

# Energy efficiency of office equipment – Proposal for a policy mix for Germany with an in-depth analysis of labelling strategies

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## Abstract

Research under contract with the German Federal Environmental Agency (UBA) identified a considerable energy saving potential fielding the area of office equipment. In this paper, a proposal for a policy mix is presented with the goal to increase energy efficiency by market-transformation in this sector. *This was worked out by order of the UBA.* Pending EU legislation like the Procurement Directive and the proposal for Eco-Design Directive have been considered. An in-depth analysis for labelling schemes for office equipment is provided with respect to the future of the Energy Star process, specifically the continuation of the Energy Star-cooperation between the U.S.EPA and the EU. Preliminary results gained after literature enquiry and interviews of experts were discussed during a workshop at the German Federal Environmental Ministry in September 2004.

Our proposal for a policy mix includes: public procurement, efficiency labelling, training and education, energy management in public and private institutions, mandatory minimum standards, marketing. The *demand* for high efficient appliances should initially be boosted by green procurement to trigger market transformation. In the field of efficiency labelling, we first analyse the shortcomings of previous strategies. On this basis, we propose a two level-strategy for Germany: 1. The Energy Star process with improved structures shall act as a widely compliable labelling minimum standard. 2. An information programme about high efficient appliances (“quality-programme”) should be

established basing on existing structures (Energy Star, GEEA, TopTen) to minimise transaction costs.

## Introduction

In Germany, electrical office equipment accounts for approx. 7.5 TWh/yr (6%) of the annual electrical demand in the sector of trade and commerce, and for approx. 3.5 TWh (3%) in the sector of private households (source: (ISI&CEPE 2003) and (VDEW), cited in (energiegedepesche 2004)). The European Commission assumes that office equipment will be the product group with the highest increase in energy use until 2010 (European Commission 2004). In preliminary studies under contract with the German Federal Environmental Agency (UBA), the saving potential by increasing end-use efficiency of electrical appliances in the Federal Republic of Germany was determined (Wuppertal Institut & ebök, 2001). For the year 2010, the potential is about 3.5 TWh/yr in the field of office equipment for the trade and commerce sector and private households combined. The most important instrument of electricity efficiency policy in the field of office equipment in Europe since 2000 has been the Energy Star labelling programme. The Energy Star Agreement requires negotiations in 2005 about the continuation of the cooperation between the EU and the USA (EPA), providing the opportunity to address shortcomings of the Energy Star-programme. In addition, new EU Directives like the Directive on End-Use Energy Efficiency, the Directive on the eco-design of Energy-using Products (EuP) are currently under discussion and the Procurement Directive has been recently introduced. They may also open new options for national efficiency pol-

icies of EU member states. In this study, we present an integrated policy strategy with focus on Germany to tap into the potentials that were identified in the preliminary study mentioned above<sup>1</sup>. A special focus was set on the role of the Energy Star and other labelling programmes, and possible improvements of these instruments.

As a first step, a literature search about existing instruments and proposals drafted earlier was carried out, as well as interviews of eight experts. Preliminary results have been discussed during a workshop at the German Federal Environmental Ministry in September 2004. The results of this workshop are included in the proposal now present.

The proposed policy mix consists of the following instruments, which will be described in this paper:

#### Creating *demand*

- Improvement and harmonisation of public procurement
- Marketing for energy efficiency in general and for labelling schemes in particular
- Education and training for users, procurers, retailers and system administrators
- Energy efficiency management in the sector of trade, commerce and services

#### Instruments directly influencing *supply*:

- Voluntary commitments / codes of conduct
- Minimum efficiency performance standards (MEPS)

#### Labelling programmes (as a communication tool between supply and demand)

- Energy Star as Minimum Efficiency Label
- Quality programmes

### Creating demand for energy efficient office equipment

Although a focus was set on the improvement of energy labelling strategies, the importance of a more comprehensive approach was emphasized by a part of the available literature and all consulted experts. *Labelling as a single measure does not create demand for efficient appliances, although it is an important condition for effective marketing measures.* But without demand, producers have little motivation to participate in voluntary labelling programmes. This demand has to be created by various political measures addressing different barriers:

#### IMPROVEMENT AND HARMONISATION OF PUBLIC PROCUREMENT

Public institutions in Germany spent about 13% of Germany's GDP. Until this date, public procurement guidelines in Germany are very heterogeneous, mainly due to the coun-

try's federal structure. Besides that, legal uncertainties are quite common among those responsible for procurement as to the extent to which environmentally-related criteria may be taken into account. Important political measures in the field of public procurement would be:

- Rapid implementation of the new EU Procurement Directive that clearly allows for environmental-related criteria in public procurement.
- Harmonisation of procurement on all public levels (federal, state and local authorities). For this purpose, the formation of a working committee "Efficient Appliance Procurement" with representatives of these three levels might be a suitable measure.
- An agreement within such a working committee as to minimum requirements for energy efficiency that are updated regularly (or reference to specifications of labelling programmes that are updated regularly). We propose the GEEA-criteria<sup>2</sup> as minimum requirement, or other quality label criteria.
- Making sample tenders available to commercial procurers.

