in building technology
Allow for reserve capacity in vertical shafts, and electricity and IT supply at the planning stage:
- Reserve capacity in excess of or equal to 20% for subsequent upgrades in vertical shafts for water-carrying systems (heating, plumbing, and cooling)
- Reserve capacity in excess of or equal to 20% for subsequent upgrades to electricity and IT supply

Measure 3 (M3): flexibility in layout and facade design
- The facade is designed to enable a flexible room layout; there is the option of adding inner walls a maximum of 3 m apart (e.g. using a perforated facade or wide vertical frame units in windows).

Commercial

Measure 1 (M1): increasing the reserve load capacity
- The SIA 261 requirement relating to characteristic load capacity values listed for category D (commercial spaces) on the ground floor has been exceeded (e.g. load capacities of up to 1,000 kg provided for on the ground floor).

Measure 2 (M2): space requirement for tenant installations
- Installation space is on hand for tenant installations (e.g. cooling units), along with the associated load capacity/ space reserves.

More information
- Minergie®-Eco: "Requirement specifications and implementation guidelines for new buildings" (Vorgabenkatalog und Umsetzungshinweise für Neubauten), version 1.4 (January 2018)
- SIA 261: "Effects on load-bearing structures" (Einwirkungen auf Tragwerke) (2014)
- BWO: housing evaluation system, criteria catalog

Assessment

	Requirement	Degree of fulfillment	
Residential	▪ Have measures been taken into consideration and implemented for flexibility in design (M1), building technology (M2), and layout and facade design (M3)?	Fulfilled	▪ Design (M1) and ▪ Building technology (M2) or ▪ Layout and facade design (M3)
		Partially fulfilled	▪ Design (M1)
Office	▪ Have measures been taken into consideration and implemented for flexibility in design (M1), building technology (M2), and layout and facade design (M3)?	Fulfilled	▪ Design (M1) and ▪ Building technology (M2) and ▪ Layout and facade design (M3)
		Partially fulfilled	▪ Design (M1) and ▪ Building technology (M2) or ▪ Layout and facade design (M3)
Commercial	▪ Have measures to increase the reserve load capacity (M1) and space requirement for tenant installations (M2) been taken into consideration and implemented?	Fulfilled	▪ Reserve load capacity (M1) and ▪ Tenant installations (M2)
		Partially fulfilled	▪ Tenant installations (M2)

Required evidence

	Provisional	Definitive
Residential	Design (M1): ▪ Load-bearing and non-load-bearing structural elements, including earthquake walls, marked in annotated floor plans Building technology (M2): ▪ Drafts or plans that document the accessibility of horizontal installations ▪ Excerpts from building services engineering plans relating to ventilation and sanitary facility arrangements and connections, indicating reserve capacity Layout and facade design (M3): ▪ All layout drafts necessary for demonstration (to a scale of at least 1 : 200), including designation of areas; facade plans (to a scale of at least 1 : 200). Facade cross section (to a scale of at least 1 : 50)	Design (M1), building technology (M2), layout and facade design (M3): ▪ Photo documentation ▪ Revised plans
Office	Design (M1): ▪ Load-bearing and non-load-bearing structural elements, including earthquake walls, marked in annotated floor plans ▪ Detailed drawings of the ceiling and floor connections, product certificate Building technology (M2): ▪ Evidence of planned reserves in the technology centers, such as planning documents Layout and facade design (M3): ▪ All layout drafts necessary for demonstration (to a scale of at least 1 : 200), including designation of areas; facade plans (to a scale of at least 1 : 200). Facade cross section (to a scale of at least 1 : 50)	Design (M1), building technology (M2), layout and facade design (M3): ▪ Photo documentation ▪ Revised plans Building technology (M2): ▪ Revised documents ▪ Post-completion photos (e.g. of the reserve capacity in the vertical shafts) Layout and facade design (M3): ▪ Photo documentation ▪ Revised plans
Commercial	Reserve load capacity (M1): ▪ Plausible evidence of reserve load capacity calculation Tenant installations (M2): ▪ Annotated plans showing installation areas for tenant installations	Reserve load capacity (M1), tenant installations (M2): ▪ Revised documents

5.2 Commissioning

5.2.1 Commissioning

Basic fit-out
Objective: Promotion of a planned and systematic commissioning process which ensures compliance with all technical and energy-relevant systems and components according to the project requirements laid down by the developer, the specifications outlined during planning work and the defined target values.

