

German Energy Savings Ordinance (EnEV 2014/2016)

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EnEV 2014/2016

How it works...

Reference Building Procedure

A: Reference Building



B: Planned Building



Reference Building Procedure

A: Reference Building

- Planned Geometry
- Planned Orientation and Site
- **Reference**-Envelope
- **Reference**-building systems and Energy source
- → Reference value for primary energy demand Q_p “REF”

B: Planned Building

- Planned Geometry
- Planned Orientation and Site
- **Planned** Envelope
- **Planned** building systems and Energy source
- → real value for primary energy demand Q_p “VORH”

Reference Building Procedure

A: Reference Building

- Maximum value (limit value) for transmission heat losses $H'_{T,zul}$ from a table

B: Planned Building

- Planned Geometry
- Planned Envelope
- → real value for transmission heat loss H'_T “VORH”

$$Q_{p,vorh} \leq Q_{p,Ref} \text{ AND } H'_{T,vorh} \leq H'_{T,zul}$$

→ **passed!**

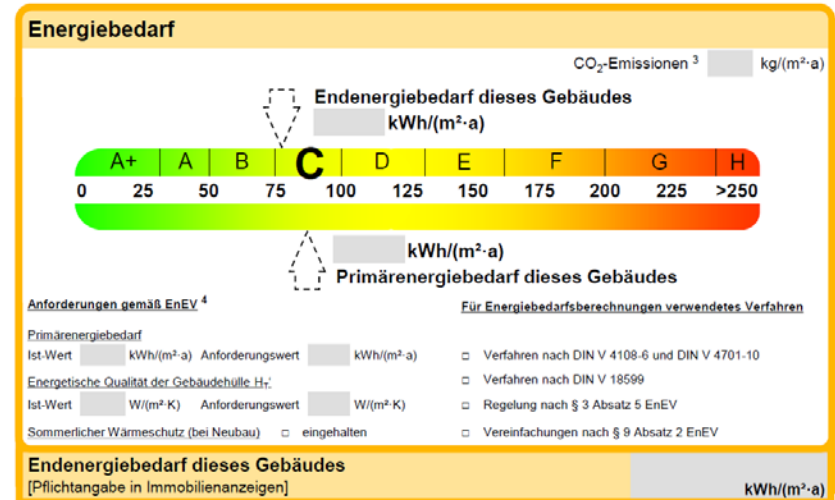
Federal Gouvernement passes EnEV 2014



- Goal: CO2 neutral building stock until 2050
- Implementation of the EU-directive for energy efficiency of buildings
- Ministerial decision for an energy concept and for the „Energiewende“ in 2010 and 2011
- Bundesrat (federal assembly) passes EnEV under obligations:
 - Simplify energy savings legislation
 - Provide 2 B€ per year for the renovation of the building stock
 - Establish a nation renovation schedule
 - Implement energy savings categories for buildings
 - Substitute constant temperature domestic heating systems

Obligations of the „Bundesrat“

- Implementation of energy saving categories for buildings
 - Energy savings tachometre
 - From A+ ($< 30 \text{ kWh}/(\text{m}^2 \cdot \text{a})$)
 - To H ($> 250 \text{ kWh}/(\text{m}^2 \cdot \text{a})$)
 - Result has to be highlighted or printed bigger
 - Easier to understand
 - 22 of 28 EU member states have similar systems



Nichtamtliche Lesefassung z.B. von www.enev-online.de

EnEV 2014/2016 – overview on tightening



New buildings

- Tightening of requirements for primary energy demand Q_p
 - 2014: 0 %
 - Jan. 2016: 25 %
- Tightening of requirements for transmission heat loss H'_T
 - 2014: 0 %
 - Jan. 2016: approx. 10 to 25 %

Existing buildings

- No tightening of requirements for the renovation of the building envelope (same level as EnEV 2009)
- No additional requirements, except:
 - External doors
 - Shop windows

- Implementation of the requirement to indicate the energetic figures of a building in a real estate advertisement for sale and/or rent
 - Values to be related to the m² living space
 - Energy pass has to be presented at the first visit
 - Handover to new tenant or new owner is mandatory!
- Requirement to hang out the energy pass in public buildings
 - Now for smaller public buildings, too
 - Also for private buildings if they have many visitors (e.g. private museums etc.)
- Primary energy factor for Electricity is lowered from 2,6 to 1,8 (2016) (electricity mix is changing to renewables more and more...)



