

Toward a green lights programme in Europe

Vincent BERRUTTO and Flavio CONTI

European Commission - Joint Research Centre¹ Environment Institute

Paolo BERTOLDI

European Commission

John S. HOFFMAN

(former Senior Official at US Environmental Protection Agency) WorkSmart Energy Enterprises, Inc.

Herve LEFEBVRE

French Agency for Energy and Environment (ADEME)

Sabrina BIRNER

June Consulting, Inc.

Nils BORG

Borg&Co AB

1 - SYNOPSIS

Interviews among several European companies show favourable dispositions for a lighting-related pledge programme. This could be implemented in Europe by EC-DGXVII, with support from the Joint Research Centre and National Energy Agencies.

2 - ABSTRACT

The European Commission is investigating the idea of launching soon a voluntary programme encouraging non-residential electricity consumers (public or private) to commit themselves to install energy-efficient lighting technologies in their facilities wherever (1) it is profitable, and (2) lighting quality gets maintained or improved. The principle is to invite top-managers to sign a Memorandum of Understanding stating that they will undertake all the profitable lighting upgrades within a given time period.

In the United States, significant energy savings are claimed by the organisers of such a scheme, called Green Lights. In Europe, the concept hasn't been much experienced but an interview among 43 companies shows favourable dispositions. A European Green Lights programme could be established by EC-DGXVII with a strong support from the Joint Research Centre and National Energy Agencies. These Agencies could help fund, tailor and market the programme. They could also provide European partners with a customised technical support.

3 - INTRODUCTION

Lighting accounts for about one-third of electricity use in commercial buildings and therefore has been the subject of significant saving actions in Europe. Still, the saving potential remains high and, based on the outcome of a previous SAVE project² (BRE 1994), the European Commission (DGXVII) intends to achieve further savings by starting soon a Green Lights programme.

This is a voluntary pollution prevention initiative which encourages non-residential electricity consumers (public or private) to commit themselves to install energy-efficient lighting technologies in their facilities wherever (1) it is profitable, and (2) lighting quality gets maintained or improved. Top-managers are invited to sign a Memorandum of Understanding stating that they will undertake all the relevant lighting upgrades within a given time period.

The present paper reports on the status of this upcoming programme which is a complement to the lighting-related actions of DGXVII in the non-residential sector (i.e. minimum efficiency standards through legislation or negotiated agreement; energy classification of ballasts and perhaps luminaires; possible procurement). First, the paper recalls the method and results of the US Green Lights programme. Then, it provides insights on the opinion of potential European participants, together with suggestions for the implementation of Green Lights in Europe (potential energy savings will be reported separately).

4 - PRECEDENT IN USA

In the United States, Green Lights is a voluntary pollution prevention programme that helps its participants, referred to as Partners, save money and reduce pollution by increasing the energy efficiency of their lighting. The programme is run by the United States Environmental Protection Agency (EPA).

The core of the programme is a Memorandum of Understanding (MoU), signed by the Partner and the EPA, in which the Partner commits to implementing, within 5 years, 90% of the profitable lighting efficiency upgrades available in their facilities. The EPA provides support to the partner in the form of information resources and publicity. Green Lights programme has run since 1991. In 1999, Green Lights marketing was incorporated into the Energy Star Buildings Programme.

An implicit programme goal is to transform the way organisations make decisions about efficient lighting investments. These decisions have traditionally been low priority, have not benefited from information and analysis, and have had low visibility within an organisation. A critical element of Green Lights success was to elevate decision-making about efficiency in buildings to senior corporate officials. Partners in Green Lights have learned to make profitable lighting upgrades a priority, have been able to make decisions based on up-to-date information and proper analysis, and have advertised their accomplishment both within and outside their organisation.

4.1 Method of US Green Lights

After a series of meetings between an EPA Green Lights representative and high-level staff from the prospective partner, the two parties will sign a Memorandum of Understanding (MoU).

The MoU commits the Partner to:

- _ survey the lighting in all of the floor area of their eligible facilities,
- _ consider the full range of lighting technology, design, and maintenance options that can reduce energy use,
- _ upgrade the lighting with the set of options that, taken as a whole on a facility-aggregate basis, maximises energy savings and that is also (1) profitable³ and (2) meets Green Lights Partner's lighting quality objectives.

