Stromspar-check for low-income households

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Abstract

In 2013, about 345,000 households in Germany had been disconnected from electricity supply because they were unable to pay their electricity bills. To help low-income households to save energy and water costs and to reduce their CO_2 emissions, the German Caritas Association and the German Climate and Energy Agency (eaD) initiated the project "Stromspar-Check". The project is financed by the German Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB). It has been successfully implemented in more than 170 cities in Germany since 2009 and more than 150,000 households on social benefits have participated to date.

The program involves a free energy audit for each participating household carried out by "Energy-Efficiency Checkers", who are trained by the program. Based on the energy audit, energy saving devices such as compact fluorescent lamps, LEDs, switchable power extension leads, tap aerators, etc. are installed. These devices are worth on average €70 per household but result in savings of electricity, heating and water that amount to more than €1,200 undiscounted savings over their lifetime. The results of the project show that significant savings in energy and water can be achieved through the use of simple energy saving devices in low-income households. Long-term unemployed people are trained as "Energy Efficiency-Checkers" through the program. This engagement helps to reintegrate unemployed people into the job market. During the course of the program, more than 4,000 "Energy-Efficiency Checkers" have been trained and subsequently worked in the project.

This project demonstrates that if the interests of the different stakeholders can be aligned, highly economic energy-efficiency measures can be realized which benefit everyone: the households, municipality and state governments, the long-term unemployed and the climate.

The Stromspar-check (energy savings check initiative)

PROJECT BACKGROUND AND OBJECTIVES

The electricity prices in Germany have doubled over the last 13 years partly due to the renewable energy levy (EEG) which was introduced in the year 2000 to promote the uptake of renewable energy technologies. The EEG levy alone was responsible for 6.2 cents/kWh in 2014.[1] Low-income households are particularly vulnerable to high electricity prices. As shown in Figure 1, the share of electricity expenses of the disposable net income is much higher for low-income households than for middle-class or high-income households. In 2012, the poorest 10 % of households spent 7 % of their net incomes on electricity compared to only 1.2 % for the richest 10 % of households. This disparity has increased between 2010 and 2012 (Heindl/Römer 2014) and the trend continued in 2013 and 2014.

Low-income households have an electricity consumption which is about 20 percent lower than the average electricity consumption of German households. Even so, there is still a high potential to save electricity. If the Energiewende, the government's ambitious energy transition, is to be successful all

1. It should be noted that this amount includes the subsidies for large German electricity consumers (5,1 billion Euro/year).

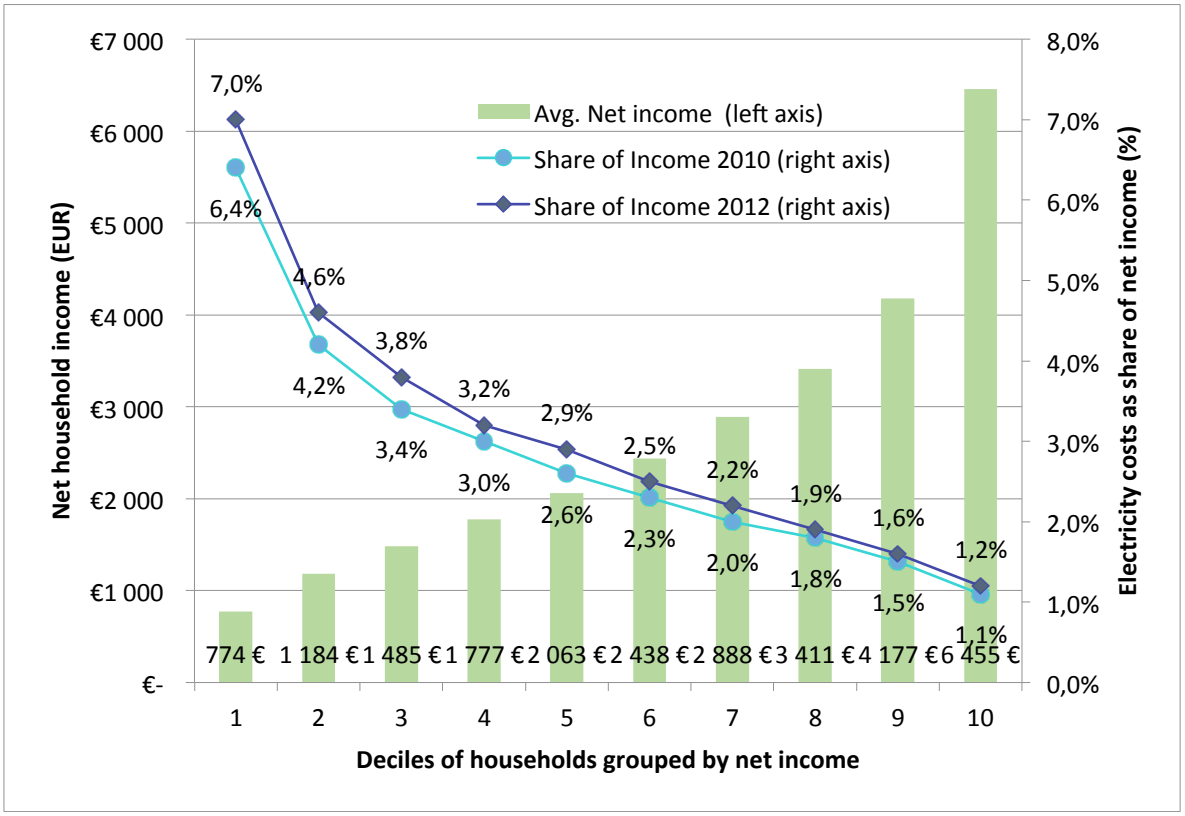

Figure 1. Electricity costs in relation to net-income (Heindl/Römer 2014).

households and sectors should be included. Further, sheltering low income households from rising electricity costs is necessary to maintain a high public approval of the Energiewende and to bring it to a successful end. One reason for the disproportionally high electricity bills of low-income households is that they often cannot afford to invest into efficiency measures, even if these measures have a short payback time.