Proper commissioning as defined by greenproperty serves as a quality assurance instrument to ensure that all planned systems are commissioned properly and commissioning is documented accordingly. Proper commissioning ensures that what is planned matches what was asked for, and that the final building matches the original plans. It makes a decisive contribution to building technology that works efficiently and is sustainable over the long term.

Proper commissioning comprises at least all technical building facilities relevant for energy:
- Heating system (heat generation and distribution)
- Cooling (generation and distribution of coolants), incl. commercial cooling and HRS
- Ventilation (air conveyance, conditioning, and distribution systems)
- Hot water supply (water heating and distribution systems)
- Renewable energy systems (production, conversion, and storage systems)
- Air-conditioning (air-conditioning storage, cold accumulation, and cold distribution systems)
- Refrigeration technology (industrial cooling systems with refrigeration production and distribution)
- Building automation (control systems: heating, ventilation, air-conditioning, and plumbing technology, lighting, blinds)
- Lighting (in MUA)

Measure 1 (M1): creation of guidance documents for systematic commissioning

Project requirements by the developer
The project requirements by the developer are the requirements specified, described and laid down by the developer. The project requirements (e.g. submission program, project specifications, definition/agreement of targets, etc.) should ideally be in place as early as the early design phase, because these define the project objectives and project requirements and thus serve as an important basis for planning. The project requirements by the developer define the functional and technical requirements for the project as well as the expectations concerning use and operation of the building. They contain project and planning objectives, measurable performance criteria, schedules, success criteria, developer instructions and other supporting information. They also contain information and specifications that need to be considered by the project team during design, planning and implementation.

Project requirements and planning fundamentals are compared with each other on a periodic basis. Discrepancies are discussed between the developer and project team, and either the project requirements or planning fundamentals are adjusted where necessary.

Planning fundamentals
The planning fundamentals are drafted by the planning team and contain documentation and descriptions regarding decisions that were made by the project team during planning. Concepts, calculations, assumptions, system configurations, selection of products, etc., that describe and prove compliance with the developer's project requirements form part of the planning fundamentals.

The project requirements specify "what" the developer expects from the project; the planning fundamentals describe "how" the developer's project requirements are met through planning, and how the "what" is implemented with the "how".
The planning fundamentals are compared with the project requirements on a periodic basis. Discrepancies are discussed between the developer and project team, and planning fundamentals or project requirements are adjusted where necessary.

The commissioning plan
The commissioning plan is a dynamic planning and work instrument that is created and managed by the project team. It specifies which building technology facilities are commissioned, which tasks need to be completed for this purpose, who is responsible for performing these tasks, and how quality assurance is undertaken. The commissioning plan constitutes a systematic and interactive process which ensures that all systems described in the planning fundamentals are properly commissioned (including documentation of commissioning). When the developer accepts the project, this confirms that the specified project requirements have been met. A commissioning schedule and an organizational chart specifying the roles involved also form part of the commissioning plan.

Measure 2 (M2): execution and documentation of full systematic commissioning

Performance of proper commissioning with:
- Creation of a schedule for systematic commissioning including training and subsequent adjustment and readjustment
- Startup, commissioning as well as integrated and integral tests in line with recognized rules of engineering/according to SIA standard
- Functional and performance tests (including seasonal tests or retests) and checks for > functions of building facilities relevant for energy in terms of stable control performance / definition of correct settings (temperatures, airflow rates, etc.) / achievement of planned parameters (e.g. COP of a heat pump) / efficiency of heat recovery systems for waste heat recovery, ventilation, air-conditioning
- List of defects with timeline for rectification
- Provision of complete revision documents including operating and maintenance instructions

Documentation of proper commissioning, including:
- Schedule for SIA phase 53 "Commissioning, completion"
- Training concept and logs of training courses held
- (IBS/IBN) logs incl. required measurement logs, etc.
- Evidence, finding/analysis reports, etc., of checks/tests performed
- Lists of defects
- Construction documents

Measure 3 (M3): optimization concept

Concept for transitioning commissioning to a process of continuous review and optimization within the first 14 months following commissioning and handover / start of building utilization (concept for energetic operational optimization, eBO[1]).