Green Lights Partners agree to complete within five years:

- _ lighting surveys of 90% of the floor area of its eligible facilities, and
- _ upgrades of 90% of the floor area of its eligible facilities other than those that are no-upgrade facilities.

The Partner also agrees to appoint a Green Lights Implementation Director, responsible for ensuring that the Partner fulfils its commitments made in the MoU. To publicise Green Lights activities, the Partner appoints a Communications Director, who informs employees, stockholders, and customers about the Partner's Green Lights activities.

The MoU requires a Quick Start to the lighting upgrade activities. Within 180 days of signing the MoU, the Partner must

1. specify and install a 465 – 1400 m² demonstration lighting upgrade. EPA can provide technical co-operation if needed (most partners succeed on their own).
2. Create a list of all facilities to be surveyed and/or upgraded under this agreement, their location, floor area, projected survey date, and pre-survey estimated upgrade budget. EPA can provide assistance with budget estimation.
3. Conduct, in co-operation with EPA, a kick-off meeting at which all parts of its organisation with a stake in Green Lights (such as facilities management, environmental compliance, human resources, corporate communications, strategic planning, financial resources, etc.) will be represented by a senior manager. EPA can provide materials, orientation information, planning assistance, technical training and networking ideas at or to this kick-off meeting.

While the EPA does not provide actual funds for the lighting upgrades, it provides a comprehensive range of information resources to help address implementation barriers, including databanks of lighting equipment, lighting contractors, and financing sources, as well as software for preparing and analysing lighting upgrades. Through advertisements, articles, a Green Lights Partners logo, and media events, EPA provides public recognition for the Green Lights programme and its Partners. The vast majority of the effort required for upgrades is paid for or provided by the partners themselves.

Green Lights estimates that a Partner should anticipate dedicating the equivalent of one person-year of staff time for every 500,000 m² of facility space. The lighting upgrade typically has a post-tax rate of return between 20-40%, and requires an initial investment of approximately \$0.50 – 2.00 per square foot (\$5.37 - \$21.50 per m² or 4.5 – 18.4 Euro per m²)⁴, depending on existing equipment, purchasing strategy, and the scope of the lighting upgrades.

4.2 EPA-reported good results

According to Hoffman (Hoffman et al. 1998), more than 158 million square meters were upgraded and reported by Green Lights partners in 1996, reducing lighting electricity bills by an average of 47 percent while earning an average internal rate of return (IRR) of 36 percent. This has been achieved predominantly through the installation of 26mm diameter fluorescent lamps, electronic ballasts and reflectors. There has also been a marked increase in the use of operations and maintenance practices, such as commissioning, which enhance lighting efficiency.

Green Lights has not been able to systematically gather accurate data on programme results. Because the results of this voluntary programme are self-reported, Partners often neglect to report results, or fill in the reporting forms incorrectly. Green Lights has done a study on reporting levels, and found that 30% of retrofits are under-reported. The programme is currently making efforts to improve its data collection. As part of this effort, it will simplify the reporting process.

Additionally, many companies decided to upgrade facilities but not join the Green Lights programme, because of hostility to government programmes, because they felt the reporting requirements onerous, or because they felt they could not comply with some part of the MoU. Green Lights has made little effort to document or even estimate the size of this cohort, but some observers believe it is large. Since the inception of the Green Lights programme, Hoffman claims that sale of electronic ballasts has gone from less than a million to 34 million a year, many more than could be accounted by reported results (N.B: it is not clear how much of this is attributable to Green Lights and how much would have been achieved anyway). Table 1 below summarises the available data on programme results.

Table 1: Summary of the results of the US EPA Green Lights Programme. Source (EPA 1998).

	Participants' investment in lighting upgrades	Total square meters recruited	Total square meters upgraded	Annual energy savings from completed upgrades	Annual energy bill savings from completed upgrades	Annual carbon equivalent prevented
	<i>in Mio. US\$</i>	<i>in Mio. m²</i>	<i>in Mio. m²</i>	<i>in GWh</i>	<i>in Mio. US\$</i>	<i>in MMTCE*</i>
1991	17	93	3	75	5.4	0.02
1992	45	288	7	193	16	0.05
1993	160	362	22	563	48	0.12
1994	378	409	53	1,400	112	0.31
1995	784	474	111	2,900	223	0.63
1996	1,100	492	158	4,500	338	0.96
1997	1,600	520	260	7,000	514	1.4

*MMTCE: million tons of carbon equivalent

4.3 Lessons learned in US

Green Lights has shown that a voluntary approach can be an effective means of increasing the energy efficiency of commercial lighting in both large and small facilities. Some of the most effective elements of the Green Lights approach, and lessons learned from the programme, are summarised below.

