Will there be an Energy Efficiency Fund in Germany?

Stefan Thomas
Wuppertal Institute for Climate Environment Energy
Döppersberg 19
D-42103 Wuppertal
stefan.thomas@wupperinst.org

Dr. Wolfgang Irrek
Wuppertal Institute for Climate Environment Energy
wolfgang.irrek@wupperinst.org

Keywords

Energy efficiency policy, energy efficiency fund, energy efficiency programmes, stakeholder impacts, financing, employment, Germany

Abstract

As many other countries, Germany misses to exploit most of its large potential for cost-effective energy efficiency improvements. An organisation collecting funds and allocating them to the most (cost-)effective programmes could be a solution.

Therefore, political parties and trade unions as well as environmental NGOs have called for the creation of such an Energy Efficiency Fund. A recent study by the Wuppertal Institute together with a number of partners, commissioned by the Hans Böckler Foundation, analysed the feasibility of such an institution.

It has been the objective of the project, completed in March 2005, to

- identify the added value of an Energy Efficiency Fund,
- develop concrete proposals for the institutional setting and the financing of an Energy Efficiency Fund in Germany,
- prepare and assess the benefits and costs of a portfolio of innovative but realistic energy efficiency programmes and campaigns, which the Energy Efficiency Fund would implement,
- identify the effects of the fundraising and the programmes on different industries, particularly on the suppliers of energy-efficient technologies and services, and on their growth and employment perspectives,
- estimate the net employment effects of such an Energy Efficiency Fund and its activities.

This paper presents the results and assesses the usefulness of the project and the participatory elements for increasing the acceptance of such a policy instrument.

Introduction and overview

As many other countries, Germany misses to exploit most of its large potential for cost-effective energy efficiency improvements. There have been building codes, labelling, information campaigns, soft loans for thermal insulation, and energy audit programmes by the federal, regional and local governments, and by some energy companies as well as the development of some energy performance contracting, particular for larger and public customers. But none of these has reached a level of impact that would achieve anywhere close to the full potential of market transformation for energy-efficient appliances or energy efficiency retrofits in buildings and factories. And too often, the different activities are not well co-ordinated between different programme agents and programme types (cf paper 5,225 by Lechtenböhmer et al.).

A professional intermediary between the providers and the buyers or users of energy-efficient end-use equipment and buildings is needed to overcome the many barriers to end-use energy efficiency, and to reduce the transaction costs for energy efficiency measures. This agent should combine targeted (if needed on-site) information, financing or financial incentives, and support for implementation. In

some cases, this package can be sold as an energy efficiency service; in most cases, it will have to be financed by the community of customers via the energy prices or by the state. In any case, a policy framework is needed to support the potential programme co-ordination and implementation agents, such as energy agencies, energy companies, consumer protection agencies, independent energy consultants, energy service companies, and other private companies.

Such supportive policy has been most effective (cf. Wuppertal Institute et al. 2000; 2002; 2003a, Irrek et al. 2003) where a combination has been created of

- An agreed or mandated, quantified target for energy savings,
- A channel or an allowance for raising funding and for avoiding net economic losses in a way not discriminating between companies, and
- A standardised and mandatory scheme for cost-benefit evaluation of the energy efficiency activities.

As the Table 1 shows for the example of energy efficiency in liberalised electricity and gas markets, there are two basic models; some EU Member States use both. An organisation collecting funds and allocating them to the most (cost-)effective programmes could be one solution. This is the way Denmark, the Netherlands, the UK, and Wallonia (Belgium) have chosen. An advantage of energy efficiency funds is that they can easily cover energy efficiency activities for other fuels such as oil or coal, maybe even transportation fuels. The other solution could be an obligation to either electricity and gas suppliers or network companies to achieve a certain amount of energy savings, coupled with the allowance to refinance the programme costs via the energy prices. Denmark, Flanders (Belgium), Italy and the UK have chosen this option, France is considering to follow suit. Both solutions, as far as the network energies are concerned, need to be complemented by a mechanism applied by the network regulation authorities to avoid any net losses in network revenues due to the energy savings. This is in place in countries such as Denmark, Italy, Portugal, and the UK.

Germany so far has not yet installed either of the two alternative solutions for creating a supportive policy framework for energy efficiency programmes and services. Given the large number of energy companies in Germany – making the control of an obligation potentially difficult – and the German political culture that is not very fond of creating obligations for economic actors, as well as reservations in the policy arena against too large a role for energy companies in promoting energy end-use efficiency, most experts in Germany favour an energy efficiency fund as the most likely solution (Wuppertal Institute et al. 2000; Wuppertal Institute et al. 2003b).

