

Focus on Economics

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KfW programmes on energy-efficient housing substantially contribute to the German energy turnaround

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The KfW programmes for energy-efficient construction and refurbishment are key components of the energy turnaround. A current evaluation again illustrates that these housing programmes make an indispensable contribution to the implementation of the Federal Government's energy and climate change decisions. The construction of new, highly energy-efficient buildings and the renovation of existing buildings to high energy standards essentially contributes to the reduction of energy demand and the lowering of greenhouse gas emissions. They also achieve enormous savings in heating costs. Finally, the additional demand in the construction sector has a positive effect on employment, which benefits SMEs in particular.

With the energy turnaround the German Federal Government is continuing its ambitious climate and energy policy goal: Greenhouse gas emissions are to be reduced by 40% by 2020 compared to 1990; the heating needs (final energy demand) in buildings are to be reduced by 20% by 2020 compared to 2008.

The energy turnaround will thus only succeed if large amounts of energy are saved. Great potential lies in the building stock: Residential buildings alone consume almost a third of all energy produced in Germany and cause a quarter of greenhouse gas emissions.

At the same time, about 9 million of the residential buildings built up to 1978 have not been energetically modernised or only marginally. That is three quarters of residential buildings in this age class.¹

The targeted use of thermal insulation and energy-efficient and renewable energy

heating systems are essential components to reduce energy demand and advance the energy turnaround.

This is where KfW's promotion comes in on behalf of the Federal Ministry of Transport, Building and Urban Development: The programmes for energy-efficient construction and refurbishment, which receive favourable terms through German federal budget funds or from the national Energy and Climate Fund, provide financial incentives for more energy efficiency in the housing sector.

The impacts of the promotion are noticeable. This is illustrated by the numbers from the recent evaluation for the promotional year 2011 conducted by the German Institute for Housing and the Environment (IWU) and the Bremen Energy Institute (BEI).²

Promotional measures trigger high turnover

The measures promoted in 2011 alone triggered investments amounting to EUR 18.4 billion. If along with direct sales, the sales from additional demand from wholesale service items are included (such as demand for insulation materials, heating furnaces, etc), the promotion results in a total turnover volume of EUR 27 billion for 2011.

The **Energy-efficient Refurbishment** programme comprised about 60,000 promotional commitments to modernise 181,000 homes. This led to the implementation of modernisation measures for increasing energy efficiency in 0.5% of all housing units in Germany.

When modernising there are two approaches: Either the building is subjected

to a complete package of modernisation measures to attain a KfW efficiency house standard or individual measures or combinations of measures are implemented to increase efficiency.

The **Energy-efficient Construction** programme supported about 45,000 building projects in 2011. These represent a good 81,000 housing units and thus almost every second newly constructed home in Germany in 2011.³

Significant energy savings through thermal insulation measures

The considerable energy savings in the Energy-Efficient Refurbishment and Energy-Efficient Construction programmes play a key role in attaining the energy goals of the German Federal Government: Alone the promotional support provided in 2011 with annual energy savings of 1,550 GWh annually meets 15% of the ambitious goals of the energy turnaround. These require (with proportional inclusion of residential housing) annual energy savings of about 10,000 GWh up to 2020.

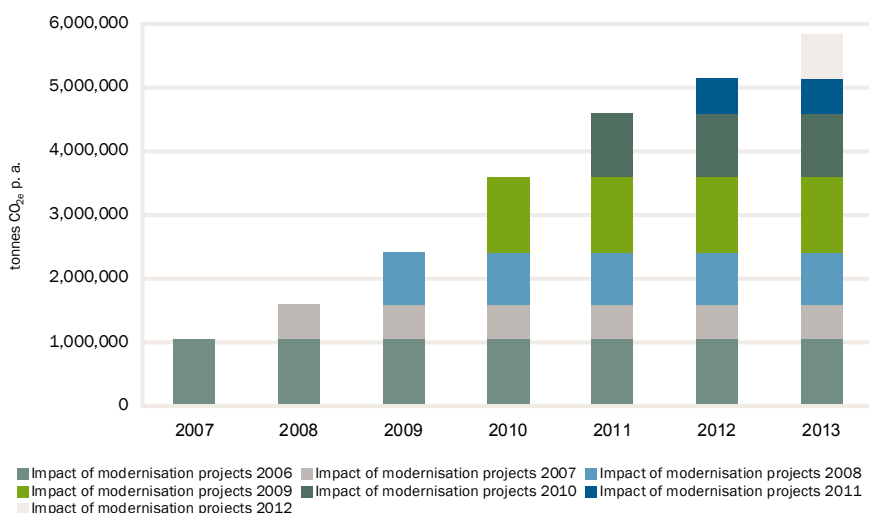
The refurbishment of existing buildings contributes to this result with savings of approximately 1,250 GWh per year. Proportionally, the reduced use of heating oil particularly saves energy. In new buildings about 300 GWh per year were saved compared to the reference value of the Energy Saving Ordinance 2009 (Energieeinsparverordnung/EnEV).

