

Project No. EIE/06/134/sl2.448721

## Raising the efficiency of boiler installations

**Deliverable 6.2: Evaluation report on success factors for a broad market introduction of DHQI and GPQU**

Start date of project: 01.02.2007

Duration: 32 months

Organisation name of lead contractor for this deliverable: Wuppertal Institute

Dissemination level		
PU	Public	X
CO	Confidential, only for members of the consortium (including the Commission Services)	

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## 1 Introduction

Modern, optimised heating can reduce the energy consumption of an apartment or house up to 20% compared to an older installation. This only works when the whole system is professionally designed and optimised. The installation of efficient boilers and improved components does in practice not automatically lead to a better fuel utilisation.

It was the aim of the EU-funded BOILeff-project to develop two services for improving the installation quality while enhancing the fuel utilisation of heating systems.

The first service DHQUI (Declaration of High Quality Installation) is concerned with optimised design: The installer, following a catalogue of optimisation measures, builds a new heating installation including all components and optimised settings.

The second service GPQUI (Guaranteed Performance Quality) is about guaranteeing and monitoring the achieved efficiency improvement for the customer. This is monitored using heat energy metering. The plumber determines the standardised annual overall efficiency that functions as a measurement for the efficient operation of the installed heating system and compares it to a preliminarily determined efficiency standard for this installation.

Installers who have worked with the BOILeff-project have checked these new services in field tests.

Besides technical issues success is prevalingly defined through the perceived value from the side of the customer as well as from the side of the service provider.

In order to assess this perceived value two questionnaires were developed (one for customers and one for installers, cf. Annex) dealing among others with the following topics: convincing arguments for the participation in the field testing, general satisfaction with the service and additional value resulting from the declaration of guarantee of a certain boiler installation quality. A series of interviews with boiler owners and installers were carried out.

This paper is based on the replies to the national questionnaires and presents an evaluation on success factors for a broad market introduction of the new services of the European project BOILeff.

## 2 Participating customers and installers

The BOILEff project provoked great interest among customers and installers and other agents of the sector in the participating countries. More than 352 customers/ boiler owners and 110 installers showed high interest in the project and the two services DHQUI and GPQU and a remarkable share participated in the field tests. The developed questionnaires were sent to the whole stakeholder group of boiler owners and installers. In total 99 returned questionnaires could be evaluated.

	Interested in DHQUI and GPQU		Participated in GPQU field tests and DHQUI implementation		Returned questionnaires	
	Customers/ boiler owners	Installers	Customers/ boiler owners	Installers	Customers/ boiler owners	Installers
<b>Austria</b>	78	36	13	12	10	10
<b>Germany</b>	40	18	6	3	9	5
<b>Hungary</b>	> 20	>10	20	10	20	10
<b>Greece</b>	> 200	26	>200	12	12	6
<b>Spain</b>	> 14	> 20	14	7	13	4
<b>Total</b>	<b>&gt; 352</b>	<b>&gt; 110</b>	<b>&gt; 249</b>	<b>44</b>	<b>64</b>	<b>35</b>

Table 1: Overview of the participating customers and installers

In Austria a total of 78 interested customers (boiler owners) and 36 interested innovative installers were identified during the project. From this group 13 boiler owners and 12 installers participated in the Austrian field test (WP 5). 10 boiler owners (60% participated in the field test) and 10 installers (40% participated in the field test) returned filled-in questionnaires.

In Germany, 18 boiler owners and 40 installers were interested in participating in the BOILEff project. Six boiler owners and three installers participated in the field tests. Some of those customers and installers, who didn't participate in the field tests, filled in the questionnaire.

In Hungary in total more than 20 customers and 10 installers were interested in participating in the BOILEff project. 20 boiler owners and 10 installers participated in the field test and returned the questionnaire.

In Greece RAE managed to gather more than 200 signed DHQUI forms, by over 10 boiler installers and associations from all over Greece. Specifically, 12 installers took part in the implementation of the DHQUI, while more than 26 installers showed interest for further collaboration. 12 customers and 4 installers returned the questionnaire.

In Spain more than 20 installers were interested in taking part in the project, in the end 7 of them were able to participate in the field tests. These installers presented a total of 14 installations, 13 customers and 4 installers returned the questionnaire.

As a first result from the answers of the installers it can be seen that the typical business areas of the participating installers are manifold. They include 38 % heating, 16 % solar, 11 % biomass, 10 % sanitary installation (3 % others). Especially the high percentage of solar and biomass business areas indicates a high interest in quality installations by installers who are active in these relatively new business fields.

### 3 Evaluation of customers' answers

The questionnaire starts with a general part: questions about the project and the customer and his motivation for his interest in the two new BOILeff services. This is followed by questions about the customer's expectations and the possible implementation of these new services.