4.3.1 Most useful programme elements

- The National Lighting Product Information Program, an independent source of information on branded lighting products, was very popular with Partners and was widely used in the programme.
- The compendium of utility DSM rebate programmes is another resource Partners found particularly valuable.
- Green Lights Endorsers (independent groups such as Non-Governmental Organisations or research institutions, or trade associations who agree to promote Green Lights to their members) played a very important role in convincing Partners to join. Trade associations, who could provide both a forum for the Green Lights message and a stamp of approval for the programme, were especially helpful.
- An account manager who can work with a Partner to identify and resolve barriers to the implementation of the MoU helps keep the MoU implementation rate high.

4.3.2 Programme lessons learned

- Programme materials (MoU, case studies, software, reporting forms, etc.) should be kept as simple as possible. Complex material does not get used, and may even turn people away from the programme.
- Support from the highest levels (Chief Executive Officers) helps ensure the full participation of the rest of the organisation.
- A “Quick Start” provision in the MoU, in which participants commit to start implementing their lighting retrofits within 180 days of signing, significantly helps increase the level of Partners who follow through on their commitments.
- Programme success should include how well non-partners are motivated to upgrade facilities not just partners.
- The programme should explicitly address the internal organisational challenges a Partner will face in signing and implementing the MoU, such as making energy efficiency a priority, organising Green Lights meetings, planning the retrofit, and changing corporate thinking so as to view energy efficiency upgrades not as cost centres, but as profit centres.

5 - FAVOURABLE DISPOSITIONS IN EUROPE

In Europe, there has been similar pledge programmes⁵. E.g. the UK Energy Efficiency Office has run a scheme entitled “making a Corporate Commitment”. This is similar to the EPA Green Lights scheme but covers all aspects of energy consumption, not just lighting (BRE 1994). However, the concept hasn’t been much experienced and the European Commission (DGXVII) decided to sponsor two parallel prospective studies:

1. Study of Green Lights potential.
2. Study of the opinion of potential Partners.

The first study, led by the Netherlands Agency for Energy and the Environment (NOVEM), is investigating the potential energy and economic effects of a European Green Lights programme⁶. A first attempt is made at establishing a baseline for commercial sector lighting energy use in Europe, including a survey of typical and best practices for lighting design in various European countries. Data are gathered through the members of the European luminaire manufacturers association (CELMA) and complemented with interviews among knowledgeable persons in Europe, such as lighting designers, facility managers and large electrical contractors. In addition, statistics are being compiled on electricity prices and building stock floor-size data. The following type of data are gathered:

- _ The total commercial building stock (floor size) per member country for offices and educational buildings.
- _ Average electricity prices per country.
- _ Quantitative and qualitative descriptions of two types of existing installations and four types of new installations (two typical, and two representing the best practice).
- _ The typical turnover rate for lighting installations.
- _ Cost data for each new type of installation.

The results of this study will be delivered by summer 1999 and will later be cross-checked with the very few other available sources⁷.

The second study - reported hereafter - was a small-scale market research commissioned by the EC Joint Research Centre¹ (JRC) to sound the opinion of targeted Green Lights Partners. This study consisted in interviews in four member states: Denmark, France, Italy and Spain. It ran from November 1998 to February 1999.

5.1. Forty three European companies interviewed

JRC made a questionnaire with three sets of questions. In the first set, questions were meant to reflect the decision-makers' awareness about some energy figures. The second series contained general questions on how lighting was considered within the company, and the third series dealt primarily with the US Memorandum of Understanding (MoU).

Except for the first set, questions were sent prior to the interview so that people had the time to prepare their response. The whole questionnaire was translated and submitted inside the four countries via external consultants. As much as possible, companies were first contacted by telephone or e-mail whereupon they were met. In few cases where direct contact was not possible, company representatives provided their answer only by phone or fax.