The eBO aims to adjust the setting parameters of the regulation and control functions to the building, its use, and the installations for which this was not already possible during orderly commissioning during SIA phase 53 "Commissioning, completion". The eBO concept includes the following points (non-exhaustive list) and is created in coordination with the developer and building operator:
- Definition of the disciplines subject to energetic operational optimization
- Definition of intervals for monitoring depending on disciplines and media, incl. conceptual structure of a logbook for documenting eBO
- Ensuring seasonal reference
- Consideration of the building ramp-up (when will which users arrive) simple training concept for responsible operation.
- The specific conceptual requirements serve as a basis for operational implementation.

[1]Operational energy optimization immediately after handover, hereinafter referred to as eBO (OEO).

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Are guidance documents available for proper commissioning (M1)? ▪ Has full systematic commissioning been carried out and documented (M2)? ▪ Has an optimization concept been drawn up and is it intended to implement the eBO (M3)?	Fulfilled	▪ Guidance documents (M1) and ▪ Commissioning (M2) and ▪ Optimization concept (M3)
		Partially fulfilled	▪ Guidance documents (M1) and ▪ Commissioning (M2)

Required evidence

	Provisional	Definitive
Residential Office Commercial	Guidance documents (M1): ▪ Project requirements by the developer: e.g. submission program, project specifications, definition/agreement of targets, etc., and ▪ planning fundamentals: ▪ e.g. concepts, calculations, assumptions, system configurations, product selection, etc., and commissioning plan or ▪ Declaration of intent for the timely production of the abovementioned documents Optimization concept (M3): ▪ Document "Optimization concept" or ▪ declaration of intent for timely construction	Guidance documents (M1): ▪ Project requirements by the developer: e.g. submission program, project specifications, definition/agreement of targets, etc., and ▪ planning fundamentals: e.g. concepts, calculations, assumptions, system configurations, product selection, etc., and ▪ commissioning plan Commissioning (M2): ▪ Schedule for phase 53 / commissioning program ▪ Documentation of proper commissioning completed (logs, lists of defects, reports, revision documents, etc.) ▪ Training concept and logs of training courses held ▪ Documentation of adjustment and readjustment Optimization concept (M3): ▪ Concept for transitioning commissioning to a process of continuous review and optimization / concept for energetic operational optimization (eBO*) and ▪ intention of performance / assignment of eBO*

More information

- SIA 108 Regulation governing engineer services and fees in the fields of building technology, mechanical engineering and electrical engineering
- SIA 112 Construction planning model - terminological standard
- SIA factsheet 2046 Integral tests of building technology systems
- SIA 382.102: "Ventilation for buildings – Test procedures and measurement methods for the handover of air-conditioning and ventilation systems" (Lüftung von Gebäuden – Prüf- und Messverfahren für die Übergabe raumlufttechnischer Anlagen) (2012)
- SIA factsheet 2048 Energetic operational optimization
- SIA 382.102: "Ventilation for buildings – Test procedures and measurement methods for the handover of air-conditioning and ventilation systems" (Lüftung von Gebäuden – Prüf- und Messverfahren für die Übergabe raumlufttechnischer Anlagen) (2012)
- SIA 384.104: "Heating systems in buildings – Installation and commissioning of hot water heating systems" (Heizungsanlagen in Gebäuden – Installation und Abnahme der Warmwasser-Heizungsanlagen) (2004)

5.2.2 Energy controlling/operational optimization

Basic fit-out
Objective: supporting energy management and identifying potential energy savings to optimize energy consumption in building operation

Monitoring involves the automatic, ongoing measurement of energy flows and the visualization of these. Energy monitoring gives the user feedback on their energy consumption and thus the opportunity to comprehend the impact of their own behavior on key energy flows. Monitoring offers a key basis for effective operational optimization and the replacement of technical building installations.

