Germany

KfW Energy Efficient Rehabilitation and Energy Efficient Construction Programmes

Context
A scheme from the German state bank KfW offering long term fixed rate low interest loans to support energy efficiency work during general refurbishment of existing buildings and to encourage energy efficiency standards in new build that are higher than the legally required minimum. The loans are supported by subsidies linked to the achievement of higher energy efficiency levels, together with general promotional activity. The current schemes were launched in 2008, but these built on similar programmes that had operated since 1996. To date, over 3 million German homes have improved energy efficiency as a result of the scheme.

Overall German primary energy consumption and emissions reduction targets exist, but they are not legally binding. The German energy conservation act 2009 states that ‘major changes to the building envelope (e.g. roof, exterior walls, windows) must be made 30% more energy efficient [than before] and the envelope must be 15% better insulated’ and ‘heating, hot water, ventilation, shading and cooling systems must be upgraded to include energy efficient, renewable technologies’.

Subsidies under the scheme are linked to the German Energy Conservation Ordinance (EnEV) that sets standards for the energy efficiency of new buildings. KfW was founded in 1948 as the Promotional Bank of the Federal Republic of Germany. Its shares are owned 80% by the Federal Government and 20% by the Länder. Its key functions include environmental and climate protection, and promotion of housing, education, infrastructure and social development. The other key stakeholders are the commercial banks.

Objective
The programmes aim to contribute to national carbon emissions reduction targets, essentially by adding energy efficiency work into the existing property renovation cycle. When the CO₂ Reduction Programme was first introduced in 1996 it also aimed to support a weakening construction industry and to channel investment into German Infrastructure.

The national climate change programme estimated that the programme would result in a reduction of 5–7MtCO₂ over the period 2000 – 2005, but this proved over-optimistic and evaluation of the programme in 2004 by Prognos IER suggested that the total reduction from improvements to existing buildings would be around 2 – 2.5MtCO₂. The current German government goal, expressed in the German Energy Concept 2050, is for a ‘climate neutral building stock’ by 2050. Recognising the additional progress needed, the energy strategy sets an aim of doubling the rate of energy-saving modernisation from 1% to 2% per year. The use of soft loans is based on the idea that these are more cost-efficient than subsidies and that, because costs are spread over a period, there is not such a
large pressure on the federal budget.

Programme description

Main characteristics

<table>
<thead>
<tr>
<th>Measures and recipients</th>
</tr>
</thead>
<tbody>
<tr>
<td>The KfW Energy Efficient Rehabilitation Programme and the Energy Efficient Construction Programme build on the experience of the KfW CO₂ Reduction Programme and the KfW CO₂ Building Rehabilitation Programme. These programmes focus on residential buildings, but similar schemes targeting municipal, commercial and industrial buildings have been created.</td>
</tr>
</tbody>
</table>

**KfW CO₂ Reduction Programme:** From 1990 onwards KfW provided reduced interest rate loans for modernisation of properties in the former East Germany. In 1996 an energy efficiency element was added to this work, through the KfW CO₂ Minderungsprogramm (CO₂ Reduction Programme). In 1999 the CO₂ Reduction Programme was extended to cover the whole of Germany. The programme ran until 2008.

**KfW CO₂ Building Rehabilitation Programme:** In 2001 the KfW CO₂ Gebäudesanierungsprogramm (CO₂ Building Rehabilitation Programme) was added. Whereas the CO₂ Reduction Programme supported investment in individual energy efficiency measures, this programme supported a series of packages of energy efficiency work. This programme also ran until 2008.

**KfW Energy Efficient Rehabilitation Programme:** In 2009, this programme replaced the existing buildings elements of the CO₂ Reduction Programme and the CO₂ Building Rehabilitation Programme. In essence it is very similar to these programmes, but with the addition of a standard: ‘the KfW Efficiency House’.

**KfW Energy Efficient Construction Programme:** In 2009, this programme replaced the new build elements of the CO₂ Reduction Programme and the CO₂ Building Rehabilitation Programme. As with the Energy Efficient Rehabilitation Programme, it is essentially similar to its predecessor programmes, with the addition of the KfW Efficiency House standard.

The current programmes are available to all building owners who have good enough credit scores, and there are no pre-defined target groups within this. The group of building owners includes private individuals, housing enterprises, housing cooperatives, real estate agents, municipalities, local community associations, districts, civil groups and ‘other establishments of public law’.