The estimated potential in the field of public procurement in Germany amounts to 400-600 GWh/yr (Ökopol 2003). Due to the autonomy of public institutions in Germany, the realisation of this goal is not easy and depends on the degree of the political emphasis. Perhaps it is even easier to try to harmonise procurement on EU-level with the national governmental procurers.

#### MARKETING FOR ENERGY EFFICIENCY IN GENERAL AND FOR LABELLING SCHEMES IN PARTICULAR

Marketing instruments are essential for the success of almost all other instruments. To trigger demand for energy efficiency aside from the public sector, other target groups have to be addressed with specific marketing campaigns. These should eliminate the lack of awareness and information concerning options of energy efficient acting and purchasing. To provide for this, product information should be easily available to purchasers (cf. database as an element of labelling below). For the field of private households, we recommend a continuation of the campaign "Initiative EnergieEffizienz", if the evaluation shows positive results. The campaign deals up to now particularly with stand-by, lighting and domestic appliances.

Marketing is a matter for the national or even regional level, because the different communication and of value systems in each country or region have to be taken into account.<sup>3</sup>

1. This policy strategy focussing on the field of office equipment was one of two focal points of a more comprehensive study regarding policy instruments for the improvement of energy efficiency of electrical appliances in the fields of households, offices and in the trade and commerce sector (ifeu 2005). The authors of the preliminary study were advisors to this project.

2. GEEA: Group for Energy Efficient Appliances. Initiated by government agencies and institutions of some European countries. The goal is the establishment of a uniform European-wide scheme on voluntary informative activities. The GEEA Label promotes approximately 25% of all models available on the market.

3. If you compare British, French and German advertisements for example it gets quite clear, why there has to be a very good differentiation.

**EDUCATION AND TRAINING FOR USERS, PROCURERS, RETAILERS AND SYSTEM ADMINISTRATORS, PARTICULARLY IN THE SECTORS OF COMMERCE AND TRADE AND IN PUBLIC AUTHORITIES**

Office equipment is mainly used occupationally. The cost of electricity consumption is rarely high enough to make companies optimise efficiency of the equipment in its use. System administrators are usually only in charge of the reliability and stability of a system and know little of how to optimise energy efficiency. Most users are not aware of the connections between their energy consumption and climate change and do not care about the electricity costs caused by their activities because they don't have to pay for them. Even customers who are interested in energy efficient appliances are often discouraged by their dealers, who are neither able to meet this (rare) demand nor to give adequate advice.

By offering education and training in the sectors mentioned above, the awareness and behaviour of users should be improved, in particular by using the power management functions instead of disabling it, and by switching off equipment that is not in use. Furthermore, procurers should be informed of equipment options when purchasing. For public procurers, it is particularly important to eliminate legal uncertainties that have often hampered considerations of ecological aspects. Training in the use of tools for life-cycle cost assessment should also be included. Training for system administrators should deal the optimisation of energy efficiency in design, purchase and administration of EDP<sup>4</sup> systems – without limiting the performance. The need of training for dealers has to be raised by raising the number of “energy efficient” customers, which will give dealers motivation to inform themselves about energy efficiency.

To achieve this, high quality training tools should be developed by a central institution on the national level, because of the different systems of professional education and training in the different European countries. In Germany, for example, the *dena* (German Energy Agency) would be appropriate for coordination. The dissemination could be done by existing training institutions that can obtain the tools free of charge. There are already positive examples in other countries like Switzerland and the federal state of Northrhine-Westfalia, well known as “RAVEL”.

In general, these educational and training measures have to be closely linked to activities in the field of marketing campaigns, procurement and consumer information by databases and labels.

