

# RIEEB – Regional Impact with Energy Efficient Buildings

## Introducing the EPBD Results of RIEEB

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LANDESAMT FÜR UMWELT,  
LANDWIRTSCHAFT  
UND GEOLOGIE



Freistaat  
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## The European Performance of Buildings Directive (EPBD)

*This Directive promotes the improvement of the energy performance of buildings within the Union, taking into account outdoor climatic and local conditions, as well as indoor climate requirements and cost-effectiveness.* Source: EPBD 2010/31/EU, Article 1, Number 1

- Sets the general conditions and requirements regarding the energy efficiency of buildings and their installation systems on the European level
- The first version (2002/91/EG) was issued on 04. January 2003
- The revised version (2010/31/EU) became effective on 8. July 2010

## The European Performance of Buildings Directive (EPBD)

The EPBD regards to:

- General framework to calculating the energy performance of buildings
- Minimal requirements for new buildings
- Minimal requirements for existing buildings
- National plans for increasing the number of nearly zero buildings
- Energy Performance Certificates
- Inspection of heating and air conditioning units
- Independent control system for Energy Performance Certificates

# The European Performance of Buildings Directive (EPBD)

## Revisions in the EPBD:

- The definitions are summarised and completed
- Minimum requirements are more detailed
- Alternative energy sources must be considered in all buildings
- Minimum requirements by renovation apply to all buildings
- New introduction of requirements for technical installations
- Introduction of nearly zero houses

## The European Performance of Buildings Directive (EPBD)

### Revisions in the EPBD:

- Obligation to present the Energy Performance Certificates
- Energy certificates must be shown during letting and selling of real estate
- Obligation to inspection of heating and air conditioning systems
- Lists for Energy Performance Certificate issuers and examiners of technical systems must be available to the public
- Introduction of an independent control and information system for Energy Performance Certificates and inspections

## Germany

The EPBD was reflected in the following Laws and Ordinances:

### -Energy Saving Act (EnEG)

-First issued in 1976 to reduce consumption of energy

Source: Wege zum Effizienzhaus-Plus, BMVBS

-Concentration on limitation of heat transfer and ventilation heat losses

### -Renewable Energies Heat Act (EEWärmeG)

-A certain proportion of the produced heat should come from renewable energies

-Applies to new residential and non-residential buildings, as well as redeveloped public buildings

-Valid since 1. January 2009

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Anforderung EEWärmeG		
Erfüllung EEWärmeG zu 100 % durch		Mindestanteil
Erneuerbare Energien	Solare Strahlungsenergie	15 %
	Feste Biomasse	50 %
	Flüssige Biomasse	50 %
	Gasförmige Biomasse in KWK	30 %
	Geothermie und Umweltwärme	50 %
Ersatzmaßnahme	Anlagen zur Nutzung von Abwärme	50 %
	KWK-Anlagen	50 %
	Maßnahmen zur Einsparung von Energie	~ 15 %
Nah- oder Fernwärme mit oben stehenden Anteilen an erneuerbarer Energie bzw. Ersatzmaßnahmen		



## Germany

The EPBD was reflected in the following Laws and Ordinances:

- Renewable Energy Act (EEG)

- Regulates the preferred supply of electricity from renewable energy and guarantees the suppliers a fixed compensation

- First version issued on 1. April 2000

- Energy Saving Ordinance (EnEV)

