

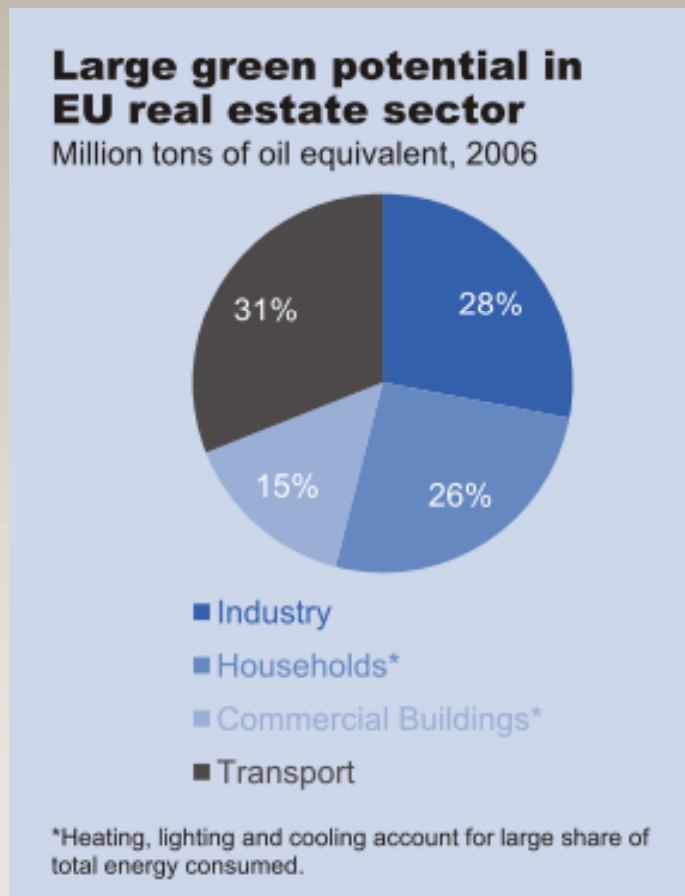
# Renewable Energies and Energy Efficiency

## Green buildings on the Rise - Some legal aspects

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## Building-related Efficiency Potential



Buildings are responsible in the EU for

- 41 % of the final energy consumption, and
- 35 % of all greenhouse gas emissions