Between 1996 and 2000 the vast majority¹ of applicants for support were private households. However, this situation seems to have changed more recently: KfW have examined how the distribution of their loans in 2009 compared to the national distribution of tenure² and owner occupiers have a representative share, private landlords are underrepresented but their share is increasing, and

---

¹ 85% in terms of loan volume; 70% of dwellings

² Tenure split: owner occupiers 40.3%, private landlords 36.6%, others 22.7%. Loans split: owner occupiers 40.6%, private landlords 32.5%, others 26.8% (source Pflegner et al, 2012)
cooperatives and housing companies are somewhat overrepresented.

**Buildings and measures**

The programmes are intended to be technology neutral, the key criteria for measures is cost-efficiency and reductions in energy consumption. In the current programmes, energy savings have to be verified by an approved energy assessor before funding can be drawn from KfW.

Current programmes support both single measures (wall insulation, loft insulation, floor insulation, window replacement / refurbishment, installation of ventilation, replacement of heating systems) and a series of packages, detailed in Table 1 below.

**Table 1: Packages of measures supported**

<table>
<thead>
<tr>
<th>Package</th>
<th>Measures</th>
</tr>
</thead>
</table>
| 0       | • Retrofitted insulation on exterior walls  
         | • Retrofitted insulation on the roof       
         | • Retrofitted insulation of the basement ceiling or outside walls of heated rooms in contact with the ground  
         | • Replacement of existing windows         |
| 1       | • Replacement of central-heating boiler   
         | • Retrofitted insulation of the roof       
         | • Retrofitted insulation on exterior walls |
| 2       | • Replacement of central-heating boiler   
         | • Retrofitted insulation of the roof       
         | • Retrofitted insulation of the basement ceiling or outside walls of heated rooms in contact with the ground  
         | • Replacement of existing windows         |
| 3       | • Replacement of central-heating boiler   
         | • Change of heating energy carrier         
         | • Replacement of existing windows         |
| 4       | • A combination of measures from package 0 to 3  
         | • Proof of a 40kg reduction of CO2 emissions per m² floor area and year through calculations by an accredited energy advisor |
| 5       | • Replacement of a) decentralised furnaces fired by gas, oil or black coal, or b) night storage heaters, or c) black coal-fired central heating boilers with a heating system complying with EnEV  
         | Or  
         | • Replacement of standard oil- or gas-fired central heating systems installed before 01.06.1982 with oil- or gas-fired condensing boilers combined with solar thermal or other renewable energy sources (i.e. biomass) |

---

3 This differs from earlier programmes, where only a minority of plans had to be verified.
Finance and funding

Offers to home owners comprise low interest rate, long term loans, and a range of subsidies linked to the energy performance of the refurbished / new building. The loan can cover expenses related to the main investment, such as architects’ fees or energy advice. Home owners who do not require a loan can still apply for subsidies if their refurbishment will achieve the required standard of energy efficiency.

Additional elements of the offer include redemption-free start up years and off-schedule repayments at no extra cost. Money must be drawn down from KfW within 12 months of the loan being approved (although extensions to 24 months are possible) and at least part of the funding must be spent on measures within three months of the funding being released.

Maximum loan values under the CO₂ Building Rehabilitation Programme were:
- for packages 0 to 3, €250 ($263) per m² floor space
- for package 4, €100 ($105) or €150 ($158) per m² floor space, depending on the carbon savings achieved
- for package 5, €80 ($84.23) per m² floor space

Under the CO₂ Reduction Programme in 1996, the average loan per dwelling was €8,317. Under the CO₂ Building Rehabilitation Programme in 2001, the average loan per dwelling was €20,643 ($25,500).

Under the CO₂ Building Rehabilitation Programme, the interest rate was 1.3% for a 20 year loan and 1.6% for a 30 year loan. In September 2011, the interest rate was 1%, fixed for 10 years.

Subsidies provided under the programme are linked to energy efficiency standards set out in the German Energy Conservation Ordinance (EnEV)⁴. These are defined as a percentage of the loan that does not have to be repaid. The subsidies are available to everyone who takes out a loan; they are not linked to the applicant’s income.

Subsidies under the CO₂ Building Rehabilitation Programme were initially set at 20% of the loan value for refurbishments that brought buildings to the then level of the EnEV for new buildings. In 2004, this was reduced to 15%.

Since 2006, the level of subsidy has been linked to a series of levels of energy efficiency achieved. These are expressed in terms of the energy use of the dwelling compared to that of a new dwelling meeting the EnEV standard: a house meeting the standard would be referred to as an Effizienzhaus-100 (Efficiency-House-100); one using 15% more energy would be an Effizienzhaus-115; one using 20% less energy would be an Effizienzhous-80, and so on. A series of subsidies operated between 2006 and 2009, and a new series has been in place since 2010. These are both detailed in Table 2 below.

