DGNB Certification System

Barcelona
October 10, 2011

Contents

Philosophy and Principles

DGNB Certification System – Philosophy

USP – Unique Selling Point

- Second generation voluntary system
- Based on the entire life cycle of a building and used materials
- Performance instead of individual and specific measures
- Holistic and flexible approach
- Best practice means achievable goals
- Progressive values in the criteria (limit , reference and target values)
- Based on scientific and engineering principles

DGNB Certification System – Principles

- Assessment of LCA and LCC
- Promotion of building performance / quality
- Technical state-of-the-art technology
- Focus on user comfort and wellbeing
- Based on present and future EU directives
- Promotion of integrated design
- Documentation and verification as quality control measures
- Recommended by the German government

Neubau der Behörde für Stadtentwicklung und Umwelt
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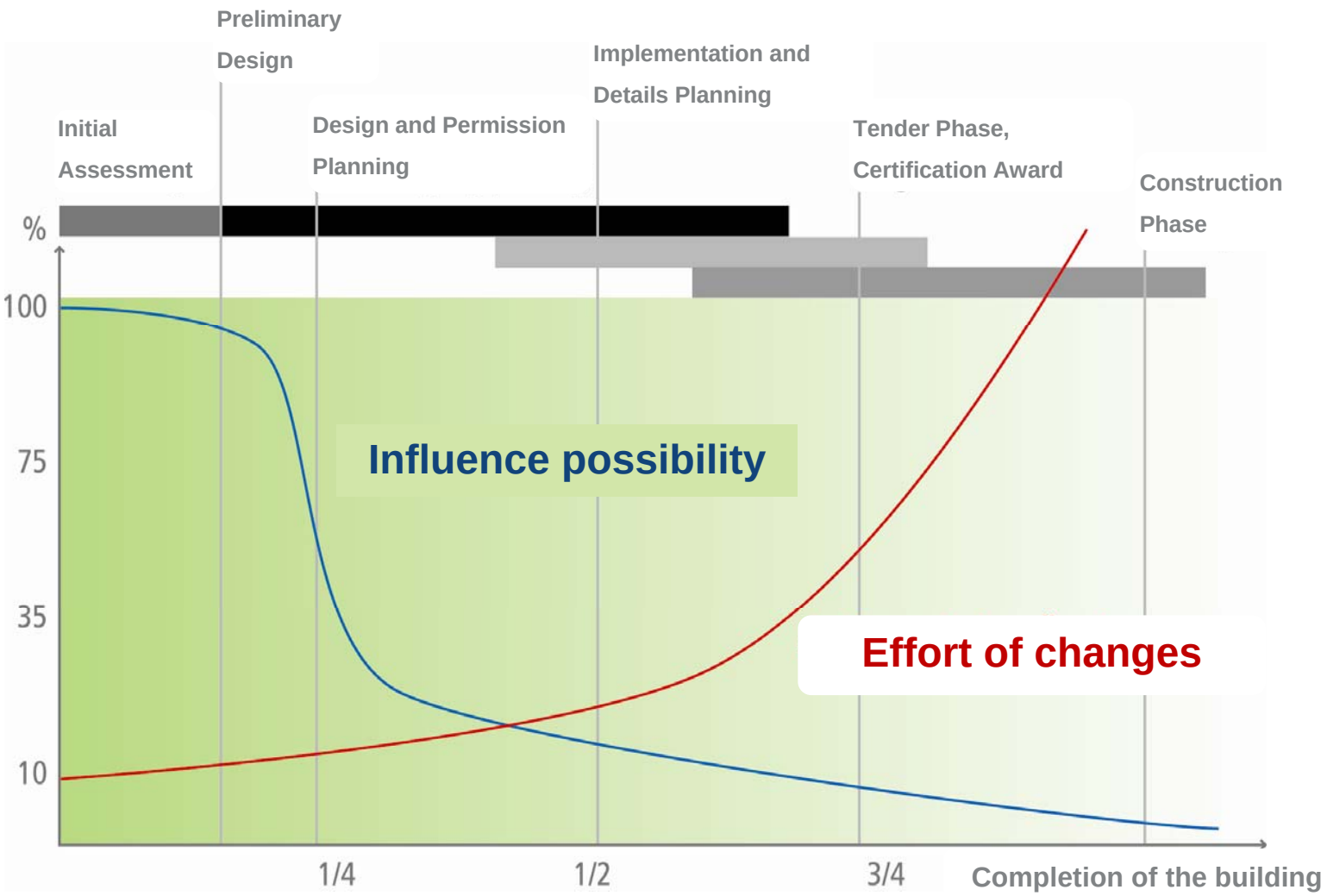
Setting the benchmark

- Integrated design
- Goal definition in the early stages of design
- State-of-the-art technology
- Intelligent concepts

Relevance of integrated design



Process and Assessment Methodology

Pathway to certification – Overview

Registration of the building with the DGNB

Goal definition for building performance
according to gold, silver or bronze

Pre-certification as marketing tool

Assessment during planning and construction phase
according to DGNB regulations

Evaluation of planning and construction documentation
by the DGNB (conformity assessment)

Award of the DGNB Certificate

Goal definition

- Target value: best practice
- Reference value: state of the art
- Limit value: legal regulations / ~ Construction standards

	NUMBER OF POINTS
TARGET VALUE	10
REFERENCE VALUE	5
LIMIT VALUE	1

ACHIEVABLE GOALS

Evaluation Process

Evaluation process
- What and how is evaluated in a criterion?

