Above all, existing buildings shape our built environment

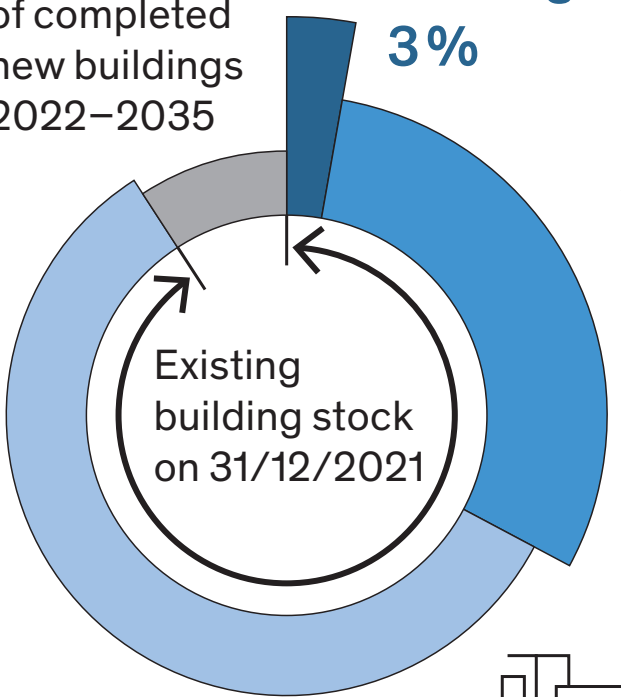
Existing building stock by 2035 according to an estimate of the Federal Foundation of Baukultur

Sources: BDA NRW 2016; dena 2021; Destatis 2021

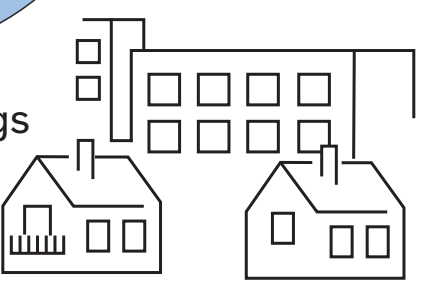
Approx. 8 %
estimated number of completed new buildings 2022–2035

Heritage buildings
3 %

Buildings particularly worth retaining
30 %



Ordinary buildings
59 %

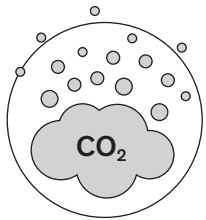


From grey energy to “golden energy”

By retaining the existing building stock, not only tangibles but also intangible values can be preserved and developed further.

Source: Federal Foundation of Baukultur (BSBK)

Transport routes



CO_2 emissions

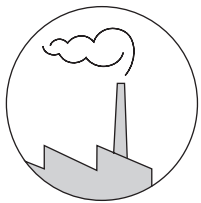
Integration in the surroundings

Contemporary design

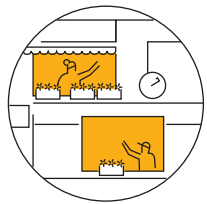
Maintenance

Identification

Raw materials



Production energy



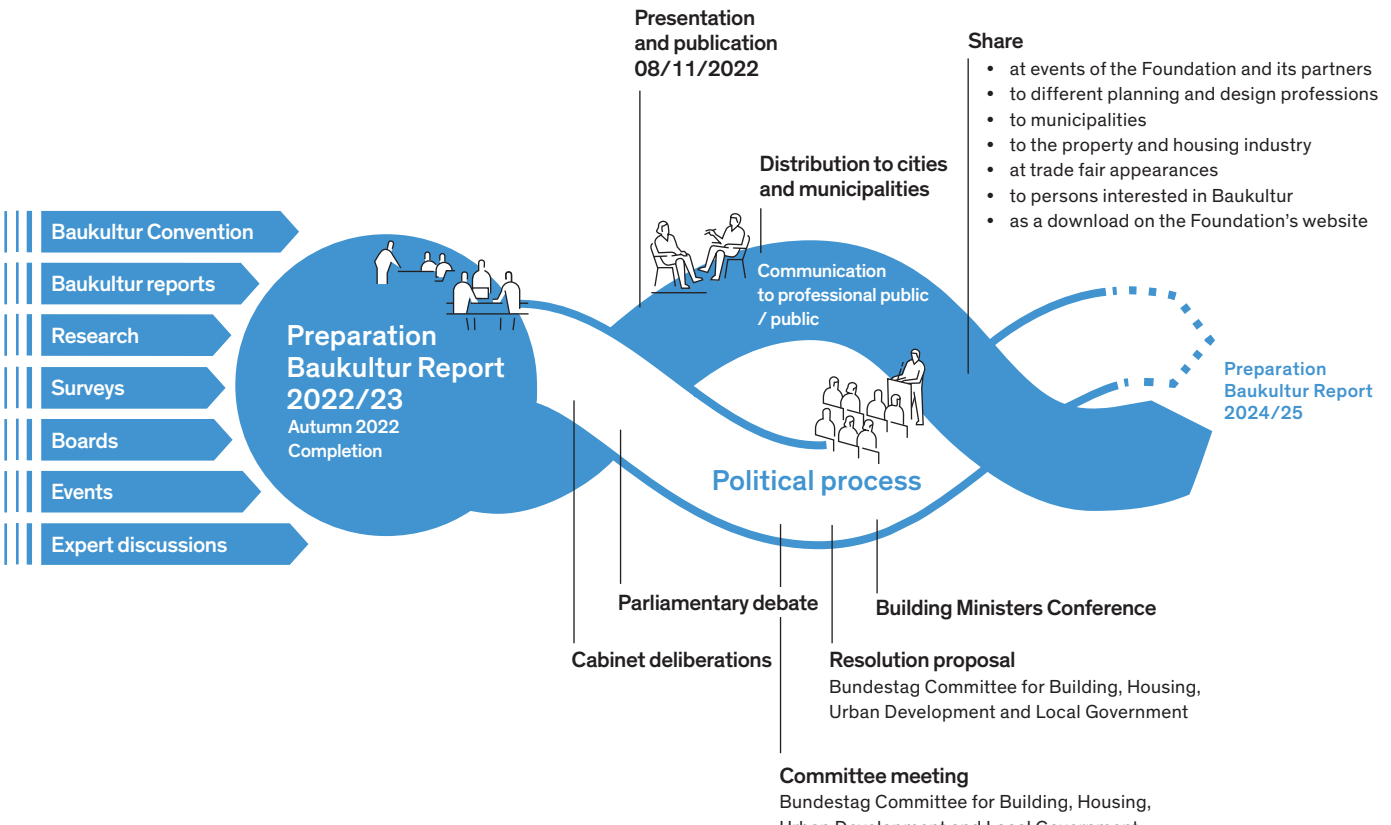
Use

Construction work

Design process

The political and social path of the Baukultur Report 2022/23

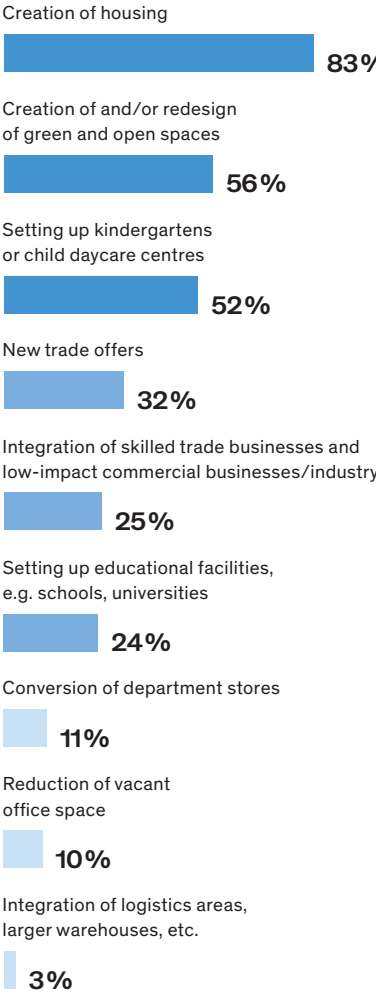
Source: Federal Foundation of Baukultur 2022



Objectives for the development of the city centre and town centre

Source: Municipal survey for the Baukultur Report 2022/23

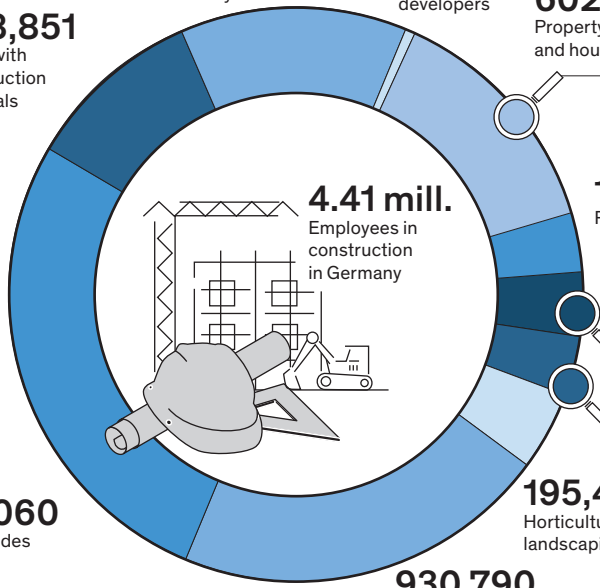
The municipalities name the following as current fields of action for the development of city and town centres:



Construction employment

Total number of employees in selected planning, design and building jobs in Germany 2021

Sources: BAK 2021; Bundesagentur für Arbeit 2022; ZIA 2022



4.41 mill.
Employees in construction in Germany

554,210
Construction materials industry

32,940
Property developers

602,442
Property industry and housing

448,851
Trade with construction materials

144,479
Property financing

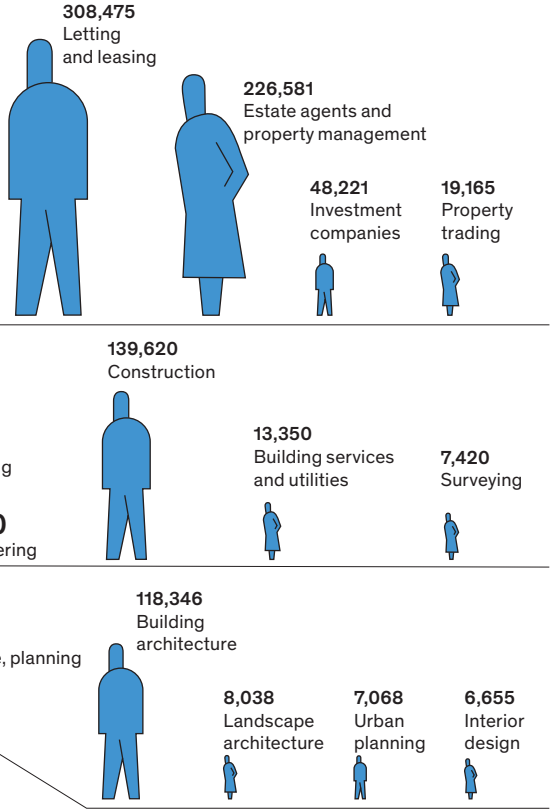
160,390
Civil engineering

140,107
Architecture, planning and design

195,418
Horticulture and landscaping work

930,790
Main construction trades

1,199,060
Finishing trades



308,475
Letting and leasing

226,581
Estate agents and property management

48,221
Investment companies

19,165
Property trading

139,620
Construction

13,350
Building services and utilities

7,420
Surveying

118,346
Building architecture

8,038
Landscape architecture

7,068
Urban planning

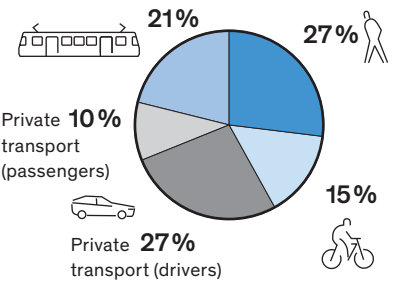
6,655
Interior design

Modal split

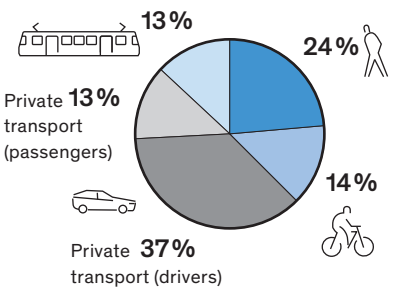
Distribution of traffic volume between the different means of transport (modal split)