This dilemma (shortfall) was identified by Büro Ö-quadrat in 2007 and after a short pilot project in 2008 the project 'Stromspar-Check' was initiated with the aim to support low-income households to reduce their utility bills through efficiency measures and to foster their water and energy saving behaviour.[2] The 'Stromspar-Check' project was commissioned by the German Caritas Association and the German Climate and Energy Agency (eaD). The project started in December 2008 and is expected to run until at least the end of 2015 – with a high chance of extension to the end of 2018. This paper presents the results of the project up to the end of 2014.

Beside the environmental goal to reduce CO_2 emissions and the social goal to reduce the cost burden for low-income households, the project also aims to bring unemployed people into regular work again. The project employs long-term unemployed people as "Energy Efficiency Checkers" which increases their chances to re-enter the workforce with a regular job. Last but not least, the federal state and the municipalities will have an advantage from the resultant water- and energy savings, because these costs are directly borne by the municipality (see below).

2. The change of saving behaviour was analysed through interviews. However, the effect of bevioural change is not included in the saving calculation.

The project Stromspar-Check is focused on the electricity sector, which has direct impacts on the energy costs borne by households on social benefits. As shown in Figure 2, households on social welfare receive support from the municipality and the federal state. In principal, these households receive a monthly payment from which they have to cover their daily expenses including electricity costs. The monthly allowance depends on the number and age of the household members. Additionally the municipality pays the rent of the accommodation and other utility costs such as heating, cold water and wastewater treatment.

DESCRIPTION OF MEASURES AND ACTIVITIES

Households who have signed up for the program will receive a free energy efficiency check carried out by two "Efficiency Checkers". During the first visit, electrical appliances, water appliances and the lighting conditions of the households are investigated and the bills for electricity, heat and water are analysed. Based on the actual situation, the need for saving devices is assessed and recommendations are made and documented.

During the second visit, an "instant help package" is installed, which includes energy and water saving devices such as compact fluorescentlightbulbs or LEDs, switchable extension leads, tap aerators, water saving shower heads, etc. Households are informed by the "Efficiency-Checkers" about the stand-by losses of their TVs, computers and other entertaining devices. Additionally they are asked about their behaviour on appliances usage and are advised about specific energy-saving tips. For water savings the "Efficiency-Checkers" use flowmeters to analyse the actual water flow in the shower and taps and evaluate the saving potential.

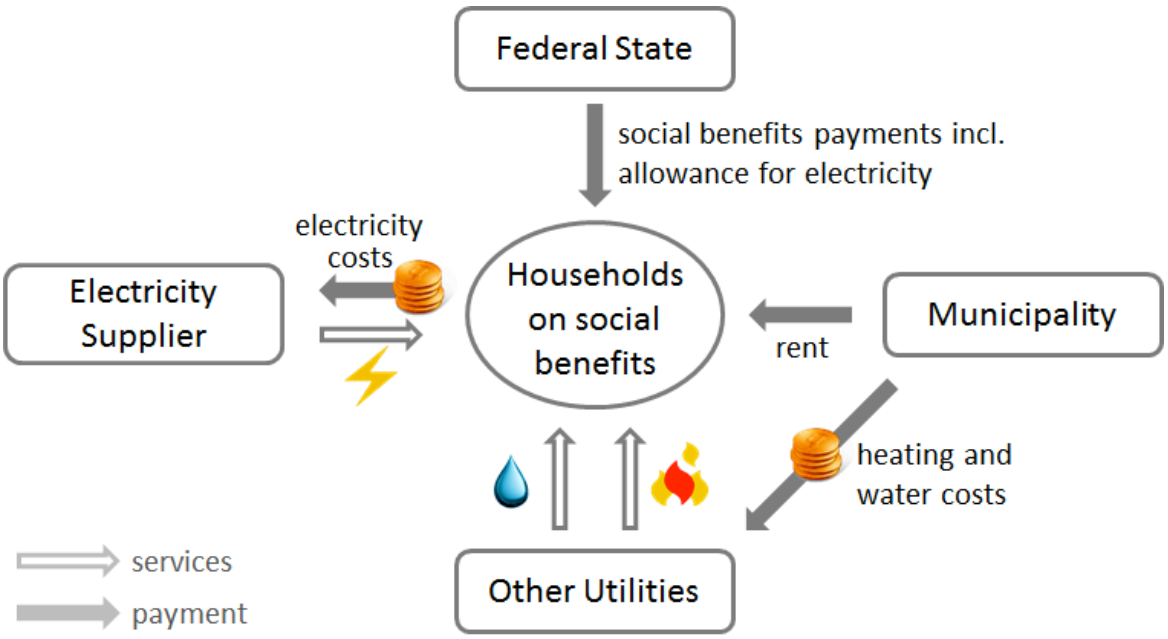

Figure 2. Structure of the German social benefit system for low-income households (Öko-Institut/Büro Ö-quadrat 2012).

The results are documented in a report[3], which is counter-checked by the adviser of the "Efficiency-Checkers". For each city that participates in the "Stromspar-Check" program, an adviser is appointed to oversee the local implementation, carry out training of the "Energy-Efficiency Checkers" and monitor the quality of their work. After the counter check, the report is mailed to the headquarter where it is integrated into a data bank.

