

The European GreenLight Programme 2000-2008

- Evaluation and outlook -



Paolo BERTOLDI, Rita WERLE
European Commission Joint Research Centre

Vassilios KARAVEZYRIS
Joint Research Centre (Structural Stage)
Federal Ministry for the Environment,
Nature Conservation and Nuclear Safety,
Germany

Perry SEBASTIAN
Capella University, USA

EUR 24303 EN - 2010

The mission of the JRC-IE is to provide support to Community policies related to both nuclear and non-nuclear energy in order to ensure sustainable, secure and efficient energy production, distribution and use.

European Commission
Joint Research Centre
Institute for Energy

Contact information

Address: Via E. Fermi, 2749, I-21027 Ispra (VA), ITALY
E-mail: paolo.bertoldi@ec.europa.eu
Tel.: +39 0332 78 9299
Fax: +39 0332 78 9992

<http://ie.jrc.ec.europa.eu/>
<http://www.jrc.ec.europa.eu/>
<http://re.jrc.ec.europa.eu/energyefficiency/>

Legal Notice

Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of this publication.

***Europe Direct is a service to help you find answers
to your questions about the European Union***

**Freephone number (*):
00 800 6 7 8 9 10 11**

(*) Certain mobile telephone operators do not allow access to 00 800 numbers or these calls may be billed.

A great deal of additional information on the European Union is available on the Internet. It can be accessed through the Europa server <http://europa.eu/>

JRC JRC56826

EUR 24303 EN
ISBN 978-92-79-15352-5
ISSN 1018-5593
DOI 10.2788/79576

Luxembourg: Office for Official Publications of the European Communities

© European Communities, 2010

Reproduction is authorised provided the source is acknowledged

Printed in Luxembourg

The European GreenLight Programme 2000-2008

- Evaluation and outlook -

Paolo BERTOLDI, Rita WERLE
European Commission Joint Research Centre

Vassilios KARAVEZYRIS
Joint Research Centre (Structural Stage)
Federal Ministry for the Environment,
Nature Conservation and Nuclear Safety,
Germany

Perry SEBASTIAN
Capella University, USA

EUR 24303 EN - 2010

Table of contents

1.	Executive summary	1
2.	Introduction	3
3.	Objectives	5
4.	Methods	7
5.	Results – expansion of the GreenLight Programme	9
5.1.	Composition of Partners	9
5.2.	Partners’ savings	11
5.2.1.	Total energy savings	12
5.2.2.	Energy savings per Partner	15
5.3.	Role of National Contact Points and Endorsers	22
6.	Results – Changes in technology	25
6.1.	Introduction	25
6.2.	Scope of the analysis	25
6.3.	Results	26
6.3.1.	Investments by public and private sector Partners	26
6.3.2.	Lighting technologies	29
6.3.3.	Lighting applications	31
6.3.4.	Changes in lamps	32
	Incandescent to incandescent retrofits	33
	Incandescent to fluorescent retrofits	33
	Incandescent to other lamps retrofits	34
	Fluorescent to fluorescent retrofits	34
	Other lamps to fluorescent retrofits	35
	Other lamps to other lamps retrofits	36
6.3.5.	Ballast changes	36
6.3.6.	Lighting controls	37
6.3.7.	Luminaries changes	38
6.4.	Summary and outlook	39
7.	Results - Savings per country in detail	41
7.1.	Italy	41
7.2.	Belgium	42
7.3.	France	43
7.4.	Germany	44
7.5.	Spain	47
7.6.	Austria	47
7.7.	Portugal	48
7.8.	Romania	49
7.9.	The Netherlands	50
7.10.	Latvia	51
7.11.	Slovenia	52
7.12.	Czech Republic	52
7.13.	Norway	53
7.14.	Lithuania	54
7.15.	Sweden	54
7.16.	Greece	55
7.17.	Poland	55
7.18.	Bulgaria	56
7.19.	Slovakia	57
7.20.	Switzerland	57
7.21.	Denmark	58
7.22.	Ireland	58
7.23.	United Kingdom	58

7.24.	Finland.....	59
7.25.	Countries with no GreenLight Partners	59
8.	Results – GreenLight Partners’ motivations and experience	61
8.1.	Introduction.....	61
8.2.	Data input.....	61
8.3.	Results	64
8.3.1.	Motivation	64
8.3.2.	Barriers	66
8.3.3.	Commitment	67
8.3.4.	Benefits	68
8.3.5.	Satisfaction.....	69
8.3.6.	Overall evaluation.....	70
8.3.7.	Public and Private Partners	72
8.4.	Summary.....	73
9.	Conclusion	75
10.	References.....	77
11.	ANNEX.....	79
I.	Calculation methods.....	79
I.I.	Annual energy savings.....	79
I.II.	Average energy savings.....	79
I.III.	Relative energy savings	80
I.IV.	Simple payback.....	80
II.	Abbreviations	81
III.	Survey (Questionnaire, Annex to the Questionnaire).....	83
IV.	Winners of the GreenLight Awards	87
V.	GreenLight Partners at the end of 2008.....	89
VI.	Partners joining the GreenLight Programme in 2009.....	95
VII.	National Contact Points.....	97

Table of figures and tables

Figures

Figure 5.1. Evolution of the number of GreenLight Partners per year	9
Figure 5.2. Total number of GreenLight Partners per country in 2008	10
Figure 5.3. Number of GreenLight Partners according per sector and category, by the end of 2008..	11
Figure 5.4. Energy savings of all GreenLight Partners per country, by the end of 2008	13
Figure 5.5. Energy savings of all GreenLight Partners per category, by the end of 2008	14
Figure 5.6. Relative energy savings for one Partner per country	16
Figure 5.7. Average energy savings for one Partner per country	17
Figure 5.8. Relative energy savings for one Partner per category	18
Figure 5.9. Average energy savings for one Partner per category	21
Figure 5.10. Number of Endorsers per country in 2008.....	23
Figure 6.1. Percentage of public sector participation by type of lighting retrofit	27
Figure 6.2. Average payback time per Partner per category	28
Figure 6.3. Average payback (in years) by sector and lighting retrofit type.....	29
Figure 6.4. Energy savings by lighting retrofit for the period 2000 to 2008.	30
Figure 6.5. Main types of lighting changes for the period 2000 to 2008.	32
Figure 6.6. Energy savings due to change of ballast for fluorescent lamp conversions.....	37
Figure 7.1. Number of new GreenLight Partners in Italy from 2000 to 2008	41
Figure 7.2. Number of new GreenLight Partners in Belgium from 2001 to 2008.....	43
Figure 7.3. Number of new GreenLight Partners in France from 2000 to 2008	44
Figure 7.4. Number of new GreenLight Partners in Germany from 2002 to 2008.....	45
Figure 7.5. Total energy savings in Germany per category, by the end of 2008.....	45
Figure 7.6 Number of new GreenLight Partners Partners in Spain (2000-2008)	47
Figure 7.7. Number of Romanian Partners and total energy savings per category. Period: 2006 to 2008	50
Figure 8.1. Distribution of countries' participation in the survey	63
Figure 8.2. Partners' motivation (item frequencies)	66
Figure 8.3. Barriers (item frequencies)	67
Figure 8.4. Commitment to energy efficiency (item frequencies)	68
Figure 8.5. Partners' benefits (item frequencies)	69
Figure 8.6. Partners' satisfaction (item frequencies).....	70
Figure 8.7. Partners' evaluation of the GreenLight Programme (item frequencies)	71
Figure 8.8. Partners' outlook (item frequencies)	72
Figure I.1. Calculation of annual energy savings	79

Tables

Table 4.1. Division of private and public sector into further categories	7
Table 5.1. Availability of data for calculation of average and relative savings per Partner	15
Table 5.2. Availability of data for calculation of relative savings per Partner per category	19
Table 6.1. Availability of technology data for the technical analysis	25
Table 6.2. Lamp changes summary.....	32
Table 6.3. Incandescent to incandescent lighting changes	33
Table 6.4. Incandescent to fluorescent lighting changes.....	33
Table 6.5. Incandescent to other lamps lighting changes.....	34
Table 6.6. Fluorescent to fluorescent lighting changes	35
Table 6.7. Other lamps to fluorescent lighting changes.....	35
Table 6.8. Other lamps to other lamps lighting changes	36
Table 6.9. Ballast changes.....	37
Table 6.10. Lighting controls	38
Table 6.11. Luminaries changes	38
Table 8.1. General description of the data material.....	62
Table 8.2. Type of projects represented in the survey compared to the whole GreenLight Programme by the end of the survey period (560 Partners)	64
Table 8.3. Partners' motivation (overview of the responses).....	65

Table 8.4. Perceived barriers (overview of the responses)	66
Table 8.5. Partners' benefits (overview of the responses).....	68
Table 8.6. Partners' satisfaction (overview of the responses)	69
Table I.1. Annual energy savings (MWh) of GreenLight Partner Robert Bosch FRANCE S.A.S.....	79

1. Executive summary

The GreenLight Programme is a voluntary, non-residential lighting energy efficiency programme launched by the European Commission in 2000. By the end of 2008 519 Partners from 24 European countries participated in it. This report assesses the achievements of the European GreenLight Programme during the period 2000-2008.

The scope of the current analysis is to provide insight into how the GreenLight Programme expanded during the assessed period in terms of GreenLight Partners, energy savings and technologies used. Furthermore, the aim was also to gain a better understanding of the expectations, experiences and recommendations of the Partners regarding the GreenLight Programme.

The analysis is based on information received from the Partners either as part of their reporting obligations or in response to the survey asking for their feedback on the GreenLight Programme. Spreadsheet analysis was used for the evaluation.

A limitation of the analysis was that there was not adequate data available on the energy savings for 169 Partners. Even if Partners reported on the energy savings, in some cases there were inconsistencies in the reported data. Furthermore, there were variations in the extent of the data reported, which affected savings calculations (e.g. relative savings) and the technological analysis. The result of variations in the reported data meant that the analysis was based on different subgroups of Partners throughout the report, which at each respective section is presented in detail.

The result of the evaluation is that the GreenLight Programme was very successful during the assessed period. The network of Partners was continuously expanding reaching 519 Partners by the end of 2008. Out of this, 90 Partners coming from the New Member States of the European Union joined between 2006-2008. New GreenLight gave an impetus to the promotion of the GreenLight Programme. It was launched in 2006 aiming to expand the GreenLight Programme to the New Member States of the European Union.

In total, Partners saved 241 GWh/year by the end of 2008 which corresponds to a saving of around 24 million EUR in running costs. From the total, almost 60 GWh/year was saved by Partners coming from the New Member States. One GreenLight Partner saved 689 MWh/year on the average, or 35.99% compared to the level of energy consumption before introducing energy saving measures.

As for technology, savings were achieved through lamp conversions and the use of lighting controls. In the case of interior lighting, changing mercury vapour lamps or fluorescent T8 tubes to fluorescent T5 tubes accounted for 23% of the assessed energy savings. Converting metal halide lamps to compact fluorescent lamps generated a further 10% saving. In the case of outdoor lighting, changing mercury vapour lamps to high pressure sodium lamps meant a saving of 13% of all the reported technology savings. By using lighting controls, Partners saved 18% within the total reported energy savings, attributable to technological changes. The rest of the savings is linked to other lamp conversions.

Based on Partners' responses to the survey, their major motivation for joining the GreenLight Programme was to reduce energy use and cut costs. More than 75% of the Partners were satisfied with the results of the lighting efficiency project, and in general with the GreenLight Programme as a whole. 14% of the respondents stated that they would have not introduced energy efficiency measures without the GreenLight Programme. Partners strongly encouraged further promotion of the GreenLight Programme both within their network and towards the public.

To conclude, the GreenLight Programme shall be promoted on a wider scale through different channels (e.g. internet, television, technical literature, conferences, seminars, etc.). Programme administration could be largely facilitated with web-based tools, making online application and reporting possible. Acceptance as a GreenLight Partner could be tied to the submission of sufficient savings data together with the application. A requirement for remaining a Partner on the long term could be to maintain the lighting system energy efficient by regular upgrades, keeping pace with the advancements of lighting technology.

2. Introduction

To convince end-users to adopt efficient lighting technologies and systems and achieve a long lasting market transformation, the European Commission launched in 2000 the European GreenLight Programme ("GreenLight Programme"). It has been designed to promote energy efficiency in non-residential lighting, based on a voluntary participation. It aims to stimulate investment in efficient lighting in a visible manner [EGL2009]. The GreenLight Programme is managed by the Joint Research Centre of the European Commission ("Joint Research Centre").

Any European public or private organisation can join the GreenLight Programme as a GreenLight Partner ("Partner") or as a GreenLight Endorser ("Endorser"). Partner organisations commit themselves to upgrading the lighting system in their existing facilities or to install best available efficient lighting systems in their new buildings, in case the energy savings justify such investments and the lighting quality is maintained or improved. Endorser organisations are promoting the GreenLight Programme to potential Partners, which might be in their country of origin, or any other country. They are expanding the network of Partners with each new applicant, as well as providing assistance to Partners throughout the application process and foremost in the implementation of the energy saving measures [EGL2009].

The benefit of Partner and Endorser organisations in joining the GreenLight Programme is a wide public recognition for their efforts to improve lighting energy efficiency within their organisation.

The principles of participating in the GreenLight Programme are laid down in the respective guidelines for Partners and Endorsers. Accepted Partners have to report to the Joint Research Centre on their savings, before and/or after implementing such saving measures. Endorsers have to submit a promotion plan as part of their application, detailing the specific actions they will take to promote the GreenLight Programme to potential Partners. Endorsers are expected to submit a promotion plan each year.

Next to the main GreenLight Programme administration, the Joint Research Centre, National Contact Points¹ have been appointed in each country which participates in the GreenLight Programme. National Contact Points bear a mediating role in the GreenLight Programme, constituting the bridge between the Joint Research Centre and the local organisations present in their country. They are usually non-profit, legal entities supporting the state of their origin in the field of energy, or in particular energy efficiency. Their common feature is that within the scope of their activities, they work with the GreenLight Programme. The National Contact Points are in contact with potential and already existing Partners and Endorsers coming from their country. They are providing information and are guiding potential participants through the application process. The active National Contact Points submit applications regularly to the Joint Research Centre.

¹ A list of the GreenLight National Contact Points is included in the Annex. A constantly updated list is available on the official GreenLight Programme website (<http://www.eu-GreenLight.org>).

3. Objectives

The objective of the current report is to evaluate the results of the GreenLight Programme from its start in 2000 until the end of 2008.

An interim evaluation of the results was given in the Five Year Report of the European GreenLight Programme ("Five Year Report", [BER2005])². By that time over 1000 buildings had been upgraded in the framework of the GreenLight Programme, offering a very large set of examples of efficient lighting solutions in the different sectors (schools, offices, airports, supermarkets, etc.).

The current analysis is focused on the composition, the technological changes and the energy savings of the Partners, as well as their motivations for joining the GreenLight Programme and their experiences as a GreenLight Partner. The structure of this report is as follows:

- Analysis of the composition and savings of Partners: how the number of Partners and their energy savings evolved from 2000 in the participating countries, the private and public sectors. The sectoral analysis was split into further categories³.
- Analysis of changes in the applied technology, which is the source of the savings: which part of the energy savings can be attributed to a certain type of technology change.
- Detailed analysis per country: composition of Partners in the different sectors, savings achieved in that specific country, best performing Partners.
- Analysis of the motivations for and the benefits of joining the GreenLight Programme.

² Available also on the GreenLight official website.

³ All the abbreviations used in the figures and tables can be found in Annex II of this report.

4. Methods

Partner organisations who commit to the GreenLight Programme report on their savings and the changes in technology to the Joint Research Centre. This information serves as the basis of the current analysis. To evaluate the motivation of Partners for joining the GreenLight Programme and their experiences as a GreenLight Partner, a survey was conducted among the Partner organisations.⁴

The period assessed is from 2000 to 2008. The assessment was carried out using spreadsheet analysis (Excel).

Energy savings are presented in total (e.g. total GreenLight Programme savings) and per Partner (average and relative savings). Savings are assessed according to countries and along public and private sectors. The sectoral analysis is further split into categories. These categories were created taking into account the business area of the Partners in the first place but also the project type implemented. The result of this division gave the following categories (see Table 4.1):

Table 4.1. Division of private and public sector into further categories

Public sector	Private sector	Public+private
Public Buildings	Airports	Car Parks
Educational Buildings: schools, universities	Hotels/Restaurants	Hospitals
Street Lighting	Other	
Public Transport: railway / metro stations	Production	
	Retail: super markets, commercial centres	
	Services: bank / insurance / etc.	
	Utilities/Telecommunications	

Most categories refer to efficiency projects which have been implemented mostly indoor. Street Lighting was implemented outdoor. Car Parks constitute a special category: car park upgrades can be both indoor or outdoor, or even semi-outdoor projects (multi-storey car parks in open area). Another specialty is that like in the case of Hospitals, upgrades within the category Car Parks were made by both private and public Partners.

As the energy savings were reported by the Partners themselves, this imposes some limitations on the results. First of all, there are more than 100 Partners who joined the GreenLight Programme, but there is no information available on their savings. Most of them did not report on their savings. Some others did report but the energy and/or the cost savings could not be extracted from their report. Secondly, some Partners' figures seemed inconsistent, or incomplete, which after further enquiries could be corrected, but not in all cases. Thus data which could not be justified has been excluded from the assessment, to avoid any incongruities. In the end, for 169, thus more than 30% of the Partners there is no adequate data available on the energy savings.

The extent of information provided on the savings by Partners differs which means that different subgroups of Partners are assessed with regard to total savings, relative savings and changes in technology. It shall be underlined that due to lack of sufficient data the energy savings analysed in this report are actually less than the effective savings of all the GreenLight Partners. Nevertheless the different subgroups of Partners are considered valid for the assessment.

⁴ The survey Questionnaire and Annex to the Questionnaire are available in Annex III of this report.

5. Results – expansion of the GreenLight Programme

5.1. Composition of Partners

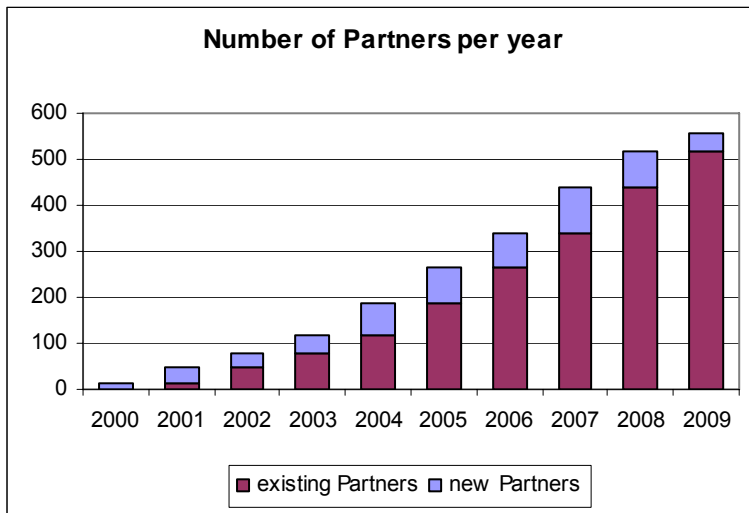


Figure 5.1. Evolution of the number of GreenLight Partners per year

Note: the number of Partners for 2009 does not reflect a completed year of the GreenLight Programme.

Figure 5.1 shows how many new Partners joined the GreenLight Programme each year from 2000 together with the number of the already existing Partners. The total value gives the number of Partners having committed by the end of the respective year⁵.

In 2005 for example 79 new Partners joined the GreenLight Programme, while 188 were already in the GreenLight Programme. Thus by the end of 2005 the GreenLight Programme counted 267 Partners. The year of joining is considered to be the year when the Partner was accepted hence received the official welcome letter of the Joint Research Centre.

The Figure below (Figure 5.2) depicts the number of Partners in the different countries at the end of 2008. There are Partners in the GreenLight Programme from the European Member States, Norway and Switzerland. Several multinational companies; Citigroup, Johnson&Johnson, McDonald's Europe and IKEA also joined the GreenLight Programme.

The total number of Partners at the end of 2008 was 519, more than twice as much as at the end of 2005 [BER2005].

⁵ It shall be emphasized that the number of Partners for 2009 does not reflect a completed year of the GreenLight Programme.

Number of Partners per country in 2008

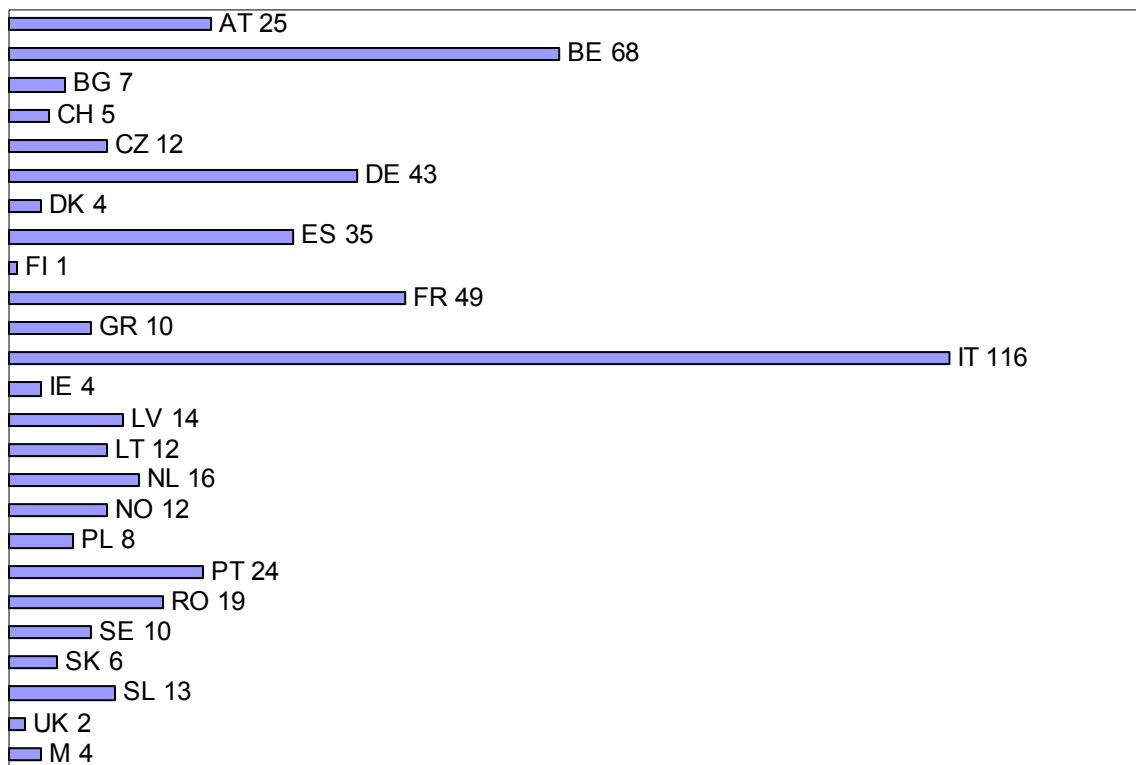


Figure 5.2. Total number of GreenLight Partners per country in 2008

It is notable, that Italy has the highest number of Partners, with 116 organisations. Second placed is Belgium, followed by France and Germany. Spain is fifth ranked.

At the beginning of 2000 a project was launched providing financial contribution to some National Contact Points of the GreenLight Programme in the EU-15 and in Norway. The “Demonstration of the EU - GREENLIGHT Programme” (“DEMO GL”) was the first phase of such project, implemented through a contract⁶ under the Specific Actions for Vigorous Energy Efficiency („SAVE”) Programme⁷. In particular, the following National Contact Points participated in DEMO GL: Austria, Finland, France, Germany, Greece, Italy, the Netherlands, Norway, Portugal, Spain, Sweden and the United Kingdom. DEMO GL was co-ordinated by the Spanish National Contact Point. The project’s second phase lasted until 2003.

Partners from the New Member States⁸ started to adhere to the GreenLight Programme only starting from 2006⁹. In 2006 “New GreenLight”¹⁰ was launched with the scope of extending the GreenLight Programme to the New Member States. New GreenLight was a project co-ordinated by the Czech National Contact Point SEVEN, running for two years [NGL2009]. By the end of 2008 90 new GreenLight Partners from each participating country of New GreenLight adhered to the GreenLight Programme, with a total energy saving of 59.5 GWh/year. In fact, 24 organisations whose applications were received under New GreenLight were accepted as GreenLight Partners in 2009. This makes the

⁶ SAVE Contract N. XVII/4.1031/Z/99-180.

⁷ SAVE was the European Commission’s programme for energy efficiency, which has been integrated into the Intelligent Energy Europe Programme.

⁸ Bulgaria (2007), Cyprus (2004), Czech Republic (2004), Estonia (2004), Hungary (2004), Latvia (2004), Lithuania (2004), Malta (2004), Poland (2004), Slovakia (2004), Slovenia (2004), Romania (2007).

⁹ Except for the first Slovenian Partner, who adhered to the GreenLight Programme in 2003.

¹⁰ A project supported by the Intelligent Energy Europe Programme. For more information:

http://ieea.erba.hu/ieea/page/Page.jsp?op=project_detail&prid=1644

A brochure with case studies is available on the GreenLight website (http://www.eu-greenlight.org/pdf/1_GreenLight_D4_CentralEurope.pdf).

total number of Partners joining the GreenLight Programme under New GreenLight 114, with a total saving of 68 GWh/year¹¹.

The size of GreenLight Partners varies from large private organisations to companies with one small building. To give some examples, in the case of Johnson&Johnson the total upgraded floor area is almost 390,000 m², while in the case of the store warehouse Bloom S.r.o. from Slovakia it is 250 m². In the public sector, the same feature can be seen: there are large cities such as München, where more than 8 million m² of the city's streets have been relighted, with a total energy saving of more than 2.6 GWh per year. The other end could be represented well by the Italian Comune di Careri, where the municipal seat of less than 500 m² was upgraded, saving thereby 2.6 MWh per year.

There are 276 Partners from the public sector and 243 Partners from the private sector in the GreenLight Programme (see Figure 5.3).

About 24% of all the Partners, more precisely 123 active in the public sector implemented modernisations in Street Lighting. There were three Partners who upgraded next to street lighting also educational buildings; and two who upgraded public buildings as well. In total, 99 Partners realized projects in the category Public Buildings.

The third highest number of Partners is in Production with 74 private Partners. This is followed by a mix of the private and public sector's representatives. As for the public sector, next in the list are Partners in Educational Buildings, who upgraded schools or universities. In the private sector, the leading Production is followed by the categories Retail and Services. The number of Partners in the Hotels/Restaurants and Utilities/Telecommunications is also notable.

Either only public or only private Partners are to be found in each category. However, there are two categories where a mix of public and private Partners can be seen (Hospitals and Car Parks).

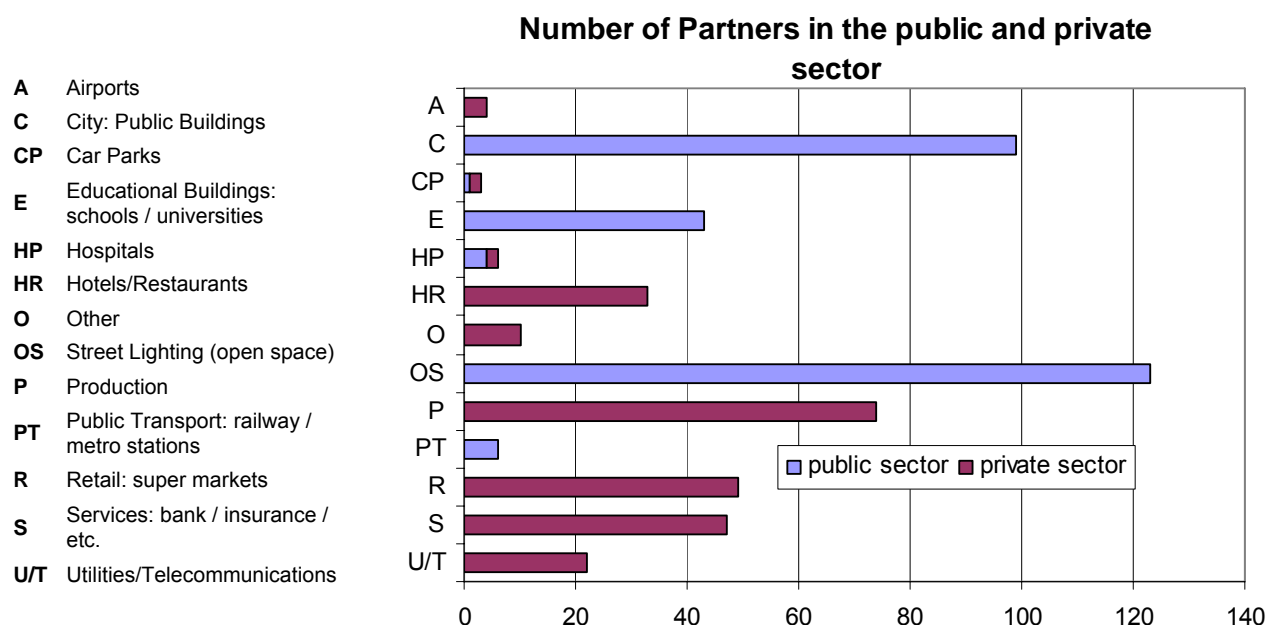


Figure 5.3. Number of GreenLight Partners according per sector and category, by the end of 2008

5.2. Partners' savings

As already mentioned in section 4 (Methods), the dataset imposes some limitations on the evaluation of the results. For some Partners data is only available on the energy savings (kWh), while for others only on the cost savings (EUR). For 158 Partners none of this data is available.