- The most important ordinance for buildings

# Germany

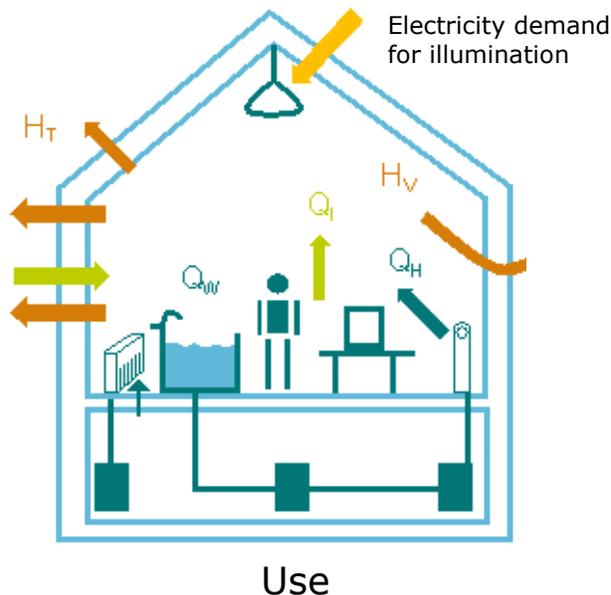
## The EnEV

- First issued on 1. April 2002 to implement the EPBD into German law
- Revised three times, fourth revision should come out in 2013
- Every revision strengthens the requirements for energy efficiency of the buildings (last revision by ca. 30%)
- Valid for new and redeveloped buildings
- Introduced the Energy Performance Certificates
- Currently valid version: EnEV 2009

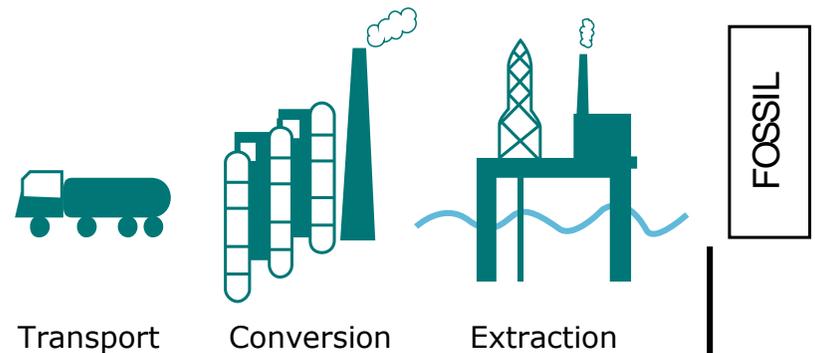
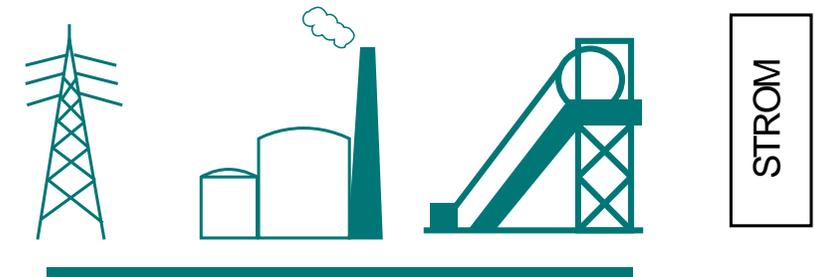
# Germany

## General conditions of the ENEV 2009

1. Primary energy demand  
Measurement for the CO<sub>2</sub> balance of the building including the production
2. Specific heat transfer coefficient  
Measurement for the energetic quality of the building envelope
3. Protection against summer overheating  
Measurement for the use quality in summer



End energy ←



Primary energy ←

# EnEV - Calculation method according to DIN 18599

Reference building

Planned building

$H_T; \text{ref.}$

$H_T; \text{real}$

Reference-Ventilation

$f_{p, \text{RLT}, \text{real}}$

Reference-Heating

$f_{p, \text{Heizung}, \text{real}}$

Reference-Illumination

$f_{p, \text{Beleucht.}; \text{real}}$

Reference-Domestic hot water

$f_{p, \text{WW}; \text{real}}$

## Use specific:

Room temperature  
Air exchange  
Heat load  
Use time  
Hot water demand

$$Q_{p, \text{ref}} = Q_{p, \text{max}}$$

$$Q_{p, \text{real}} < Q_{p, \text{max}}$$

$$H_T < \text{EnEV}_{\text{vorg.}}$$

Solar load < DIN 4108

## France

The EPBD was reflected in the following Laws and Ordinances:

-The Grenelle: Act 1

-Adopted during the Grenelle Forum on 21. October 2008

-Reduction of energy consumption and introduction of positive energy

-The Grenelle: Act 2

-Adopted on 15. October 2009

-The legal tool to implementing the targets set in Act 1

## France

The EPBD was reflected in the following Laws and Ordinances:

-Thermal Regulation 2005 (RT 2005)

-Comparison of primary energy consumption (cep) and interior comfort temperature (tic) of the actual and reference building

-For existing buildings - reduction of energy consumption by 30%

-Thermal Regulation 2012 (RT 2012)

-From 1. January 2011 for non-residential buildings and from

1. January 2013 for residential buildings

-Two calculations are necessary – Bbio and Cep

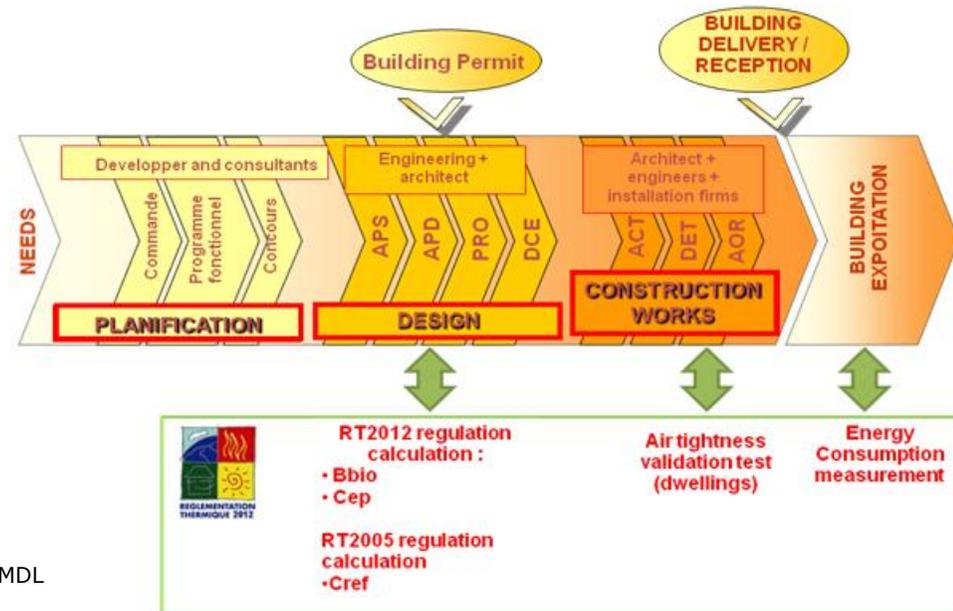
# France

The EPBD was reflected in the following Laws and Ordinances:

-Energy Efficiency Report

-The legal basis for the issue of Energy Performance Certificates

-Amended in 2012



Source: CMDL  
MANASLU

## Sweden

The EPBD was reflected in the following Laws and Ordinances:

- The Swedish Planning and Building Act (PBL)

  - Issued in 1987

  - General requirements on planning and building of buildings

  - Not very detailed, further requirements in following laws

  - Currently valid version: 2010

## Sweden

The EPBD was reflected in the following Laws and Ordinances:

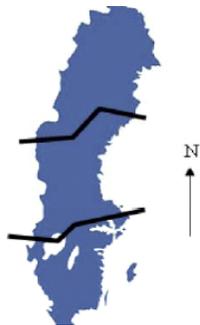
-The Swedish National Building Regulation (BBR)

-Issued in 1994, currently valid version 2011

-Specific requirements on the construction of buildings and the redevelopment of existing structures in nine chapters