Documentation on technical data of the field projects in the participating countries is already given in the Technical Evaluation Report (cf. D 6.1). In the following the questions regarding motivation, expectations and implementations are documented and evaluated.

#### 3.1 Are the two BOILeff services DHQUI and GPQU realistic and practicable?

The question if the two proposed new services are realistic and practicable had different results. The majority of customers agrees with the DHQUI standard but regarding the guaranteed performance (GPQU) more than half of the customers only partly agree.

This shows a high acceptance for high quality installations, whereas there might be open questions regarding the guaranteed performance by the installer.

#### 3.2 Motives for the participation in the project

The following motives are fully applicable for 100% of the boiler owners in Germany and Austria for their interest in participating in the DHQUI and GPQU:

- A guaranteed high quality installation
- An energy-optimized highly efficient heating system
- Reduction of maintenance and repair services
- Reduction of greenhouse gas emissions
- Reduction of fuel consumption and costs

Customers in Hungary, Greece and Spain show a different picture: Only about half of them agrees, the other half has reservations regarding these new services and only partly agrees.

It can be stated that there is a difference in motivation between customers in Germany and Austria and customers in Hungary, Greece and Spain. Possibly the importance of heating is lower in the last-mentioned countries.

#### 3.3 Expected energy savings

Only small differences were found in the participating countries. All interviewed customers expect energy savings between 10 and 30% by the implementation of the DHQUI and GPQU. In Austria 60% of the customers expect energy savings of 20%, two customers expect energy savings of 15% and two of 30%. In Germany the range of expected savings is distributed between 10 % and 30 %, in Hungary and in Spain between 15 % and 20 %.

### 3.4 Acceptance of additional costs for highly efficient heating systems

The acceptance of additional costs varies a lot in the different countries. In Germany, Austria and Spain customers are willing to pay additional costs for high quality installations (according to the DHQI and including a guarantee declaration) of up to 400 € or 10% of the total installation costs, in Hungary the interviewed customers are willing to pay additional costs of up to 250 €, in Greece up to 150 €. Restricted only to the Declaration of High Quality Installation additional costs of 250 € max. would be accepted, some customers wouldn't even accept any additional costs.

It can be stated that generally additional costs are accepted, though the amount differs.

### 3.5 Establishment of an independent arbitrator

With regards to the guaranteed installation quality according to the "Declaration of High Quality Installation" or "Guaranteed Performance Quality" the individual installer will not be able to supervise his own work. Customers are asked if an independent control would be necessary in case of conflicts, and which institution would be adequate for this kind of control.

Country-independent most of the interviewed customers are of the opinion that an independent arbitrator is necessary to solve conflicts between installers and customers. For being this arbitrator, a majority of customers favours a local / regional expert board (representing the professional body, the chamber of crafts, the association of engineers, etc), some customers favour a body representing the government and a representative of the consumers, and some a scientific institute (university, university of applied science) in cooperation with an approved expert.

### 3.6 Quality label and professional training

In order to establish market transparency and to ensure the necessary quality standards, a quality label or a recognized certificate linked to professional training course can be established. Customers were asked if such kind of label would be useful.

All interviewed customers are of the opinion that a special certificate for a professional training or a product label named „guaranteed installation quality“ will be useful for the promotion of high quality installations. Furthermore the customers noted that this certificate should be granted due to a participation of the installer in a professional training; about half of all customers preferred such training in combination with a successfully established high quality installation (best practice project).

## 4 Evaluation of installers' answers

The questionnaire starts with a general part: questions about the installer's main application area (cf. chapter 2) and his motivation for being interested in the two new BOILeff services. This is followed by questions about success factors and barriers and cost data regarding the possible implementation of these new services.

### 4.1 Motives for the participation in the project

100% of the interviewed installers are interested in the DHQUI whereas the GPQU is only of interest for about half of the installers.

The question if the two proposed new services are realistic and practicable had different results. The majority of country-independent installers agrees with the DHQUI standard, though some of them only partly. Regarding the guaranteed performance (GPQU) installers in Greece and Hungary don't see this service as a new business segment, while about half of the installers in Germany, Austria and Spain regard it as practicable.

The following motives are applicable for all installers for their interest in the DHQUI and GPQU:

- Extension of business activities with the objectives energy efficiency and guaranteed quality for the customer;
- Improvement of expertise and reputation in the field of energy efficiency and customer satisfaction;
- Expectation of higher turn-over rates;
- Clear differentiation from cheap installations.

### 4.2 Important preconditions for the establishment of the DHQUI and GPQU

Nearly all interviewed installers are of the opinion that the following preconditions are important for the establishment of the „Declaration of High Quality Installation“ and the „Guaranteed Performance Quality“:

- Open to new challenges; high technical expertise of the management and the executing staff;
- The customers are open-minded and interested in the topics energy saving and climate protection;
- Motivating the staff through professional trainings with specific training contents (hydraulic balance etc.);
- Public information.