¹¹ This value may differ from previously published total savings, due to corrections and updates on savings reported to the Joint Research Centre by the Partner organisations.

The energy savings and the cost savings are closely related, more precisely, a saving of 1 kWh in energy use generates roughly 5-15 eurocents of savings in running costs¹². The fact that the dataset is incomplete has to be taken into consideration when comparing energy and cost savings. Adding up all reported data on energy and cost savings would give a result which deviates from the above expected range. To avoid a false picture, in the followings only the reported annual energy savings achieved by the end of 2008¹³ (expressed in kWh/year) will be presented in detail.

5.2.1. Total energy savings

Considering all the energy savings reported by the end of 2008, the total savings of GreenLight Partners amount to 241 GWh/year¹⁴. This is more than twice as much as the savings reported by 2005 [BER2005]. As not only the savings but also the number of Partners doubled with respect to 2005, considering the reported energy savings, it can be concluded that the average saving per Partner remained constant over time.

The energy saving of 241 GWh/year generated a running cost saving of about 24 million EUR. 76% of the GreenLight Partners implemented lighting retrofits in buildings, on a total surface area of 3.5 million m². The remaining Partners' projects were street lighting upgrades. 81% of the savings was achieved indoor. This share was approximately the same between indoor and outdoor savings by 2005 as well [BER2005].

Figure 5.4 includes the total energy savings reported by GreenLight Partners in the participating countries, for the period from 2000 until 2008. The bars in green represent the savings achieved in each country by the end of 2008 (expressed in GWh/year). The orange bars show the share of energy savings in the particular country in comparison to the total GreenLight Programme savings (241 GWh/year).

¹² For the purposes of this report, running costs include the operation and maintenance costs of the lighting system. The costs of the energy efficiency investment are not included.

¹³ See the Annex for the calculation of annual energy savings.

¹⁴ This was reported by 350 Partners. For the remaining 169 Partners there is no adequate data available on the energy savings.

Total savings per country

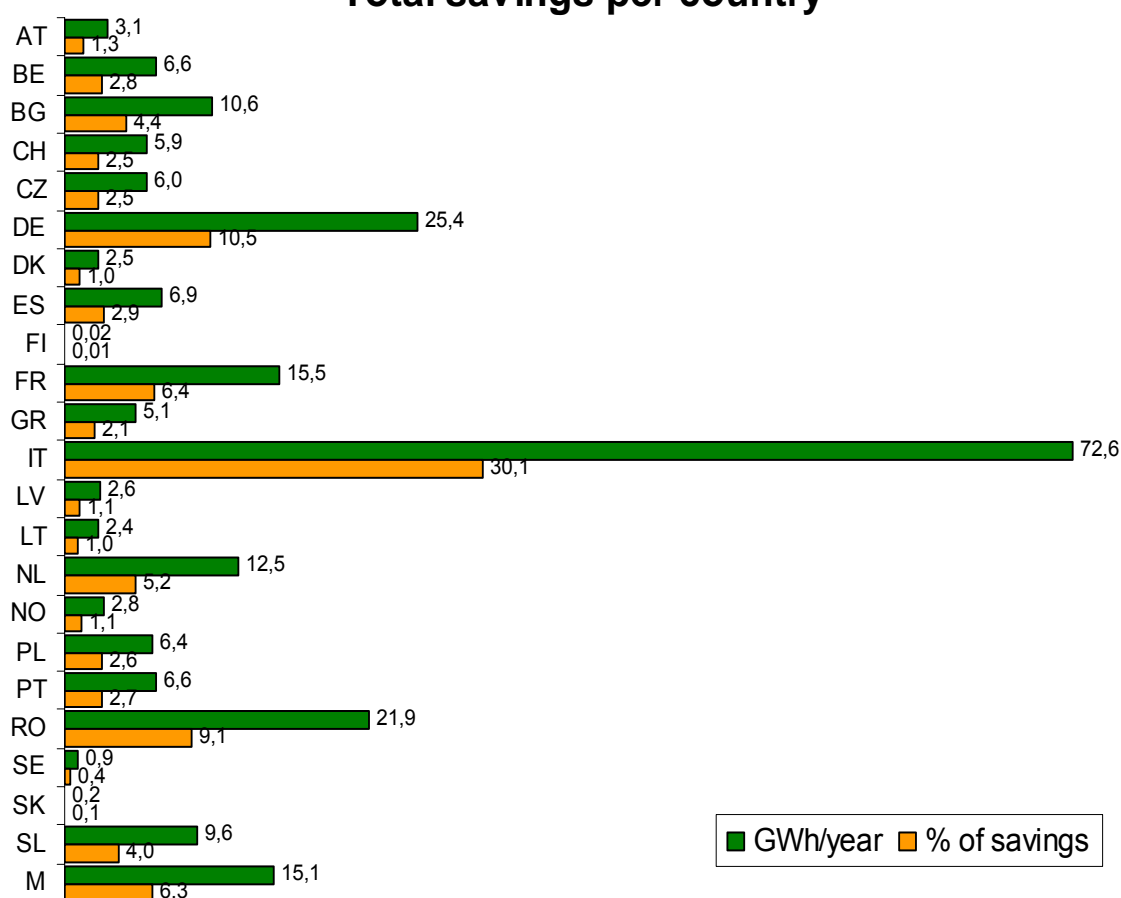


Figure 5.4. Energy savings of all GreenLight Partners per country, by the end of 2008

Italy achieved not only the highest number of Partners but also the highest savings as within one country. Italian Partners saved 73 GWh per year by the end of 2008 giving 30% of all the energy savings achieved within the GreenLight Programme. It shall be added, that the Italian retail chain Coop contributed with almost 31 GWh/year to the Italian total savings.

It is interesting to show that the Partners from the new Member States saved a little less than the Italian Partners. More precisely, Partners from Bulgaria, the Czech Republic, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia contributed with 25%, 60 GWh/year to the total savings reported by all GreenLight Partners (241 GWh/year). This saving of 25% was achieved by 91 Partners, which compared to the total number of Partners in the GreenLight Programme¹⁵ is 18%. This is a big share, taking into account that Partners from the New Member States started to adhere to the GreenLight Programme only in 2006¹⁶, when New GreenLight was launched. New GreenLight gave a visible impetus to the expansion of the GreenLight Programme in the New Member States. The results suggest that there is significant potential for energy efficiency in lighting in the New Member States.

Germany is the second best energy saving country, giving 11% of the total savings of all GreenLight Partners with 25 GWh/year.

As a confirmation of the above potential in New Member States, German Partners are followed by Romanian Partners, who saved 22 GWh/year by the end of 2008. This represents a share of 9% from all Partners' savings.

¹⁵ 519 by the end of 2008.

¹⁶ Except for the first Slovenian Partner, who joined the GreenLight Programme in 2003.

French Partners saved close to 16 GWh/year, which corresponds to 6% of all GreenLight Partners' energy savings.

The multinational companies saved 15 GWh/year, representing 6% of the total savings achieved under the aegis of the GreenLight Programme.

The total savings of Austria and Belgium do not seem very high. This is due to lack of sufficient data. From the 25 Austrian Partners there is no data available for 12 on the energy savings, while from the 68 Belgian Partners for 35. This is about 50% of the Partners in both cases. Extrapolating the savings with a simple method¹⁷ based on the reported savings, it could be assumed that Austrian Partners could have saved about 6 GWh/year. Using the same method, Belgian Partners could have saved almost 14 GWh/year. Extrapolation based on the average savings per Partner gives the same values as a result.¹⁸ Thus it could be assumed that Belgian Partners could have saved on energy roughly as much as the multinational organisations.

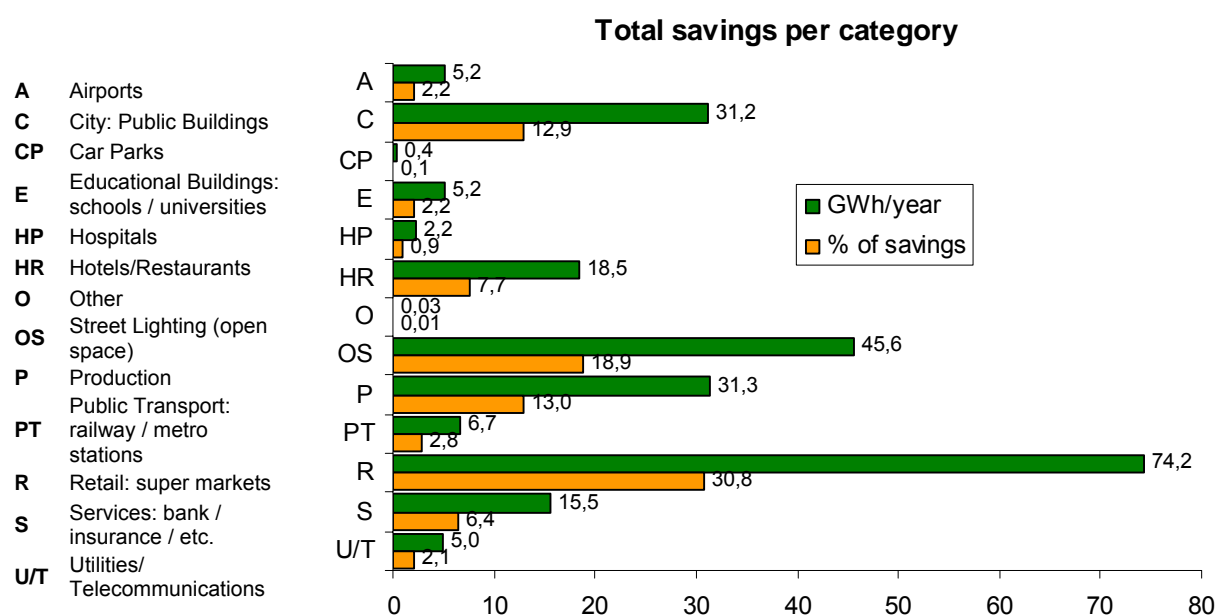


Figure 5.5. Energy savings of all GreenLight Partners per category, by the end of 2008

About 60% (150 GWh/year) of the total savings was achieved in the private sector, while around 40% (91 GWh/year) derives from the public sector. Figure 5.5 depicts the distribution of savings reached by 2008 across the different categories, in which the Partners are active.

The highest savings – 31% of the total GreenLight Programme savings - were achieved in Retail. This is thanks to some big retailers, such as Carrefour Italia, Coop in Italy, or Distribution Casino France, who reported savings between 10-31 GWh/year each. The three of them saved altogether about 62 GWh/year, which represents 83% of the category's total. It shall be added that supermarkets can save high amounts of energy on lighting due to high lighting levels (up to 1,000 lux), which are coupled with long opening hours. Some examples of Partners and their savings in Retail were collected in a GreenLight brochure¹⁹ in 2002.

The second highest savings were reported by Partners who modernized the public lighting system, giving close to 20% of the total GreenLight Programme savings. There are small municipalities and big cities among the Partners as well, with energy savings ranging from 8 MWh to 5 GWh. Most of the GreenLight Partners implemented street lighting projects. Hence, the total savings in Street Lighting

¹⁷ In the case of Austria, total savings were divided by the percentage of Partners who reported on savings: 3 GWh/52%. This results in a total saving of 6 GWh. The same method was used for calculating the effective savings in Belgium.

¹⁸ Taking the average saving per Partner in Austria, 241 MWh/year and multiplying it by 25, the total number of Partners in Austria, equals 6 GWh/year. Multiplying the average saving per Belgian Partner, 201 MWh/year by the total number of Partners in the country corresponds to a total saving of 13.6 MWh/year in Belgium.

¹⁹ Available at: http://www.eu-greenlight.org/pdf/2002_GreenLight_retail_sector.pdf

are prone to show a high value, even if there is no adequate data available for 44% of the Partners in Street Lighting.

The third highest savings, almost 15% of the total GreenLight Programme savings were achieved in Production. The number of companies active in this category is also the third greatest regarding the whole GreenLight Programme.

The number of Partners who refurbished public buildings is higher than that of producers, but their total savings are not higher. It shall be added that data on the savings is available for more Partners in Production (60) than in Public Buildings (50).

5.2.2. Energy savings per Partner

In this section the average and relative savings per GreenLight Partner will be presented.²⁰

It has to be noted, that data for the calculation of the average savings per Partner is available for about 70% of the Partners, while for the calculation of the relative savings per Partner for about 50% of the Partners. In particular:

Table 5.1. Availability of data for calculation of average and relative savings per Partner

	available		not available		sum	
	number of Partners	%	number of Partners	%	number of Partners	%
Data for average savings per Partner	350	67%	169	33%	519	100%
Data for relative savings per Partner	277	53%	242	47%	519	100%

For the calculation of relative savings the level of energy use before introducing energy saving measures has to be available.

Figure 5.6 and Figure 5.7 show the relative and average energy saving per one Partner across the participating countries. Figure 5.6 demonstrates the relative savings per Partner. The relative savings are expressed as a percentual value of the total energy savings²¹ divided by the energy consumption before implementing the energy saving measures.

²⁰ See Annex for detailed calculation methods.

²¹ achieved by the end of 2008.

Relative savings per Partner per country

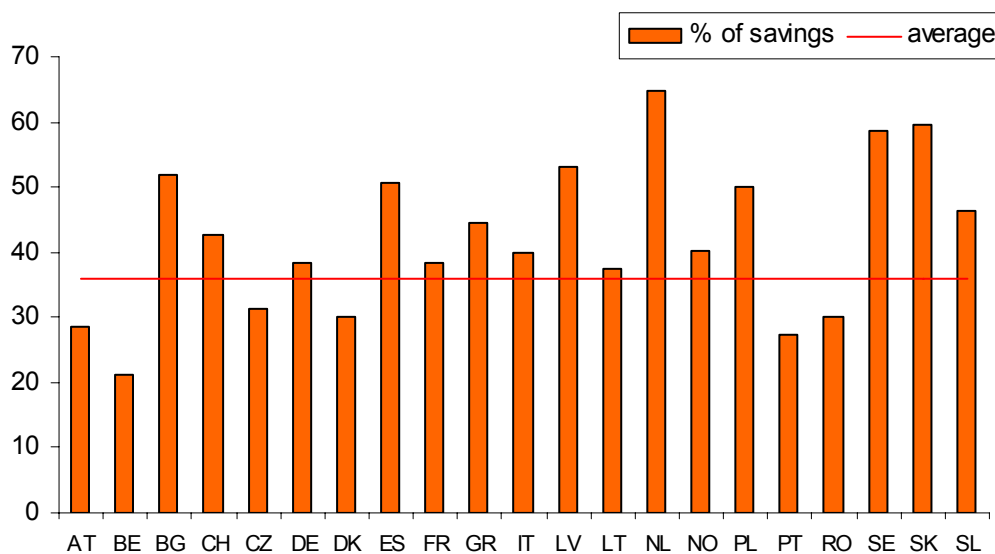


Figure 5.6. Relative energy savings for one Partner per country

The highest relative savings were reported in the Netherlands (65%). Five out of the 16 Dutch Partners reported a relative consumption saving about or exceeding 60%. They are representatives of both the private (Production, Services) and the public sector (public and educational building upgrades).

Considering the whole GreenLight Programme, one Partner managed to save 36% of its energy consumption on the average. A Partner from the New Member States saved 37%, slightly higher compared to the former rate.

The average annual consumption savings of a GreenLight Partner corresponds to 689 MWh/year. For a Partner from the New Member States this value is 654 MWh/year.

Savings per Partner per country

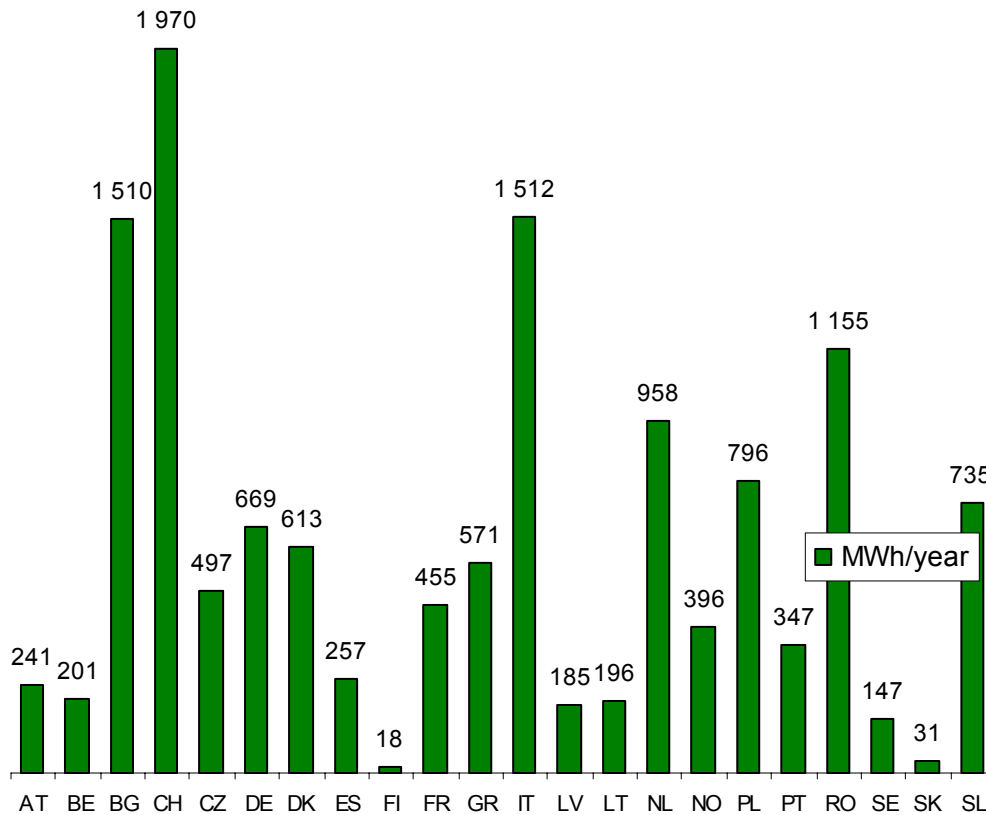


Figure 5.7. Average energy savings for one Partner per country

Figure 5.7 demonstrates the average savings per Partner: the total reported energy savings in each country (MWh/year) were divided by the number of reporting Partners in that country.

The average saving for one multinational organisation is 3.8 GWh/year. This is the highest average saving per Partner in the classification according to countries. However, since this value is very high, it would have been difficult to visualize the smaller savings. Therefore, the category for multinational organisation was not included in Figure 5.7.

The second highest average savings per Partner were reported by the Swiss Partners (1.97 GWh/year). However, as the dataset for calculating the relative energy savings of the Swiss Partners is rather small, no relevant conclusions can be drawn.

Third in the row are the Italian Partners, with an average saving of 1.5 GWh/year per Partner. The relative saving per Partner is 40%. There is a number of Italian Partners with very high savings, such as Carrefour Italia, Coop, Intesa Sanpaolo or UniCredit, each of them saving more than 4.5 GWh annually. However, there are also a number of small Italian municipalities with small savings (in absolute terms).

One Bulgarian Partner saved almost the same as one Italian Partner: 1.5 GWh/year on the average. All the seven projects in Bulgaria are street lighting upgrades, with some of them focused not only on street lighting but also on the retrofitting of public or educational buildings. Four of the Bulgarian Partners reported savings between 1.5-3 GWh/year which is the reason for such a high average saving. As for the relative energy savings (see Figure 5.6 above), with an average of 52% per Partner they were the fifth best savers. Thus, both the average and the relative savings per Bulgarian Partner were high.

Romanian Partners' absolute savings stand out as well, though their relative savings are a little lower than the GreenLight Programme average. This suggests that only their absolute savings are high. About 30% of their projects are street light upgrades, on which they did not save so much in relative terms, only approximately 20% on average. This pulls down the relative savings per Romanian Partner.

Nevertheless it should be underlined, that Partners coming from the New Members States made a significant contribution to saving energy on lighting.

The Dutch Partners are sixth in the row with an average saving of 958 MWh/year per Partner. Their relative savings are the highest within the GreenLight Programme. On average, one Dutch Partner saved 65% on energy consumption compared to before the lighting retrofit.

Another interesting issue to investigate is how the savings evolved in the different categories (Figure 5.8 and Figure 5.9).

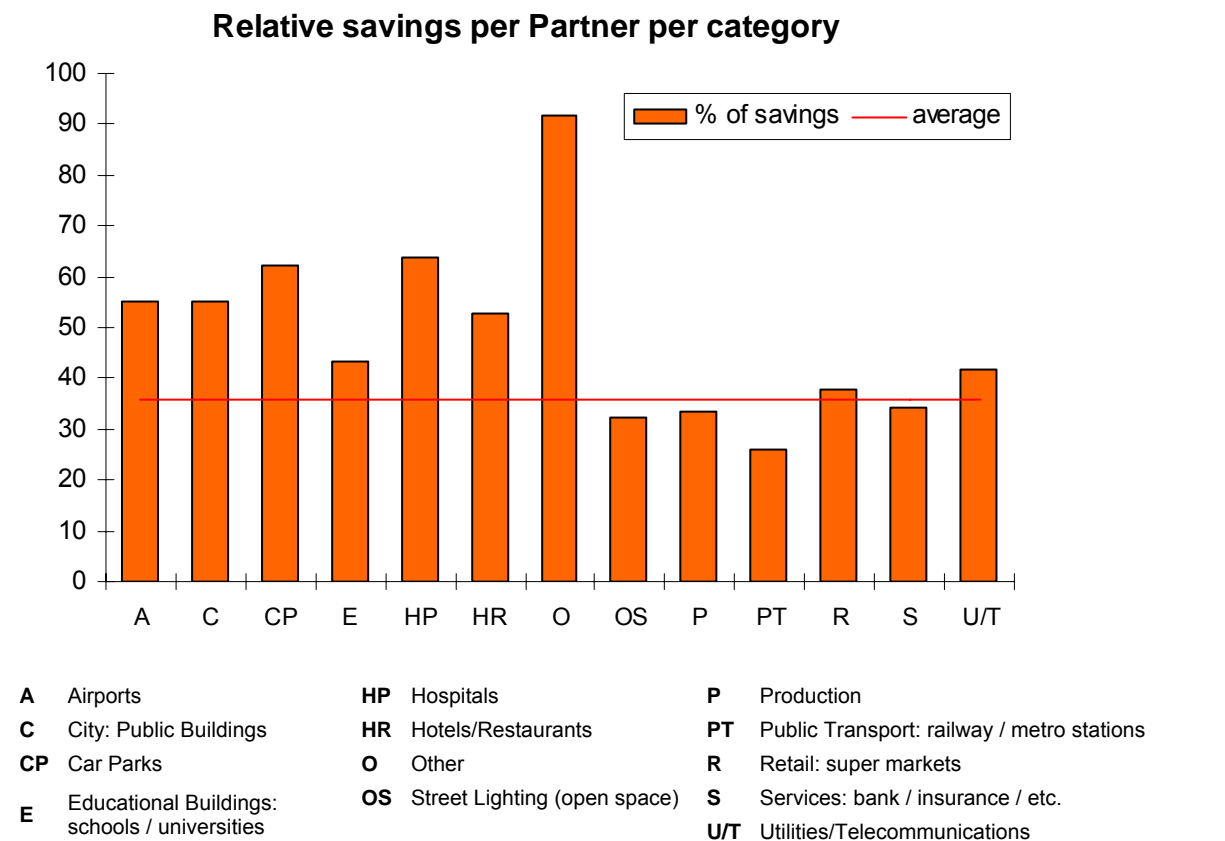


Figure 5.8. Relative energy savings for one Partner per category

Note: Data on the relative energy consumption of the category "Other" is available only for one Partner.

Figure 5.8 above depicts the relative savings in the different categories. The average relative saving per Partner for the whole GreenLight Programme is 35.99% compared to the level of energy use before implementing energy saving measures. This might seem too low at first sight: in the case of Airports, Public Buildings, Car Parks, Hospitals, Hotels/Restaurants and the category "Other" the average savings per Partner are well above 35.99%. Table 5.2 shows the dataset for calculating the relative savings per Partner in the different categories which helps in understanding the weighting.

Table 5.2. Availability of data for calculation of relative savings per Partner per category

		number of Partners	compared to all Partners (%)	number of Partners	savings (MWh/year)	compared to all Partners (%)	savings (MWh/year)
A	Airport	4	100%	4	5 218	100%	5 218
C	City, municipality: public building	41	41%	99	13 440	43%	31 200
CP	Car park	2	67%	3	213	60%	353
E	Education: School / University	32	74%	43	5 100	98%	5 188
HP	Hospital	3	50%	6	298	13%	2 246
HR	Hotel / Restaurant	16	48%	33	2 222	12%	18 509
O	Other	1	10%	10	9	35%	27
OS	Street lighting (open space)	58	47%	123	34 423	76%	45 569
P	Production	52	70%	74	23 151	74%	31 278
PT	Public Transport: railway/metro stations	4	67%	6	6 097	91%	6 710
R	Retail: Super Market / Commercial centre	21	43%	49	5 142	7%	74 213
S	Services: Bank / Insurance / etc.	33	70%	47	14 613	94%	15 535
UT	Utility provider/ Telecommunications	10	45%	22	2 526	51%	4 987
Total		277	53%	519	112 454	47%	241 032

Table 5.2 shows that there were four Partners in the category Airports, two in Car Parks, 3 in Hospitals and one single Partner in the category "Other" with sufficient data for calculating the relative savings per Partner. In fact, even if "Other" represents a very high relative saving, given that it is the saving of one Partner, no relevant conclusions can be drawn from its value. There were 16 Partners in the category Hotels/Restaurants with sufficient data for the calculation of the relative savings, representing 12% of the category's total savings. Partners in the category Airports are 100% represented. However, not only the representation of savings but also the absolute value of such savings shall be considered. In the end, the impact of the aforementioned categories on the average relative savings per Partner (35.99%) is rather small.

It is important to see that categories with a high number of Partners and high total savings had the strongest impact on the value of the average relative savings per Partner (35.99%). Such categories were Street Lighting and Production in the first place. Data for Street Lighting is available for about 50% of the Partners, while in Production for 70% of the Partners. Both in Street Lighting and in Production data covers roughly 50 Partners and around 75% of the savings within the respective category. This is more than 30 GWh/year in each of these categories.

Data available covers around 50% of the Partners and their savings for the total GreenLight Programme.

After "Other", the highest relative savings per Partner were reported by Partners who upgraded hospitals and car parks. It shall be emphasized that the number of such projects is small. Therefore the samples are not considered big enough to draw any relevant conclusions regarding the whole GreenLight Programme – just like in the case of "Other".

The relative savings per Partner are 55% in the category Public Buildings. Twelve of the 41 Partners for which data is available for the calculation in this category reported savings above 60%. As Figure 5.9 suggests, these projects did not result in very high average savings. However, this number is not reflecting well the average savings per Partner: the city of Hamburg alone saved more than 10 GWh/year by the end of 2008 which obviously pulls up the average. Not considering Hamburg's

savings in the calculation, one Partner's average saving results 428 MWh/year. Going even one step further, and not considering the savings of the city of Zürich (4.9 GWh/year), one Partner's average savings equal 334 MWh/year. If we compare this with the average saving of a Partner coming from the category Utilities/Telecommunications, where most of the upgrades were focused on the modernization of office buildings, it may be assumed that this number (334 MWh/year) appears to be a more reliable source for cross-comparison of average savings per Partner.