Achieved results
- e.g. calculation result such as 1,4 t/a or 300€/m²

Evaluation
- The result is evaluated with points

Weighting
- At criteria and main criteria groups level

Final result

In Gold, Silver or Bronze

Example of evaluation – Criterion 8 „wood“

- At least **50 %** of all timber, timber products, and /or timber materials are produced by sustainable forestry. This is verified by an **FSC certificate and a corresponding CoC certificate**
- Central European or local timber can also be verified by PEFC certification and a corresponding CoC certificate
- Quantification can be determined by a quantity estimate based on the component catalogue for the life cycle assessment (see criterion 01 and others) or for each trade based on the calls for tenders

Evaluation points	
1	Quality level 1
5	Quality level 2
10	Quality level 3

Example of documentation

SCIENTIFIC CERTIFICATION SYSTEMS

SCS does hereby certify that an independent assessment has been conducted on behalf of:

McKillican International, Inc. and also DBA
Certified Forest Products Inc.

16240 118 Avenue, Edmonton, AB, T5V 1C8 Canada
Sales & Distribution Center (Oregon) - 375 Dillard Gardens Road, Winston, OR 97496 USA
Sales & Distribution Center (Seattle WA) - 512 Boundary Blvd., Algona, WA 98001 USA
Sales & Distribution Center (Phoenix AZ) - 1401 East Hadley Street, Phoenix, AZ 85034 USA
Sales & Distribution Center (Hayward Calif) - 2388 Lincoln Avenue, Hayward, CA 94545 USA
Sales & Distribution Center (Austin TX) - 29 Cypress Blvd., Round Rock, TX 78665 USA

Scope of Certificate:

Distributor of hardwood plywood, panel and construction lumber and plywood products.

The facility(s) are hereby Chain of Custody certified to sell products as:

FSC Pure and FSC Mixed

The assessment has been conducted by Scientific Certification Systems (SCS) in accordance with the rules of the Forest Stewardship Council A.C. (FSC).
FSC Standard FSC-STD-40-004 V2-0, FSC-STD-40-003 V1

Certificate Code: SCS-COC-001034
Valid from 7 Jun, 2007 to 6 Jun, 2012

FSC
ACCREDITED
©1996 Forest Stewardship Council A.C.
FSC-ACC-003

SCS CERTIFIED
FOREST CONSERVATION PROGRAM

Certified by
SCS SCIENTIFIC CERTIFICATION SYSTEMS
Certification for a sustainable world

Robert J. Hrubes, Senior Vice President
SCS Forest Management Program
2200 Powell Street, Suite 725, Emeryville, CA 94608 USA

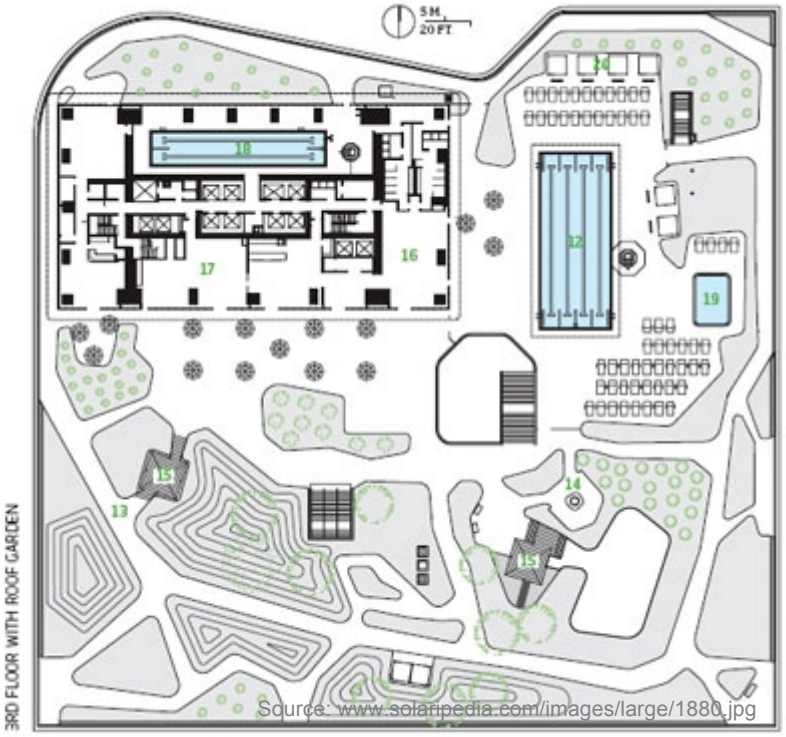
Source: www.panelsource.net/files/McKillican-Chain-Custody-Cert.jpg

Example of evaluation – Criterion 24 „outdoor quality“

Indicator	Checklist points
Questions are to be answered „yes“ or „no“	yes
Is there a design concept that factors in the integration of necessary technical structures? Technical Structures must be covered on all sides with a camouflage that fits in the overall design concept.	10
Are the plants used indigenous and appropriate for the location?	5
Is there maintenance contract for the plants?	5
Does (do) the surface(s) under evaluation face at least two directions?	5
Is (are) the outdoor area(s) used for socio-cultural purposes?	5
Does (do) the outdoor area(s) help improve the microclimate, for example with greening or light-colored, reflective surfaces?	5