### 4.3 Expected energy savings

The answers regarding expected energy savings by the implementation of new heating systems according to the DHQUI reveal big differences in the participating countries. Whereas the interviewed installers in Austria and Hungary expect energy savings between 15 and 20% the installers in Germany and Spain expect savings between 10 % and 30 %.

### 4.4 Obstacles or barriers for the success of the DHQUI or GPQU

This question is related to the practicability of the new services and the role of obstacles and barriers.

Nearly all of the installers in the participating countries agree or partly agree on the following obstacles and barriers for the success of the „Declaration of High Quality Installation“ and the „Guaranteed Performance Quality:

- Insufficient transparency of the installation quality of the heating system: For the customer it is very difficult to differentiate between a good quality installation and a less good installation (this obstacle can be overcome by DHQUI and GPQU);
- More personal efforts for the acquisition (advertising and dialogues with customers) and an additional inspection of the unit (heating system and distribution) is necessary;
- More time effort to prepare offers (pre-calculation) for the installation and the controlling of the guaranteed quality;
- Higher efforts for the initial setup of the heating system and the subsequent maintenance are needed.

### 4.5 Estimated additional costs for highly efficient heating systems

Assessment of additional costs varies quite a lot in the different countries. For the installation of the heating system according to the declaration of high quality the installers in Austria and Germany expect additional costs between 150 and 1500 € or 3 to 15% of the total installation costs. 80% of the interviewed installers expect additional costs of around 5% of the total installation costs. In Hungary, Spain and Greece, installers expect additional costs of 250 € max.

### 4.6 General integration of heat and electric meters into the heating system

Some experts propose to generally to integrate heat meters and an electricity meter to ease the evaluation of the heating system's efficiency.

The installers' feedback is quite different: 80% of the installers in Austria disagree to a general integration of heat and electric meters into the heating system because they are of the opinion that the system will become prone to errors and that the customer dialogue will

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<sup>1</sup> Taking into account average total installation costs for a flat or single-family house (around 130 m<sup>2</sup> gross floor area).

become more challenging. Only 20% of the installers agree if the additional costs do not exceed 5% of the total installation costs. In Greece, all installers disagree even if the costs do not exceed 5 % of the total installation costs. In contrast, in Germany, Hungary and Spain about all installers agree if the costs for the meters do not exceed 5 % of the total costs.

#### 4.7 Necessary additional time for carrying out the following steps according to DHQUI and GPQU

In the following table the distinct steps for the implementation of the DHQUI and the GPQU are listed together with the expected time needed in average. It shows that the assumptions are similar in the participating countries but strongly depend on the size of the building.

MEASURES	SFH*	MFH*	
Survey of the building for the heat load calculation	1,5 to 3	3 to 12	h / house
Survey of the heating network and rooms for the room by room heat load calculation and the calculation of the pipeline network	0,2 to 3	0,3 to 15	h / room
Implementation of a heat load calculation according to a valid standard (i.e. DIN EN 12831, ÖNORM EN 12831)	0,5 to 4	2 to 15	h / house
Calculation of the pipeline network and identification of the values for the thermostatic valves	1 to 4	2 to 4	h / ThV
Installation of a pre-adjustable thermostatic valve	0,4 to 1,5		h / ThV
Implementation of a hydraulic balance by adjusting the thermostatic valve	0,2 to 0,5		h / piece
Pump parameterisation and adjusting the central heating controls	1 to 2	2 to 3	h / system
Briefing the customer about his new heating system concerning fuel supply, boiler, circulation pump, control system, hot water storage tank and actions to be taken in case of malfunction as well as possibilities to optimise the system operation (e.g. proper use of the thermostatic valves).	1 to 8		h / system
Assembly time for the installation of heat and electricity meters	1 to 2		h / meter
Annual costs for monitoring the system (for the GPQU)	No estimation, difficult to assess		Euro / house

\* SFH= single family house of about 130 m<sup>2</sup> gross floor area, MFH= multi family house with about 8 flats (80 m<sup>2</sup> gross floor area per flat)

#### 4.8 Establishment of an independent arbitrator

With regards to the guaranteed installation quality according to the “Declaration of High Quality Installation” or “Guaranteed Performance Quality”, the individual installer will not be able to supervise his own work. Installers were asked if an independent control would be

necessary in case of conflicts, and which institution would be adequate for this kind of control.