Measure 1 (M1): creation of a property-specific measurement concept
The property-specific measurement concept contains information about the installation of measurement equipment, reading of measurement results, evaluation of measurement results, and depiction of measurement results, including responsibilities (who is responsible for which working step).

This will be supplemented with a measurement plan. The following energy flows must be measured:
- Final energy consumption for heating and water heating together (meter for the heat generator)
- In-house energy production such as photovoltaics (PV), solar thermal energy, combined heat and power generation (CHP) (meter after the inverter in PV systems or CHP systems)
- Electricity without heat generation (measurement as a whole; meter in the electrical distribution system)
- Cold water (measurement as a whole; meter in the cold water distribution systems)
- Heating and hot water useful energy
- Cooling or air-conditioning in purpose-built structures (electricity meters for heat exchangers, cooling towers, refrigerators, including auxiliary energy for pumps and regulation)
- Electricity for air conveyance in central ventilation systems

Measure 2 (M2): installation of measurement equipment
- The consumer systems specified in the property-specific measurement concept are monitored via a building energy management system or easily accessible separate meters labeled with the monitored consumer. The measurement equipment has been installed and the measurement values are plausible.
- If a property-specific measurement concept has not been created, the standard requirements for energy flows to be measured as defined in the Credit Suisse energy measurement concept apply.

Measure 3 (M3): automated reading and transmission of measurement results
- Measurement results are read out and transmitted automatically.

More information
- KBOB: Recommendation "Energy measurement concept" (Energie-Messkonzept), issue 1 (January 2000)
- SIA 2048: "Operational energy optimization" (Energetische Betriebsoptimierung) (2015)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Has a property-specific measurement concept been created (M1)? ▪ Has measurement equipment been installed (M2)? ▪ Are measurement results read out and transmitted automatically (M3)?	Fulfilled	▪ Measurement concept (M1) and ▪ Measurement equipment (M1) and ▪ Readouts (M3)
		Partially fulfilled	▪ Measurement equipment (M2) (measurement equipment installed in line with Minergie® or the Credit Suisse energy measurement concept)

Required evidence

	Provisional	Definitive
Residential Office Commercial	Measurement concept (M1): ▪ Measurement concept, including measurement plan	Measurement concept (M1): ▪ Revised documents Measurement equipment (M2), readouts (M3): ▪ Documentation and logs on installation of measurement equipment

5.3 Maintenance

5.3.1 Building envelope

Basic fit-out
Objective: a durable building envelope and easy separability of support structure configuration

In the interests of sustainability, it should be ensured that the building structure is developed and constructed not just using state-of-the-art technology, but also with the life span of the building in mind.

The life spans of the building structure, installation, and building envelope can differ considerably from one another. The life span of a building structure can be up to 100 years or more in some case, whereas building envelopes require renewal after just a few decades.

Measure 1 (M1): weather-resistant facade in line with Minergie®-Eco
- Vulnerable facade components are sufficiently weatherproofed (roof overhang, foundations made of weather-resistant material) or
- The facade (plasterwork, masonry, facade cladding, etc.) is made of weather-resistant materials or structures

Measure 2 (M2): weather-resistant windows and sun protection installations in line with Minergie®-Eco
- The weather-exposed sides of newly installed windows and permanent sun protection installations are made of weather-resistant materials or
- The newly installed windows and permanent sun protection installations are sufficiently weatherproofed

Measure 3 (M3): easy replacement and dismantling of support structure and building envelope in line with Minergie®-Eco
- Removable and purely mechanical fixings have been used, allowing for the subsequent replacement, reinforcement, or reuse of the structural components without any damage to or replacement of neighboring structural components.