**ENERGY EFFICIENCY MANAGEMENT IN THE SECTOR OF TRADE, COMMERCE AND SERVICES**

In small and medium enterprises (SME), improvements in energy efficiency is usually sporadic and not well coordinated, if improvements take place at all. To allow for continuous and systematic optimisation, energy efficiency has to be integrated as a regular component of management responsibilities. Therefore, clear management structures are required, including the allocation of responsibilities and the

coordination of management in matters of quality, environment, energy and procurement. Furthermore, a comprehensive approach to optimise complete systems rather than single appliances has to be established. European programmes like GreenBuilding or eco-audit schemes should be fostered by the German government to be (more) widely transferred in Germany in special national programmes. It should be adapted to the national management cultures and to enterprises that unfortunately all too often do not think or act in an European way (especially SME).<sup>5</sup>

**Instruments that directly influence supply instead of demand**

Creating a demand for energy efficient office equipment with instruments like the ones proposed before is an essential part of an effective efficiency policy strategy. A complementary approach is to increase the energy efficiency of office equipment is to directly increase the product supply with very efficient appliances on the market. Suitable instruments for this are voluntary commitments and minimum efficiency performance standards (MEPS).

**VOLUNTARY COMMITMENTS / CODES OF CONDUCT**

The process of stipulating Codes of Conduct<sup>6</sup> should receive greater support. This instrument shall contribute to general improvements of energy efficiency in entire product groups, preparing market structures for the introduction of minimum efficiency performance standards (MEPS) for selected product categories without causing avoidable market barriers and distortions.

This instrument should aim at fostering more efficient products than at least the average of the market already hits.

As far as possible priority should be given to voluntary commitments on EU-level. The European Commission has already experience to get to acceptable results<sup>7</sup>. The German government could give greater support. If it is not possible to reach targets mentioned above, perhaps because of to many different interests in the EU, ambitious European countries can work together to reach those Code of Conducts.

Furthermore we propose to combine the processes of improvements of public procurement (see above) and this Codes of Conducts to reach a public/private commitment on a national level. This could be much more attractive for the relevant producers and retailers, if there is a will to really reach improvements on the side of public procurement.

**MINIMUM EFFICIENCY PERFORMANCE STANDARDS (MEPS)**

This instrument should complete a multi-level approach for product-related efficiency policy consisting of purchaser information backed by databases, product labelling, voluntary commitments of producers and, finally, MEPS.

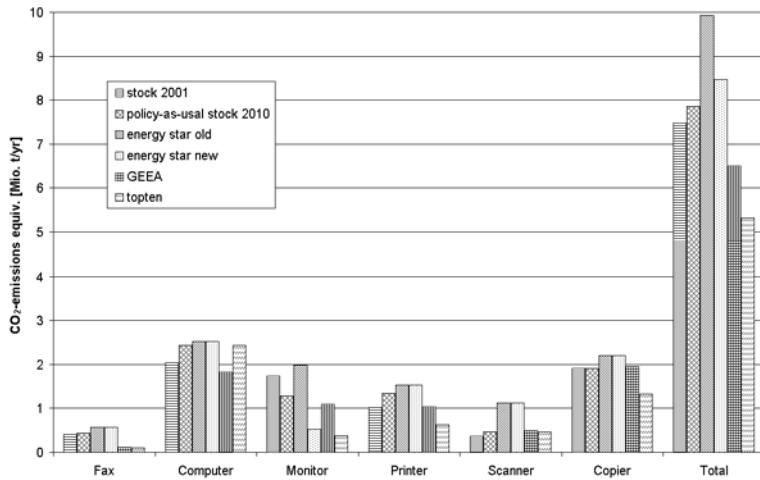
MEPS are suitable for product categories in which the development of product energy efficiency is levelling off and at the same time many products are highly inefficient and

4. EDP: electronic data processing.

5. Compare other European Energy Efficiency Programmes like “MotorChallenge” for example, where the EU- and the member states follow this strategy also.

6. Voluntary commitments of individual companies.

7. For example for external power supplies and washing machines.



**Figure 1. CO<sub>2</sub>-Emissions caused by office appliances in Germany in 2001 and 2010 in different scenarios: policy as usual, hitting the criteria of existing labelling programs and by using the most efficient appliances you can buy even in 2004 (cf. topten-list in Switzerland, there are no computers listed) (Calculated on the basis of scenarios in (ISI&CEPE, 2003))**

not state of the art. When the dynamic of product cycles is slowing, it is worthwhile to think about directives and laws, which themselves are slow in their development or adjustment.

E.g., introduction of MEPS may be considered for the product group of external power supplies. Even though a Code of Conduct addresses efficiency of this product group, the effect of this instrument is limited, because one can never get *all* manufacturers to participate.

