Technology procurement for very energy efficient circulation pumps
Overall Evaluation Report

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Wuppertal Institute for Climate, Environment and Energy

On behalf of the Energy+ Pumps project team

22 December 2008

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Energy+ Pumps

The Project in brief

About 2–3 % of the overall electricity consumption of the EU is caused by circulators in single or double family homes and flats. A new technology of pumps with electronically commutated (EC) motor pumps is available now; it is one possible way to achieve a reduction in circulator annual electricity use by 60 % or more.

The project’s objective is a market transformation towards this new very energy-efficient pump technologies – Energy+ pumps – for circulators in heating systems, both stand alone and integrated in boilers. The aim of the project is, therefore, to bring more products to the market from all major manufacturers, to contribute to their market success, and to reduce their prices through mass production.

In order to achieve this objective, the project adapts and applies the technology procurement methodology. Large buyers will be aggregated to activate the pump and boiler manufacturers. Sales and training materials, and a sizing spreadsheet software for installation contractors will be developed and applied. A competition both for energy-efficient products and marketing campaigns will be organised and the information on the Energy+ pumps will be disseminated widely through website, newsletter, media, and fairs.

Consortium

The project is co-ordinated by the Wuppertal Institute. The eleven project partners are:

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<th>Project Partner</th>
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<tr>
<td>Wuppertal Institute for Climate, Environment and Energy (WI)</td>
<td>DE</td>
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<tr>
<td>Österreichische Energieagentur – Austrian Energy Agency (A.E.A.)</td>
<td>AT</td>
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<tr>
<td>Politecnico di Milano, Dipartimento di Energetica, eERG</td>
<td>IT</td>
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<td>Flemisch Institute for Technological Research (Vito)</td>
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<td>Agence de l’Environnement et de la Maitrise de l’Energie (ADEME)</td>
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<td>Centre for Renewable Energy Sources (CRES)</td>
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<td>ESCAN, S.A.</td>
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<td>SEVEN, Stredisko pro efektivni využivani energie, o.p.s.</td>
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<td>Deutsche Energie-Agentur GmbH (dena)</td>
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<td>ARENA, Arbeitsgemeinschaft Energie-Alternativen</td>
<td>CH</td>
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Overall evaluation report
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1 Introduction

At the end of the Energy+ Pumps project, it is time to evaluate the impact the project has had on the market for heating system circulators in the participating countries. Each project partner has prepared a national evaluation report. This report summarises the national reports and gives an overview about the impacts of the Energy+ pumps project in Europe.
2 Market shares and prices of Energy+ products

The short-term objective of the Energy+ Pumps project was to bring more energy-efficient circulators and boilers to the market, to contribute to their market success, and to reduce their prices through mass production. Therefore, this chapter will look at the availability of Energy+ products, their market shares, and whether their prices have reduced compared to the year 2005, i.e., before the project started.

2.1 Energy+ products available in the countries represented in the project

2.1.1 Circulators

From the first Energy+ Lists in March 2007 to the fourth edition in November 2008, the number of Energy+ circulators rose from 19 to 26, so the market offer has increased. It is likely that Energy+ Pumps contributed to this increase in products on the market. However, it is impossible to say what exactly was the contribution of the project to this market development.

Out of the 26 Energy+ circulators, 15 are available in all European countries, which are those from Grundfos, KSB, Laing, and Wilo. The other 11, from Askoll, Biral, Salmson, and Smedegaard, are only available in selected countries.

This is confirmed by a market screening of the Energy+ partners, although in the smaller countries, sometimes only between 8 and 13 models were easily found on the market.

2.1.2 Boilers

No boilers were offered by manufacturers for inclusion in the Energy+ Lists. However, one model won the Energy+ Award. Many major boiler manufacturers are now offering condensing boilers with highly energy-efficient circulators, however, they usually do not meet the Energy+ criterion of a low internal flow resistance. E.g., in Spain, seven models in total were found available on the market, which include circulators that would meet Energy+ requirements if sold stand-alone.

2.2 Market shares and prices of Energy+ products

2.2.1 Energy+ circulator market shares

Have the new highly energy-efficient circulators been successfully introduced in the market? The Energy+ Pumps project partners asked manufacturer representatives for the market shares they achieved or estimate for the market of circulators sold stand-
alone in 2008 in each of the nine countries. Table 2 presents the results. In the Czech Republic, no data were obtained from the manufacturers, so that the figures are informed estimates by the project partner.