A total of 43 big organisations were contacted: 6 in Denmark, 12 in France, 15 in Italy and 10 in Spain. They were big companies (median number of employees: 3000). Twenty-four were public and 19 belonged to the private sector. In each country, the sample covered different business fields and therefore different types of spaces: office, retail, educational, healthcare, hotel, industry, transport, leisure/sport. The information from these companies couldn't be traced accurately since most of the questions were sent in advance and therefore different people could contribute to the response. But in most cases, interviewers were directed to the technical divisions that took care of building infrastructure and/or environmental issues. In these divisions, interviewees had diverse functions but in most cases high-level people got interested (very often technical managers). The fact that only four interviewers reached top-managers can be partly explained by the technical content of the questionnaire. It shows nevertheless the big effort that will be needed for marketing Green Lights to senior corporate officials.

5.2. Emergence of positive trends

The data should be treated with a degree of caution and interpreted knowing that this is the point of view of infrastructure managers, not necessarily that of top managers. The size of the sample didn't allow a per-business-field analysis. Only general trends could be outlined regarding the acceptance of the Green Lights concept. These trends were split when a significant difference was detected between countries or sectors (public/private).

5.2.1 Unanimous acknowledgement of green investments

There was a majority of people who didn't know the share of energy fees on the total operating cost of the company, nor the share of lighting consumption on the total electricity consumption, nor the share of the investment cost compared to the total cost of a typical lighting installation. However, all the people in the four countries without exception agreed that an energy-saving investment could be profitable. In Spain, they tended to think that heating/cooling system upgrades were the most profitable (cited 3 times more than lighting) whereas in Denmark and Italy heating/cooling and lighting were equally considered as the most profitable. In addition, 3/4 of the respondents, no matter the sector to which they belonged (public or private), answered positively when asked if the "Green Image" was part of their communication strategy.

5.2.2 Preferential use of Payback Time but receptivity to better indicators

Although Payback Time does not measure the profitability of an investment, nor does it take into account either interest rates or any need for reinvestment during the lifetime of the system installed (CADDET 1991), it was the parameter used by most interviewees to decide on investing. It was 4 times more cited than Internal Rate of Return (IRR) and Net Present Value though these are usually considered as preferred decision making tools for energy-saving investments. The associated payback values were below 5 years in all but one (public) case. The average was 3 years.

However, in all countries, more than 80% of the people agreed with the definition of profitability mentioned in the MoU. This definition says, "a project is defined as profitable when it provides an annualised internal rate of return that is equal to or greater than the twenty percentage points, with an analysis term of at least 10 years". Also, 2/3 claimed that they would be sensitive to a profitability calculation that integrates improvements of users' productivity (or client satisfaction).

5.2.3 Diverse experience with energy-efficient lighting

60% of the respondents claimed to have a lighting retrofit strategy at the scale of the whole company (e.g. a certain percentage of retrofits per year). The most cited reasons were the compliance with current lighting standards and the reduction of energy consumption (3 times more than the enhancement of workers productivity). In commercial premises, some respondents provided an additional reason, which was the satisfaction of clients.

The same percentage of people said that they had an in-house designer who could upgrade a lighting installation (no correlation was detected with the previous responses). In most cases, these designers were also active in other fields (e.g. HVAC) which could offer propitious conditions for the replication of energy-saving investments in other fields than lighting.

Overall, a slight majority claimed to have had experience with a lighting energy management project, though this was to various extents (from one or two buildings to the whole company). The others invoked several reasons: lack of time (cited 6 times); lack of available finance for the necessary capital investment (4); lack of technical expertise and/or experience (4); distinct budget for operation/maintenance costs and investments costs (3); disturbance of the company activity (3).

When asked if they knew any existing programmes in their country that promoted energy-efficient lighting, responses tended to differ between countries. In Denmark, although the sample was limited to 6 companies, the responses tended to suggest that not only did these companies know existing programmes, they had also benefited from some of them. The same situation would have probably occurred also in other northern countries, for instance The Netherlands where a relatively high number of programmes have been carried out (e.g. voluntary agreements were signed between major branches in the commercial/ non-profit sector and the Dutch Government). In contrast, the majority of Spanish respondents were unaware of existing programmes.