Table 1 and 2[4] present information about the average energy use of the participating households and the energy saving measures involved in the program. The information was extracted from the data bank containing 157,244 household checks up to 30.11.2014. As shown in Table 2, an average of 8.7 incandescent and halogen lamps had been replaced by compact fluorescent bulbs and LEDs per household. Switchable power extension leads and tap aerators have been installed in almost every household. Overall, about 1.9 million energy- and water-saving devices have been installed within the program to date, which in total are worth up to €10.7 million or an average of €68 per household.

Since April 2014, the project has been extended to include a scrappage scheme for inefficient refrigerators. Low-income households with an old refrigerator that consumes 200 kWh/year more than a benchmark A+++ refrigerator are eligible for a €150 bonus to replace their old refrigerator with one of A+++ energy rating. The scheme requires the capacity of the new refrigerator to be comparable to the old one and the disposal of the old refrigerator to a recycle facility. The preliminary results of the scrappage scheme will be presented in the next section.

EVALUATION OF SAVING POTENTIAL

Annual savings

Table 3 shows the annual savings in energy and water as a result of the "Stromspar-Check" program. The average total annual savings per household is about €160, of which €95 saved from the electricity bills constitute direct financial gains to the low-income households.[5] The annual savings in water and hot water consumptions (€49 and €16 per household respectively) help largely to reduce the utility costs borne by the municipality for the households. Besides, since water and hot water consumptions are often measured at the building level in multi-family buildings, savings obtained through the participating household are shared among other households connected to the same water and hot water meters. This brings about a small side-benefit to the neighbours of the participating households[6].

The energy savings obtained from the program will lead to an annual reduction of 287 kgCO_2 per household.[7] This is equivalent to a 13.5 % reduction of CO_2 emissions compared to the annual emissions associated with electricity use of an average low-income household in Germany.

3. Within the Excel-based report every direct installation (change of incandescent lamps, avoiding stand-by losses, water saving measures, etc.) is documented. Furthermore the appliances of the households (as well as their age and condition) are documented. The Stromspar-Checker also give advice on how to use the appliances in an energy efficient way. For example, the following web page developed within the program provides energy-saving tips on the use of the washing maschine: http://www.stromspar-check.de/stromspar-tipps/waschen-und-trocknen/.

4. Timers and thermostops for hot-water tank: http://www.energieverbraucher.de/de/Thermostop__284/.

5. The calculation of the savings in electricity, water and heating are based on correction factors which takes into account that some instant help measures may be taken out of use shortly after installation. The correction factors are device-dependent: energy saving light bulbs (9 %), flow restrictors (10 %), water-saving shower heads (13 %), timers and thermostops for hot water tanks (11 %) and the switchable power extension leads are not used all the time (26 %). (Source: Evaluation Stromspar-Check Freie Universität Berlin, 06/2010).

6. About 15 % of the audited households have no own meter for water or energy consumption. In this case the savings cannot been billed based on the consumption for the audited household (Source: DCV/eaD 2014)

7. The CO_2 reductions are calculated based on the average emission rate of 0,596 kg CO_2/kWh for electricity (UBA 2008) and 0,235 kg CO_2/kWh for heating. The latter production factor is calculated based on a mix of fuels in Germany consisting of gas (53 %), heating oil (33 %) and district heating (14 %).

Table 1. Average energy use of low-income households participated in the program (Source: DCV/ead 2014).

	Average per household	
Household size	2.5	persons
Electricity consumption	2,913	kWh/year
Water consumption	96	m^3/year
Energy consumption for heating	10,932	kWh/year
Energy consumption for hot water	2,673	kWh/year
Percentage of households living in flats	95 %	
Percentage of households in single or semi-detached family-houses	5 %	

Table 2. Number and value of all devices replaced within the instant help packages (Source: DCV/ead 2014).

	Number of devices replaced – average per household	Number of devices replaced – total of all households	
Compact fluorescent lamps, LEDs	8.66	1,361,483	
Switchable power extension leads	1.03	161,964	
Tap aerators	0.97	152,409	
Water-saving toilet counterweights	0.09	13,468	
Water-saving shower heads	0.50	77,982	
Flow restrictor	0.12	19,297	
Fridge thermometers	0.55	85,971	
Hydro- and thermometer	0.04	6,048	
Room thermometer	0.02	3,755	
Timers and thermostops for hot-water tank	0.04	6,463	
Total number of installed devices		1,888,840	
Total value of installed devices		10,641,390	Euro
Value of installed devices per Household		68	Euro/hh

Table 3. Savings per household and per year (Source: DCV/ead 2014).

	Quantity	Savings (including neighbours)	Savings of audited households
Electricity savings through instant measures	393 kWh	€95	€95
Water	11.7 m^3	€49	€42
Energy savings for hot water (not electrified)	223 kWh	€16	€11
CO_2-reduction	287 kg CO_2	–	–
Total		€160	€148

Table 4. Undiscounted average savings per household over lifetime of technologies (Source: DCV/ead 2014).

	Quantity	Undiscounted savings (including neighbours)	Undiscounted savings of audited households
Electricity savings through instant help measures	2,249 kWh	€543	€543
Water	117 m^3	€491	€418
Energy savings for hot water (not electrified)	2,228 kWh	€165	€110
CO_2-reduction	1,864 kg CO_2	–	–
Total without refrigerator scrappage		€1,199	€1,071
Total with refrigerator scrappage		€1,751	€1,623

Table 5. Savings through the Stromspar-Check program from December 2008 to November 2014 (Source: DCV/ead 2014).

