UITP SUSTAINABLE DEVELOPMENT COMMISSION

The Munich Metro Refurbishment –
Sustainability Standard for buildings



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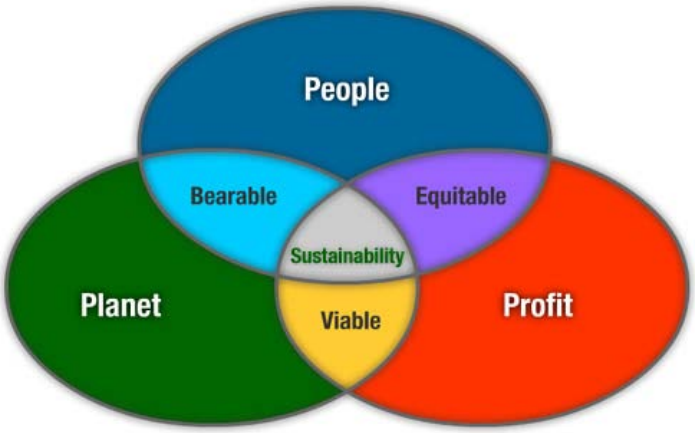
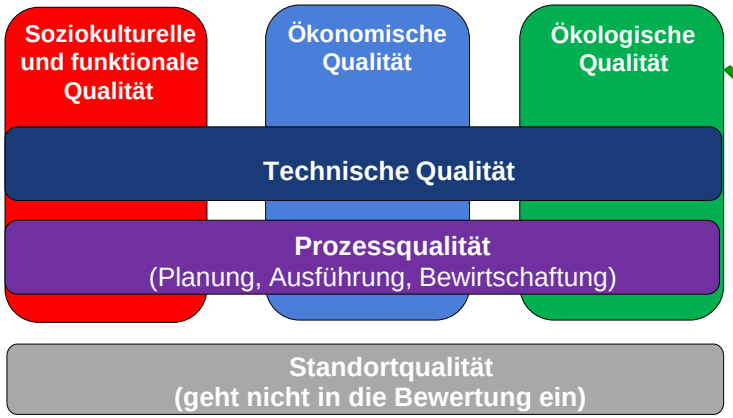
Sustainable building
Starting point

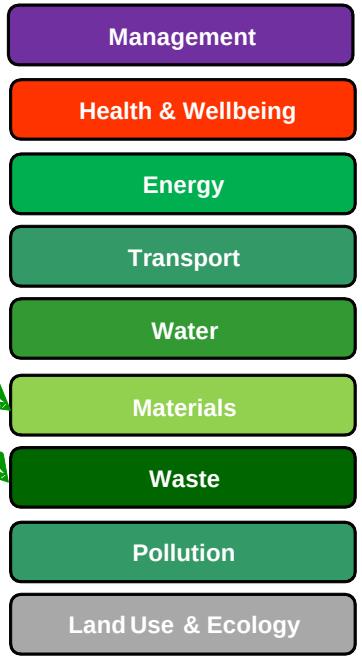
- The topic of sustainability has become a central goal for transport companies.
- The consideration focus of the field ‚buildings / infrastructure‘ is on the construction and operation as well as on the sustainable development of stock.
- Universal guidelines and possibilities of certification currently only exist for housing or commercial buildings, but not for construction and refurbishment of transport infrastructure.
- There are 3 leading and generally accepted certification institutions for buildings:
  - U.S. Green Building Council (LEED)
  - UK Green Building Council (BREEAM)
  - German Sustainable Building Council (DGNB).



Sustainable building
Comparison of certification systems

DGNB
Deutsche Gesellschaft für nachhaltiges Bauen e.V.
German Sustainable Building Council



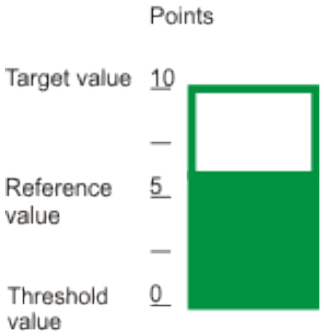


- The substantial contents are similar to each other.
- The requirements refer to the standards of the countries of origin.
- Economic quality is the unique feature of DGNB.
- Process quality is not content of LEED.
- All certificate systems operate according to a point system.