Table 2: Market share of Energy+ circulators among small stand-alone circulators in 2008

<table>
<thead>
<tr>
<th>Country</th>
<th>Austria</th>
<th>Belgium</th>
<th>Czech Republic</th>
<th>France</th>
<th>Finland</th>
<th>Germany</th>
<th>Greece</th>
<th>Italy</th>
<th>Spain</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>20%</td>
<td>15 to 20%</td>
<td>10 to 15%</td>
<td>5%</td>
<td>25%</td>
<td>30%</td>
<td>2%</td>
<td>20%</td>
<td>8%</td>
</tr>
</tbody>
</table>

Altogether, weighted with the annual sales of stand-alone circulators per country, the Energy+ circulators have achieved more than 15 % of the market for small-scale circulators (below 1.85 m³/h of flow rate) sold stand-alone (i.e., for installation with floor-standing boilers or for replacement).

This is much higher than the Energy+ Pumps project hoped when writing the proposal: the initial target was a market share of 5 %.

However, the market share for circulators included in boilers, particularly wall-mounted boilers, is certainly much lower than 15 % in the Energy+ Pumps countries overall. We have no substantiated estimates, but the market share probably still remains below 10 % in all of the nine countries. For example, one major manufacturer reported a share of 3 % in his sales in Spain. Particularly in the Southern European countries such as France, Greece, Italy, and Spain, the total sales of circulators included in wall-mounted boilers is much more important than those of stand-alone circulators. These are often not condensing boilers but a rather cheap product, which is unlikely to host an expensive circulator, however energy-efficient it may be. Furthermore, Energy+ circulators can normally not even be used as replacement circulators due to special geometry or hydraulic design of the boiler.

Given these uncertainties, we may estimate that the overall market share of small Energy+ circulators in the nine Energy+ Pumps countries was probably between 5 and 10 %. This is more than the project’s target, and means that an initial market acceptance of the products has been achieved. This even more the case for the medium-sized circulators, which have achieved market shares as high as 45 % in Austria and 60 % in Finland during 2008.

Again, to which extent the Energy+ Pumps project has contributed to this market success, is very difficult to estimate. The next chapter will provide some qualitative evidence from interviews made with market actors. It is clear that particularly the manufacturers are now keen to increase the market share of Energy+ circulators, which they still sell at quite a high price premium (cf. next section). E.g., Grundfos in Italy has announced a target of raising the market share to 50% by 2010.
2.2.2 Energy+ circulator market prices

The small Energy+ circulators (below 1.85 m³/h of flow rate) usually cost around 300 Euros. This is between 70 and 100 percent more than the price of a conventional, non-controlled model and between 50 and 60 percent more than for a conventional, electronically controlled model of the same hydraulic performance (flow rate and head).

For the medium-sized models, the price differential towards conventional, non-controlled models is in the same range, whereas it is often lower compared to a conventional, electronically controlled model (20 to 60 percent).

These prices and price premiums over conventional circulators have changed very little compared to the first survey the project did in 2006.

The Energy+ Pumps project’s target was to reduce the price premium over conventional electronically controlled circulators for sizes below 100 Watts to less than 50 % or 60 Euros. Given the results reported here, this has not (yet) been achieved. In relative terms, the price premium is only slightly higher than 50 %. In absolute terms, however, the price premium remains around 100 Euros in most countries. We do not know whether the reason for this is that production volumes are not yet big enough to achieve economies of scale, or whether it is manufacturers’ marketing strategies. However, the marketing strategies may now change. For example in a campaign in Italy from September to December 2008, Grundfos offered the small Energy+ circulators at around 180 Euros, i.e., with almost zero price premium over conventional electronically controlled circulators.

Regarding boilers, highly energy-efficient circulators are usually included in premium products that have a higher price anyway, which is only for a small part due to the circulator. However, this is of course also a barrier for wider market uptake of highly energy-efficient circulators.
3 What market actors think about the impact of the Energy+ Pumps project

To learn more about the impact the project has had on the market for heating system circulators in the participating countries, the project partners asked a non-representative selection of market partners what they did, what use they made out of the information provided by the project, and whether they think Energy+ Pumps has had an influence in the market.

This chapter briefly summarises the results of these interviews.

3.1 Participating buyers

All buyers who signed a declaration were asked to state how many Energy+ circulators the purchased. Not all of them responded; from those who did we estimate that the buyers directly purchased more than 1,000 Energy+ circulators.

Furthermore, the project made detailed interviews with potential buyers in each country. In countries, in which there are participating buyers, both participating and non-participating buyers were to be interviewed; in the other countries, non-participating buyers only.

Purchasing Energy+ circulators was easy for the participating buyers due to the information provided by the project. One buyer in the Czech Republic reported that sometimes, in urgent replacement cases, wholesalers did not have the big pumps on stock. Another remark was that installers who are not familiar with the new circulators prefer the conventional ones, since the new circulators require more work for setting the optimal way of operation.

