

Changing behaviour of energy consumers and motivating private investments in energy efficiency by individual and neutral on site energy consultancy for private house owners

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Table of contents

Introduction..... 1
 Objectives and Frame conditions.....2
 Consumer Association as independent partner for neutral advice.....2
 a) Objectives of the Consumer Association.....2
 b) Energy consultancy in advice centres.....2
 c) On-site energy advice.....2
 Target group.....3
 Energetic dimensions of behavioural change.....4
 Evaluation results of neutral on-site consultancy.....4
 Influence of on-site advice.....4
 Consumers satisfaction.....5
 Consumers barriers and reasons for public funded advice.....5
 Independent and individual advice.....5
 Advice characteristics and advisers role and quality.....6
 What brings consumer and adviser together?.....6
 Success factors for partners and external effects.....6
 Evaluated external effects.....6
 Conclusion.....7

Introduction

The behaviour of private energy consumers is a significant factor concerning the consumption of energy and energy saving measures. The highest part of energy use in homes is determined by heating of rooms and water and depends on the existing energy efficiency standard and the ecological awareness. Many private buildings are not up to date concerning the energetic and the constructional standards. Global warming, rising energy costs and upcoming retrofitting measures are reasons to reflect about behavioural aspects by retrofitting private buildings to reduce energy consumption. For private house owners this is quite a challenge, as there are many technical details to consider for an effective energetic refurbishment. That's why it's important to support them. In addition the public interest is to use less energy, to save resources and to grade up regions by retrofitting existing buildings – not least as regional economic factor. An effective measure to support people in decision making is individual, independent consultancy. An individual optimized energy saving concept accompanied by financing advice is a good motivation to get started. A neutral consultancy concerning energetic measures at private buildings is able to bridge the gap between economic and ecological efficiency.

The described project of individual on-site energy consultancy was designed to contribute to climate protection connected and to effect local employment positively. The consultancy project is well accepted and influences consumers behaviour in realising energy savings. The project is implemented by the consumer association (Verbraucherzentrale) of North Rhine-Westphalia (NRW), a NGO with experience of 20 years of on-site energy consultancy. It is publicly funded by the state North Rhine-Westphalia, in connection with the European Regional Development Fund and some municipalities. The project is part of the regional development policy related to the aim of energetic modernisation of buildings.

The energy-region North Rhine-Westphalia is converting from coal and other fossil fuels towards new and efficient energy technologies. Private consumers shall also be motivated to use efficient heating systems, to improve thermal insulation, to install renewable energies and to change their behaviour concerning heating and energy consumption. Private households profit by reducing their energy costs, improving the quality of buildings and their living comfort as well as by contributing to climate protection measures by reducing their fossil-fuel consumption. The government of the state NRW aims to raise the refurbishment rate of residential buildings as a regional contribution to climate protection and strengthening the economy.

Objectives and Frame conditions

The energy used for heating has the biggest proportion of energy consumption in private households. Due to technical innovations a lot of this heating energy can be saved. At the same time these energy saving measures afford high domestic investments, which have a positive effect on the markets of skilled crafts and building materials.

The regional governmental goal is to raise the refurbishing rate of existing residential buildings from about one percent up to three percent per year. To reach this rate the target group should have a chance to get good information and support in their decision-making process.

Consumer Association as independent partner for neutral advice

a) Objectives of the Consumer Association

Verbraucherzentrale NRW is an independent non governmental organisation, which advises, supports and protects exclusively private consumers throughout the state in all consumer related topics. As with all other topics also its energy consultancy is neutral and independent of any economic interest. The organisation advises individually and from a holistic perspective by suggesting economic and ecological balanced measures. It's as well a local as a regional partner in several networks.



In more than 50 towns of the state North Rhine-Westphalia exist local consumer advice centres, where consumers can get individual advice and support for problems with sellers and suppliers. Also they can get information about many matters concerning daily life like, using energy, healthy nutrition, financial matters, insurances and so on. The Consumer Association of NRW has an institutional funding by the state government and the respective municipalities in which advice centres are situated.

b) Energy consultancy in advice centres

Since thirty years the consumer association has been offering initial energy advice for private households in several own offices with qualified consultants - architects or engineers. Each consultancy lasts 30 minutes on the average. The consumers bring their plans of houses or installation to the consultant and then different possibilities of energy saving measures are discussed. This advice is adequate for getting initial advice and short information and requires a small fee. This project is funded by the Federal Ministry of Economics.



c) On-site energy advice

After ten years of experience with advice in offices the consumer association started to visit the houses as additional consultancy offer funded by the state NRW and several municipalities.

