

# IMPACT ON PUBLIC BUDGETS OF KFW PROMOTIONAL PROGRAMMES IN THE FIELD OF „ENERGY-EFFICIENT BUILDING AND REHABILITATION“

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# IMPACT ON PUBLIC BUDGETS OF KfW PROMOTIONAL PROGRAMMES IN THE FIELD OF “ENERGY-EFFICIENT BUILDING AND REHABILITATION”

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## **1. Background**

Measures to reduce energy consumption and bring down CO<sub>2</sub> emissions in the building sector have been on the political agenda for years. KfW has for a number of years been promoting investment in schemes to save energy and reduce CO<sub>2</sub> in order to support the efforts of private and public property owners and to achieve the reduction targets set by policymakers. These activities are geared to an essential element of the strategy drawn up by the federal government in autumn 2010 [Federal Ministry of Economics and Technology (BMWi), 2010]. The contribution made by the building industry to energy efficiency and climate protection has gained in importance as a result of the decision to phase out nuclear energy [BMWi, 2011]. The efficiency standards for buildings should be raised ambitiously high and, between 2012 and 2020, the EnEV (Energy Conservation Ordinance) in particular should help to ensure that new buildings gradually comply with the future European standards for nearly zero energy buildings, while observing due and reasonable consideration of the impact on owners and tenants. Funds to improve the energy efficiency of buildings are to be increased to EUR 1.5 billion a year from 2012 to 2014 and additional amortisation opportunities are to be introduced in the building sector. Also under examination is the possibility of introducing a solution in 2015 by means of development programmes, such as the “White Certificate” environmental economic instrument, without placing a burden on public budgets [BMWi, 2011].

The evaluations of KfW programmes in this sphere for the funding years 2005 to 2009 showed positive results, not only in terms of investment stimuli, energy savings, CO<sub>2</sub> reduction and the impact on employment [Clausnitzer et al., 2010, Clausnitzer et al., 2007, Clausnitzer et al., 2008a, Gabriel & Balmert, 2007], but also regarding impact on public budgets

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<sup>1</sup> This is an abridged translation by KfW Bankengruppe of W. Kuckshinrichs, Kronenburg, T., Hansen, P. (2011), Wirkungen der Förderprogramme im Bereich ‚Energieeffizientes Bauen und Sanieren‘ der KfW auf öffentliche Haushalte, Forschungszentrum Jülich, STE Research Report, commissioned by KfW Bankengruppe.

[Kuckshinrichs et al. 2010b, Kuckshinrichs et al. 2010a]. KfW adapted its promotional programmes to the modified framework conditions in the funding years 2008 to 2010, also providing a considerable amount of funding for new construction for example. There is as yet no evaluation of the modified programmes in terms of the impact on public budgets.

## **2. Terms of reference and procedure**

The aim is to produce a brief analysis of the impact on public budgets of KfW programmes in the areas of energy efficiency and CO<sub>2</sub> reduction for the funding years 2008 to 2010. The analysis focuses on the short-term budgetary impact, i.e. in the year of the measure. The programme costs are shown, while surplus revenue and reduced expenditure for the relevant individual types of taxes and duties are listed and allocated to the regional authorities (federal government, states, municipalities) and to the social security institutions. The analysis for the funding year 2008 covers the following four KfW programmes: “CO<sub>2</sub> building rehabilitation”, “Ecological Construction”, “KfW municipal loans – energy-efficient refurbishments” and “Social investment – energy-saving building refurbishment”. The analysis for the funding years 2009 and 2010 covers the following four KfW programmes: “Energy-efficient construction”, “Energy-efficient refurbishment”, “Energy-efficient refurbishment – municipalities” and “Social investment – energy-saving building refurbishment”.