EnEV 2014/2016

Residential Buildings

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- Tightening of 25 % realized by a factor for the reference value

Tabelle 1

Ausführung des Referenzgebäudes

Zeile	Bauteile/Systeme	Referenzausführung/Wert (Maßeinheit)	
		Eigenschaft (zu Zeilen 1.1 bis 3)	
1.0	Der nach einem der in Nummer 2.1 angegebenen Verfahren berechnete Jahres-Primärenergiebedarf des Referenzgebäudes nach den Zeilen 1.1 bis 8 ist für Neubauvorhaben ab dem 1. Januar 2016 mit dem Faktor 0,75 zu multiplizieren. § 28 bleibt unberührt.		

Reference Building

- Planned Geometry
- **Reference-Envelope**

Planned Building

- Planned Geometry
- Planned Envelope

NEW:

- Reference Value for H'_T “REF” has to be considered, and
- Real value for transmission heat loss H'_T “VORH”

- Tabulated values additionally

$$Q_{p,vorh} \leq Q_{p,Ref} \text{ AND } H'_{T,vorh} \leq H'_{T,Ref}$$

➔ **Passed!**

EnEV: nichtamtliche Lesefassung www.enev-online.de

- Tabulated values to be seen as upper limit for buildings with unfavourable geometry only...

Zeile	Gebäudetyp		Höchstwert des spezifischen Transmissionswärmeverlusts
1	Freistehendes Wohngebäude	mit $A_N \leq 350\text{m}^2$	$H'_T = 0,40 \text{ W}/(\text{m}^2 \cdot \text{K})$
		mit $A_N > 350\text{m}^2$	$H'_T = 0,50 \text{ W}/(\text{m}^2 \cdot \text{K})$
2	Einseitig angebautes Wohngebäude *		$H'_T = 0,45 \text{ W}/(\text{m}^2 \cdot \text{K})$
3	Alle anderen Wohngebäude		$H'_T = 0,65 \text{ W}/(\text{m}^2 \cdot \text{K})$
4	Erweiterungen und Ausbauten von Wohngebäuden gemäß § 9 Absatz 5		$H'_T = 0,65 \text{ W}/(\text{m}^2 \cdot \text{K})$

* Einseitig angebaut ist ein Wohngebäude, wenn von den vertikalen Flächen dieses Gebäudes, die nach einer Himmelsrichtung weisen, ein Anteil von 80 Prozent oder mehr an ein anderes Wohngebäude oder an ein Nichtwohngebäude mit einer Raum-Solltemperatur von mindestens 19 Grad Celsius angrenzt.

Reference components according to EnEV 2009

- External walls: $U \leq 0,28$
- External walls in the ground: $U \leq 0,35$
- Roof or topmost ceiling: $U \leq 0,20$
- Windows and doors: $U \leq 1,3$
- Roof windows: $U \leq 1,4$
- External doors: $U \leq 1,8$

Reference components according to EnEV 2014 / 2016

- External walls: $U \leq 0,28$
- External walls in the ground: $U \leq 0,35$
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- Roof windows: $U \leq 1,4$
- External doors: $U \leq 1,8$

EnEV 2014/2016 – additional changes



■ Summerhouse legislation

- EnEV is not mandatory if 25% or less of the expected yearly energy demand is really existent during the time of use

■ Electricity from renewable sources

- To be subtracted from the calculated result if
 - Produced in the ambience of the building
 - Used mainly directly in the building



EnEV 2014/2016

Non residential buildings

EnEV 2014/2016 – non residential buildings



- Primary energy demand: Reference building procedure
 - Boundaries of the system according to DIN V 18599
 - No changes in envelope components of the reference building
 - Reduction of 25 % on 1. January 2016 realized via a factor – same as for residential buildings
 - Mean U-values: tabulated value procedure for single parts and components – but tightening of the limit values – appr. minus 20% from Jan. 2016
- $$Q_{p,vorh} \leq Q_{p,Ref} \text{ AND } U_{vorh} \leq U_{zul}$$
- ➔ Passed!**

EnEV 2014/2016 – non residential buildings

EnEV: nichtamtliche Lesefassung www.enev-online.de

- Tightening for primary energy demand realized via a factor (-25%)

Tabelle 1

Ausführung des Referenzgebäudes

Zeile	Bauteile/Systeme	Eigenschaft (zu Zeilen 1.1 bis 1.13)	Referenzausführung/Wert (Maßeinheit)	
			Raum-Solltempe- raturen im Heizfall ≥ 19 °C	Raum-Solltempe- raturen im Heizfall von 12 bis < 19 °C
1.0	Der nach einem der in Nummer 2 oder in Nummer 3 angegebenen Verfahren berechnete Jahres-Primärenergiebedarf des Referenzgebäudes nach den Zeilen 1.1 bis 8 ist für Neubauvorhaben ab dem 1. Januar 2016 mit dem Faktor 0,75 zu multiplizieren. § 28 bleibt unberührt.			