For the participating buyers, the Energy+ Lists, newsletter, seminars, and website were very helpful to create awareness of the advantages of Energy+ circulators, for information and for selection of circulators. Those buyers interviewed, who were not participating buyers, generally did not know of the project at all, and often not of the advantages of energy-efficient circulators either.

In conclusion, the participating buyers do not feel able to judge to which extent Energy+ Pumps was influencing the market, but it was at least influencing themselves in a positive way. Obviously, since the non-participating buyers were not aware of the project, they also did not think it had an influence on the market.
3.2 Participating supporters

A sample of supporters was also interviewed in detail. Generally, the information provided by the Energy+ Pumps project - Energy+ Lists, newsletter, and website were very helpful for them in their activities directed either to the general public of energy consumers, or to installation contractors. They used the material for publications, websites, events, training courses, and some for own campaigns, as in Salzburg. The material thus helped them to create awareness of the advantages of Energy+ circulators among their target groups.

On the other hand, their opinion as to whether Energy+ Pumps was influencing the market was mixed. Most think that through the information provided and through linking market actors and supporters, the project has had an impact, but was not able to deeply change the market. Much more media presence than what can be done with such a small budget, even through supporters, financial incentives, and regulation were mentioned as necessary to achieve a real change in the market.

3.3 Installation contractors

Both contractors listed as participating buyers and those that are not but participated in training courses organised in connection with the project were interviewed.

Countries differ as to the knowledge and opinion of installation contractors about class A circulators. There are countries, in which installation contractors are both aware of and try to sell the energy-efficient circulators, e.g., Austria, Belgium, Finland, or Germany. Still, they see difficulties to sell them to customers who are not aware of their advantages because of the higher price of the circulators.

Then, there are countries, such as the Czech Republic, Italy, or Spain, where many installation contractors know about the energy-efficient circulators but don’t actively sell them, since they feel they will not be able to convince customers, or the building designer has specified a conventional circulator.

And there are countries, where most installation contractors did yet not know of the energy-efficient circulators. For example, in France, out of 12 installation contractors who participated in a training course and answered a questionnaire, only four (33%) had known about A pumps before and only three (25 %) had used them. None of them knew about the project before. Greece may be another member of this group of countries.

Those who participated in the training courses found the material provided very helpful, some even asked for more detailed information about sizing of circulators or interpretation of pump load curves.
Their opinion about whether Energy+ Pumps was influencing the market is similar to that of the supporters.

### 3.4 Manufacturers’ representatives

Manufacturers of circulators are the actor group who value the Energy+ Pumps project most useful. This includes both the project as such and the material it created. Manufacturer representatives used the material most intensively, and also visited fairs and the Energy+ booths at ISH and Mostra Convegno much more often than the representatives of buyers, supporters, and installation contractors. They value particularly high that the project was run by an independent consortium, which ensures that the information provided is highly credible to end users and installation contractors.

Furthermore, the Energy+ Awards had a high value for the winning companies in their marketing and particularly communication efforts towards final customers but also installation contractors.

The manufacturers confirm that installation contractors are an important link in the market chain, but also that wholesale is a bottleneck: if wholesale does not store the energy-efficient circulators due to the vicious circle of low sales numbers / high prices, installation contractors will have difficulties to order and sell them. This is why the manufacturers think that making the final customers aware is very important, too, to create market demand pull on both installation contractors and then wholesale. Some manufacturers say that Energy+ Pumps has made them more aware of the needs and benefits of addressing final consumers, something that they did not do so much in the conventional circulator business. So this is why they value the communication by Energy+ Pumps and its supporters to final consumers, and the Energy+ Awards so positively.

As one reason for the still relatively high price premium, one manufacturer representative in one country quoted the still high costs of permanent magnets, which are mostly imported from China.

Furthermore, the training courses and material for installation contractors were also seen as very useful. However, major manufacturers hesitate to use the software tool provided by the project, since it includes circulator models from all manufacturers. They prefer to use their own software that only features their own models.

In conclusion, the manufacturers are the group of market actors who judge the (potential) influence of Energy+ Pumps on the market most positively. They think the project has been highly useful but was too short. Some state that financial incentives would be needed, as well as addressing end-users much more intensively to achieve a demand pull towards installation contractors and then wholesale.
4 Conclusions: how to further promote highly energy-efficient circulators in the EU

Looking at the evidence on the market development (chapter 3) and the statements of buyers, Energy+ supporters, installation contractors, and manufacturers (chapter 4), we can conclude: The Energy+ Pumps project has had some impact on the market for highly energy-efficient heating system circulators in the nine countries represented in the project. It has made potential buyers and installation contractors more aware of the advantages of Energy+ circulators, it has assisted at least those installation contractors who participated in the training courses organised with assistance of the project to correctly size and sell Energy+ circulators more easily, and it has made manufacturers more aware of the need to market the new generation of circulators more actively to final customers, and assisted them in doing so, particularly the Energy+ Award winners.