Therefore, political parties and trade unions as well as environmental NGOs have repeatedly called for the creation of an Energy Efficiency Fund. Examples include an Enquete Commission on future sustainable energy supply by the German Bundestag (Deutscher Bundestag 2002); the national convention of trade unions (2002); the Bundestag fractions of the Social Democrat and Green parties (2003); the Social Democrat party convention in the state of North Rhine-Westphalia (early 2004); and a coalition of environmental NGOs, trade unions, and ecological entrepreneurs (late 2004).

In December 2003, the European Commission proposed a Directive on energy end-use efficiency and energy services (COM (2003) 739). This Directive would require the Member States to save each year 1% more energy, mainly through energy efficiency programmes and services. It explicitly mentions the creation of Energy Efficiency Funds as one

Table 1: Framework for energy efficiency in EU-15 Member States.

Country	Electricity energy efficiency			Gas energy efficiency		
	Energy efficiency funds	Energy efficiency obligations	Others	Energy efficiency funds	Energy efficiency obligations	Others
Austria						
Belgium	X[1] (Wallonia)	X (Flanders)	A	X[1] (Wallonia)		A
Denmark	X	X	A, R		X	A, R
Finland			A			A
France		planned	A		planned	A
Germany			A			A
Greece	?	?	?	?	?	?
Ireland		X	A			
Italy		X	R		X	R
Luxembourg	?	?	?	?	?	?
Netherlands	X[1]		A	X[1]		A
Portugal			R			R
Spain						
Sweden						
UK		X	R		X	R

Source: based on Wuppertal Institute et al. 2000; Wuppertal Institute 2002

A – Negotiated agreements and other commitments for energy efficiency activities or savings targets
R – Reduction of disincentives or setting of incentives in ratemaking of monopoly segments
? – No information could be gained in the course of the study, no response to survey

[1] Energy efficiency activities financed via energy taxes and administered by the utilities.

way to achieve this. The Energy Efficiency Fund would thus also fit very well into the planned EU policy framework.

In early 2004, the Hans Böckler Foundation of the German trade unions commissioned a study by the Wuppertal Institute together with its partners Prof. Dr. Olav Hohmeyer, the University of Frankfurt am Main, and Triple Innova to analyse the feasibility of such an Energy Efficiency Fund. The background for the study, and why it focuses on the Energy Efficiency Fund as opposed to energy-saving obligations with or without a White Certificate scheme, is the decision of the German federation of trade unions (DGB) to call for the creation of an Energy Efficiency Fund.

It has been the objective of the project, completed in March 2005 (Wuppertal Institute et al. 2005), to

- identify the added value of an Energy Efficiency Fund compared to other policy instruments for energy efficiency and climate change mitigation,
- develop concrete proposals for the institutional setting and financing of an Energy Efficiency Fund in Germany, making use of an extensive dialogue with relevant stakeholders as well as scientific experts,
- prepare and assess the benefits and costs of a portfolio of innovative but realistic energy efficiency programmes and campaigns, which the Energy Efficiency Fund would implement e.g. via calls for tenders,
- identify the effects of the fundraising and the programmes on different industries, particularly on the suppliers of energy-efficient technologies and services, and on their growth and employment perspectives,
- estimate the net employment effects of such an Energy Efficiency Fund and its activities.

This paper presents the results and assesses the usefulness of the project and the participatory elements for increasing the acceptance of such a policy instrument.

We start with presenting the methodology. After that, the results for the four work packages – added value of an Energy Efficiency Fund, organisation and funding, programme portfolio, and stakeholder and employment impacts – will each be given one section for presentation. We conclude with an assessment of the usefulness of the project and the prospects for actually creating an Energy Efficiency Fund in Germany.

Methodology

The work was divided into four Work Packages:

WP 1 Necessity and appropriateness of an Energy Efficiency Fund for a change in framework conditions – as a part of the policy mix

WP 2 Institutional setting of, and the generation of income for the Fund

WP 3 Development of a portfolio of innovative energy efficiency programmes, with a preliminary concept for their implementation

WP 4 Estimating net employment effects, and identification of winners and losers from an Energy Efficiency Fund

In order to improve the quality of the results, broaden the scientific perspectives, and enhance stakeholder acceptance of the solutions proposed, two workshops were held and further experts were invited for both oral statements at the workshops and written comments on the first draft proposals for organising the Fund and generating the funds.

The two workshops were held on 7 October 2004 in Berlin, at the headquarters of the Deutscher Gewerkschaftsbund (German federation of trade unions), and on 24 February 2005 in Düsseldorf, at the headquarters of the Hans Böckler Foundation. At the first workshop, around 40 invited experts from federal and state governments, federal and state energy agencies, parliament, energy industry associations, associations of energy performance contracting companies and energy efficiency industry, trade unions, the federal investment bank, environment and consumer NGOs commented on the preliminary findings of the project on WPs 1 to 3. At the second workshop, the preliminary final results of the project were presented to a broader audience of 70 from the same and other stakeholder groups, and discussed again.

