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The Implementation of Energy Efficient Buildings Policies in Europe
24 February 2010

EUROPÄISCHES INSTITUT FÜR ENERGIEFORSCHUNG
INSTITUT EUROPEEN DE RECHERCHE SUR L'ENERGIE
EUROPEAN INSTITUTE FOR ENERGY RESEARCH

Renovating the building stock in Germany

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A – Energy Efficiency in the building sector

1. Structure of the residential building stock
2. Classification of buildings according to energy needs
3. Actual conditions of buildings and localisation

B – Policies targeting the building sector

1. German Energy Saving Ordinance 2009
2. Energy Modernisation Programme (KfW)

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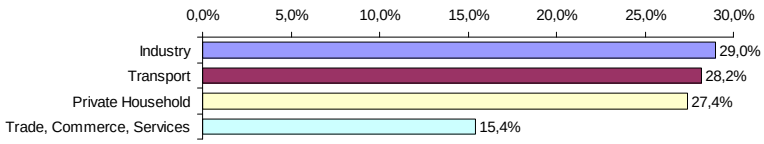
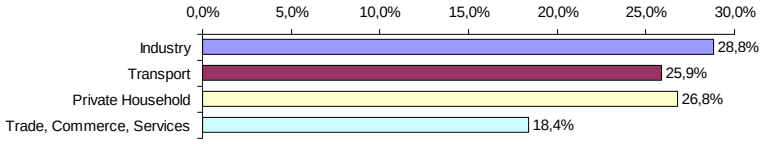
Final Energy Use by Sector 2008



Final Energy Use by Sector 1991



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Source: Arbeitsgemeinschaft Energiebilanzen, see destatis 2009

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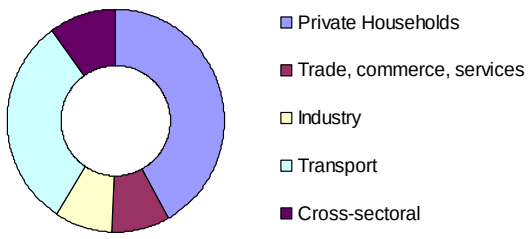
Identifying target sectors for energy efficiency (NEEAP)

Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC.

Projected Energy Efficiency Measures (%, mean value)



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Source: German NEEAP, BMWi 2007

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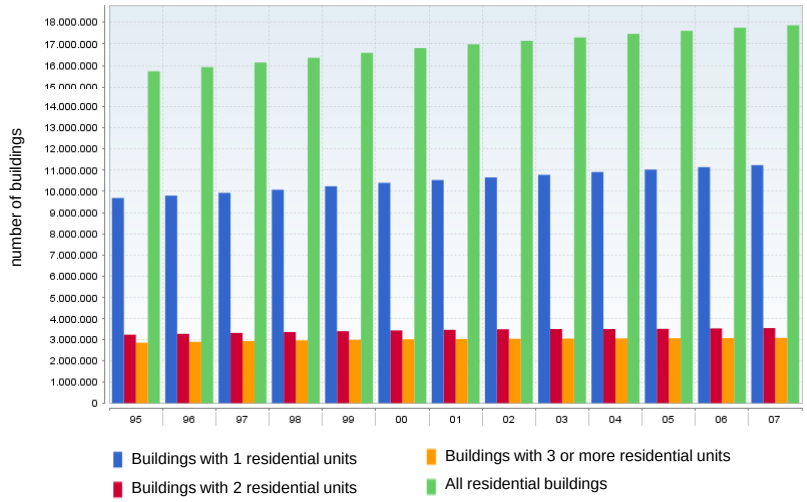

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Source: GENESIS-Online, Statistisches Bundesamt, Wiesbaden 2010