PASS
GOOD
VERY GOOD
EXCELLENT
OUTSTANDING

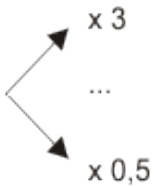
Sustainable building
System structure of DGNB

Criterion



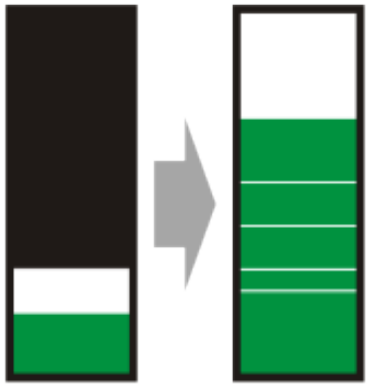
For each criterion, at most 10 points are awarded.

Importance factor



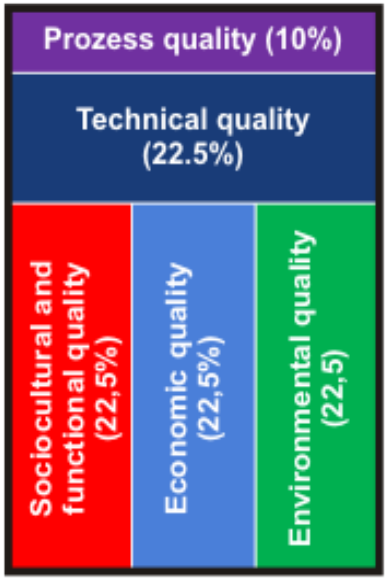
Each criterion is weighted according to its importance.

Quality



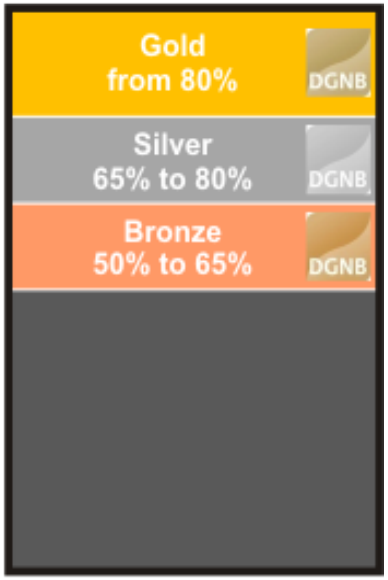
The weighted criteria are summed up in a quality section and the degree of fulfilment is determined.

Quality weighting



There are five quality sections available for valuation of the building quality. They have different weightings. The site is rated separately.

Award Medals



On the basis of degrees of fulfilment and weightings of the five quality groups, the total degree of fulfilment is determined. Thereof, the award and the grade for the building derives.

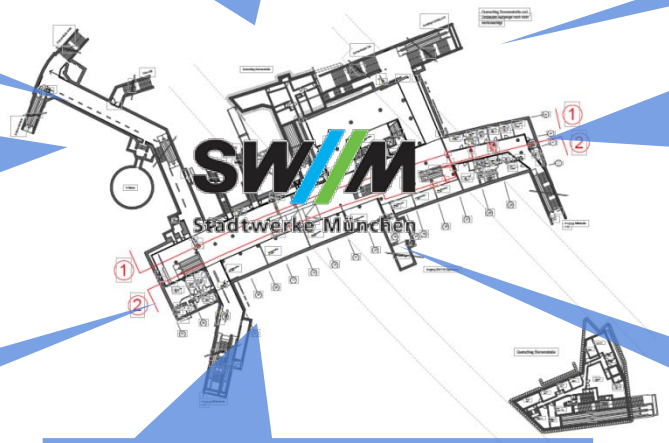
Sustainable building
Scope of consideration

Conservation of material resources
- Reduced material consumption
- Sustainability and longevity of construction
- Recycling, no composite materials
- Simple dismantling

Increase of socio-cultural quality
- Accessibility
- Public use
- Art on the building
- Design quality

Reduction of water use
- Rain water management
- Roof greening
- Unsealing, better infiltration
- Waste water management

Optimization of operation
- Optimized conservation cycles
- Adapted operating parameters
- Intelligent control systems
- Optimal operators concepts and processes