WP 1 AN ENERGY EFFICIENCY FUND AS A PART OF THE POLICY MIX

The objective of this work package was to prove the necessity and appropriateness of an Energy Efficiency Fund for a change in framework conditions, as a part of the policy mix. This included the relation of an Energy Efficiency Fund to existing or planned policies as well as the added value of a Fund compared to these.

In order to achieve this objective, stock was taken of existing or planned policies in comparison to energy efficiency potentials by sector and end use, and barriers for their implementation that are addressed by current or planned policies. In this way, gaps were identified that an Energy Efficiency Fund is needed for and able to close.

WP 2 INSTITUTIONAL SETTING OF, AND GENERATION OF INCOME FOR THE FUND

It was the objective of this work package to develop a proposal for the institutional setting of, and the generation of income for the Fund, that is adapted to the political and isntitutional framework in Germany and therefore stands realistic changes of being implemented.

The first step was an analysis of existing or proposed Energy Efficiency Funds from Germany and abroad. Then, potential ways of organising and financing the Fund were collected and analysed by a set of criteria. The results were intensely discussed during the stakeholder dialogue provided through the two workshops.

Furthermore, six experts on energy efficiency policy, Dr. Michael Brand (azes, Saarbrücken), Markus Duscha (ifeu, Heidelberg), Barbara Schlomann (Fraunhofer-ISI, Karlsruhe), Dieter Seifried (Ö-Quadrat, Freiburg), Christof Timpe (Öko-Institute, Freiburg), and Klaus Wortmann (ISSH, Kiel), commented on the first draft proposals for organising the Fund and generating the funds. Some of these experts have themselves analysed possibilities for creating an Energy Efficiency Fund for Germany in the past.

Finally, the University of Frankfurt am Main (Prof. Dr. Georg Hermes, Dr. Markus Pöcker) assessed the compati-

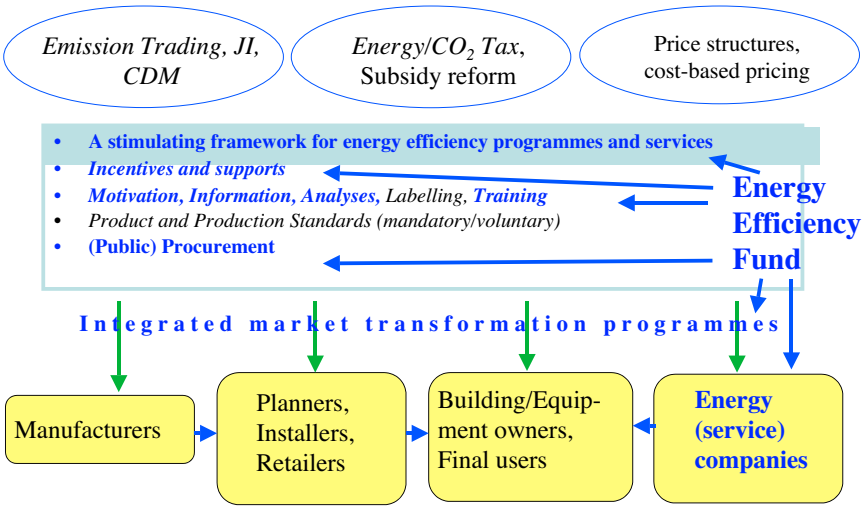

Figure 1. The Energy Efficiency Fund as part of the policy mix.
Types of policy instruments and programmes that exist or are planned (italics) and those that would benefit from the financing framework of an Energy Efficiency Fund (bold).

bility of the proposal with German and European law, and developed core elements for a law on the creation of the Energy Efficiency Fund.

WP 3 A PORTFOLIO OF INNOVATIVE ENERGY EFFICIENCY PROGRAMMES

Since the concept for an Energy Efficiency Fund can only be discussed in connection with the activities it is supposed to finance, this work package had the objective to develop around 10 well-presented energy efficiency programmes ready for implementation. They were to address particularly the gaps identified in WP 1. Based on existing experiences and evaluations, their impact on energy savings and CO_2 reduction had to be estimated as well as their costs and benefits. Dr Holger Wallbaum of Triple Innova assisted us with the programme for energy and resource efficiency in residential buildings.

WP 4 EMPLOYMENT EFFECTS, WINNERS AND LOSERS

This work package had three interlinked objectives: to identify sectors in the economy that would be winners or losers from the activities and the financing of an Energy Efficiency Fund; to estimate the net employment effects through macroeconomic model calculations; and to assess whether potential winner sectors and companies would benefit from better networking and lobbying for energy-efficient products and services.