Opaque external building parts „walls“: tabulated values

Zeile	Bauteile	Anforderungsniveau	Höchstwerte der nach Nummer 2.3 bestimmten Mittelwerte der Wärmedurchgangskoeffizienten	
			Zonen mit Raum-Solltemperaturen im Heizfall $\geq 19\text{ °C}$	Zonen mit Raum-Solltemperaturen im Heizfall von $12\text{ bis } < 19\text{ °C}$
1a	Opake Außenbauteile, soweit nicht in Bauteilen der Zeilen 3 und 4 enthalten	nach EnEV 2009 *	$\bar{U} = 0,35\text{ W}/(\text{m}^2\cdot\text{K})$	$\bar{U} = 0,50\text{ W}/(\text{m}^2\cdot\text{K})$
1b		für Neubauvorhaben bis zum 31. Dezember 2015 **	$\bar{U} = 0,35\text{ W}/(\text{m}^2\cdot\text{K})$	
1c		für Neubauvorhaben ab dem 1. Januar 2016 **	$\bar{U} = 0,28\text{ W}/(\text{m}^2\cdot\text{K})$	

Windows: tabulated values

Zeile	Bauteile	Anforderungsniveau	Höchstwerte der nach Nummer 2.3 bestimmten Mittelwerte der Wärmedurchgangskoeffizienten	
			Zonen mit Raum-Solltemperaturen im Heizfall $\geq 19\text{ °C}$	Zonen mit Raum-Solltemperaturen im Heizfall von $12\text{ bis } < 19\text{ °C}$
2a	Transparente Außenbauteile, soweit nicht in Bauteilen der Zeilen 3 und 4 enthalten	nach EnEV 2009 *	$\bar{U} = 1,9\text{ W}/(\text{m}^2\cdot\text{K})$	$\bar{U} = 2,8\text{ W}/(\text{m}^2\cdot\text{K})$
2b		für Neubauvorhaben bis zum 31. Dezember 2015 **	$\bar{U} = 1,9\text{ W}/(\text{m}^2\cdot\text{K})$	
2c		für Neubauvorhaben ab dem 1. Januar 2016 **	$\bar{U} = 1,5\text{ W}/(\text{m}^2\cdot\text{K})$	

Curtain walls: tabulated values

Zeile	Bauteile	Anforderungsniveau	Höchstwerte der nach Nummer 2.3 bestimmten Mittelwerte der Wärmedurchgangskoeffizienten	
			Zonen mit Raum-Solltemperaturen im Heizfall $\geq 19\text{ °C}$	Zonen mit Raum-Solltemperaturen im Heizfall von $12\text{ bis } < 19\text{ °C}$
3a	Vorhangfassade	nach EnEV 2009 *	$\bar{U} = 1,9\text{ W/(m}^2\cdot\text{K)}$	$\bar{U} = 3,0\text{ W/(m}^2\cdot\text{K)}$
3b		für Neubauvorhaben bis zum 31. Dezember 2015 **	$\bar{U} = 1,9\text{ W/(m}^2\cdot\text{K)}$	
3c		für Neubauvorhaben ab dem 1. Januar 2016 **	$\bar{U} = 1,5\text{ W/(m}^2\cdot\text{K)}$	



EnEV 2014/2016

Existing building stock

EnEV 2014/2016 – existing buildings



- In case of changes on one or more of the following building parts...
 - External walls
 - Windows and roof windows
 - External doors
 - Roofs and topmost ceiling
 - External walls in the ground
 - Curtain walls
- Max. U-values according to table 3...
- Requirements (for residential and non-residential buildings) are o.k. if
 - Primary energy demand of the reference building **and**
 - The limit values for the specific transmission heat losses
- are not exceeded by more than 40%



Goals of the German Energy Policy

- Energy Concept of the federal gouvernement defines 9 fields of action:
 - Renewable Energy sources as the basis for future energy Supplies
 - Key Issue: Energy Efficiency
 - Nuclear Energy and fossile power plants
 - Capable grid infrastructure for electricity and integration of renewable energy
 - Energetic refurbishment and energy efficient new buildings
 - Societal challenge: Mobility
 - Research in Energy related fields for Innovations and new technologies
 - Energy supply in a european and international context
 - Acceptancy and transparency