As for Airports, the relative savings for one Partner are 55%. The absolute savings are 1.3 GWh/year. Airports are usually big complexes that have a big surface area which needs to be illuminated, often also during night, as opposed to e.g. offices. So their absolute savings were expected to be high.

The relative savings of Hotels/Restaurants per Partner are 53%. Data for the calculation of the relative savings is available for about 50% of all the Partners in this category. From this, about 60% of the Partners saved more than 60% on energy consumption, which explains the high relative value per Partner. These high relative savings were due to the technological changes: most of them changed incandescent lamps to fluorescent lamps, or halogen. Except for one, they all come from the New Member States. The average savings of 881 MWh/year show a high value as well. Partners with high savings cause a deviation in this value. In the case of Hotels/Restaurants Holland Casino Breda saved 9.5 GWh/year, while McDonald's Europe saved more than 6 GWh/year. Excluding these two Partners' savings from the calculation, the resulting average saving per Partner is only 152 MWh/year.

The relative savings of one Partner from the category Educational Buildings are 43% on average. The average savings per Partner are 148 MWh/year. Almost 80% of all reporting Partners in this category achieved savings below 150 MWh/year.

In the category Utilities/Telecommunications relative savings are 42% per Partner. 40% of the Partners with sufficient data for the calculation of relative savings in this category had savings above 60%. They changed incandescent light bulbs to compact fluorescent lamps (CFL) or T8 to T5. As already mentioned before, their projects were focused on the modernization of office buildings. The average savings per Partner are 356 MWh/year.

Savings per Partner per category

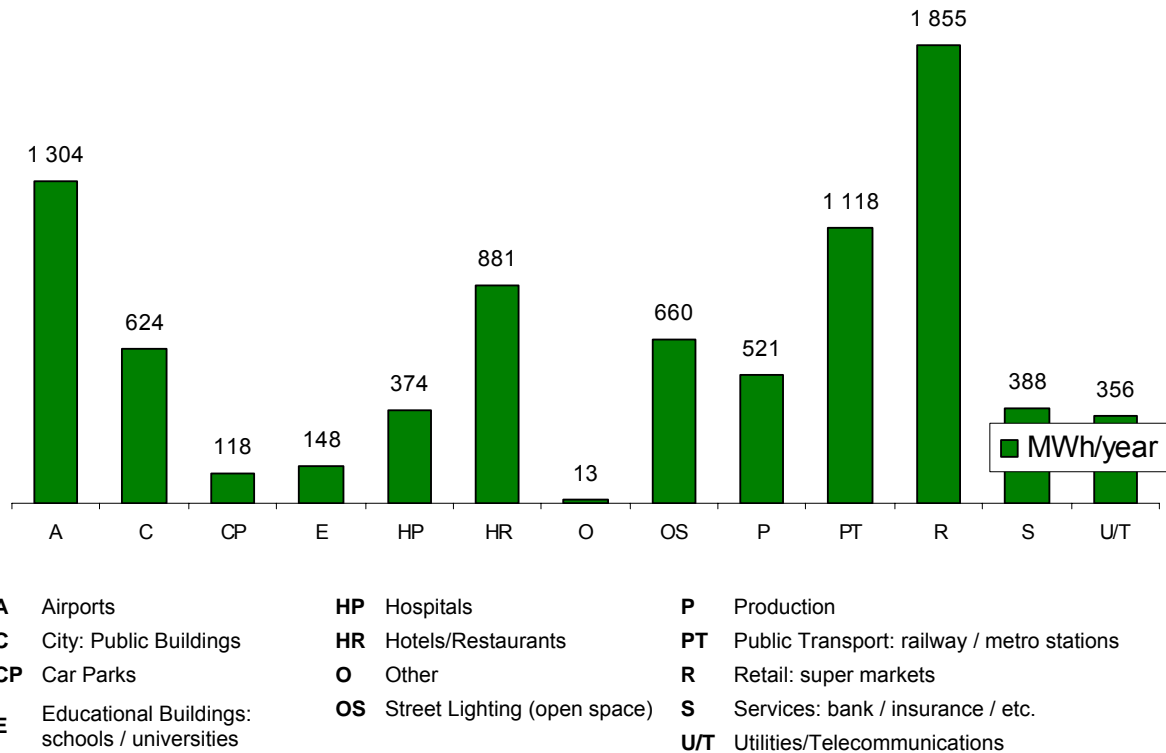


Figure 5.9. Average energy savings for one Partner per category

The highest average savings were achieved in Retail (see Figure 5.9). As already referred to in section 5.2.1 (Total energy savings), there are a few big retailers who reported very high savings (Carrefour Italia, Coop in Italy, Distribution Casino France). Again, they saved altogether about 62 GWh/year. Not considering their contribution in the calculation, the average saving per Partner would be 467 MWh/year. This figure seems to be reliable for cross-comparisons, especially if we compare it to the corrected saving of Public Buildings per Partner which is 334 MWh/year. The reasoning is that in the shops lights are usually on for the entire period of the opening hours which are generally longer than the working hours, so that consumers can do their shopping before or after work. Plus, high lighting levels are also required for a good product visibility. Therefore, it can be assumed that stores use more energy for lighting hence they save more in absolute figures. The relative savings are 38% per Partner on average.

Partners in Public Transport saved 1.3 MWh per annum. This high value can be explained by two factors. Like Airports, companies in Public Transport have generally a big surface which needs to be illuminated. However, this is different in the sense that an airport is rather one big conglomerate while for example an underground line consists of a number of smaller stations. Still, if we add them up, this results in a high surface area. Another factor is that lighting is needed often during night as well, or in the case of an underground metro station also during the whole day. Showing some similarities, it is not surprising that Partners from Public Transport closely follow Partners from Airports as for annual savings per Partner.

The relative savings per Partner in Services are 34%, while the average savings are 388 MWh/year. Partners involved in Services upgraded mostly their office spaces, similarly to Partners from Utilities/Telecommunications and Public Buildings. The average savings per Partner in the category Utilities/Telecommunications are close to the average in Services, as well as the corrected average savings in Public Buildings (334 MWh/year). It can be concluded that for projects aiming to upgrade office spaces, the average savings per Partner are around 350 MWh/year.

One Partner in Production saved 34% on energy use on average, compared to the state before implementing the efficiency project. The average savings per Partner correspond to 521 MWh/year. Taking into account that eight Partners reported savings equal to or above 1 GWh/year, moreover,

one Partner saved almost 8 GWh/year, this value seems a little low. However, 35 Partners reported savings equal to or below 200 MWh/year which has a stronger effect on the average savings.

The relative savings per Partner for Street Lighting are 32%. The average savings per Partner equal 660 MWh/year. Both values are around the GreenLight Programme average. Fifteen Partners reported savings exceeding 1 GWh/year. The average of these Partners' relative savings is 34%. Thirty-nine Partners reported savings below 300 MWh/year.

The relative savings in Public Transport are the lowest with 26%. One of the four reporting companies in this category, Metrorex s.a., saved less than 25% on its energy consumption, while the other three saved above 45%. However, since Metrorex reported huge savings (5.1 GWh/year) there did not remain much room for the other Partners to influence the value of the relative savings per Partner.

The average saving for one Partner across all categories is 689 MWh/year, the same as across countries.

5.3. Role of National Contact Points and Endorsers

The National Contact Points²² have a very important role in the management of the GreenLight Programme.

Firstly, communication with the applicant/Partner is much easier through the National Contact Point. Active National Contact Points submit regularly Partner applications to the Joint Research Centre and assist the applicant through the application process. The National Contact Point establishes direct contact with the Partner or the applicant – in this case already prior to the application. The nature of this relationship makes the National Contact Point more effective when it comes to asking for missing/additional information from the applicant/Partner. To give an example, 90 Partners from the New Member States who joined the GreenLight Programme under New GreenLight between 2006-2008 were all assisted by the National Contact Points of their countries. Data on energy savings is not missing for any of these Partners.

It shall be added, that at present, potential GreenLight Partners can apply and join the GreenLight Programme without having to report on their savings at the same time²³. If acceptance in the GreenLight Programme was tied to submitting savings data together with the application, efforts made for requiring missing data could be minimised.

The operation of the National Contact Point is also efficient because it is coupled with the absence of language barriers: the National Contact Point and the applicant share the same mother tongue and are based in the same country. Due to this, the respond rate of Partners to a request coming through a National Contact Point rather than directly from the Joint Research Centre can be higher, even if the Partner's application was not assisted by the National Contact Point.

Secondly, the preparatory work of the National Contact Point accelerates the application process, as the necessary documents are already collected in most cases, plus any further enquiries can be communicated through the National Contact Point. This relieves the main GreenLight Programme administration (Joint Research Centre). Another strength of the National Contact Point is that its resources can be better focused, as it is operating in one country only as opposed to the main GreenLight Programme administration who deals with applicants/Partners from all the participating countries.

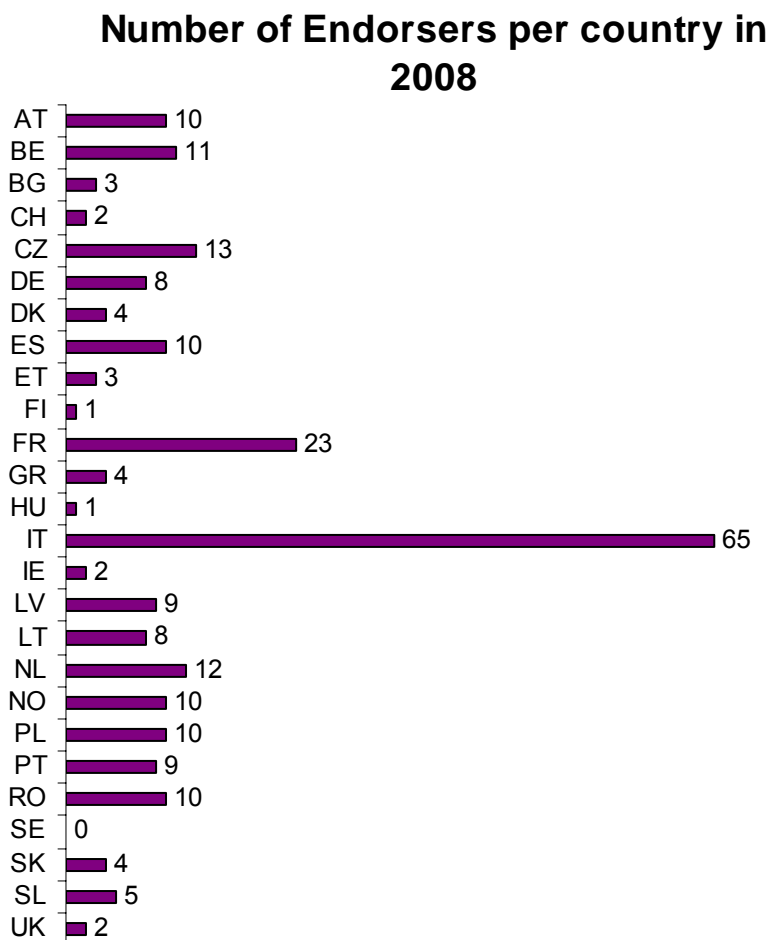
It shall be added, that some National Contact Points (e.g. from Austria, Germany or the Czech Republic²⁴) are very active, while others are less committed. Naturally, the active National Contact Points are the ones on which the main programme administration can rely on the most.

²² The List of National Contact Points can be found in the Annex.

²³ They have three months to report on the savings from their acceptance into the GreenLight Programme.

²⁴ The Czech National Contact Point SEVEN was very active from 2006-2008 as it was managing the New GreenLight, serving as a main co-ordinator between the Joint Research Centre and other National Contact Points participating in New GreenLight. Since that its activities declined.

Similarly to the National Contact Points, there are some Endorsers in the GreenLight Programme who are recruiting many new Partners, while there are others who have not brought any new Partner.



It shall be emphasised that it is not the number of Endorsers within a country what is important, but their commitment. For example, there are only 11 Endorsers in Belgium, but 68 Partners (see Figure 5.10). The Czech Republic counts 13 Endorsers and 12 Partners. Estonia has three Endorsers, but only one Partner (who joined the GreenLight Programme in 2009).

Italy has the highest number of Partners and Endorsers, but a big part of these, 48 Partners were collected by two very active Endorsers (Merchantfin and ESCO NET). These Partners are all municipalities active in Street Lighting.

Figure 5.10. Number of Endorsers per country in 2008

Endorsers are not only focused on the country where they are based. A good example is ETAP Lighting. ETAP Lighting is based in Belgium. It brought 37 Partners to the GreenLight Programme, primarily outside of Belgium. In particular, ETAP Lighting brought 17 Partners from France, 9 from Spain, 6 from Belgium, 3 from the Netherlands and 2 from Germany through its local teams.

It can be concluded, that the number of Partners within a country does not depend on the number of Endorsers present in that country. In the end, it is always up to the activities of the individual Endorsers how many Partners they assist - from which country - in becoming a GreenLight Partner.

It is interesting to investigate what kind of projects and from which sectors were brought to the GreenLight Programme by National Contact Points and Endorsers.

The National Contact Points are legal entities, mostly non-profit, supporting or complementing the state's activities in the area of energy and/or energy efficiency. They can be (partially) state-owned or (partially) state-subsidised. Some of them are private organisations or Energy Service Companies ("ESCOs").

To give an example, the Austrian National Contact Point (Österreichische Energieagentur) is a non-profit scientific society providing scientific support to the federal and provincial governments in shaping the energy policy [ENA2009]. Through its activities, it is in contact with other, small or large public entities, such as cities or municipalities. It brought 7 Partners to the GreenLight Programme, all of them from the public sector. Five of these Partners did street lighting upgrades. The German

Berliner Energieagentur is a private, thus profit-oriented ESCO, who is partially state-owned. It brought four Partners to the GreenLight Programme, all of them from the public sector.

National Contact Points in the New Member States assisted both private and public Partners. There are some country-specific features, for example the Bulgarian National Contact Point assisted only public Partners in Street Lighting. Also in Romania the majority of the assisted Partners are public, from Street Lighting and Public Buildings. In Slovenia, however, all the Partners are private, from Production. This might be related to the fact that the Slovenian National Contact Point is a research institute, closely collaborating with the industry [IJS2009].

As for Endorsers, the composition of Partners brought by them is strongly linked to their area of activities, like in the case of National Contact Points. Endorsers are meeting potential Partners through the course of their business too.

At present, there are ten main Endorsers²⁵ in the GreenLight Programme. These are: Diputación Provincial de Valencia, ENCON Ingenieursbureau, ETAP Group Companies in Europe, Eurolux AG, FINES N.V., Infrac CVBA, INRES s.c., Merchantfin srl, SATEL srl and OPUS Light.

ETAP Lighting is active in the professional lighting of offices, factories, schools, hospitals and hotels [ETP2009]. 28 from the 37 Partners ETAP Lighting assisted in becoming a GreenLight Partner came from the private sector: 11 of them are involved in Production, 10 in Services.

Fines, a Belgian ESCO, is working with customers from both the public and private sectors [FIN2009]. Fines brought 19 Partners from the public sector and 16 Partners from the private sector to the GreenLight Programme. The majority of the public Partners implemented public building upgrades. The private Partners come from different categories, most of them from Production.

Two Italian ESCOs, Merchantfin and ESCO NET collected 48 Partners from the public sector. ESCO NET is offering its services principally to Italian municipalities [ESN2009]. A third ESCO, Reverberi Enetec srl brought four Partners to the GreenLight Programme, three of them from the public sector and one being the airport of Bologna. Reverberi Enetec srl provides assistance in public lighting control [REV2009].

INRES s.c. is managing the shops of the Italian retail chain Coop. This means in terms of the GreenLight Programme, that INRES has modernised the lighting system in about 200 shops of the retail chain just between 2005 and 2008. They have been reporting continuously to the GreenLight Programme management on the lighting efficiency projects implemented.

Eurolux AG, a German Endorser is providing assistance in the modernisation of the lighting system for municipalities, hospitals and industry. [EUX2009] The Endorser brought 8 new German Partners to the GreenLight Programme: three from Production, three from the category Educational Buildings and two from Public Buildings.

The above may suggest that also in the case of Endorsers, there is no clear trend for bringing Partners from one specific sector. The scope of their activities determines what kind of Partner and project they bring to the GreenLight Programme. The same is valid for National Contact Points. To conclude, National Contact Points and Endorsers bring Partners to the GreenLight Programme through their general course of business, which might be from the public or the private sector.

²⁵ According to the Endorsers Guidelines of the GreenLight Programme, "Endorsers that enrol at least ten potential Partners in the GreenLight Programme are designated as 'Main Endorsers'." The Partners and Endorsers Guidelines are available at www.eu-greenlight.org.

6. Results – Changes in technology

6.1. Introduction

The lighting data from the GreenLight Programme from 2000 to 2008 has been examined as a part of this report. The composition of types and quantities of the lighting technologies has changed in the GreenLight Partner projects over this time period. In general the GreenLight Programme has expanded in terms of the total number of participating Partners, the types of technologies implemented, the amount of energy savings per Partner, and the total reduction of energy consumption in the participating countries.

6.2. Scope of the analysis

The technical analysis of the reported data from GreenLight Programme Partners was done in three parts;

- i. an evaluation of private sector and public sector project performance,
- ii. a review of the lighting technologies and applications, and
- iii. a categorical analysis of the types of lighting conversions made by the Partners.

The analysis uses the best available data within the overall programme (see Table 6.1). However, not all Partners were able to report on technological changes so only those Partners that were able to report are included in this technical analysis.

Table 6.1. Availability of technology data for the technical analysis

Acronym	Branch	Partners with available data		All Partners		Partners with available data		All Partners	
		number of Partners	compared to all Partners (%)	number of Partners	savings (MWh/year)	compared to all Partners (%)	savings (MWh/year)		
A	Airports	3	75%	4	5 003	96%	5 218		
C	City: Public Building	32	32%	99	11 422	37%	31 200		
CP	Car Park	-	-	3	-	-	353		
E	Education: School	19	44%	43	1 638	32%	5 188		
HP	Hospitals	-	-	6	-	-	2 246		
HR	Hotels / Restaurants	15	45%	33	17 582	95%	18 509		
O	Other	1	10%	10	9	35%	27		
OS	Street lighting	56	46%	123	34 205	75%	45 569		
P	Production	41	55%	74	19 029	61%	31 278		
PT	Public Transport	5	83%	6	6 577	98%	6 710		
R	Retail	27	55%	49	34 117	46%	74 213		
S	Services: Bank / etc.	24	51%	47	8 674	56%	15 535		
U/T	Utilities / Telecommunications	7	32%	22	2 261	45%	4 987		
Total		230	44%	519	140 517	58%	241 032		

Those Partners who were able to report comprise two main subgroups; those who provided data on their energy savings and another subgroup of Partners who provided data on the technological changes. Generally there is a strong correlation between these two subgroups; energy savings and technological changes, but there are Partners who provided data on energy savings but not on the technological changes and vice versa. For the technical analysis the correlation between the two subgroups is sufficient because most of the 230 Partners who provided data on the technological changes also reported on their energy savings (97% of this group reported energy savings).

Regarding Partners reporting within the categories, there are four categories where the representation of Partners reporting technology data is below 40% of the total Partners reporting on energy savings. These are: Public Buildings, Other, Retail and Utilities/Telecommunications.

Of the 519 Partners in the GreenLight Programme, 350 Partners reported energy savings. This leaves 169 Partners in the GreenLight Programme with no adequate data on savings. It is possible that there are significant savings not being reported; however, this does not appear to be likely. In any case, those Partners who were not able to report savings do not significantly impact this analysis because the GreenLight Programme is presumably a snapshot of all of the lighting retrofits in the participating countries; so the main concern is that samples used are representative of the larger industry. For the technical analysis, the number of Partners reporting on technology (230) is 63% to the total number of Partners reporting on energy savings (350). This analysis focuses on well defined trends, therefore this sample size is considered to be sufficient. This section of the report assesses explicitly the 230 Partners for which data on technology is available.

Ratio comparisons of the total Partners per category and Partners reporting technical data were performed and a strong match between the demographic makeup of these data sets was found, giving confidence that any variation between the reported data and the overall programme performance is small. Note that parties interested in extrapolating from the results presented in this report, should do so cautiously because the data used is a sample of the larger population. Additionally, much of the data is self-reported (thus reported by the Partners themselves) so it may include some reporting error (see also section 4. Methods). Note that data which was mislabelled or contained typos was corrected to enable appropriate comparisons. If it was possible to properly attribute the energy savings to technology changes, this was done to preserve the sample size instead of excluding partially incomplete data.

The technical analysis used in this report is principally based on percentage ratios of categories of lighting conversions, which provides a robust comparison of these categories even with small amounts of reporting error. The categories of lighting changes assessed in this report are:

- I. Lamp changes:
 - Incandescent lamps to fluorescent lamps changes
 - Incandescent lamps to other lamps changes
 - Incandescent lamps to incandescent lamps changes
 - Fluorescent lamps to fluorescent lamps changes
 - Other lamps to fluorescent lamp changes
 - Other lamps to other lamps changes
- II. Ballast type changes
- III. Luminaires changes
- IV. Lighting control upgrades

6.3. Results

6.3.1. Investments by public and private sector Partners

Within the reported data, the mix of Partners from the public sector and Partners from the private sector is 51% (112) to 49% (118) respectively. In terms of energy savings, the private sector generated about 62% of the reported technology energy savings. Using a simple ratio comparison between the public sector and private sector Partners this shows that the average energy savings for private sector Partners is approximately 53% more than the energy savings for public sector Partners. This is a significant difference and indicates the affect that several of the large private sector Partners have on the results of the Programme. However, this simple ratio hides much complexity in the types of retrofits, the amount of energy savings achieved, and the expected payback per project. The lighting retrofits from public sector Partners is heavily made up of outdoor lighting upgrades. Indeed, 100% of the efficiency upgrades of outdoor mercury vapour lamps and over 90% of the efficiency upgrades of outdoor incandescent lamps reported to the GreenLight Programme were made by public sector Partners. These types of outdoor lighting applications have long and stable periods of operation that enable the public sector Partners to use a longer investment period with the confidence that the project will have a positive cash flow. Figure 6.1, below, depicts the percentage of public sector participation in each of the lighting retrofit categories in the GreenLight Programme. In the case of other lamps to other lamp retrofits, the public sector represented about 82% of the total Partners

performing this change, and achieved approximately 73% of the total energy savings attributed to this retrofit change. This weighting towards the public sector for other lamps to other lamps retrofits is because this type of change includes significant amounts of outdoor public area lighting.

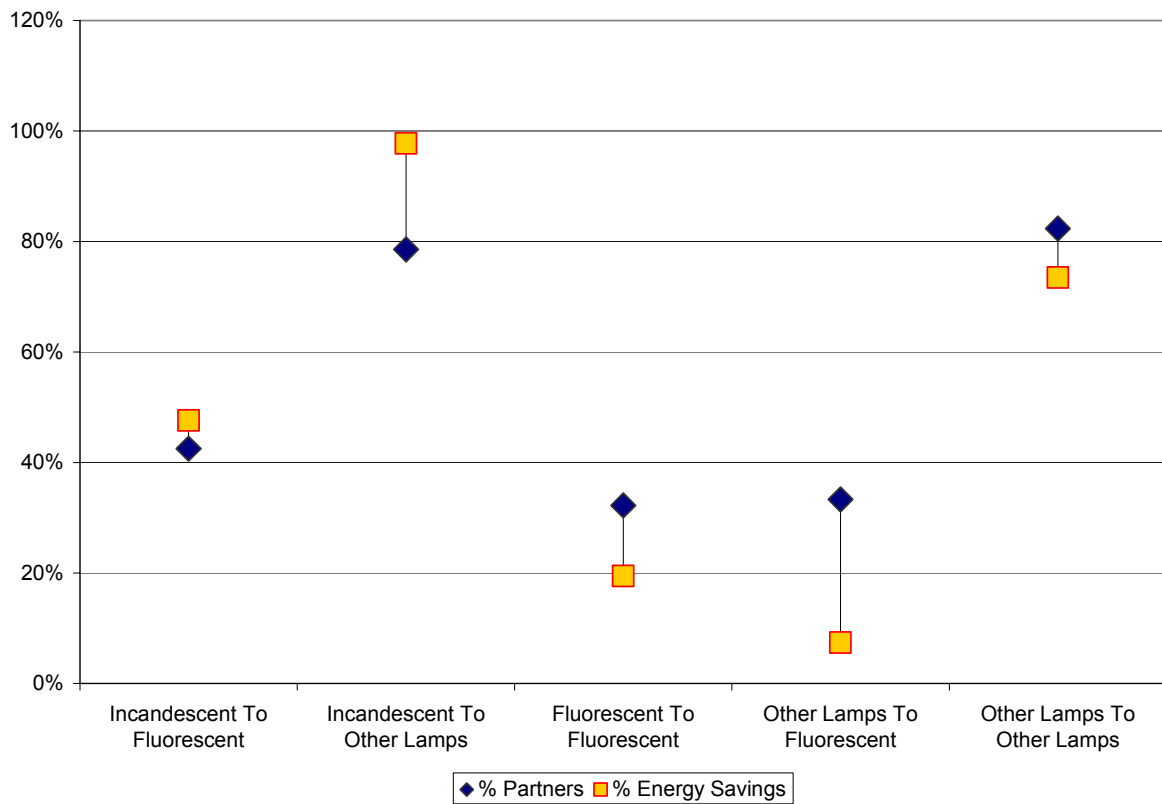
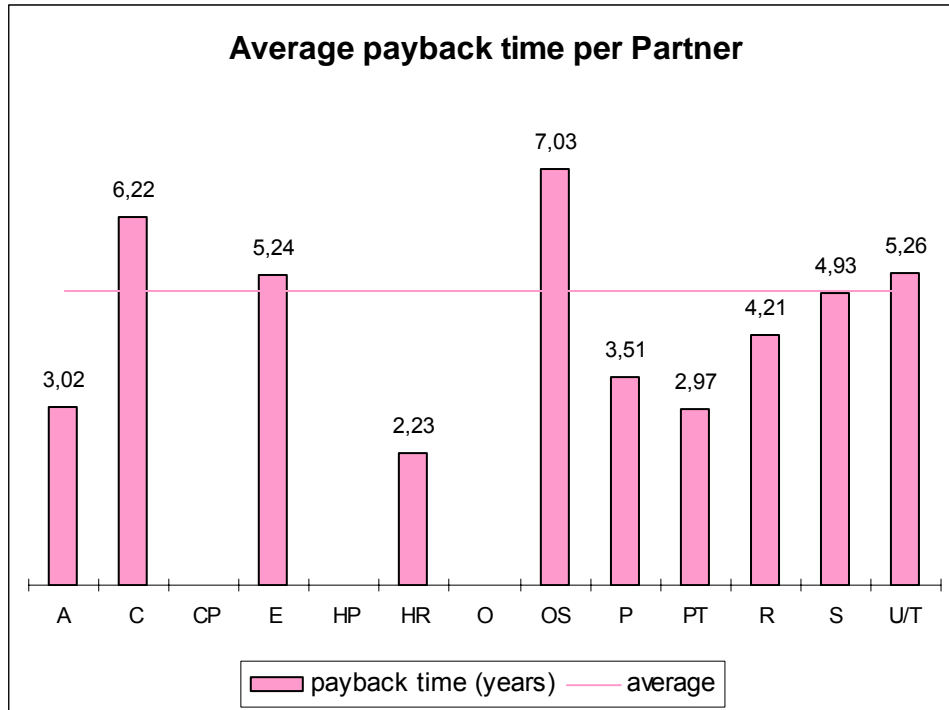


Figure 6.1. Percentage of public sector participation by type of lighting retrofit

There is a difference in the investment requirements between Partners from the public sector and Partners from the private sector, too. Private sector Partners normally require a higher rate of return on their investment in energy efficiency than do public sector Partners. The reported projects for private sector Partners averaged about 3.9 years of simple payback²⁶, with a maximum of 15 years of simple payback. The public sector Partners reported an average of 6.3 years of simple payback for investment return, with a maximum of 23 years of simple payback. Figure 6.2 shows well the longer payback of the public sector. Street lighting upgrades and projects aimed at upgrading Public Buildings require the longest payback. The GreenLight Programme average is 4.97 years.

²⁶ See the Annex of this report for the calculation of simple payback.