5.2.4 Rather positive reactions on the US Memorandum of Understanding (MoU)

A large majority of respondents in each country, representing overall 3/4 of the interviewees, said that the MoU staff commitment would be achievable. In other words, they said that it would be possible to appoint a Green Lights Implementation Director, as well as a Communication Director, and to allocate approximately one person-year for every 500,000 m² of facility space. The same large majority of the people found also no problem in reporting their results to the Commission.

At least half of the interviewees in each country (higher proportion in Italy) agreed that a 5-year period would be suitable to carry out 90% of the profitable upgrade bearing in mind their definition of profitability. The others answered either that it was better to have a smaller period to keep a certain dynamics or, more often, that 5 years wasn't long enough. However, in this latter case, it seemed that some people had in mind the total area of their company, including no-upgrade areas (which are difficult to quantify a priori).

The situation was more contrasted when talking about financial commitment. A slight majority of respondents in France and Spain said that the initial investment of about 5-20 Euros per m² would be achievable. However, the trend was reversed for Denmark and clearly negative in Italy where 3/4 of the respondents refused such a commitment. This is no surprise since the lack of capital and the inability to get financing for projects are well-known barriers to energy efficiency investments. It shows the need to describe how these barriers can be overcome using various financing strategies. In particular, the role of Energy Service Companies (ESCO) must be explained. Except for Spain, there was a majority of respondents in each country who didn't know what an ESCO was and the kind of service he/she could offer.

5.2.5 A need for information, training, and software tools

The following three types of support were claimed to be the most important by interviewees of all countries, except Denmark:

- summary of the best available information about energy-efficient lighting and implementation methods,
- workshops and training courses,
- lighting analysis software.

These items were more cited than the other proposed, namely: allies programme; independent lighting product information programme; directory of utility rebate programmes and non-utility financing organisations; hotlines. This was somehow in contradiction with the preferences expressed in US (see section 4.3.1). In Denmark, none of the 6 interviewees believed that information about energy-efficient lighting was part of the most important support. The information is probably more developed there than in the three other countries.

5.2.6 A preference for nominative recognition

As expected, the most rated recognition actions were those where the name of the company was likely to appear. Comparatively, there was less interest for advertisements raising awareness of the programme as a whole.

5.2.7 A demand for guarantees/demonstration

The interviews were not sales speeches, nor did they always address the exact person who could decide on joining Green Lights (see section 5.1). Thus, only a minority of people said that their company would agree to enrol. More interesting was to examine the kind of additional support they thought would be useful. Here again the situation in Denmark appeared to be different from the situation in other countries. Whereas none of the Danish interviewees asked for guarantees or demonstration of the benefits on occupants, these were the two most cited additional items requested in the other countries. This seemed to reflect once again the imbalance of information between Denmark (maybe northern countries in general) and the other countries.

5.2.8 A plebiscite for Energy Agencies' involvement

Finally, when the interviewed companies were asked what kind of Green Lights Promoter they would be the most receptive to, the first choice whatever the country went always to energy agencies (national or regional). The next chapter shows that this makes sense for several reasons.

6 - NEED TO RELY ON EUROPEAN ENERGY AGENCIES

Given their experience, independence, commitment to energy efficiency and their acknowledged institutional role in the country, the energy agencies (preferably national due to the scope of the programme) will have major tasks within EU Green Lights. These tasks will consist in:

6.1. Tailoring the programme

The Green Lights concept will be the same in Europe as in the US: Partners will be invited to sign a Memorandum of Understanding stating that they will undertake all the profitable lighting upgrades within a given time period (5 years or maybe less). But the European Union is characterised by a very different attitude of consumers with respect to the energy saving issue. Governments, public administrations, industries have different sensitivity to the environmental problem. Moreover, the electricity market situation varies considerably from country to country. Tariffs and cost-effectiveness of various energy efficient measures are also quite different. For these reasons, the national energy agencies will need to tailor the Green Light programme according to the market situation and consumers' preferences in each country. They will also take into account national lighting programmes already underway, carried out by national organisations or local utilities. Conflict or competition with similar programmes must be absolutely avoided. In the case a lighting programme is underway, an agreement has to be reached with the programme promoter. A critical review of the on-going programmes⁵ is being carried out and the opportunity of re-framing and re-launching of the programme could be considered.