- Goals for reduction (quantitativ)
 - Reduction of green house gas emissions by 80 % to 95 % compared to 1990 (2020: 40 %)
 - Reduction of the primary energy consumption by 50 % compared to 2008
 - Reduction of the electricity consumption by 25 % compared to 2008
 - Increase of Energy production from renewables to 60 % of the gross End-Energy Consumption (2020: 18%) resp. 80 % of the gross electricity consumption (2020: at least 35%)
- Primary Energy Demand of existing buildings (total building stock) has to be reduced by 80% by the year 2050

National Action Plan Energy Efficiency



Bundesministerium
für Wirtschaft
und Energie



Ein gutes Stück Arbeit.

Mehr aus Energie machen

Nationaler Aktionsplan Energieeffizienz

www.bmwi.de

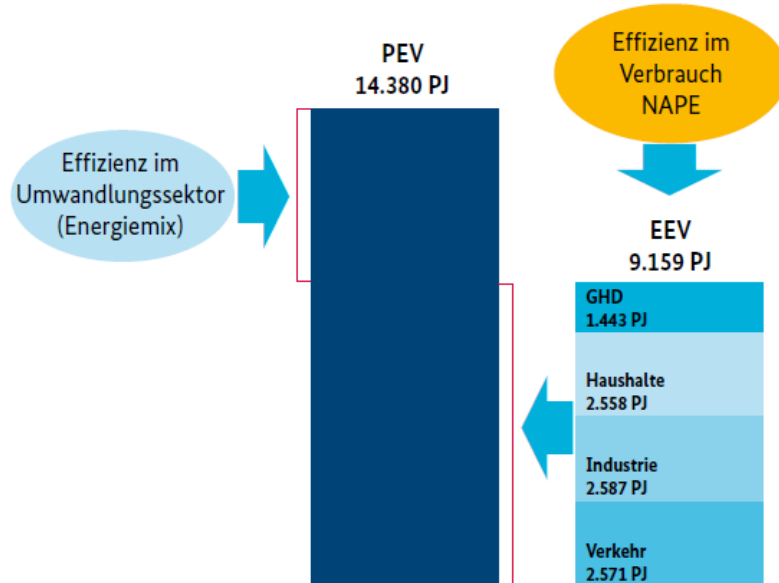
Why Energy Efficiency?



- Increasing prices for Energy
- High rentability (fast payback) of investments into energy efficiency
- Fundamental basis for the „Energiewende“
- Essential contribution to a secure Energy Supply
- Increasing Independency from Energy Imports

Starting Points of the Action Plan

Abbildung 5: Darstellung von Primär- und Endenergie in Deutschland (Zahlen des Basisjahrs 2008) und Ansatzpunkt des NAPE



Quellen: BMWi, AG Energiebilanzen.

- Information and Consulting
- Incentives by funding programmes
- Ordinance policy
- Research for the „Energiewende“ (Block and multiple housing management and energy grids, etc.)
- Private initiatives and measures by the provinces and federal states

Immediate measures



- Quality control and optimization of existing Energy Consulting
- Fiscal sponsorship of energetic refurbishment investments
- Further development and upgrading of the CO2 building refurbishment program until 2018
- Functional checks of domestic heating systems
- Starting points of the Energy Efficiency Strategy for buildings (ESG)

ESG Energy Efficiency Strategie for buildings



Goal:

Reduction of Primary Energy Consumption due to Energy Savings and use of renewable energy sources by 80% until 2050 (compared to the year 2008)

ESG immediate measures



- Energy Consulting for local authorities
- Energy Savings Legislation
- Tenancy law adjustments
- Individual refurbishment schedules for residential and non residential buildings
- Further development of the market boost programme for renewable energies
- Faster developments of improvements and new techniques in energy savings and refurbishment
- Energy related research: Research network „Energy in Buildings and Quarters“



Buildings producing Energy

Energy Plus Buildings (producing Energy)



- Plusenergystandard will be mandatory in the EU from 2019 on (public) and 2021 (all) buildings
- Funding for Energy Plus Buildings
 - Negativ Yearly Primary Energy Demand
 - Negativ Yearly End-Energy Demand
 - Other Criteria like EnEV Buildings...
- Method for Balancing (e.g. Yearly Balance)
- Boundaries for Balancing (e.g. Borders of the property)
- Balancing including residential Electricity demand
 - All electricity?
 - Electricity related to the domestic heating and hot-water system
 - Lump-sum Balancing (fixed values for certain appliances)