-Chapter 9: specific calculation of energy demand

-3 climate zones, type of building and heating energy



Requirements for residential buildings

Climatic Zone	Residential buildings				Residential building electric heating <sup>2</sup>			
	North	Middle	South	U <sub>value</sub>	North	Middle	South	U <sub>value</sub>
2006	130		110	0.5	95		75	0.5
2009	150	130	110	0.5	95	75	55	0.4
Proposed demands 2011	130	110	90	0.4	95	75	55	0.4

Source: EACI

## Sweden

The EPBD was reflected in the following Laws and Ordinances:

-The Act on Energy Certification of Buildings

-Issued in 2006

-Operational rules for the energy and indoor room air quality certification

-Competence of experts and their accreditation

## Poland

The EPBD was reflected in the following Laws and Ordinances:

- The Construction Act

- First issued on 7. July 1994

- Revised on 19. September 2007

- Calculation similar to Germany – reference building

- Two alternative calculation methods

- Prescriptive method

- Performance method

## Poland

The EPBD was reflected in the following Laws and Ordinances:

- The Ordinance on the methodology of energy performance calculations
  - Parameters for calculation of energy performance
  - Defines the content of the Energy Performance Certificates
- The Ordinance on training and examination of experts
  - Allows the issue of Energy Performance Certificates
- The Ordinances on amendments to the Ministry of Infrastructure Ordinances

# Italy

The EPBD was reflected in the following Laws and Ordinances:

-National Transposition Decree

-Started the implementation of the EPBD in Italy in 2005

-Previous minimum requirements strengthened by 30%

-Energy certification of buildings replaced by a declaration limited to new and existing buildings and in 2006 extended to buildings on sale or for lease

## Italy

The EPBD was reflected in the following Laws and Ordinances:

-Energy Certification of Buildings

-For new buildings, major renovations, public buildings and all buildings during sale

-Not necessary for exchange of windows, boiler change and installation of thermal solar systems

-Different Ordinances and Regulations of the individual 20 provinces of Italy

## What has been done?

Within RIEEB, four newly built non-residential buildings were investigated. The main points were:

- The verification of the Energy Performance Certificate and the calculation of the annual primary energy demand
- The verification of the implementation of the planned construction and installations
- Thermo graphical investigation to show construction defects, such as thermal bridges and air leaks

## Which buildings?

The “Functional and Workshop building” of the State Office for environment, agriculture and geology (LfULG) in Dresden Pillnitz



Main entrance

Workshop drive in



## Which buildings?

The "Project house MeTeOr" at the Technical University in Chemnitz



View from the south

Main entrance



## Which buildings?

The “Research building Mierdel-bau” at the Technical University in Dresden



Front view

Back view



## Which buildings?

The “Information house” of the Biosphere reserve centre in Wartha



Access road



Main entrance

## What did we find out?

- The correct calculation method was chosen for all the buildings
- The EnEV was fulfilled in two of the four buildings
- The Energy Performance Certificates were not issued at the correct time
- The zoning of the buildings was very simplistic
- The installed technical systems did not correspond to the plans
- Several severe thermal bridges and air leaks were found
- The thermal bridges surcharge was often not correctly chosen
- The protection against summer overheating was not sufficient in several buildings

## What problems did we encounter?

- The necessary documents and plans were not always available
- The Energy Performance Certificates were issued with different programs, the follow up of the inserted data was impossible
- The calculations were not always comprehensible
- The heat transfer coefficients could not be verified

## What are our recommendations?

### -Further development of the Ordinances

- guide to the EnEV for easier understanding for the laymen
- specification of the requirements in DIN V 18599
- clear differentiation between provisional energy demand calculations and energy performance certificate
- further criteria to be included in the energy performance certificate calculation

## What are our recommendations?

- Proposals for future check of the compliance of the EnEV
  - fulfilment of additional requirements of the EnEV should be proven in separate forms
  - obligation to save all construction relevant documents
  - synchronisation of the data through a harmonised nomenclature of all calculation programs or an uniform program

# Thank you for your attention!

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