	Units	Total savings (including savings of neighbours)	Savings of the audited households
Electricity savings through instant help measures	353.7 GWh	€85.4 M	€85.4 M
Water savings	18.4 Mm^3	€77.2 M	€65.7 M
Energy savings for hot water (not electrified)	350.3 GWh	€25.9 M	€17,4 M
CO_2-reduction	293,109 tons	–	–

Long-term Savings

All implemented technologies have a lifetime longer than one year. In order to calculate the long-term energy savings, the average lifetime[8] of the implemented technologies was used and the user behaviour is assumed to remain unchanged after the interventions. In estimating the savings for municipality and federal state, the average period on benefits for different groups of households participated in the program was evaluated[9]. Table 4 shows the estimated saving potential per household over the lifetime of the implemented technologies.

All calculations have been done without discounting the savings. On the other hand, the rising prices for electricity and other fuels have not been included into the calculation. This approach avoids discussions about the discount-factor and the future price-development.

Table 5 gives an overview of the total savings over the lifetime of the implemented technologies as a result of 157,244 household checks that have been realized by the "Stromspar-Check" program over the period from December 2008 to November 2014.

COST-EFFECTIVENESS AND MITIGATION COSTS PER KWH SAVED

Even though the economic advantage for all participants is clear, the macroeconomic impact of the project is more difficult to quantify. According to our initial estimates, the avoided costs of electricity production are much higher than the total cost to carry out the household checks. About 75 % of the direct material costs for the 'instant help package' (€68/household) are used on electricity-saving devices. This small investment of €50/household leads to electricity savings of 2,249 kWh, resulting in technical costs of about 2.2 Cent per kWh saved. However, this constitutes only part of the mitigation costs as the transaction costs also need to be accounted for. The total cost per household check is about €300, of which €200 is borne by the federal state and the remaining €100 by the municipalities[10] or other local organisations committed to the program. If the transaction costs of €232[11] are shared proportionally to the savings in electricity, water and heat, the transaction costs related to electricity savings are €105 per household check or 4.7 Cent/

8. The assumed lifetime for compact fluorescent lamps and switchable power extension leads is 7 years. The lifetime for water-saving measures, timers and thermostops is 10 years and that of refrigerators is 14 years. Price inflation for energy and water during the lifetime of the devices were not factored in.

9. Here we also considered that for receipents of unemployment (ALGII) and social benefits, the municipalities bare the costs for water and heating whereas other receipents of housing benefits have to bare these costs themselves. For the calculation of long-term benefits, we assumed that only 45 % of households would still receive unemployment and social benefits after 3 years and 25 % after 10 years (following Evaluation Energiesparservice Frankfurt, IFEU/ISOE 2009).

10. The cost borne by the municipality is a rough estimation as there is no official data available.

11. 300 Euro minus 68 Euro direct material costs.

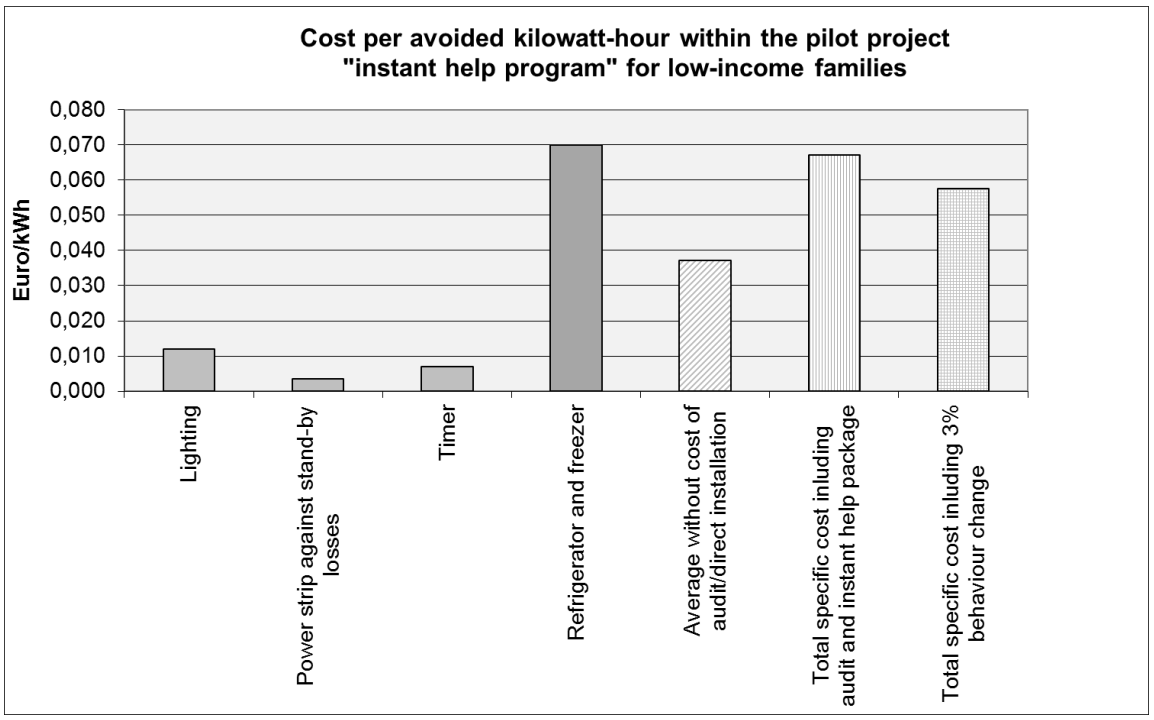

Figure 3. Cost-effectiveness of efficiency measures with and without audit costs (source: Büro Ö-quadrat et al 2008).

kWh saved. As a result, the mitigation costs (i.e. sum of the technical and transaction costs) are about 6.9 Cent/kWh saved.