### **2.1 Model approach**

The investment stimulus triggered by the KfW programmes is taken from KfW data or estimated on the basis of individual analyses. Two cases are assumed in order to demonstrate the scope of potential investment stimuli. This scope ranges between induced investments in the sense of directly initiated ones, and promoted investments in the sense of supported ones. The impact of short-term demand on public budgets is calculated by using the STEIN model [Kuckshinrichs et al., 2009]. This is a static open input-output model (here without income multiplier), which has an added module to simulate the effects on public budgets. In this module all the relevant public revenues and expenditures are fully recorded within the context of the KfW programmes and allocated to the regional authorities (federal government, states, municipalities) and to the social security institutions. The extent of the impact on public budgets essentially depends on how far the induced volume of work is served by a demand for additional personnel. Two scenarios covering the range of possible reactions on the labour market are assumed. The entire volume of work is performed by existing staff working overtime in the overtime (OS) scenario, whereas additional personnel are appointed in the jobs scenario (JS); in the latter case the burden on public budgets is reduced as a result of avoided expenditure on unemployment. For the analysis of avoided

expenditure on unemployment, reference is made to studies by the IAB [Bach & Spitznagel, 2008], which record the total costs of unemployment in Germany.

## **2.2 KfW programmes: basic data and data analysis**

KfW programmes designed to improve energy efficiency and reduce CO<sub>2</sub> emissions in the building sector promote investments in energy-saving measures and the reduction of CO<sub>2</sub>, whether in the construction of new homes or in the refurbishment of housing and buildings that form part of the public and social infrastructure. The Federal Ministry of Transport, Building and Urban Development (BMVBS) provides budget resources to KfW for low-interest loans and for investment grants.

In April 2009 the “Energy-efficient refurbishment” programme superseded the programmes “CO<sub>2</sub> building rehabilitation programme – loan and grant variants” and “Housing modernisation – Eco-Plus variant”. This programme serves to promote comprehensive refurbishment into “KfW efficiency houses” or individual measures to improve energy efficiency. As well as repayment bonuses dependent on the primary energy consumption of the efficiency house, a special promotion is possible if construction is supervised by an external technical expert.

The former “Ecological construction” programme was superseded by the “Energy-efficient construction” programme in April 2009. This promotes the construction and initial purchase of “KfW efficiency houses”. It can also be used to promote the conversion of existing buildings and replacing new buildings into energy-efficient new buildings. The KfW loan will assume 100 % of construction costs (without the costs of the property) up to a maximum of EUR 50,000 per housing unit.

As for non-residential housing, the KfW programmes “Energy-efficient refurbishment – municipalities” and “Social investment programme – energy-saving building refurbishment” promote measures to improve the energy-efficiency of buildings that form part of the municipal and social infrastructure. Since 2008, low-interest KfW loans have been available to municipalities and non-profit-making organisations for energy-efficient refurbishment.

**Table 1: Programme to reduce CO2 in buildings (status: June 2011)**

	<b>New building</b>	<b>Building stock</b>
Federal budget funds Loans and grants	<b>Energy-efficient construction</b> KfW efficiency houses 70, 55 and 40, repayment bonuses (max. 10 %), max EUR 50k per housing unit [HU]	Energy-efficient refurbishment KfW efficiency houses 115, 100, 85, 70, 55 Individual measures up to max. EUR 50k per HU Complete refurbishment up to max. EUR 75k per HU Repayment bonuses (max. 12.5 %) or grants (EFH/ZFH) (max. 17.5 %)
Federal budget funds Loans		<b>Energy-efficient refurbishment – municipalities</b> <b>Social investment programme – energy-saving building refurbishment</b> Individual measures/complete refurbishment
Source: IEK-STE, compiled from KfW information		IEK-STE 2011

The KfW data on programme costs, the volume of loan commitments, the promoted investments in the construction sector and the impact on jobs are the basic elements on which the brief analysis is based.<sup>2</sup>

Table 2 shows the basic data for the funding years 2008-2010 of the programmes examined. The programme costs are covered by the federal government budget and, at around EUR 1,300 million in 2008 and almost EUR 1,400 million in 2010, are nearly the same amount in these two years. In 2009 approximately 50 % more was provided in federal funds, some EUR 2,000 million. As part of the federal government's economic stimulus package (Konjunkturpaket I), these funds were part of an economic policy designed to mitigate the downturn in the wake of the financial crisis.

<sup>2</sup> The results of individual programmes (CO2 rehabilitation and energy-efficient refurbishment) in terms of investments and impact on jobs were calculated by the Bremer Energie Institut [Clausnitzer et al., 2010, Clausnitzer et al., 2009, KfW, 2011b]. These results with regard to the investments induced by refurbishment in the construction sector and the resulting impact on jobs are directly incorporated.