With the exception of Austria all installers regard an arbitrator as necessary, though the question who could take that role is answered differently. In Austria 80 % of the interviewed installers are of the opinion that an independent arbitrator isn't necessary to solve conflicts between installers and customers. Only 20 % agree with the idea to take into account a local/regional expert board as independent arbitrator, if necessary. In Germany most of the installers regard an arbitrator as necessary. This task should be carried out by an already existing local / regional expert board (representing the professional body, the chamber of crafts, the association of engineers, the house owners, other independent institutions or a university institute). In Spain, 50 % of installers agree with the idea of an independent arbitrator in case of conflicts. For this role they favour a body representing the government or the administration and a representative of the consumers. In Hungary and Greece an arbitrator is regarded as necessary, 80 % of the installers in Hungary propose a qualified expert for this, 100 % of the Greek installers propose a committee consisting of one representative of the own professional body and one representative for the consumers' interest.

#### **4.9 Quality label and professional training**

In order to establish market transparency and to ensure the necessary quality standards, a quality label or a recognized certificate linked to a professional training course could be established. Installers are asked if such kind of label would be useful.

In Austria, only 50% of the installers are of the opinion that a special certificate for a professional training or a product label „Guaranteed Installation Quality“ would be useful to promote high quality installations. In Germany, Hungary and Spain 70 % to 80 % of installers agree, while in Greece 100 % (partly) agree to such a label.

## 5 Conclusions

It can be concluded that there are only small differences in the assessment of the two proposed new services “Declaration of High Quality Installation” (DHQUI) and “Guaranteed Performance Quality” (GPQU) in the participating countries.

The customers as well as the installers regard the DHQUI approach as realistic whereas the GPQU is only partly agreed with at the moment. It seems that too many questions are still open (e.g. the open question regarding an independent arbitrator in case the guaranteed efficiency is not achieved).

Generally the agreement in Austria and Germany is higher than in Hungary, Greece and Spain but the customers’ motivation to implement a high quality installation matches the installers’ in all participating countries: Customers want a high quality installation to save greenhouse gas emissions and money, installers see the possibility to extend their business activities via a clear differentiation from cheap installations.

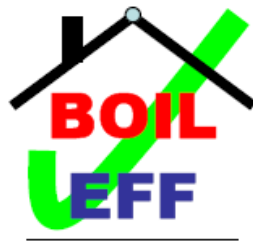
Because of the higher installation quality, both the customers and the installers expect fuel savings between 5 % and 30 %. The customers principally accept additional costs, which will result from DHQUI and GPQU, though there are some differences between countries regarding the amount of the additional costs. It is agreed that additional costs could be reduced partly by general integration of heat and electricity meters into the heating system.

One major problem are obstacles for future implementation, which have to be overcome: Insufficient transparency of the installation quality for customers, more personal and time efforts for acquisition and higher efforts for the initial setup by installers.

These obstacles can partly be overcome by the installation of an independent arbitrator, who can mediate in case of problems. Nearly all customers and installers in the participating countries agree to such an institution, though big differences and uncertainties exist concerning the question which institution or person could execute such a role.

An important measure to overcome insufficient transparency for the customer and to reduce time efforts for acquisition of the installer could be the invention of a “Guaranteed Installation Quality Label” for installers who are certified to carry out high quality installations. All customers in the participating countries agree, the installers generally agree as well but show a different grade of agreement in the different countries: Austria 50 %, Germany, Hungary, Spain 70 % to 80 % and Greece 100 %.

## 6 Annex: Questionnaires for customers and installers



Project No. EIE/06/134/sI2.448721

### Raising the Efficiency of Boiler Installations

#### Questionnaire for Customers

Date: 11.05.09

Authors: Gerhard Wohlauf, Dr. Claus Barthel, Dr. Stefan Thomas

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**Part A: General part / Introduction - questions about the project and the customer, motivation and experiences/assessment regarding the participation in the project, further desires and suggestions**

**A 1a: Information about the object: kind of flat or house**  
 (please underline the respective appropriate distinctive feature!)

<input type="radio"/>	Flat in a multiple family house with up to 4 / 8 /12 / more than 12 flats
<input type="radio"/>	Detached one-family house
<input type="radio"/>	One-family house as semidetached house, as terraced house (mid/end)
<input type="radio"/>	Detached two-family house
<input type="radio"/>	Other building:..... (please specify!)

**A 1b: How many persons permanently live in the object under test: flat or house**

<input type="radio"/>	Up to 2
<input type="radio"/>	2-4
<input type="radio"/>	5-10
<input type="radio"/>	11-20
<input type="radio"/>	More than 20