Prior to the implementation of the "Stromspar-Check" program, a pilot study was carried out between March and December 2008 to understand the cost-effectiveness of different energy-saving measures included in the program. Figure 3 shows the results.

The costs per kWh saved are less than 1 Cent for switchable power extension leads and timers. Compact fluorescent lamps cost 1.2 Cents/kWh saved, whereas the replacement of inefficient refrigerators costs 7 Cent/kWh saved. On average, the implementation of all efficiency measures cost 3.7 Cents/kWh saved. Taking the costs of household audit into account, the cost per kWh saved amounts to 6.7 Cents. If we assume that the households will reduce their power consumption by 3 % as a result of consultation and raised environmental awareness, the cost per kWh saved drops to around 5.7 Cents (Büro Ö-quadrat et al 2008). For comparison, the average electricity price in 2014 for households with a yearly consumption of 3,500 kWh was 29.1 Cent/kWh (BDEW 2014).

JOB CREATION AND REINTEGRATION OF UNEMPLOYED PEOPLE INTO THE JOB MARKET

As shown above, the "Stromspar-Check" program has considerable impacts on energy consumption and CO_2 reduction. Besides, it also profits the society by reintegrating unemployed people into the regular job market. In fact, being long-term unemployed is one of the must-have criteria for becoming a so-called "Energy-Efficiency Checkers". Since the start of the project in 2008 until end of 2014, "Stromspar-Check" has trained 4,200 long-term unemployed people and has helped many of them to reintegrate into the job market.

The 8-week training course, which all new "Energy-Efficiency Checkers" are required to attend, includes training in communication and computing skills, work safety as well as professional training in energy and water saving techniques by qualified advisers. The course manual and content were developed specifically for this project by Büro Ö-Quadrat in cooperation with Energieagentur Regio Freiburg and other organizations (Seifried et al 2009). To ensure the quality of the household audits, the "Energy-Efficiency Checkers" are accompanied by their trainers in the first few on-site visits. The job as an "Energy-Efficiency Checker" is not intended to be permanent but rather as a chance for long-term unemployed people to get back into the workforce. For this purpose, all participants receive a special job application training as additional module in their training course.

In the end of 2014, about 1,200 "Energy-Efficiency Checkers" were active within the "Stromspar-Check" centers. According to a survey conducted in 2012 with 1,345 former "Energy-Efficiency Checkers", 20 % of them have been reintegrated into the regular job market. Another 7 % could find a job in the "second job-market" i.e. jobs that are partly subsidized by the state and 5 % were still working within the "Stromspar-Check" project in other positions (Figure 4).

DATABASE AND EVALUATION

One of the strengths of the "Stromspar-Check" project is the good documentation of all activities and the integration of the database, which allows differentiated analysis for periods, locations, Energy-Efficiency Checkers, etc. The results of the project were externally reviewed by independent researchers. The Freie Universität Berlin (FFU) made an evaluation of the project (Tews 2012) and confirmed the results. A survey was conducted in April 2010, in which 300 households were asked if the devices installed by the Stromspar-Checkers, had been uninstalled or replaced. In 2011, another random sample of 500 households have been analysed to find out if the devices were still in use. Both surveys reported a low dropout rate.

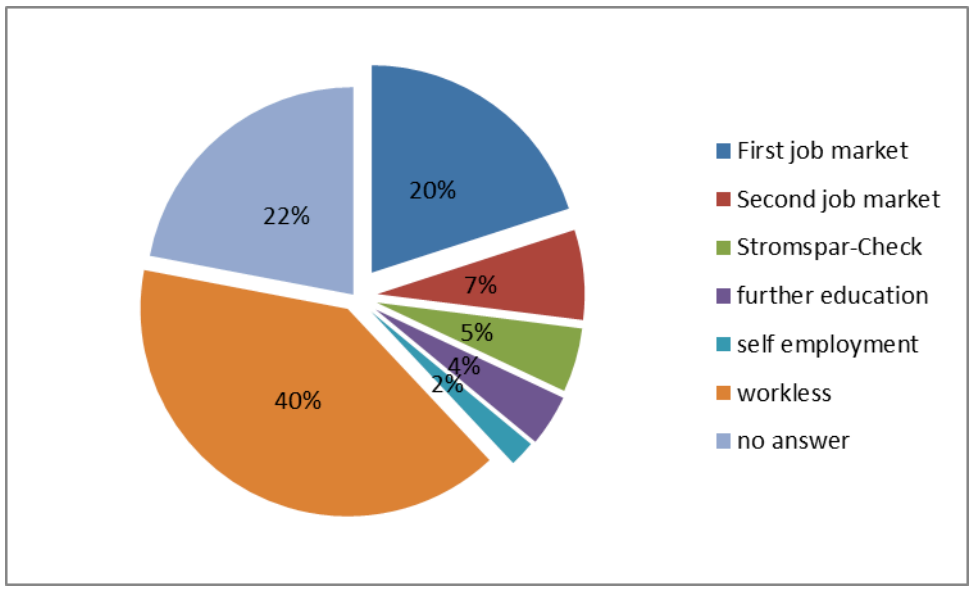

Figure 4. Reintegration of "Energy-Efficiency Checkers" into the job market (Source: Marx/Potthoff 2014).