More information
- Minergie®-Eco: "Requirement specifications and implementation guidelines for new buildings" (Vorgabenkatalog und Umsetzungshinweise für Neubauten), version 1.4 (January 2018)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Have measures been taken to ensure a weather-resistant facade (M1), weather-resistant windows/sun protection installations (M2), and easy replacement and dismantling of the support structure/building envelope (M3) to guarantee a durable building structure?	Fulfilled	▪ 3 out of the 3 measures have been implemented
		Partially fulfilled	▪ 2 out of the 3 measures have been implemented

Required evidence

	Provisional	Definitive
Residential Office Commercial	Facade (M1): ▪ Facade cross section (to a scale of at least 1 : 50) from basement floor to roof, with annotations detailing materials and structural design Windows/sun protection installations (M2): ▪ Facade cross section (to a scale of at least 1 : 50) from basement floor to roof, with annotations detailing materials and structural design Support structure/building envelope (M3): ▪ Facade plans (to a scale of at least 1 : 200); facade cross section (to a scale of at least 1 : 50) from basement floor to roof, with annotations detailing materials and structural design	Facade (M1) and windows/sun protection installations (M2), support structure/building envelope (M3): ▪ Revised documents ▪ Photos

5.3.2 Building structure/fit-out

Use-specific indicator
Basic fit-out
Objective: easy separability of structural components with differing life spans and easy access to building technology

In the interests of sustainability, it should be ensured that the building structure is developed and constructed not just using state-of-the-art technology, but also with the life span of the building in mind. The life spans of the building structure, installation, and building envelope can differ considerably from one another. The life span of a building structure can be up to 100 years or more in some case, whereas installations require renewal after just a few decades.

A structured duct and distribution system design ensures easy access to installation areas because building technology is subject to a faster pace of change than the building structure. Increasing complexity and the rapid pace of technological development mean there is a continual need for maintenance and renovation work.

Buildings should be designed and constructed in such a way that their technical systems can adapt easily to changing framework conditions, meaning future modifications can be carried out with minimal effort.

Measure 1 (M1): accessibility of vertical building service installations

- Accessibility of vertical building service installations in line with Minergie®-Eco: vertically routed ventilation and sanitary installations can be accessed, repaired, dismantled, replaced, and upgraded with minimal effort across all floors. These installations are positioned so as to allow for short service routes.

Measure 2 (M2): accessibility of horizontal building service installations

- Accessibility of horizontal building service installations in line with Minergie®-Eco: horizontally routed ventilation and sanitary installations can be accessed, repaired, dismantled, replaced, and upgraded with minimal effort.

Measure 3 (M3): replacement of machinery and large appliances

- Structural conditions for the replacement of machinery and large appliances in line with Minergie®-Eco: the positioning and size of entrances to technical areas and centers guarantee that permanently installed machinery and large appliances can be replaced with minimal effort and no structural measures.

More information

- Minergie®-Eco: "Requirement specifications and implementation guidelines for new buildings" (Vorgabenkatalog und Umsetzungshinweise für Neubauten), version 1.4 (January 2018)
- SIA 382/1: "Ventilation and air-conditioning systems – General principles and requirements" (Lüftungs- und Klimaanlagen – Allgemeine Grundlagen und Anforderungen) (2014)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Is access to vertical (M1) and horizontal (M2) building service installations and the replacement of machinery/large appliances (M3) guaranteed?	Fulfilled	▪ 3 out of the 3 measures have been implemented
		Partially fulfilled	▪ 2 out of the 3 measures have been implemented

Required evidence

	Provisional	Definitive
Residential Office Commercial	Access to vertical (M1) and horizontal (M2) building service installations, replacement of machinery/large appliances (M3): ▪ Description of building services concept ▪ Sketches or plans documenting the accessibility of the installations (e.g. referencing the height and width of the corridors and doors as well as dimensions of the staircase) ▪ Excerpts from building services engineering plans in relation to the arrangements and connections of ventilation/air-conditioning, cooling, heating, and plumbing systems, including explanations	Access to vertical and horizontal building service installations (M1) and (M2), replacement of appliances (M3): ▪ Revised documents ▪ Post-construction photos (e.g. of assembly openings and accessibility of the vertical shafts)

5.4 Operation

5.4.1 Comparison of variants based on life cycle costs

Objective: consideration of the total life cycle costs when making system decisions

To improve the quality of planning and execution, alternatives should be compared in the planning process. It is important that financial resources are dealt with economically throughout the entire life cycle of the building.

Measure: comparisons of variants based on life cycle cost calculations
Concepts and evaluations of variants are a key part of targeted planning and contribute significantly to building quality. These economic assessments should take into account the entire life cycle and must not be restricted to the investment costs alone.