Apart from market research on sectors producing energy-efficient products and services, case studies of potential winning companies were carried out via structured interviews. The case studies concentrated on sectors that would benefit from the portfolio of programmes developed in WP 3. These interviews and questionnaires sent out to further companies also helped to collect input data for the macroeconomic model calculations.

The latter were implemented by Prof. Dr. Olav Hohmeyer (University of Flensburg). He used an extended input-output model to calculate the employment effects in the whole market chain of the supply of energy-efficient solutions. Based on a scenario of energy and cost savings, and investments induced by the portfolio of programmes developed in WP 3 and potential further programmes, the overall employment effects of an Energy Efficiency Fund were quantified. These include indirect effects of the net increase in available income due to the net energy cost savings.

Why should there be an Energy Efficiency Fund in Germany?

There are of course many existing policy instruments to stimulate energy efficiency in Germany, from the EU, the national, regional, and local government levels, as well as energy efficiency programmes and services offered by energy companies and energy service companies. Since the space available for this paper does not allow us a full discussion, we can only present the types of policy instruments and programmes that exist and those that would benefit from the financing framework of an Energy Efficiency Fund in Figure 1, to demonstrate overlaps and gaps and how the Fund would fit into the policy mix, followed by a short discussion of these.

Figure 1 shows how the overall economic instruments (ovals at the top) and the sector- and technology-specific instruments (in the box in the centre; integrated market transformations programmes are packages of these) act together as the basic package of energy efficiency policy to stimulate energy efficiency measures by the agents in the markets for energy efficient technologies, services, and buildings (left three boxes at the bottom), but also the supply of energy efficiency programmes and services by energy companies and energy service companies (bottom, right).

The vertical arrows in Figure 1 are to show that the policy package should make energy efficiency easy, feasible and attractive for all market actors at the bottom. The horizontal arrows between the market actors represent market chains. The blue arrows originating from the Energy Efficiency Fund point towards policy instruments that would benefit most from the existence of such a Fund. They also point towards energy companies and energy service companies, since the Energy Efficiency Fund would enable these (and other) potential suppliers to offer energy efficiency programmes and services to all the other market actors. In that respect, the Fund will create a stimulating framework for energy efficiency programmes and services. Since this is a precondition for the sector- and technology-specific instruments, it is placed above these, and highlighted by a coloured background.

As we show through italic style letters in the figure, there are already a number of policy instruments in place in Germany. This includes: incentive programmes – mainly soft loans for thermal insulation of buildings; information, labelling, energy audit, and professional training programmes; EU standards for energy-efficient appliances and the German national building code. But these policies mainly target the residential sector, standardised appliances and thermal insulation. They are, furthermore, far from tapping the full potential, many are only available in certain regions, and too often these policies are not well co-ordinated between, e.g., separate information and financial assistance programmes. Their continuation is, furthermore, often threatened by budgetary constraints of the federal, regional, or local governments funding them.

By contrast, there is a lack in Germany of a stimulating framework for energy companies and others to implement more energy efficiency incentive programmes, or integrated market transformation programmes, and of a stringent, nationwide energy-efficient public procurement policy. Furthermore, few, weak, or no policies at all target the potentials for energy efficiency in buildings and installed systems in the tertiary sector and industry. All of these could be created with the help of an Energy Efficiency Fund, particularly if it has a stable source of funding that is not subject to cuts in the general federal government budget.

An Energy Efficiency Fund is thus not just another sector- or technology-specific instrument. It would create a stimulating framework enabling the funding of stringent energy efficiency programmes, particularly integrated market transformation programmes, a nation-wide motivation and professional training programme following the examples of some states such as North Rhine-Westphalia and Hesse, an independent infrastructure for on-site energy advice, and a strong support for the development and marketing of energy efficiency services such as energy performance contracting.

Since many energy efficiency measures (e. g. the replacement of circulation pumps in single family houses) are little, decentral measures with relatively high transaction costs, their realisation by energy performance conctracting schemes is not feasible. Therefore, a (financial) push is needed to overcome the existing barriers. This central stimulus should be co-ordinated nation-wide in order to:

- broaden the implementation of energy efficiency measures and its impacts,
- strengthen the impacts of already existing decentral initiatives and programmes, and
- harmonise the market for energy efficiency services in Germany.

The creation of a new funds organisation would not be necessary, if the Fund was just a new portfolio of rebate programmes. For the implementation of a new rebate programme, existing organisations in Germany like the Bundesamt für Wirtschaft und Ausfuhrkontrolle (BAFA) could be used. However, since usually, the monetary incentives have to be co-ordinated with other instruments like information and motivation campaigns, labelling, individual advice, procurement, qualification and voluntary agreements, the Fund should be much more than just an instrument for giving financial support to final customers and/or other market actors, and thus should be created as an organisation of its own:

- The Fund co-ordinates the different instruments within an energy efficiency programme and between programmes, and thereby explores synergies.
- The Fund co-ordinates and finances different networking tasks.
- As a separate organisation with an own corporate identity and the task to co-ordinate energy efficiency activities nation-wide, the Fund follows the 'one face to the customer' principle.
- The Fund initiates the development of innovative concepts for the broad implementation of energy efficiency measures in a competitive way via tenders.
- The Fund should act as an independent, transparent organisation in order to be trustworthy.