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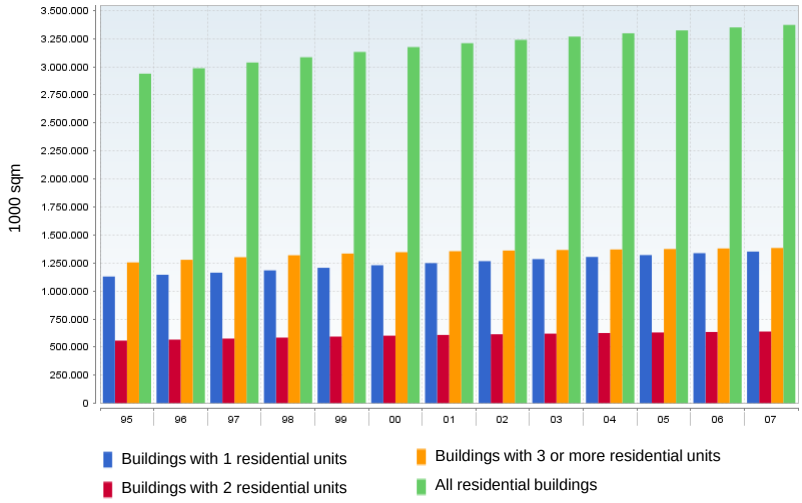

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Source: GENESIS-Online, Statistisches Bundesamt, Wiesbaden 2010

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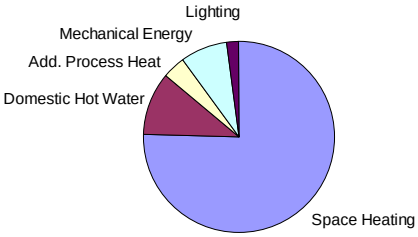
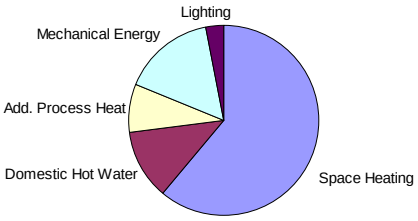
Final Energy Use in Households (2004)



Final Energy Use in Households (Accounting for conversion losses)



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Source: Schoer et al. 2006

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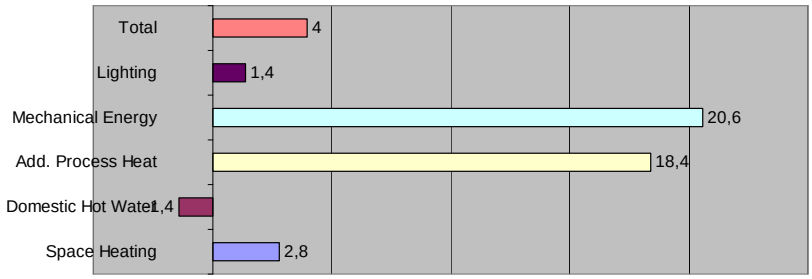
Development of the Energy Use of Private Households 1995-2004



- Strong increase in the use of mechanical energy and additional process heat (mainly cooking)
- Efficiency gains in specific space heat demand (9%) while used surface increased by 13%

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Source: Schoer et al. 2006

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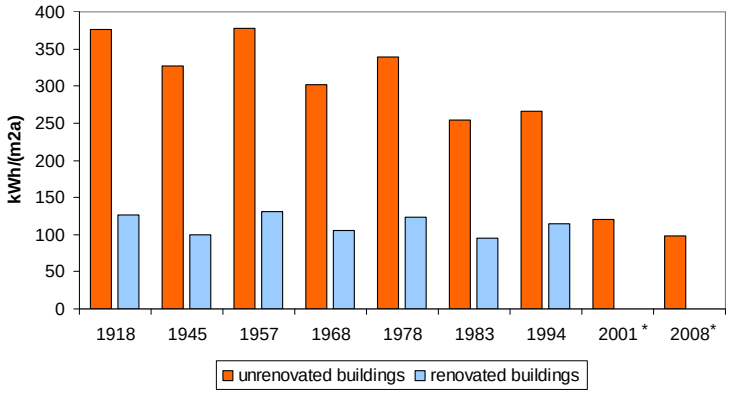
Specific energy demand of single family buildings by year of construction



*Requirements of the building regulation

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Source: EIFER 2009, calculation based on the German typology, IWU 2003

