German Strategy for Energy-Efficient-Buildings & CO$_2$-Rehabilitation Programme

(operated by KfW on behalf of Federal Ministry for Economic Affairs and Energy, Germany)

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Energy Concept – The Energy Strategy

By 2020:

› - 40% Green House Gas (GHG) emissions compared with 1990 levels
› - 20% Primary Energy Demand (PED) compared with 2008 levels

By 2050:

› - 80% Green House Gas (GHG) emissions compared with 1990 levels
› - 50% Primary Energy Demand (PED) compared with 2008 levels

› Balance energy efficiency and renewables
Energy Concept – Part “Buildings”

› By 2020
  › - 20% Heat Demand

› By 2050
  › - 80% PED in buildings
  › existing building stock to be “almost climate neutral” (by reducing heat demand and heating based on renewables)

› Improving the quality of energy-efficient measures

› Technical reality: We are already building in accordance with these highly efficient standards today!

German Government Coalition Agreement

› Continuation and increased funding for the CO₂-Rehabilitation Programme – KfW Programmes

› Strengthening of Energy Consulting
Key principles for CO₂-Rehabilitation Programme – KfW-Programmes

› **German Energy Saving Ordinance (EnEV)**
  › Promotional programmes are based on legal framework
  › Incentives require higher efficiency standard than legal framework

› **Promotional Programmes are focused on a holistic approach**
  › Focusing on energy efficiency and renewable energies
  › Free choice of technology (heating system and building envelope)
  › Cost efficiency and reduction of energy consumption are crucial

› **KfW-Efficiency House: brand for energy-efficiency**
  › Technological standard for new and existing buildings
  › Easy to understand: the smaller the number the higher the energy efficiency

› **The higher the energy efficiency, the higher the promotional incentives**
Development of energy-efficiency standards

Primary Energy Demand (PED) for Heating [kWh/m²a] e.g. one-family house

- WSVO 1977
- WSVO 1984
- WSVO 1995
- EnEV 2002
- EnEV 2007
- EnEV 2009
- EnEV 2014

regulatory requirements
usual market standards

source: KfW / IBP, Erhorn
German Energy Savings Regulations (EnEV 2009)

› Energy standards for the construction and the energy-efficient retrofitting of residential and non-residential buildings:
   › with regard to the envelope
   › with regard to heating, cooling and air conditioning techniques as well as warm water
› Determines calculation methods
› Regulation for Energy Performance certificates

German Energy Savings Regulations (EnEV 2014)

› Control system for energy performance certificates
› Introduction of Low-Energy Building Standard or Zero Energy Building (ZEB) (Art. 9 EPBD)
› Energy indicator for property advertisements
› Proportion of renewable energy in energy performance certificates for new build
› Primary energy indicators for all energy performance certificates
KfW-Efficiency House
Requirements reduced on two values

Annual Primary Energy Demand $Q_p$ (PED)
(required energy demand for heating, ventilation and hot water; considering the energy source, heat generation, storage, distribution etc.)

Transmission Heat Loss $H_T$
energy loss of the building through its components (building envelope)
CO₂-Rehabilitation Programme

KfW-Programmes for Residential Buildings and Buildings of cities/municipalities and social institutions

New Buildings

Energy-Efficient Construction of KfW-Efficiency Houses
- loans
- up to € 50,000
- Repayment Bonus
- Home owners

Existing Buildings

Energy-Efficient Refurbishment of KfW-Efficiency Houses or Single Measures
- grants or loans
- up to € 75,000
- Repayment Bonus
- Home owners

Energy consulting before and carry out of measures by an expert
www.energie-effizienz-experten.de
## CO₂-Rehabilitation Programme

**Energy-Efficient Refurbishment (KfW-Programme)**

### Annual primary energy demand**

<table>
<thead>
<tr>
<th>KfW-Efficiency House</th>
<th>55 %</th>
<th>70 %</th>
<th>17.5 %</th>
<th>25.0 %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>70 %</td>
<td>85 %</td>
<td>12.5 %</td>
<td>20.0 %</td>
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<tr>
<td></td>
<td>85 %</td>
<td>100 %</td>
<td>7.5 %</td>
<td>15.0 %</td>
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<tr>
<td></td>
<td>100 %</td>
<td>115 %</td>
<td>5.0 %</td>
<td>12.5 %</td>
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<tr>
<td></td>
<td>115 %</td>
<td>130 %</td>
<td>2.5 %</td>
<td>10.0 %</td>
</tr>
<tr>
<td></td>
<td>160 %</td>
<td>-</td>
<td>2.5 %</td>
<td>10.0 %</td>
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</tbody>
</table>