When comparing variants, life cycle costs must be used as a basis for decision-making rather than investment costs.

Life cycle cost comparisons of variants can provide key bases for decision-making, for example:
- In system comparisons
  - System A/B
    Example: solid plastered facade or rear-ventilated facade
- In supplier or contractor comparisons
  - Contractor A/B
    Example: Quotes for a passenger elevator, including service costs

More information
- SIA 480: "Calculating the economic feasibility of investments in buildings" (Wirtschaftlichkeitsrechnung für Investitionen im Hochbau) (2016)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Have variants been compared with a life cycle cost calculation, and were life cycle costs used as a decision-making basis instead of investment costs?	Fulfilled	▪ At least 3 alternatives compared
		Partially fulfilled	▪ At least 1 alternative compared

Required evidence

	Provisional	Definitive
Residential Office Commercial	▪ Definition of the comparisons and declaration of intent (e.g. in the building description)	▪ Summary/short report on the comparisons with a conclusion, recommendation, and justified decision

5.4.2 Planning/construction

Use-specific indicator
Basic fit-out
Objective: a purpose-oriented building design

Designing a building with its purpose in mind and enabling a seamless transition from the construction phase to the usage phase requires optimum coordination with future usage requirements and facility management early on in the planning stage. Involving facility management in the planning and construction phase is intended as a means of optimizing the building from a management point of view and facilitating the early planning of this. The key focuses of facility management in the planning and construction phase are optimizing life cycle costs, the use value, and information management.

Measure 1 (M1): involving a facility management (FM) planner/consultant

- There is a FM planner/consultant on the planning team.

Measure 2 (M2): creation of a facility management concept

- A facility management concept has been created to define the processes and performances incumbent on the involved parties for the future running of the building based on the "Process/performance model in facility management (ProLeMo)" (ProLeMo – Prozess-/ Leistungsmodell im Facility Management) guideline or the standard SN EN 15221-4.

More information

- KBOB/IPB: Recommendation "Building structure documentation" (Bauwerksdokumentation im Hochbau) (2016)
- SIA 113: "FM-oriented construction and execution" (FM-gerechte Bauplanung und Realisierung) (2010)
- Swiss Research Centre for Rationalization in Building and Civil Engineering (CRB; Schweizerische Zentralstelle für Baurationalisierung): Facility Management during planning and construction, "Best practice guide for SIA recommendation 113" (Planungs- und baubegleitendes Facility Management (pbFM), Praxisleitfaden für die Empfehlung SIA 113) (2018)
- International Facility Management Association, Switzerland Chapter (IFMA): "Process/performance model in facility management (ProLeMo)" (ProLeMo – Prozess-/ Leistungsmodell im Facility Management) guideline
- SN EN 15221-4: "Facility management – Part 4: Taxonomy, classification and structures in Facility Management" (Facility Management – Teil 4: Taxonomie, Klassifikation und Strukturen im Facility Management) (2011)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Have measures in the planning and construction phase been implemented to guarantee optimum operation and appropriate management?	Fulfilled	▪ FM planner/consultant enlisted (M1) and ▪ Facility management concept is in place and has been implemented (M2)
		Partially fulfilled	▪ FM planner/consultant enlisted (M1) or ▪ Facility management concept is in place and has been implemented (M2)

Required evidence

	Provisional	Definitive
Residential Office Commercial	FM planner/consultant (M1): ▪ Organizational chart Facility management concept (M2): ▪ Facility management concept	FM planner/consultant (M1): ▪ Revised documents Facility management concept (M2): ▪ Revised documents

5.4.3 Building operation

Use-specific indicator
Basic fit-out
Objective: Reduction of operating costs

The most significant drivers of running costs are supply and disposal costs, cleaning costs, and monitoring and maintenance costs. Operating costs for cleaning and maintaining building units, equipment, technical installations, and any surrounding areas should be kept to a minimum, but the structure must not be adversely affected due to a lack of care. Smooth and sealed non-textile surfaces minimize the need for cleaning.