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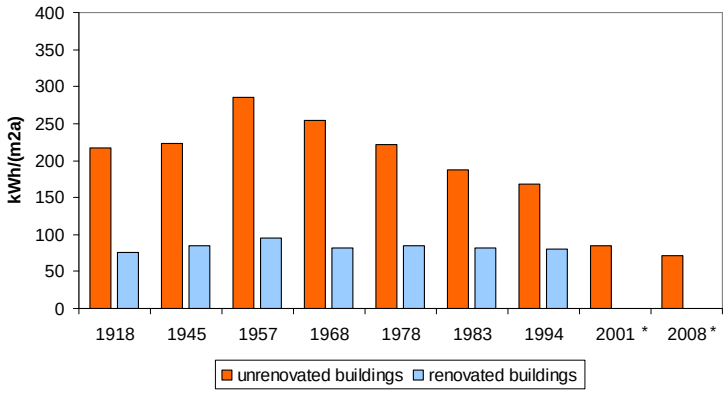
Specific energy demand of multi family buildings by year of construction



*Requirements of the building regulation

EIFER, Koch A., Markl-Hummel L.

Source: EIFER 2009, calculation based on the German typology, IWU 2003

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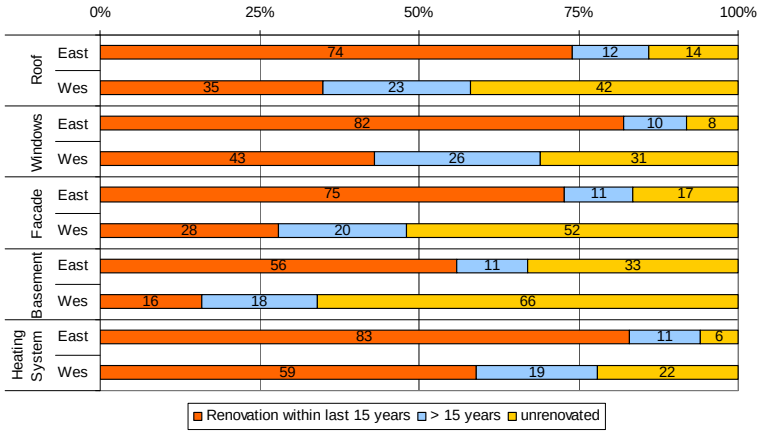
Actual conditions of the building stock with a focus on multi-family buildings



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Source: Michelsen 2009

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B - Policies targeting the building stock

Sticks

- German Energy Saving Ordinance (EnEV 2009) 1.10.2009
- The Renewable Energies Heat Act, (EEWärmeG), EWärmeG (BW)

Carrots

- KfW* Programmes (“CO2-Gebäudemodernisierung”)

Tambourine

- Energy Performance Certificate
- Voluntary Energy Audits

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*promotional bank under the ownership of the Federal Republic and the Länder (federal states)

The Integrated Energy and Climate Programme 2007

IECP measure	Title of the measure	Annually saved (fossil) energy (PJ)	Annually saved (fossil) energy (billion Euro)	Specific (net) reduction costs (Euro/t CO_2)	Annually saved CO_2 (Mt)
1	Combined Heat and Power Act (6)	135	-0,24	9	19,89
2	Renewables in the power sector	255	4,2	27	49,6
6+7	Energy management systems; Support programmes for climate protection and energy efficiency	128	3,2	-22	10,4
8	Energy-efficient products (in households and industry)	112	4,2	-266	15,1
10A	Energy Saving Ordinance	573	10,3	-63	39,8
10B	Substitution of electric night storage heating in households	-5	0,9	-102	6,5
12	Modernisation programme to reduce CO_2 emissions from buildings	189	3,2	-67	13,3
13	Energy-efficient modernisation of social infrastructure	20	0,33	110	1,38
14	Renewable Energies Heat Act	210	1,1	121	17,1
15	Programme for the energy-efficient modernisation of federal buildings	6	0,10	-34	0,40
16	CO_2 strategy for passenger cars	275	8,7	-128	17,4
17	Expansion of biofuels (9)	323	-2,1	180	11,9
20	Improved steering effect of the toll on Heavy Goods Vehicles (HGVs)	1,2	0,04	-275	0,1
	Sum (with overlaps for building measures)	**2220**	**33,8**	**-23**	**202,9**
	Sum (excluding overlaps for building measures)	**1872**	**29,0**	**-27**	**173,4**