Source: Agora traffic transition 2020

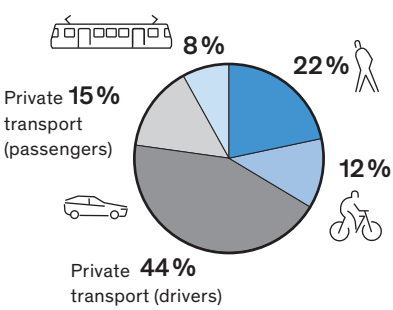
Metropolises



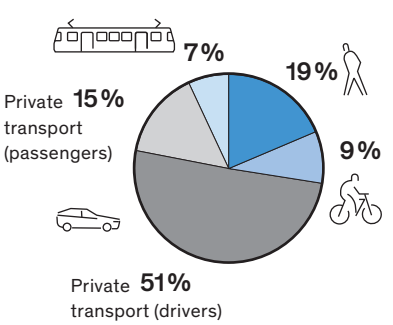
Large cities



Medium-sized cities

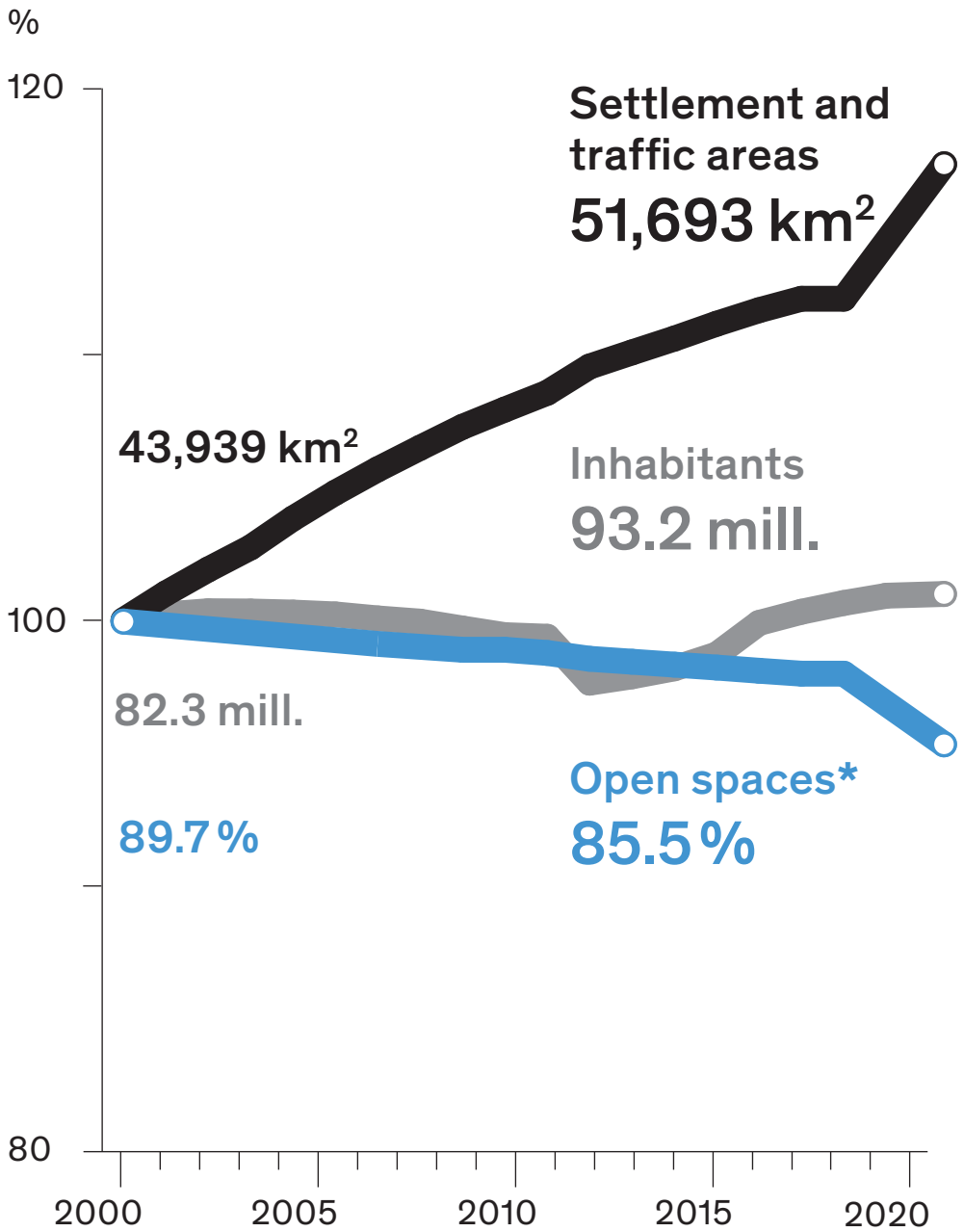


Small cities



Unequal developments

Sources: Destatis 2021, 2022; UBA 2022

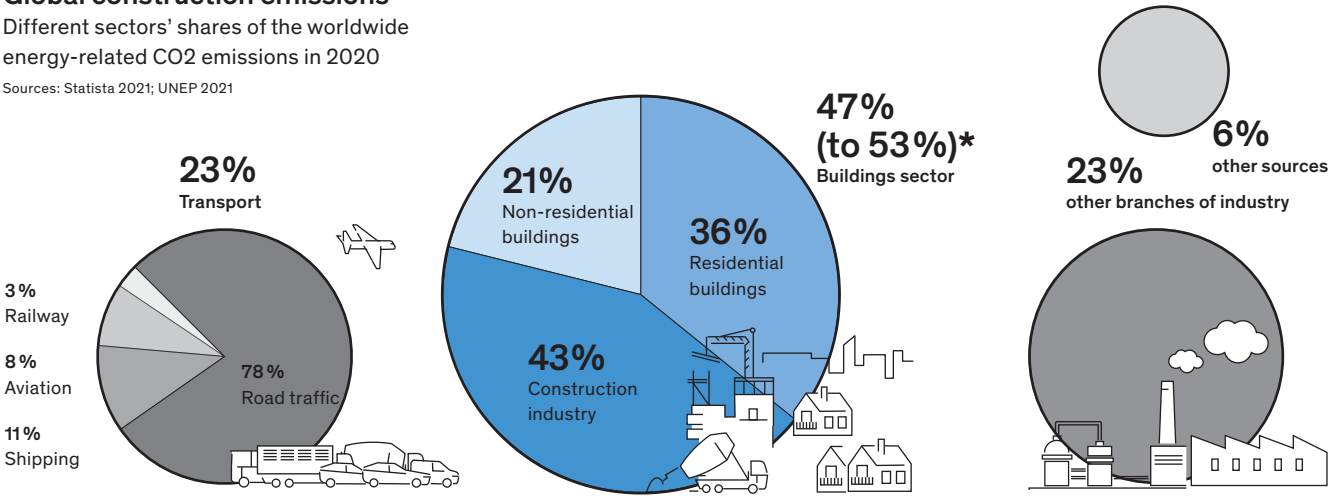


* Agricultural land, forest and forestry land, uncultivated land, mining/quarrying and spoil area and water area

Global construction emissions

Different sectors' shares of the worldwide energy-related CO2 emissions in 2020

Sources: Statista 2021; UNEP 2021



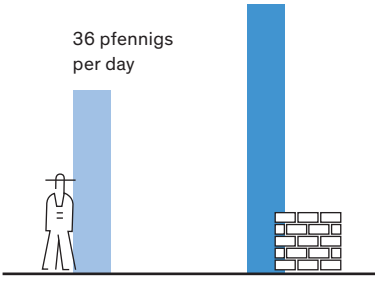
* Studies that also take into account the process-related release of greenhouse gases as well as those emissions due to production and demolition, which are usually attributed to other categories such as industry or mobility, estimate the share of the construction and building sector to actually be above 50%

Construction costs then and now

Ratio of daily wage to material price

Sources: Destatis 2018; Fouquet 1998; Hornbach 2022

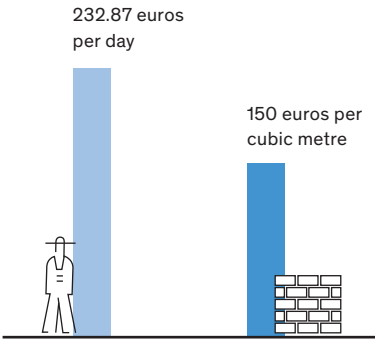
68 %
of the material costs



Wage of a master craftsman in Nuremberg in 1629

Nuremberg ashlar 1523

155 %
of the material costs



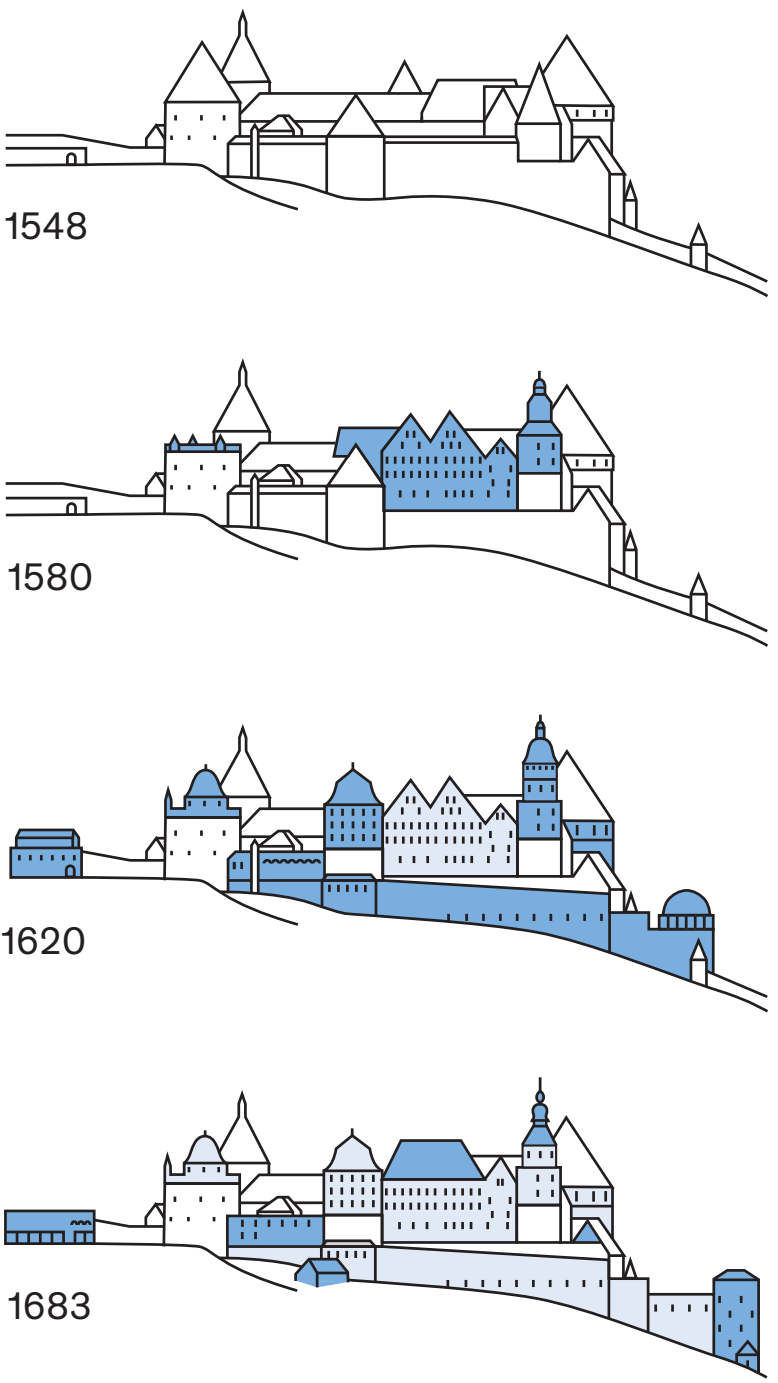
Gross wage of a Bavarian master bricklayer 2022

Calcium silicate masonry unit 2DF 2022

Baukultur of Conversion in Times Past

Conversion work on Heidelberg Castle from 1548 to 1683

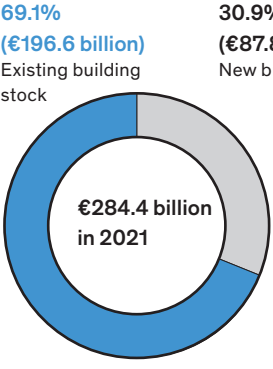
Source: Federal Foundation of Baukultur
after Julian Hanschke



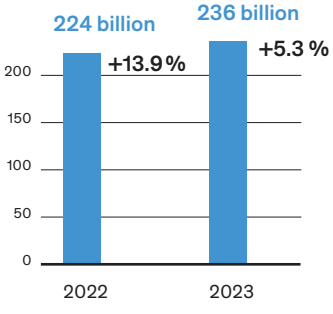
Construction volume: the proportion of conversion is increasing

Source: Gornig/Michelsen/Pagenhardt 2022

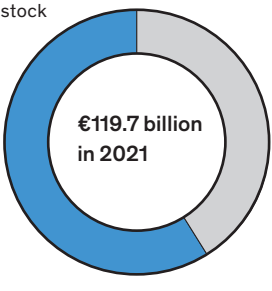
Construction work in housing



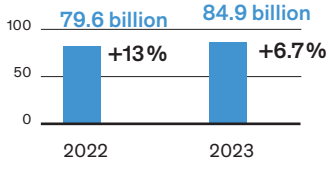
Forecast for construction volume in the existing housing stock



Construction work in non-housing



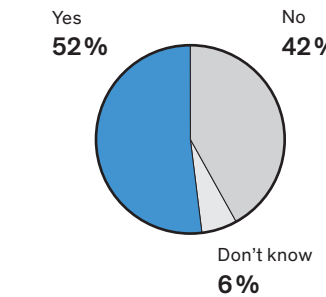
Forecast for construction volume in the existing non-housing stock



Every second person said they had already been annoyed by a demolition

Source diagram: Population survey for the Baukultur Report 2022/23; Source text: Municipal survey for the Baukultur Report 2022/23

Have you already regretted or been annoyed by the demolition of a building?