Example of documentation

12 Pool
13 Track
14 Fire pit
15 Pavilion
16 Commons
17 Club
18 Indoor pool
19 Small pool
20 Cabana



Source: www.solaripedia.com/images/large/1880.jpg

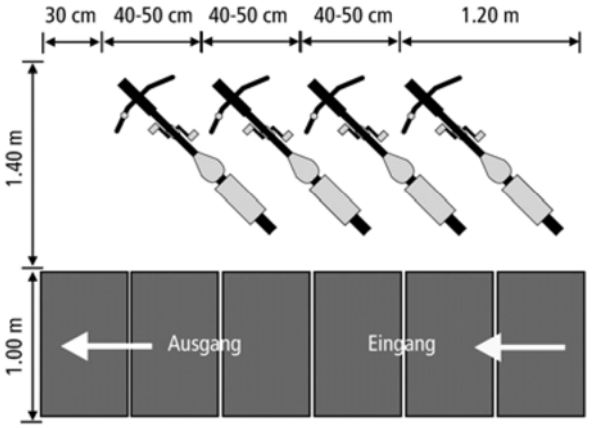

Source: www.hermanmiller.com/discover/wp-content/uploads/at21.jpg

Example of evaluation – Criterion 30 „Cycling convenience“

Service level depending on the buildings function:

	Train stations, bus terminals, airports	Bicycle repair facility
		Under surveillance
	Residential offices, federal agencies, schools	Protected from the weather
	Retail kindergartens	Protected against theft
		Bicycle parking racks

Configuration of bicycle parking spaces – space requirement:



Number of parking spaces:

Description	Checklist points
1 parking space / 80 m²	50
In compliance with state building code or 1 parking space / 140 m²	40
In compliance with state building code or 1 parking space / 200 m²	30
No state building code requirements and < 1 parking space / 200 m² and a statement is avaiable	10

Example of documentation

Source: www.panelsource.net/files/McKillican-Chain-Custody-Cert.jpg

Award of the DGNB Certificate

Gold	Silver	Bronze
>80%	65% - 80%	50% - 65%

Award of the DGNB Certificate

DGNB ZERTIFIKAT

Objekt	Objektbewertung	Nutzungsprofil
NORDEXFORUM Langenhorner Chaussee 600 24419 Hamburg	Auszeichnung: Gold Gesamterfüllungsgrad: 86,9 % Gesamtnote: 1,27	Neubau Büro- und Verwaltungsgebäude, Version 2008
Bauherr	**Architekt (Entwurf)**	**Auditor**
HOCHTIEF Construction AG NL Hamburg	Schenk&Waiblinger Architekten	Daniel Keppel HOCHTIEF Construction AG
	Aussteller	
	Prof. M. sc. econ. Manfred Hegger DGNB Präsident	Dr. Christine Lemaitre DGNB Geschäftsführerin

Role of the DGNB Auditor

Role of the DGNB Auditor

- **Pre-Assessment**
  - Initial assessment of a project with regard to the DGNB criteria
  - If required, joint workshop concerning the certification system with the client, design team and possibly future building users

- **Pre-Certification**
  - Definition of tasks and goals (declaration of intent) together with the client and the design team
  - Support during the planning process
  - Description of the consequences of the individual decisions
  - Compilation of documentation for the pre-certification to be submitted to the DGNB

Role of DGNB Auditor

- **Certification**
  - Coordination of compilation of the validation documents and plausibility check
  - Compilation of documentation for the certification to be submitted to the DGNB