To minimize running costs, all areas of the building requiring cleaning must be easily accessible. Ideally, no special equipment should be required to reach the various different parts of the building's infrastructure when cleaning, since this can have an impact on running costs.

The logistics infrastructure of the building plays a key role in supply and removal to and from building units and systems. An effective logistics infrastructure contributes to cost optimization in the delivery of supplies and removal of waste.

Measure 1 (M1): patterned and mid- to dark-colored hard coverings
Lightly patterned and mid- to dark-colored hard coverings in the access zones of the building.

Measure 2 (M2): sealed and washable surfaces
Sealed, washable surfaces in the interiors (all floors, walls in sanitary units).

Measure 3 (M3): easy cleaning of facade material
Easy cleaning of facade material or dirt-resistant surfaces (e.g. high-quality exposed brick or plaster).

Measure 4 (M4): easy cleaning of windows and sun protection installations
Windows and sun protection installations can be cleaned from inside, or a facade elevator system is available. Textile sun protection installations are washable.

Measure 5 (M5): concept and areas for disposal and recycling
A concept is in place for composting, waste, and recycling (e.g. integrated within the facility management concept), and corresponding areas are designated in the building.

Measure 6 (M6): logistics for supply and disposal
The logistics infrastructure for supply and disposal is suitable for the transportation of supplies and waste material with or without automated tools (limited obstacles and short routes).

More information
- KBOB/IPB: "Floor coverings in office construction – Comparison over 50 years" (Bodenbeläge im Bürobau – Vergleich über 50 Jahre) (2000/1)
- Federal Coordination Commission for Occupational Safety (FCOS – Eidgenössische Koordinationskommission für Arbeitssicherheit, EKAS) and the Swiss National Accident Insurance Fund (Suva): Guidelines and bulletins on "Technology level" (Technisierungsgrad)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Have measures been implemented for hard coverings (M1), surfaces (M2), facade material (M3), windows/sun protection installations (M4), disposal/recycling (M5), logistics (M6) to guarantee the optimum running of the building?	Fulfilled	▪ At least 4 out of the 6 measures have been implemented
		Partially fulfilled	▪ At least 3 out of the 6 measures have been implemented

Required evidence

	Provisional	Definitive
Residential Office Commercial	Hard coverings (M1), surfaces (M2), facade material (M3), windows/sun protection installations (M4): ▪ Building description and/or material concept ▪ Detailed cross section (to a scale of at least 1 : 50), indicating materials in the access zones (e.g. in the staircase and corridors) ▪ Detailed cross section (to a scale of at least 1 : 50), indicating materials in the interiors ▪ Facade plans (to a scale of at least 1 : 200); facade cross section (to a scale of at least 1 : 50) from basement floor to roof, with annotations detailing materials and structural design Disposal/recycling (M5): ▪ Waste disposal or "operating concept" (for residential buildings: Plans with sufficient disposal points) ▪ All floor plans necessary for demonstration (to a scale of at least 1 : 200), including designation of areas; site plan (to a scale of at least 1 : 500) Logistics (M6): ▪ All floor plans necessary for demonstration (to a scale of at least 1 : 200), including designation of areas; site plan (to a scale of at least 1 : 500); logistics diagrams	Hard coverings (M1), surfaces (M2), facade material (M3), windows/sun protection installations (M4), disposal/recycling (M5), logistics (M6): ▪ Revised documents

5.5 Data management/ documentation

5.5.1 Building information modeling

Basic fit-out
Objective: introduction of an integrated planning process using building information modeling (BIM) for sustainable information and data management

BIM is the digital modeling of the physical and functional properties of a building from initial conceptual design to dismantling. It serves as a source of information and a data hub for collaboration throughout the entire life cycle of the building.

BIM is a method that involves integrated planning and the use of a digital building model across all life cycle phases.

Measure 1 (M1): using the BIM method
BIM creates a model that all project participants can access and that supports and optimizes the processes in all the life cycle phases of a building. The result is a considerable improvement in cooperation between project participants and a reduction in the loss of data or multiple data entries. The BIM method will be used to manage information and data during the property planning and construction stage.