Organising the Fund and generating the funds

As a first step of approaching a solution for the crucial question of how to organise and to feed an Energy Efficiency fund, we collected all potential options that seemed feasible at all, in order not to loose any possibility.

OPTIONS

The following potential options for the institutional setting of the fund were identified:

1. **public institutions:**
   administration of the Energy Efficiency Fund through
   ministry department,
   detached agency of a ministry,
   energy agency governed by the state or
   non-profit organisation initiated by the state or
   regulatory authority;
2. **(negotiated) sector self-organisation:** e.g.,
   administration by energy companies or
   by the energy efficiency industry or
   by the "Independent Transmission System Operator"
   (which, for electricity, is in the hands of the four trans-

mission companies in Germany);
in each case, either without or with regulatory oversight by a government ministry or agency, or by the regulatory authority.

We furthermore examined the following options for generating the funds:

1. from the general national government budget;
2. from the energy tax revenue;
3. sale of public assets in order to create a foundation (as has been done, e.g., for the Deutsche Bundesstiftung Umwelt);
4. "Efficiency Tenth of a Cent" as a new non-bypassable levy for the customers;
5. fees paid by energy companies (e.g. a fixed amount per customer);
6. sector self-organisation solutions I of the energy supply industry in order to fulfil legal obligations or (negotiated) self-obligations to save energy: companies provide shares of the financing for an Energy Efficiency Fund owned by the sector;
7. sector self-organisation solutions II of the energy supply industry: each company implements own programmes in order to fulfil legal obligations or (negotiated) self-obligations to save energy; integration of the programme costs into the supply price or the network fees of each company;
8. sector self-organisation solutions of the energy efficiency industry, i.e. the manufacturers or suppliers of energy-efficient technologies and services;
9. "Inefficiency levy" on inefficient appliances and equipment or buildings;
10. "NEEG model", adapting the model of the German renewable energy act (EEG) to energy efficiency: distribution network operators have to pay guaranteed amounts per saved kWh for well-defined energy efficiency programmes and measures in the network area. Just as with the EEG, the network operators can pass on the costs to the transmission network operators, who calculate the national average and pass it on further to each electricity or gas supplier; the amount of energy savings to be achieved is not fixed per se with this model, but can be controlled by the level of payment per saved kWh, just as with the EEG for the renewable energies;
11. "Optional Fund": coupled to an energy saving obligation. If energy companies miss their target, they can purchase energy efficiency certificates from an external Energy Efficiency Fund;
12. Mixed funding from more than one of the above approaches in Public-Private-Partnership (e.g., from energy tax revenue, direct payments of energy companies or parts of the network fees, participation of the energy efficiency industries, a share of the local authorities from their revenues from concession fees for electricity and gas networks, etc.).

Of course, the choice of the institutional setting is depending on the way that the funds are generated.

SELECTION CRITERIA

The next step was to select the most promising and plausible funding models. The following set of criteria was used for this step:

- Compatibility with German and European law,
- Compatibility with competition in the energy sector,
- Equity between customer groups or agents who cause energy consumption and have the possibility to act,
- Equity between customer groups paying the funds and those benefiting from the programmes,
- Limiting the transaction costs of the Energy Efficiency Fund,
- Independence from particular economic interests, e.g., of the energy supply or efficiency industries,
- Independence from political changes,
- Stable financing over several years,
- Degree of acceptance by decision makers and by the public.

SELECTION OF OPTIONS

Based on the selection criteria, first of all several options for financing were ruled out. Finally, the following three options were analysed more closely:

- From a theoretical, economic point of view, the "Efficiency Tenth of a Cent" as a new non-bypassable levy for the customers seems to be the best and most stable option. However, to avoid legal problems during implementation, much effort has to be laid on a design compatible with competition and German law. On average, about 0,06 Cent/kWh gas, oil, district heat or coal and 0,09 Cent/kWh electricity would be needed in order to finance the portfolio of energy efficiency programmes shown in Table 3. While commerce and industry would only have to pay 0,04 Cent/kWh gas, oil, district heat or coal and 0,06 Cent/kWh electricity, the average surcharge for private households would be about 0,09 Cent/kWh gas, oil, district heat or coal and 0,17 Cent/kWh electricity. This is due to the fact, that the majority of the activities addresses private households and thus has to be financed by private households according to the equity principle.
- A more realistic model with low transaction costs and higher acceptance would be to combine the introduction of an Energy Efficiency Fund with the planned revision and possible further steps of the German eco tax system. The additional burden on the energy bill of the different customer groups would be of the same size as the "Efficiency Tenth of a Cent". For example, for a typical private household taking part in the proposed programme offering support for the optimisation of the heating system and the installation of a high efficiency 'Factor 4' circulation pump in a single occupancy and semidetached houses this would mean an increase in the annual end-