6.2. Marketing

As it would not be possible to have a contract similar to the MoU between EPA and American consumers in Europe, programme Partners must sign a unilateral commitment. The marketing action in order to get unilateral commitment signed will be carried out by the national energy agencies. The US experience has shown that this task is crucial and deserves special attention.

6.3. Funding

As in the USA, public funds are needed to support Green Lights. Indeed, the administrative effort required to mount such a programme is significant (BRE 1994). The funding should be shared between the European Commission and Member States. The amount of resources must be enough to set up and provide financial support for maintaining a structure of a few people. The benefits of such public expenditure are the market transformation and the cost-effective reduction of greenhouse gas emissions.

6.4. Monitoring and communicating

The energy agencies will monitor the progress of Green Lights in their country while the EC Joint Research Centre will draw pan-European syntheses. In parallel, they will develop an extensive communication plan that will help market Green Lights.

6.5. Diffusing the technical support

The national agencies will be in charge of tailoring and diffusing the technical support for Green Lights Partners. This is justified by the fact that they're already well identified by the Partners and that their information is likely to have the best impact. Indeed, not only can they translate the information but they can also customise it to the country situation (legislation, national standards, incentives, etc.).

It is still unclear, for budget reasons, whether all agencies will be able to offer training, workshops, and hot lines to help disseminate the technical support. But for sure, the use of the Internet will be massive. The EC Joint Research Centre will host the Green Lights homepage and act as a router to all national agencies' pages. The homepage will contain the shared information and the updated results of Green Lights. The agencies' pages will contain the country-specific information. A common format will be used and the appropriate links will be made. The result will be a decentralised but cohesive Green Lights web site. What this site will contain is described hereafter.

7 - TECHNICAL SUPPORT FOR EUROPEAN GREEN LIGHTS PARTNERS

The technical support constitutes an essential feature of the Green Lights deal and comes in addition to the public recognition provided by the EC to the Partners for their contribution in protecting the environment. For outlining this support, the best is to figure the kind of questions European Green Lights Partners will ask themselves.

The terms Green Lights Partner hide a number of different actors inside the company, each of them having a specific background and specific needs. Basically, a distinction can be made on whether these actors are more involved in financial and planning tasks or in technical tasks. In this respect, two types of information can be distinguished beforehand: the information for ‘planning people’ and that for ‘technical people’. These two types of information are outlined hereafter. They have been cross-checked with the results of the market study (see section 5) and with what is offered by EPA to US Green Lights Partners (EPA 1998). Although transpositions from US to Europe are not straightforward, the support from EPA is interesting to look at because the US project has been constantly refined since its creation in 1990 to take into account remarks and suggestions that have come up from more than 1600 participants. In this sense, it provides good insights on Partners’ demand.

7.1. Information for planning people

This information is targeted to all the people in the company who will manage the financial, organisational and communicative aspects of the project, e.g.: decision-makers, financial and communication directors, etc. Their task is essential to make the project develop at the scale of the whole company. Often, they have limited knowledge in the field of lighting. Sometimes, they may not even be familiar with energy management projects in general. Described below are the questions that they will probably ask themselves and the pieces of information most likely to provide relevant answers (see table 2 for a summary).

7.1.1 What is the programme?

This should require the EC to provide a small input at the beginning of the programme and then to act as a ‘results-watcher’. Indeed, an initial response to the question consists in first defining the general background of lighting with rough but easy-to-grasp numbers and then offering an overview of the programme as well as a copy of the Green Lights deal. But Partners are likely to be also interested in getting an idea of the programme impact. For this reason, they should also have access to an updated list of participants and, if possible, updated and cumulated energy saving results. These latter values could be complemented with some results from outstanding companies.

7.1.2 How to implement such programme in my company?

The Green Lights programme concerns the whole company. Therefore, it requires guidelines to know who’s doing what and to define successive implementation steps. Compared to the EPA implementation guide, some form of national customisation will be necessary. Also, it will be important to ensure a good coherence with current environmental standards (especially ISO 14000 and EMAS⁸).

7.1.3 How can I finance such programme?

Companies may not always think about all the financing options they can choose from to fund lighting upgrades (as shown in 5.2.4). Also, they may not always be aware of all the financial incentives they can benefit from. A guide that would resume all these aspects would certainly be useful. Financing options could be described at a European level. However, the list of incentives would need to be drawn for each country.