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Source: IECP measures after MURE / ODYSSEE, see BMU 2007

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German Energy Saving Ordinance 2009

Construction of new residential or non-residential buidings

- Maximum values for the anual primary energy demand decreased by 30% in 2009 (another 30% foreseen in 2012)
- Maximum values for the specific heat transmission losses decreased by 15% in 2009

Renovation of existing buildings

- Requirements for building parts have been increased by 30%
- When an energy balance is calculated the requirements follow 140% of the values for new construction

Calculation procedure

- Standard procedure provided by DIN 18599 for all buildings, residential buildings can alternatively be calculated along DIN 4108
- Requirements are calculated using a reference building with an identical geometry and specified properties

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Minimum requirements when changing external building parts §9

Pitched Roofs:
EnEV 2009: U= 0.24 W/(m²K)
EnEV 2007: U= 0.30 W/(m²K)

External Walls:
EnEV 2009: U= 0.24 W/(m²K)
EnEV 2007: U= 0.34 W/(m²K)

Ceilings and Walls adjacant (basement):
EnEV 2009: U= 0.30 W/(m²K)
EnEV 2007: U= 0.40W/(m²K)

Flat Roofs:
EnEV 2009: U= 0.20 W/(m²K)
EnEV 2007: U= 0.25 W/(m²K)

Windows:
EnEV 2009: U= 1.30 W/(m²K)
EnEV 2007: U= 1.70 W/(m²K)

All measures have to be declared to meet the requirements after completion by the company ("Unternehmererklärung")

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Source: Energy Saving Ordinance EnEV 2009 Annex 3, Table 1

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KfW Programme: Energy Efficient Renovation („Energieeffizientes Sanieren)

Renovation standard is directly linked to the Energy Savings Ordinance

- E.g. "KfW Effizienzhaus 85" will have a calculated primary energy demand of max. 85% of the current Energy Saving ordinance
- Interest rate and subsidy are specified according to standard
- Programme is available in form of credit or direct subsidy
- New construction allows for 85, 70 and 55 percent

Reference to EnEV 2009	Interest rate*	Subsidy (% of credit)
KfW Effizienzhaus 130	1.41 %	5%
KfW Effizienzhaus 115	1.41 %	7.5%
KfW Effizienzhaus 100	1.41 %	12.5%
KfW Effizienzhaus 85	1.41 %	15%
Individual measures	2.47 %	

*up to a maximum of 75,000€ per unit for a „KfW Effizienzhaus" and 50,000€ for individual measures, 10 years

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Source: KfW Group, as of 1.2.2010

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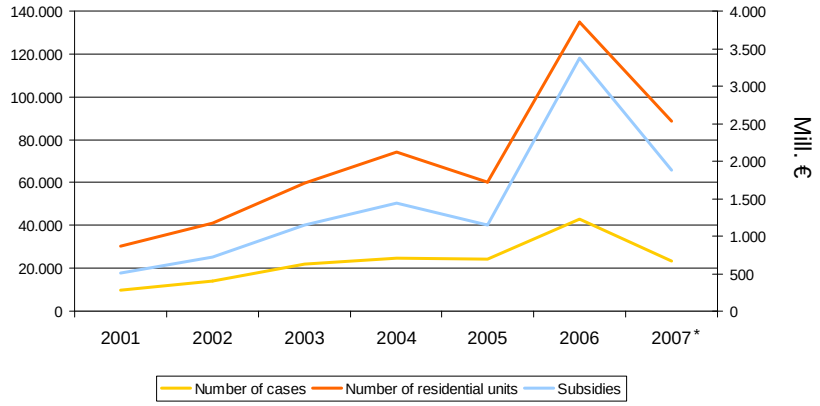
CO2 Building Renovation programmes of the KfW



*sum of loans and grants introduced in 2007

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Source: own illustration after information provided by KfW Group