**Table 2: Basic data on KfW programmes (EUR million)**

	2008				2009				2010			
	Credit Volume	Induced* [Promoted]* Investment	Induced* [Promoted]* Jobs	Programme costs	Credit Volume	Induced* [Promoted]* Investment	Induced* [Promoted]* Jobs	Programme costs	Credit Volume	Induced* [Promoted]* Investment	Induced* [Promoted]* Jobs	Programme costs
	EUR m	EUR m		EUR m	EUR m	EUR m		EUR m	EUR m	EUR m		EUR m
CO <sub>2</sub> building rehabilitation	3,104	3,394 [3,394]	51,000 [51,000]		-	-	-		-	-	-	
KfW municipal loans – refurbishment	80	125 [125]	1,878 <sup>1)</sup> [1,878] <sup>1)</sup>		-	-	-		-	-	-	
Social investment – energy-saving refurbishment	10	14 [14]	210 <sup>1)</sup> [210] <sup>1)</sup>		-	-	-		-	-	-	
Energy-efficient refurbishment	-	-	-		5,769	7,761 [7,761]	124,000 [124,000]		5,092	7,042 [7,042]	113,000 [113,000]	
Energy-efficient infrastructure	-	-	-		152	229 [229]	4,000 [4,000]		114	205 [205]	3,000 [3,000]	
<b>Total refurbishment</b>	<b>3,194</b>	<b>3,533</b> <b>[3,533]</b>	<b>53,089<sup>1)</sup></b> <b>[53,089]<sup>1)</sup></b>		<b>5,921</b>	<b>7,990</b> <b>[7,990]</b>	<b>128,000</b> <b>[128,000]</b>		<b>5,206</b>	<b>7,247</b> <b>[7,247]</b>	<b>116,000</b> <b>[116,000]</b>	
Inv./credit		1.11				1.35				1.39		
Ecological building	2,389	2,643 <sup>1)</sup> [8,648]	39,708 <sup>1)</sup> [137,911] <sup>1)</sup>		-	-	-		-	-	-	
Energy-efficient construction	-	-	-		3,094	4,175 <sup>1)</sup> [10,607] <sup>1)</sup>	66,886 <sup>1)</sup> [170,000]		3,654	5,087 <sup>1)</sup> [14,288]	81,418 <sup>1)</sup> [229,000]	
Inv./credit		1.11 <sup>1)</sup> [3.62] <sup>1)</sup>				1.35 <sup>1)</sup> [3.43] <sup>1)</sup>				1.39 <sup>1)</sup> [3.91]		
<b>Total refurbishment and construction</b>	<b>5,583</b>	<b>6,176<sup>1)</sup></b> <b>[12,181]</b>	<b>92,797<sup>1)</sup></b> <b>[191,000]</b>	<b>1,293</b>	<b>9,015</b>	<b>12,165<sup>1)</sup></b> <b>[18,597]<sup>1)</sup></b>	<b>194,886<sup>1)</sup></b> <b>[298,000]</b>	<b>2,035</b>	<b>8,860</b>	<b>12,334<sup>1)</sup></b> <b>[21,535]</b>	<b>[197,418]<sup>1)</sup></b> <b>[345,000]</b>	<b>1,366</b>

\* : Promoted by provision of KfW funds; induced in the sense of directly initiated by KfW funds

1): Data adjusted by the authors

Source: [KfW, 2011a, KfW, 2011c, KfW, 2011d, Clausnitzer et al., 2009, Clausnitzer et al. 2010], own conversion

IEK-STE 2011

The programme costs include an interest rate reduction and a grant, the proportion of which rises from 2 % in 2008 to 5 % in 2009 and 13 % in 2010. At the same time there is an increase in the ratio of investments to the volume of loans. For refurbishment work this ratio rises from 1.11 in 2008 to 1.39 in 2010. In new construction this quota rises to a significantly higher level from 3.62 in 2008 to 3.91 in 2010.