7.1.4 Why and how should I optimise maintenance and waste disposal?

Although lighting maintenance and waste disposal are sometimes considered as straightforward routine actions by planning people, they can bring significant money and energy savings if they are carefully planned at the scale of the whole company. This can be resumed in a European guide derived from existing ones and as far as waste disposal is concerned, be complemented at country level by an up-to-date description of the relevant legislation.

7.1.5 Who can I contact outside my company?

Who can I contact for third party investments, lamp recycling, lighting upgrades, etc. when I don't have the expertise in-house? The EC together with member countries should maintain a list of contacts with electronic links. Whether some of these contacts could be endorsed by the EC, as EPA endorses a list of 'Surveyor Allies', is still open.

7.1.6 How do I communicate my participation?

It is the interest of companies to use their Green Lights commitment in their communication strategy. Guidelines would be useful on how companies can communicate their Green Lights success. In Europe, such advice could be partly shared at EU level and partly customised to each country.

7.2. Information for technical people

This information is targeted to the people inside (or outside) the company who will tell which and how installations must be upgraded. Their knowledge in lighting is very variable. Some of these people may be considered as actual lighting designers while some others are mostly active in other fields, e.g. HVAC, and know very little about lighting. For this reason, they should be provided with some reference information on lighting. This reference information should accommodate for the fact that technical people have different background. It should also take into account the fact that they may either look for some information on specific technologies or proceed with a specific application in mind, searching for example lighting recommendations for offices, sport halls, retail spaces, etc. Therefore, it should be both technology-oriented and application-oriented. Properly edited, it will serve as a reference to the information provided in direct support to participant questions. These questions and the corresponding support are presented below.

7.2.1 How do I see whether a given installation can be upgraded? What kind of upgrade shall I do?

These two questions are put together because a common answer can be provided. This can be partly done with a guide that tells technical people (1) how to carry out a comprehensive lighting assessment within their facilities before and after the retrofit, considering energy and human aspects; and (2) how to choose upgrade options. Such guide will be complemented by software that calculates the Internal Rate of Return of any upgrade option. However such software will need to be kept simple. Experience from EPA has shown that the main challenge is to get partner organisations to execute basic steps in a timely manner. Focusing on simple procedures to get all key-steps taken has been much more important than elaborating decision support systems.

Such a guide will also be complemented by a product database. It is still open however whether an independent laboratory could check such database. The financial resources required for this might not be too high if an independent performance-testing programme was already planned or under way somewhere in Europe. In this case, the financial effort from the EC to check the Green Lights database could be limited to a co-sponsoring of this programme.

The upgrade guide/software should make special attention in the way Green Lights Partners are advised when the visual quality of the existing installations appears to be extremely poor (this may be especially the case in work places). In such cases, it would be a pity if the guide/software wasn't raising a flag saying that changing only ballasts and lamps has no sense and that the whole layout has to be rethought. Without this flag, a profitability-oriented upgrade process like Green Lights might lead to an energy-efficient retrofit that maintains a very poor visual quality, or slightly improves it but with no common measure with what is needed to ensure even just-decent illumination. The danger then would be that top-managers consider that no more improvements are needed for an other decade (period considered to calculate internal rates of returns in US calculations) and that occupants keep on working in bad conditions for that long.

In order to avoid incorrect and inhomogeneous ways of collecting and reporting energy saving results, it is highly advisable to define few standard procedures for measuring the energy savings. The importance of this requirement is not only for gathering correct data at country and EU level, but also for ensuring contractual specifications and guarantees for all parties involved in the lighting retrofit actions.

Reference can be made to International Performance Measurements and Verification (M&V) Protocol (DOE 1997), where four M&V options are defined for various energy efficiency retrofit measures, lighting retrofit included. Since the retrofit actions may vary considerably in size, cost and importance, also the accuracy of M&V vary accordingly and hence the need of defining different options. The involved parties are free to choose the option that best suit to the types of performance contract, values and risks. The JRC and the national agencies could check M&V options for general viability.

7.2.2 How do I report to the Commission?

The Green Lights deal supposes that participants send progress reports to the EC. As a matter of fact, this is likely to be felt as a constraint and if the constraint is too big may compromise Partner's involvement. Therefore, care should be taken to simplify as much as possible the reporting task and avoid document duplication. One way to do so would be to make the outputs from the upgrade software not only suitable for deciding on upgrades but also suitable for reporting to the Commission. By this way, participants would just have to enter their parameters once.