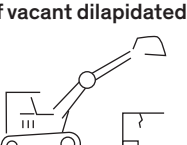


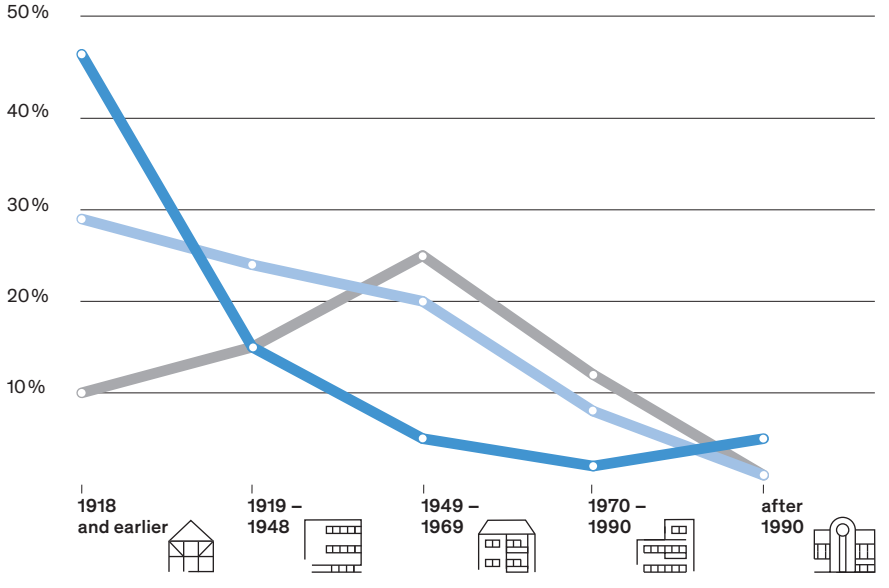
42 %

of the cities have experienced demands for the retention of buildings threatened by demolition

17 %

of the cities have experienced demands for the demolition of vacant dilapidated buildings





Little-valued buildings are demolished quickly!

Municipalities' assessments of Baukultur value, demolition as well as need for conversion and renewal according to building age.

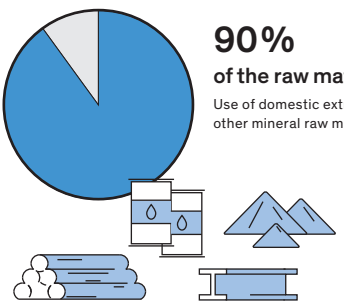
Source: Municipal survey for the Baukultur Report 2022/23

- Perceived high Baukultur value
- Need for conversion and renewal
- (Very) frequent demolitions

The construction and building sector in Germany

Shares of raw material consumption, quantity of waste and greenhouse gas emissions

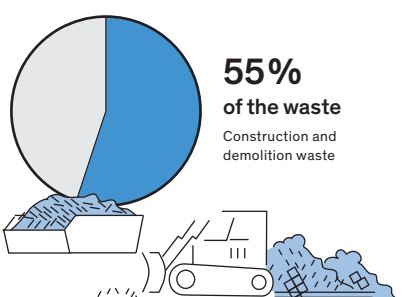
Sources: BBSR 2020; dena 2021; Destatis 2022



90%

of the raw materials

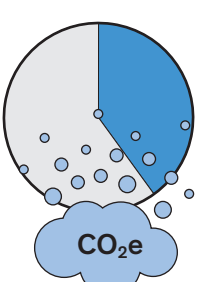
Use of domestic extractions of other mineral raw materials



55%

of the waste

Construction and demolition waste



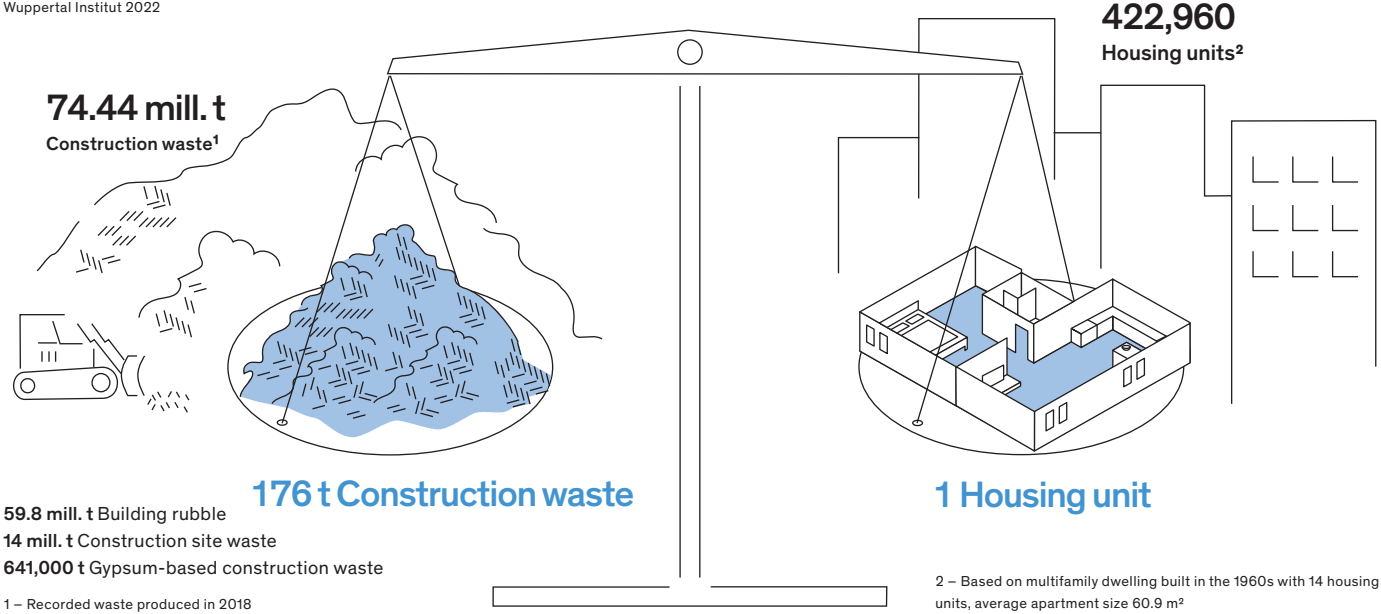
40%

of the emissions

Greenhouse gas emissions due to production, erection, modernisation, use and operation of buildings – without consideration of dismantling and emissions by foreign suppliers

Germany's annual construction waste is equal to the calculated material requirement for approx. 422,000 housing units

Sources: The circular economy, construction 2021; Wuppertal Institut 2022



59.8 mill. t Building rubble
14 mill. t Construction site waste
641,000 t Gypsum-based construction waste

1 – Recorded waste produced in 2018

2 – Based on multifamily dwelling built in the 1960s with 14 housing units, average apartment size 60.9 m²

High approval of the population for climate adaptation measures

Source: Population survey for the Baukultur Report 2022/23

Climate change adaptation measures that are important to the population:

More green and open spaces

93 %

Unsealing areas so that precipitation can infiltrate and percolate into the ground

91 %

Flood protection systems

89 %

More street trees/tree planting

89 %

Protected areas specifically for the preservation of biodiversity

85 %

Surfacings that help against overheating

77 %

Roof and façade greening

73 %

Roofs that provide shade

67 %

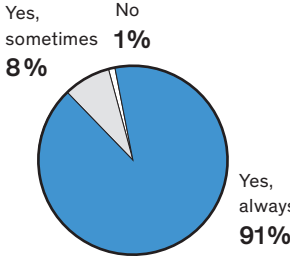
More water areas, water features, fountains, etc.

61 %

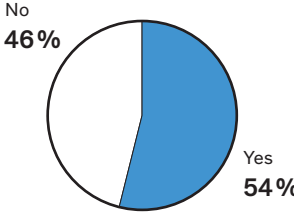
Demolition despite checking

Source: Municipal survey for the Baukultur Report 2022/23

Does your city check whether conversion is possible when developing municipal buildings?



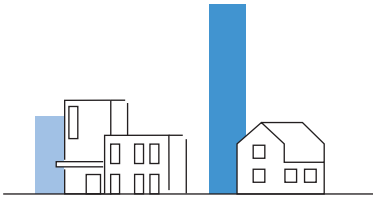
Have municipal building stocks been demolished in your city in favour of a replacement new building during the past ten years?



Skilled trades find conversion good

Source: Survey of the trades for the Baukultur Report 2022/23

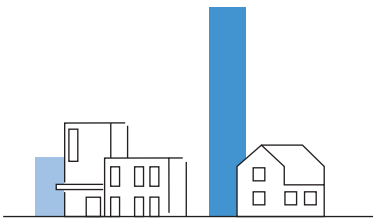
What percentage of your turnover do you achieve in which area?



New build
29 %

Conversion/renovation
71 %

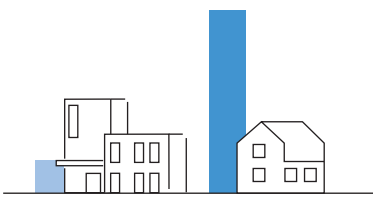
On which construction site do you prefer to work?



New build
22 %

Conversion/renovation
78 %

Which area will be more important for your company in the next ten years?