Diminution of power demand
- Good heat insulation
- Optimal heat distribution
- Need-based indoor climate systems
- Efficient lighting systems
- Low primary energy demand

Improvement of location quality
- Minimization of area consumption
- Connection to public transport
- Optimization of infrastructure
- Upgrade of the quarter

Promotion of health and comfort
- Healthy materials
- Good air quality
- High thermal cosiness
- Visual convenience
- Acoustic comfort
- No harmful emissions

Use of renewable energy
- Geothermal energy
- Biomass
- Solar heat
- Photovoltaic
- Wind power

Sustainable building
Benefit of Green Building Certifications

- Higher transparency and clear processes during planning and construction (guideline)
- Quality assurance in the building compilation and documentation
- Better risk management
- Early target definition
- Image-building (the public, customers)
- Employee communication (health, comfort, ecology)
- Life cycle perspective
- Resource savings over the life cycle
- Potential financial benefits

➔ **Sustainable building and operation of real estate**

➔ **Measureable quantities for a controlled sustainable development**

Certification procedure SWM - use case traffic buildings

(1) In-house development of a criteria catalogue for refurbishment of metro stations:
- Compilation by an external planning agency with expertise in certifications: DREES & SOMMER
- Basis of the criteria catalogue : DGNB system for buildings
- Valuation of suitability of the criteria from the DGNB systems of 'Modernization', 'Retail buildings', 'Urban districts' as well as LEED NC for traffic buildings.

(2) Inventory of selected metro stations for compilation of benchmarks.

(3) Testing of the criteria catalogue based on pilot projects (Refurbishment plans).

➔ **Establishment of an internal standard**

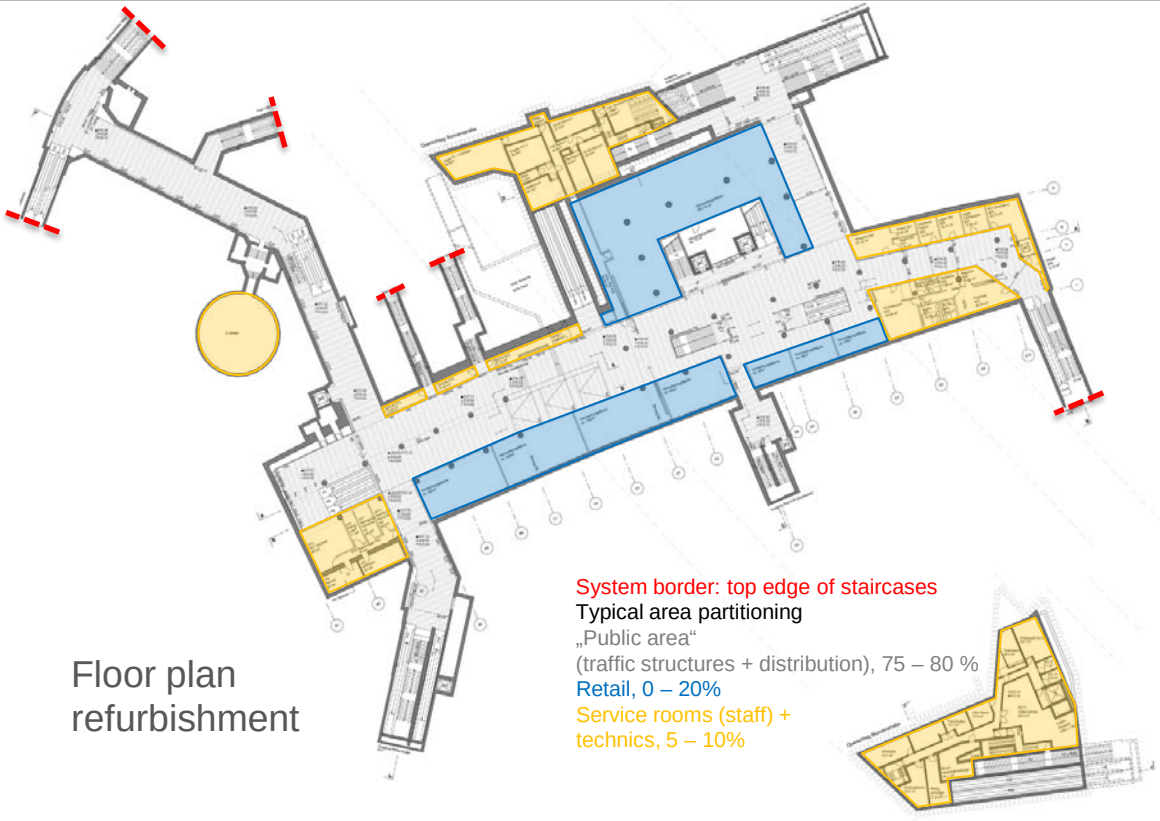
(4) Coordination with the DGNB expert committee to establish a nationwide standard for traffic buildings. DGNB Deutsche Gesellschaft für nachhaltiges Bauen e.V. German Sustainable Building Council