---

⁴People can still receive low interest loans without the subsidies if they implement measures that do not achieve the required standard of energy efficiency.
Table 2: Subsidy levels

<table>
<thead>
<tr>
<th>Year</th>
<th>Standard</th>
<th>Subsidy</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006 – 2009</td>
<td>Effizienzhaus-70</td>
<td>17.5% (max. €8,750; $11,600)</td>
</tr>
<tr>
<td></td>
<td>Effizienzhaus-100</td>
<td>10% (max. €5,000; $6,600)</td>
</tr>
<tr>
<td></td>
<td>Measures achieving ‘considerable savings’ (in homes built before 1995)</td>
<td>5% (max. €2,500; $3,300)</td>
</tr>
<tr>
<td>2010 - present</td>
<td>Effizienzhaus-55</td>
<td>17.5%</td>
</tr>
<tr>
<td></td>
<td>Effizienzhaus-70</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td>Effizienzhaus-85</td>
<td>12.5%</td>
</tr>
<tr>
<td></td>
<td>Effizienzhaus-100</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Effizienzhaus-115</td>
<td>7.5%</td>
</tr>
</tbody>
</table>

All the above categories of subsidy are available for refurbishment projects; new homes have to achieve at least an Effizienzhaus-85 standard to be eligible. KfW sources the majority of funding for its loan commitments from the capital markets. The Federal Government guarantees all its commitments and hence it has an AAA credit rating and the ability to secure the finance at low interest rates for high volume, long-maturity schemes. Federal funds are used to further reduce interest rates and provide subsidies.\(^5\)

The level of Federal funding has varied throughout the programmes’ lifetime: in 2000 the government initially allocated €200 million ($242.4 million) to cover the period to the end of 2003, but this budget was used up within the first year. Subsequently funding levels increased and, following the policy decision to aim for a doubling of the energy efficiency refurbishment rate, housing funds from Government sat at around €1.5 billion per year\(^6\) (around $2 million). In 2010 €0.8 billion was allocated by the Government to KfW specifically for energy programmes\(^7\) ($1.1 billion). In the past the funding has come from general Federal Funds, but in future it will come from the Energy and Climate Fund (which collects carbon certificate revenues and power plant duties).

Although KfW funds the loans and integrates the Federal Government-provided interest rate reduction and other subsidies, on-lending is through commercial banks. Hence there is no distortion of competition and no need for a branch network for KfW. The commercial banks bear the risk of default\(^8\) (there is no legal relationship between the final recipient and KfW), but are allowed to charge an additional interest rate premium that reflects both their administrative costs and these risks. This is capped, generally at 0.75% per year for households.

The recipient guarantees the loan repayment through a secondary land charge on the property. The primary mortgage on the property takes precedence over this.

\(^5\) Initially this funding came from post-war reconstruction funds, and so the scheme may only be replicable where there is a large amount of funding available for infrastructure investment.

\(^6\) Dorendorf, 2013

\(^7\) Novikova 2013 (ECEEE)

\(^8\) For commercial sector loans, KfW does offer the banks some partial exemption from liability
and the loan to value ratio of the property (i.e. the borrower’s collateral) is irrelevant to the decision to grant the loan. However, the loan is dependent on the borrower’s credit rating.

**Impact/Evaluation**

| Market Transformation | There are no comprehensive published data on the overall level of take-up across all the schemes that have operated since 1996. However, KfW figures show that around 2.1 million homes had energy efficiency improvement work funded through KfW loans between 2001 and 2011. There are approximately 40 million dwellings in Germany (2010) so this is 5.3% of homes. It is likely that the volume is higher in the later years of this period, as subsidies have been introduced. This assumption is supported by a report of financed measures in 2010 in 868,000 existing properties and 50 per cent of new homes. Following a reduction in government funding, the anticipated level of activity in 2012 was around 300,000 to 400,000 properties.

There are no surveys that record the level of public familiarity with the programme. The entire budget is used each year, which may suggest that familiarity is high (or that commercial banks promote the scheme well) but there is no assessment of the level of latent demand that could be met with higher funding. |
| --- |
| Energy savings | There is little published information about the monitoring and evaluation mechanisms used to track the performance of the programme, other than the requirement for energy assessments to support provision of subsidies. Most of the information about the scheme comes from sources within KfW and the independent evaluations that have been carried out seem to be based on a combination of data from KfW and modelling of impacts on buildings energy use.