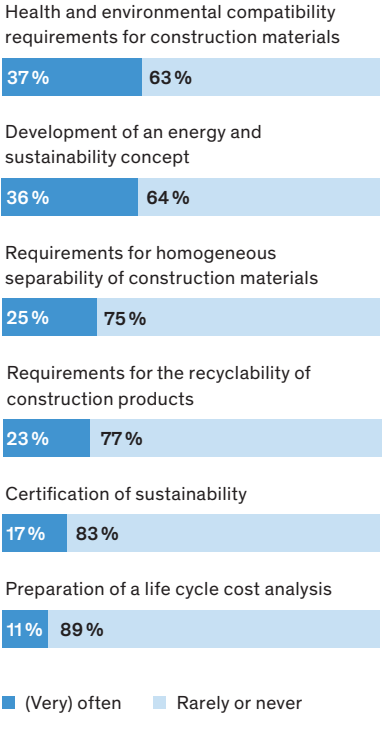
New build
15 %

Conversion/renovation
85 %

Sustainability in municipal calls for tender

Source: Municipal survey for the Baukultur Report 2022/23

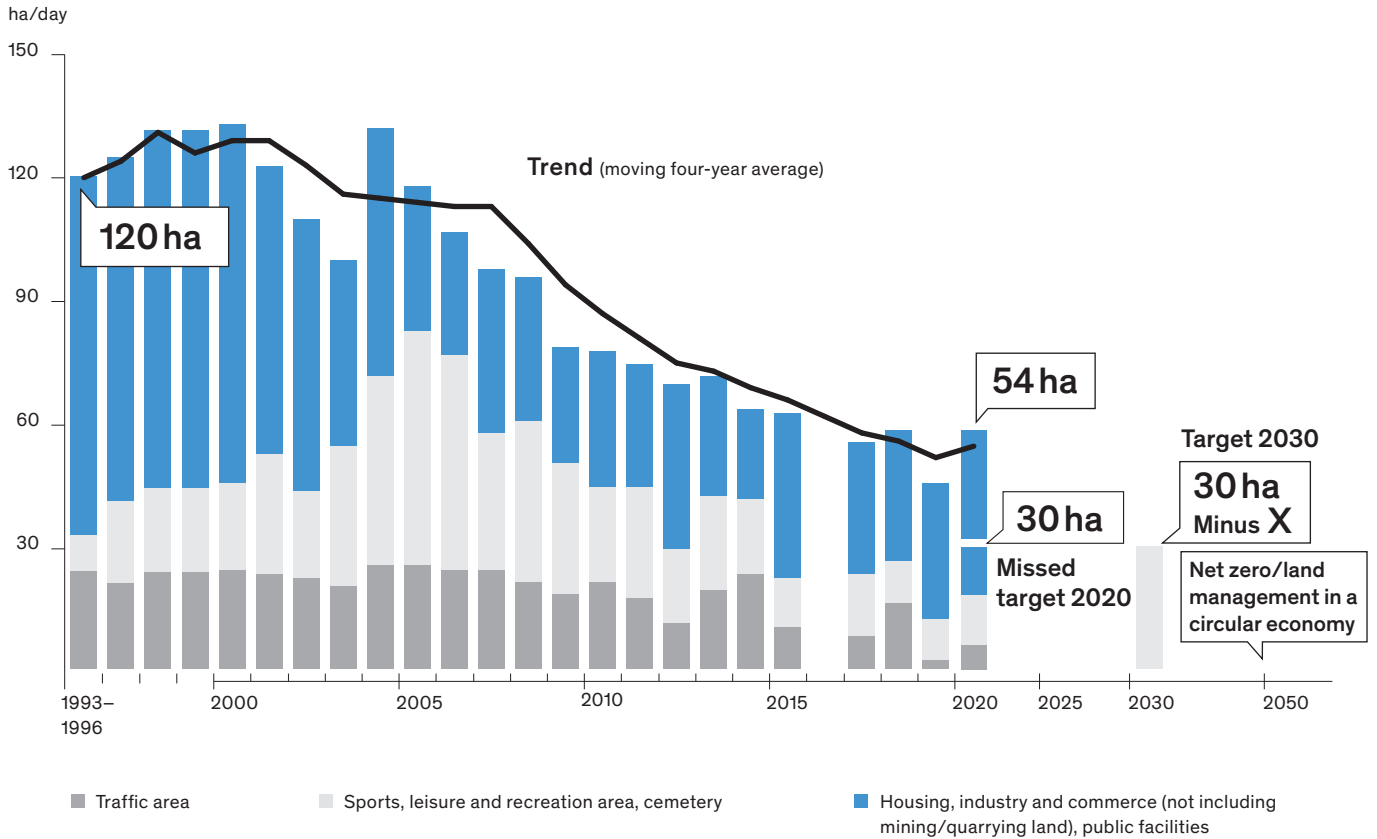
To what extent are sustainability requirements integrated in calls for tender in your municipality?



The goals are still far away

Daily growth and composition of the settlement and traffic area

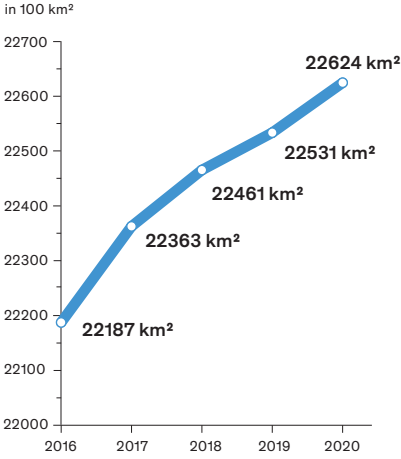
Sources: Destatis 2021; UBA 2022



Soil sealing continues to increase

Rise in the sealed land areas in Germany

Source: Statistics offices of the federal government and the federal states

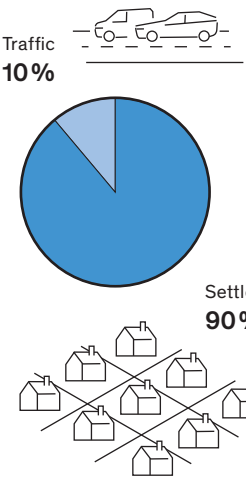


Each year, an area roughly the size of Sylt Island is sealed.

Settlement areas dominate land use

Shares of new settlement and traffic areas designated in 2020

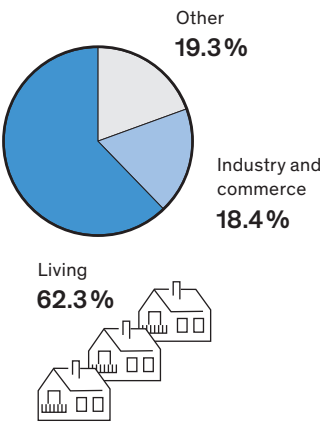
Source: Destatis 2021



New settlement areas mainly for housing use

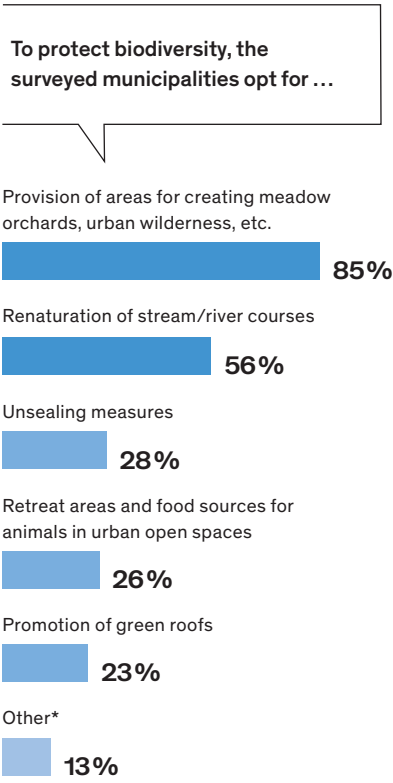
Shares of the new settlement areas designated in 2020

Source: Destatis 2021, 2020



Protection of biodiversity can be linked to Baukultur concerns

Source: Municipal survey for the Baukultur Report 2022/23

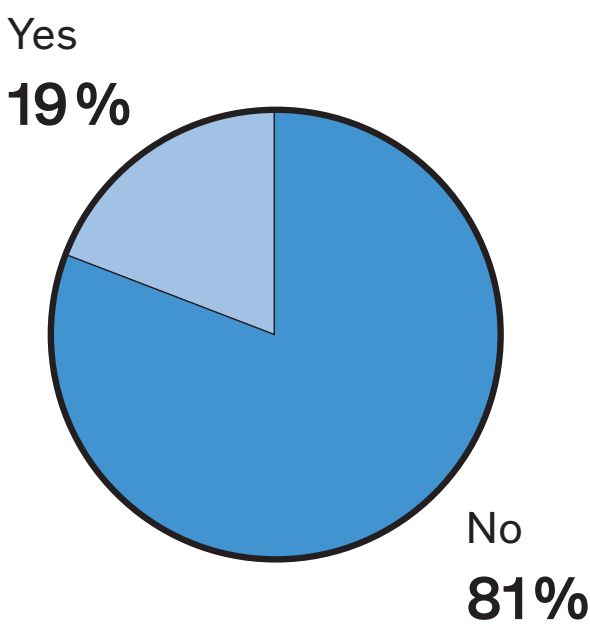


* Other, including wildflower meadows, tree planting, counteracting sealing

Innovative rainwater management (harvesting) has not yet become generally accepted

Source: Municipal survey for the Baukultur Report 2022/23

Is the principle of the “sponge city” applied in your city?



… of which currently being planned: 39 %

Retail alone is no longer enough!

Source: Population survey for the Baukultur Report 2022/23

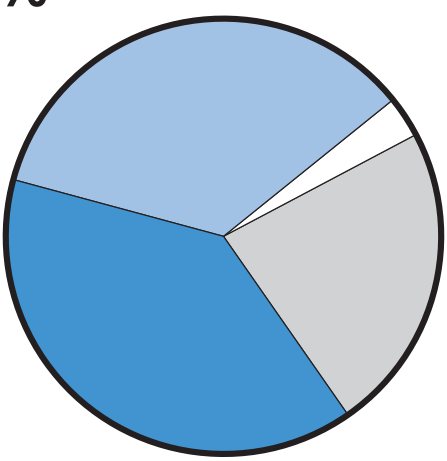
Four out of five municipalities see a need for development of business parks

Source: Municipal survey for the Baukultur Report 2022/23

Do the business parks in your municipality need development?

Yes, at the edge of the settlement
35 %

Yes, in the inner city
3 %

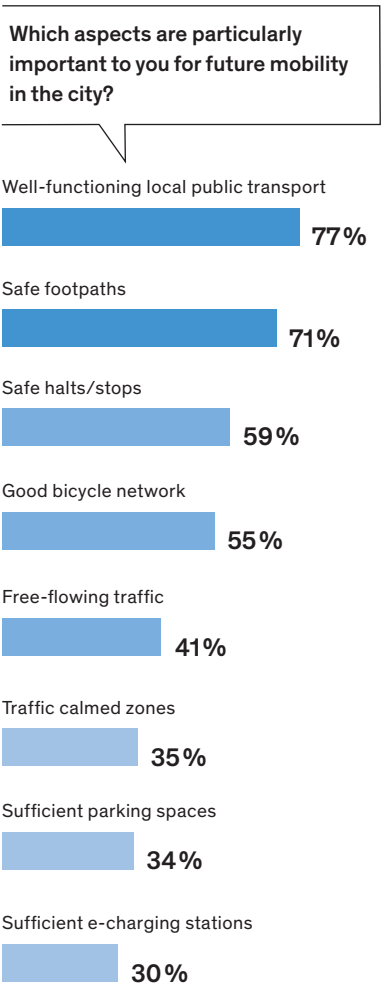


No
23 %

Yes, in the inner city and at the edge of the settlement
39 %

Particularly important to the population: pedestrian traffic and local public transport

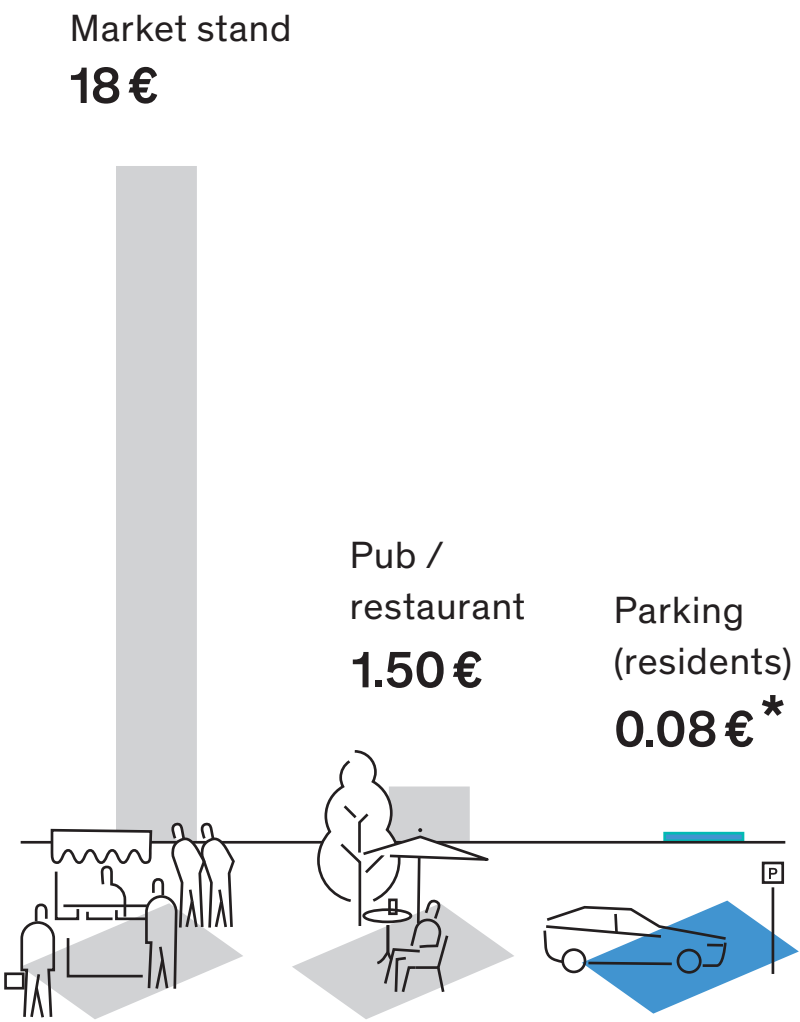
Source: Population survey for the Baukultur Report 2022/23



Privileging of parking as a special use

Source: Agora traffic transition 2020

Fees for special uses on public roads per day and per area of a parking space using the example of the city of Munich.



*in Freiburg, at least 0.99 euros since 1 April 2022

Transport station and passenger building

Differences in the funding, official competence and legal basis

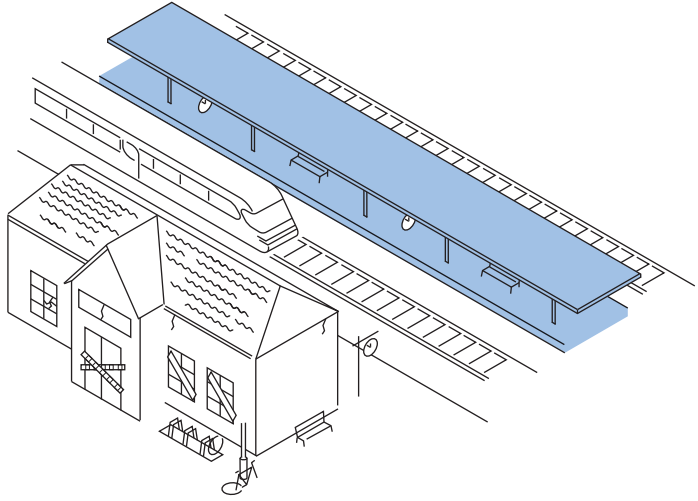
Sources: Allianz pro Schiene; VBB 2021

Passenger building

€
- mainly by means of rental income by the respective owners
- only minor public funding

§
- Building code (BauGB), building regulations of the federal states, etc.