A distinction is made between induced and promoted investments for a further evaluation. A significant portion of the programmes' great success can be attributed to new construction. Given the loan system, promoted investments in this area cannot be fully considered as induced investments. The loan amount in this area is capped at a maximum of EUR 50,000, which is far below the total investment for a new building, and must be strictly allocated to the increased expenditure on energy efficiency. It thus makes sense to assume that the ratio of induced investments to the volume of loans is similar to that of refurbishment work. There is, however, no empirical data available on this. This is why the variants of promoted investments are also shown, whereby the upper limit of a possible investment stimulus is reached less frequently. Assuming this, induced investments for ecological and energy-efficient construction are lower than promoted investments. The induced investments for all activities in refurbishment and new building work amount to EUR 6,176 million (2008), EUR 12,165 million (2009) and EUR 12,334 million (2010), while promoted investments are significantly higher at EUR 12,181 million (2008), EUR 18,597 million (2009) and EUR 21,535 million (2010) (cf. square brackets in Table 2). Accordingly, the number of jobs consequently induced in new construction is significantly lower than in the case with promoted investments. The total numbers of jobs induced (directly and indirectly created) by refurbishment and new construction are 92,800 (2008), 194,900 (2009) and 197,400 (2010), but significantly more are promoted.

### 3. Budgetary implications of promotional programmes

When evaluating the successes of programmes from an overall economic perspective, it is essential that the measures were initiated by the programmes and would not have been carried out by the investors without the support of a programme (cf. [Schope, 2010]). It can certainly be assumed that individual transactions are profitable for the investors without the support of the CO<sub>2</sub> building rehabilitation programme. The analysis does not deal with the extent to which these investments may also have been made without the financial backing of the programme. Possible free-rider effects are therefore speculative but by no means completely unfounded on the basis of the decisions of a rational investor. The aspect of possible free-rider effects becomes relative, however, as the assumption of an all-knowing “homo economicus” as an investor sets the bar high. The programmes are also effective in the sense that, in many cases, they have first raised an awareness of the issue, and the information and advice provided by KfW have reduced transaction costs for investors. It has also been shown that measures to improve the energy efficiency of existing buildings carried out outside of KfW promotional activities have resulted into higher standards than required by EnEV, but significantly lower than those specified in KfW programmes [Diefenbach et al., 2010].

The promotional programmes can help to relieve the national budget if they induce increases in government revenue or reductions in government expenditure that exceed programme costs. The induced increase of government revenue arises from additional income from sales tax, taxation on wages and earnings, social security contributions and tax on business profits. The reduced national expenditure arises from the reduction in government aid money if unemployed people have gained employment subject to social security contributions as a result of the programmes.

The measures promoted by KfW have various implications for the national budget. Short-term demand occurs during the investment period because the production of construction services and the requisite advance payments increases the revenue from value-added tax, income tax and various other taxes. There are other long-term implications, as annual revenue from energy taxation falls as a result of energy conservation measures. There may be other implications if employment increases over the long term, if renovation work is reflected in the value of the properties or if the learning effects lead to a sharp rise in exports.

Table 3 shows the short-term impact of promotional programmes on the public finances at aggregate level. The government collects the highest revenues from sales tax levied on the investor, income tax and social security contributions, including solidarity tax. In 2010, for example, sales tax climbs to approximately EUR 2,300 million. This effect arises because in

the basic data provided by KfW the volume of loans issued is very much higher than in 2008 with similar programme costs to 2008 (Table 2). The ratio of investments to loans also increases in the basic data.

The taxation of business profits and income from assets takes the next position of importance. In the overtime scenario, induced investments relieve public budgets of net amounts of around EUR 1,500 million (2008), EUR 3,300 million (2009) and EUR 4,000 million (2010). The net amounts of relief under the promoted investments approach are significantly higher.

**Table 3: Budgetary implications of promotional programmes by means of induced and promoted investments (in EUR million)**

	2008	2009	2010
Programme costs	1,293	2,035	1,366
Sales tax levied on investor	1,173 [2,314]	2,313 [3,536]	2,343 [4,091]
Taxes on products levied on businesses, less subsidies	94 [185]	185 [283]	188 [328]
Other production duties levied on businesses, less any other subsidies	76 [150]	149 [228]	151 [264]
Income tax and insurance contributions, incl. solidarity surcharge	1,167 [2,302]	2,273 [3,475]	2,282 [3,984]
Taxation of corporate profits and income from assets, incl. solidarity surcharge	261 [515]	441 [674]	388 [677]
<b>Overtime scenario (OS)</b>	<b>1,478</b> <b>[4,173]</b>	<b>3,326</b> <b>[6,161]</b>	<b>3,987</b> <b>[7,978]</b>
Avoided expenditure on unemployment	857 [1,764]	1,800 [2,752]	1,823 [3,186]
<b>Jobs scenario (JS)</b>	<b>2,335</b> <b>[5,937]</b>	<b>5,126</b> <b>[8,913]</b>	<b>5,810</b> <b>[11,164]</b>
[ ]: promoted investments			
Source: own calculations	IEK-STE 2011		