- | | | |
|--|--|--|
| A Airports | HP Hospitals | P Production |
| C City: Public Buildings | HR Hotels/Restaurants | PT Public Transport: railway / metro stations |
| CP Car Parks | O Other | R Retail: super markets |
| E Educational Buildings: schools / universities | OS Street Lighting (open space) | S Services: bank / insurance / etc. |
| | | U/T Utilities/Telecommunications |

Figure 6.2. Average payback time per Partner per category

As the subgroup does not include Partners from Car Parks and Hospitals, and there is no payback data available in for “Other”, no value appears in the respective categories on the figure.

The longer paybacks of the public sector Partners mean that the public sector has invested more in energy efficient lighting technology than the private sector. In contrast the private sector has implemented more different lighting technologies per project (295 different types of conversion in the private sector to 243 different types in the public sector), but generally with a lower level of investment per project. These results roughly match the investment in the overall GreenLight Programme, so it is likely this sample applies across the energy efficiency industry. Figure 6.3, below, shows the differences between public sector and private sector Partners in regard to the average simple payback required in years, categorized by the type of lighting retrofit.

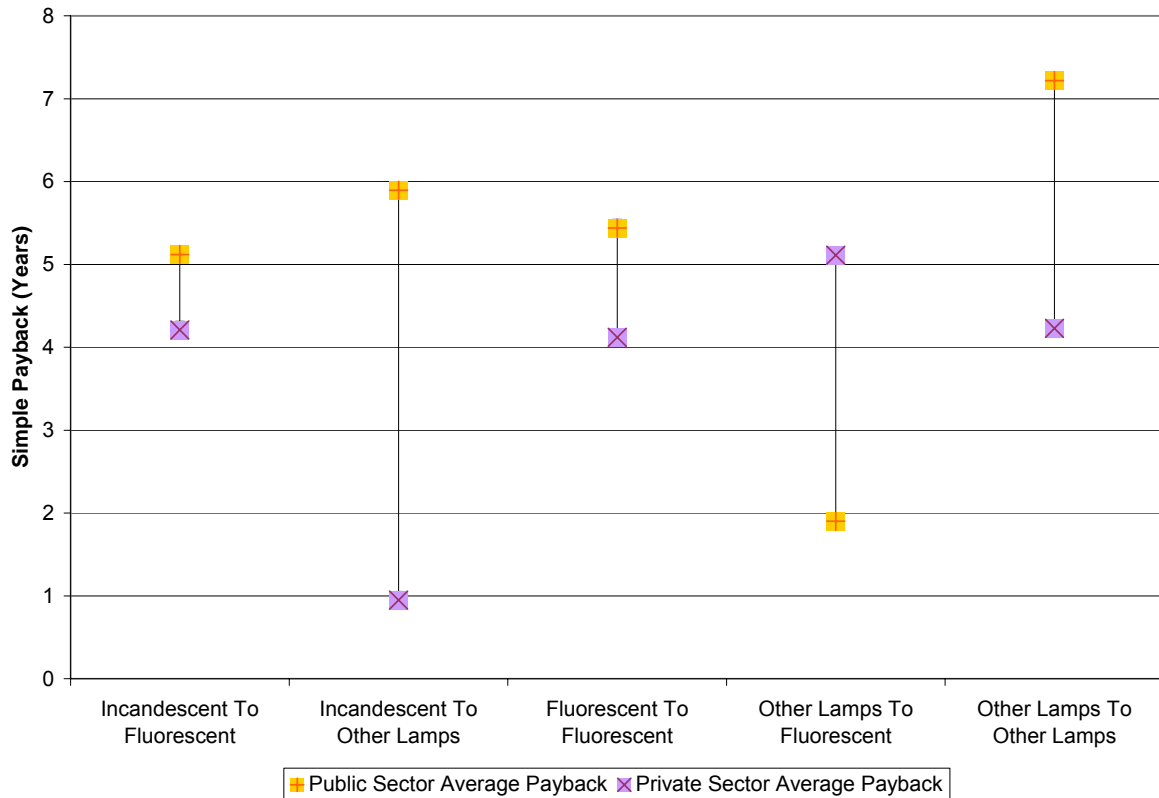


Figure 6.3. Average payback (in years) by sector and lighting retrofit type

Does this mean that the private sector is investing less, or is perhaps investing more efficiently? This is difficult to determine within the GreenLight Programme for two reasons. First, the time period, 2000 to 2008, is too short to allow the examination of repeated investments. If the private sector was making more repeated investments over time by reinvesting in more energy efficient lighting as the life of the previous lighting investment came to an end, then the differences in investment levels between the public and private sector may not be as significant. Second, the categories of lighting technology are significantly different between the lighting types upgraded by the public sector and those upgraded mostly by the private sector (e.g., the public sector has upgraded much more outdoor lighting). The lighting upgraded that is attributable to the public sector may intrinsically have a longer payback for the same investment so direct comparisons between the private and public sector investments should be made cautiously.

Clearly the private sector does make smaller and more numerous investments in energy efficient lighting technology; from which we can infer that the project's initial cost is an important investment constraint. The private sector has more flexibility on the type of contractual method it can use to implement the investment, such as using in-house maintenance staff or an on-demand lighting contractor or ESCO. This flexibility likely yields a broader range of project scopes, such as small projects for one or two office spaces up to the complete renovation of the facility. Smaller projects do not lend themselves to the easy measurement of the energy savings, so although the energy savings may be real, the difficulty in identifying, measuring, and reporting these energy savings tends to limit the participation of these small projects in the GreenLight Programme.

6.3.2. Lighting technologies

The lighting technologies used in the GreenLight Partner projects have undergone a slow transition over the last eight years, from less efficient incandescent lamps, magnetically ballasted fluorescent lamps, and mercury vapour lamps to more efficient electronic fluorescent lamps and compact fluorescent lamps. Notably in regard to fluorescent lamps, the reduction in the size of the lamp has reduced the amount of energy needed to provide the same quantity of lighting. The use of electronically induced ballasts to charge the fluorescent lamps instead of magnetically induced ballasts, has not only reduced the amount of energy consumed per fixture, the electronic technology

has improved the quality of the lighting. Not all retrofit projects entailed the replacement of lamps and fixtures. In some cases, lighting control was implemented to turn lights on and off with a schedule, with some type of occupancy linking technology (e.g., motion sensors), or by using photosensors to dim lights in response to ambient daylight.

In terms of changing from existing lamp types that have had the most significant impact on the overall GreenLight Programme energy savings, the most important changes to existing lamps are:

- retrofits of existing incandescents comprised approximately 12.3% of the lamp and lighting control energy savings,
- retrofits of existing fluorescents were about 21.6% of the lamp and lighting control energy savings,
- retrofits of existing other lamp types, most notably mercury vapour lamps, were about 48.5% of the lamp and lighting control energy savings.

Lighting controls provided an additional source of energy savings, where approximately 21% of the energy savings of lighting controls was due to time scheduling the use of the lights, about 24% was due to dimming or turning off lights in response to daylight, and approximately 10% was from linking lighting levels to the occupancy of the spaces (see 6.3.6 Lighting controls). The chart below shows the installations of the respective categories of lights over the 2000 to 2008 time period. Partners were required to report only about lighting types and quantities pertinent to their retrofit projects so it is not possible to ascertain the actual mix of lamp types in the entire facility or facilities managed by each Partner; though it is reasonable to assume that the energy savings roughly mirror the most significant sources of energy consumption.

**Energy Savings by Category
2000 to 2008**

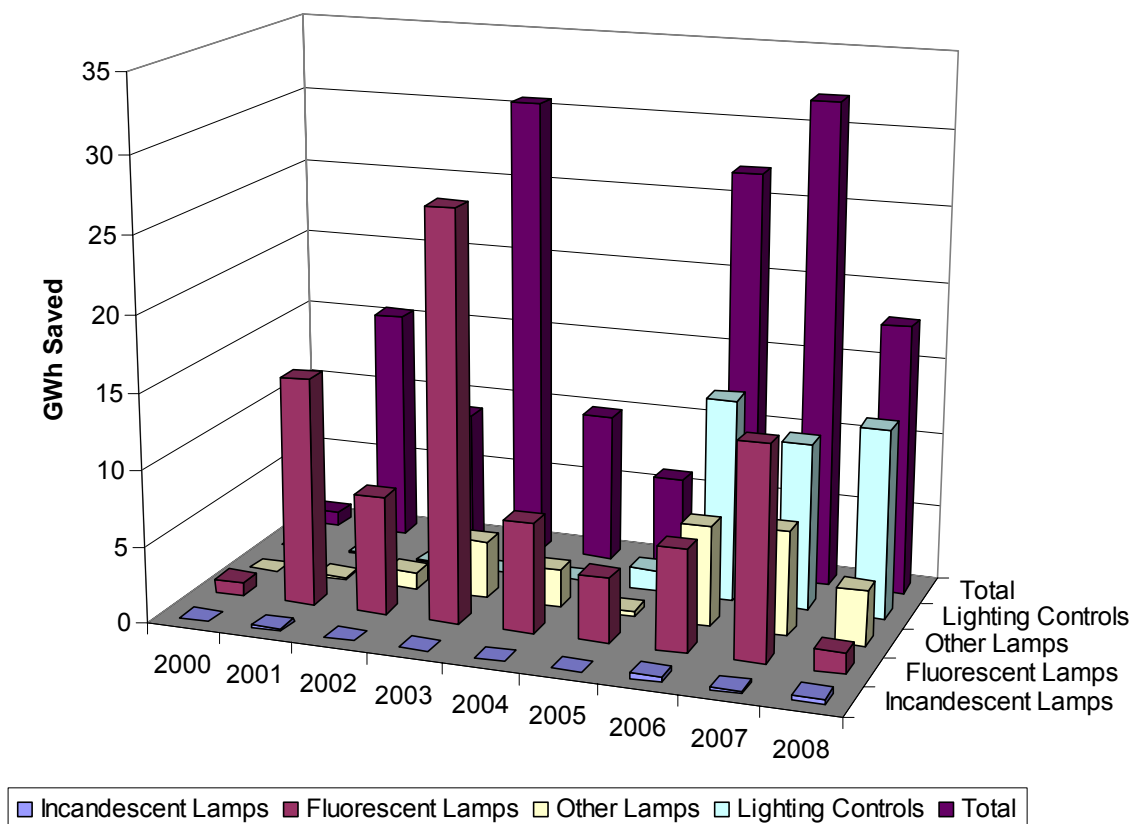


Figure 6.4. Energy savings by lighting retrofit for the period 2000 to 2008.

6.3.3. Lighting applications

Based on the reported lighting types from the Partners, approximately 20.4% of the energy savings came from the application of new lighting technologies to exterior lighting, such as lighting for streets, pedestrian zones, parks, and parking areas. Most of these upgrades, about 80%, consisted of retrofitting mercury vapour lamps to higher efficiency lamps, such as high pressure sodium lamps. Approximately 18% of the mercury vapour lamp retrofits changed from high pressure vapour lamps to fluorescent lamps. It is too early to determine whether the retrofits from high pressure vapour lamps to fluorescent lamps are a trend or just a response to special case lighting. High pressure sodium lamps are very efficient, 30% to 50% more than fluorescent lamps, but have greater lumen depreciation than fluorescent lamps. Fluorescent lighting typically provides more directed lighting (downward) to minimize nighttime light pollution and provides better colour rendering; however, fluorescent lamps are more sensitive to cold temperatures. At this time the cost per lumen over the life of the lamp favours the installation of high pressure sodium lamps. The technology improvements of fluorescent lamps have been increasing at a greater rate than high pressure sodium lamps in terms of lamp output per Watt, so there is the potential that the technological features and economics of future fluorescent lamps may shift the selection decision toward adopting fluorescent lighting for outdoor applications.

For interior lighting, four categories of the private sector comprise approximately 57% of the GreenLight Programme lighting retrofits in terms of energy savings. These categories are Production at 13,5%, Hotels/Restaurants 12,5%, Retail at 24%, and Services at 6%. The remaining private categories comprise approximately 5,5% of the total lighting retrofits. Within the four categories noted above, three types of lighting changes make up 72% of the interior lighting upgrades and about 55% of the total GreenLight Programme energy savings. The three types of lighting changes are; T8 lamps to T5 lamps retrofits of fluorescent lighting providing 28% of the interior lighting energy savings, mercury vapour lamps to T5 fluorescent lamps retrofits providing 25% of the interior lighting energy savings, and mercury vapour lamps to metal halide lamps providing 19% of the interior lighting energy savings. These main applications of lighting changes are depicted in the chart below over the 2000 to 2008 time period. High pressure sodium is rarely used in interior spaces because of its poor colour rendering, so although outdoor lighting changes are overwhelming lighting changes to install new high pressure sodium lamps, for interior spaces that have high bay lighting, the lighting designer will normally specify the use of metal halide or fluorescent lamps, not high pressure sodium lamps. LED lighting appears to be a lighting technology of great potential due to its good colour rendering, lamp efficiency, flexibility in design, long lamp life, and robust on/off cycling capability; however, the uptake of the LED technology has been limited within the GreenLight Programme at this point. Future implementations of LED lighting are expected and because high levels of energy savings are likely; this type of lighting is expected to be a significant category of future lighting retrofits.

Main Types of Lighting Changes 2000 to 2008

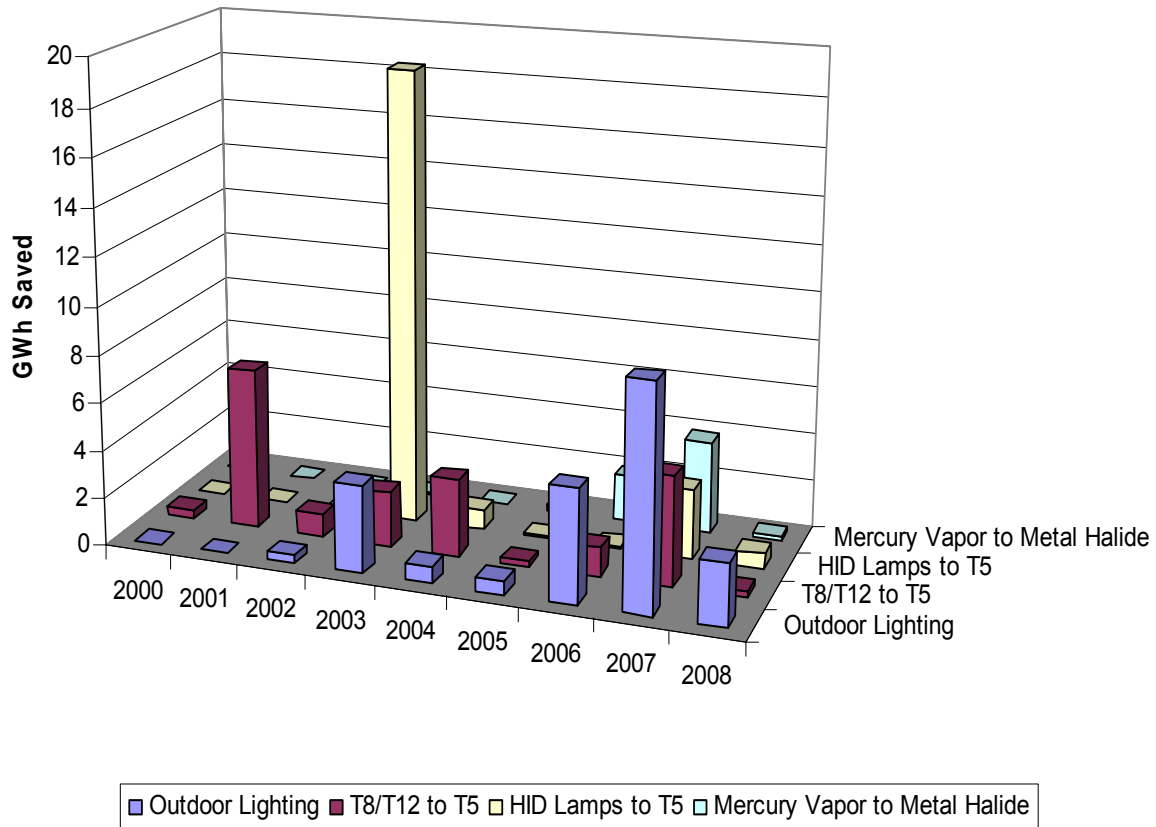


Figure 6.5. Main types of lighting changes for the period 2000 to 2008.

6.3.4. Changes in lamps

Table 6.2 below summarises the energy saving and Partner percentages per lamp type retrofit. The energy savings percentages sum to 100% of the total available energy savings reported by the Partners performing the lighting retrofits. However, some Partners performed multiple types of retrofits so the number of Partners will total more than the number of Partners who reported technology changes.

Table 6.2. Lamp changes summary

Retrofit category	Partners	Energy savings, % category	Energy savings kWh, category
Incandescent to incandescent	13	0,8%	1 124 140
Incandescent to fluorescent conversion	33	4,0%	5 620 690
Incandescent to other conversion	7	7,5%	10 538 800
Fluorescent to fluorescent	109	21,6%	30 351 730
Other to fluorescent conversion	33	28,3%	39 766 390
Other lamps to other lamps	58	20,2%	28 384 490
Lighting Controls	81	17,6%	24 731 040
Total		100,0%	140 517 280

Incandescent to incandescent retrofits

For incandescent to incandescent retrofits, 13 Partners reported this type of lamp conversion. Approximately 12,3% of the baseline lamps within the total reported technology energy savings in the GreenLight Programme during the 2000 – 2008 time period were incandescent lamps. However, for the segment of incandescent to incandescent retrofits that replaced existing incandescent lamps with new incandescent lamps, this segment is under 1% of the total energy savings for GreenLight Programme (the remaining 11.5% of the incandescent retrofits converted the incandescent lamps to fluorescent or other lamp types). The incandescent to incandescent type of lamp retrofit is normally not allowed within the GreenLight Programme unless there is a reduction in the number of fixtures or a reduction in lamp power. There were 4 categories of incandescent to incandescent lighting changes: halogen to halogen lamps, incandescent to halogen lamps, incandescent to incandescent lamps, and other incandescent lamps. Table 6.3, Incandescent to incandescent lighting changes, below, show the percent change values by category.

Table 6.3. Incandescent to incandescent lighting changes

Lamp change category	Partners, % category	Energy savings, % category	Energy savings kWh, category
Halogen to halogen	50,0%	47,9%	499 719
Incandescent to halogen	18,8%	28,2%	294 030
Incandescent to incandescent	25,0%	20,1%	209 633
Other	6,3%	3,8%	39 373

Although there has been considerable encouragement to move away from the use of incandescent lamps because they are not as energy efficient as other types of lamps, there are still applications where the colour rendition and lighting quality provided by incandescent lamps is paramount to the lighting application. In these situations Partners have examined and implemented more effective levels of incandescent lighting; thus saving energy while providing the same aesthetic value. From a practical standpoint because incandescent to incandescent lamps offer very little energy savings at the same lighting output (lumens), this type of retrofit is seldom done. This lamp conversion segment provides a very small portion of the overall energy savings so the impact of this type of lamp conversion on the GreenLight Programme is minor. The incandescent retrofits undertaken in this segment typically installed halogen lighting. Note that new advances in LED technology for high intensity spotlights have the potential of replacing decorative halogen lighting with more energy efficient LED lamps, so a reduction in this type of retrofit is expected.

Incandescent to fluorescent retrofits

For incandescent to fluorescent retrofits, 33 Partners reported this type of lamp conversion. This change accounted for approximately 4% of the total reported technology energy savings in the GreenLight Programme during the 2000 – 2008 time period. There were 7 categories of incandescent to fluorescent lighting changes: incandescent to T8, incandescent to T5, incandescent to T12, incandescent to CFL, halogen to T8, halogen to T5, and halogen to CFL. Table 6.4, Incandescent to fluorescent lighting changes, below, shows the percent change values by category.

Table 6.4. Incandescent to fluorescent lighting changes

Lamp change category	Partners, % category	Energy savings, % category	Energy savings kWh, category
Incandescent to T8	20,0%	26,9%	1 497 711
Incandescent to T5	13,3%	2,9%	163 663
Incandescent to T12	4,4%	1,3%	74 141
Incandescent to CFL	44,4%	57,6%	3 210 361
Halogen to T8	2,2%	1,3%	72 531
Halogen to T5	2,2%	1,1%	64 038
Halogen to CFL	13,3%	8,9%	495 046

The conversion of incandescent lamps to compact fluorescent lamps continues to be an important

retrofit both in terms of the number of Partners implementing this retrofit and the energy savings produced. The replacement of incandescent lamps by fluorescent T8 lamps generates notable energy savings, which appears to correlate to incandescent fixtures located in high use areas that would typically be regarded as a location for fluorescent lighting. In general the opportunity for this type of lighting retrofit is small; it is less than 1% of the potential overall lighting energy savings. Nonetheless, Partners are encouraged to retrofit these non-typical spaces whenever possible.

Incandescent to other lamps retrofits

For incandescent to other lamps retrofits, 7 Partners reported this type of lamp conversion. This change accounted for approximately 7.5% of the total reported technology energy savings in the GreenLight Programme during the 2000 – 2008 time period. There were 6 categories of incandescent to other lamps lighting changes: incandescent to high pressure (“HP”) sodium, incandescent to metal halide, incandescent to LED, halogen to HP sodium, halogen to metal halide, and halogen to LED. Table 6.5, Incandescent to other lamps lighting changes, below, show the percent change values by category.

Table 6.5. Incandescent to other lamps lighting changes

Lamp change category	Partners, % category	Energy savings, % category	Energy savings kWh, category
Incandescent to HP Sodium	41,2%	78,0%	8 230 246
Incandescent to metal halide	11,8%	0,5%	53 438
Incandescent to LED	11,8%	2,5%	267 082
Halogen to HP Sodium	5,9%	0,3%	28 646
Halogen to metal halide	17,6%	0,4%	45 449
Halogen hi-voltage to LED	11,8%	18,3%	1 931 445

This segment of retrofits has several important aspects; the first of which is that there are significant potential energy savings available to projects that retrofit traffic lights to LED lamps, as is noted by the halogen to LED category. There appear to be locations in the participating countries of the GreenLight Programme where Partners are still using incandescent lamps for outdoor lighting. Retrofitting these lamps to high pressure sodium lamps provides significant energy savings per lamp. GreenLight Programme Partners are demonstrating a preference of selecting high pressure sodium lamps over metal halide lamps, which can be seen by comparing the large difference in category energy savings between retrofits to high pressure sodium lamps and retrofits to metal halide lamps. While the economics of retrofitting incandescent lamps is strong, it is also evident that many of these energy savings opportunities are limited to isolated cases and have a small impact on the overall program. GreenLight Programme Partners should continue to explore opportunities such as this segment, but this should not be the main focus of an energy management program.

Fluorescent to fluorescent retrofits

For fluorescent to fluorescent retrofits, 78 Partners reported this type of lamp conversion. This change accounted for approximately 21.6% of the total reported technology energy savings in the GreenLight Programme during the 2000 – 2008 time period. There are 7 categories of fluorescent to fluorescent lighting changes: T8 to T8 lamps, T8 to T5 lamps, T8 to compact fluorescent lamps, T12 to T8, T12 to T5, T12 to compact fluorescent lamps, other lamp changes. Table 6.6, Fluorescent to fluorescent lighting changes, below, shows the percent change values by category.

Table 6.6. Fluorescent to fluorescent lighting changes

Lamp change category	Partners, % category	Energy savings, % category	Energy savings kWh, category
T8 to T8	19,0%	11,4%	3 464 315
T8 to T5	40,5%	44,9%	13 649 954
T8 to CFL	17,4%	8,5%	2 596 655
T12 to T8	5,8%	0,5%	145 419
T12 to T5	4,1%	2,5%	770 592
T12 to CFL	3,3%	8,1%	2 468 142
Other	9,9%	24,0%	7 307 106

The largest change in fluorescent to fluorescent retrofits has been the conversion of T8 lamps to T5 lamps, both in terms of Partners implementing the retrofit and in terms of the energy savings (approximately 10% of the total reported lamp energy savings within the GreenLight Programme). Retrofits from T12 lamps occurred earlier in the GreenLight Programme but the frequency of this retrofit has decreased considerably because most Partners have changed to T8 and T5 lamps. The T8 to T8 retrofits appear to be mostly composed of two components of savings (yielding roughly 15 – 18% energy savings per fixture); (1) changes from halophosphate lamps to triphosphate lamps and (2) from magnetic to electronic ballasts. However, some T8 to T8 lamp retrofits appear to involve delamping, though it is difficult to quantify these delamping energy savings because fixture lighting coverage area is not a reportable item and lighting changes sometimes include multiple lamp types. There were a variety of lamp changes within the “other” category, such as CFL to CFL, T5 to CFL, and T5 to T5 lamp changes, but these changes appear to be motivated by specific applications of lighting required at that Partner’s facility and are not reflective of a trend. Not reflected in this data is a trend in the conversion of lamps from incandescent lamps and other types of lamps to the use of compact fluorescent lamps that are similar in application as the linear T5 lamps. There is the potential of a larger adoption of single pin fluorescents in place of the typical linear double pin fluorescent lamps because this allows greater flexibility in the placement of the lamp within the fixture.

Other lamps to fluorescent retrofits

For other lamps to fluorescent retrofits, 15 Partners reported this type of lamp conversion. This change accounted for approximately 28.3% of the total reported technology energy savings in the GreenLight Programme during the 2000 – 2008 time period. There are 5 categories of other lamps to fluorescent lighting changes: mercury vapour to T5 lamps, mercury vapour to T8 lamps, mercury vapour to compact fluorescent lamps, metal halide to T8, and metal halide to compact fluorescent lamps changes. Table 6.7, Other lamps to fluorescent lighting changes, below, shows the percent change values by category.

Table 6.7. Other lamps to fluorescent lighting changes

Lamp change category	Partners, % category	Energy savings, % category	Energy savings kWh, category
Mercury vapour to T5	18,6%	46,8%	18 600 975
Mercury vapour to T8	14,0%	3,7%	1 460 786
Mercury vapour to CFL	11,6%	3,8%	1 509 561
Metal halide to T8	23,3%	8,8%	3 509 034
Metal halide to CFL	25,6%	34,9%	13 857 545
Metal halide to T5	7,0%	2,1%	817 645

The largest change in other lamps to fluorescent retrofits has been the conversion of mercury vapour lamps to T5 fluorescent lamps, both in terms of Partners implementing the retrofit and in terms of the energy savings. This category is the largest category of lamp conversion energy savings of total energy savings within the GreenLight Programme, resulting in 13% of the total energy savings. Although conversions of other lamps to T8 fluorescent lamps was accomplished by several Partners, these conversions involved relatively low levels of energy savings so these were not significant categories of retrofit. The lighting industry is migrating to T5 fluorescent lamps so future energy saving retrofit projects will likely concentrate on the use of T5 lamps.

Other lamps to other lamps retrofits

For other lamps to other lamps retrofits, 58 Partners reported this type of lamp conversion. This change accounted for approximately 20.2% of the total reported technology energy savings in the GreenLight Programme during the 2000 – 2008 time period, the second largest group after fluorescent to fluorescent retrofits. There are 7 categories of other lamps to other lamps lighting changes: mercury vapour to metal halide, mercury vapour to HP sodium, HP sodium to HP sodium, neon to LED, metal halide to metal halide, mercury vapour to mercury vapour, and other lamp changes. Table 6.8, Other lamps to other lamps lighting changes, below, shows the percent change values by category.

Table 6.8. Other lamps to other lamps lighting changes

Lamp change category	Partners, % category	Energy savings, % category	Energy savings kWh, category
Mercury vapour to metal halide	12,3%	22,1%	6 275 559
Mercury vapour to HP sodium	59,3%	61,7%	17 529 806
HP sodium to HP sodium	7,4%	3,3%	923 921
Neon to LED	1,2%	2,9%	819 006
Metal halide to metal halide	2,5%	0,8%	224 357
Mercury vapour to mercury vapour	3,7%	0,9%	263 540
Other	13,6%	8,4%	2 379 683

The most significant change in other lamps to other lamps retrofits has been the conversion of mercury vapour lamps to HP sodium lamps, both in terms of Partners implementing the retrofit and in terms of the energy savings. The majority of these Partners were public sector entities upgrading their street lighting. These street lighting retrofits provide a significant amount of energy savings and account for the reason this category yielded about 62% of the other lamps to other lamps energy savings, and approximately 12.5% of the total GreenLight Programme energy savings. Although the conversions of mercury vapour to metal halide lamps involved relatively few Partners (8), some of them (active in Production) achieved significant savings. This is the reason for this lamp change category yielding the second highest savings within the other lamps to other lamps retrofits. The neon to LED retrofit was given its own category to emphasize the potential energy savings significance of this lighting technology change. This type of lighting is typically used to enhance the aesthetics of a place of business so energy savings is not normally a consideration; however, if LED lighting is used instead of neon, fluorescent, or halogen lamps the energy savings are very significant.

