

EUROPEAN EFFICIENT RESIDENTIAL LIGHTING INITIATIVE ENERLIN

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Proposal under the frame of the Commission of the European Communities Directorate-General for Energy and Transport EIE PROGRAMME – SAVE

In the context of the Kyoto Agreement, the European Community and individual Member States are looking for cost-effective measures to reduce CO₂ emissions and combat climate change. The residential lighting market is still dominated by inefficient incandescence lamps (GLS). Market research has indicated that to achieve durable market transformation and to substantially increase the use of Compact Fluorescent Lamps (CFLs) in the residential sector, it is essential to develop and market attractive and goods quality CFLs. The ENERLIN EIE SAVE program proposes to develop and validate robust scenarios for CFL promotional campaigns in European, national and regional levels. Concerning energy savings from CFLs, assuming that there is 150 million households in Europe the energy economy by replacing only one additional 75W GLS lamp by one 15W CFL is in the order of 22.5 TWh or 4 MTEP per annum, this corresponds to 1.2 Mtonnes of less CO₂ per annum.

1. Objectives of the ENERLIN action

Improving the efficiency with which energy is consumed is a central theme of energy policy within the European Community, as indicated in the White Paper “An Energy Policy for the European Union”, since improved energy efficiency meets all three goals of energy policy, namely security of supply, competitiveness and protection of the environment. Lighting represents an important part of building energy consumption in the EU – around 10% of the total electricity consumption, ranging from 5% (Belgium, Luxemburg) to 15% (Denmark, Netherlands, and also Japan). The global electric lighting energy use may be split in four sectors: services 48%, residential 28%, industrial 16% and street lighting and other 8% [Mills 2002]. Overall electric appliances in households, industry and the tertiary sector represent 40% of the EU’s total electricity consumption, its generation being one of the most important sources of CO₂ emissions. However, the European Union has very limited scope to influence energy supply conditions. Within the EU, the household and

private and public services sector buildings are important power consumers. In both cases lighting represents a large part of their energy consumption. Several EU and National Initiatives and Directives tented to promote energy efficient lighting for services sector buildings. These efforts can be judged as very successful because nowadays the Compact Fluorescent Lamp (CFL) market share represent 20% of the global European market whereas the same figure in world scale is limited to 17%. The rate of the households owning a CFL covers the range from 0,8 CFLs per household in UK to more than 3 CFLs per household in Denmark; the SAVE projects have found that there is at least room for 8 CFLs per home [Kofod 2002, Loe & Jones 2002, Palmer & Boardman, *DELight* 1998]. An analysis on the lighting pattern in 100 Danish homes denotes that the monthly average lighting consumption varies between 5% and 21% of the total respective monthly consumption, and 24% of the lamps are energy efficient lamps (linear fluorescent lamps or CFLs). However, the same market analysis from Lighting Companies show that in Western Europe energy inefficient incandescence lamps

(including halogens) still represent 30% of the sales. The bulk of these inefficient light sources concern the residential sector

There are several reasons explaining that residential sector still use a large amount of incandescence lamps:

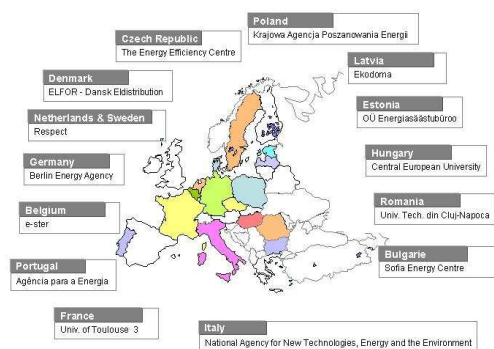
- It seems difficult to convince individual customers that the payback time is so rapid.
- There is still a large part of customer unaware of the environmental and economic benefits of CFLs
- Low quality (and probably lower cost) CFLs are widely available in the Western European markets; customer buying these devices due to the attractive price is very rapidly disappointed due to reduced lifetime, bad lumen output due to wrong information from manufactures about how to replace incandescent and bad lumen maintenance of these lamps.
- Older generation of CFLs were almost unable to offer to customers an acceptable ambiance within the residence, this due to poor colour rendering index, limited choice of colour temperatures, ungracious shapes and aesthetic incompatibility with luminaires; most of these inconveniences are now overcome but there is still a large part of customer unaware of that progress.
- For households lighting can be purely practical or a very architectural feature or a combination of both, therefore energy efficiency is often just one consideration and probably not the prevailing one.
- CFL lamps are not suitable for applications with short on-off cycles as this reduces lamp life; therefore it is necessary to educate the customer on how to use them effectively.
- The warm up time of the CFL before full lumen output does that the user should not use in a staircase or elsewhere where they need the full lumen output immediately.
- CFL lamps are very sensitive to voltage variation; of course, in many countries the mains voltage is very well regulated, but in other countries and especially eastern European regions the voltage may fluctuate and this is still an important issue for CFLs.
- Find a nice design luminaire suitable for CFL's is, in nearly all countries, a difficult thing; many nicely designed luminaires for incandescent are not visually the same if CFLs are use in them.