Of greater significance is the avoided expenditure for unemployment, which includes the expenditures of the Federal Employment Agency, regional authorities and social insurance (health, pensions and nursing care insurance). Even a cautious approach (overtime scenario and induced investments) minus the programme costs shows a positive net impact on public budgets of over 100 % of programme costs for 2008 and 2009. Due to the relatively low programme costs for the funding year 2010, the net impact is significantly higher at around EUR

3,990 million. Assuming promoted investments, the respective amount of relief is even higher, approximately doubling in 2010.

The overtime scenario illustrates the extreme situation of the required work being fully covered by overtime. An optimistic view (jobs scenario and promoted investments) produces a significantly higher balance due to avoided expenditure on unemployment. Approximately EUR 5,900 million (2008), EUR 8,900 million (2009) and EUR 11,000 million (2010) more remain in public budgets. It must, however, be assumed that this scenario is a very unlikely one.

#### **4. Conclusion**

KfW promotional programmes for “energy-efficient building and rehabilitation” serve the low-interest and long-term financing of investments designed to save energy and reduce CO<sub>2</sub> in residential building stock, new buildings and in buildings that form part of the municipal and social infrastructure. In total, the federal budgets for 2008 to 2010 assumed around EUR 4,700 million of the programme costs for this purpose. These activities are an essential element of the federal government’s energy concept from autumn 2010 and of energy policy from June 2011.

The impact of the programmes on public budgets is of great significance for the overall assessment. These effects arise in the short term – i.e. in the year in which measures were promoted – from the programme costs and the investments as a consequence of which economic activities accompany changes in the government’s revenue and expenditure. The ratio of credit to investment is of crucial significance here. To this end, two cases were analysed to illustrate the scope of possible stimuli. This scope ranges from induced investments, in the sense of directly initiated ones, to promoted investments, in the sense of total costs of the promoted energy saving measures. It is plausible, albeit not empirically proven, to assume that the ratio of induced investments to volume of credit for the promotion of energy efficient new buildings is similar to that for the promotion of energy efficient rehabilitation of existing buildings. For this reason, the promoted investments variant is also illustrated, although the upper limit of a potential investment stimulus is unlikely to be reached.

Apart from the impact on taxes and duties, the extent of the impact on public budgets depends to what extent the required volume of work is done by additional staff. The two scenarios of “Overtime” and “Jobs” are examined to assess implications for the labour market. In both cases the effects are so great that the government account balance as a whole is positive. The less the work induced by the programme is done through overtime and the more it is done by taking on new staff, the better the government account balance turns out, and the

programme can thus be considered all the more a success from a general economic point of view. The “Overtime” variant shows a very conservative estimate, as it is unrealistic to neglect any kind of impact of productive activity in the labour market. The “Jobs” variant is based on the restrictive assumption that all production has been carried out by additional staff.

Based on KfW basic data, the success of the programmes is clear at aggregate level. A cautious approach (overtime scenario and induced investments) clearly shows a net relief for public budgets in all three funding years, which rises to approximately EUR 4,000 million in 2010. In the optimistic, albeit unlikely, variant (jobs scenario and promoted investments) the net relief to public budgets rises from approximately EUR 6,000 million in 2008 to approximately EUR 11,000 million in 2010.

All in all, therefore, from a general economic perspective KfW promotional programmes for “energy-efficient building and rehabilitation” can be seen as a successful funding instrument in terms of the housing industry and climate policy.

In terms of their impact on public budgets, however, there is nothing special about the programmes; similar outcomes can be demonstrated by completely different initiatives with no connection to climate protection if sectors with a comparatively high intensity of labour and low imports are concerned. The special nature of the programme is based on the fact that incentives designed both to internalise external effects in the field of climate protection and to promote energy efficiency are accompanied by a positive impact on employment and surplus government revenues.

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