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Energy efficiency made in Germany



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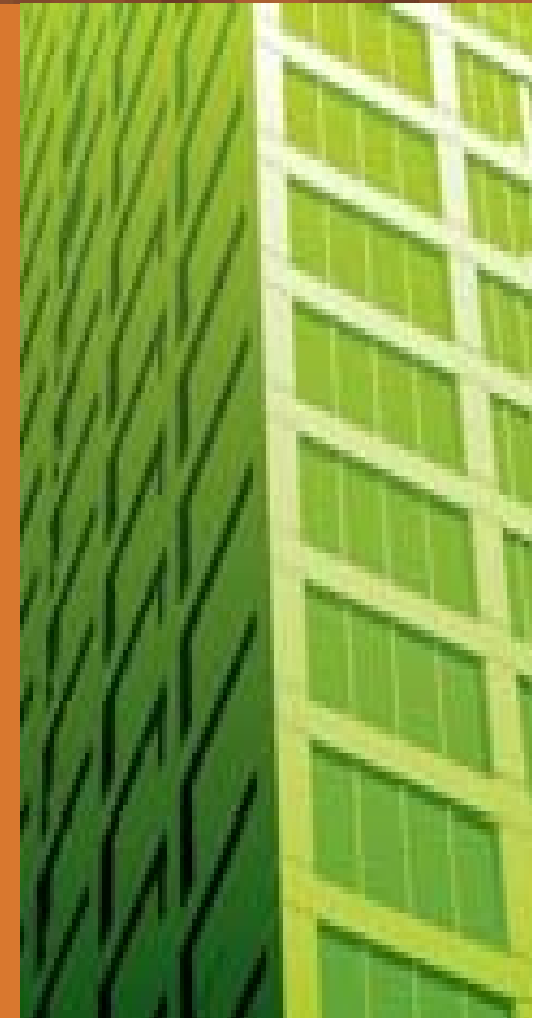


Energy efficiency from Germany – An introduction

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Energy Efficiency from a German perspective

- ▶ Energy Efficiency is:
 - ▶ An economic issue
 - ▶ A security issue
 - ▶ A moral issue
 - ▶ An imperative
 - ▶ An issue that is best addressed on a global level



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The impact of climate change on the world

- ▶ In 2007 the International Panel on Climate Change confirmed that climate change is man-made and that we have to expect severe changes in world climate in the next years
- ▶ Scenario for global warming 2009-2100:
1.8 – 6.4°C [3.24 – 11.52°F]
- ▶ Scenario for a rise in sea level 2009-2100:
28 – 59 cm [11” – 23.23”]





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Consequences of climate change

“If the global surface temperature of earth increases by 4.5°C (8.1°F), there will be damage costs of € 800 Billion (US\$ 1,100 Billion).”

[German Institute for Economic Research, March 14th, 2007]



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Worldwide Energy Productivity Differences