Specifications for MEPS have to include a maximum level of standby electricity consumption which can be defined comparably easily for many product groups<sup>8</sup>. In medium term, all models of operation should be included.

This instrument must be tackled at EU-level to prevent market distortions in Europe. It is not possible to do it on a national level, from a legal point of view. So it will hardly be possible to get very ambitious targets as MEPS, because it will always be a compromise of the interests of the variety of EU member states. That is why MEPS in the EU aim at ridding the most inefficient appliances. The proposed EU-EuP-Directive might give an important legal basis for further MEPS.

## Labelling and information programmes

Labelling programmes have already been part of the German efficiency policy in the field of office equipment. Depending on their design, such programmes can have different purposes, such as the exclusion of highly ineffi-

cient products. They can bolster highly efficient products, deliver general information and raise the awareness of consumers<sup>9</sup>.

## STATUS QUO

The Energy Star is the label mostly displayed on office appliances; it was introduced into the EU after an agreement between the U.S. EPA and the EU Commission. From its onset, the Energy Star programme was subject to criticism from different parties, e.g. the German Federal Environmental Agency (UBA) (Umweltbundesamt, 2003). The main focus of the critique is that the process of updating label specifications is too slow compared to the short product cycles of office equipment. As a result, a high percentage of products on the market meet the Energy Star specifications. An survey in Austria showed that about 80% of office appliances on the Austrian market, matched the Energy Star criteria (Ritter, Schäppi, Reichel 2003). The study is probably representative for the situation in Germany and other EU countries as well.

Thus, the Energy Star fails to achieve one of its objectives, namely to highlight only the best products. Besides that, shortcomings in cooperation both within the EU and with the USA in organising this process of updating specifications have been expressed by experts and the Energy Star Advisory Board. The resources allocated by the European Commission to this task are insufficient. Given the upcoming negotiations about further cooperation between the EU and the USA, there is time to think about possible improvements of this process and options to optimise labelling strategies in general.

Aside from the Energy Star, various other efficiency labels and ecolabels<sup>10</sup> exist in Germany. Figure 1 shows the different levels of requirements of the Energy Star and the Energy Label of the Group for Energy Efficient Appliances (GEEA)<sup>11</sup> in comparison to current most efficient products of 2004 (see [www.topten.ch](http://www.topten.ch)), actual stock (2001) and stock of 2010 in a policy-as-usual-scenario.

This figure shows the dimension in which improvements of efficiency are possible. If, in 2010, all products in the categories would consume as much energy as the targets of either the old Energy Star criteria<sup>12</sup> or of new Energy Star criteria<sup>13</sup>, the overall energy consumption of office equipment in Germany would be actually be higher than that of the current stock. GEEA specifications are more ambitious. If all products would exhibit the highest efficiency, energy savings in 2010 would amount to about 2.5 million tons (about 30%) of CO<sub>2</sub> equivalents compared to the policy-as-usual-scenario. While it is not possible to realise this potential solely by labelling, this shows the market potential for more ambitious labelling criteria.

The Energy Star as a voluntarily accepted minimum standard by producers stimulated energy efficiency. With improvements in organizational structures and in pro-

8. A standardized measuring method will be provided by IEC 62301.

9. Of course, a good marketing strategy for the label has to be a part of the labelling programme.

10. Environmental labels refer not only to energy efficiency, but also to other impacts on environment like content and emission of toxic substances and noise emission.

11. See: <http://www.efficient-appliances.org>

12. Old Energy Star criteria are the ones valid in 2004.

13. New Energy Star Criteria include the new specifications for monitors (tiers 2) coming into force in 2006.

gramme design, the Energy Star programme for office appliances should be continued in Europe.

In science and policy instruments to support top-efficient products (e.g., the top-performing 25%) have been called for (Bundesrat, 2000; Wuppertal Institut &ebök, 2001; Ritter, Schäppi, Reichel, 2003). Due to its comprehensive approach, the Energy Star will never be able to meet this demand as pointed out by Siderius (2004). Most of the experts that we interviewed and of participants in our workshop agreed about the need for a programme in addition to the Energy Star to support top-efficient products. Both programmes should be closely inter-coordinated to gain synergy effects. Necessary steps towards a successful realization of such plans are outlined below. While these are mainly formulated for the Federal Republic of Germany they mostly could and need to be addressed on the European level.

### DISCUSSION ON NEW AND ECO-LABELS

We further analysed whether the introduction of new labels or totally new programmes for energy efficient office appliances would be interesting or find acceptance.