(5) Convening a working group with other German transport companies to universalize the criteria catalogue.

(6) Universal certification for both German and international transport companies will be possible.

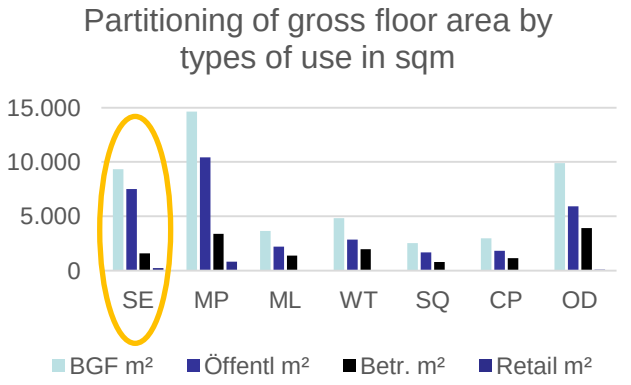
➔ **Establishment of an universal standard**

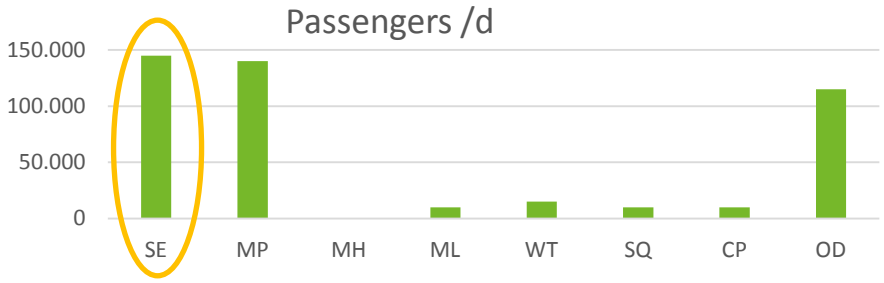
Example - Refurbishment of the metro station Sendlinger Tor



Floor plan refurbishment

System border: top edge of staircases
Typical area partitioning
„Public area“
(traffic structures + distribution), 75 – 80 %
Retail, 0 – 20%
Service rooms (staff) + technics, 5 – 10%