** in % of the reference building of Energy Savings Ordinance (EnEV)**

### Transmission-heat-loss***

| KfW-Efficiency House Monument | -     | -     | 2.5 %  | 10.0 % |

### Repayment Bonus

<table>
<thead>
<tr>
<th>Loans or Grants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,00 % p.a.*</td>
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</tbody>
</table>

### Grants

| 10.0 %          |

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* 06.06.2012 effective interest-rate; loan amount max. € 75,000 per housing unit for KfW-EH and max. € 50,000 per housing unit for individual measures.
How does the funding work?

Refinancing through KfW and on-lending through commercial banks

Government → KfW → Customers bank → Customer

- Government provides grants to KfW.
- KfW lends to Customers bank with a promotional mandate defined by KfW Law.
- Customers bank lends to the customer.

Advantages:
- Competition neutrality with commercial banks.
- Concentration on core competences.
- Diversification and minimisation of risk.
CO₂-Rehabilitation Programme (KfW-Programmes)

Commitment Volumes since 2006

€ billion

<table>
<thead>
<tr>
<th>Year</th>
<th>Commitment Volume Housing</th>
<th>National Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>5.5</td>
<td>1.5</td>
</tr>
<tr>
<td>2007</td>
<td>3.5</td>
<td>0.9</td>
</tr>
<tr>
<td>2008</td>
<td>5.4</td>
<td>1.3</td>
</tr>
<tr>
<td>2009</td>
<td>8.9</td>
<td>2.0</td>
</tr>
<tr>
<td>2010</td>
<td>8.7</td>
<td>1.4</td>
</tr>
<tr>
<td>2011</td>
<td>6.5</td>
<td>1.0</td>
</tr>
<tr>
<td>2012</td>
<td>9.9</td>
<td>1.5</td>
</tr>
<tr>
<td>2013</td>
<td>10.4</td>
<td>1.8</td>
</tr>
</tbody>
</table>
CO₂-Rehabilitation Programme (KfW-Programmes)

Results 2006 – march 2014

› more than 3.5 million housing units were refurbished or newly erected
› nearly 50% of new residential buildings and 33% of refurbished buildings are cofinanced by CO₂-rehabilitation programme
› nearly 1,940 buildings of cities, municipalities and social institutions were cofinanced
› €11,1 billion federal funds (2006 – 2013) generated a
  › total investment of around €162 billion
  › 1 € public funding effects 12 € private investments in average per year
› climate will benefit due to less GHG-emissions of 7.1 mio. t per year (for an estimated 30 years lifespan of measures)
› Energy efficiency benefits all
  › saving of heating costs for tenants
  › tenants live in a more comfortable home
  › increase of market value of building
  › Energetic modernisation combined with maintenance measures are often economical
  › less-dependence on energy
CO₂-Rehabilitation Programme (KfW-Programmes)

› investments in energy efficiency create and safeguard annually up to 300,000 jobs in the small and medium-sized construction industry, 2013 up to 440,000 jobs

› additional budget of taxes and social security contribution as well as reducing costs of unemployment (expertise of Forschungszentrum Jülich, Germany) by reliefs to the public budget of about € 4 to € 5 by each €

› energy-efficient refurbishment and erection of „KfW-Efficiency Houses“ demand further training of

   › architects and civil engineers
   › engineers for heating etc.
   › energy consultants
   › skilled employees of construction industry
Lessons

› The more transparent and simple the promotional scheme …
  › the better it is to understand and
  › the easier it is to distribute

› The mandatory involvement of an energy expert is very important to
  › provide comfort to the investor regarding his energy efficiency project
  › assure a high degree of quality and reliability regarding energy efficiency level reached
  › assure target-oriented use of public funds and
  › assure high degree of reliability regarding the promotional effects

› Monitoring of promotional effects is important to show
  › economic and climatic impact
  › contribution to fulfill the goals of the Federal Government