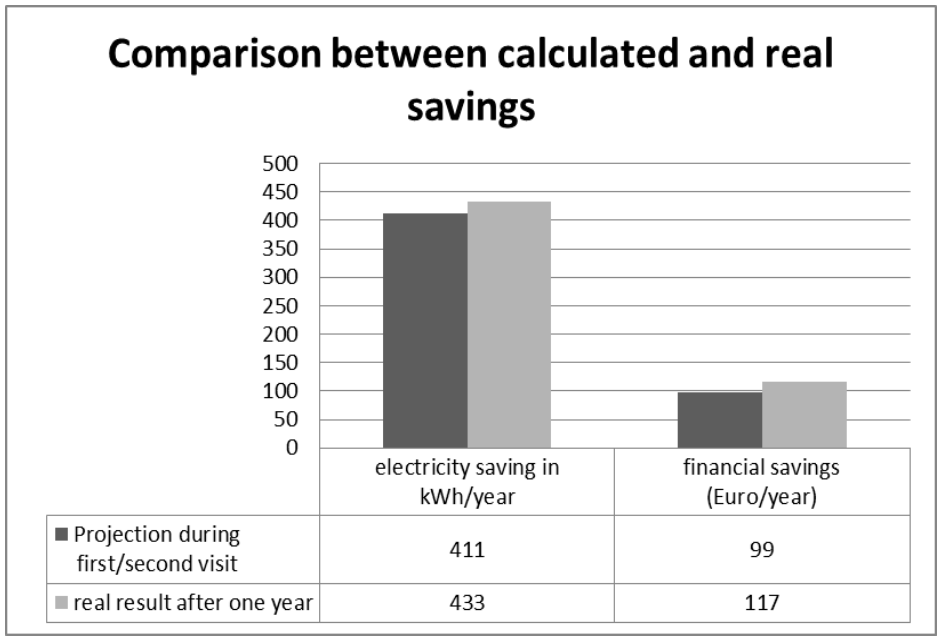

Figure 5. Comparison of calculated and real electricity savings (Source: Marx/Potthoff 2014).

Since 2014, a monitoring system has been integrated into the project. Some participating households are asked to provide their electricity bills within a year after the first energy efficiency check. This allows comparison of the calculation from the Stromspar-Check project with the real consumption. The result from a sample of 227 households shows that the realised electricity savings even slightly exceeded the savings calculated by the Stromspar-Check (Figure 5).

SCRAPPAGE SCHEME FOR INEFFICIENT REFRIGERATORS

In April 2014 a refrigerator scrappage scheme was introduced as part of the project. Since April 2014 until end of November 2014, a total of 1,022 refrigerators have been exchanged. In relation to 41,000 energy efficiency checks which have been successfully implemented during the same period about 3 % of the audited households have taken up this offer. The average savings of the scrappage scheme was 398 kWh per year per fridge.

The authors think that one of the reasons for the low uptake of the scheme is that these households have no free money for investment even if it is highly profitable. During the pilot project which preceded the "Stromspar-Check" project, 80 households were audited of which 30 expressed interests to exchange their inefficient refrigerator. From these 30 households, 24 changed their inefficient refrigerator against one with A++[12] energy rating and 17 of these 24 households used

12. A++ was the most efficient category in the cooling sector at that time.

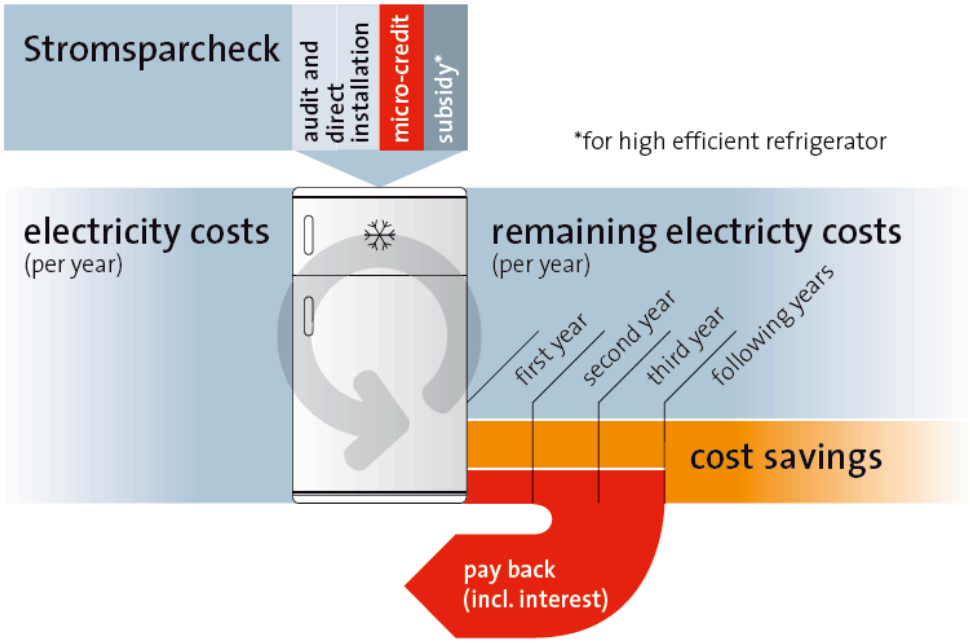

Figure 6. Energy efficiency pays for itself.

a micro-credit at a 4 % interest rate offered to them as part of the scrappage program.[13]

The conditions of this pilot project were slightly different from the current "Stromspar-Check" program. In the pilot, households that could save more than 200 kWh per year by replacing their refrigerator or freezer were granted up to €300 or no more than half of the purchase price of the new appliance. Furthermore, they were offered loans with a term of up to three years. Depending on the amount and term, the loans were tailored to the appliance's purchase price and the expected cumulative savings from the instant help package to ensure that the loan installments did not exceed the savings from reduced electricity costs. In other words, the savings in electricity costs had to cover the loans (Büro Ö-quadrat et al 2008).