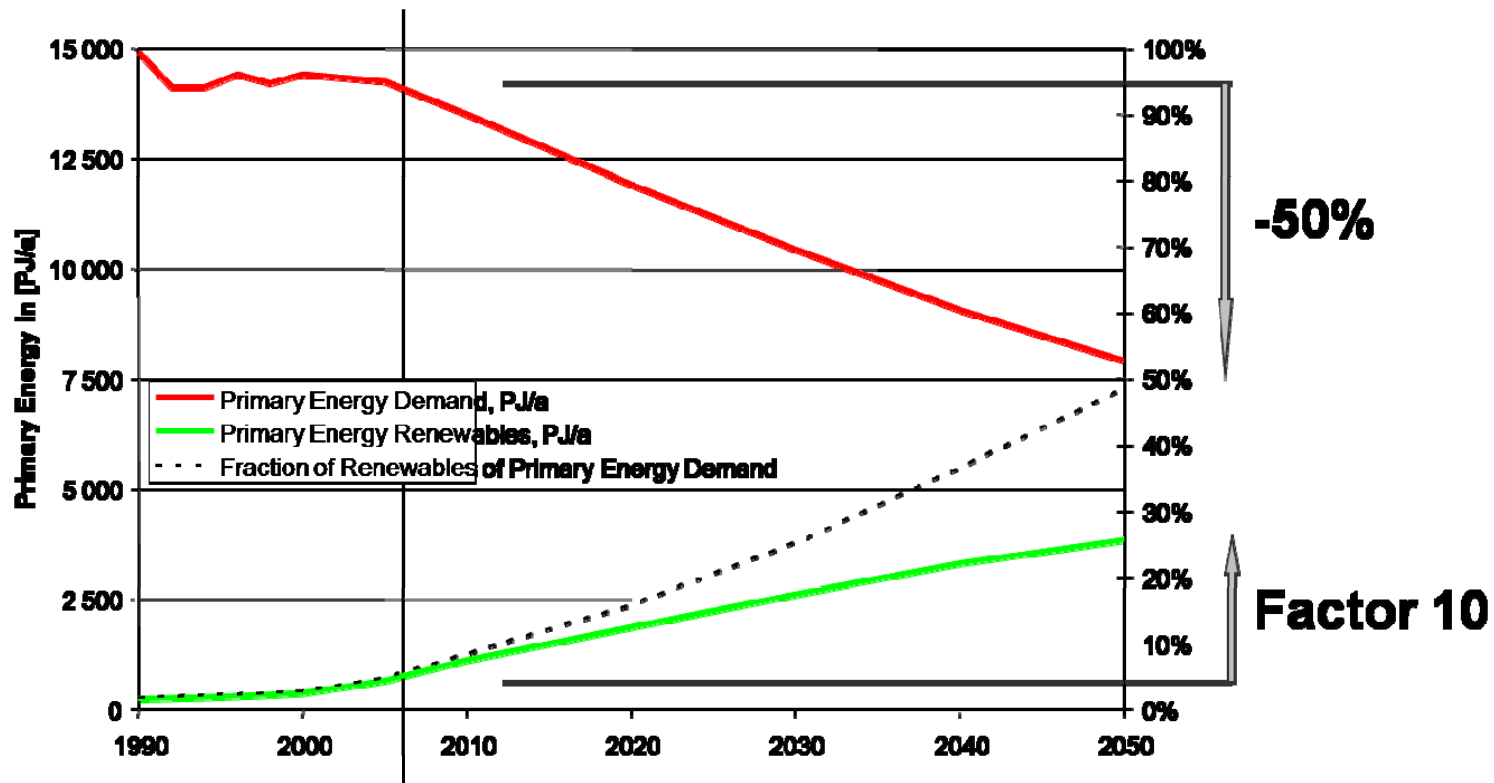
Region	Population (%)	GDP (%)	Energy Total (%)	Energy / Capita	Energy / GDP
USA	5%	27%	22%	100	100
Europe	7%	32%	16%	48	64
Japan	2%	10%	5%	52	62
China	20%	5%	15%	15	369
Rest of World	66%	24%	42%	14	233

GHG per capita: USA: 23.9 MT / EU: 9.3 MT





Forecast of the German Federal Ministry for the Environment



Source: BMU, DLR 2007





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The German Renewable Energy Experience

- ▶ One of the largest installed wind power capacities in the world
- ▶ Largest photovoltaic market in the world
- ▶ Largest solar thermal market in Europe
- ▶ Pioneer in the field of biofuels and hydrogen
- ▶ Leader in energy efficient technologies



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29-Point Integrated Energy and Climate Program of the German Federal Government

1. **Combined heat-and-power generation**
2. Expansion of renewable energies in the power sector
3. CCS technologies
4. **Smart metering**
5. Clean power-station technologies
6. Introduction of modern energy management systems
7. Support programs for climate protection and energy efficiency (apart from buildings)
8. **Energy efficient products**
9. Provisions on the feed-in of biogas to natural gas grids
10. **Energy Savings Ordinance**
11. **Operating costs of rental accommodation**
12. **Modernization program to reduce CO2 emissions from buildings**
13. **Energy efficient modernization of social infrastructure**
14. **Renewable Energies Heat Act**
15. **Program for the energy efficient modernization of federal buildings**
16. CO2 strategy for passenger cars
17. Expansion of the biofuels market
18. Reform of vehicle tax on CO2 basis
19. Energy labeling of passenger cars
20. Reinforcing the influence of the HGV toll
21. Aviation
22. Shipping
23. **Reduction of emissions of fluorinated greenhouse gases**
24. **Procurement of energy-efficient products and services**
25. **Energy research and innovation**
26. Electric mobility
27. **International projects on climate protection and energy efficiency**
28. Reporting on energy and climate policy by German embassies and consulates
29. **Transatlantic climate and technology initiative**