**A 2: In which Boileff sub-project are you especially interested, did you take part or will you possibly take part? (please tick one box per line)**

	interested (without participation )	future partici- pation possible	interested, participa- ting in the project
high quality installation according to the „Declaration of high quality installation (DHQUI standard)“	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
high quality installation with Performance Quality Guarantee (GPQU-standard)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**A 3: Which kind of heating do you use (before and after modernisation) (multiple answers are permitted) - note: persons who are interested in the Boileff project should tick the box „before modernisation“**

before modernisa- tion	after modernisa- tion	<u>notice:</u> concerning the differentiation of the details: fuels: <u>gas / fuel oil</u> or <u>with / without integrated water heating!</u> please underline the respective distinctive feature!
<input type="radio"/>	<input type="radio"/>	Gas / fuel oil heating with a floor standing boiler with / without domestic hot water
<input type="radio"/>	<input type="radio"/>	Gas-heating with a wall mounted boiler with / without domestic hot water
<input type="radio"/>	<input type="radio"/>	Gas / fuel oil heating – with additional use of renewables – if yes, please specify the kind of energy source
<input type="radio"/>	<input type="radio"/>	Gas / fuel oil heating with a floor standing condensing boiler with / without domestic hot water
<input type="radio"/>	<input type="radio"/>	Gas-heating with a wall mounted condensing boiler with / without domestic hot water
<input type="radio"/>	<input type="radio"/>	solar heat for domestic hot water; collector size in m <sup>2</sup> : .....m <sup>2</sup> (...before/after modernisation!)
<input type="radio"/>	<input type="radio"/>	solar heat for domestic hot water and support of heating system; collector size m <sup>2</sup> : .....m <sup>2</sup>
<input type="radio"/>	<input type="radio"/>	split logs boiler: with / without buffer storage
<input type="radio"/>	<input type="radio"/>	wood pellets boiler: with / without buffer storage

o	o	Other, (please complete if so):.....
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**A 4: Do you think that the Boileff-objective with standards for the two services „Declaration of high quality installation“ and „Guaranteed performance quality“ is realistic and practicable? (please tick one box per line)**

	yes	partly	no
The high quality installation according to the „Declaration of high quality installation (DHQUI standard)“	o	o	o
The high quality installation with Performance Quality Guarantee (GPQU-standard)	o	o	o

**A 5: : Which were/are the main motifs for your interest in the Declaration of high quality installation? (please tick one box per line)**

	fully applicable	partially applicable	not applicable
Interest in a guaranteed quality of installation including durable high quality components (boiler, fitting material, valves etc.)	o	o	o
Ensuring an <u>energy optimized operation of the heating system</u> as well as largely eliminating technical dysfunctions	o	o	o
Contributing considerably to climate protection due to energy reduction to be additionally achieved by an efficient operation of the heating system	o	o	o
other:..... (please complete if so)	o	o	o

**A 6 Which were the main motifs for your participation in the „Guaranteed performance quality“? (please tick one box per line)**

	fully applicable	less applicable	not applicable
Interest in a guaranteed quality of installation including durable high quality components (boiler, fitting material, valves etc.)	o	o	o
Ensuring a <u>guaranteed performance efficiency</u>	o	o	o
Contributing considerably to climate protection due to energy reduction to be additionally achieved by an efficient operation of the heating system	o	o	o
other:..... (please complete if so)	o	o	o

**Part B: Your expectations regarding your project participation, the guaranteed quality ensured by an independent institute and the qualifications of the performing installer**

**B1: : Which heat savings (in percentage) do you expect for the modernised heating system in case of the „guaranteed installation quality“ or the „guaranteed performance quality“ ? (old boiler: 30 kW max, older than 20 years, new condensing boiler) (please tick one box per line)**

	up to 10%	up to 15%	up to 20%	up to 30%
Boiler old (fuel oil/gas), new gas condensing boiler	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Boiler old (fuel oil/gas), new fuel oil condensing boiler	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**B 2a: : Which maximum additional costs per heating system are you willing to pay for the installation according to the standards of a „guaranteed installation quality“ or a „guaranteed performance quality“ compared to a normal installation? (please tick one box per line)**

<i>Note: each case applies to the necessary installation of new thermic valves with preadjustment – only the additional costs for the above mentioned services are considered</i>	up to 150 Eur	up to 250 Eur	up to 400 Eur	up to 500 Eur
Self-contained central heating for a flat with 3 or 4 rooms with about 7-9 radiators – guaranteed installation quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Self-contained central heating for a flat with 3 or 4 rooms with about 7-9 radiators – guaranteed performance quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
One-family house with 13 – 14 radiators - guaranteed installation quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
One-family house with 13 – 14 radiators - guaranteed performance quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**B 2b: Which maximum additional costs (in percentage) per heating system are you willing to pay for the installation according to the standards of a „guaranteed installation quality“ or a „guaranteed performance quality“ compared to normal installation? (please tick one box per line)**