There is no single figure for the overall impact of the programmes to date on energy use. However, there are estimates of the impact of the CO₂ Reduction Programme and the CO₂ Building Rehabilitation Programme up to 2004: the former is estimated to have saved 28.4PJ and the latter 16.6PJ. Note that neither of these figures includes any adjustment for deadweight.

Two different evaluations of the programmes operating between 2003 and 2005 suggest annual carbon savings from the programme that range from 50,000t to 500,000t. The disparity between these figures is not explained.

KfW’s own figures suggest a carbon saving from the programmes in 2006-2009 in the region of 3 million tonnes per year, suggesting that the 500,000t figure above is perhaps more likely. Another estimate suggests that, on average, buildings that benefit from energy efficiency improvements under the programme achieve reductions in carbon emissions of 59%. |
| Perspectives | There are various estimates of the programme’s impact on employment, ranging in recent years between 200,000 and 300,000 jobs created or protected each year. Largely as a result of this impact on employment combined with the purchase of energy efficiency measures themselves, the programmes are thought... |
to have resulted in more than four times as much revenue for the government as it cost in terms of public subsidies. Note that these employment and government revenue figures should be treated with caution as they do not take into account deadweight effects.

The programmes are designed to overcome high initial investment cost and long payback period barriers, and also the lack of awareness of the impact of renovation in energy consumption and about the technical options available.

Key strengths of the programme are:

- The structure of incentives, with subsidies increasing with the level of energy efficiency attained, that encourages deep retrofits
- The harnessing of existing refurbishment levels to add energy efficiency into normal refurbishment activity
- The fact that the programme is comprehensive, since almost all domestic buildings can be eligible for the subsidies
- The existence of additional regional and local subsidies makes the overall picture very complex, but does ensure that offers of varying additional attractiveness are available in many places
- The KfW-Effizienzhaus brand creates visibility and transparency.

Potential weaknesses include:

- The changes in the incentives on offer, linked to take up of the budget: this is potentially confusing for customers
- Under the original programmes that supported individual measures and not packages, a large potential for improvement was not accessed: perhaps only around 1/3 of the available potential in the buildings concerned was actually achieved.
- The key concern about the reported effectiveness of the programme seems to be around the treatment of deadweight / free-ridership: it appears that this is not taken into account in any reporting of impacts, despite some commentators suggesting that it could be as high as 30 to 50 per cent.

The reputation of KfW in Germany is based on its centrality to post-war reconstruction efforts. This situation is not replicated anywhere else, and hence caution is needed when considering transferring elements of the programme to other countries. Also, Germany now is a highly regulated social democracy with a high level of support for action on climate change; a situation which may in part be driving the relatively high level of uptake of the incentives.

Levels of core funding have been inconsistent and far lower than the €5 billion ($7.4 billion) annually that the German national energy agency estimates that KfW needs to ensure that 2020 energy and climate objectives are met. Although demand is sufficient for the current budget to be spent, it might not be at the level needed to meet these policy goals. KfW’s budget is exposed to political trends as much as any central government programme; achieving budgetary stability will be important to the future of the programme. The case for doing so may well be strengthened by the finding that in 2011, for every €1 of public money spent on the energy efficiency programmes, over €15 were invested in
construction and retrofit, and more than €4 went back to the public finances in taxes and savings – and that the positive leveraging effect of the programmes has been increasing\(^9\).

**Accompanying measures**

Germany’s banks, building societies and credit unions market the scheme to property owners, often when the latter are seeking finance for general property refurbishment.

Supporting this are energy efficiency campaigns run by DENA (the German Energy Agency), and a range of KfW promotional activities including KfW awards, information campaigns and a KfW academy to train business partners.

In addition to defining the framework for subsidies, the KfW-Effizienzhaus is used as a brand. It offers a consistent standard, defined by DENA, has energy auditor approval, and also translates complicated energy efficiency regulation into an easy to understand quality mark.

**References**

B. Dorendorf, Promotional programmes for energy efficiency in the housing sector Key principles and key results, Presentation at the CA EED meeting in Dublin 26th March 2013


R Hennes. “Enhancing the Building Stock for 2050 – Experience from German Promotional Programmes.” presented at the 55th IFH world congress, The impact of housing and planning on the economic environment, Tallinn, September 10,

\(^9\) (KfW Research and Forschungszentrum Jülich 2013)
2011.