KfW programmes drive reduction of CO₂ emissions

Households would have to reduce about 2.4 million tonnes CO₂ by 2020 in order to achieve their proportional share of total greenhouse gas emissions reductions targeted by the German Federal Government (reduction by 40% by 2020).⁴ The new and converted buildings financed in 2011 contributed more than 20% to this goal with a reduction of 540,000 tonnes CO_{2e}.

The Energy-efficient Refurbishment programme achieves the lion's share of greenhouse gas emission reduction. Tar-

Chart 1: Accumulated CO_{2e} reduction from 2006 to 2012 (tonnes p.a.)



Source: IWU/BEI 2012, own calculations.

geted modernisation measures in 2011 reduced CO_{2e} emissions by about 457,000 tonnes per year. This corresponds to a reduction of approx. 35% compared to the emission levels before the modernisation.

In 2011, new building constructions with particularly high energy efficiency levels accounted for a reduction of 85,000 tonnes CO_{2e} per year compared to a home built according to the applicable Energy Saving Ordinance (Energieeinsparverordnung).

Adding up the reductions from these promotional programmes since 2006 results in impressive 5.7 million tonnes CO_{2e} p. a.

saved (see Chart 1)⁵.

Warm homes for low costs

Well insulated buildings with energy-saving heating systems reduce the burden on pocketbooks as they significantly reduce heating costs. The actual figures for energy renovations are remarkable: Savings in heating costs of EUR 3.3 billion - resulting from the promotional support in 2011 - cover approximately three quarters of the investment amount over a time period of 30 years.⁶

For newly constructed homes, savings in heating costs amounted to approx. EUR 900 million in 2011. This is 6 % of the investment amount, which is considerable

as it corresponds to the total costs for the new construction. Thus, alone the share for the additional energy modernisation costs of the investment is significantly higher.

Energy-efficient Refurbishment - Well packaged to meet the KfW Efficiency House standard

Through complete refurbishment the homes attain the KfW Efficiency House standard which goes far beyond the legal minimum requirements.

Insulation measures were implemented for almost all full refurbishments. The quality of the insulation exceeds the legal standards (EnEV 2009). Chart 2 shows the average heat transmission coefficients (U-values) of promoted measures and compares them against the requirements of the EnEV 2009. The lower the U-value the better the quality of thermal insulation. In fact, the promoted thermal insulation measures achieve a substantially higher thermal insulation than required by the EnEV 2009.

The promotional programmes also support the transition to a sustainable energy supply: In more than one out of two energy-saving modernisation projects (54 %) the **heating system** was renovated. A biomass boiler was used in 10 % of modernisations, while an electric heat pump was used in 8 %. In addition, in about 20 % of the cases solar systems were installed.

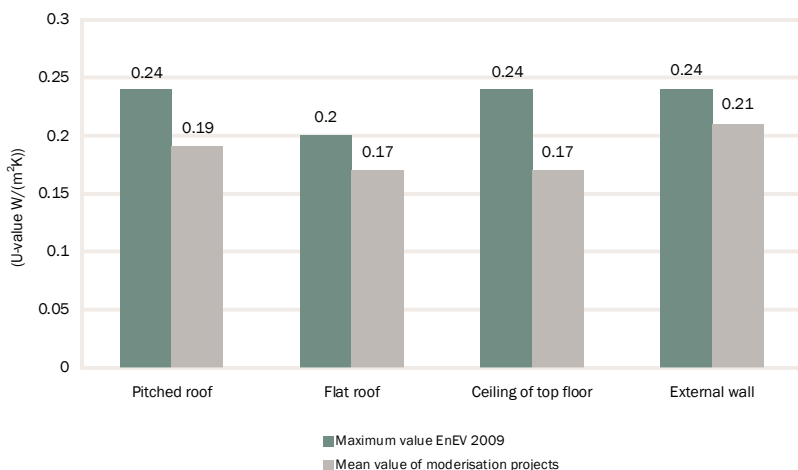
Energy-efficient Construction: Use of sustainable heating systems

Energy efficiency in new buildings is also clearly above the legal requirements: The homes supported in 2011 exceed the requirements of thermal insulation by 32 % to 53 %.⁷

This is made possible firstly through a sustainable energy system. Every second promoted house uses heat pumps for the **heating system**; 12 % of new builds use biomass for heating. Solar thermal and photovoltaic panels were installed in nearly half of the buildings (49 %).

Modern construction makes targeted thermal insulation possible. Besides single-layer masonry (with or without additional insulation: 52 %), primarily double-shelled masonry with insulation (16%) or also wood construction (27 %) is used.