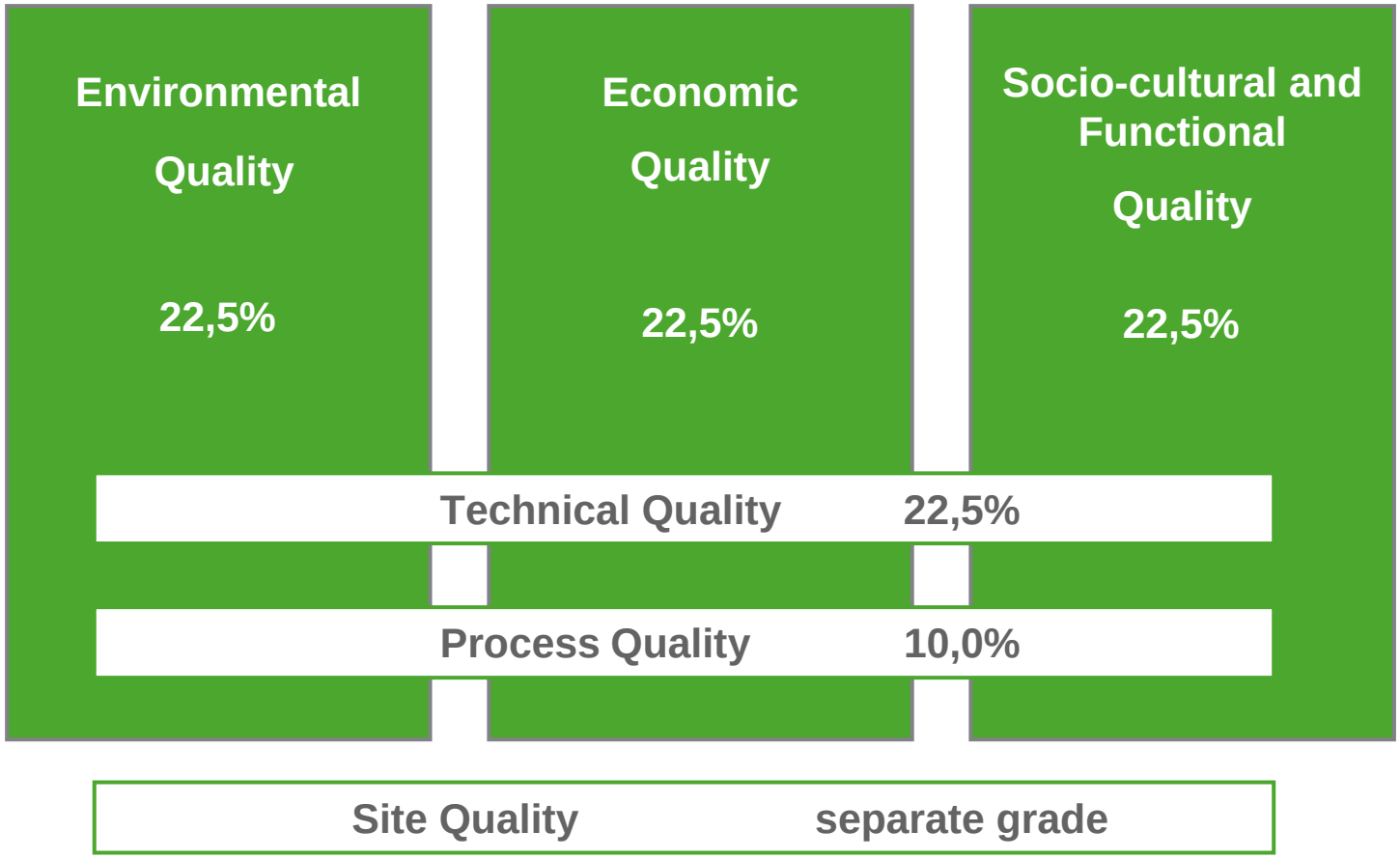
© Fotograf Dietmar Träupmann

Evaluation Areas and Criteria

Evaluation areas

- 61 criteria (48 active)
- Different weighting
- Documentation

Weighting of areas



Evaluation and award of the certificate

Gold	Silver	Bronze
>80%	65% - 80%	50% - 65%

Overview of the DGNB Criteria

Environmental Quality

1	Global warming potential (GWP) → *Climate change*
2	Ozone depletion potential (ODP) → *Hole in ozone layer*
3	Photochemical ozone creation potential (POCP) → *Summer smog*
4	Acidification potential (AP) → *Forest dieback*
5	Eutrophication potential (EP) → *Algae growth*
6	Local environmental impact
8	Sustainable use of resources / wood
10	Non-renewable primary energy demand
11	Total primary energy demand and proportion of renewable primary energy
14	Drinking water demand and waste water volume
15	Land use

Environmental Quality

1	**Global warming potential (GWP)**
2	**Ozone depletion potential (ODP)**
3	**Photochemical ozone creation potential (POCP)**
4	**Acidification potential (AP)**
5	**Eutrophication potential (EP)**
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LCA – Ecological Footprint of the physical building components in compliance with DIN EN ISO 14040 and 14044.

Incorporates all involved lifecycle stages:

- **Construction**
- **Operation** incl. supply & disposal, maintenance, repairs and replacements
- **End-of-Life** incl. recycling and disposal of all building materials

Environmental Quality

1	Global warming potential (GWP)
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The DGNB Certification System determines and evaluates **high-risk material** and substance groups.

- Halogens and halogen bonds
- Heavy metals
- Organic solvents
- Substances and products included in the **European Biocidal Products Directive**
- Substances and products listed in **REACH** as harming water, soil, and air or detrimentally affecting or generally endangering the environment

Environmental Quality

1	Global warming potential (GWP)
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Typical ecological criterias:

- Useage of sustainable wood
- Reduction of drinking water demand
- Reduction of land use

Economic Quality

16	**Building related life-cycle costs**
17	**Suitability for third-party use**

Building-related life-cycle costs are determined at **net present value** over a period of 50 years:

- Selected construction costs
- Selected occupancy costs
- Selected operation costs (supply and disposal, cleaning, operation, inspection and maintenance)
- Selected repair costs

Neue Deutsche Bank-Türme, © Deutsche Bank

Sociocultural and Functional Quality

18	Thermal comfort in the winter
19	Thermal comfort in the summer
20	Indoor air quality
21	Acoustic comfort
22	Visual comfort
23	User influence on building operation
24	Quality of outdoor spaces
25	Safety and security
26	Handicapped accessibility
27	Efficient use of floor area
28	Suitability for conversion
29	Public access
30	Cycling convenience
31	Design and urban planning quality trough competition
32	Integration of public art

Criteria groups:

18-25: Health, comfort, and user well-beeing

26-30: Functionality

31-32: Aesthetic quality

Sociocultural and Functional Quality

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Comfort criterias to evaluate the benefit of the building to the users.

Each criteria includes different indicators such as:

- Operating temperature
- Draughts
- Radiant temperature asymmetry
- Relative humidity

and:

- Availability of daylight in line of sight to the outside
- Lack of glare in daylight and artificial light
- Light distribution
- Color rendering

Example – Criterion 20 „Indoor air quality“

Indoor air concentrations for all of the tested rooms:

VOC [µg/m³]	FORMALDEHYDE [µg/m³]	CHECKLIST POINTS
≤ 500	≤ 60	50
≤ 1000	≤ 60	25
≤ 3000	≤ 120	10
> 3000	> 120	0

VOC: Volatile Organic Compounds

Sociocultural and Functional Quality

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Functional criteria addressing topics of efficiency and flexibiliy.

The suitability for conversion is analyzed on four levels:

- Modularity of the building
- Spatial structure
- Supply of electricity and other media
- Heating, supply and disposal of water

Technical Quality

33	Fire prevention
34	Noise protection, emission controls
35	Building envelope quality
40	Ease of cleaning and maintenance
42	Ease of dismantling and recycling

Technical Quality

33	Fire prevention
34	Noise protection, emission controls
35	**Building envelope quality**
40	Ease of cleaning and maintenance
42	Ease of dismantling and recycling

Requirements are based on the specification of the German Energy Conservation Ordnance, DIN 4108, and DIN EN 12207.