Table 2: Summary of the information for future European Green Lights Partners

	Items	Country-dependent	
		no	yes
For planning people	General information on the programme	•	
	Results of the programme	(•)	•
	Implementation guide	•	(•)
	Financial guide	•	(•)
	Maintenance/waste disposal guide	•	(•)
	Contact directories	(•)	•
	Communication guide	•	(•)
For technical people	Fundamentals / glossary	•	
	Survey & upgrade guide	•	
	Upgrade & report software	•	(•)
	Independent tests of products	•	

8 - CONCLUSION

The Green Lights concept has the potential to transform the way organisations make decisions about efficiency in buildings. The organisers in the United States claim significant energy savings and a similar success is expected in Europe too. The present paper shows that the interviewed European companies offer favourable dispositions, that national energy agencies can be strong relays, and that a technical support can be defined and disseminated in Europe.

In the coming months, this positive impression will be translated into estimated energy savings. A simple two or three page European Memorandum of Understanding will be written, the technical support will materialise, and a founding group of motivated companies will be formed. Then, energy agencies will embark into a timely SAVE project⁹ that will help them market and publicise Green Lights with famous sites as a means to sell the programme to the public.

At present, 12 energy agencies have confirmed their participation in this project¹⁰. This is considered as a very positive signal for the success of the future EU Green Lights Programme.

9 - ENDNOTES

¹ The mission of the Joint Research Centre (JRC) is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. As a service of the European Commission, the JRC functions as a reference centre of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, private or national. Web site: www.jrc.it

² Project co-funded in the framework of SAVE, the non-technology energy efficiency programme of the European Union.

³ The EPA defines a “profitable” project as one that provides an annualised internal rate of return that is equal to or greater than the twenty percentage points, with an analysis term of at least 10 years.

⁴ Exchange rate: 1\$ = 1.17 ECU, 1 square meter = 10.764 square feet.

⁵ An inventory and analysis of voluntary lighting programmes is under preparation within the framework of the SAVE II project “Green Lights Potential Assessment and Program Experience Study” (see next endnote).

⁶ This study is part of the SAVE II project “Green Lights Potential Assessment and Programme Experience Study”. Prime Contractor: Netherlands Agency for Energy and the Environment (NL). Partners: Borg&Co, Building Research Establishment, ProLicht. In progress. SAVE II contract EC-DGXVII No. 4.103/D/97-028

⁷ In particular: “Market Research on the Use of Energy Efficient Lighting in the Commercial Sector”. Prime Contractor: Research Association of Danish Electric Utilities (DEFU). Partners: Building Research Establishment, Danish Illuminating Engineering Society. In progress. SAVE II contract with EC-DGXVII.

⁸ ISO 14000 and the European Eco-Management and Audit Scheme (EMAS) are standards for implementing environmental management systems.

⁹ “DemoGL: Demonstration of the EU Green Light Programme”. Contractor: IDAE, National Energy Agency of Spain. SAVE II Proposal submitted March 31 1999.

¹⁰ Progress of EU Green Lights can be followed at <ftp://greenlt:greenlt@iamest.jrc.it/home.htm>

10 - REFERENCES

Building Research Establishment. 1994. “*Study of measures to promote energy efficient lighting in the commercial sector in Europe*”. Final Report, SAVE Contract EC-DGXVII No. 4.1031/E/93-01.

Centre for the Analysis and Dissemination of Demonstrated Energy Technologies. 1991. “*Learning from experiences with energy-efficient lighting in commercial buildings*”. CADDET Analyses Series No. 6, NOVEM, The Netherlands.

HOFFMAN, J. S., WELLS, J. B., KOPKO, W. L. 1998. “*Capturing efficiency potential requires institutional and organisational reform*”. Proc. of the IEECD International Conference (Amsterdam 21-22 Sept. 98), ed.: NOVEM, The Netherlands.

United States Department of Energy. Dec. 1997. “*International performance measurement and verification protocol*”. DOE/EE-0157, USA.

United States Environmental Protection Agency. April 1998. “*Helping build a better future: ENERGY STAR Buildings and Green Lights 1997 year in review*”. US EPA 430-R-98-01, USA.