<i>Note: each case applies to the necessary installation of new thermic valves with preadjustment – only the additional costs for the above mentioned services are considered</i>	up to 5%	up to 7,5%	up to 10%	up to 15%
Self-contained central heating for a flat with 3 or 4 rooms with about 7-9 radiators – guaranteed installation quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Self-contained central heating for a flat with 3 or 4 rooms with about 7-9 radiators – guaranteed performance quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
One-family house with 13 – 14 radiators - guaranteed installation quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
One-family house with 13 – 14 radiators - guaranteed performance quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**B3: Which further costs per heating system are you willing to pay for the installation of the following additional components to achieve even more efficiency? (please tick one box per line)**

<i>Note: The additional costs include the following individual high quality components – per line and per dwelling unit in a multiple family house or per one-family house. Circulation pumps certified as A-class pumps are primarily installed, whenever possible (subject to boiler, distribution tubes)</i>	Up to 50 Eur	Up to 100 Eur	Up to 150 Eur	up to 250 Eur
a) additional installation of water saving valves and components (flow restrictor)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b) installation of high efficient regulating components (thermostatic valves with 1 K-proportionality range, time-controlled thermostatic valves with central control panel by means of radio control etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c) installation of regulating components for a more efficient domestic hot water supply in case of central water heating (circulation control, A-class circulation pumps etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d) other services: namely:..... (please complete if so)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Previous notions to the following questions: B4–B5**

**Reasoning:** With regard to the guaranteed installation quality according to the „Declaration of high quality installation“ or „Guaranteed Performance Quality“ the individual installer will not be able to supervise his own work. In case there will be conflicts regarding the project’s success, an independent institution acting as an arbitrator for both parties (installer and customer) should be appointed.

In order to establish market transparency and to ensure the necessary quality standards, the installing companies should produce a recognized certificate of professional training or a quality-label, thus offering orientation and decision guidance to the interested customer.

**B4: Is it necessary to establish an independent arbitrator and which institutions will be suitable for this purpose? (please tick one box per line)**

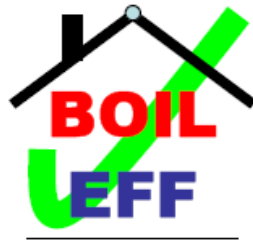
	yes	I do not know	no
Do you think that an independent arbitrator is necessary in case of conflicts between installer and user?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If you say <b>yes</b> : to your opinion, which of the following institutions should fulfil this task?			
	suitable	Less suitable	Not suitable
A local / regional expert board (representing the professional body, the chamber of crafts, the association of engineers, etc)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A scientific institute (university, university of applied science) in cooperation with a recognized expert	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
other, namely:..... (please complete if so)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**B 5: Do you think that a special certificate for a professional training or the product label „Guaranteed installation quality“ will be useful? (please tick one box per line)**

	approval	partly approval	no approval
Certificate of participation in a professional training in combination with a successfully terminated project	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Product label on the basis of the successful participation in a one-day professional training in a recognized institute	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**We thank you for your assistance!**

Please send the filled in questionnaire in the enclosed, addressed and stamped reply envelope back to the given address as soon as possible until .... (requested date).



**Project No. EIE/06/134/sI2.448721**

## **Raising the Efficiency of Boiler Installations**

### **Questionnaire for Installers**

**Date: 11.05.09**

**Authors: Gerhard Wohlauf, Dr. Claus Barthel, Dr. Stefan Thomas**

**Wuppertal Institute for Climate, Environment and Energy  
Döppersberg 19  
42103 Wuppertal  
Germany**

**Part A: General part / Introduction – Questions about the company’s structure and activities as well as about the motivation to take part in this project.**

<b>A 1: Which are the typical activities /business fields of your company? (multiple answers are permitted)</b>	
<input type="radio"/>	Sanitary installation (water and waste water)
<input type="radio"/>	Heating installation (service inclusive) – heating units for fossil fuels
<input type="radio"/>	solar heat for domestic hot water and support of heating system
<input type="radio"/>	biomass-split logs
<input type="radio"/>	biomass-wood pellets
<input type="radio"/>	other – if so please specify

<b>A 2: What is the total number of employees in your company?</b>	
<input type="radio"/>	less than 3
<input type="radio"/>	4-10
<input type="radio"/>	11-20
<input type="radio"/>	more than 20
<input type="radio"/>	more than 30

<b>A 3: How did you learn about the Boileff-project? (multiple answers are permitted)</b>	
<input type="radio"/>	Participation in this project was recommended by the national Boileff-organisation (business partner/staff etc)
<input type="radio"/>	Participation in this project was recommended by a business partner/employee
<input type="radio"/>	Participation in this project was recommended by an interested customer
<input type="radio"/>	I learned about the project on internet
<input type="radio"/>	other sources of information (trade journals etc.)
<input type="radio"/>	I do not remember