6.3.5. Ballast changes

GreenLight Programme Partners reported ballast changes for fluorescent lamps and for other lamps such as mercury vapour, metal halide, and HP sodium. Although Partners reported ballast types for lamp retrofits of mercury vapour, metal halide, and HP sodium lamps, these ballast replacements are magnetic to magnetic when a high intensity discharge (“HID”) type lamp is retained with the retrofitted fixture. While there is interest in obtaining additional energy savings from the use of electronic ballasts in HID fixtures, magnetic ballasts in these fixtures still offer better cold and hot weather life and performance. Therefore the focus in this section is on the ballast upgrades of fluorescent lighting, and especially on changes from magnetic to electronic ballasts. In those cases where the Partner continued to use magnetic ballasts the energy savings were either generated by lighting controls or de-lamping of existing fixtures. If the Partner already was using electronic ballasts then the savings were obtained by implementing lighting controls and/or upgrading to better electronically ballasted lighting (such as converting T8 lamps to T5 lamps).

Figure 6.6 shows the percentage ratios by total energy savings of the breakout of main fluorescent lamp conversions matched to their respective ballast changes.

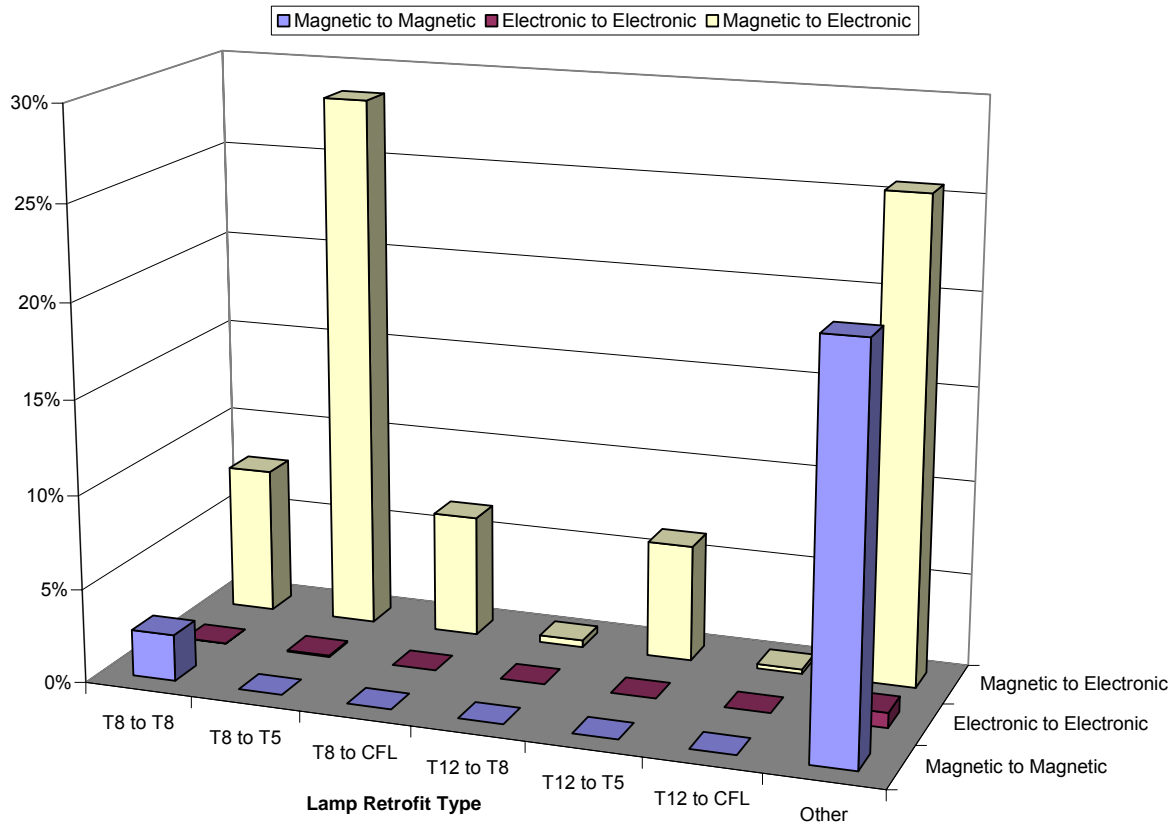


Figure 6.6. Energy savings due to change of ballast for fluorescent lamp conversions

There are three categories of ballast changes: magnetic to electronic, magnetic to magnetic, and electronic to electronic. Table 6.9, Ballast changes, below, shows the percent change values by category.

Table 6.9. Ballast changes

Ballast change category	Partners, % category	Energy savings, % category	Lighting Control % category
Magnetic to electronic	92,3%	75,6%	31,6%
Magnetic to magnetic	3,1%	23,5%	2,5%
Electronic to electronic	4,6%	0,9%	0,8%

6.3.6. Lighting controls

For lighting control retrofits, 81 Partners reported this energy savings measure. These changes accounted for approximately 17.6% of the total reported technology energy savings in the GreenLight Programme during the 2000 – 2008 time period. There are 4 categories of lighting controls: localized manual switch, time scheduling, occupancy linking, daylight responsive. Localized manual switching is providing individuals in open office configurations a local (task or work based) light switch instead of controlling the light from a single area switch; allowing each individual the opportunity to use only the lighting needed for his/her work area. Time scheduling provides an automated clock based schedule of the lighting to ensure that the lighting is turned off in work areas that are scheduled to be unoccupied. Occupancy linking allows the lighting to be turned on and off in conjunction with the occupancy of the space via some type of presence sensing control. Daylight responsive controls dim the artificial lighting when the ambient daylight reaches sufficient intensity levels. Table 6.10, Lighting controls, below, shows the percent change values by category.

Table 6.10. Lighting controls

Lighting control category	Partners, % category	Energy savings, % category	Energy savings kWh, category
Localised manual switch	40,8%	45,0%	11 136 515
Time scheduling	23,8%	21,0%	5 196 481
Occupancy linking	15,4%	9,6%	2 384 862
Daylight responsive	20,0%	24,4%	6 049 276

The largest amount of energy savings from lighting controls retrofits has come from installing daylight responsive controls, even though this category of savings was implemented only 20.9% of the time. The occupant density in most work spaces is highest during the day so this provides a significant opportunity to reduce energy consumption without reducing work productivity. Time scheduling was also an important lighting controls measure providing significantly higher saving by category than localized manual switching and occupancy linking. Time scheduling has the additional benefit of being relatively simple to implement and operate. It is important to have regular energy conservation training that emphasizes turning off equipment and lights when they are not needed; however, time scheduling supplements those efforts by ensuring that the lights are turned off when not needed.

6.3.7. Luminaries changes

GreenLight Programme Partners reported luminaire's changes for primarily fluorescent lamps. However, other lamp types, such as metal halide lamps and LEDs, do make use of reflective surfaces to direct the light, so these cases, of other lamps with reflectors, are included in the reported data, too. The reported luminaries' categories below do not separate the reflector changes into specific types of lamps. For reflector changes, 78 Partners reported equipment types for before and after the retrofit. There are 7 categories of reflector changes: no reflector to aluminised, aluminised to aluminised, painted to aluminised, no reflector to no reflector, painted to painted, aluminised to painted, and other. Table 6.11, Luminaries changes, below, shows the percent change values by category.

Table 6.11. Luminaries changes

Reflector Change Category	Partners, Category	%	Energy Savings, % Category	Energy Savings kWh, Category
No Reflector to Aluminised	18,8%		20,5%	7 774 378
Aluminised to Aluminised	14,3%		5,7%	2 180 303
Painted to Aluminised	36,8%		51,8%	19 688 891
No Reflector to No Reflector	6,8%		3,0%	1 132 694
Painted to Painted	4,5%		7,3%	2 779 809
Aluminised to Painted	2,3%		0,9%	331 518
Other	16,5%		10,8%	4 119 627

The largest category of luminaries change in terms of energy savings is the change from a painted reflector to an aluminised reflector at about 52% of the luminaries' changes. This is followed by the case of adding on an aluminised reflector to fixtures that had no reflectors. Reflectors are beneficial because they focus potentially wasted light into the working space. For exterior applications, a reflector can minimize upward light pollution and increase the useful light in pedestrian and parking areas. However, the reflector does add to the cost of the fixture so not every lighting upgrade justifies a reflector. The no reflector to no reflector category indicates that many Partners have fixtures that either require no reflector or the addition of a reflector is not cost effective. This category also shows that the energy savings for this case of no reflector is low, so the lack of a reflector is not a significant concern in terms of impact on the GreenLight Programme energy savings. There are several different types of luminaries' changes within the "other" category, many of which are specialized luminaries changes for specific applications. Although these are interesting applications of luminaries, the review of each application is too broad for this report.

6.4. Summary and outlook

The energy savings reported by the Partners participating in the GreenLight Programme provide a good snapshot of the energy savings that are available to those willing to upgrade their lighting systems. Partners concerned about conserving energy have many opportunities to improve the lighting in their facilities and in turn reduce their environmental footprint. Organisations interested in saving money can invest in the new lighting technologies to obtain new and better lighting systems and lower their energy bills. The basic lighting energy savings strategies are not complex. This report shows that the main strategies of converting mercury vapour lamps to more efficient lamp types, converting older fluorescent lamps and ballasts to T5 lamps and electronic ballasts, implementing daylighting controls where possible, and installing timing controls to shut off lights when the building is unoccupied, are appropriated for most Partners and tend to generate the most energy savings.

Advances in lighting technologies appear to be continuing as the lighting industry introduces better and more versatile compact fluorescent fixtures. The service life of fluorescent lamps has been increased to nearly match the life of high pressure gas lamps. The efficiency of fluorescent lamps continues to improve and may eventually be a cost competitive choice along side high pressure sodium lamps. High pressure gas discharge lamps can be installed with electronic ballasts to improve the start up of the lamp, improve the quality of the light, and lengthen lamp life. In the short and long term, LED lamps show significant potential for increasing lighting efficiency and also lighting effectiveness. Although, currently available LED lamps are less efficient than compact fluorescents, new developments indicate that efficiency of LED lamps will improve quickly. LEDs have a long service life (approximately 50.000 hours), have good colour rendering, can be dimmed, and allow for a large variety of fixture configurations. Their small size lends itself to more localised applications improving effectiveness by putting light where it is most useful. The high cost of LED lamps is still a limiting factor but the cost per lumen is expected to continue to drop.

7. Results - Savings per country in detail

The following section presents how the number of Partners, their total and average savings evolved in each country. The order is based on the number of Partners present in the participating country, starting with the country who counts the most Partners.

7.1. Italy

The number of GreenLight Partners is notably the highest in Italy. A big part of these Partners (84) are small municipalities (called "Comune"), who mostly implemented street light projects. By the end of 2008, 62 Italian public organisations joined the GreenLight Programme from the category Street Lighting, while there were 24 projects in Public Buildings. Thus, more than 70% of the projects are street lighting modernisations in the public sector. The reporting rate for the municipalities is very low: there is no data available on the energy savings for 63 of them. Based on the data for the rest of them, an average municipality saved 397 MWh per annum.

At the beginning of the GreenLight Programme many Italian organisations have been approached and some big companies, such as Carrefour Italia (2002), Coop (2001), Intesa Sanpaolo (2000), Monte dei Paschi di Siena (2002) and UniCredit (2001) became GreenLight Partners. This is partly due to the fact that the GreenLight Programme administration is located in Italy therefore it was easier to reach out to local organisations, also because there were no language barriers present.

Furthermore, the Italian National Contact Point was also active in acquiring new Partners, as well as the 65 Italian Endorsers. There were two Endorsers who were very effective in acquiring new Partners. Merchantfin, an ESCO, is one of them, who itself only brought 39 new Partners to the GreenLight Programme. The other Endorser, ESCO NET (who also happens to be an ESCO) brought 9 Partners. All these Partners brought by Merchantfin and ESCO NET are municipalities with street lighting projects.

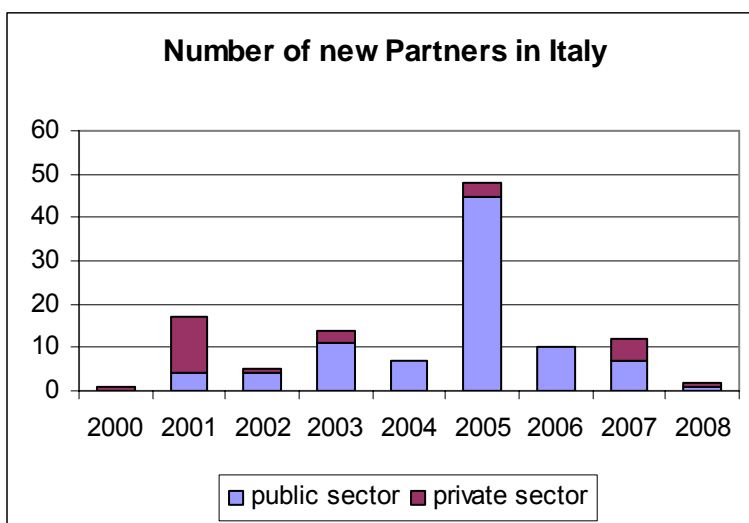


Figure 7.1 shows that in 2005 there was a boost of new Partners. More than half of them, 35 out of the 48 new signers were public organisations brought to the GreenLight Programme by the aforementioned two Endorsers.

More than half of all the Italian Partners realized their upgrades through an ESCO.

Figure 7.1. Number of new GreenLight Partners in Italy from 2000 to 2008

Italy is the country with the highest total energy savings achieved within the GreenLight Programme: nearly 72.6 GWh/year by the end of 2008. The average energy savings for one Partner in Italy are 1.5 GWh/year. This is higher than the average across all countries, which is 689 MWh/year (see Figure 5.7). One Italian Partner reduced its energy consumption by 40% on the average compared to the state before upgrading the lighting system.

The lighting energy efficiency projects of the Italian Retail chain, Coop are managed by an ESCO, INRES. The eleven GreenLight Partners constituting Coop altogether reported total energy savings of 30.5 GWh by the end of 2008. This corresponds to an annual saving of about 3.1 million EUR in running costs.



Carrefour Italia

Carrefour Italia reported the highest savings for one Italian Partner: 21.5 GWh per year. This corresponds to a relative saving of 22.5%.



The highest relative savings were achieved by Dolce&Gabbana, with a saving value of 80%. This equals a saving of 280 MWh/year.

Dolce&Gabbana

7.2. Belgium

The number of GreenLight Partners in Belgium is the second highest. The first Belgian Partners adhered only in 2001 to the GreenLight Programme. The high number of Partners is partly due to the active Endorser activities present in Belgium.

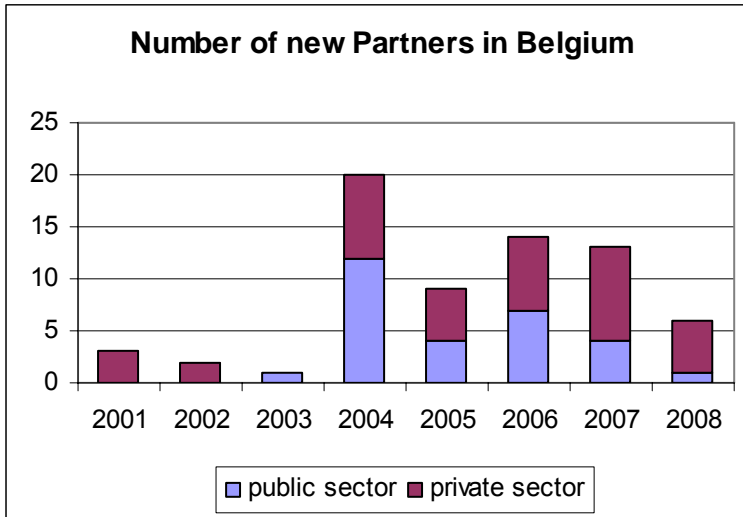


Figure 7.2. Number of new GreenLight Partners in Belgium from 2001 to 2008

The most active Endorser in recruiting Belgian Partners is an ESCO, Fines. Fines only brought 35 Belgian Partners to the GreenLight Programme, 29 of which between 2004 and 2006. This is also notable on Figure 7.2, as there is a sharp rise in the number of new Partners starting in 2004. In total, more than half of all the Belgian Partners' projects were realized through an ESCO type of contract.

ETAP Lighting (not an ESCO) is another active Endorser, bringing 37 Partners to the GreenLight Programme. Though only 6 of them are Belgian organisations; the majority of the endorsed Partners come outside of Belgium.

The share of the number of Partners between the public and private sector is more balanced in Belgium than in Italy. At the end of 2008 there were 22 municipalities who upgraded their public buildings. Only one street lighting modernisation project can be counted among the Belgian Partners which was actually coupled with the modernization of an educational building.

The total savings achieved by Belgian Partners within the country add up to 6.6 GWh annually. There is no information available on the savings for 35 organisations, thus for about 50% of the Partners. This renders it difficult to draw any conclusion from the above data. However, it could be reasonably assumed that the country's total savings would amount to 13.7 GWh/year if data was available for all Partners (see 5.2.1 Total energy savings).

The savings per Belgian Partner with 201 MWh/year are well below the average savings per GreenLight Partner (689 MWh/year). The reason for this is that 70% of the Partners who provided data on their savings declared to have saved less than 130 MWh/year. The relative savings per Partner are 21%. This is very low because of the Partner Nike CSC who on the one hand reported the highest annual savings within the country, but on the other hand also the lowest relative saving. To express it in values: Nike CSC reported energy savings of 2 GWh/year and 10% compared to the energy consumption level before the refurbishment. Not taking into account Nike's savings, the relative savings per Partner in Belgium would equal 47%.

The highest relative savings can be attributed to the municipality Gemeentebestuur Zingem, saving 82% on energy consumption by upgrading the town's sports hall.

7.3. France

France counts the third highest number of Partners.

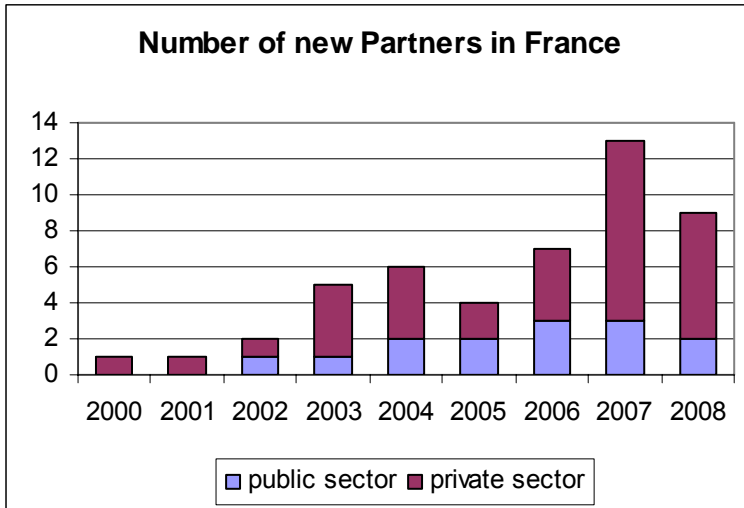


Figure 7.3. Number of new GreenLight Partners in France from 2000 to 2008

2007 was the most active year with 13 new signers, 7 of which brought by ETAP Lighting. ETAP Lighting has been very active in France, bringing 17 Partners from 2000 to 2008 to the GreenLight Programme.

The majority of the Partners come from the private sector, mostly from the categories Retail, Production and Services. Within the public sector, Partners refurbishing the public buildings represent about 70% of all public organisations.

The total energy savings achieved by French Partners add up to 15.5 GWh/year. There is no savings data available for 30% of the Partners.



The savings per Partner are 455 MWh/year, while the relative savings per Partner are 38%. 26 from the 49 French Partners reported energy savings below 250 MWh/year.

Distribution Casino France - Branche Supermarchés upgraded 15 supermarkets which resulted in the highest reported energy savings for France: 9.5 GWh/year for one Partner. The greatest proportional savings – 76% - were achieved by Neuilly Dessin, a retail company. This corresponds to a saving of 30.5 MWh/year.

Distribution Casino France

7.4. Germany

Germany is close after France with 43 Partners.



Figure 7.4. Number of new GreenLight Partners in Germany from 2002 to 2008

Figure 7.4 shows that the GreenLight Programme was not very widespread in Germany between 2000 and 2005. In fact, in 2005 no new Partner joined the GreenLight Programme, and the first signers came only in 2002. In 2007 there was a boost of new Partners, with 17 signers that year, mostly from the public sector. Also in 2008 eleven Partners committed to the GreenLight Programme, still with a dominant participation from the public sector. The sudden increase of new signers can be explained on the one hand by the increased activity of the German National Contact Point, who brought four new Partners to the GreenLight Programme in 2007 (all from the public sector).

On the other hand, the Endorser Eurolux AG brought five new Partners in 2006 and three in 2007, with an ESCO type of contract. In Germany, about 30% of the Partners realized their efficiency project through an ESCO.

The country's total savings are 25.4 GWh per year, being the second highest per country²⁷. There is no data available on the energy savings for five Partners (12% of the total). One German organisation saved 669 MWh/year on the average, or 38% in relative terms. Both values are close to that of an average GreenLight Partner.

It is worth to compare the savings achieved in the different categories and the number of Partners who executed the respective projects (see Figure 7.5).

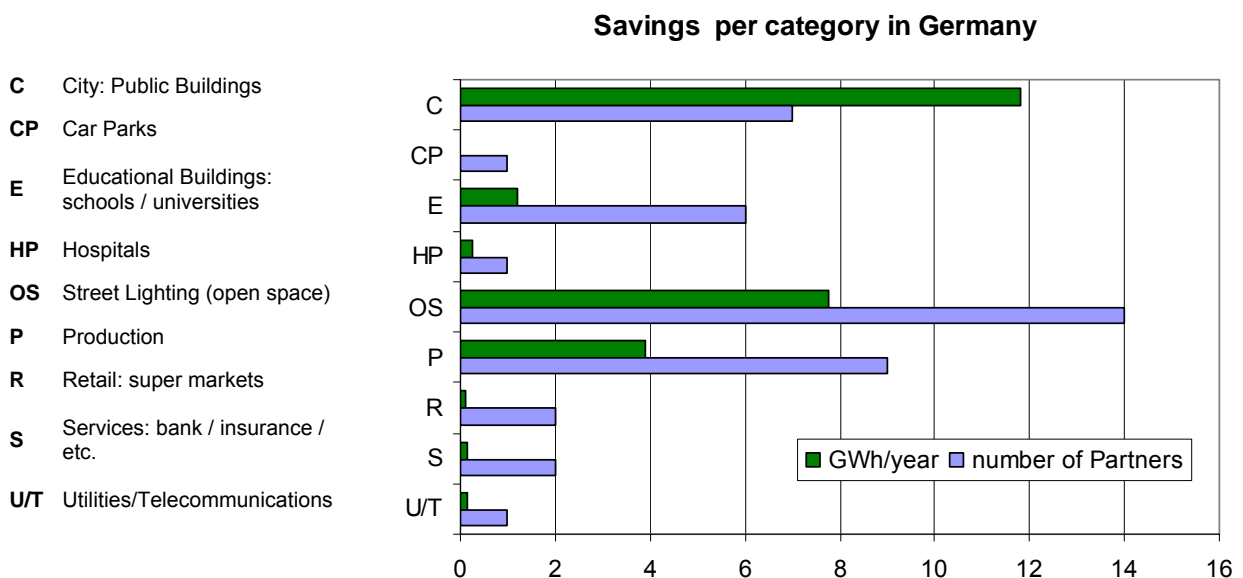


Figure 7.5. Total energy savings in Germany per category, by the end of 2008

²⁷ after Italy.

As shown on Figure 7.5, the total energy savings are considerably higher in Public Buildings (12 GWh/year) than for Street Lighting (8 GWh/year). Considering the whole GreenLight Programme, the average savings per Partner for street light projects are 660 MWh/year, about the same as for Public Building retrofits. Based on these average values and on the number of German Partners per category, more savings would be expected through Street Lighting in Germany, especially if we also take into account the corrected savings per Partner for Public Buildings (334 MWh/year). However, this is not the case but exactly the opposite. Seven Partners saved 12 GWh/year in Public Buildings as opposed to 8 GWh/year saved by 14 Partners in Street Lighting. To conclude, fewer Partners saved more energy in Public Buildings compared to Street Lighting. The reason for this is two-fold.

On the one hand, there were five Partners who implemented street lighting projects and achieved energy savings below 100 MWh/year, almost one seventh of the average savings for such a project.



The city of Hamburg

On the other hand, the city of Hamburg had a major contribution to the savings in Public Buildings. Between 2000 and 2007 about 450 public buildings were upgraded in Hamburg resulting in a total energy saving of about 10.3 GWh/year. To compare, this is approximately as much as the total Bulgarian energy savings. With this performance Hamburg qualifies as the German Partner with the highest savings.

In fact, Hamburg implemented energy saving measures in its public buildings starting from 1992. During the period of 1992-1999 the city saved about 15.6 GWh per year.

These savings were also included in the Five Year Report, where Germany was the country with the highest total energy savings, thanks to Hamburg.²⁸ Considering the period 2000-2008, 40% of the German savings are linked to the city of Hamburg.²⁹

The highest relative savings were reported by the Partner Franz-Böhm School - Frankfurt am Main, who upgraded the sports hall of the school. With a saving of 59.3 MWh/year the Partner cut 85% on energy consumption, compared to the state before the upgrade.

²⁸ Hamburg saved roughly 22.5 GWh per year through the period 1992-2005, out of the total German savings of 23.4 GWh/annum, for the period up until 2005.

²⁹ The current report does not take into account the savings of the city of Hamburg for the period 1992-1999, only the savings starting from 2000.

7.5. Spain

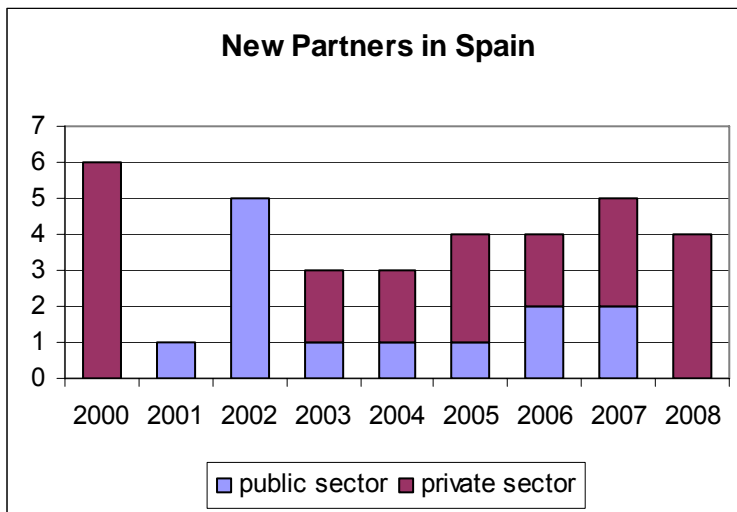


Figure 7.6 Number of new GreenLight Partners in Spain (2000-2008)

Spain has the fifth highest number of GreenLight Partners. 2000 was the year with the most new signers (see Figure 7.6), all of them coming from the private sector. In 2002 five municipalities joined the GreenLight Programme: this time the new Partners came only from the public sector.

The country's total savings correspond to 6.9 GWh/year. Since there is no data available on the energy savings for 23% of the Partners, it can be presumed that the real value is higher. Extrapolating based on the average savings per Partner would give a total saving of about 9 GWh/year for Spain.

One Spanish Partner saved 257 MWh/year on average. This value is low compared to the GreenLight Programme average, which might be explained by the fact that more than half of the reporting Spanish Partners saved less than 150 MWh/year. Compared to the level of energy use before implementing energy efficiency measures, an average Spanish Partner saved 51%. More than 20% of the Partners with sufficient data reported savings greater than 50%.

The highest savings were achieved by the airport of Madrid, Aeropuertos Españoles y Navegación Aérea (AENA), being 1.55 GWh/annum. This is a saving of 63%. The highest relative savings reported a company offering construction Services: Ibérica de Estudios e Ingeniería, S.A. (IBERINSA). They saved 72% of the energy consumption which corresponds to 215 MWh/year.