use energy bill of 31,70 Euro. Furthermore, the household will have to invest an annuity of 79,85 Euro for the energy efficiency measures implemented. On the other hand the household will receive a rebate (annuity of 31,97 Euro) and experiences energy cost savings (248,72 Euro). In the end, this household would make a profit from taking part in the programme (+ 169,14 Euro). However, the problem with the eco tax model is its dependence on yearly budget negotiations.

- Several participants in the workshops and experts favoured the NEEG model, since in principle it provides flexibility concerning the agents to implement the energy efficiency programmes and measures, and creates incentives for innovation in terms of technologies and programme agents. It could even allow larger customers to propose their own energy efficiency measures and receive the bonus payment. Furthermore, this model does not face any legal constraints. However, taking a closer look, a problem with the NEEG model is the same as with the White Certificate models in Italy and France: the difficulty to define and measure the savings with sufficient accuracy, since these are the basis for the payment. In fact, the main difference between the NEEG model and White Certificates is that the latter are based on a fixed savings target, with prices per saved kWh determined by the market, whereas the NEEG model uses fixed prices per saved kWh but the amount of savings is determined by the market. It will therefore probably take a certain time to develop the definitions for energy efficiency measures and the methods for determining the savings for each type of measure. E.g., the Italian energy regulator AEEG has already defined around 20 detailed methods for the determination of savings to make the White Certificate system operational, and more are to come (Pavan 2004).

THE PROPOSED CHOICE

Finally, the analysis based on the selection criteria particularly with regard to the possible acceptance and chance of implementation of the proposed system, and further considerations on the portfolio of programmes (see next section) have led us to propose the following ways of funding and organisation.

For the beginning, funding should come from the energy tax system. The parties forming the federal government have agreed to further developing the ecological tax reform and the energy tax system. At current oil price levels and during a period of increasing electricity and gas prices, it seems unlikely that they will decide on further full steps of increasing the electricity and fuel taxes. However, there still are considerable tax rebates for industry. These are likely to be further reduced, since EU legislation and the European Commission require action. A part of the funding for the Energy Efficiency Fund could come from this source of reducing tax rebates. It would fit with the equity principle among customer groups if these revenues were used to finance the large programmes we propose for energy-efficient lighting, pumps, ventilations systems and others for the commercial and industrial sectors. For the programmes for the residential sector, a small "Efficiency Tenth of a Cent" increase in the energy taxes seems to be acceptable, if the net benefit can be proven.

This financing option has the disadvantage that it cannot be sure, that the extra money will be dedicated to energy efficiency in the mid-term or long-term. However, this solution might be more acceptable in Germany than the other options, since it could be realised relatively fast and because a majority would like to see at least part of the money from the eco tax being spent for ecological and climate protection activities. Furthermore, this solution can be designed consistent with the State subsidies rules of the EU.

This way of funding implies the creation of a public non-profit organisation initiated by the state as the natural choice of the institutional setting. This could be organised in a similar way as the Danish Electricity Saving Fund. The organisation could have the legal form of a foundation with a board overseeing the operations and an advisory committee consisting of about 20 stakeholders from a broad range of relevant market actors. In addition, a gender-energy-efficiency network would be established to secure gender mainstreaming of the activities and to give advice on programme development and implementation. The main purpose of the foundation would be to induce verifiable energy savings by initiating the implementation of energy-efficiency measures on the demand-side.

One of the programmes we propose is a pilot programme providing fixed payments per saved kWh. This is supposed to test the NEEG model. During the next two or three years, if the test is successful, this part of the portfolio could be widened in scope and volume, so that the idea of the flexible NEEG model, buying White Certificates at fixed prices, could be realised step by step. For the calculations in Table 2, it has been already assumed, that the pilot programme will be widened in scope and volume after the test phase. Still, in this proposal, the funding for the purchase of the energy savings would come from the national state budget.

However, after a number of years, if it has been successfully introduced, it might be able to find the acceptance in the public to convert it into the full NEEG model, with the payments made directly by the distribution network companies to the producers of energy savings, and integrated into the normal electricity and gas prices in this way. The same way of funding energy efficiency might then be possible with the heating oil supply chain and prices. However, if energy prices rise fast until this time, acceptance will be diminished.