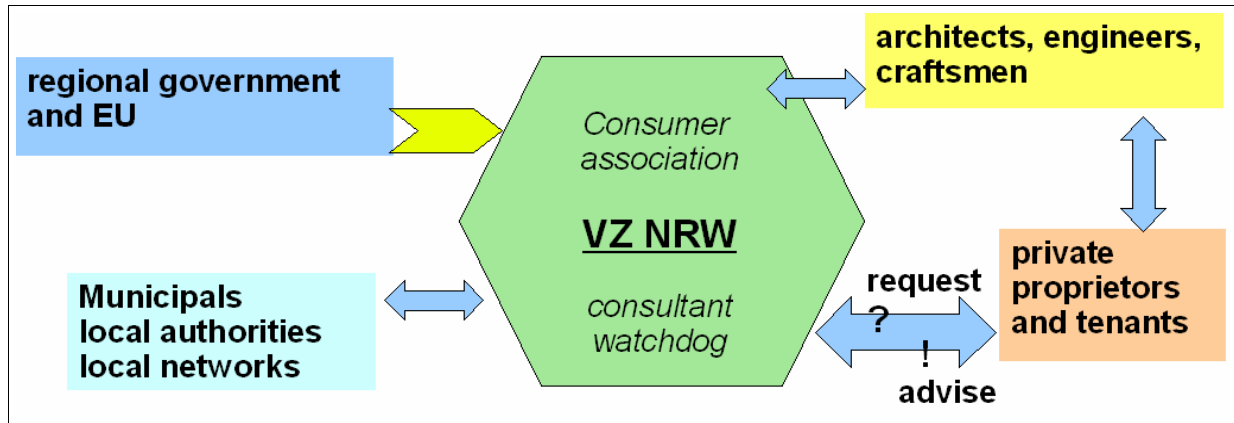


The changing of the place of advice brought some advantages and success factors:

- the consultant is able to inspect the building directly and to realise previously unknown effects of energy loss (e. g. thermal bridges);
- construction details and various options can be better discussed on site;

- the effects of various measures can be explained in more detail
- a better implementation of the advice can be expected.

The consultancy offer is designed to be an initial but sophisticated advise to help consumers create optimal plans for refurbishment measures and to open doors for local craftsmen, architects and planners. It is focused on energy efficiency and items about changing or improving energetic technology and parts of the building, insulation, renewables and changing behaviour in using energy (heating, ventilation, consumption of electricity). The consultancy is focused on one initial advice session with a duration of 90 minutes.



Cooperation and intermediation for climate protection

Actually - since 2005 with additional funding by the EU - the on-site advice model is regional enlarged to a basic offer nearly in the whole state with 45 additional advisers in contract. In addition a premium offer is realised in 17 closely cooperating municipalities. This cooperation serves as a model for local networking and neutral energy advice for private households. A small fee (60,- EUR) is charged by the advise calling consumers which contribute in this way to finance the project. The number of on-site advices could be increased from about 1,400 (in 2007) to more than 5,000 (to be reached in 2009) and the ambitious goal is to give more than 18,000 advices in the period from 2007 to 2011 with effects on private investments, climate protection and local employment.

Target group

In North Rhine-Westphalia exist about 3.6 Million residential buildings. About 79 % residential buildings have only one or two accommodation units. Again 82 % of this are inhabited by the owners themselves and therefore they profit directly from realised energy saving measures. The buildings with higher refurbishing potential can be focused on the part of old buildings built until 1990:

State NRW	8.4 M accommodations		3.6 M buildings
accommodation units per building	all accommodation units	part of accommodations built until 1990	all residential buildings
1 - 2	42.1%	36.4%	78.7%
3 - 6	30.2%	27.7%	3 and more units: 21.3%
7 -12	20.0%	18.3%	
	= 92.3%	= 81.4% or 6.9 M	

www.it.nrw.de/statistik, 2008 and www.destatis.de Mikrozensus Zusatzerhebung 2006

Smaller buildings between one and six accommodation units and built until 1990 represent nearly two thirds of all accommodations which can be assigned to the private sector and which require energetic refurbishment. Therefore private households represent a big potential to reduce CO2

emissions by refurbishing their houses and changing their energy use patterns. Still it is a big challenge to activate this potential as there are manifold barriers.