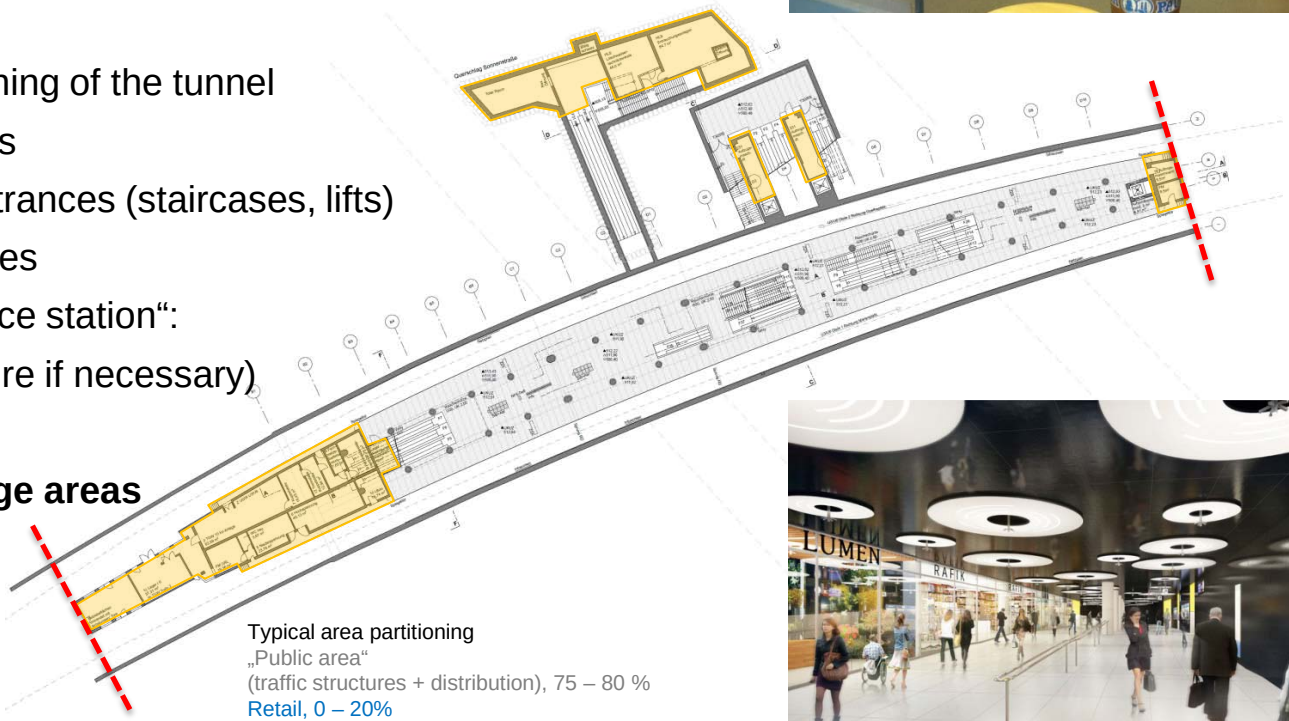


Example - Refurbishment of the metro station Sendlinger Tor

- **Compilation of the criteria catalogue for Type I „Underground station“**
  (Type II: „Surface station“)

- **Determination of the system border of Type I**
  - Interior design
  - Platform to beginning of the tunnel incl. service rooms
  - Upper border: Entrances (staircases, lifts)
  - No outside surfaces
    (for Type II „Surface station“: considered in future if necessary)

- **Determination of usage areas**
  - Public area
  - Retail (tenants)
  - Service rooms



Typical area partitioning
„Public area“
(traffic structures + distribution), 75 – 80 %
Retail, 0 – 20%
Service rooms (staff) + technics, 5 – 10%

Example use - Refurbishment of the metro station Sendlinger Tor

Kriterien-nummer	Kriterienbezeichnung	Gewichtung SWM	Inhalte, Indikatoren, Bewertungsgrundlage		Indikatoren	Checklisten-punkte CLP 100 je Kriterium
SOC1.7	Sicherheit und Störfallrisiken	3	Übersichtliche Wegeführung Technische Sicherheitseinrichtungen Organisatorische Sicherheit Barrierefreie Fluchtwege Betriebsanweisungen Schadensfälle		For each criterion, at most 100 so-called check list points (CLP) can be awarded (= 100 % fulfilment).	100
				1	Übersichtliche Wegeführung	5
				2	Ausleuchtung der Wege	5
				3	Technische Sicherheitseinrichtungen	10
				4	Sicherheit außerhalb der regulären Arbeits- und Öffnungszeiten 7.1.4 Anwesenheit / Erreichbarkeit von Personal/Polizei	10
				5	Räumungspläne	10
				6	Vermeidung von Brandgasrisiken (Materialien)	10
				7	Barrierefreie Fluchtwege	10
				8	Betriebsanweisungen für RLT-Anlagen	10
				9	7.2.1 Vorhandensein/Sichtbarkeit von Hilfseinrichtungen wie z.B. Haltegriffen	10
				10	7.2.3 Aktive Sicherung durch Personal	10
				11	Alkoholverbot im Gebäude	10

Each of the indicators is used for the individual valuation of contents and important aspects of the criterion.
According to the weighting, appropriate points are awarded.
The set-up of the evaluation is regularly made as a checklist.
If it is not possible to clearly answer with yes/no, individual assessment standards can be determined and the indicator can be differentiated in content if necessary.