7.6. Austria

Austria has 25 Partners, the first joining the GreenLight Programme only in 2003. The National Contact Point in Austria was active in recruiting Partners especially in 2007, bringing 6 new signers. All these new Partners were coming from the public sector, with a dominant participation of Street Lighting.

The total Austrian savings amount to 3.1 GWh/year. There is no data available on the energy savings for 12 Partners, almost half of all the Partners. The average savings per Austrian Partner are 241 MWh/year: savings deriving from the energy efficiency projects implemented were not high. Seven Partners reported savings below 100 MWh/year. The relative savings per Partner are 29% (compared to the energy consumption level before modernising the lighting system).

Almost 90% of all the Partners come from the public sector, with a majority of them (15 Partners) implementing street lighting upgrades. These projects give about 75% of the country's total energy savings.

However, since the number of Partners not providing data on the energy savings is relatively high also in Austria, and 50% of them come from Street Lighting, the savings shall be approached prudently. The average savings for one Austrian Partner which can be attributed to Street Lighting are 257 MWh/year, which is about 40% of the GreenLight Programme average³⁰.

³⁰ Thus about 40% of the average savings counted for one Partner, regarding all the GreenLight Partners who adhered to the GreenLight Programme and implemented street lighting upgrades.



Street lighting of the city of Graz

Even so, the highest savings – around 1.5 GWh annually - were reported by the city of Graz, achieved by upgrading the city's street lighting in two steps³¹. This is a saving of 26%.

The highest relative savings were achieved by Marktgemeinde Gössendorf: 53% compared to the state before upgrading the municipality's street lighting. This equals an energy use reduction of 42 MWh/year.



Snapshot of the street lighting of Marktgemeinde Gössendorf (before and after the upgrade)

There is also one interesting project to be mentioned: the sunniest mountain village in Austria, Gemeinde Diex installed a photovoltaic street lighting system.

7.7. Portugal

The first Portuguese GreenLight Partner adhered in 2001 to the GreenLight Programme. 2004 was the year with the highest number of new signers: 9 out of the total 14 (as by the end of 2004). The number of Partners was 24 by the end of 2008.

³¹ the second step ending in 2010.

Most of the Partners (15) come from the private sector, from Retail and Production (5 and 4 respectively). The rest come from Services, or Utilities/Telecommunications.

As for the public sector: Partners projects' are aimed at upgrading public and educational buildings. There is one street light project.

The total savings achieved within the country amount to 6.6 GWh/year. 20% of the Partners did not report on their savings. Taking this into account, the extrapolation of total savings would equal 8.3 GWh/year. The average savings of one Portuguese Partner are 347 MWh/year. About half of the Portuguese Partners³² savings were inferior to 200 MWh/year. A Portuguese Partner saved 27% on average, compared to the state before the upgrade. Two Partners saved less than 10%.



The highest savings were reported in Retail, with 2.5 GWh per annum. The company Feira Nova Hipermercados who actually reported the biggest savings per Portuguese Partner contributed with 1.3 GWh/year to the Retail category's total savings. This is a saving of 42%.

The second highest savings achieved the Partner Futebol Clube do Porto. The savings due to the modernisation of a football stadium equal 1 GWh/annum. It also reported the second greatest relative savings, 55.97% of the energy consumption.

Football stadium upgraded by the Partner Futebol Clube do Porto

The highest relative savings, 56.14% reported the municipality Camara Municipal de Oliveira de Azemeis. By upgrading educational buildings, they saved 66 MWh/year.

7.8. Romania

Romania is an outstanding example of how a relatively small number of Partners can achieve significant savings and also, that there is a big potential for lighting savings in the New Member States. To translate this statement into numbers: 19 Romanian Partners joined GreenLight, starting from 2006, and they achieved a saving of 21.9 GWh which is the third highest saving per country in the GreenLight Programme. Romania is a role model – just like all the New Member States - also from the point of view that savings data is available for all the Partners in the country.

The average savings per Romanian Partner are 1.2 GWh/year, while the relative savings per Partner are 30%.

³² Of those who provided data on their energy savings.

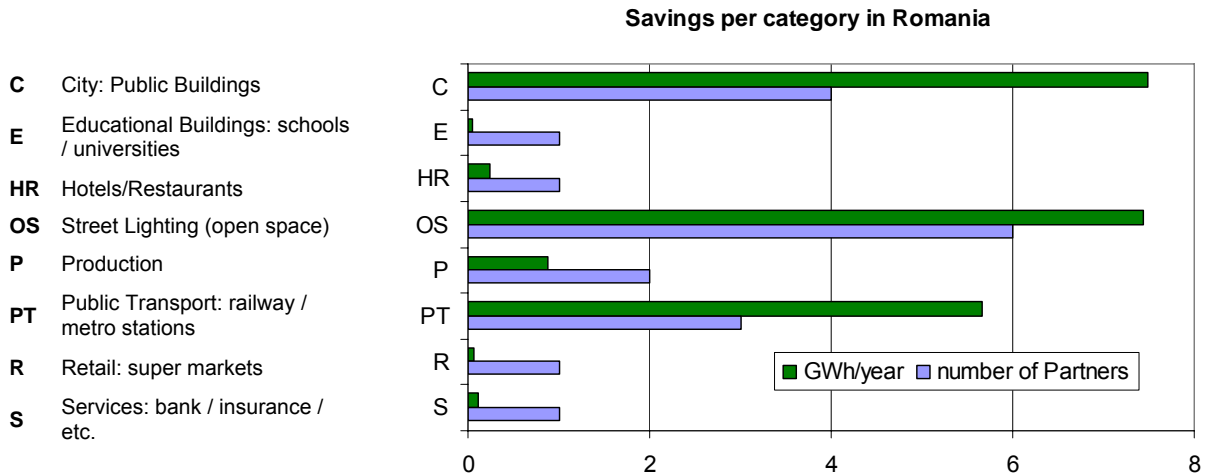


Figure 7.7. Number of Romanian Partners and total energy savings per category. Period: 2006 to 2008

The majority of the savings was achieved in the public sector, with 20.6 GWh/year, thus 94% of the country's total. Four Romanian Partners saved 7.5 GWh/year in Public Buildings, followed by six Partners saving 7.5 GWh/year too in Street Lighting (see Figure 7.7). Finally, 5.7 GWh/year was saved by only three Partners in Public Transport.



The subway in Bucharest, retrofitted by Metrorex s.a.

The highest savings, namely 5.1 GWh/year were reported by Metrorex s.a., who is operating the subway in Bucharest, the capital city. This saving represents a reduction of 23% in energy consumption.

The Romanian Chamber of Deputies saved almost 80% on energy, 4.3 GWh/year, by upgrading the Parliament's lighting system.



The Romanian Parliament

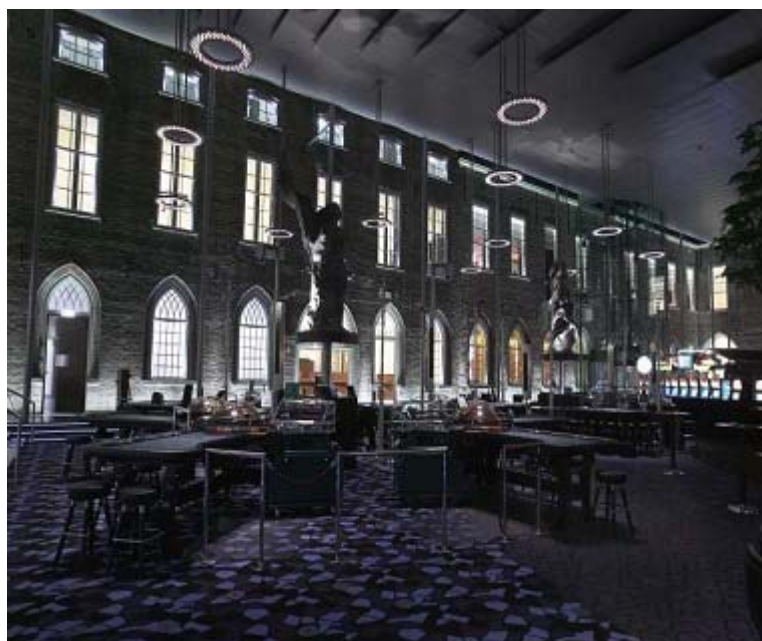
7.9. The Netherlands

The first Dutch Partner joined GreenLight in 2001. Just like in Portugal, 2004 was the year with the highest number of new signers: six out of the total 16 Dutch Partners.

The share of Partners between the different sectors is well-balanced: 8 Partners are active in the public sector, 8 in the private sector.

In the private sector, most of the Partners are involved in Production (5). In the public sector, Partners did not execute street lighting projects, only educational and public building retrofits.

The Dutch Partners saved 12.5 GWh/year by the end of 2008. There are only three Dutch Partners with no information on savings.



One Dutch Partner saved 958 MWh/year on average. This high value is due to the activities of Holland Casino Breda, who saved 9.45 GWh/year. This is the highest reported saving in the country, giving about 80% of the total Dutch savings. Not considering Holland Casino Breda's activities, the average savings per Dutch Partner would only be 250 MWh/year.

The relative savings are 65% for one Partner. The high efficiency (more than 65% saved) of the efficiency measures implemented by two Partners with savings greater than 800 MWh/year is pulling up this number.

Holland Casino Breda

The savings achieved through public and educational building upgrades are not significant. Savings in Production amount to 1.6 GWh/annum.

Gemeente Sittard Geleen managed to save 81% on energy use, by upgrading the municipality's buildings. This is a saving of 150 MWh annually.

7.10. Latvia

The first two Latvian Partners joined the GreenLight Programme in 2006. In 2007 they were followed by ten new signers. There were 14 Latvian Partners in the GreenLight Programme by the end of 2008.

Most of the projects implemented in the public sector were upgrades in the category Street Lighting, while in the private sector the majority of the retrofits concerned Hotels/Restaurants.

The higher savings were achieved in the public sector, even though the number of Partners is less than those active in the private sector³³. This was mainly due to street light projects, a public transport project and public building upgrades respectively (altogether 1.9 GWh/year).

In the private sector the aforementioned hotel and restaurant upgrades amounted to savings close to 600 MWh/annum.

The highest savings were reported by Jelgava Municipality, with 873 MWh/year saved on street lighting. This is a relative saving of 39%.

The greatest relative savings were realised by Dagda town Council. The energy saving of 85% corresponds to a saving of 435 MWh/year.

The country's total savings are 2.6 GWh/annum. Just like in every New Member State, in Latvia data on the savings is available for all Partners. The average savings per Partner are 185 MWh/year. The

³³ In Latvia there are 6 Partners from the public and 8 Partners from the private sector.

relative savings per Partner equal 53%. This suggests that even if project sizes were not too big, the savings are significant. The reasons for this could be lying in the technology: 10 Partners retrofitted incandescent and/or halogen lamps to halogen lamps, compact fluorescent lamps, T8 or high pressure sodium lamps.

7.11. Slovenia

The first Slovenian Partner joined the GreenLight Programme in 2003. This is the one and only Partner from the New Member States who joined before the launch of New GreenLight (in 2006). There were four new signers in 2007 and eight new signers in 2008. The total number of Slovenian Partners by the end of 2008 was 13.

There are no public organisations among the Partners, all of them come from the private sector. Moreover, 12 of the 13 are active in Production. In terms of savings, they give 99% of the country's total which is 9.6 GWh per year.



Acroni d.o.o.

The highest relative savings were achieved by another production company, Exoterm – IT, d.o.o., who reduced energy consumption by 75%. This through saving 65 MWh/year.

The average savings per Partner are 735 MWh/year, the relative savings per Partner are 46%. Acroni d.o.o., a steel manufacturer, reported the highest savings in the country: 7.7 GWh/year. This is 80% of the savings achieved in Production. Acroni d.o.o. reduced the energy use by 54%.



Exoterm – IT, d.o.o.

7.12. Czech Republic

The first Czech Partner joined the GreenLight Programme in 2006, followed by eight new Partners in 2007 and three more in 2008. There were 12 Czech Partners in the GreenLight Programme at the end of 2008.

The number of Partners from the public and private sector is the same. Most of the public Partners' projects are street lighting upgrades. Private Partners are dispersed equally among the categories Production, Retail and Hotels/Restaurants.

The total Czech savings amount to 6 GWh/year. The savings per Partner equal 497 MWh/year. Six Partners reported savings below 150 MWh/year. The relative savings per Partner are 31%.



Savings in the private sector are about twice as much as in the public sector. The best performing category was Retail, giving 60% of the total private savings. IKEA Czech Republic reported the highest savings, 1.9 GWh, which is 85% of Production's total.

Ramada Grand Hotel Symphony reached the biggest relative savings with a reduction of 73% in energy use. This corresponds to a saving of 140 MWh/year.

IKEA Czech Republic

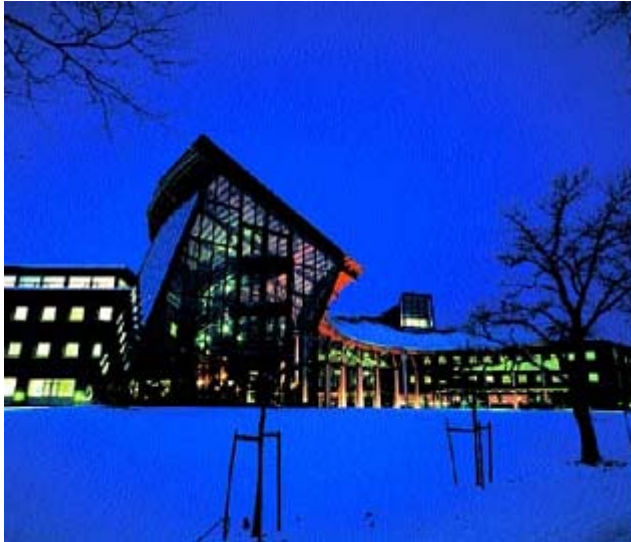
The Czech National Contact Point SEVEN was the co-ordinator of New GreenLight, which ran from 2006 to 2008 [NGL2009]. All the Czech Partners joined the GreenLight Programme through the Czech National Contact Point. In fact, all the Partners from the New Member States who joined the GreenLight Programme from 2006 were assisted by their respective National Contact Point [NGR2009].

7.13. Norway

The Norwegian Partners were rather active in the first years of the GreenLight Programme than in the latter years. 2001 was the first year of new signers, with four signers straight away. New signers kept on coming until 2004, however that year only one new Partner adhered to the GreenLight Programme. The last new signer came in 2006. The total number of Partners was 12 at the end of 2008.

Most of the Partners come from the private sector, with a dominance from the categories Utilities/Telecommunications and Services. In the public sector two Partners are active in the category Public Buildings, one in Hospitals and one in Street Lighting.

The total Norwegian savings amount to 2.8 GWh/year. Five Partners, more than 40% of all Partners did not report on their savings. Extrapolating the given data on the rest of the Norwegian Partners would give a saving of 4.8 GWh/year.



Statoil

96% of the reported savings can be attributed to the private sector, more than 75% of which – about 2 GWh/year - derives from Utilities/Telecommunications. The rest is split between Services and Car Parks.

One Norwegian Partner saved 396 MWh/year on the average. The relative savings per Partner are 40%, compared to the level of energy consumption before introducing energy efficiency measures.

Statoil reported the highest savings: 1.1 GWh per year.

The highest relative savings were reported by the Partner Halliburton. Halliburton cut 66% on its energy use compared to before the refurbishment. This corresponds to a saving of 71 MWh/year.

7.14. Lithuania

The first Lithuanian Partner joined GreenLight in 2007, followed by 11 more in 2008.

75% of the Partners are active in the public sector. Most of them implemented educational and public building refurbishments. More than 80% of the savings, 2 GWh/year come from the public sector, split between the public and the educational buildings' upgrades, and a street light project respectively.

In the private sector more than half of the savings can be attributed to the modernisation of Kaunas Airport SE. The rest of the savings is linked to a sport centre modernisation and the activities of a utility provider.

The country's total reported savings correspond to 2.4 GWh/year.



Kaunas Airport SE

One Lithuanian Partner saved about 196 MWh/year on the average. Eight Partners reported savings below 100 MWh/year, with two of them below 10 MWh/year. The relative savings per Partner are 37% on average.

The highest savings reported the Kaunas District Municipality: 1.5 GWh/year. The highest relative savings reported the Partner Kaunas Airport SE, with an energy use reduction of 75% compared to the state before the upgrade. This equals a saving of 215 MWh/year.

7.15. Sweden

The Swedish Partners started to adhere to the GreenLight Programme in 2001 with four Partners, followed by four further Partners in 2002. For the years after only one Partner joined in 2005 and one in 2008. The total number of Swedish Partners at the end of 2008 was 10.

There are more Partners in the private sector, most of them active in Retail and Services. The public Partners were implementing public and educational building upgrades.

The total Swedish savings correspond to 879 MWh/year. There is no savings data available for 4 Partners. One Swedish Partner saved 147 MWh/year on the average. The relative savings per Partner correspond to 59%. The reason for this is that the sample is very small, including only Partners with high relative savings. Therefore, this average ratio should be approached prudently.

The highest savings were achieved in Services: 364 MWh per year. Savings reported in the public sector add up to 217 MWh/year.

The highest savings reported Fastighets AB Brostaden: 185 MWh/year. This corresponds to a saving of 67% compared to the state before refurbishment, which is also the highest relative saving reported in the country.

7.16. Greece

The first two Greek Partners joined the GreenLight Programme in 2000. 7 out of the total ten joined between 2002 and 2004. The last new signer came in 2006. There were 10 Greek Partners by the end of 2008 within the GreenLight Programme.

All the Partners come from the private sector, with a dominant participation of service providers.



Partners in Services saved 449 MWh/year, while the two telecommunication providers saved 1.1 GWh per year. One of them refurbished the car park of its office building too.

Athens International Airport saved 3.3 GWh/year, 64% of all the private sector's savings. This is the highest saving reported by one Partner within the country. Compared to the state before the refurbishment, it is a saving of 52%.

The GreenLight Plaque at the Athens International Airport

The Partner joined the GreenLight Programme with three buildings (Main Terminal Building, Main Administration Building and Satellite Terminal Building) in 2003 and was awarded for its lighting efficiency efforts in 2004 with the GreenLight Partner Award³⁴. The Partner declared to be satisfied with the results of this investment. According to the Partner, as new and more efficient technologies become available on the market over time, investing into lighting efficiency is a never-ending process. In line with this, a new lighting efficiency project is planned for 2010 in two of their buildings (Main Terminal Building and Satellite Terminal Building).

The highest relative savings in Greece achieved the Hotel Princess Lanassa SA with an energy consumption cut of 82% - this by saving 74 MWh/year.

The total Greek savings amount to 5.1 GWh/year. Data on energy savings is missing for only one Greek Partner. One Greek Partner saved 571 MWh/year on the average, thanks to the high savings of the International Airport of Athens. The relative savings per Partner equal 45%. Only two Partners reported relative savings below 40%.

7.17. Poland

The first Polish Partner joined the GreenLight Programme in 2006. It was followed by two new signers in 2007 and five new signers in 2008. This totals 8 Partners by the end of 2008.

³⁴ See Annex for the list of winners of the GreenLight Awards.

Most Partners come from the public sector, with five from Street Lighting. As a matter of fact, one of them, the City of Kamien Pomorski also upgraded the illumination in two public buildings: the City Hall and the Cathedral.

As for the Partners from the private sector, one is involved in Production, while the other one is a condominium (from the category "Other").



More efficient Street Lighting executed by the Partner Partner Zaklad Energetyczny Szczecin - Oswietlenie Ulic Sp. z o.o.

91% of the Polish savings derive from Street Lighting (5.8 GWh/year). From this, 4.8 GWh/year achieved the Partner Zaklad Energetyczny Szczecin - Oswietlenie Ulic Sp. z o.o. This is the highest saving reported by one Partner in the country.

The highest relative savings reported the condominium Board of Housing Partnership Bernardynska 20, with an energy consumption decrease of 92%, compared to before the modernisation. Just by changing the lighting controls (i.e. introducing occupancy linking) the Partner was able to reduce energy consumption drastically. The savings equal only 9 MWh/year.

Savings in the private sector are not significant.

The total reported Polish savings are 6.4 GWh/year. One Polish Partner saved 796 MWh/year on the average. The relative savings per Partner are 50% compared to the level of energy consumption before introducing energy efficiency measures. This seems rather high which is due to the high efficiency of the project of the Partner Board of Housing Partnership Bernardynska 20.

7.18. Bulgaria

The first Partners from Bulgaria came in 2007 to the GreenLight Programme. By the end of 2008 the total number of Partners was seven.



Municipality of Smolyan

All the Partners come from the public sector and all of them were modernising their street lighting. In fact, the Municipality of Smolyan upgraded educational buildings, and the Municipality of Gorna Oryahovica upgraded public buildings besides their street Lighting modernisation projects as well. In the latter case, this led to energy savings of 2.8 GWh per year, the highest reported in Bulgaria. This equals a saving of 64% compared to the state of the lighting system before the refurbishment, which is also the highest relative saving per Bulgarian Partner.

Four out of the seven Partners saved between 1.5-3 GWh/year each. Because of this, even though Bulgaria does not have many Partner, the reported savings are high: 10.6 GWh/year. The average savings of one Bulgarian GreenLight Partner correspond to 1.5 GWh/year. This is roughly twice as much as the average savings of one GreenLight Partner (689 MWh/year). The relative savings for one Bulgarian Partner are 52% on average. There are 5 Partners who provided sufficient information for the calculation of their relative savings. Those with savings superior o 2 GWh/year reduced their energy consumption by more than 45%.

Bulgaria's case demonstrates very well that even a few Partners can achieve significant savings.

7.19. Slovakia

The GreenLight Programme welcomed the first Slovakian Partners in 2008. Six of them joined the GreenLight Programme.

Four Partners come from the private sector, mostly from Hotels/Restaurants and Services. The remaining two Partners implemented educational building upgrades in the public sector.

55% of the Slovakian Partners' savings (101 MWh/year) derive from the private sector. Out of this, 97 MWh/year was saved in Hotels/Restaurants. Savings in the public sector amount to 83 MWh/year, deriving from educational building upgrades.

The total savings in Slovakia are 184 MWh/year. The average savings per Partner are 31 MWh/year, the relative savings per Partner 60%. The highest savings – 51 MWh/year – reported the Partner Špitálek - polyfunkčná budova, a commercial centre with shops and offices. Energy consumption was reduced with 59% in the building. The Partner MAGNA E.A. s.r.o. reported the highest relative savings: 82%. This equals an energy saving of 39 MWh. They changed incandescent lamps to CFL and put an emphasis on raising users' awareness for efficient lighting (e.g. switching off lights when not needed).

7.20. Switzerland

There are five Swiss Partners in the GreenLight Programme. The first Partner joined in 2003, followed by three other Partners in 2005. The last Partner joined in 2006.

Three of them come from the private sector and are active in Production. The other two Partners implemented upgrades in public buildings.



Building Werd in the city of Zürich

The highest savings were reported by the city of Zürich, 4.9 GWh/year. The highest relative savings were reported by Zehnder Group Produktion Gränichen c/o, being 51% compared to the energy consumption level before refurbishment. This corresponds to a saving of 545 MWh/year.

The country's total savings amount to 5.9 GWh/year. One Swiss Partner saved 1.97 GWh/year on the average, the highest within the whole GreenLight Programme. This is due to a very small sample size: data on the energy savings is available for three Swiss Partners. The relative savings are 43% for one Swiss Partner on average. Since the sample size for Swiss Partners is so small, no relevant conclusions shall be drawn.

7.21. Denmark

The first Danish Partners joined the GreenLight Programme in 2004, with three new signers. One new Partner came in the following year, which was up to now the last new signer. In total, there are four Danish Partners in the GreenLight Programme.

Two of them come from the public and two from the private sector.



Gas station refurbished by the Partner Q8 Denmark

Nyborg municipality, who implemented a street lighting project saved 460 MWh/year, almost five times as much as the municipality Ringsted Kommune in the public sector, who retrofitted the lighting in its public buildings.

The total Danish savings equal 2.5 GWh/year. Savings data is available for all Partners. The average savings per Partner are 613 MWh/year. For the calculation of the relative savings data is available only for Nyborg municipality, who cut 30% on its energy usage.

About 80% of the savings were achieved in the private sector. Almost all of them, 1.7 GWh/year saved Q8 Denmark, the Partner active in Retail. This is the highest saving reported by one Danish Partner. The other Partner from the private sector, Skallerup Klit Feriecenter A/S, is active in the category Hotels/Restaurants.



Nyborg municipality at the harbour

7.22. Ireland

Four Irish Partners joined the GreenLight Programme. The first in 2003, two in 2004 and the last in 2005.

All of them come from the private sector, two from the category Retail and two from the category Hotels/Restaurants.

There is no data available on the Irish Partners' savings.

7.23. United Kingdom

The GreenLight Programme has two Partners from the United Kingdom. Both of them joined in 2001.

One of them is a retailer, the other is a utility provider.

There is no data available on their savings.

7.24. Finland



The one and only Finnish Partner joined GreenLight in 2004. It is the Education Department of the City of Helsinki, who implemented educational building upgrades, reporting savings of 18 MWh/year.

Munkkivuori elementary school, refurbished by the Education Department of the City of Helsinki

7.25. Countries with no GreenLight Partners

There are a few Member States where no GreenLight Partners could be found at the end of 2008. These are: Cyprus, Estonia³⁵, Hungary, Luxemburg and Malta.

³⁵ The first Estonian Partner joined the GreenLight Programme in 2009.

8. Results – GreenLight Partners’ motivations and experience

8.1. Introduction

The Joint Research Centre conducted a survey in 2008/2009 among the GreenLight Partners. The main goal of this survey was to elicit Partners’ attitudes and experiences with the GreenLight Programme by 2008/2009. By use of a Questionnaire, Partners were asked to answer two issues:

- Motivation, barriers and commitment in the planning phase, i.e. before implementing the energy saving measures and applying to join the GreenLight Programme (Questions 1, 2 and 3, see Annex of this report).
- Evaluation of benefits, success of the finished or ongoing project and the whole GreenLight Programme (Questions 4, 5, and 6).

Partners were asked, using an Annex within the Questionnaire, to report on technical data, such as measures taken, area upgraded, reduction in power and energy consumption, cost and CO₂ savings, payback time and internal rate of return (IRR)³⁶ of the investment. This data is included in the analysis of the savings achieved by Partners. The following analysis of survey responses is focused solely on the two issues aforementioned.

The population sample contains about one fifth of the participating Partners and is held to be sufficient for valid conclusions on the subject of this inquiry. Whereas numerical methods have been used to analyse the responses, the underlying methodological approach is qualitative rather than quantitative. In fact, some important points could be revealed only after content analysis of the comments that respondents made to explain and specify their answers to the closed-ended Questions.

For the purpose of this paper, no further descriptive statistical methods, e.g. correlation or cluster analysis, were applied. The authors believe that an elaborate quantitative analysis would not provide a deeper insight in the evaluation of the responses and reasoning of this qualitative research.

8.2. Data input

The survey was conducted between November 2008 and June 2009 and addressed 560 Partners registered by that time. It was based on the use of a Questionnaire, addressing qualitative information, and a technical Annex to the Questionnaire, addressing technical and economic information (i.e. measures, energy/cost savings and estimated payback time - see Annex III of this report). In order to reduce the number of non-responses, a main objective of the survey was to gain as much valuable information as possible with the minimum possible time required to fill out the Questionnaire.

The Questionnaire was focused on elicitation of the Partners’ perception of the GreenLight Programme in view of their

- motivation and problems encountered before introducing efficiency measures (Questions 1 and 2),
- commitment to energy efficiency (Question 3),
- benefits and satisfaction after introducing efficiency measures (Questions 4 and 5) and
- overall evaluation of the GreenLight Programme (Question 6).

The aim here was to get aggregated and up-to-date information, i.e. covering the period between 2005 and 2008.

³⁶ The Internal Rate of Return (IRR) is the interest rate that equates the present value of expected future cash flows to the initial cost of the project. Expressed as a percentage, IRR can be easily compared with loan rates to determine an investment’s profitability. The higher the IRR, the more cost-effective the investment. The GreenLight commitment defines a profitable investment as one that provides an annualised IRR equivalent of at least 20% over a 15-year period [EGL2009].