<b>A 4: In which Boileff sub-project are you especially interested, did you take part or do you intend to take part (please tick one box per line)</b>				
		<b>interested (without participation)</b>	<b>interested, participating in the project</b>	<b>future participation possible</b>
high quality installation according to the „Declaration of high quality installation (DHQUI standard)“		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
high quality installation with Performance Quality Guarantee (GPQU-standard)		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**A 5: Do you think that the Boileff-objective with standards for the two services „Declaration of high quality installation“ and „Guaranteed performance quality“ is realistic and practicable? (please tick one box per line)**

	yes	partly	no
The high quality installation according to the „Declaration of high quality installation (DHQUI standard)“	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The high quality installation with Performance Quality Guarantee (GPQU-standard)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**A 6: Which were/are the main motifs for your interest in the Declaration of high quality installation? (please tick one box per line)**

	fully applicable	partially applicable	not applicable
Diversification of the own business activities with the objectives: energy efficiency and guaranteed quality for the customer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improvement of expertise and reputation in the field of energy efficiency and higher customer satisfaction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Expectation of a higher sales volume due to high quality components and additional installation services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other, namely:..... (please complete if so)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**A 7: Which were the decisive motifs for your participation in the field test „Guaranteed performance quality“? (please tick one box per line)**

	fully applicable	less applicable	not applicable
Diversification of the own business activities with the objectives: energy efficiency and guaranteed quality for the customer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improvement of expertise and reputation in the field of energy efficiency and higher customer satisfaction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Expectation of a higher sales volume due to high quality components and additional installation services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other, namely:..... (please complete if so)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Part B: Success factors and barriers, indications about the additional costs for the services: „Declaration of high quality installation“ and „Guaranteed performance quality“ and reasoning on the necessary quality control (professional training etc.)**

**B 1: In how many objects under test you / your company took directly part?**

<input type="radio"/>	In no one
<input type="radio"/>	In one
<input type="radio"/>	In two
<input type="radio"/>	In three or more

**B 2: From your point of view, which preconditions are important for establishing the „Declaration of high quality installation“ and the „Guaranteed performance quality (please tick one box per line**

	fully applicable	less applicable	not applicable
openness to new challenges and high expertise of the management and the participating staff	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
your own regular clientele contains a growing number of open-minded and solvent customers for the topics energy saving and climate protection	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Motivation of the staff by professional training with relevant training contents (hydraulic balance etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other, namely..... (please complete if so)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**B3: Which typical heat savings (in percentage) do you expect in case you carry out the modernisation of a heating system according to the standards for the „guaranteed installation quality“ or the „guaranteed performance quality“? (old boiler: 30 kW max, older than 20 years, new condensing boiler) (please tick one box per line)**

	up to 10%	up to 15%	up to 20%	up to 30%
Boiler old (fuel oil/gas), new gas condensing boiler – guaranteed installation quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Boiler old (fuel oil/gas), new fuel oilcondensing boiler – guaranteed installation quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Boiler old (fuel oil/gas), new gas condensing boiler – guaranteed performance quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Boiler old (fuel oil/gas), new fuel oil condensing boiler – guaranteed performance quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**B 4: Where do you see obstacles and barriers for the success of the „Declaration of high quality installation“ and the „Guaranteed performance quality“ (please tick one box per line)**

	fully applicable	partly applicable	not applicable
Insufficient transparency of quality: for the customer it is very difficult to differentiate between a good and long-lasting installation and a less good!	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Is it possible to eliminate this lack of transparency or this dilemma by means of the „Declaration of high quality installation“ and the „Guaranteed performance quality“?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
More personal efforts for the acquisition (advertising and dialogues with customers) and an additional inspection of the unit (heating system and distribution) for the „guaranteed performance quality“	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
More efforts to prepare offers (pre-calculation), for the installation and the guaranteed quality (controlling)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Significantly higher efforts for the initial setup and the subsequent maintenance (follow-up optimisation and customer dialogue)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other, namely:..... (please complete if so)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**B 5: What are the typical additional costs per heating system (including exchange of the boiler) for the „guaranteed installation quality“ or „guaranteed performance quality“ in the following examples, according to your present experience? (please tick one box per line)**

*Note: each case applies to the necessary installation of new thermic valves with pre-adjustment – only the additional costs for the above mentioned services are considered*

	up to 150 Eur	up to 250 Eur	up to 400 Eur	up to 500 Eur
Self-contained central heating for a flat with 3 or 4 rooms with about 7-9 radiators – guaranteed installation quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Self-contained central heating for a flat with 3 or 4 rooms with about 7-9 radiators – guaranteed performance quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
One-family house with 13 – 14 radiators - guaranteed installation quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
One-family house with 13 – 14 radiators - guaranteed performance quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**B 6: How do you judge the proposals of some experts to generally integrate a heat and electric meter into the heating system in order to substantiate the efficiency of the installation? (please tick one box per line)**

	yes	no
I fully agree – independently from the additional costs	<input type="radio"/>	<input type="radio"/>
I agree, if the additional costs do not exceed 5% per customer for a typical boiler exchange (6000 – 10000 euro)	<input type="radio"/>	<input type="radio"/>
I disapprove, because heating systems will get more complicated and thus possibly more susceptible to error	<input type="radio"/>	<input type="radio"/>
I disapprove, because the already delicate customer relations will get more complicated, dealing with the customer will be more challenging and exhausting	<input type="radio"/>	<input type="radio"/>
f) other reason, namely:..... (please complete if so)	<input type="radio"/>	<input type="radio"/>