A portfolio of programmes for immediate release

Reflecting our knowledge on existing energy efficiency potentials in Germany (e.g., Deutscher Bundestag 2002; Fischedick et al. 2001; 2002), we looked at existing policies to harness these potentials (cf. paper 5,225 for the residential sector) and thus were able to identify policy gaps.

Based on the results of this analysis, we developed a set of 12 programmes for short-term release through an Energy Efficiency fund in Germany. Among these are 9 technology-specific programmes, which are often also targeting specific

Table 2. Proposed portfolio of energy efficiency programmes of an Energy Efficiency Fund in Germany.

Measures/Technologies addressed by the programme	Additional investment costs[1] Mio. EUR	Total funds needed[2] Mio. EUR	Saved energy costs[3] Mio. EUR	Energy savings/a in the year 2015		TRC[4]	Net employment effects[5]
				Electricity GWh/a	Heat GWh/a		
Technology-specific programmes							
Insulation (improved and increased refurbishment of existing buildings)	6 822	3 142	12 096	1 661	26 790	1,06	256 570
Energy-efficient dryers	755	164	1 750	2 176	*- 1 787*	1,30	12 316
Energy-efficient refrigerators and freezers	648	380	1 762	1 703		1,39	12 011
Conversion of electric heating to more efficient heating systems	1 253	408	3 878	5 001	*- 5 314*	2,38	26 653
Day-light, movement and presence sensors in offices	689	231	1 172	1 540		1,29	7 709
High efficiency ‚Factor 4' circulation pumps and optimisation of heating system in single occupancy and semidetached houses	1 404	485	3 374	1 950	6 633	1,46	40 261
High efficiency circulation pumps and optimisation of heating system in larger buildings	601	116	1 162	803	1 944	1,22	11 692
Optimisation of dry running pumps in industry and commerce	2 505	381	6 249	11 004		2,22	34 275
Refurbishment of ventilation and air conditioning systems	2 644	346	3 379	3 773	3 300	1,05	50 584
Other programmes							
Energy management and internal performance contracting in public administrations	296	230	484	255	745	1,21	5 247
Deficiency suretyship for performance contractors	1 740	78	2 232	1 813	4 174	2,38	23 856
Programme testing and further developing the NEEG model[6]	27 122	4 513	46 270	43 401	65 214	1,27	528 942
Overall Fund management		2					
TOTAL	**46 480**	**10 480**	**83 808**	**75 079**	**101 700**	**1,31**	**≈ 1 010 000**

1 Additional costs of investing in a particular energy-efficient solution compared to the reference case (present value)

2 Total means of finance needed by the Energy Efficiency Fund for paying rebates, further programme costs and organisational costs independent from running the programmes (present value).

3 Energy cost savings from the perspective of the customers (reduced energy bills; present value).

4 Total Resource Cost Test

5 Total sum of net person-years over the lifetime of the measures (on average about 40 000 person-years/year)

6 Pilot programme providing fixed payments per saved kWh to test the 'NEEG model', adapting the model of the German renewable energy act (EEG) to energy efficiency, with fixed payments of 1,5 Cent/kWh electricity and 0,5 Cent/kWh heat saved (with the present value of these payments paid at once after installation and verification), and with a minimum amount of energy savings to be reached in total as a precondition for receiving these rebates.

The portfolio as a whole is designed for the period 2006-2015, while most of the programmes are designed for a few years only. The programme testing and further developing the NEEG model fills the calculative gap for the years until 2015. There should be a regular monitoring and evaluation of programmes and programme results, after which it should be decided about their further development. Investment costs, total funds needed and energy costs saved are given here as present values for the whole lifetime of the programmes.

sectors, and three programmes allowing complete freedom in terms technology choice: one programme for the public sector, one programme that aims to stimulate the market for energy performance contracting, and the already mentioned pilot programme providing fixed payments per saved kWh to test and further develop the NEEG model. The following table summarised key features of the 12 programmes (cf. Table 2).

Table 3. Winner and looser branches of an Energy Efficiency Fund in Germany (only employment impacts exceeding 50 000 person-years).