Some Partners could not be reached, or could not respond, within the scheduled time period for data collection. Reasons for this included change of the responsible GreenLight managers or senior management. In other cases, replies were sent to the survey team explaining reasons for not completing the Questionnaire, e.g. inconvenient period of the year (Christmas time), international financial crisis or significant changes in the organisation.

Table 8.1. General description of the data material

Data description	Total	%
Partners (by the end of survey period)	560	100,0
Total responses	104	18,6
Complete responses	95	17,0
Non-responses	456	81,4

At the end of the data collection period, 104 responses were available for the survey evaluation. Again, some of them were not complete, i.e. they lacked information about technical data or responses to parts of the Questionnaire. Due to this, throughout the evaluation of the survey different missing values had to be considered in the calculations. This manifests itself in including the item "m.v." - "missing value" in the tables and graphs presented in section 9.3 (Results). Table 8.1 shows the summary of the information provided or missing in the responses finally evaluated. Whereas the total number of Partners participating in the GreenLight Programme within the survey period amounted to 519 by the end of 2008, it increased to 560 by the end of the survey period.

The responses came from 25 countries (Figure 8.1). Some of the private sector Partners are multinational corporations, so their responses were from facilities across many countries. These Partners are denoted as multinational in this survey ("M" on Figure 8.1). The distribution of the countries participating in the survey is with a few exceptions very similar to the distribution of Member States in the GreenLight Programme. Italy, Belgium and France have more Partners participating in the GreenLight Programme (respective percentages in the entire GreenLight Programme are 21%, 13% and 10%). However, these countries (Italy, Belgium and France) are less well represented in the survey (respective percentages in the survey 12%, 5% and 4%). On the contrary, representation of Germany and Romania in the survey is higher than in the GreenLight Programme (respective percentages in the survey are 27% and 9% against 8% and 4% in the entire GreenLight Programme).

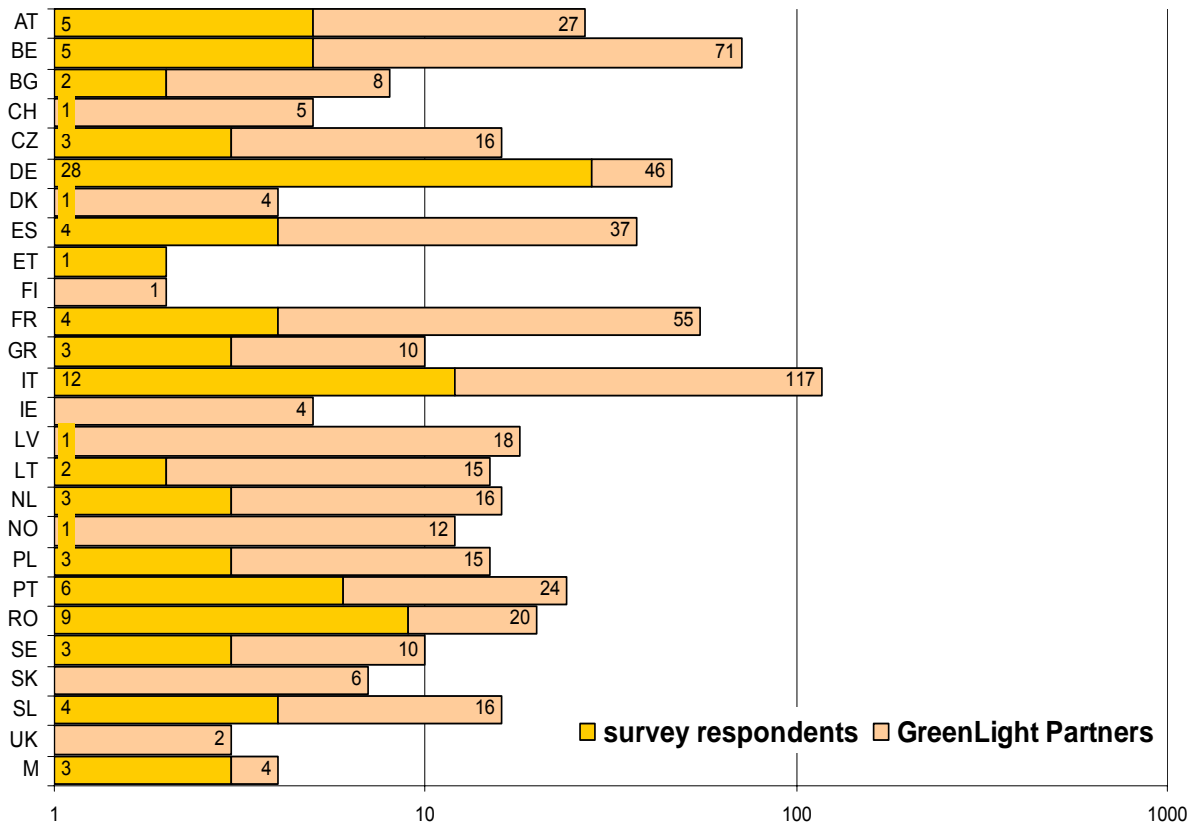


Figure 8.1. Distribution of countries' participation in the survey

Notes: Total number of responses: 104, total number of GreenLight Partners by the end of the survey period: 560 Partners. The numbers on the peach-coloured bars indicate the total number of GreenLight Partners per country, by the end of the survey period. The data is presented on a logarithmic scale for better visualisation.

Distribution of private and public Partners responding to the survey is similar to the distribution of Partners participating in the GreenLight Programme (around 50%, Table 8.2). Projects include various categories of retrofits from public Street Lighting with large illuminated surface areas to Hotels/Restaurants with smaller illuminated surface areas which belong to the private sector.

Table 8.2. Type of projects represented in the survey compared to the whole GreenLight Programme by the end of the survey period (560 Partners)

Project type	Survey		Total GreenLight	
	number	%*	number	%**
Private	54	51,9	268	47,9
airport	4	3,8	4	0,7
car park	0	-	2	0,4
hotel / restaurant	4	3,8	38	6,8
hospital	0	-	2	0,4
other	1	1,0	12	2,1
production	21	20,2	85	15,2
retail (super market, commercial centre)	10	9,6	51	9,1
service providers (bank, insurance)	9	8,7	52	9,3
telecommunications, energy	5	4,8	22	3,9
Public	50	48,1	292	52,1
indoor	24	23,1	156	27,9
car park	1	1,0	1	0,2
education	10	9,6	46	8,2
hospitals	2	1,9	5	0,9
municipal buildings	11	10,6	104	18,6
other (railway stations)	2	1,9	6	1,1
outdoor (street lighting)	24	23,1	130	23,2
sum	104	100	560	100

* compared to the total number of respondents.

** compared to the total number of GreenLight Partners.

Private Partners generally have introduced indoor lighting efficiency measures. Public Partners have applied energy saving measures to both interior and open spaces (i.e. Street Lighting). Among the business sectors with a significant number of Partners, public Partners with indoor lighting projects and Partners with hotel/restaurant upgrades are rather underrepresented, while private Partners involved in Production are somewhat overrepresented in the survey. Apart from these small deviations, the survey sample represents well the distribution of sectors in the GreenLight Programme as a whole.

8.3. Results

8.3.1. Motivation

Most of the Partners had different motivations for joining the GreenLight Programme. The highest motivation was saving energy/costs, followed by improving lighting quality and raising in-house environmental awareness³⁷. Improving the environmental image of the organisation as well as executing a general renovation³⁸ which includes a renovation of the lighting system were considered to be slightly lower motivations for joining the GreenLight Programme (Table 8.3 and Figure 8.2). Other kinds of motivation did not occur as frequently (less than 6% of the reported motivations). These included:

- use of participation in the GreenLight Programme as a marketing tool,
- congruence with similar partnerships or network activities,
- increased safety (street lighting under adverse weather conditions).

³⁷ In-house awareness in this survey meant to raise the environmental awareness of the organisation's personnel.

³⁸ General renovation in this survey meant the lighting project was done as a part of a larger project to renovate the facility.

Table 8.3. Partners' motivation (overview of the responses)

Question 1	responses	total			%		
		higher	lower	m.v.	higher	lower	m. v.
1.1 energy savings / cost reduction	92	91	1	12	88	1	12
1.2 improvement of lighting quality	92	69	23	12	66	22	12
1.3 inclusion of lighting in a general renovation	89	52	37	15	50	36	14
1.4 raising in-house awareness	92	62	30	12	60	29	12
1.5 improvement of environmental image	86	70	16	18	67	15	17
1.6 other	6	6	0	98	6	0	94
comment 1	9			95			91

m.v.: missing value

The results show that energy savings and cost reduction are the most important motivations followed by improvement of environmental image, lighting quality and in-house environmental awareness. However, requirements for a general renovation seem to be a weaker motivation for participation in the GreenLight Programme. According to more than one third of the responses, this factor was evaluated of lower importance, mostly without any further comments.

Partners who stated a lower motivation in one of the categories in Question 1 generally meant it;

- a) compared to other categories, or
- b) compared to the state before introducing the energy saving measures (e.g. existing good and/or energy-efficient lighting, high environmental image already before the upgrade).

Almost half of the Partners who stated lighting quality to be a less significant motivation were involved in Street Lighting or Retail (10 out of 23 responses, Table 8.3, column 4).

Most of the Partners who attributed lower motivation to the lighting retrofit being a part of a general renovation (20 of 37 responses) were providers of street lighting (6 responses), educational institutions (5 responses) and producers (9 responses), shown in Table 8.3 column 4). This may suggest that joining the GreenLight Programme does not appeal to potential Partners doing a lighting retrofit as part of a general renovation.

Environmental image seems to be an important co-driver whenever energy/cost reduction, lighting quality, general renovation or in-house awareness are deemed to be higher motivations. The strongest linkage between any of the items in Question 1 refers to in-house awareness *and* environmental image (48 from 62 respondents, i.e. 77% indicated both in-house awareness *and* environmental image as highly important; one fourth of them are involved in Street Lighting).

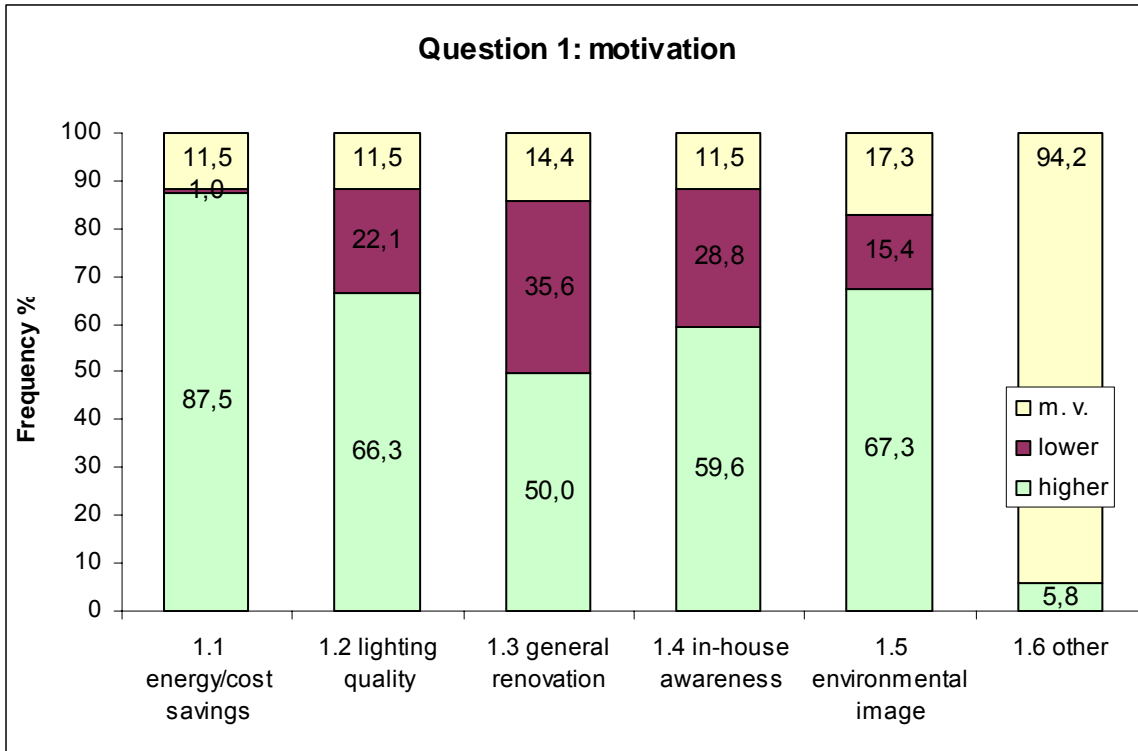


Figure 8.2. Partners' motivation (item frequencies)

m.v.: missing value

A small part of the responses, i.e. approx. 6%, provided additional items of motivation. The compilation of those responses showed that having an additional tool for improved marketing, building networks with important stakeholders (e.g. National Contact Points, other Partners) or raising safety (Street Lighting) were important motivations.

8.3.2. Barriers

Responses to Question 2 indicate that cost estimation was perceived differently from all other types of possible barriers to implement energy efficiency measures (Table 8.4 and Figure 8.3). Whereas technical, management and end-use problems were not deemed important barriers (with each of these items answered negatively in at least 64% of the responses), the estimation of costs and benefits was a problem for almost half of the respondents (46 from 94 responses, i.e. 44%). Several of these responses were delivered by “big” Partners, i.e. private companies with energy savings exceeding 500 MWh per year (7 responses) and providers for street lighting (4 responses from Partners who saved more than 1.4 GWh per year). The comments revealed that many Partners were not certain about their cost-benefit analysis or found it to be too time and resource consuming. There was a strong correlation between Partners who perceived cost estimation barriers and Partners who had multiple facilities and/or lacked a submetering system.

Table 8.4. Perceived barriers (overview of the responses)

Question 2	responses	Total			%		
		yes	No	m.v.	yes	no	m.v.
2.1 estimation of costs and benefits	94	46	48	10	44	46	10
2.2 understanding technical implications	94	23	71	10	22	68	10
2.3 persuasion of senior management	92	22	70	12	21	67	12
2.4 understanding implications for personnel, users	87	23	64	17	22	62	16
2.5 other	5	5	0	99	5	0	95
comment 2	55			49			47

m.v.: missing value

All Partners who stated problems with cost estimation, deemed energy and cost reduction (Question 1.1) as an important factor for motivation. With few exceptions, almost all of these Partners (41 from 46 responses) have shown finally to be satisfied (23 responses) or very satisfied (18 responses) with the whole GreenLight Programme according to Question 6 (see below).

Fourteen from the 22 responses (65%) that refer to persuasion of senior management as a barrier come from public organisations, particularly municipalities responsible for street lighting and schools. This may indicate that public decision-makers show less flexibility or need more time to develop and implement efficiency measures.

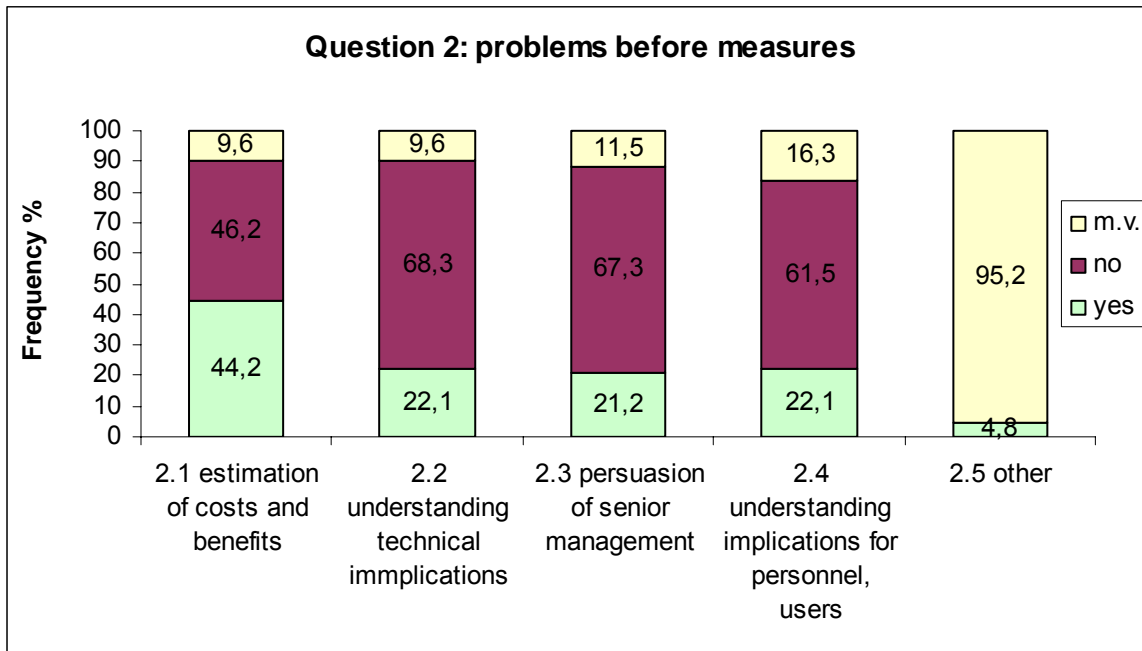


Figure 8.3. Barriers (item frequencies)
m.v.: missing value

A factor not explicitly included in Question 2, financing the project, may actually be behind some of the responses regarding barriers. Six from the 46 Partners (Table 8.4, column 3, row 3) indicated that financing the project *per se* was the main barrier instead of the estimation of costs and benefits. To put it another way, Partners found it difficult to find sufficient financial resources for the project.

Regarding interrelated barriers, the strongest linkage may exist between persuasion of senior management *and* understanding the implications for facility users (10 from 22 responses, i.e. 45% combined responses). A further strong linkage seems to occur between problems with cost-benefit estimation *and* understanding technical implications (40% combined responses).

8.3.3. Commitment

Approximately 72% of the Partners responded that they would have improved lighting efficiency independent of the GreenLight Programme (76 from 104 responses). However, most of them emphasised the added value of the GreenLight activity. It was felt, that implementation of the lighting efficiency project was enhanced by becoming or remaining a Partner in the GreenLight Programme. The further stated that the GreenLight Programme offers a sound technical and economic framework for project development and is properly focused on promoting and marketing lighting energy efficiency.

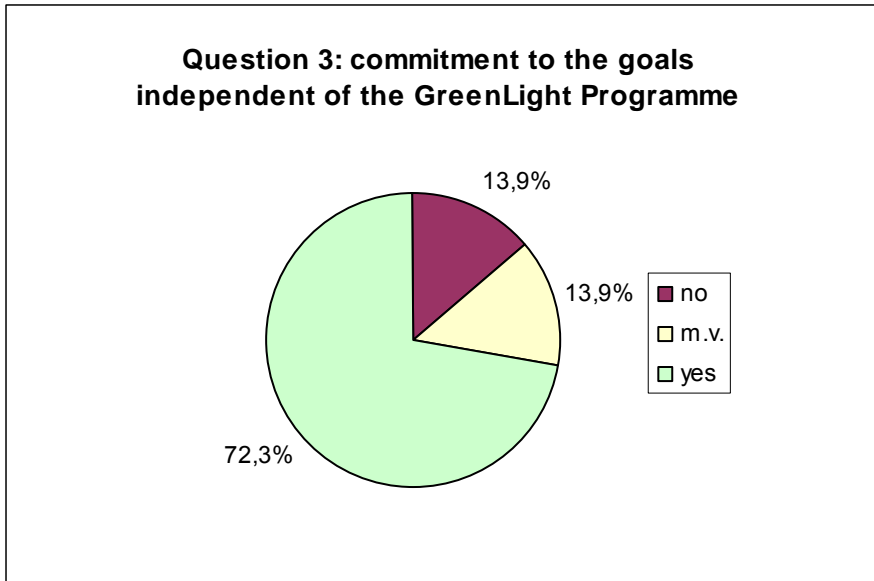


Figure 8.4. Commitment to energy efficiency (item frequencies)
m.v.: missing value

Nevertheless, introduction of lighting efficiency measures was for 14 respondents (approx. 14% of the responding Partners) possible *because* of the GreenLight Programme. In terms of satisfaction with their lighting projects, their responses show that all these Partners were satisfied or very satisfied with the project outcomes (according to Question 5). Eight of the satisfied Partners indicated that they would consider implementing other energy efficiency projects, e.g. by participating in the GreenBuilding Programme (“yes” according to Question 6.3). The other five Partners were not opposed to other energy efficiency projects, but did not indicate a positive willingness to pursue these projects (“perhaps” according to Question 6.3).

8.3.4. Benefits

With respect to any of the aspects studied here; energy savings, cost reductions, lighting quality, in-house awareness, environmental image, and other; benefits were deemed in more than 75% of the responses to be the same or higher than initially expected (Table 8.5, Figure 8.5). Less than 4% of the responses deemed benefits were lower than expectations from 2 response items; energy/cost savings and lighting quality. The study of these responses shows that, although these benefits were lower than expected, except for a single case, the Partners were satisfied with the results and would not refuse to undertake similar activities in the future (answers to Question 5 and Question 6).

Table 8.5. Partners' benefits (overview of the responses)

Question 4	Responses	Total				%			
		higher	same	lower	m.v.	higher	same	lower	m.v.
4.1 energy savings	90	35	52	3	14	34	50	3	13
4.2 cost reduction	88	35	49	4	16	34	47	4	15
4.3 improvement of lighting quality	91	36	52	3	13	35	50	3	13
4.4 raising in-house awareness	92	44	40	8	12	42	38	8	12
4.5 improvement of environmental image	88	47	31	10	16	45	30	10	15
4.6 other	3	3	0	0	101	3	0	0	97
comment 4	47				57				55

m.v.: missing value

Higher benefits than initially expected were stated in regard to in-house environmental awareness (44 from 92 responses) and environmental image (47 from 88 responses). This may suggest that “soft” criteria such as environmental awareness and image may be underestimated at the beginning of the planning process. Even if, as will be shown later, private Partners who initially focus their decision making activities for lighting efficiency on quantitative economic targets (savings), they may eventually

recognise that the non-economic benefits of the project have a significant positive impact on their organisation; and also the customers and users of their products or services.

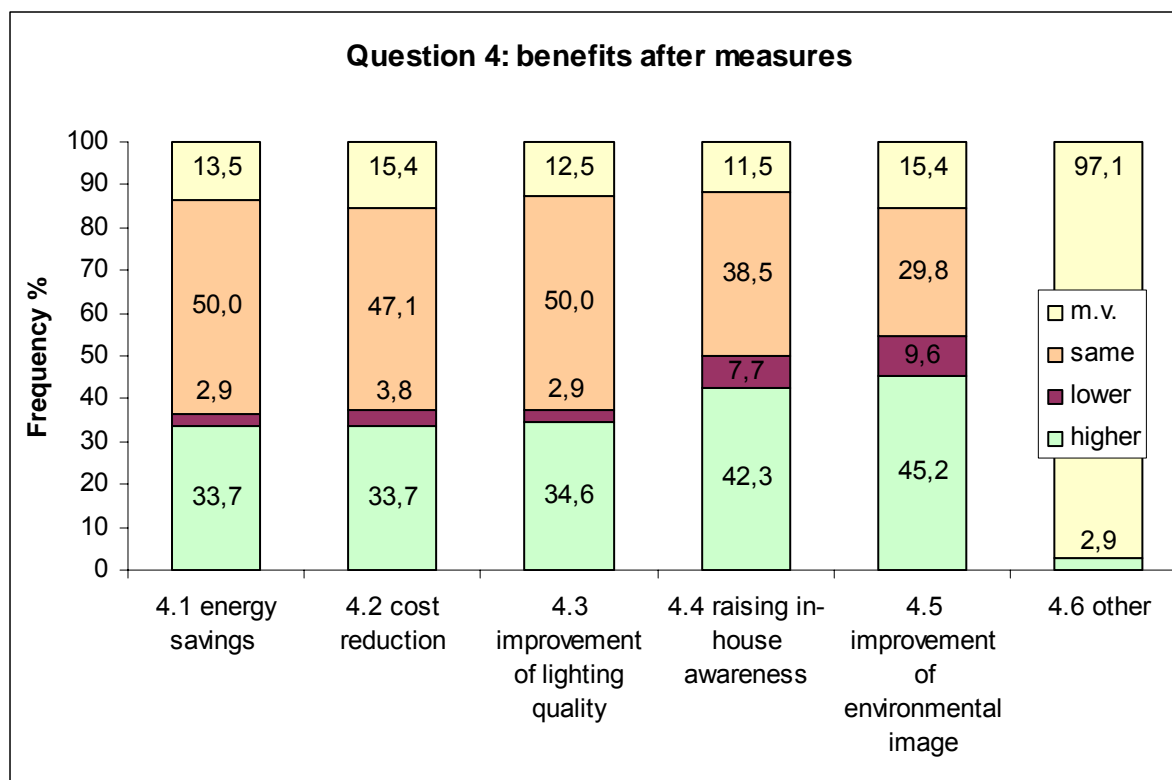


Figure 8.5. Partners' benefits (item frequencies)

m.v.: missing value

Analysis of the data shows a small cluster of Partners (eight responses) who assessed any project outcome benefit as “same” or “lower”. Whereas benefits for savings or lighting were same as, benefits for in-house awareness or environmental image were lower than initially expected. However, even these Partners who assessed a lower benefit from the project were generally satisfied with the project (according to Question 5). This cluster is mainly composed of Partners who have more recently joined the GreenLight Programme. It may be assumed that these Partners have less experience with energy efficiency projects so may feel uncertain about the future outcomes of their projects.

8.3.5. Satisfaction

The survey shows a very positive picture of the light efficiency projects under the auspices of the GreenLight Programme. More than 84 of the responding Partners were satisfied with the results after introducing energy efficiency measures with respect to implementation cost, technical improvements and general acceptance from personnel, users, and customers (Table 8.6, Figure 8.6).

Table 8.6. Partners' satisfaction (overview of the responses)

Question 5	responses	Total			%		
		yes	no	m.v.	yes	No	m.v.
5.1 implementation costs	91	88	3	13	85	3	13
5.2 technical improvements	91	85	6	13	82	6	13
5.3 acceptance from personnel, users	90	84	6	14	81	6	13
5.4 other	6	6	0	98	6	0	94
comment 5	41			63			61

m.v.: missing value

The comparative analysis of responses to Question 2 and 5 shows that more than 83% of the Partners who encountered barriers before introduction of new measures (Table 8.4, column 3) were satisfied with the results of their project (Table 8.6, column 3):

- 43 from 46 responses (93%): satisfaction with implementation cost after encountering problems with estimating costs and benefits;
- 19 from 23 responses (83%): satisfaction with technical improvements after encountering problems with understanding technical implications;
- 19 from 22 responses (86%): satisfaction with acceptance from personnel, users and customers after encountering problems with persuading senior management.

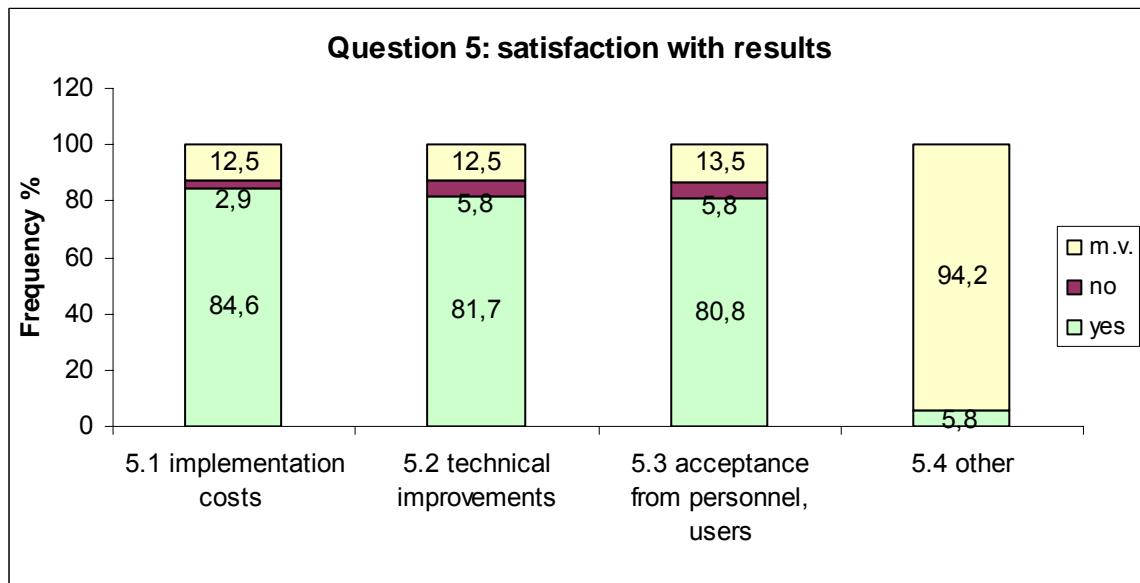


Figure 8.6. Partners' satisfaction (item frequencies)

m.v.: missing value

Partners who were indifferent to the barriers of cost estimation, technical understanding and acceptance from their organisation (“no” according to Question 2) were satisfied with the final results too. There were a few exceptions to this. Three to four Partners were not satisfied particularly with implementation costs, technical improvements or acceptance after introduction of measures, even though they had not encountered problems with these aspects beforehand. Still, even these Partners generally evaluated the GreenLight Programme positively (see the overall evaluation below).