Promoting CFLs by using solid argumentation, which answer to the specific individual questions and fears of the customer and then add imitative measures seems to be the right way to act. It should be noticed here that "rational" arguments is not appropriate for all customer segments. To reach the last customer

segment we need new CFL solution and new control features that create added value. Identifying all possible reasons of putting CFLs, compile them and provide the good answers (scientifically proved) and then translate them to a clear and understandable argumentation for the non-specialist, is the main barrier to overcome. Furthermore, barriers to information about energy-efficient technologies (including lighting) exist on several levels, each of which has implications for penetration rates. The most widespread problem in many countries, to varying degrees, is that of a lack of awareness of energy efficiency. Members of the general public simply cannot define what it means for a technology to be energy efficient. Information barriers are important to policy makers as well. The ultimate objective of this program is to substantially increase the efficiency of residential lighting in a number of Member States and Candidate Countries, and this can be done by offering them good arguments necessary to overcome the above cited barrier. It is also important to promote the wide-scale availability of a high spectrum of low-cost CFLs suiting a wide range of needs including different sizes, shapes, colour rendering, wattage (particular problem in some counties like Hungary is that the typical good CFLs are of lower wattage and therefore provide limited illumination levels), and bases. Furthermore, to achieve successful residential market transformation we should promote that both light fixture outlets as well as design and specialty stores display their luminaires with CFLs (good and aesthetic ones) rather than incandescent. At the same time the program is aiming at promoting to all the stakeholders a quality charter to assure that the CFL that are marketed and promoted can deliver savings which last overtime and meet the customer expectations of high quality lighting. The major part of the program will design implement and evaluate a common promotional campaigns for CFLs that meet the European CFL Quality Charter along with dedicated fixtures. These national or regional campaigns shall be conducted in collaboration with lamp manufacturers, retailers, consumer and environmental organisations, and electricity

utilities. On the other hand the elaboration of the argumentation should be based as deep as possible to quantitative and scientific arguments. This last, may lead to the creation or/and use of independent test facilities allowing to examine different proposed solutions before adopt them in the final argument list. All the program objectives will lead to a higher market share for the most efficient CFLs and dedicated luminaires. The main stakeholders concerned by this program are manufacturers' associations, consumers' associations, buyer's groups, energy agencies and other intermediates, utilities, training institutes, retailers, installers and other professions. The final beneficiaries will be end-users of equipment mainly in domestic sector.

2. ENERLIN Consortium



The ENERLIN consortium map

14 partners from 14 countries constitute the proposed consortium, covering a large part of the Europe from north to south and from east to west. This is an important issue; because, concerning lighting the reaction of the individual customers is quite different from a country to the other (north countries prefer low colour temperatures lamps –hot ambiance- and south countries are more sensitive to high colour temperatures –cold ambiance-). The consortium includes western countries with high GDPs compared to eastern countries that they just integrated EU (Poland, Hungary, Czech Rep., Latvia and Estonia). These countries are in full market transformation at this moment. Finally, two candidate countries (Bulgaria and

Romania) are also members of the consortium. The ENERLIN consortium is strongly cross-disciplinary including National or Regional Energy Agencies (ADENE, KAPE, ENEA, SEC, SEVEN, BE), one ESCO in Belgium, academic institutions (France, Hungary and Romania), a values-based consultancy focussing on sustainability (Respect) as well as independent consulting SMEs (Ekodoma, Energy Saving Bureau). Each partner has solid experience with EU projects (especially from DG TREN), and strong links with international organisms like CIE and projects like ELI, other European networks (COST-529) and programs (GreenLight). Some consortium partners are quite influential for policy-making bodies in both national (regional) and European levels.