Chart 2: Average heat transmission coefficient in terms of renovation and requirements EnEV 2009 (U value in W/(m²K))



Source: IWU/BEI 2012, own calculation

In nearly all new builds (90 %), triple pane **windows** avoid unnecessary heat loss; in every fifth house the heat insulation is improved through additional installation of highly insulated window frames ("passive house windows").

Employment effects strengthen SMEs

The promoted (conversion) construction measures also have a noticeable impact on the labour market in that they trigger considerable employment effects. Overall in 2011 about 251,000 jobs were secured or created for one year. Of this number, new builds created the largest share with 199,000 jobs.

The construction industry accounts for nearly three fourths of the direct employment effects. This also triggers indirect employment effects through the demand for inputs such as heating furnaces or insulation material in other industries.

Due to the strong representation of SMEs in the construction industry, SMEs particularly benefit from the employment effects: 83 % of the overall employment effects occur in SMEs. In terms of direct employment effects, about 90 % of the employment effects benefit SMEs (see Chart 3).

Conclusion

In order to achieve the ambitious goals of

the energy turnaround every opportunity must be taken. For example, currently modernisation measures for exterior rendering or facades are carried out on about 425,000 residential buildings annually without making use of the opportunity to conduct an energy-saving rehabilitation at the same time.⁸ Energy-saving rehabilitation is for the most part cost-effective when it is incorporated as part of the rehabilitation cycle, in other words with already planned modernisation measures.

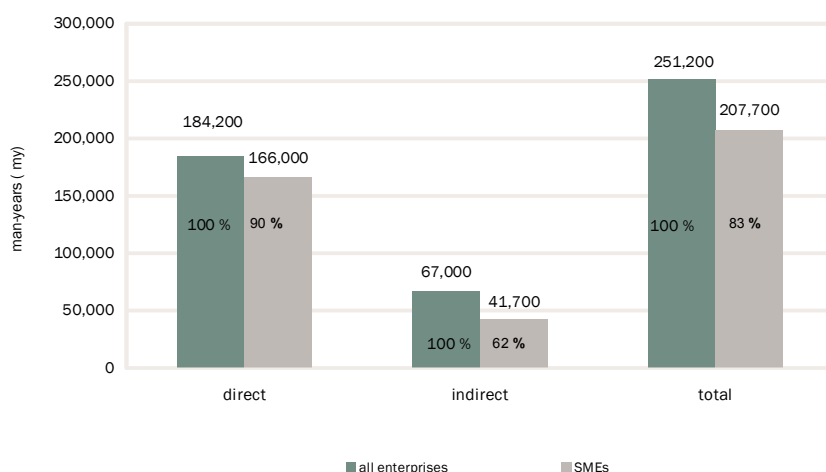
In this regard, the KfW promotional programmes have great relevance for energy policy. The targeted provision of promotional funds for energy-efficient housing triggers essential investments relevant to energy.

The most recent evaluation shows that the modernisation projects from 2011 alone greatly reduced both energy consumption (1,550 GWh per year) and greenhouse gas emissions (524,000 tonnes CO_{2e} p. a.).

At the same time the economy benefited significantly from the promotional measures. When including the inputs, the promoted measures triggered overall turnover of about EUR 27 billion in 2011.

This increase in turnover directly benefits the labour market. Overall the promoted measures in 2011 secured or created about 251,000 jobs for one year. Particularly SMEs with their strong presence in the construction industry benefited from these positive employment effects. ■

Chart 3: Employment effects of the Energy-Efficient Construction and Refurbishment and programmes 2011 (man-years)



Source: IWU/BEI 2012.

¹ Biogasrat e. V. (Editor) 2012, Ökologische und ökonomische Optimierung des Wärmemarktes, Stuttgart.

² The effects of the supported energy efficiency measures have been evaluated since 2006. The current and previous evaluations are available at http://www.kfw.de/kfw/de/KfW-Konzern/KfW_Research/Economic_Research/Evaluationen/CO2-Gebaeudesanierungsprogramm.jsp. The evaluation for the completed promotional year 2012 is under preparation.

³ In term of completed construction works in 2011, Federal Statistical Office, selected construction figures, 12/2011.

⁴ It is assumed that private households have a 40 % proportional share of emission reductions. However, there are no specific reduction targets for the private household sector.

⁵ Assumption: The CO_{2e} reductions always occur starting in the year following the investment. The figures for 2012 apply as at 30 November and are preliminary.

⁶ Calculated using the present value over a period of 30 years.

⁷ In the Energy Saving Ordinance (EnEV) the specific transmission heat loss HT^{*} is utilised for heat insulation of the whole building envelope. Furthermore, in terms of the promotion of efficiency houses through KfW, the specific transmission heat loss HT^{*} of the reference building must be calculated. In promoted new construction this value is 32 to 53 % lower.

⁸ IWU/BEI (2010), Database of Existing Buildings, Darmstadt.