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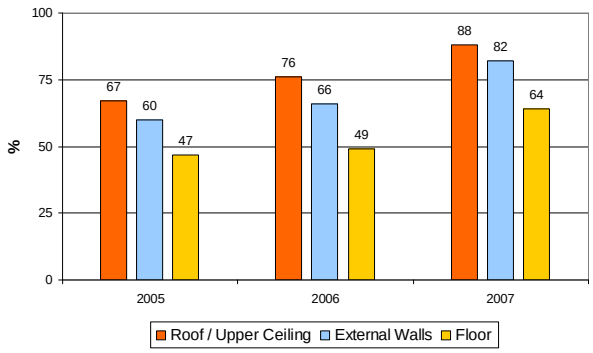
Percentage of insulates building parts in the renovation measures supported by the KfW CO2 Programme



2004-values (Source: eza 2004)

Heating System	70 %
Insulation of Roof	43 %
Insulation of External Walls	44 %

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Source: Clausnitzer et al. 2008

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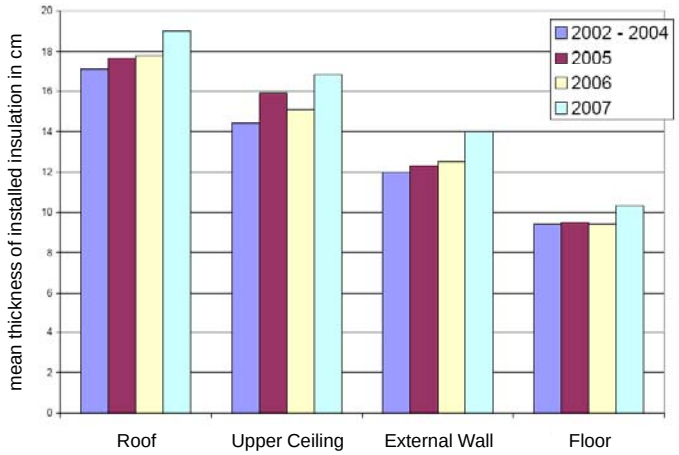
Evolution of the Quality of Measures - Insulation



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Source: Clausnitzer et al. 2008

Drivers

- High budget for incentive programmes
- Consciousness / Energy prices
- Sector specific approaches

and barriers

- User-investor dilemma
- Still too complicated procedures / multitude of legislation?
- High initial investment costs
- In trade, commerce and services relatively low importance of energy costs in an undertakings' overall costs

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Source: partly referring to the final remarks of the German NEEAP

References and further sources

Federal Minister of Economics and Technology (BMWi) (2007). National Energy Efficiency Action Plan (EEAP) of the Federal Republic of Germany Energy in accordance with the EU Directive on "energy end-use efficiency and energy services" (2006/32/EC)

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) (2007). The Integrated Energy and Climate Programme of the German Government, report by the federal Ministry

Michelsen, C. (2009): Energieeffiziente Wohnimmobilien stehen im Osten und Süden der Republik – Ergebnisse des ista-IWH-Energieeffizienzindex. in: Wirtschaft im Wandel, Institut für Wirtschaftsforschung Halle (2009), pp. 380-388

Clausnitzer, K.-D. et al. (2008). Effekte des CO2-Gebäudesanierungsprogramms 2007

German Government (2007). Report on implementation of the key elements of an integrated energy and climate programme adopted in the closed meeting of the Cabinet on 23/24 August 2007 in Meseberg

Diefenbach et al. (2007). Grundlagen für die Entwicklung von Klimaschutzmaßnahmen – Untersuchung über die bautechnische Struktur und den Ist-Zustand des Gebäudebestandes in Deutschland. BMVBS (ed.), BBR-Online-Publikation, Nr. 22/2007

Kleemann, M., Hansen, P. (2005). Evaluierung der CO2-Minderungsmaßnahmenim Gebäudebereich. Bundesamt für Bauwesen und Raumordnung (ed.), Bonn. BBR-Online-Publikation, Juni 2005

Schoer, K., Buyny, S., Flachmann, C., Mayer, H. (2006). Die Nutzung von Umweltressourcen durch die Konsumaktivitäten der privaten Haushalte Ergebnisse der Umweltökonomischen Gesamtrechnungen 1995 – 2004, Statistisches Bundesamt, Wiesbaden, 2006.

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Thank you for your attention!

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