3. Target groups and key actors for the ENERLIN action

The objective of ENERLIN is to address all target groups and key actors, which are esteemed essential to fulfil the aim of the program. To achieve this objective the consortium is in close contact with key actors in the domain. The present program has been elaborated in agreement with these “key actors” who will be invited to participate to “advisory committee” during the program operation. Thus ELC (European Lighting Companies Association) will participate to AdCom together with other institutions like Eurelectric and Joint Research Centre in Ispra and national institutions like ADEME in France.

The main target groups for ENERLIN are:

- National Energy Agencies because they have in several case the material possibility to proceed to large scale promotional campaigns in their countries.
- Energy utilities, energy distribution and energy service companies, energy gains affecting directly the activity of these organisms.
- Lighting manufacturers, increasing market parts of CFLs in household being an important issue for Lighting Industry; the European Lighting Companies Association (ELC) is associated to this program passing through the European CFL Quality Charter working group.
- Consumer defend associations can promote to a very effective way all positive arguments issued from

ENERLIN; this type of institutions will be invited to participate to the ENERLIN AdCom.

- Individual consumers - this is the final target of the program because they are the CFL end-users, but, however, this is the most difficult group to deal with; the proposed way of interaction will be "one way" from ENERLIN to the consumer passing through a "legible" and user-friendly web page, promotion campaigns and Gallup pools and other communication tools, like quizzes.
- Lamp and luminaire retailers constitute the interface between the end-user (customer) and all above cited groups; they will be involved in the ENERLIN work indirectly by testing and using the promotional arguments issued from the Consortium.
- Engineers working on building construction; architects - a simple questionnaire will be distributed in order to know the information they need in order to make the best use of the results of the ENERLIN program, and to design the distant learning courses and the web data base.
- Policy makers in National, European and International level, such as CIE, COST-529 and CEN.
- Politicians is a very important group because they can directly use the results concerning energy gains and environmental impact of CFL promotion and, in consequence, they can propose new incitement legislation in this domain.

It should be noticed that each consortium partner would work in close collaboration with local actors in the domain of CFLs: in Romania three other bodies will join this activity: Electric Energy Distribution and Supply Branch "Transilvania Nord", EnergoBit S.R.L. - electric designer and energy management provider -, and PRAGMATIC Comprest S.R.L. - electric/ lighting retail company.

Ultimately, the program outputs can be transferable to other countries, but obviously need to be modified to reflect local interests and values. This competences transfer can be done passing through international organisms like CIE, IAEEL, or national bodies like IESNA in North America, of JIES (Japan Illuminating Engineering Society) in Japan. In parallel COST-529 and Efficient Lighting Initiative (ELI) may be a vector for this transfer. Of course, developed nations could implement similar programs and labelling of exports may help savvy companies in developing nations to adopt more efficient lighting technologies.

4. Program work plan

The ENERLIN program should have the following phases:

- **Phase one:** to review the current European CFL Quality Charter, and to investigate quality and efficiency issues to arrive to a new version; the consortium should also collect existing information and define the questions to be addressed by the test facility.
- **Phase two:** design of a common CFL promotion campaign - target areas, customers, promotional messages -, the development of common and well-structured information and dissemination material freely available in the website of the program.
- **Phase three:** implementation of national/regional promotion campaigns.
- **Phase four:** collection of the campaign results and general assessment concerning the efficacy of the campaign; development of methods to assess the "real" energy and carbon value of the CFL campaigns to assign it to the regional/national CFL campaign promoter for possible exchange with carbon credits or, where existing, white certificates; gathering all information about residential penetration of CFL, and market potential in order to develop the baselines.
- **Phase five:** creation of dissemination package to allow countries/regions/stakeholder not participating in the program to benefits from the results and experience made in the program to design, carry out and evaluate CFL promotion campaigns - printed material, CD-roms, a comprehensive website with downloadable documents and with distant learning courses for different target users; this web page will be accessible at least in three levels: individual consumers, retailers and other institutions like ESCOs, Lighting industry, Energy agencies.

5. Conclusions

The European Climate Change Programme (ECCP) identified residential lighting as an important area to CO₂ emission reductions. After a considerable number of promotion and rebate schemes, about 135 million CFLs are used today in European homes. However only 30% of household in the EU have at least one CFL, with those households that own them having an average of three or four. The ENERLIN EIE SAVE program is aiming at promoting to all the stakeholders a quality charter to assure that the CFL that are marketed and promoted can deliver savings which last overtime and meet the customer expectations of high quality lighting, and the ultimate objective of the program is to substantially increase the efficiency of residential lighting in a number of Member States and Candidate Countries.