Around **2,300** passenger buildings in Germany, of which **30 %** owned by Deutsche Bahn **70 %** owned by others



Transport station

including platforms, stairs, underpasses and signage/wayfinding systems

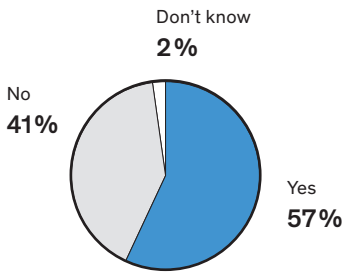
€
- via station charge by the transport company
- own funds of the infrastructure company
- retention, expansion and new build funded by the federal government and federal states

§
- General Railway Act (AEG)

Many people know of dilapidated railway stations …

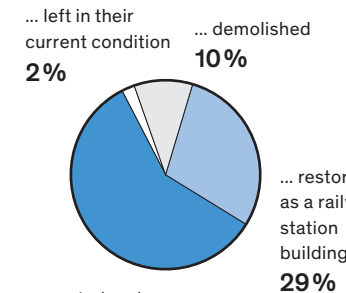
Source: Population survey for the Baukultur Report 2022/23

Do you know of a dilapidated railway station building?



… and there is a need for action!

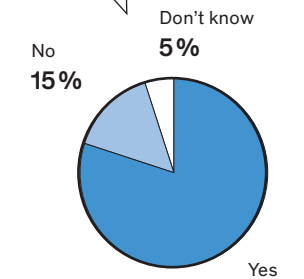
These dilapidated buildings should be …

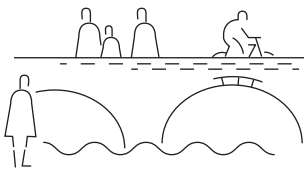


Infrastructure needs design too!

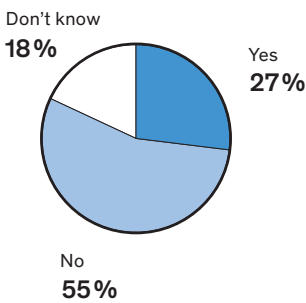
Source: Population survey for the Baukultur Report 2022/23

Do you think that infrastructure structures should be designed to be visually attractive?





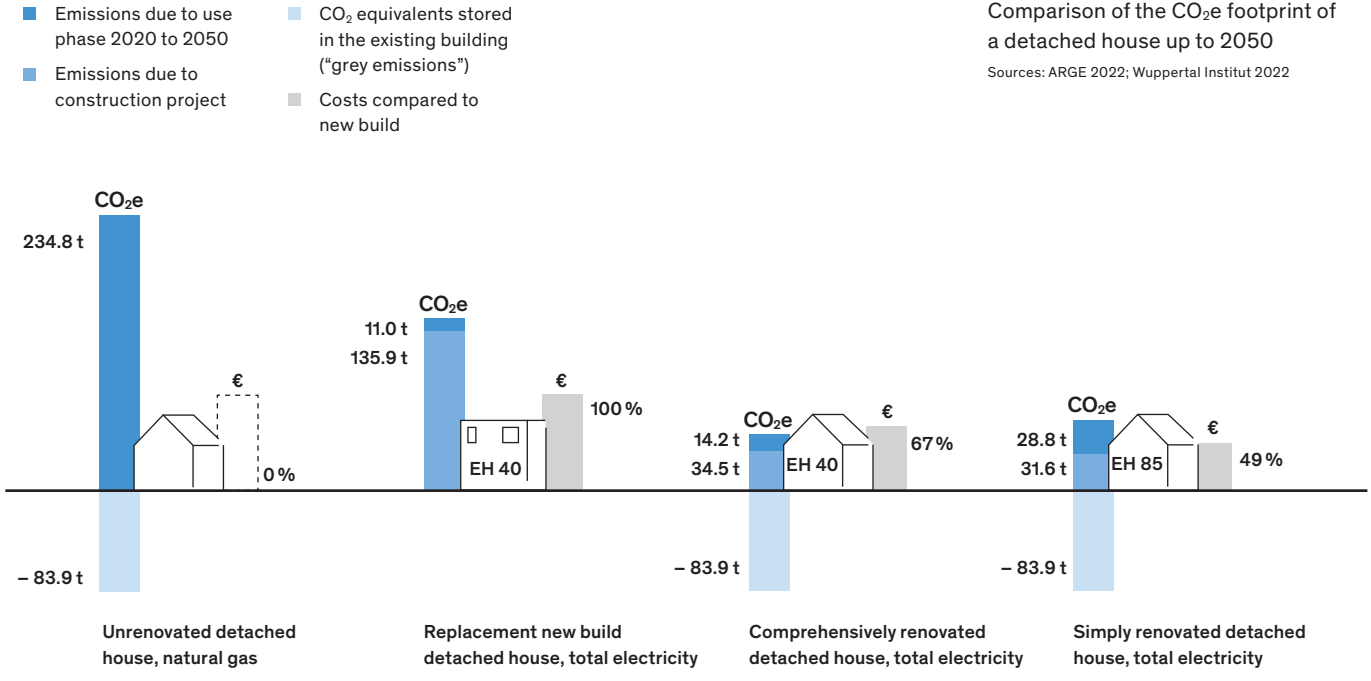
Do you think that infrastructure structures are currently well designed?



Renovation beats new build!

Comparison of the CO_2e footprint of a detached house up to 2050

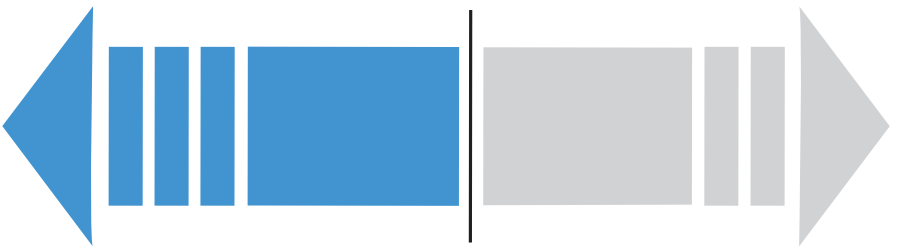
Sources: ARGE 2022; Wuppertal Institut 2022



The performance gap

The consumption of operating energy differs from the calculated demand due to the “human factor”. The prebound effect reduces the consumption in unrenovated buildings due to careful, economical behaviour, the rebound effect increases it in an efficiency house (EH), for example, due to higher room temperatures and more frequent ventilation.

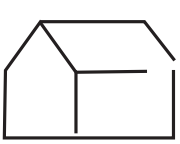
Sources: BBSR 2019; Wuppertal Institut 2022

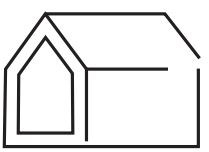


Unrenovated up to – 50 %

Calculated operating energy requirement

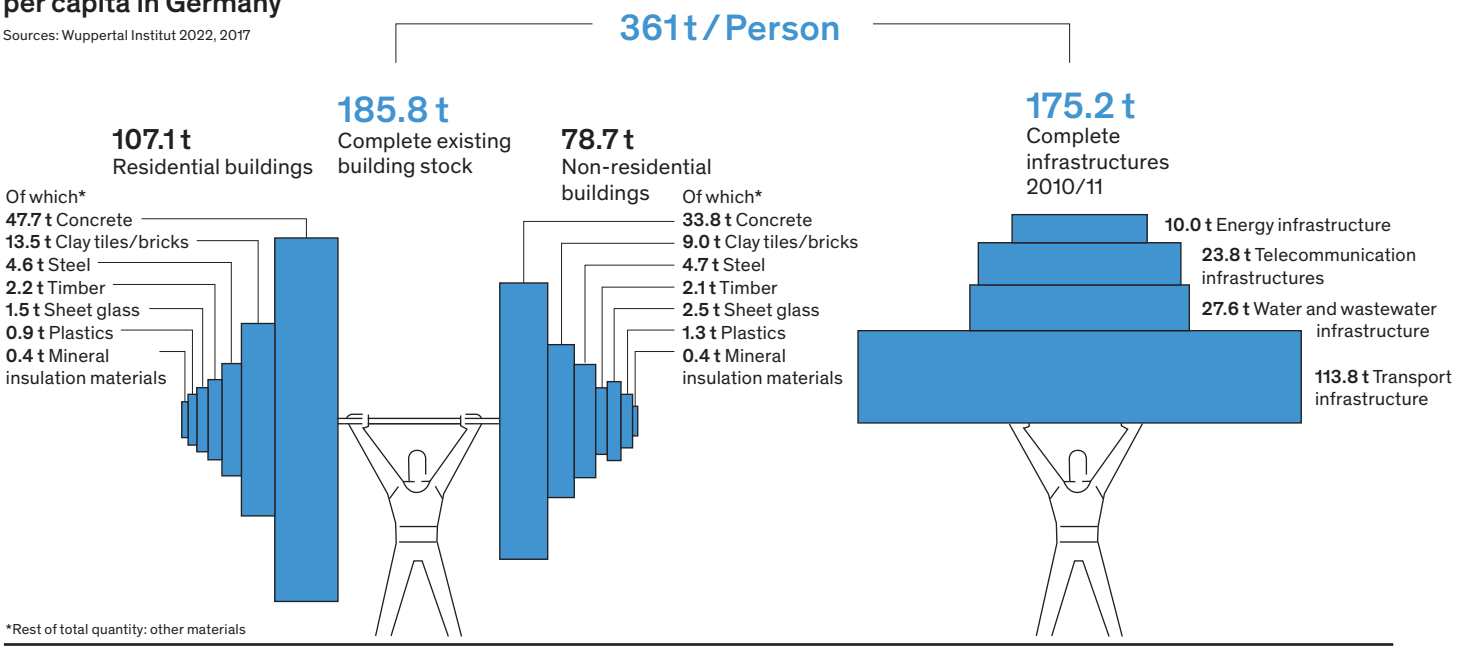
Efficiency house up to + 40 %



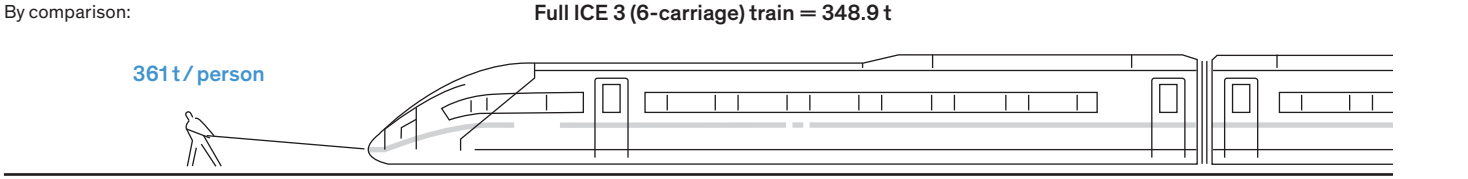


Building and infrastructure material stock per capita in Germany

Sources: Wuppertal Institut 2022, 2017



By comparison:



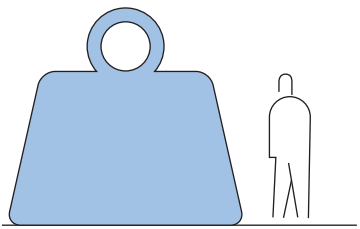
CO_2 in the existing building stock

If manufactured today, the materials stored in the existing building stock would cause greenhouse gas emissions amounting to 5.85 billion t CO_2 equivalents.