<b>B 7: Necessary efforts as to time and costs for carrying out the following steps for the „Guaranteed installation quality“ (a-h) and the „Guaranteed Performance quality“ (a-l)</b>			
Notes: OFH= one-family house of about 130 m <sup>2</sup> MFH= multiple-family house with about 8 flats à 80 m <sup>2</sup> <u>note:</u> the prices indicated are the customers gross prices (VAT incl.) - Prices: 01.01.2009	OFH	MFH	unit
a) survey of the building's particulars (physics of construction) and the central specifications of the heating system for the calculation of heat load			<b>h / house</b>
b) survey of the heating network and rooms for the calculation of heat load and subsequently the tube system			<b>h / room</b>
c) evaluation of heat load according to a valid standard (i.e. DIN EN 12831, ÖNORM EN 12831)			<b>h / house</b>
d) calculation of the tube system and identification of the values for the pre-adjustment of the thermic valves			<b>h / ThV</b>
e) assembly time for fitting a pre-adjustable thermostatic valve, diameter 15 (1/2 ")			<b>min / ThV</b>
f) time for exectuing the hydraulic balance per thermostatic valve or other differential pressure regulators			<b>min / piece</b>
g) optional: expenses for material and wage costs in case of the supplementary insulation of tubing (central distribution tubes and ascending tubes) in unheated rooms according to valid standards (OFH: diam. 20; MFH: diam. 25/32) -  g1) necessary assembly time for this work			<b>Euro / continuous tube meter (tm)</b>  <b>min / continuous tm</b>
h) optional: expenses for material and wage costs in case of the supplementary insulation of tubing (radiator tubes) in unheated rooms according to valid standards (OFH/MFH: each with diam. 15)			<b>Euro/ continuous tube meter (tm)</b>
i) pump parameterisation and adjusting of the central heating control (heating grades etc.)			<b>h / system</b>
j) handing over and instructing the customer on the functioning of the system and an energy-efficient operating of the system (start-up protocol incl.)			<b>h / system</b>
k) one-time average assembly time for the installation of 1 piece heat meter (hm) and 1 piece electric meter (em) respectively for the electric auxiliary energy – in case of service: guaranteed performance quality			<b>h/hm</b> <b>h/em</b>
l) annual costs for the monitoring of the system (Declaration of high quality installation incl) – guaranteed performance quality			<b>Euro / house</b>

**Previous notions to the following questions: B8–B9**

**Reasoning:** With regard to the guaranteed installation quality according to the „Declaration of high quality installation“ or „Guaranteed Performance Quality“ the individual installer will not be able, if required, to supervise his own work independently. In case there will be conflicts regarding the project’s success, an independent institution acting as an arbitrator for both parties (installer and customer) should to be appointed.

If required, this institution could offer professional training for the interested installing companies in order to achieve the necessary expert knowledge. In this context, introducing of a certificate or a quality label should be discussed, for those companies that have successfully finished a training. Subsequently, these companies could use this certificate or label for marketing purposes.

<b>B 8: Which kind of institution will be suitable to act as independent arbitrator (in case of conflicts and disputes? (please tick one box per line)</b>			
	suitable	less suitable	not suitable
A committee consisting of one representative of the own professional body (craft guild etc.) and one representative for the consumers' interest (i.e. consumer protection agency)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A local/regional expert board (representing the professional body, the chamber of crafts, the association of engineers, of house owners, other independent institutions or a university institute)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other (no.1), namely:..... (please complete if so)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other (no.2), namely:..... (please complete if so)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

<b>B 9: Do you think that a special certificate for a professional training or the product label „Guaranteed installation quality“ will be useful? (please tick one box per line)</b>			
	approval	partly approval	no approval
Certificate of participation in a recognized professional training (minimum period: 1 to 2 days), offered by an admitted expert institute or the professional body, possibly in cooperation with an admitted and recognized modernisation project	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Product label on the basis of the successful participation in a recognized professional training (minimum period: 1 to 2 days, including a test) and a successfully executed modernisation project including the calculation of heat load and tube system, evaluation of the pre-adjustment values and the pump capacity)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

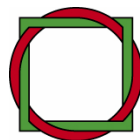
**We thank you for your assistance!**

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Project partners:



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