- Median thermal transmittance coefficients of building components
- Thermal bridge adjustment
- Air permeability class (window air-tightness)
- Amount of condensation within the structure
- Air exchange rate n_{50} and if necessary q_{50}

Process Quality

43	Comprehensive project definition
44	Integrated planning
45	Comprehensive building design
46	Sustainable aspects in tender phase
47	Documentation for facility management
48	Environmental impact of construction site / construction process
49	Prequalification of contractors
50	Construction quality assurance
51	Systematic commissioning

Criteria groups:

43-47: Quality of planning
48-51: Quality of construction

LVM 5 Kristall, © LVM Landwirtschaftlicher Versicherungsverein Münster a.G.

Process Quality

43	Comprehensive project definition
44	Integrated planning
45	Comprehensive building design
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47	Documentation for facility management
48	Environmental impact of construction site / construction process
49	Prequalification of contractors
50	**Construction quality assurance**
51	Systematic commissioning

This criterion is assessed by summing up the following two indicators:

- **Documentation** of materials, auxiliary materials, and safety data sheets
- **Measurements** for quality control (e.g. blower door test, thermography, footfall sound tests, indoor air quality measures)

Site Quality

56	Site location risks
57	Site location conditions
58	Public image and social conditions
59	Access to transportation
60	Access to specific-use facilities
61	Connections to utilities

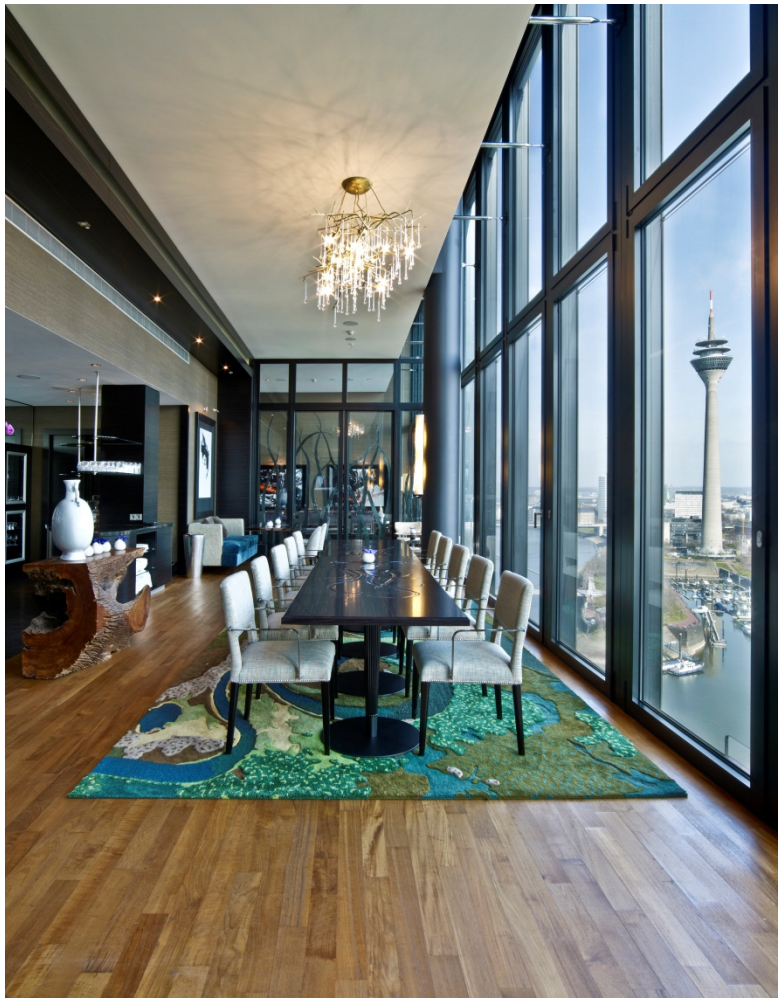
The criterias include topics such as:

- Avalanches, storm
- Outdoor air quality, outdoor noise
- Soil and building plot
- Upkeep and condition of the neighborhood
- Accessibility of public transport systems
- Existance of use-specific facilities

Country-specific adaptation

Country-specific adaptation

- Market driven demands for one system / more comparability
- Different regions require different solutions
  (climate, social, cultural, technical, legal, political, economical)



Hafenspitze (Hotel-Bauteil A) Düsseldorf, © Dejan Saric

Occupancy Profiles

Pilot phase

- New Office and Administrative Buildings (NOA2010)

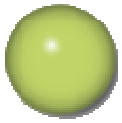
Development

- Residential
- Retail / malls
- Existing Office and Administrative Buildings
- Existing Residential
- Hotels
- …

Country-specific adaptation

Core System

- Comparability

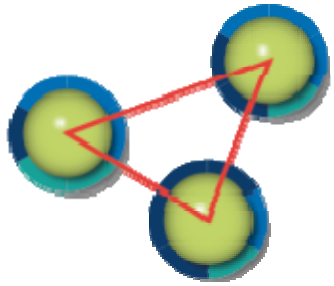


Regional requirements

- Adaptation to local conditions

Flexibility

- Possibility to adaptation to local standards and existing local state of knowledge
- Possibility to adaptation to the economic situation and construction standard