New labels would bring greater confusion than information to customers, who already now face a variety of efficiency and environmental labels; there would be little sense to create new ones.

Eco-labels that take into account a greater set of criteria than just energy efficiency tend to be even slower in the adaptation of criteria. In the context of a very dynamic development they are not a sufficient tool for fostering energy efficiency in office appliances.

The transfer or implementation of a new programme, e.g. the Japanese Top Runner Programme, would not get acceptance for several reasons. Defining top efficient targets without disturbing competition would lead to the same problems analysed within the Energy Star process. Furthermore mandatory minimum efficiency performance standards (MEPS) could only be implemented at EU-level, not nationally, as shown before (see above chapter MEPS). Mandatory MEPS in Europe should aim at ridding the market from the most inefficient appliances instead of fostering the best ones.

Consequently, the following discussion on labelling strategies and further going information for consumers is built on Energy Star and other existing programmes in Europe.

### HOW TO IMPROVE THE ENERGY STAR

To improve the Energy Star programme as mentioned above, further European engagement should be subject to the following conditions:

1. The distribution and effectiveness of the Energy Star label should be subject to a reliable *monitoring process*. Thus, essential data for a more dynamic updating of specifications can be obtained. Furthermore, new trends, product groups and criteria might be identified that are not yet included in the Energy Star programme.

The Energy Star database could be a suitable contribution for this monitoring

2. A well designed and supervised *database* is an important condition for an ambitious labelling strategy and for an ambitious energy-efficiency policy including product-related instruments alike. The following points should be established in a further agreement with the U.S.EPA:
  - public accessibility to the database,
  - authorisation, that advanced programmes may be carried out by the EU and its member states (and programme partners, e.g. Switzerland) using the Energy Star database,
  - control of good data quality in terms of correct, up-to-date and complete data (a neutral institution has to be in charge of <sup>14</sup>),
  - consequences for producers in case of non-delivering necessary data (e.g. use of Energy Star label for a product only after delivery of respective values),
  - design of database should allow considerations of national particularities (selection of products following availability on the national markets, presentation in respective languages in the internet).
3. The internal organisation of the programme has to be optimised. This includes clear procedures for the coordination between EUESB (EU Energy Star Board), EPA and producers. Hereby, EUESB and EPA should arrange a common position. In general, the EUESB has to represent European concerns more active than it has done up to now.
4. The organisation of the EUESB has to be tightened.
5. The Energy Star specifications should include *on mode* electricity consumption<sup>15</sup> as well as general criteria like a hard off option.

Given these conditions, the German government should further engage in the Energy Star.

### ADDITIONAL SUPPORT FOR TOP-EFFICIENT PRODUCTS: QUALITY PROGRAMME

Even if the criterions outlined above are fulfilled, it remains necessary to help consumers to find the *most efficient* products more easily, because Energy Star will remain a *minimum efficiency label*, not a *best efficiency label*. That is why we propose an advanced, a second level "quality programme" that could be built on the Energy Star Database. These programmes should aim at fostering the best 25% at the market.

Provided that the Energy Star database will fulfil all criterions outlined above, single countries or a group of interested and ambitious countries (for example the member countries of GEEA) in Europe could use the data as a baseline for quality programmes:

- To communicate high-level energy efficiency towards the customer, the Swiss Topten programme should be

14. There are some hints from a swiss project controlling the data of the database and products, that the reliability has to be ameliorated (Bush, 2004). Most differences seem to have to do with a different interpretation of standby modes.

15. New specifications for monitors and discussed draft specifications for imaging devices already include such criteria.

**Table 1. Proposed elements and work-sharing of the quality programme.**

Components of the Quality Promotion	Important Aspects	Responsible/Participation
Labelling criteria (and their adaptation)	Reasonable selection for the customers	EPA / GEEA, Bitkom etc.
Targets (and their adaptation)		GEEA / "TopTen"
Database: set up and support	Completeness, quality, transparency	EU / GEEA
Database: presentation	Representation of national particularities (availability and language) High level of transparency General availability both for institutional procurer and small-scale customers (households, small companies, decentralized buyers in companies/ public institutions)	German "TopTen" ; maybe GED <sup>2</sup> as responsible body
Public relations	specific Design for target groups: institutional procurers vs. small-scale customers	German "TopTen" for small-scale customers (specific programmes for procurers in companies and public institutions eventually by UBA / GEEA, because they are better known up to now).
Quality labels on the equipment <sup>1</sup>	Implementation medium term <sup>1</sup> . Declaration for small-scale customers. Information at the time and the place of the buying decision. Long-term goal: EU-label, based on Energy Efficiency Index	EU / GEEA EICTA
Monitoring	Samples of the database. Market share of efficient equipment.	UBA / GEEA

1: Institutional procurers should be mainly addressed as primary target group. Thus, demand can be increased more efficiently than by mainly addressing private consumers.