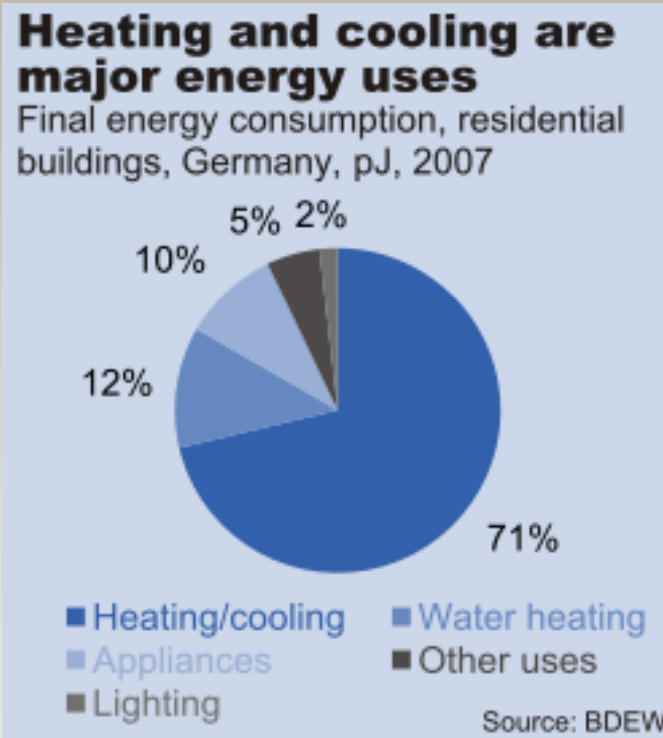
Source: Deutsche Energie-Agentur

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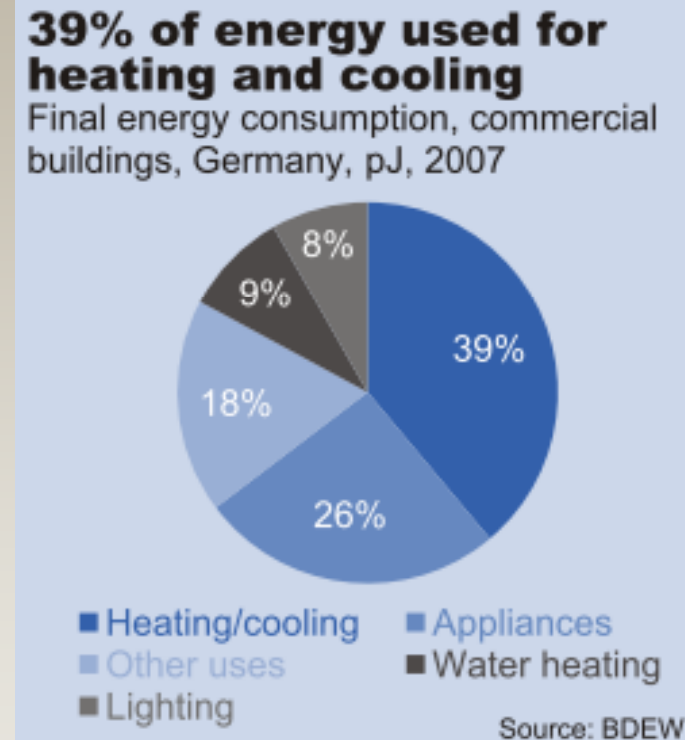
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# Energy consumption in residential and commercial buildings



BDEW Bundesverband der Energie- und Wasserwirtschaft e.V.



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## Features of Green Buildings

- Efficient use of natural resources
- Waste minimization
- Ecologically sensitive construction materials
- Consideration of local climate conditions
- Less energy to transport construction materials
- Limitation of impact on surroundings (e.g. emissions)
- Good infrastructure
- Consideration of health aspects
- Efficient building management and commissioning
- Social capacity and comfort for users
- Convenient indoor environment
- Optimization of life cycle costs

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## EU EPBD Directive 2002 (2002/91/EC)

### Key Perspectives:

- Unified methodology for calculation of the integrated energy performance of buildings
- Application of energy performance minimum requirements of new buildings / existing buildings subject to major renovation
- Energy certificates for new and existing buildings, must be less than five years old
- Regular inspection of boilers and A/C systems
- Assessment of heating installations older than 15 years

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## EPBD 2002 (continued)

- Came into force in 2003, implementation deadline until 2006
- As of 2009, only 5 countries had fully implemented the Directive (CZ, DK, DE, NL, SK)
- 12 countries had implemented most of the directive
- BG, FR, LV, LT, MT, PL and SL having deficits with at least one requirement
- CY, GR and HU still struggling with most of the elements of the EPBD

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## EPBD 2010

- On May 18, 2010, the EP passed the new Energy Performance of Buildings Directive (recast). The EPBD 2010 will be published in the EU Bulletin in a few weeks and will enter into force thereafter.
- Implementation deadline: until 2010
- The recast shall significantly contribute to reaching the energy and climate protection goals of the EU.

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## Key Characteristics of EPBD 2010

- More visibility of energy performance certificates (display obligations)
- Recommendations to be included in the energy performance certificate shall cover:
  - measures carried out in connection with a major renovation of the building envelope or technical building system(s); and
  - measures for individual building elements independent of a major renovation of the building envelope or technical building system(s).
- Independent control systems for energy performance certificates to be established by the Member States
- Qualified and/or accredited experts to issue energy performance certificates, inspect buildings
- From 2021, all new buildings to be constructed as „nearly zero energy buildings“. This standard is applicable to administrative buildings from 2019
- Renovation requirements for all buildings / building parts (previously: min. 1,000 sqm)

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## “ Nearly Zero-Energy Building ”

means a building that has a very high energy performance. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby (EPBD 2010 Sec. 2 No. 2 in connection with Annex I)

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## “ Energy Performance of a Building”

means the calculated or measured amount of energy needed to meet the energy demand associated with a typical use of the building, which includes inter alia energy used for heating, cooling, ventilation, hot water and lighting (EPBD 2010 Sec. 2 No. 4)

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## „Energy from Renewable Sources“

means energy from renewable non-fossil sources, namely wind, solar, aero-thermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases (EPBD 2010 Sec. 2 No. 6)

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## Certification Systems

- Different approaches – Regulation vs. Certification
- Countries with higher regulatory standards (e.g. Germany) introduced certification systems only lately
- Countries with lower regulatory standards (US, UK, France) introduced certification systems in the 1990ies

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## Certification systems vary in their complexity