To be sure about the electricity savings, an electricity meter was installed to measure the power consumption of freezers and refrigerators which were considered likely candidates for replacement. Once the measurements had been completed, the participating households posted the electricity meter to the energy agency for assessment.

The principal financing model is illustrated in Figure 6. The micro-credit is repaid within three years by part of the cost savings of the reduced electricity consumption through the installed saving measures and the refrigerator replacement. After three years, the household earns the whole cost savings.

Figure 7 shows an example of an average household who joined the refrigerator exchange and micro-credit program. The average price for the refrigerator was €452 and the average electricity saving from the refrigerator replacement was 561 kWh/year. The average annual electricity cost savings was €199 per refrigerator. The annual payment of the 3-year loan was €81 which is only less than half of the electricity savings. During this period, the net savings were €118 per year, and increased to €199 per year from the 4th year onwards (Büro Ö-quadrat 2008).

As shown in Figure 8, a refrigerator scrappage program combined with micro-credit is more successful than one without micro-credit. In the pilot project 30 % of the households audited replaced their inefficient refrigerator by an efficient one. Within the current Stromspar-Check commenced in 2014, only 3 % of the audited households take up the scrappage scheme. Nevertheless, the overall framework between the pilot and the current Stromspar-Check is slightly difference. The bonus within Stromspar-Check is €150, whilst the bonus of the pilot project was up to €300 but not more than half of the price of the new refrigerator.

It has to be kept in mind that each efficiency program has fixed transaction costs which include the manpower needed to explain the scrappage scheme and to carry out an initial inspection of the refrigerators. If the participation in the program is low, the specific transaction costs per household or per kWh are high. That is why it could be more cost-effective to offer a better bonus for the participating households. This could lead to higher savings and lower specific costs per kWh saved.

In future: Heat energy saving

The Stromspar-Check has been concentrating on electricity and water savings until now. Nevertheless, the "Energy-Efficiency Checkers" offer support to households if they have problems with the heating system or with mould. In this case, the "Energy-Efficiency Checker" can offer a voucher which can be used for a free audit through Verbraucherzentrale[14], a German organization to enforce consumer rights.

13. This interest rate is much less than the households would have to pay for a bank-credit at that time.

14. The aim of the publicly funded organization Verbraucherberatung is to represent the rights of private consumers, to inform them on their rights and to give legal advice. Areas of advice include financial advice to households in dept, insurances, construction loans, electricity supply and dealings with landlords.

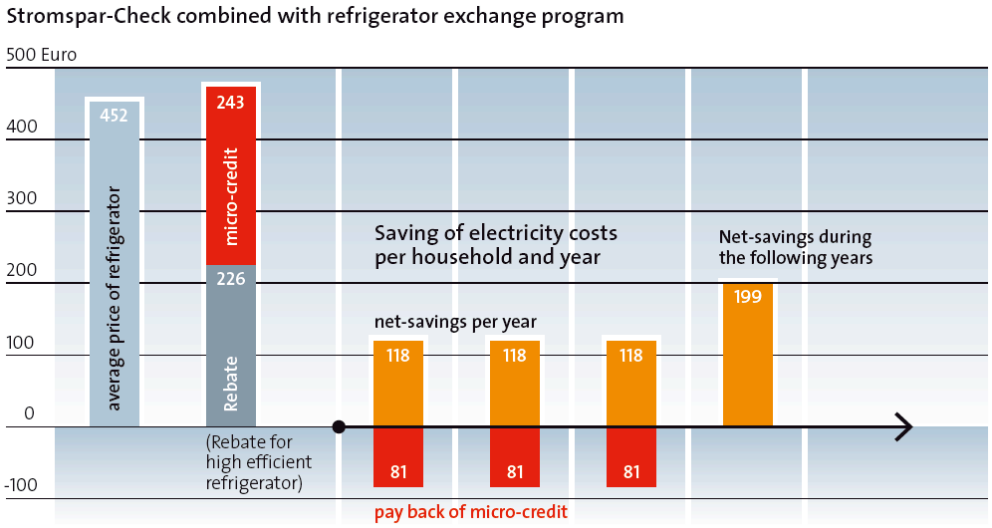

Figure 7. Example for a household who joined the pilot project including the refrigerator exchange program and the micro-credit program (Büro Ö-quadrat et al 2008).

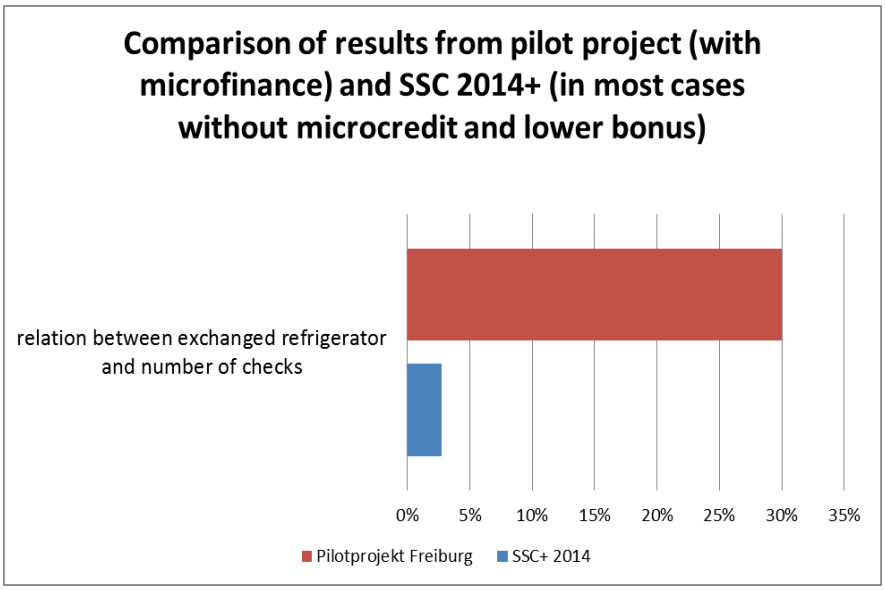

Figure 8. Comparison between refrigerator exchange program with and without micro-credit (source Büro Ö-quadrat, own calculation).