Branches (with impacts > 50,000 person-years only)	Employment impacts (person-years 2000)		
	Total employment impacts	Input-output impacts	Multiplier impacts
Winners			
Agriculture, hunting	54 460	43 509	10 951
Food, drinks	62 702	50 342	12 360
Machine building, mechanical engineering	124 485	123 161	1 324
Trade of cars	56 207	44 203	12 003
Retail trade	282 894	226 890	56 004
Hotels, restaurants, etc,	125 377	99 806	25 571
Services in the health and social sector, veterinarians	72 013	57 880	14 133
Installation of insulation	85 985	85 985	0
Installation of energy efficiency technologies within the NEEG programme	162 104	162 104	0
Total of winner branches	**1 026 227**	**893 880**	**132 347**
Losers			
Coal and peat	- 117 679	839	- 118 518
Energy and services for the energy industry	- 408 621	2 121	- 410 742
Services by public administrations, defence, social insurance	- 100 777	3 111	- 103 888
Total of looser branches	**- 627 077**	**6 071**	**- 633 148**

Winners and losers

Implementing an Energy Efficiency Fund in Germany with a portfolio of energy efficiency activities as it has been proposed here will have a net benefit for the economy as a whole. In particular, the energy end-users being addressed by the programmes, the craftsmen installing the energy-efficient technologies on-site, and the branches benefiting from increased consumption expenditures (retailers, hotels, restaurants, etc.) are the winners of an Energy Efficiency Fund (cf. Table 3). With regard to the production and trade of energy-efficient technologies, only those companies will receive a net benefit, which only or mostly produce or trade energy-efficient products, or which have a specific comparative advantage compared to other producers or tradesmen of the same branch. The benefit-cost ratio for the whole portfolio is 1,31, and the net employment impact exceeds 1 million person-years over the lifetime of the measures, i. e. about 40 000 person-years on average per year and more than 75 000 person-years in 2015.

The employment impacts have been calculated by combining an input-output analysis based on the input-output tables of the Federal Statistical Office of Germany, which differentiate between 59 branches, and a multiplier analysis. The main employment impacts of the energy efficiency programmes can be differentiated between

- impacts because of new, additional demand for energy efficiency technolgies and services,
- impacts because of reduced demand for end-use energy and
- impacts because of changes in consumption induced by the net reduction in costs of energy services.

Progress and prospects

It has been extremely useful to submit the arguments in favour of an Energy Efficiency Fund, the drafts for the energy efficiency programmes, and the draft concept for the organisation and fundraising to the scrutiny of experts and stakeholders. Their comments were instrumental in clarifying aspects such as

- The relation of the Fund to other policy instruments and its co-ordinating role;
- The relation of the Fund to the German Energy Agency (Dena) and the loans bank of the federal government (KfW) that implements many soft loan programmes on behalf of the government: while the Funds provides money and designs overall packages of information campaigns, professional training, individual advice and financial incentives, the Dena is an actor for implementing these, i.e., co-ordinating information and training campaigns nation-wide; while, on average, the Fund gives rebates of about 20% of the additional investment costs caused by the energy efficiency measures, the KfW provides soft loans for the additional part of the financing and for further measures not covered by the Fund;
- The relation also to other, decentralised actors in energy efficiency policy, programmes, advice, and services and its co-ordinating role, e.g., the Länder and their energy agencies, the local authorities and their energy agencies, private energy service companies, energy companies, consumer protection agencies, etc.
- The type of programmes that the Fund should run – targeting specific end uses and technologies with clear incentive programmes;
- The role of the Fund – defining the targets and elements of the programmes but contracting out the implementa-

tion of communication, information, training, audits or advice, and even paying out rebates;

- The impacts of the Fund on the different relevant actors, particularly private households, producers of energy-efficient technologies, craftsmen and energy companies.

Furthermore, the discussions confirmed that the choice we made for the preferable ways of organisation and financing seemed plausible to most of the stakeholders, too. However, it also confirmed scepticism that in the current political arena and situation it will be difficult to create a new organisation and either add even a small fee on top of currently high, and rising energy prices, or using a part of energy or general tax revenues for energy efficiency, when Germany is struggling to return to below 3% of deficit under the European stability pact. At least, the project has informed a number of stakeholders about the potential benefits to society of such an effort. It remains to be seen whether the publicity after publication of the final report will improve the likelihood of creation of the fund.

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Acknowledgements

The authors wish to thank their colleagues and partners who have contributed to making this project a success, particularly:

Dr. Claus Barthel, Thomas Hanke, Lars Kirchner, Natalia Przhevalskaya, Meike Spitzner, Oliver Wagner and Gerhard Wohlauf from the Wuppertal Institute; Dr. Markus Pöcker and Prof. Dr. Georg Hermes, University of Frankfurt a. M.; Prof. Dr. Olav Hohmeyer, University of Flensburg; Dr. Holger Wallbaum Triple Innova;

our invited Dr. Michael Brand (azes, Saarbrücken), Markus Duscha (ifeu, Heidelberg), Barbara Schlomann (Fraunhofer-ISI, Karlsruhe), Dieter Seifried (Ö-Quadrat, Freiburg), Christof Timpe (Öko-Institute, Freiburg), and Klaus Wortmann (ISSH, Kiel);

Dr. Frank Gerlach and his colleagues of the Hans Böckler Foundation and Dr. Horst Heuter and his colleagues of the Deutscher Gewerkschaftsbund, without whom this project would not have happened at all.