Measure 2 (M2): property and project information
The model, referred to as the building's digital twin, is added to with information from a central database. The data entered in this database also includes any building information required for its subsequent use and management. This digital twin can be used by all stakeholders for their information needs throughout a property's entire life cycle.

More information
- SIA 1001/11: "BIM supplementary agreement" (Zusatzvereinbarung BIM) (2018)
- SIA 1001/11-K: "Commentary on the application of the BIM supplementary agreement (SIA 1001/11)" (Kommentar zur Anwendung der Zusatzvereinbarung BIM (SIA 1001/11)) (2018)
- SIA 2051: "Building information modeling (BIM) – Basic principles for application of the BIM method" (Building Information Modelling (BIM) – Grundlagen zur Anwendung der BIM-Methode) (2017)
- KBOB: "Recommendations for the use of BIM" (Empfehlungen zum Umgang mit BIM) (January 2018)
- Publications by Bauen Digital Schweiz

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Was the BIM method used (M1)? ▪ Was the necessary property/project information relating to the subsequent use and management incorporated in the project information model (M2)?	Fulfilled	▪ BIM (M1) was implemented and ▪ Property/project information (M2) has been taken into full consideration
		Partially fulfilled	▪ BIM (M1) was implemented and ▪ Property/project information (M2) has been taken into partial consideration

Required evidence

	Provisional	Definitive
Residential Office Commercial	Use of BIM (M1) and property/project information (M2): ▪ Project information model: the digital twin has been completed, and all information required for the construction of building included For instance, the project scheduling can be done using the project information model. The room arrangement and room books can be accessed through the model and the associated database.	Use of BIM (M1) and property/project information (M2): ▪ Project information model: the digital twin has been completed, and all information required for the use and management of the building included For instance, the room program and room books can be accessed through the model and the associated database. These contain system documentation and guidelines for maintenance intervals.

5.5.2 Documentation for operation

Basic fit-out
Objective: Providing information from the planning and construction stage to enable sustainable use and management

The building owner works together with the future operator as part of the facility management efforts during the planning and construction stage to set guidelines on information content and/or documentation, the form of presentation and the dates for provision of such data, and responsibilities for providing and updating data.

Measure 1 (M1): creation of a "Building documentation specifications document" (Vorgabedokument Bauwerksdokumentation)
These specifications might, for example, be set out in a "Building documentation specifications document" and are included in the planner and contractor tender submission. Without this basis, the fulfillment of the individual documentation measures cannot be verified.

Measure 2 (M2): adaption of the plans, etc., to the finished building
Adaption of the plans, certifications, and calculations to the finished building.

Measure 3 (M3): creation of user and/or tenant handbook
Creation of a user and/or tenant handbook.

Measure 4 (M4): creation of maintenance and/or operating instructions
Creation of maintenance, inspection, operating, and care instructions.

Documentation, handbooks, etc., must be supplied digitally (e.g. via an app, a website, or the BIM model) and, where necessary, in hard copy. The requirements of the operator should be defined in the "Building documentation specifications document".

More information
- SIA 113: "FM-oriented construction and execution" (FM-gerechte Bauplanung und Realisierung) (2010)

Assessment

	Requirement	Degree of fulfillment	
Residential Office Commercial	▪ Is there a "Building documentation specifications document" (M1)? ▪ Have measures been implemented for plans (M2), a user/tenant handbook (M3), and maintenance/operating instructions (M4), and have the documents been supplied to the owner in digital form for management purposes?	Fulfilled	▪ "Building documentation specifications document" available (M1) and ▪ An additional 3 out of the 4 measures have been implemented
		Partially fulfilled	▪ "Building documentation specifications document" available (M1) and ▪ An additional 2 out of the 4 measures have been implemented

Required evidence

	Provisional	Definitive
Residential Office Commercial	"Building documentation specifications document" (M1): ▪ "Building documentation specifications document" or equivalent document	"Building documentation specifications document" (M1): ▪ Revised documents Plans (M2): ▪ Building documentation with revised plans, certifications, and calculations User/tenant handbook (M3): ▪ User and/or tenant handbook Maintenance/operating instructions (M4): ▪ Maintenance, inspection, operating, and care instructions

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