Sources: BBSR 2020; Statista 2022; UBA 2022, 2021; Wuppertal Institut 2022

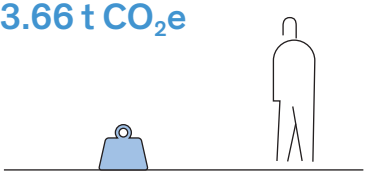
Manufacturing the material in the existing building stock again today would equate to per capita emissions of

70 t CO_2e



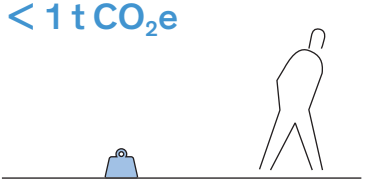
The annual CO_2 emissions of the construction and building sector in Germany is equivalent to per capita emissions of

3.66 t CO_2e



The ideal CO_2 footprint per person per year

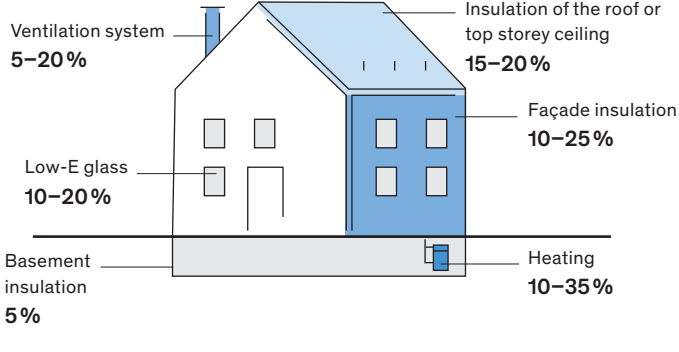
< 1 t CO_2e



Potential saving through energy-efficient renovation

Possible energy saving through different measures as part of a renovation

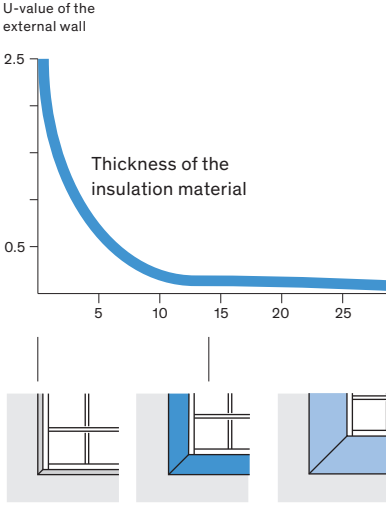
Source: Verbraucherzentrale Bundesverband



Insulation performance reduces with insulation thickness

Starting from 14 cm insulation thickness, the insulating effect is no longer increased significantly. Determination of the U-value of an external wall with retrofitted insulation by way of example.

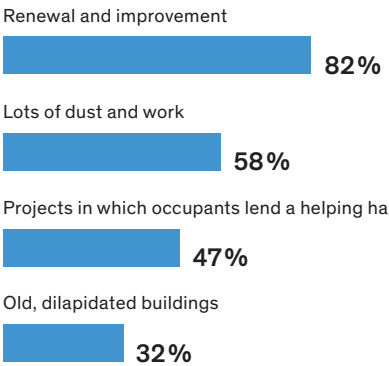
Sources: Bienert 2021; Wuppertal Institut 2022



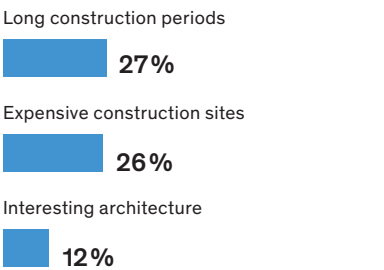
Associations with the term “conversion”

Source: Population survey for the Baukultur Report 2022/23

Four out of five respondents find conversion to be something positive!



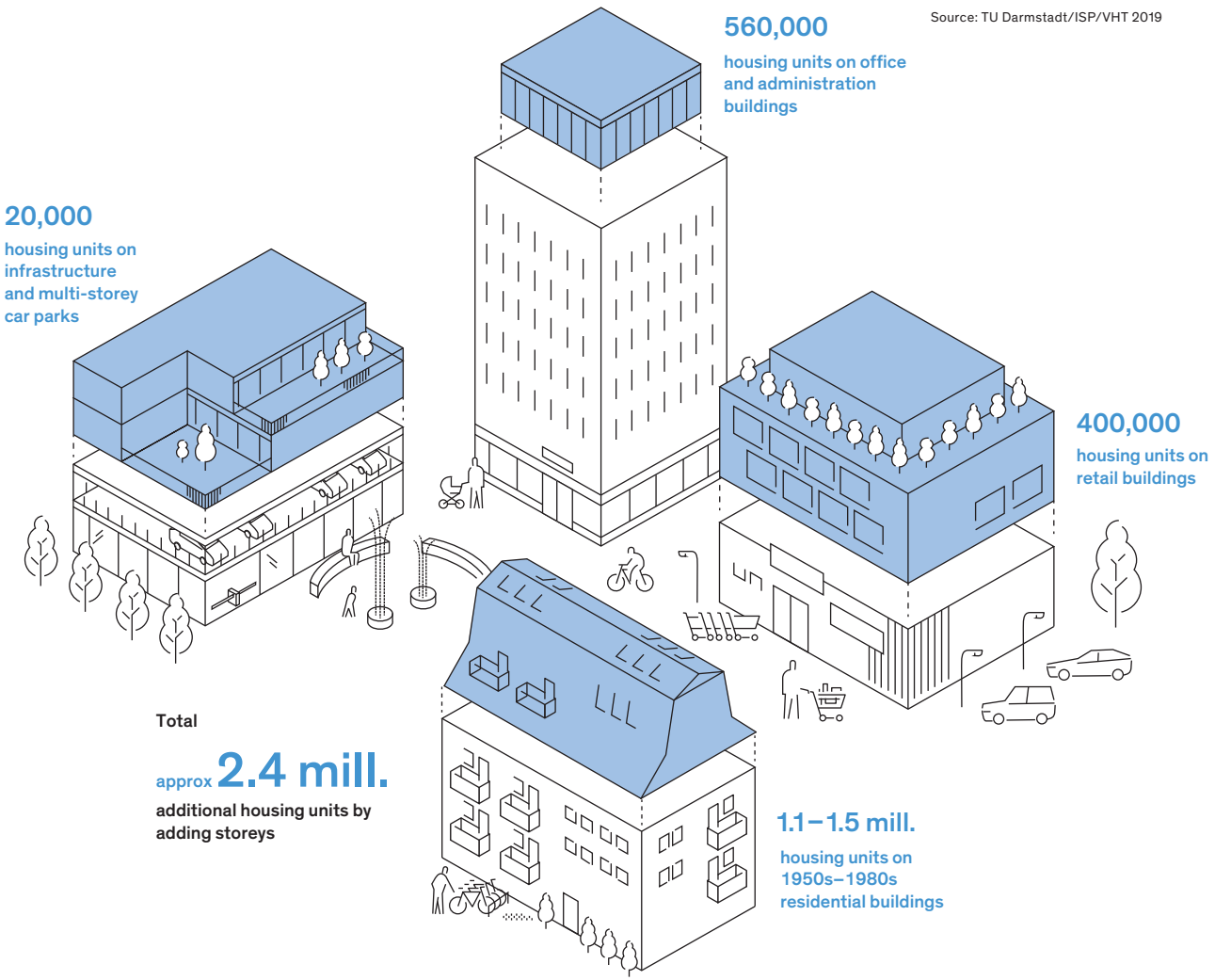
Only one in ten see design potential in conversion.



Potential through additional storeys

Inner-city housing potential in Germany

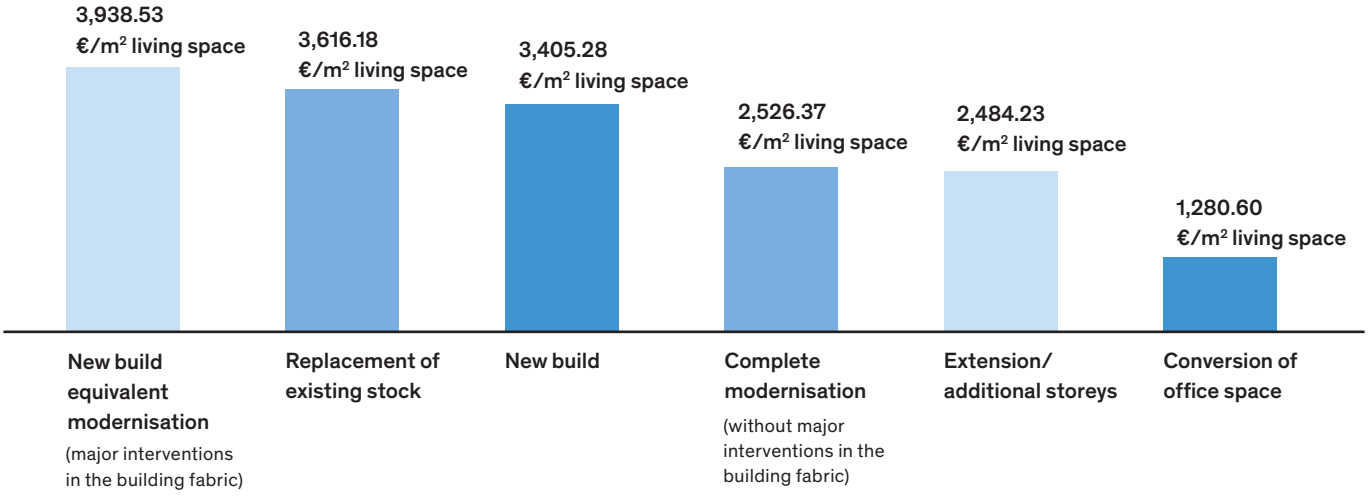
Source: TU Darmstadt/ISP/VHT 2019



Construction cost comparison

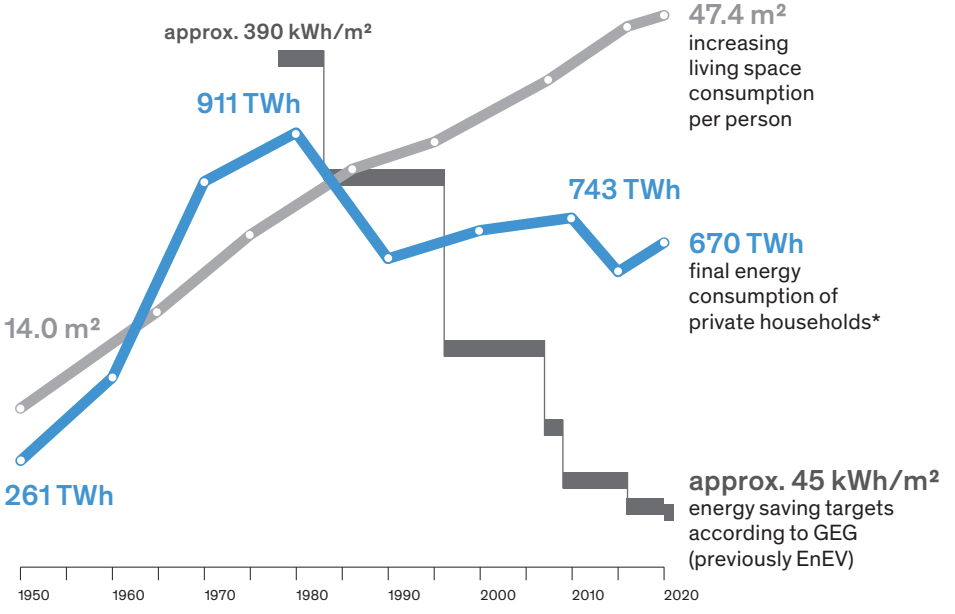
Comparison of the average gross costs for different housing creation options (4th quarter 2021)

Source: ARGE 2022



Rebound effect

Sources: AG Energiebilanzen 2021; dena 2016; Destatis 2012; GEG 2020; INSM 2009; Kühnhenrich 2014; Statista 2021

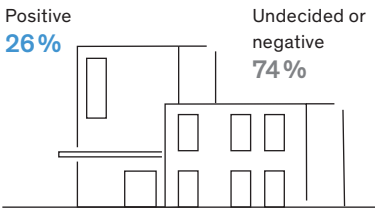


*up to 1989: old federal states incl. small consumers, converted from SKE (coal units) to TWh

Appreciation of current architecture

Source: Population survey for the Baukultur Report 2022/23

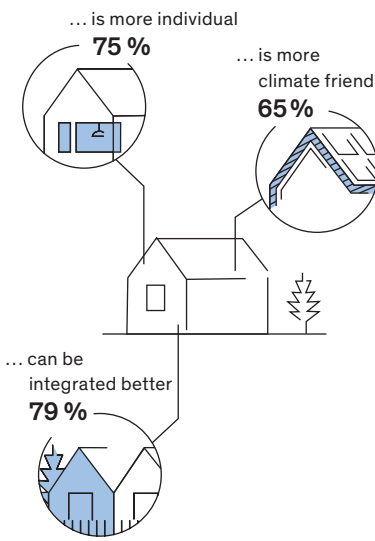
Attitude of the population towards architecture currently being created in Germany



High trust in conversion

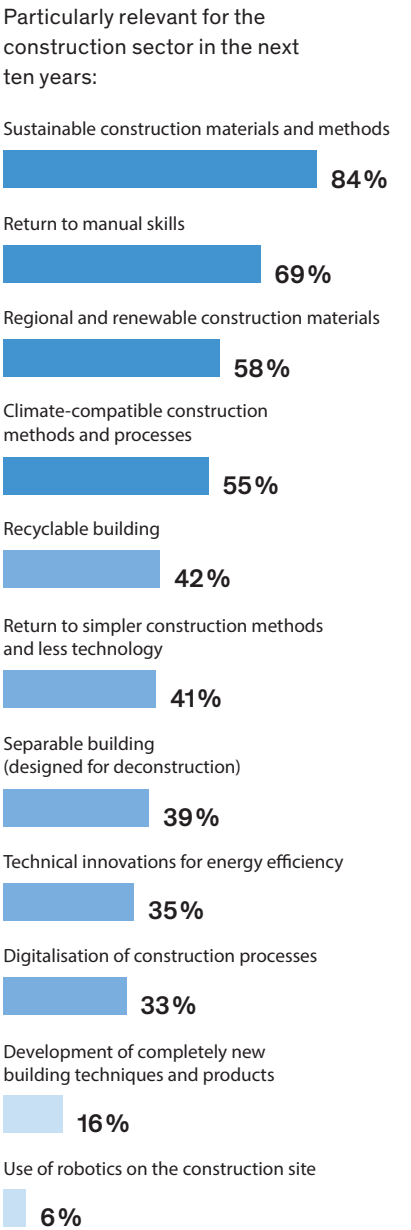
Source: Population survey for the Baukultur Report 2022/23

Unlike new build, the population finds conversion …



Skilled trade sees the future in sustainability and manual skills

Source: Survey of the trades for the Baukultur Report 2022/23



Added Baukultur of Conversion value

Conversion as a comprehensive strategy for action to upgrade our living spaces

Sources: Allianz pro Schiene; ARGE 2022; BMDV 2022, 2021, 2019; FAZ 2020; IWU 2022; Statista 2022; Wuppertal Institut 2022

Stocktake of existing railway network

Deutsche Bahn owns
38,400 kilometres of rail

and 25,180 railway bridges

From 2019 to 2029, 2,000 bridges must be completely or partly renewed.