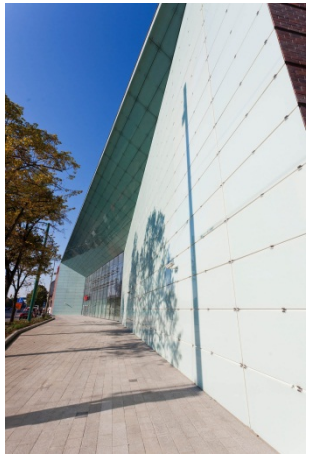


Adaptation

- Local partner
- Auditors

Árkád Szeged Shopping Center

NAME	Árkád Szeged Shoppingcenter
LOCATION	Szeged, Hungary
FUNCTION	Shopping Center
GROSS FLOOR AREA	105.000 m²
STATUS	Under construction, opening Oct. 4, 2011
DEVELOPER	ECE Projectmanagement Budapest Kft.
DESIGNER	Zsolt Gunther, 3h építész iroda



Occupancy Profiles

Pilot phase

- New Office and Administrative Buildings (NOA2010)

Development

- Residential
- Retail / malls
- Existing Office and Administrative Buildings
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Benefits of certification

Benefits of DGNB Pre-Certification / Certification

- Higher building performance / quality
- More transparency in planning and construction phase
- Powerful marketing tool
- Improved risk management
- Sustainable planning security
- Higher rents and sale prices
- Better value stability
- Decreased risk of vacancy
- Sustainable real estate portfolio

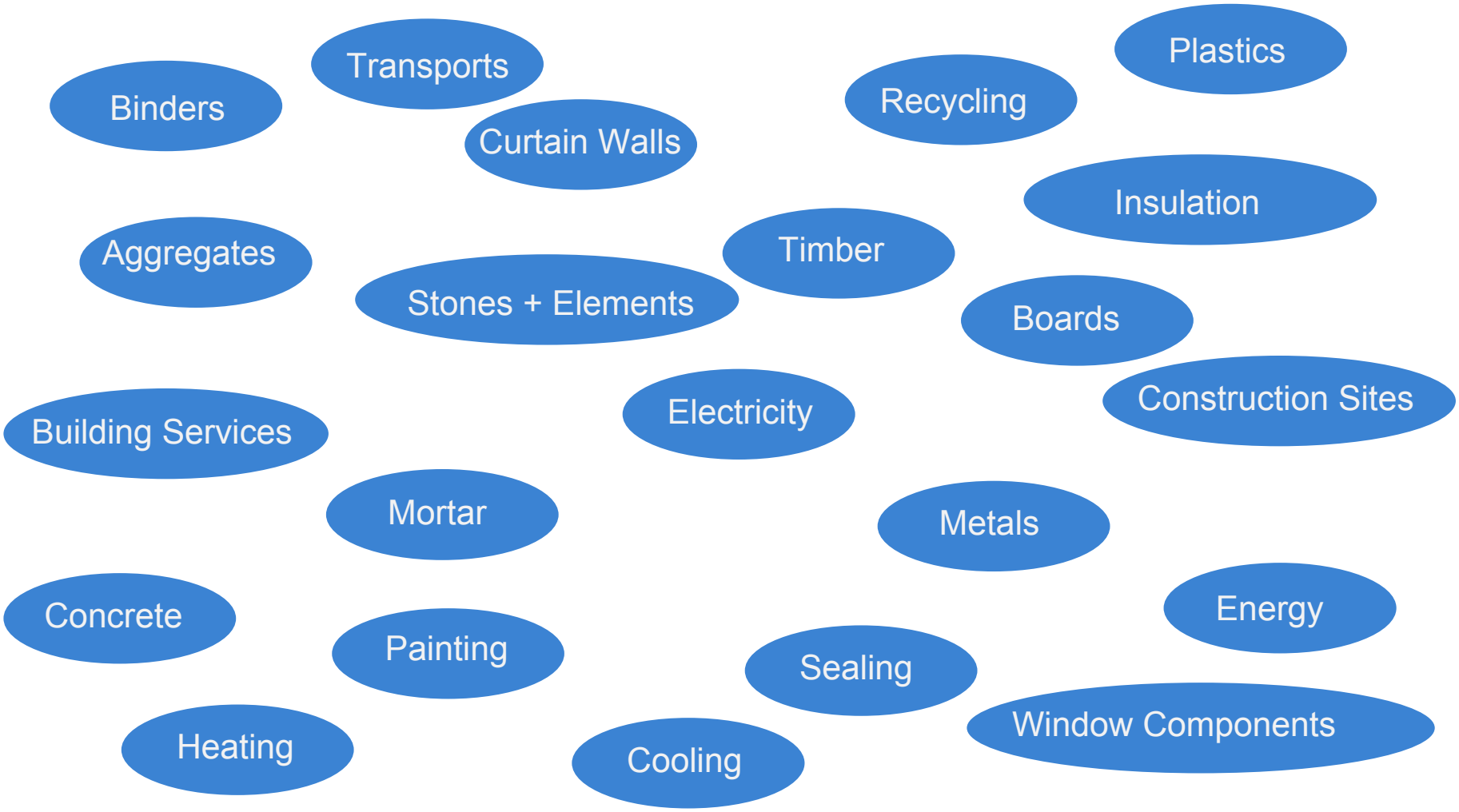
Z-Zwo Bürogebäude Stuttgart-Möhringen

ESUCO Database

ESUCO - **E**uropean **SU**stainable **CO**nstruction database

- Roots in the German Ökobau-Database based on EPD (prEN 15804)
- Part of the DGNB International System
- Contains environmental data on over 500 construction materials (i.e. concrete, timber, plastics, metals, binders, stones etc.)
- Contains **country specific data** on the use stage of buildings as **heating, cooling, electricity and services** such as elevators in buildings etc.
- Production technology of core materials is based on European average industry data
- All data on resources, energy and preliminary products are adapted to European average conditions