This model of individual on-site energy consultancy is a quite successful way to overcome them. A consumer association is an adequate and experienced partner in targeting for private house owners. The advice is targeted on owners of family homes or small apartment buildings and flats who can decide and finance retrofitting measures. Requests of tenants are not refused but questions concerning tenancy law are excluded in energy advice; consumers with such questions are referred to tenant organisations.

Energetic dimensions of behavioural change

The energy consumption is directly or indirectly influenced by different characteristics of consumer behaviour like

- choice of energetic standard of home or the disposition to upgrade the standard
- buying decision (efficiency aspects on home appliances, choice of energy supplier)
- energy use (electricity, heating and ventilation)
- decision-making about the sources of energy and integration of renewable energy
- investing in energy-efficient measures
- improving the cost awareness and ecological awareness.

Usually the interest of house owners is to live in a good building with less maintenance costs. In case of measures to maintain a private building, there is often no interest in additional expenses. In many cases it makes sense to combine different measures, like not just painting the facade but also insulating it. In the long run this reduces the overall costs, induces reinvestment by lower energy bills even with higher costs at the moment. To realise this, a holistic view by an expert can be decisive.

Private house owners like to realise small measures with a manageable budget and limited volume. That's why they rarely call an architect but call a craftsman to realise the measure.

But craftsmen are specialised and they often only see the part of the building which is connected to their professional sector. Thus the "window of opportunity" may be closed at an inappropriate moment.

Separately realised retrofitting measures without the right order concerning architectural and energetic requirements cause higher investments or less energy efficiency. Also problems with material quality or humidity are possible.

Evaluation results of neutral on-site consultancy

In 2008 the evaluation of a previous project gave some results about the behaviour of private house owners. This advice project was carried out from January 2005 to June 2008 in the Ruhr Area - the large metropolitan region in NRW with 5.3 M people (dominated in the past by coal mining and steel industry). 6 employed engineers and architects advised 3070 households. This project is quite comparable to the actual project concerning target group, advisers qualification and the subject of advice. The Institute for Site and Facility Management Ahlen was assigned to analyse the quality of the consultancy and the consequences of it in energetic and economic terms. In 2008 the on-site consultancy was evaluated with following results:

Influence of on-site advice

- Upgrading rate: more than 50% percent of all advised house owners have energetically upgraded their homes according to the recommendations of the energy consultancy.
- Influence of advice: the consumer is motivated by advice to change his refurbishment plan and behaviour in investment. For more than 30 percent of all upgrades the consultancy was

- the only or the predominant factor for the decision of the owners to refurbish their building.
- Energy using behaviour: 70 percent changed their behaviour in heating and window ventilation.
- Living conditions: nearly a third realised an improvement in their problems with humidity and mould by changing behaviour or constructional changes.
- Third party influence: the evaluation shows influences to a third party of the consulted households and a positive effect concerning the relation between proprietors and tenants. 37 % confirmed an influence to a third party - two third of them are tenants and landlords in almost equal parts. This result was interpreted as positive effect of neutral and independent advice.

Consumers satisfaction

Furthermore it could be shown that the consumers were highly satisfied with the quality of the neutral consultancy.

- good investments instead of misinvestments: the investments are qualified through trustworthy advice and the planning view on a correct order of measures. Furthermore the motivation to invest is encouraged by an improved sureness about the correct refurbishing plan. About 62% of the customers are convinced that they have been prevented for misinvestments;
- high consumer satisfaction: 92% would again call the consultancy;
- recommendation: 98 % would recommend the service of the individual consultancy;
- publicly funding accepted: 98 % are convinced of the public subsidies for an individual and neutral consultancy on energetic refurbishment.

Consumers barriers and reasons for public funded advice

The measures recommended during an individual consultancy help to save energy on a long-term basis and improve the quality of buildings. House owners employ local and regional craftsmen to carry out the measure. For more comprehensive projects - such as carrying out combinations of several measures - it is recommended to the house owner also to assign architects and planners.

But often the frame conditions of private house owners don't support a behaviour like sustainable investments with optimized energy saving on a long-term basis. It is unusual and expensive to call professional and comprehensive consultancy "from the market" for small measures.

On the other hand, a low-priced advice of service providers or contractors depends on a subsequent conclusion of a contract thus being dependent on the interests of the contractor, and/or a sectoral view on the provided technology is predominant.

But a sustainable and successful refurbishment requires a view on the whole building and the advice should be trustworthy, professional, individual and independent of a subsequent contract. . The realisation of this kind of advice needs public support so that the individual motivation in reasonable investments can be raised.