Stocktake of existing road network

In Germany there are 830,000 kilometres of roads

and 39,500 bridges on federal motorways and trunk roads

Only one in ten motorway bridges is in very good or good condition.

Stocktake of residential buildings

19.2 million residential buildings, which is 3.8 billion m² living space.

Detached house	Semi-detached house	Multifamily Dwelling
66.7%	**16.4%**	**16.8%**

More than half the residential buildings have been energy-efficiency renovated only slightly or not at all.

Stocktake of non-residential buildings

21 million non-residential buildings, of which...

- Factories and workshops **1 million**
- Office buildings **350,000**
- Trade and warehouse buildings **200,000**
- Hotels and restaurants/bars **275,000**
- Company buildings **725,000**
- Sacred buildings **121,000**
- Private garages **11 million**
- Other **3 million**
- Agricultural buildings **4 million**
- Institutional buildings **240,000**

Create living space

Integrate sustainable energy concepts

Build in a climate-compatible way

Conserve resources

Increase value

Create individual design language

Enable appropriation

Implement new mobility concepts structurally

Curb land consumption

Meet changing use standards

Design vibrant centres and city centres

Increase attractiveness

Promote brownfield development

Continue to write history

Create new meeting places

Retain cultural values

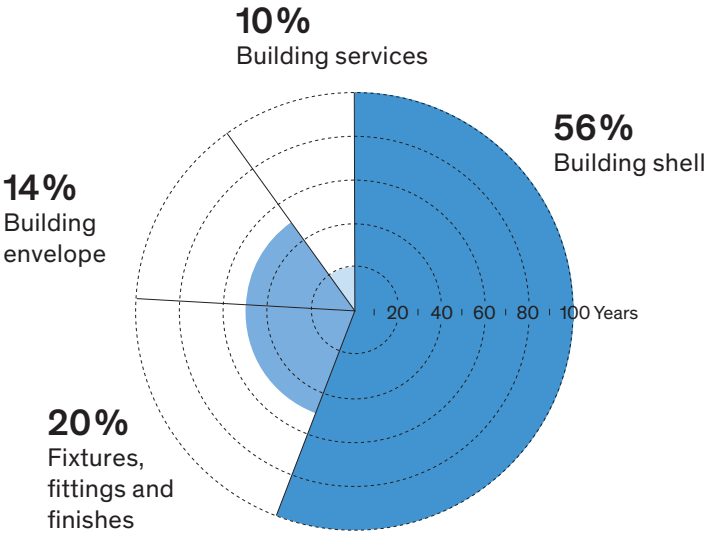
Adapt living spaces to be climate compatible

Promote biodiversity

Life cycle and grey energy

Different building elements' grey energy share and their respective life expectancy

Sources: BNB 2017; Einfach Bauen 2021; Hegger/Fuchs/Stark/Zeumer 2007

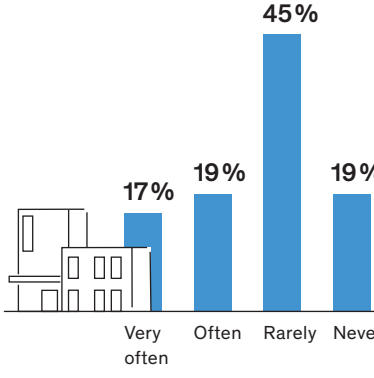


Skilled trades can have more design input in conversion

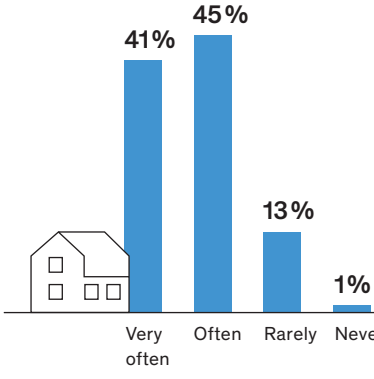
Source: Survey of the trades for the Baukultur Report 2022/23

How often are you involved in design decisions on the construction site or in advance?

New build



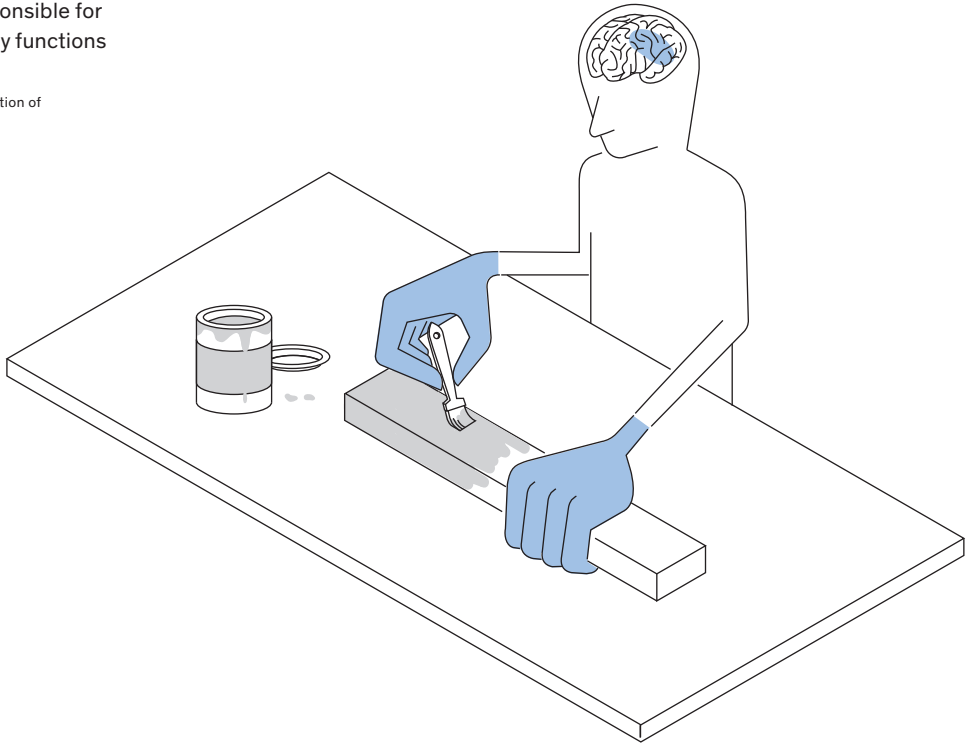
In conversion/renovation



So much brainpower lies in the hands

A third of the brain area responsible for the body's motor and sensory functions is needed for the hands.

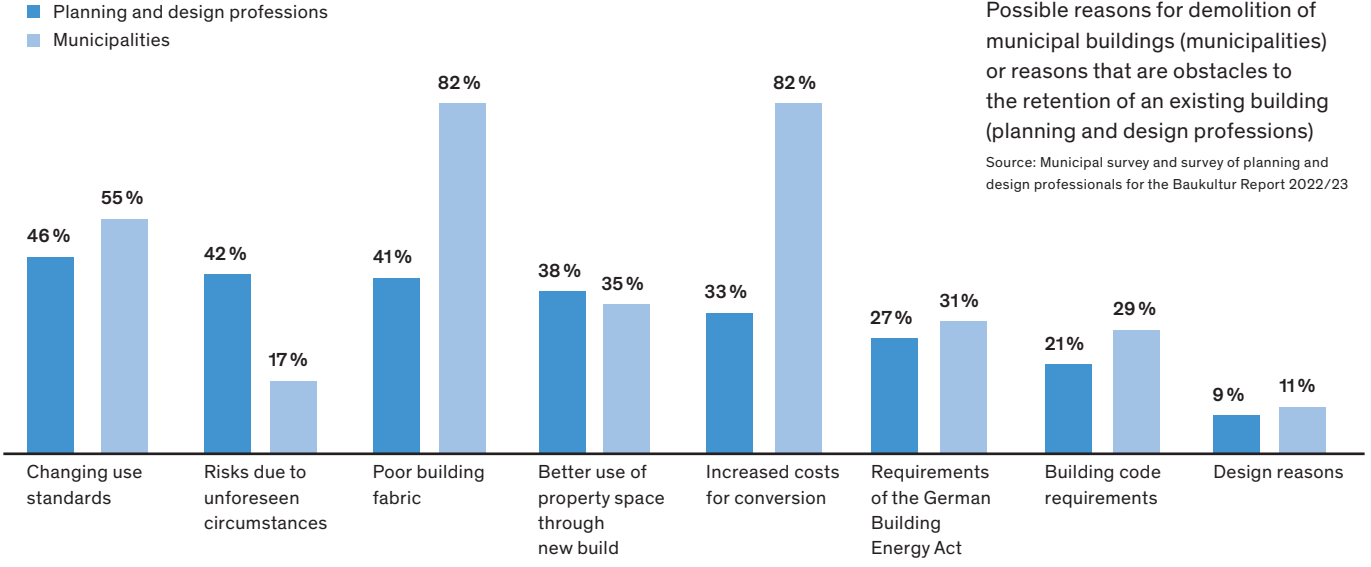
Source: Illustration by the Federal Foundation of Baukultur based on Penfield/Rasmussen



Reasons for demolition

Possible reasons for demolition of municipal buildings (municipalities) or reasons that are obstacles to the retention of an existing building (planning and design professions)

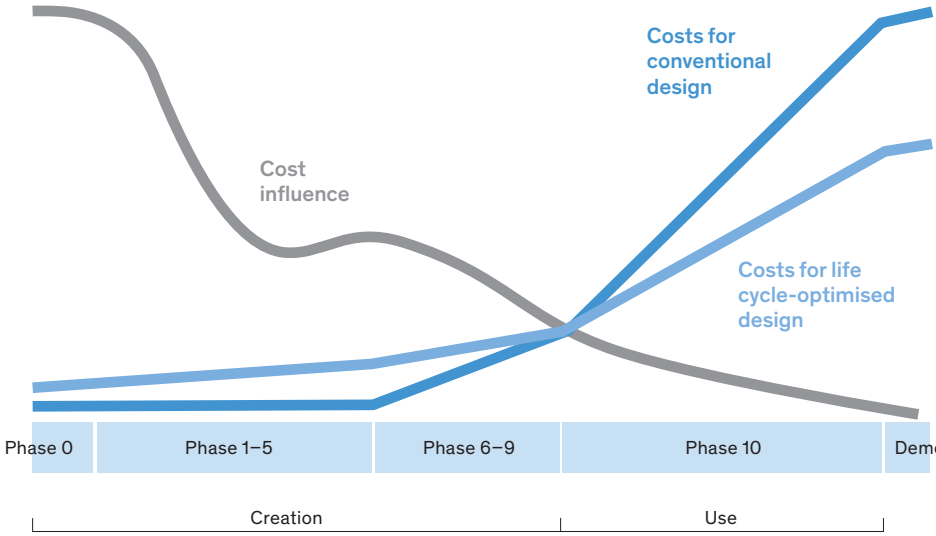
Source: Municipal survey and survey of planning and design professionals for the Baukultur Report 2022/23



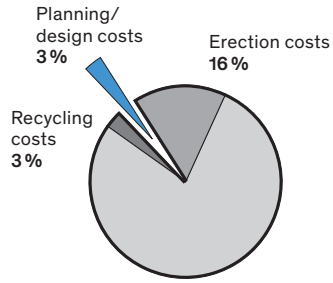
The design work is decisive!