In future the Stromspar-Check could include instant measures for energy savings like heat-insulation tiles behind the radiators, installation of thermostatic valves, sealing lips for doors and windows, interlayer for single glass windows etc. These measures only need little additional investment but can bring substantial savings in energy costs.

The results of the "Stromspar-Check" program show that, under socio-economic view, the energy-efficiency measures are profitable. For the state, it can be shown that the energy-efficiency measures pay for themselves because since 2014 onwards, the state bears 39 % of the social cost (Sozialleistungen) for the low income households[15].

Both the municipality and the federal state receive a financial advantage from this program. While the cost of an efficiency-check sums up to about €300, which is paid by the funding organization German Federal Ministry for Environment, Nature Conservation, Building and Nuclear Safety (BMUB), the federal state saves at least €350 per household through less transfer payment for the low income households (Source: Büro Ö-quadrat 2014, not published). Overall, the "Stromspar-Check" program for low income household demonstrates a good example that efficiency pays for itself and that it is an advantage for all actors.[16]

15. Calculated as an average of job-seeker allowance (Arbeitslosengeld II), the basic social benefit support (Sozialhilfe-Grundsicherung) and rent-support (Mietkostenzuschüssen).

16. The project is evaluated with different methods but until now no long term evaluation has been done.

CONCLUSION

Stromspar-Check is a very successful project[17] under different aspects:

- It helps low income-household to reduce their electricity expenses effectively and therefore to protect them from rising electricity prices partially caused by the Energiewende.
- The efficiency measures result in cost-savings for the public sector which within a few years exceed the project costs. Therefore, the project basically pays for itself.[18]
- It is a cost-effective efficiency program with high social impacts.
- Not only the low-income households but all included parties and the environment benefit from the project.
- The project is a real power house project and shines not only for low-income households. More than 1,000 articles in different newspapers and journals have been published to disseminate the results. Other households which may not have financial problems become more aware of the possibilities to reduce their energy costs. The project has a website which helps people use energy efficiently.[19]
- Within the Stromspar-Check project many long-term unemployed people have an interesting task. For some the training as "Energy-Efficiency Checker" and the work within the organization was the springboard for a job in the regular job market.
- The energy saving measures which have been implemented since the start of the project will result in a reduction of 300,000 tons of CO_2, which is a substantial contribution to the German Energiewende Plan.
- The electricity use of participating households was decreased by 13.5 %. If this reduction could be achieved in all residential, industry and public sectors, Germany would be able to achieve its energy efficiency target for 2020.

All in all, the project shows good results and still has the potential for further improvement and distribution. Beside the further project development, the social transfer payments for the electricity consumption of all low-income households should be raised in a way that these households do not have to suffer additionally from the rising electricity prices.

References

BDEW 2014: BDEW – Strompreisanalyse Juni 2014 Haushalte und Industrie, www.bdew.de.

Büro Ö-quadrat, Energieagentur Regio Freiburg, Berliner Energieagentur 2008: Implementation of energy efficiency measures in low-income families, final report, Freiburg, Berlin, September 2008, contracted by German Ministry for the Environment, Nature Conservation and Nuclear Safety.

DCV/ead 2014: Deutscher Caritasverband e.V./Bundesverband der Klimaschutz- und Energieagenturen Deutschland: Auswertungsbericht Stromspar-Check, Zeitraum 1.12.2008 bis 30.11.2014.

Heinl, Peter/Römer, Daniel 2014: Energiearmut als neues sozial- und umweltpolitisches Phänomen, Vortrag im Rahmen der Beiratssitzung Stromspar-Check PLUS am 3.12.2014, Berlin.

Marx, Eva/Potthoff, Marlene 2014: Stromspar-Check Plus – Aktuelle Entwicklungen und Ergebnisse, Vortrag im Rahmen der Beiratssitzung Stromspar-Check PLUS am 3.12.2014, Berlin.

Öko-Institut/Büro Ö-quadrat (2012): Energieeffizienter Klimaschutz bei Produkten. Vorhaben zur Weiterentwicklung des nationalen Teils der Klimaschutzinitiative, Freiburg August 2012.

Seifried, D.; Schüle, R.; Richter, E.: Handbuch für Stromsparhelfer, Freiburg 2009.

Tews, Kerstin2012: Evaluierung des Projektes „Stromspar-Check für einkommensschwache Haushalte" Präsentation im Rahmen der Beiratssitzung Stromspar-Check am 24.10.2012, Berlin.

17. During a press-conference on 17th May 2010 Stromspar-Check was declared to be the most successfull BMU-funded project to support the consumers by Dr. Norbert Röttgen, the German minister for environmental affairs (Bundesumweltminister). "The combination of environmental protection and the support of low-income households to improve their own situation was very successfully achieved".

18. The project is mostly funded by the Federal German Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB). The money of the Ministry will flow back to the Federal Ministry of Labour and Social Affairs, which has to pay lower subsidies for the low income households. The municipalities, who have to bear part of the subsidies for the low-income households profit from reduced payment for lower heat and water-consumption.

19. www.stromspar-check.de.