Further typical barriers are

- deficits in information and prejudices concerning efficiency and amortisation
- failing or too little incentives (i.e. 'investor-user-dilemma')
- basic rents without energetic criteria
- uncertainty (perspective of own life, of energy costs, of the building)
- legal restrictions (building law, tenancy law, energy performance regulations)

How to overcome this barriers?

Independent and individual advice

Private house owners as investors in energy efficiency measures ask for trustworthy advice but it has to be individual and affordable. A careful and rational decision making needs support.

Consumers favour the neutral opinion of an advisor whose only interest is to provide sound information - and not to secure a deal. The private house owners need technical advice and help in finding financial support. Qualified and well trained architects and engineers are able to motivate successful private energetic refurbishments. This model of consultancy needs a trustworthy organisation with a special form of financing and cooperation.

Advice characteristics and advisers role and quality

A high quality level is ensured by the fact that the energy consultants are well trained architects and engineers with respect to professional and methodical aspects. They have much experience in giving energy advice. The call for advice is connected to the demand for neutrality, trustworthiness, quality and independence (concerning energy sources, suppliers, products, taken measures). Usually there is only one advice contact to every customer. The Consumer Association has no authority to secure any deal concerning the following measures. Contracts and the success of planning or technical realisation are left to the market of skilled craftsmen and architects.

The role of the advisers is to open doors, to advise individually and to , to find reasonable measures, to inform about financial support. The advisers ask about the needs of the house owner and describes requirements of energetic refurbishment and gives individual and object-related prospects.

What brings consumer and adviser together?

The on-site advice is demand side orientated and needs to be called by interested consumers. Therefore some measures are necessary to increase motivation for demand:

- public relation and marketing
- to inform consumers to realise windows of opportunity
- to help finding financial support
- to use neighbourhood relations as way of multiplication of refurbishment motivation
- to cooperate with public partners and other associations



The initial advice with trustworthy suggestions is an orientation guide in building refurbishment. However public funded neutral consultancy has a limited budget for public relations. So the consumer association needs to cooperate with municipalities, media, organisations of skilled crafts and architects and engineers and other associations with general acceptance. This forms a win-win-situation for all partners. I.e. the advisers in contract are quiet satisfied in the role of an independent and neutral consultant because they've a special chance to enjoy the consumers confidence.

Success factors for partners and external effects

There is a win-win situation for partners in the regional consultancy network. Architects and skilled craft get in contact to owners of homes in planning or executing retrofitting measures. Consumers energy costs decrease and the state activates market potentials concerning energetic refurbishment of residential buildings.

Evaluated external effects

Private house owners show a high motivation to realise recommended measures. They often use their own money.

- Conversion volume: the upgrading measures are mainly financed by the consumers own resources (less than 20% by publicly subsidised credit financing). In average 18,000 € private investments per building were made (2/3 buildings with one or two flats and 1/3 buildings with more than 3 flats).



- **Regional Economy:** many of the investments were supporting the local and the regional skilled craftsmen and building materials suppliers (> 80%). 50 percent private house owners used the additional support of architects and engineers. Therefore a neutral consultancy is able to support the skilled craftsmen and promotes employment.



- **Climate and resources:** Private energetic measures realised per building within 2 to 3 years a saving of 24 MWh / year in primary energy and a reduction of about 7.5 t of CO2 / year.



Conclusion

Neutral on site consultancy is estimated as highly trustworthy. It follows a high realisation rate in terms of private energetic refurbishment, CO2 reduction thus inducing regional investment. The upgrading measures are mainly financed by the consumers own resources.

The ground for the consultancies is prepared by the advice organisations independence of own economic interests in retrofitting measures and the public funding. The advice funded by the state government of North Rhine-Westphalia and the EU structural funds and some municipalities is a successful model to give advice without barriers concerning behavioural change and refurbishing motivation.

Therefore the neutrality is an important success factor for consultancy concerning energetic measures at private buildings which are optimized to the individual situation and window of opportunity. The motivation of behavioural change depends on qualified, neutral and trustworthy advice.

Finally private investors in the sector of existing buildings are important players in climate protection and supporting regional economy.

The investments are supporting the local and the regional economy.



Key Words: residential energy use and curtailment behaviour, investment behaviour, private house owners, personal advice

Conference presentation

First European Energy Efficiency and Behaviour Conference, Maastricht, October 19th-20th, 2009

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