Cornerstones of the energy and climate program - buildings

- ▶ **Energy Saving Ordinance:**
 - ▶ Strengthening of the required standards in two steps (2009: 30%; 2012 up to 30%)
- ▶ **Renewable Energies Heat Act (EEWärmeG):**
 - ▶ Obligation and financial support to use renewable energies in heating new residential and non-residential buildings (passive solar energy, geothermal energy, bioenergy and heat from the environment)
- ▶ **Heating costs for rental housing:**
 - ▶ Simplification of heating bills for the tenant
 - ▶ Exploration of the possibility of heating cost reductions in case of violation of renovation or maintenance obligations (Energy Saving Ordinance)
- ▶ **CO₂ building renovation program:**
 - ▶ Current standards will remain in place until 2011 (residential buildings 700 mil. €/year, municipal buildings 200 mil. €/year)
- ▶ **Energy-efficient modernization of buildings and social infrastructure**
 - ▶ 600 mil. € investment package, split between the federal government, states and municipalities
- ▶ **Restoration program for federal buildings**





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Energy efficiency objectives of the German federal government

- ▶ 40% reduction in greenhouse gas emissions from 1990 levels by 2020
- ▶ Doubling of Germany's energy productivity (economic growth per unit of primary energy used) from 1990 levels by 2020
- ▶ 25-30% share in the use of renewable energy for electricity generation by 2020
- ▶ 14% share in the use of renewable energy for heating by 2020
- ▶ 25% share in the co-generation of heat and electricity by 2020



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Cornerstones of the energy and climate program: multi-sector-initiatives – national

- ▶ **Smart metering: the intelligent measurement of power consumption:** electricity saving through time-sensitive metering standards, market introduction throughout Germany during the next six years
- ▶ **Implementation of modern energy management systems:** realizing industry's large potential for efficiency improvements through tax incentives
- ▶ **Energy efficient products:** marketing and promotion of energy efficient products with help from the “Top Runner” approach: user-friendly efficiency ratings for all electrical devices and appliances
- ▶ **Reduced emissions of fluorinated greenhouse gases,** especially from refrigeration and air-conditioning systems; also, climate protection standards for all new chemicals
- ▶ **Procurement of energy efficient services and products:** developing energy efficient guidelines as a basis for federal purchasing decisions
- ▶ **Energy research and innovation:** expanding financial incentives for energy research beginning in 2008





Energy Passport according to EnEV 2007

- ▶ The “Energy Passport” was enacted with the EnEV 2007
- ▶ Since July 1, 2008 building sellers and landlords need an “Energy Passport” for their building
- ▶ The document contains information about the energy quality of the building
- ▶ It can be focused on the energy demand or the energy consumption of the building

ENERGIEAUSWEIS für Wohngebäude

gemäß den §§ 16 ff. Energieeinsparverordnung (EnEV)

Berechneter Energiebedarf des Gebäudes 2

Energiebedarf

Endenergiebedarf CO₂-Emissionen ¹⁾ kg/(m²·a)
 kWh/(m²·a)

Primärenergiebedarf („Gesamtenergieeffizienz“)
 kWh/(m²·a)

Nachweis der Einhaltung des § 3 oder § 9 Abs. 1 EnEV ²⁾

Primärenergiebedarf	Energetische Qualität der Gebäudehülle
Gebäude Ist-Wert <input type="text"/> kWh/(m ² ·a)	Gebäude Ist-Wert H _t <input type="text"/> W/(m ² ·K)
EnEV-Anforderungswert <input type="text"/> kWh/(m ² ·a)	EnEV-Anforderungswert H _t <input type="text"/> W/(m ² ·K)

Endenergiebedarf

Energeträger	Jährlicher Endenergiebedarf in kWh/(m ² ·a) für			Gesamt in kWh/(m ² ·a)
	Heizung	Warmwasser	Hilfsgeräte ¹⁾	