2: GED: German part of GEEA

enhanced on more countries. Within 'Topten, international cooperation is highly appreciated and first efforts are already made (Bush 2004, personal communication). 'Topten does not provide a label on the product itself but lists recommended products on the internet. Thus, short product cycles of office equipment can be easily handled. Data are preselected and processed in order to give clear and useful advice to users.

- Existing structures should be used in further action. Up to now, the different programmes profit by synergies. Measuring standards that were developed for the Energy Star can be adapted to other programmes; the GEEA can use its network of experts for statements and cooperation in efficiency policy. The approach of 'Topten is characterised by user-friendly communication, but it builds on other programmes. The proposed interaction of different organisations and programmes is summarised in Table 1.

A primary task is to ensure reliable financing of different measures for several years. We assume that Germany should provide about half a million Euro annually. This amount will be much higher if an additional database (beside the Energy Star programme) has to be delivered.

The advantages and disadvantages of this strategy are as follows:

#### Advantages:

- The adaptation of the targets to promote approximately 25% of the market share leaves to be done. This is possible without new consultations with the industry.
- Producers can minimize the additional effort that they have. No further negotiations about definition criteria and measuring procedures are necessary. These processes are worked out within the Energy Star.

#### Disadvantages:

- Because not all producers of office equipment take part in the Energy Star programme, the database is not complete and probably never will. In combination with the instruments that aim at strengthening the demand of efficient appliances, it could get more attractive for industry to take part.
- There will not be a special and faster European way to define criteria in comparison to Energy Star. Taking into account the proposals above, Europe could strengthen its influence in that process, making the compromise acceptable with positive effects on markets abroad.

If the conditions for the European Energy Star Programme mentioned cannot be met, the German government should vote against an extension of the Energy Star treaty between the EU and the US. In that case, the existing GEEA programme could be promoted as a neutral and autonomous quality programme for Europe.<sup>16</sup>

**Table 2. Multilevel policy approach for efficient office equipment.**

Level	Labelling and Quality Programme	Further Instruments
International/ USA	<p><u>Minimum efficiency labelling:</u> - Energy Star</p> <p><i>Regulation and servicing:</i> - Criteria - Minimum Targets</p>	
EU	<p>Exertion of influence</p> <p>Database</p>	<ul style="list-style-type: none"> <li>- Voluntary commitments</li> <li>- Mandatory Minimum Performance Standards (based on EuP-directive)</li> </ul>
Group of EU-Member states	<p><u>Quality programme</u> - GEEA - TopTen</p> <p><i>Regulation and servicing</i> - Quality Targets</p>	<ul style="list-style-type: none"> <li>- Public procurement</li> <li>- Cooperation</li> </ul>
Germany		<ul style="list-style-type: none"> <li>- Public procurement</li> <li>- Marketing</li> <li>- Education and training</li> <li>- Strengthen energy management in enterprises</li> </ul>

It is likely that if European countries with large markets for office equipment seriously consider this new approach, the willingness of manufacturers will increase to fulfil the conditions mentioned above. After all, most manufacturers act internationally and thus are not interested to take into account additional programmes when developing new products.

**Conclusions**

The package of instruments presented above consists of elements which, on the one hand, have to be designed on national level, as outlined in the chapters above. This is specifically important for marketing and training of retailers and procurers, and strengthening energy management in enterprises, perhaps still for reaching advances in public procurement.

The remaining elements on the other hand clearly are instruments that have to be designed on a EU or international level. Table 2 summarises the instruments and their assignments to the levels as proposed here.

In particular, we recommend promoting a quality efficiency programme as mentioned above on the level of interested and ambitious countries in Europe. To do this on the EU level would be associated with the risk to have the some of same problems as with Energy Star: a slow adaptation processes and no ambitious targets.

The Energy Star Programme can remain an important international, almost global instrument to foster minimum efficiency criteria that are needed to achieve international improvements. For more ambitious countries, the two-level-approach with a complementary quality programme is an important instrument to go further. If this approach is integrated into a national and international package of instruments, it can be an even more powerful locomotive of the international efficiency train for office appliances.

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