The design work, especially during the early service phases, influences the total life cycle costs.

Sources: Federal Foundation of Baukultur based on Jones Lang LaSalle 2008; Rotermund Ingenieure 2022



3 % design costs influence …

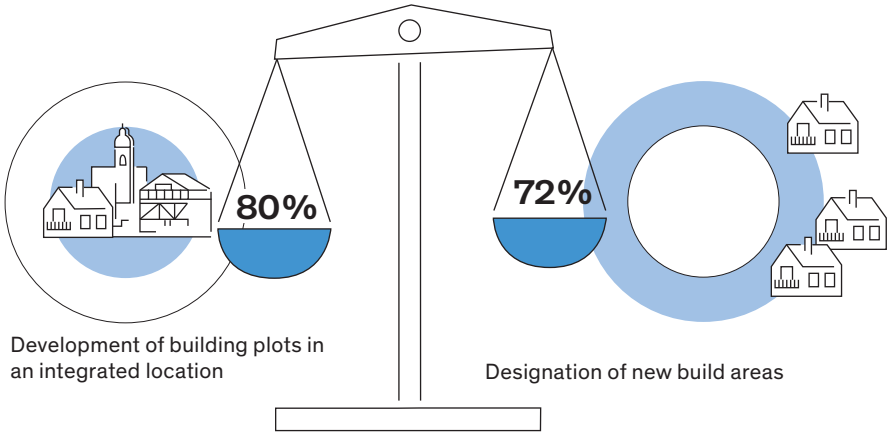


… the remaining life cycle costs.

No clear priority for brownfield development

Source: Municipal survey for the Baukultur Report 2022/23

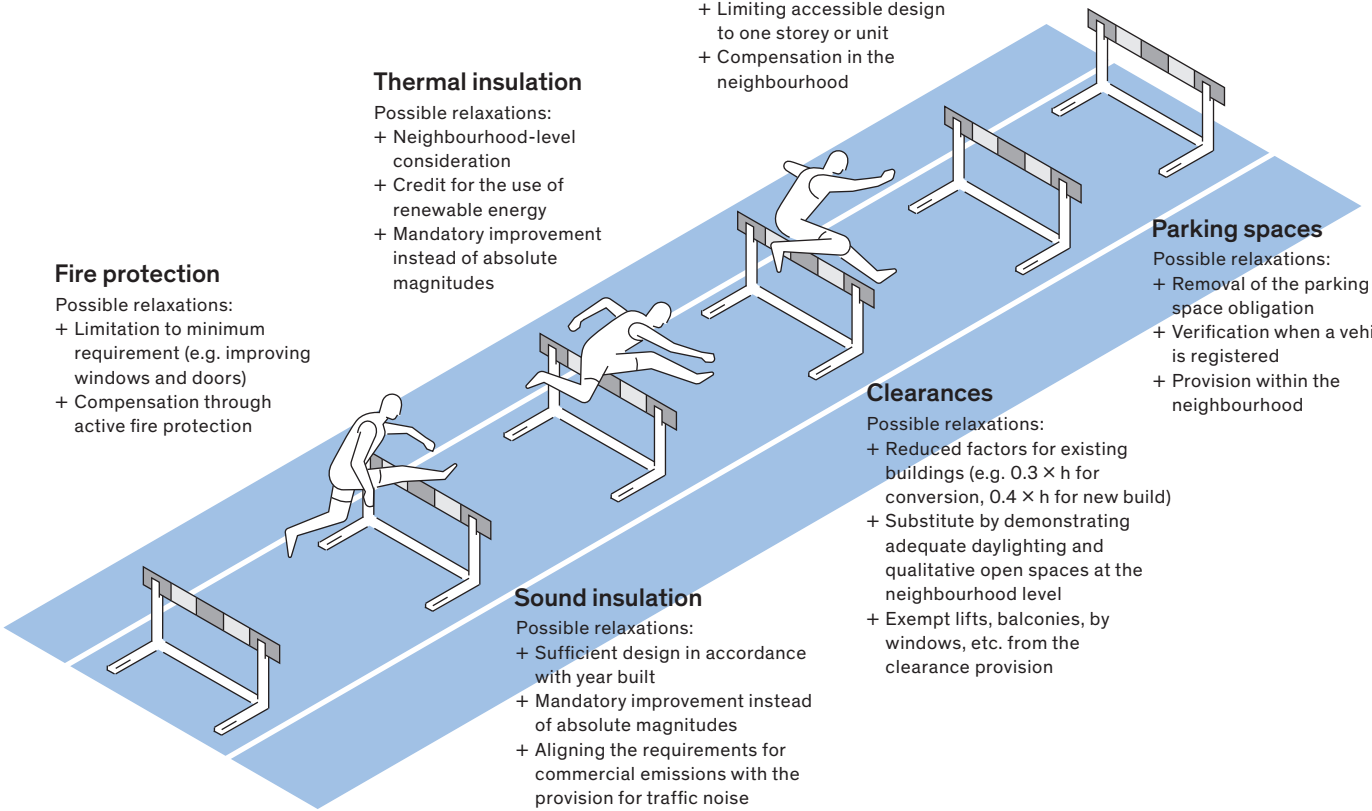
The municipalities surveyed stated their planning and building objectives as:



Big Six

Baukultur of Conversion hurdles

Source: Federal Foundation of Baukultur (BSBK)



Fire protection

Possible relaxations:

+ Limitation to minimum requirement (e.g. improving windows and doors)
+ Compensation through active fire protection

Thermal insulation

Possible relaxations:

+ Neighbourhood-level consideration
+ Credit for the use of renewable energy
+ Mandatory improvement instead of absolute magnitudes

Accessibility

Possible relaxations:

+ Limiting accessible design to one storey or unit
+ Compensation in the neighbourhood

Parking spaces

Possible relaxations:

+ Removal of the parking space obligation
+ Verification when a vehicle is registered
+ Provision within the neighbourhood

Clearances

Possible relaxations:

+ Reduced factors for existing buildings (e.g. 0.3 × h for conversion, 0.4 × h for new build)
+ Substitute by demonstrating adequate daylighting and qualitative open spaces at the neighbourhood level
+ Exempt lifts, balconies, by windows, etc. from the clearance provision

Sound insulation

Possible relaxations:

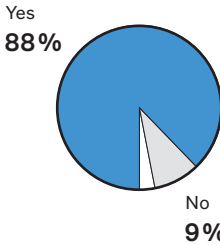
+ Sufficient design in accordance with year built
+ Mandatory improvement instead of absolute magnitudes
+ Aligning the requirements for commercial emissions with the provision for traffic noise

Retain buildings wherever possible!

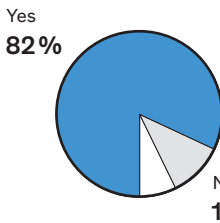
Opinions of the population on the demolition of buildings

Source: Population survey for the Baukultur Report 2022/23

Buildings should be assessed for their quality and conversion potential before being demolished!



Preference should be given to retaining a building rather than demolishing it!



Handling building fabric particularly worth protecting

Source: Municipal survey for the Baukultur Report 2022/23

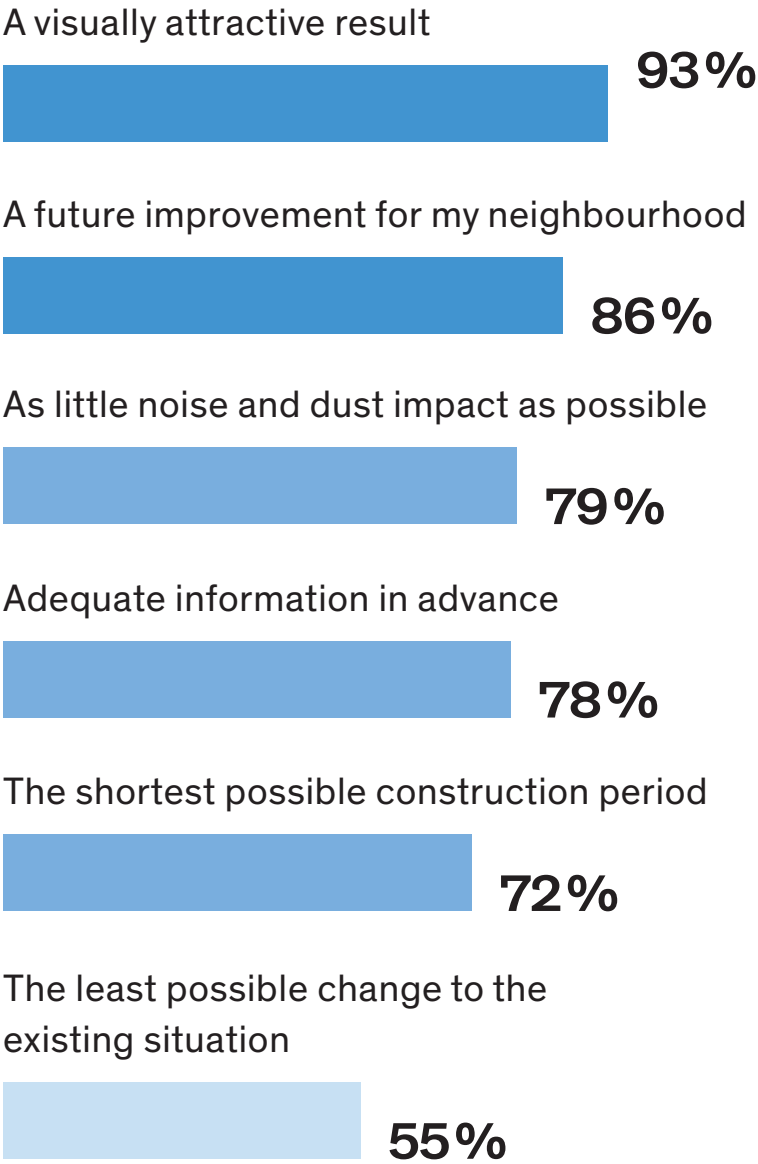
The term is not used in 52 % of the municipalities

Only 6 % of the municipalities have public and uniform evaluation criteria

For the people, a good result counts in building projects!

Source: Population survey for the Baukultur Report 2022/23

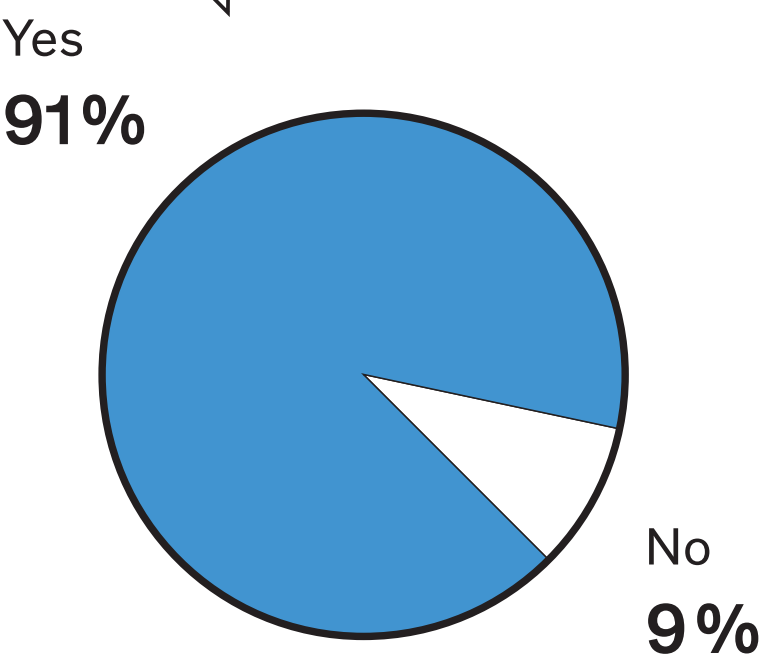
What would be important to you regarding a construction project in your vicinity?



Baukultur of conversion as part of skilled trade training

Source: Survey of the trades for the Baukultur Report 2022/23

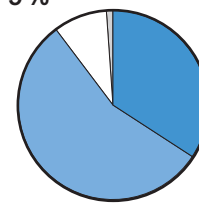
Should the topics of retention and conversion of buildings and good design be part of industry-wide training?



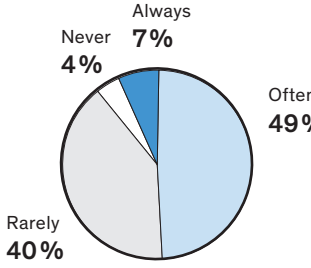
New build as the ultima ratio (last resort)?

Source: Survey of planning and design professionals for the Baukultur Report 2022/23

The planning and design professions find the call to only allow new build projects as the ultima ratio is…



Implementation of the standard in professional practice



Project stages Phase Zero and Phase Ten are the basis and potential of a project

Source: Federal Foundation of Baukultur, with reference to service phases 1-9 of the official fee scale for architects and engineers (HOAI)