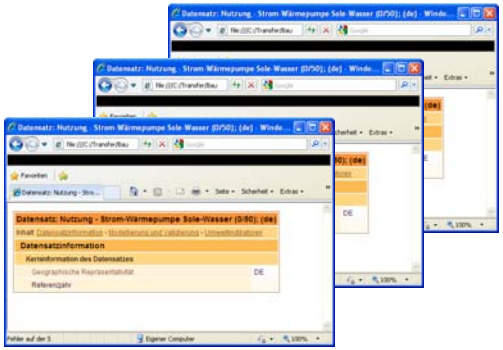
ESUCO LCA database



ESUCO LCA database

The database is provided by the DGNB on a web server

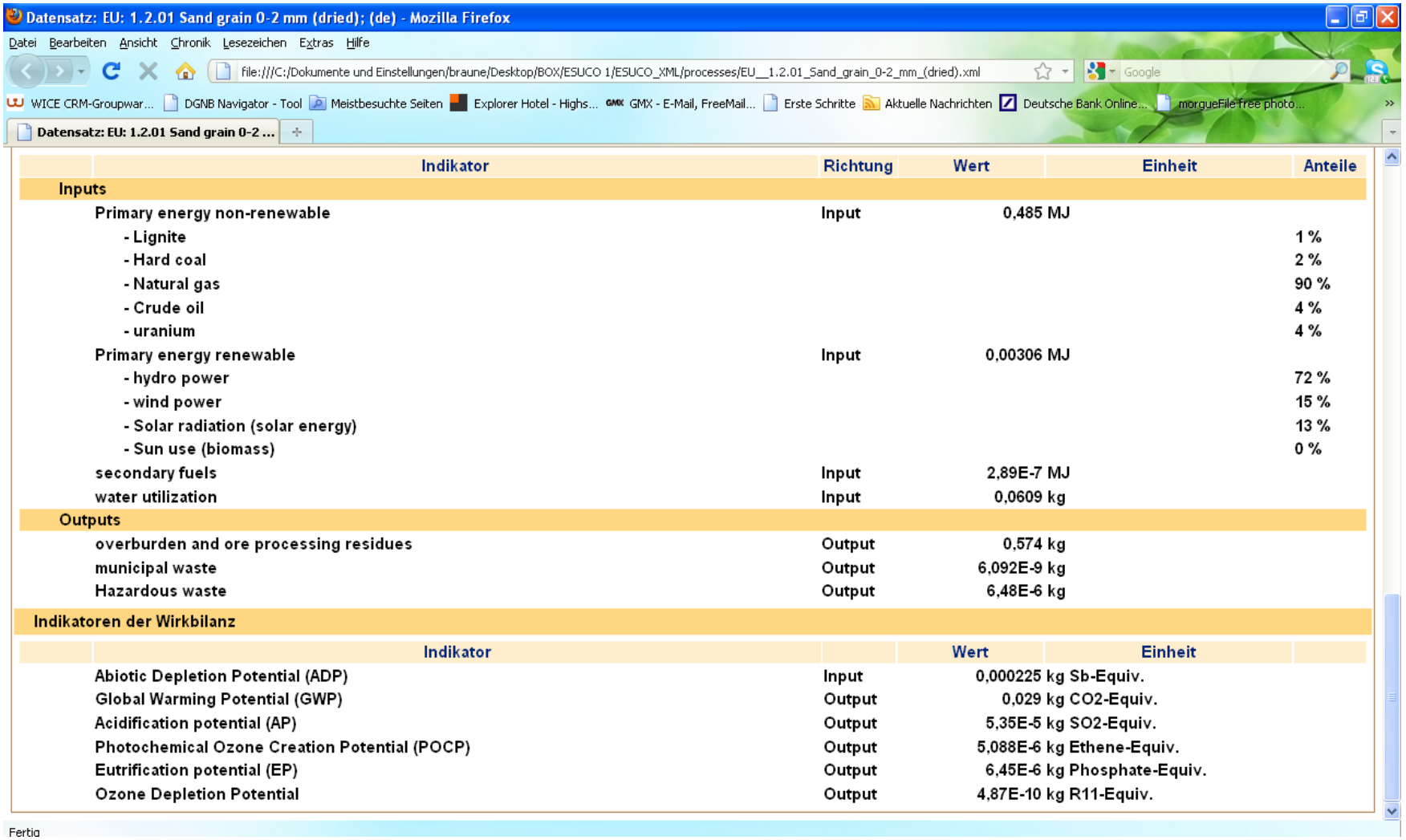
Auditors have free access to the database



The datasets in .xml format can be viewed in every web-browser and contain information about:

- Documentation
- Modeling and validation
- Environmental indicators

ESUCO LCA database



Indikator	Richtung	Wert	Einheit	Anteile
Inputs				
Primary energy non-renewable	Input	0,485	MJ	
- Lignite				1 %
- Hard coal				2 %
- Natural gas				90 %
- Crude oil				4 %
- uranium				4 %
Primary energy renewable	Input	0,00306	MJ	
- hydro power				72 %
- wind power				15 %
- Solar radiation (solar energy)				13 %
- Sun use (biomass)				0 %
secondary fuels	Input	2,89E-7	MJ	
water utilization	Input	0,0609	kg	
Outputs				
overburden and ore processing residues	Output	0,574	kg	
municipal waste	Output	6,092E-9	kg	
Hazardous waste	Output	6,48E-6	kg	

Indikatoren der Wirkbilanz

Indikator		Wert	Einheit
Abiotic Depletion Potential (ADP)	Input	0,000225	kg Sb-Equiv.
Global Warming Potential (GWP)	Output	0,029	kg CO2-Equiv.
Acidification potential (AP)	Output	5,35E-5	kg SO2-Equiv.
Photochemical Ozone Creation Potential (POCP)	Output	5,088E-6	kg Ethene-Equiv.
Eutrification potential (EP)	Output	6,45E-6	kg Phosphate-Equiv.
Ozone Depletion Potential	Output	4,87E-10	kg R11-Equiv.