Sonstige Angaben

Einsetzbarkeit alternativer Energieversorgungssysteme

nach § 5 EnEV vor Baubeginn geprüft

Alternative Energieversorgungssysteme werden genutzt für:

Heizung Warmwasser

Lüftung Kühlung

Lüftungskonzept

Die Lüftung erfolgt durch:

Fensterlüftung Schachtlüftung

Lüftungsanlage ohne Wärmerückgewinnung

Lüftungsanlage mit Wärmerückgewinnung

Vergleichswerte Endenergiebedarf

Erläuterungen zum Berechnungsverfahren

Das verwendete Berechnungsverfahren ist durch die Energieeinsparverordnung vorgegeben, insbesondere wegen standardisierter Randbedingungen erlauben die angegebenen Werte keine Rückschlüsse auf den tatsächlichen Energieverbrauch. Die ausgewiesenen Bedarfswerte sind spezifische Werte nach der EnEV pro Quadratmeter Gebäudenutzfläche (A_N).

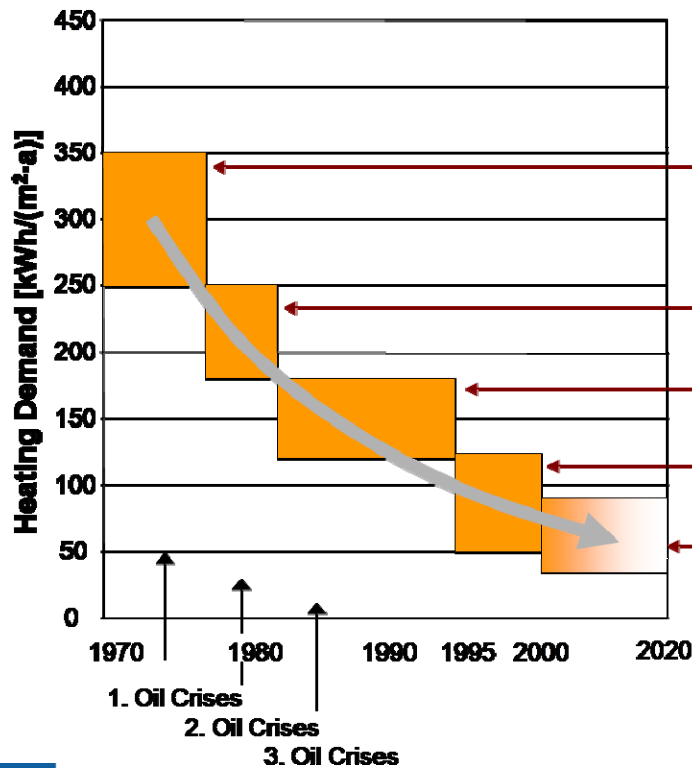
¹⁾ Frischluft-Ansohle
²⁾ nur in den Fällen des Neubaus und der Modernisierung auszuführen

³⁾ ggf. einschließlich Kühlung
⁴⁾ EFH – Einfamilienhäuser, MFH – Mehrfamilienhäuser





Energy Code for new residential buildings in Germany



Building Energy Code 1976
Revision September 2005

DIN 4108

**1. WSVO 1977
k-Value**

**2. WSVO 1982
k-Value**

**3. WSVO 1985
Energy Balance for Heating**

**EnEV 2002
Energy Balance for Primary Energy**

**EnEV 2007/ DIN V 18599
Total Energy Balance for
Heating, Cooling and Electricity**



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Integrated Climate and Energy Program - Summary

- ▶ Ambitious and concrete program without precedent both in the history of Germany and internationally
- ▶ Consisting of 29 key elements, Package of 14 acts and ordinances
- ▶ Monitoring every 2 years starting in 2010
- ▶ Reduction of CO₂ emissions of about 220 million tons per year
- ▶ Reduction of CO₂ emissions of about 36% in 2020 compared to 1990
- ▶ Average annual costs of about €31 billion
- ▶ Annual energy savings of about €36 billion
- ▶ Profit of about € 5 billion per year*

*Oil price of US\$ 65





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