	LEED	BREEAM	DGNB	HQE	SBTool
Origin	USA	UK	Germany	France	Canada
Name	Leadership in Energy and Environmental Design	Building Research Establishment Environmental Assessment Method	German Sustainable Building Certificate	Haute Qualité Environnementale	Sustainable Building Tool
Established	1998	1990	2009	1996	2002
Responsible	U.S. Green Building Council	BRE	Ministry of Housing	Association pour la HQE	iiSBE
<b>Criteria</b>					
<b>Energy</b>					
Low emissions		+	+		+
Renewable energy	+		+	+	+
Efficiency	+	+	+	+	
Electrical demand	+	+	+	+	+
Low carbon		+	+		+
Refrigerant management	+	+		+	
<b>Water</b>					
Re-use/Recycling		+	+	+	+
Water consumption	+	+	+	+	
<b>Site/Location</b>					
Public transportation	+	+	(+)	+	+
Site selection	+	+	(+)	+	+
Grace/Elegance				+	
Cyclist facilities	+	+	+		
<b>Indoor environment</b>					
Air quality	+	+		+	+
Daylighting	+	+		+	+
Acoustics		+	+	+	+
Thermal	+	+	+	+	+
Smell				+	
Hygiene			+	+	

	LEED	BREEAM	DGNB	HQE	SBTool
<b>Materials</b>					
Materials reuse	+	+		+	+
Waste management	+	+	+	+	
Robustness		+	+		
<b>Process and management</b>					
Planning			+		+
Construction phase		+	+		
Commissioning		+	+	+	+
<b>Economical issues</b>					
Costs			+		+
Life cycle consideration			+		
Value stability			+		
<b>Functionality/Comfort</b>					
Flexibility/Adaptability				+	+
Access disabled persons			+		
Safety and security		+	+		+
<b>Innovation</b>					
Innovation issues considered	+	+			
<b>Minimum requirements</b>					
Yes	+	+			
<b>Grades</b>	LEED Certified LEED Silver LEED Gold LEED Platinum	Pass Good Very Good Excellent Outstanding	Gold Silver Bronze	Basic Level High Level Very High level	Minimum Good Practice Best Practice

Based on information from the websites of the respective certification systems (September 2009)

Source: DB Research

## Life Cycle Amortization

- Benefits of green buildings larger than costs over the life cycle
- Costs for obtaining LEED certificates in silver or platinum cost 2 % / 6.5 % respectively.
- Average energy savings of 30 % for such buildings, because of lower maintenance costs and less water consumption
- The net present value of savings over 20 years (NPV at 5 % discount rate) is over 3 times larger than the initial cost premium of avg. 2 % !
- If energy prices rise further, the break even point will be reached earlier

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## Permission Requirements in European Union

Reference to a very informative page that describes for:

- 12 Member states in the EU
- Only for PV (residential, commercial, open land installations)
- Every necessary step in detail (with estimated time necessary to accomplish)

<http://www.pvlegal.eu/database>

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# Wind Energy and Monument Protection

- General Rule: Wind energy projects are allowed in outskirts areas.
- Exception: The windmill is not allowed if it is in conflict with public interest. Monument Protection is a typical public interest
- Development in court decisions: From „everything goes“ to „nothing goes anymore“
- Conclusion: It is hard or even impossible to find new windmill sites in Germany

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## Windmills - Recent Court Decisions

- VG Sachsen-Anhalt, Urteil vom 16. Juni 2005 – 2 L 533/02 (VG Dessau)
  - For windmills there exists a principle of „best possible protection“ for the environment
  - Especially for Monument Protection: The protection principle is affected not only if the windmill „ruins“ the appearance of a monument. It is sufficient that the windmill interferes with the effective range of the monument.
- VG Sigmaringen, Urteil vom 15.10.2009 – 6 K 3202/08
  - It depends especially on the question up to what amount the monument is in a „relationship with the landscape surrounding the monument“ .
  - The assessment has to be done by the view of an average observer, inclined to the concerns of monument protection

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# Photovoltaics and Monument Protection

- Monument Protection e.g. in Bavaria
- Permission of Monument Protection Authority is required
- Authority's decision has to balance monument protection against PV-benefits
- Example of successful project in Hessen - PV panels on roof of listed building from 1660



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# Geothermal Energy

- Especially interesting because geothermal energy contributes to base load energy supply (not dependent from existence of wind or sun) Possibility to combine the use of heat and power  
Example: Geothermiekraftwerk Unterhaching near Munich: 3,6 MW electric power, 44 MW long-distance heating
- Domestic Installations (only one parcel of land, only for one green building erected, drilling less than 100 m)
  - ∅ No mining law permission required
  - ∅ but eventually a permission by the law pertaining water, if groundwater may be touched (by drilling through groundwater, or by using agents that could endanger the groundwater)
- Geothermal Installations (hydrothermal, petrothermal, hydrogeothermal)
  - ∅ Need for a concession. The concession can only be refused if public interests mandatorily conflict with the use of geothermal energy.  
e.g. in protected landscape, fauna-flora habitats
  - ∅ Need for approval of the operating plan for the site

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## Target Countries (continued)

- Africa

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Titus Petronius (14 – 66 n.Chr.)