ESUCO LCA database

Name	Größe	Typ	Geänd
EU__1.1.02_Lime_hydrate_(Ca_(OH)2)	20 KB	XML-Dokument	04.05.2
EU__1.1.3_Anhydrite_Mix_(CaSO4)	19 KB	XML-Dokument	04.05.2
EU__1.1.03_Anhydrite_Mix_(thermal)			
EU__1.1.03_Gypsum_(CaSO4-alpha-hemi...			
EU__1.1.03_Gypsum_dihydrate			
EU__1.1.04_Adobe			
EU__1.1.04_Clay_powder			
EU__1.2.01_Gravel_grain_2-32_mm_(dried)			
EU__1.2.01_Sand_grain_0-2_mm			
EU__1.2.01_Sand_grain_0-2_mm_(dried)			
EU__1.2.02_Crushed_sand_grain_0-2_mm			
EU__1.2.02_Crushed_sand_grain_0-2_m...			
EU__1.2.02_Rubble_grain_16-32_mm			
EU__1.2.02_Rubble_grain_16-32_mm_(dri...			
EU__1.2.02_Stone_chips_grain_2-15_mm			
EU__1.2.02_Stone_chips_grain_2-15_mm...			
EU__1.2.03_Lava_gravel			
EU__1.2.03_Pumice_sand			
EU__1.2.03_Washing_pumice			
EU__1.2.05_Expanded_slate			
EU__1.2.06_Expanded_glass			
EU__1.2.08_Hard_coal_fly_ash			
EU__1.2.08_Melting_chamber_granulate			
EU__1.3.05_Concrete_bricks	18 KB	XML-Dokument	04.05.2
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EU__1.3.05_Concrete_pipe,_reinforced	19 KB	XML-Dokument	04.05.2
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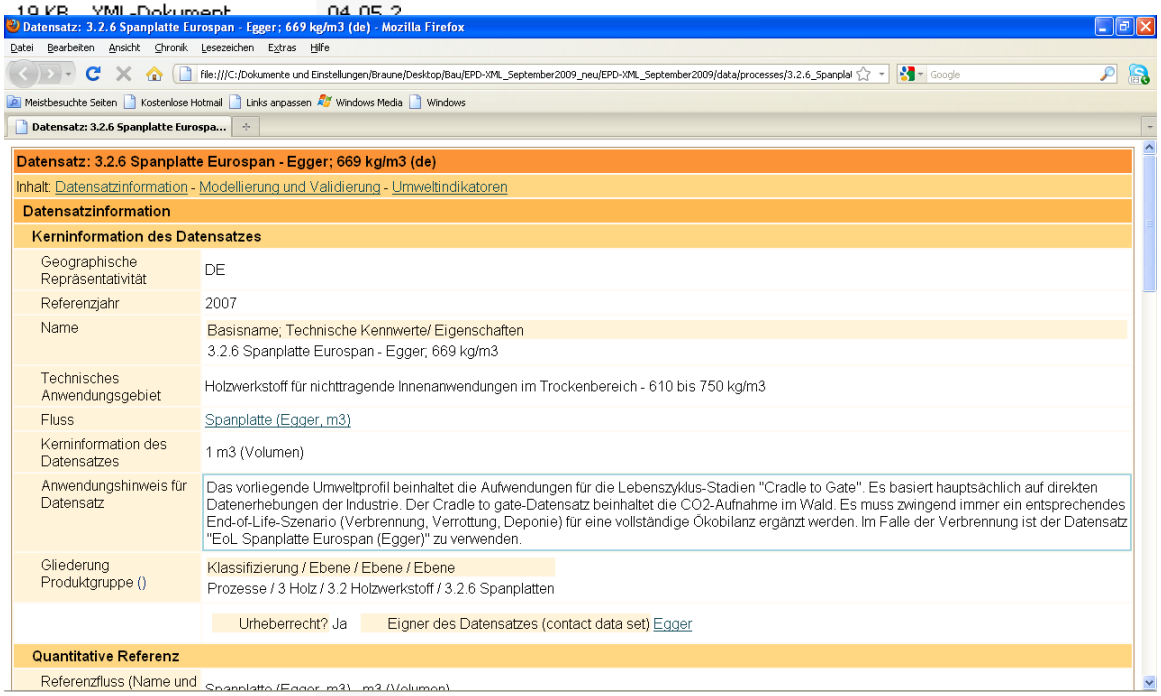

ESUCO LCA database

Why do we need country-specific data?

- The **production** of construction materials differs from country to country
- In different countries different **materials** are used for building construction.
- The **technology** of material production differs from country to country
- The regional **energy** demand on heating and cooling cannot be compared
- The country specific electricity and the fuels have different impacts on the **environment**

Conclusion

Conclusion on the DGNB Certification System

- Benefits of integrated design
- More than „GREEN“
- Flexibility
- Made in Germany

Win-Win Situation

- Reduced life-cycle costs
- Pay off in the long term: resource, energy and emission savings
- User satisfation: more comfort, healthier environment
- Competitive, public image advantages

Rhein-Galerie Ludwisghafen 2

Neubau Zentralgebäude Leuphana Universität Lüneburg
Rendering von screen ID digital, Entwurf Universität Lüneburg Prof. Daniel Libeskind

THANK YOU.

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Michael Dax
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