The market for circulators with a Europump label class A that are sold stand-alone (for replacement and/or in floor-standing boiler systems) has increased quite considerably during the three years the project has operated (2006 through 2008), reaching a share of more than 15 % in the nine countries during 2008. However, what exactly is the contribution of Energy+ Pumps to this development is impossible to say. And it became clear that boiler and circulator manufacturers still need to work closely together to increase the share of wall-mounted boilers that have the highly energy-efficient circulators included, both the share in the model range and sales.

The three main lessons learnt from the project are, therefore:

1. Market structures, the functioning of the market, and (dis)incentives of market actors to engage in the production, sale, or purchase of energy-efficient circulators are generally as assumed beforehand. In particular, the analysis confirmed that installation contractors are usually the actors who take the choice of the circulator or the boiler in the residential sector, not the building occupiers or owners (except maybe for large housing companies).

2. It turned out to be easier than expected to win the circulator manufacturers to participate in the project, but it also appears to require more work than expected to convince boiler manufacturers – even those who already have products on the market that include Energy+ circulators – and potential large buyers of circulators to participate.

3. A reason may be that the standard circulators available on the market fit well into existing heating systems, in which the circulator is external to the boiler, and yield high energy and cost savings if the heating system runs continuously during the heating season, with control via the external temperature. By contrast, if the heating system is under on-off control, energy and cost savings
will be smaller. And if the circulator is integrated in the boiler, a standard circulator may not fit, particularly not for retrofit in existing boilers. While that confirms the importance of working with boiler manufacturers to include Energy+ circulators for the new boiler market, it creates some uncertainty among installation contractors and potential buyers of replacement circulators. It needs well-laid arguments for communicating the benefits of highly energy-efficient circulators. And the large shares of heating systems with on-off controls particularly in Southern Europe confirm the absolute necessity of reducing the price premium, but also lead to the conclusion that there is a market for highly energy-efficient circulators without sophisticated variable speed controls and with a lower price than those currently on the market.

How could the market for Energy+ circulators be broadened in the future? The team has collected the following proposals:

- **It is highly important to address all actors** in the market chain, i.e., circulator and boiler manufacturers, heating system designers, wholesale, installation contractors, and building owners. If the chain of information breaks at one point, the energy-efficient solution might fail to be chosen.

- **Installation contractors are identified as key actors** in the market system. They need to continuously be schooled and trained with respect to these new products available on the market. Associations of contractors and organisations providing training to them are thus important partners for promoting energy-efficient circulators and boilers.

- **Information campaigns and initiatives with a broad target group**, like the incorporation of Energy+ pumps in the TopTen websites, are important to involve the final customer. In such a way the final customer is informed about the product and can trigger his or her installer by actively asking for these products. The installer on his or her turn will ask feedback to the wholesaler and manufacturer. A bottom-up cascade is triggered, re-enforcing the top-down approach by the manufacturers.

- **Combining these campaigns and initiatives with a financial incentive of 50 to 100 Euros** for the purchase of a circulator of Europump label class A or better could be decisive for real market transformation. The incentive could be offered by the government, or by energy companies. Energy+ partners in Belgium and France have contributed to making class A pumps eligible for the schemes run to fulfil the energy companies’ energy savings obligations. Running such incentive programmes for one or two years may be sufficient to achieve much higher production volumes and bring down the price premium. Mass procurement of circulators, as done by the City of Salzburg, could be another way to reduce prices to participating building owners. Incentive programmes could also trigger more boiler manufacturers to include Energy+ circulators in their products, and circulator manufacturers to produce more replacement circulators for boilers.
• An official EU energy label for circulators should be introduced. However, it should be improved compared to the Europump label. There are now circulators on the market using only half as much electricity as is required for Europump class A, so the requirements for class A should be tightened.

• Member States could also require class A circulators in their national building codes. The Greek project partner has proposed this to the legislator.

• And finally, the EuP requirements for circulators should require circulators of (an improved) class A. Then they would really become the European standard.

To promote a significant market introduction of a new product, the time span of an average two-year project is very modest. Promoters and manufacturers signal that this needs a long term strategy. This seems particularly the case for the boilers, which often need redesign to host the energy-efficient circulators, and for the development of highly efficient replacement circulators for existing boilers. However, the manufacturers appreciate the support from European projects as Energy+ Pumps, since it acknowledges the relevance of the energy saving products towards the broad public, which facilitates the further introduction.