8.3.6. Overall evaluation

Question 4 and 5 refer to distinct aspects of the project outcomes and the evaluation of those outcomes. Question 6 addresses the evaluation of the GreenLight Programme as a whole. Responses to Questions 4, 5 and 6 are correlated to the extent that the majority of the responding Partners recognised the benefits of the GreenLight Programme and evaluated them positively. On the basis of their experiences with their light efficiency projects, 88% of the responding Partners declared that they are satisfied (53 from 104 responses, 51%) or very satisfied (34 from 104 responses, 37%, Figure 8.7). Only one Partner, a large retailer, was dissatisfied with the GreenLight Programme.

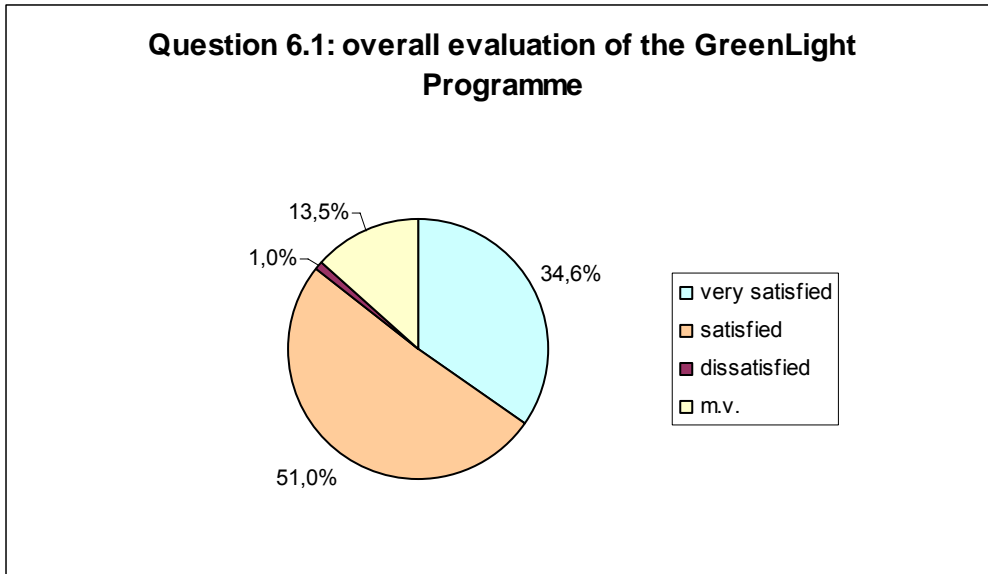


Figure 8.7. Partners' evaluation of the GreenLight Programme (item frequencies)
m.v.: missing value

The percentage of missing values for the questions of the Questionnaire seemed to be consistent across all of the questions. In regard to the specific case of Question 6.1, the missing values account for approximately 13% of the responses ($n = 104$). A similar percentage of missing values occurred for all other Questions of the Questionnaire (see Table 8.3-Table 8.6 and Figure 8.2-Figure 8.7).

There were 9 Partners (approximately 8.5% of all respondents) who did not respond to the Questionnaire but filled in the Annex only. A content analysis of their responses indicates that these Partners were not dissatisfied with the GreenLight Programme.

Question 6.2 addressed possible improvements of the GreenLight Programme and was answered by 61 Partners. A content analysis of these responses is summarised in the following recommendations:

- stronger public communication of the GreenLight Programme, to include the use of media such as the internet, television, papers, JRC reporting (21 responses),
- enhancing networking and information dissemination for participating Partners, via bulletin news, admission-free conferences, best practice seminars (14 responses),
- continuing the GreenLight Programme or integrating it into the GreenBuilding Programme (3 responses),
- offering technical advice and support for the Partners (3 responses),
- offering financial support and incentives (2 responses),
- specific improvement measures, such as upgrading the GreenLight Programme website, integrating an online registration procedure, simplifying the reporting of project performance, providing more efficient tools to enhance the participation of facility owners.

From these comments it can be seen, that Partners strongly support promotion of the GreenLight Programme and encourage programme communication in two main directions: towards the public and within the Partners' network.

The success of the GreenLight Programme can be further deduced from the willingness of the Partners to start new projects with similar scope. Answers to Question 6.3 show that about one third of the Partners would consider participating in other energy efficiency programmes, like the GreenBuilding Programme (Figure 8.8).

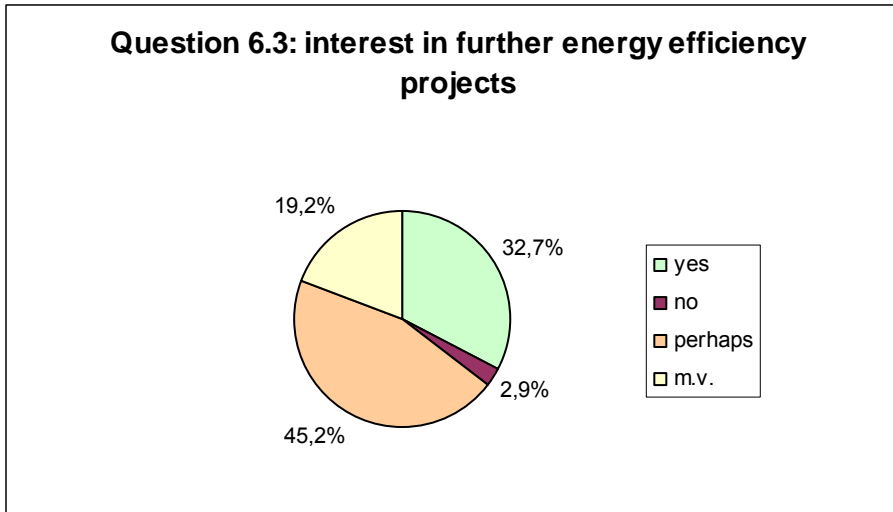


Figure 8.8. Partners' outlook (item frequencies)
m.v.: missing value

However, almost half of the participating Partners showed reservation (answer “perhaps”) and further 19 Partners (18%) did not respond to this Question. Almost all of the 47 Partners responding with “perhaps” were satisfied or very satisfied with the GreenLight Programme (Question 5). However, according to Question 4, their perceived benefits were not higher than initially expected. Particularly:

- 61% of these Partners (29 from 47 “perhaps”-responses) found project benefits in terms of in-house awareness as equal to what they had expected.
- Also 38% of them (18 from 47 “perhaps”-responses) found benefits with respect to energy/cost savings or lighting improvement same as or lower than what they had expected.

Approximately 80% of these Partners (38 from 47 responses) entered the GreenLight Programme after 2006, which may indicate that new Partners will probably need some time in order to be more certain about the success of their project and the reasoning for similar activities in the future.

8.3.7. Public and Private Partners

As Table 8.2 shows, there is an almost symmetrical distribution between private and public Partners in the survey (respectively 52 and 48%). The analysis presented above generally applies to both groups with few exceptions that will be highlighted in the following comments.

Regarding private Partner motivations for participating in the GreenLight Programme, two items of responses were reported as reasons to be less motivated to participate: (Question 1.3) including efficient lighting in a general renovation and (Question 1.5) improvement of environmental image. The analysis of the responses shows that 14 of 30 responses (62%) had a lower motivation to participate by including energy efficient lighting in a general renovation; and 10 of 16 responses (63%) had a lower motivation to participate because of improvement of their environmental image (Table 8.3, column 4).

For public Partners and barriers to participating in the GreenLight Programme, two items of responses were reported as barriers to participation; (Question 2.3) persuasion of senior management and (Question 2.4) understanding project implications for personnel, users or customers. The analysis shows that 14 of 22 respondents (64%) perceived the persuasion of senior management to be a barrier and 13 of 24 respondents (57%) perceived the understanding of project implications for personnel, users, and customers to be a barrier (Table 8.4, column 3). More than 50% of those public Partners are involved in outdoor lighting (Street Lighting).

Regarding GreenLight Programme benefits due to improved lighting quality from an energy efficiency lighting project, the data shows that public Partners perceived a greater benefit. From the 36 organisations who felt that lighting quality was actually higher than initially anticipated, 21 come from

the public sector, whereas 15 come from the private sector (Table 8.5, column 3, i.e. 60% against 40% private operation). More than half of the public projects (11 from 21 responses) are Street Lighting upgrades. This implies that improvement of lighting quality may be a more significant benefit for open public spaces than for indoor applications.

As noted in section 9.3.4, Partners found the benefits of participating in a lighting project within the GreenLight Programme to be higher than initially expected with respect to raising in-house environmental awareness. Notably, this applies particularly to private Partners (25 from 44 responses (57%), Table 8.5, column 3).

Regarding future lighting projects and participation in the GreenLight Programme (Question 6.3), there was a mixture of results. More than half of the public Partners with street lighting were satisfied with the results of their project but not certain whether they would participate in similar efficiency projects in the future (answered “perhaps” to Question 6.3). Even though both public and private Partners positively evaluated the GreenLight Programme, their interest in further energy efficiency projects and programme participation (i.e. the GreenBuilding Programme) seems to be different. Almost 60% of the “yes” answers to Question 6.3 were dominated by public Partners (14 from 34 responses with “yes”). For private Partners, the majority (60%) answered with “perhaps” (29 from 47 responses).

8.4. Summary

On the basis of the responses to Questions 1 through 6, the basic conclusions may be summarised as follows.

At the beginning of the GreenLight Programme participating Partners generally

- were highly motivated with respect to energy/cost savings,
- were very committed to improving lighting efficiency,
- perceived estimation of costs and benefits a bigger barrier in comparison to understanding technical implications or persuasion of senior management.

After implementation of the project participating Partners generally

- were satisfied with project outcomes, which included implementation costs, technical improvements, acceptance from personnel, users and customers,
- evaluated the whole GreenLight Programme positively.

The sample of Partners studied here amounts to about one fifth of the Partners (104 from 560 Partners³⁹). The distribution of countries in the sample is similar to the distribution of the entire population. The distribution of project types is also similar to that of the entire population, except for small deviations in some categories (Public Buildings and Hotels/Restaurants are weaker, while Production is stronger represented in the survey). To this extent there is the possibility of minor variances from Partner comparisons presented in this report. But in the response cases where the analysis strongly shows a clear trend or outcome, the resulting conclusions are significant and valid.

There is a need for further research in the GreenLight Programme participant motivations and barriers. Evidence gained through this survey suggests some trends that should be further investigated in the future:

- Regarding motivation for Partners to participate in the GreenLight Programme, environmental image seems to be an important co-driver whenever the Partner has motivations to pursue energy savings, cost reductions, improvements of lighting quality, or raising in-house awareness.
- Participating in the GreenLight Programme does not seem to be related to doing a lighting retrofit as part of a general renovation. The motivations of the larger general renovation project may override the motivations of the lighting retrofit part of the project.

³⁹ As at the end of the survey period.

- Estimation of costs and benefits may be a problem for some Partners. Many of the responses which indicated this factor as a barrier were delivered by “big” Partners, i.e. private companies with energy savings exceeding 500 MWh per year (7 responses) and providers for Street Lighting (4 responses from Partners who saved more than 1.4 GWh per year). Some Partners were uncertain about their cost-benefit analysis, or found it to be too time and resource consuming.
- Whereas the estimation of costs and benefits and the persuasion of senior management may impede the development of an energy efficient lighting project, financial and/or budget limitations are real barriers.
- Frequently, in-house environmental awareness and the Partner’s environmental image seem to be a higher benefit than initially expected. In other words, “soft” criteria such as environmental awareness may be underestimated at the beginning of the planning process. While Partners focus their activity for lighting efficiency on quantitative targets (energy savings, cost reduction) at early project phases, they (particularly private Partners) may eventually realize that the non-energy savings benefits have a positive impact on their organisation; including customers and users of their products or services.
- Improvement of lighting quality may be a more important benefit for open spaces than for indoor applications.
- Partners, who have recently joined, will probably need a period of time in order to accept the successful outcomes of their project, and then internalize the reasoning for engaging in similar energy savings projects in the future.

9. Conclusion

This report gives an evaluation of the GreenLight Programme, a voluntary non-residential energy efficiency programme of the European Commission, aimed at stimulating increased investment into efficient lighting in a visible manner. The report shows how successful the GreenLight Programme was during the period 2000-2008 and includes recommendations for the European Commission regarding the future. These recommendations could serve well for other voluntary energy efficiency programmes too.

The energy savings and technology changes reported by the Partners participating in the GreenLight Programme provide a good view of the energy savings that are available to facility owners and managers. The financial, productivity, environmental, and technical reasons for implementing more energy efficient lighting technologies are strong. The cost savings from these lighting projects provide significant financial incentives, the improvements in lighting quality provide productivity enhancements in the workplace and safer lighting in public areas, the reduction in energy use reduces the environmental footprint of public and private sector organisations in Europe, and the new technologies are more reliable and have more options for the control of energy use.

There were some challenges in evaluating the GreenLight Programme since the programme's start in 2000. The most significant barrier in the evaluation of the GreenLight Programme is how to make the reporting process more efficient so that the quality of the data reported remains high, the programme provides a good view of technology changes in Europe, and Partners are adequately encouraged to continue implementing energy efficient lighting within the programme. Although sufficient Partners reported in a reasonable time for this report, more timely participation would improve the basis of the report and assure the European Commission that those who join the GreenLight Programme receive the full benefits of the programme. The tools to improve the data reporting are strengthened thanks to the activities of the National Contact Points, who play an important role in the management of the GreenLight Programme.

Communication with Partners through the National Contact Points is more efficient. They share the same language and often establish direct contact with interested organisations already prior to their application for a GreenLight Partner status.

Even if data is missing for a number of Partners, a main outcome of this evaluation is that by the end of 2008 Partner number and energy savings reported within the GreenLight Programme have doubled with respect to 2005. This could be achieved only with participation of Partners from the New Member States, who contributed significantly to saving energy in total and per Partner as well.

Bulgaria is a perfect example for this. Seven Bulgarian Partners joined the GreenLight Programme in two years, saving 10.6 GWh/year in total. All the Bulgarian Partners – just like any other Partner from the New Member States - reported on their savings. One Bulgarian Partner saved 1.5 GWh/year on average. This is the third highest saving per Partner within the GreenLight Programme. The relative savings per one Bulgarian Partner are 52% on average, compared to the level of energy use before executing the energy efficiency project. This example demonstrates well that there is great potential for investing in energy efficiency in the New Member States which shall be exploited.

Partners from the New Member States started to join the GreenLight Programme in 2006⁴⁰, when New GreenLight was launched. New GreenLight was very successful, bringing many new Partners through the respective National Contact Points to the GreenLight Programme.

As for the whole GreenLight Programme, Italy is the country with the highest number of Partners and the highest total savings. This can be strongly linked to the fact that the GreenLight Programme administration is based in Italy. At the start of the GreenLight Programme, many Italian organisations have been approached regarding a possible participation. An outcome of this activity is that there is a number of Italian Partners with high savings. The retail chain Coop for example reported energy savings of 30.5 GWh/year by the end of 2008. Due to this, the highest savings were achieved in Retail.

⁴⁰ There is only one exception: the first Slovenian Partner joined in 2003, followed by other Partners from 2007 onwards.

As for the technological changes, appropriate strategies for developing lighting energy efficiency projects for most Partners are converting mercury vapour lamps to more efficient lamp types, converting older fluorescent lamps and ballasts to T5 lamps and electronic ballasts, implementing daylighting controls where possible, and installing timing controls to shut off lights when the building is unoccupied. These strategies are not complicated to implement and typically generate the most energy savings.

According to the results of the survey conducted among the Partners in 2008/2009 on the evaluation of the GreenLight Programme, 14% of the respondents stated that they would have not introduced energy efficiency measures without the GreenLight Programme. Partners expressed a clear need for further promotion of the GreenLight Programme towards the public and within the Partners' network.

The constant growth of the Partners' network, the outcomes of the survey and those of New GreenLight underpin the need and success of wider promotional activities.

Based on the analysis of the expansion of the GreenLight Programme in this report and the responses of Partners to the survey conducted, recommendations to the European Commission and the Joint Research Centre for a more widespread and smoother running GreenLight Programme may be summarised as follows:

- More publicity. Possible means: stronger public communication through the internet, television, conferences, papers, reporting. Newsletters, promotional materials, technical support and advice to Partners, best practice seminars. Participation of the National Contact Points could be of crucial importance.
- Application and reporting should be possible online. This would ensure a smoother expansion of the GreenLight Programme by speeding up the application process on both ends. On the one hand, online forms make it possible to require all the necessary information from the applicant before being able to submit the application. On the other hand, it eases the administration: if forms are filled in properly, there is no need to contact the applicants for additional information.
- New Partners should be accepted only if data on the achieved energy savings is submitted together with the application. This would eliminate the problem of missing data which has two benefits: Partners would not need to be contacted regarding data on energy savings and an evaluation of the savings could be done easier based on a larger dataset. In addition, an online reporting form gives the possibility of controlling the data provided in real time, i.e. while the applicant is filling in the reporting form. Any inconsistencies can be pointed out, moreover, clearing existing incongruities can be made a precondition for submitting the reporting form.
- Partners should be required to upgrade their lighting system through reasonable time periods keeping up with lighting technology improvements otherwise they could drop out of the GreenLight Programme. Many Partners implemented one lighting refurbishment and joined the GreenLight Programme. After that particular refurbishment only a few Partners (e.g. Athens International Airport) planned or executed further lighting efficiency improvements in the same facilities. Lighting technology changes over time and becomes more and more efficient. It is reasonable to say that in order to maintain an efficient lighting system technological changes shall be followed. Thus, it seems reasonable to require Partners to refurbish their lighting system after a certain time. The optimal method for determining the frequency of upgrades to the lighting system was not discussed in this report. This could be a subject of further research. It shall be noted that since the GreenLight Programme is a voluntary programme, expanding the obligations of Partners harbours the risk of non-compliance. However, this particular recommendation is aimed at encouraging Partners to continue investing in energy efficiency by adding a reasonable extra requirement. Public recognition under the aegis of the GreenLight Programme shall be offered to Partners who earn it.

10. References

- [BER2002] Berrutto, V., Bertoldi, P. 2002. "Second-year assessment of the European GreenLight programme". In: Proceedings of the International Conference on Improving Electricity Efficiency in Commercial Buildings (Nice, France, May 2002), pp.535-541. Editor: ADEME.
- [BER2005] Bertoldi, P., Ciugudeanu, C.N. 2005. "Five Year Report of the European GreenLight Programme". In: EC, DG JRC, Institute for Environment and Sustainability, Renewable Energies Unit, EUR 21648, Ispra.
- [EGL2009] www.eu-greenlight.org. Official website of the European GreenLight Programme.
- [ENA2009] www.energyagency.at. Official website of the Österreichische Energieagentur.
- [ESN2009] www.esconet.it. Official website of ESCO NET.
- [ETP2009] www.etaplighting.com. Official website of ETAP Lighting.
- [EUX2009] <http://www.euroluxag.de> Official website of eurolux AG.
- [FIN2009] www.fines.be. Official website of Fines N.V.
- [JIS2009] www.ijs.si. Official website of the Jožef Stefan Institute.
- [NGL2009] New GreenLight. A project supported by the Intelligent Energy Europe Programme. http://ieea.erba.hu/ieea/page/Page.jsp?op=project_detail&prid=1644.
- [NGR2009] Project no. EIE / 05 / 192 / SI2.419684 New GreenLight. The European GreenLight Programme in New Member States. Final Technical Implementation Report (FR). 2009. Internal Communication.
- [REV2009] www.reverberi.it. Official website of Reverberi Enetec srl.

11. ANNEX

I. Calculation methods

I.I. Annual energy savings

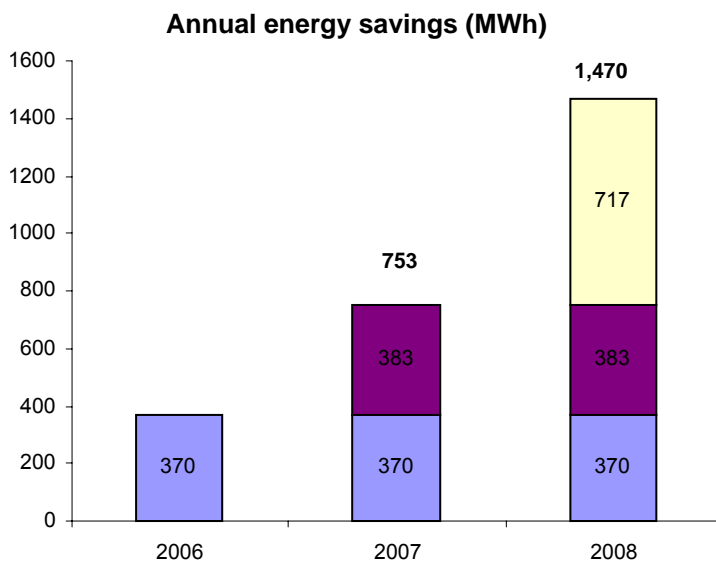
The calculation of annual energy savings will be demonstrated through the example of the GreenLight Partner Robert Bosch FRANCE S.A.S, who upgraded the lighting system in its buildings of the site de Rodez.

The Partner modernised the lighting in five buildings, in more steps. These are referred to as “part 1”, “part 2” and “part 3” in the table below (Table I.1).

In the framework of part 1, Bosch upgraded one building, gaining an energy saving of 370 MWh in the year 2006. This is the annual energy saving for 2006. This saving of 370 MWh/year is regarded as being present in 2007 and 2008 as well (second row in Table I.1). Therefore, taking into account the saving of 2006 only, for the purposes of this report the annual saving by the end of 2008 would be 370 MWh/year.

Table I.1. Annual energy savings (MWh) of GreenLight Partner Robert Bosch FRANCE S.A.S

	2006	2007	2008
<i>part 1</i>	370	370	370
<i>part 2</i>		383	383
<i>part 3</i>			717
sum	370	753	1 470



However, Bosch continued the energy saving measures in 2007 as well and upgraded one further building (“part 2”), saving an additional 383 MWh that year. Therefore, the energy saving of 2007 equals this 383 MWh plus the saving of the year before, 370 MWh. This gives a saving of 753 MWh for 2007. If Bosch did not implement any further savings, the annual savings by 2008 would have been 753 MWh as well. Yet, with “part 3”, the Partner upgraded three further buildings, thereby saving additionally 717 MWh in 2008. This adds up to an annual saving of 1,470 MWh by the end of 2008 (see also Figure I.1).

Figure I.1. Calculation of annual energy savings

I.II. Average energy savings

A. To calculate the average energy savings (MWh/year) per Partner per country, the following formula was used:

$$\frac{\text{Total savings per country}}{\text{Number of Partners in that country} - \text{Number of Partners with no data on energy savings in that country}}$$

Example:

In the case of Austria, the numerator was 3,136,505 kWh which was then divided by the denominator 25-12=13 giving an average saving of 241,270 kWh per Partner. This means that in Austria one

Partner saved on average 241 MWh on its energy consumption, compared to the level of energy consumption before the lighting system's modernisation.

B. To calculate the average energy savings (MWh/year) per Partner per category, the following formula was used:

$$\frac{\text{Total savings per category (public+private sector)}}{\text{Number of Partners in that category (public+private sector) – Number of Partners with no data on energy savings in that category (public+private sector)}}$$

Example:

In the case of Airports, the numerator was 5,217,924 kWh which was then divided by the denominator 4-0=4 giving an average saving of 1,304,481 kWh per Partner. This means that in the case of Airports, one Partner saved on average 1,304 MWh on its energy consumption, compared to the level of energy consumption before the lighting system's modernisation.

I.III. Relative energy savings

A. To calculate the relative energy savings (%) per Partner per country, the following formula was used:

$$\frac{\text{Total energy savings per country for Partners where data for energy consumption before the upgrade was available}}{\text{Total energy consumption before the upgrade per country}}$$

It shall be noted that data on the energy savings was available in each case where the data for energy consumption before the upgrade was available.

Example:

In the case of Austria, the numerator was 1,947,505 kWh which was then divided by the denominator 6,832,858 giving a relative saving of 28.50% per Partner. This means that in Austria one Partner saved on average 28.5% on its energy consumption, compared to the lighting system's state before modernisation.

B. To calculate the relative energy savings (%) per Partner per category, the following formula was used:

$$\frac{\text{Total energy savings per category (public+private sector) for Partners where data for energy consumption before the upgrade was available}}{\text{Total energy consumption before the upgrade per category (public+private sector)}}$$

It shall be noted that data on the energy savings was available in each case where the data for energy consumption before the upgrade was available.

Example:

In the case of Airports, the numerator was 5,217,924 kWh which was then divided by the denominator 9,483,332 giving a relative saving of 55.02% per Partner. This means that in the case of Airports, one Partner saved on average 55.02% on its energy consumption, compared to the lighting system's state before modernisation.

I.IV. Simple payback

For calculating the simple payback of the energy efficiency investment, the following formula is used:

$$\frac{\text{Total investment (EUR)}}{\text{Annual cost savings deriving from the annual energy savings (EUR/year)}}$$

This gives the number of years during which the investment is paid off by the project. This is a simple payback, as no discount factor is used in the calculation.

II. Abbreviations

Countries	Branches
<i>AT</i> Austria	<i>A</i> Airports
<i>BE</i> Belgium	<i>C</i> City, municipality: Public Buildings
<i>BG</i> Bulgaria	<i>CP</i> Car Parks
<i>CH</i> Switzerland	<i>E</i> Educational Buildings: Schools / Universities / R&D centres
<i>CZ</i> Czech Republic	<i>HP</i> Hospitals
<i>DE</i> Germany	<i>HR</i> Hotels / Restaurants / Entertainment / Sport centres
<i>DK</i> Denmark	<i>O</i> Other
<i>ES</i> Spain	<i>OS</i> Open space: Street Lighting
<i>ET</i> Estonia	<i>P</i> Production
<i>FI</i> Finland	<i>PT</i> Public Transport: metro / train station
<i>FR</i> France	<i>R</i> Retail: super market / store / commercial centre / other
<i>GR</i> Greece	<i>S</i> Services: bank / insurance / consulting / construction services / other
<i>IT</i> Italy	<i>U/T</i> Utilities / Telecommunications / Oil/gas companies
<i>IE</i> Ireland	
<i>LV</i> Latvia	
<i>LT</i> Lithuania	
<i>NL</i> Netherlands	
<i>NO</i> Norway	
<i>PL</i> Poland	
<i>PT</i> Portugal	
<i>RO</i> Romania	
<i>SE</i> Sweden	
<i>SK</i> Slovakia	
<i>SL</i> Slovenia	
<i>UK</i> United Kingdom	
<i>M</i> Multinational company	

III.Survey (Questionnaire, Annex to the Questionnaire)



EUROPEAN COMMISSION
DIRECTORATE-GENERAL JRC
JOINT RESEARCH CENTRE
Institute for Energy
Renewable Energy Unit



GreenLight Programme - Status report 2009 Questionnaire

[1] What was your **motivation** to participate in the GreenLight Programme? Please highlight one of the brackets for each item below and give your comments.

To save energy and reduce costs [higher] [lower] motivation

To improve lighting quality [higher] [lower] motivation

To include improved lighting in a general renovation [higher] [lower] motivation

To raise environmental awareness in-house [higher] [lower] motivation

To improve environmental image for customers, visitors etc. [higher] [lower] motivation

Other

[2] What are the **problems / barriers** you have encountered **before** introducing efficiency measures? Please highlight one of the brackets for each item below, give your comments and/or some examples.

Estimation of overall costs and benefits [yes] [no]

Understanding technical implications (e.g. maintenance) [yes] [no]

Persuasion of senior management [yes] [no]

Understanding implications for personnel, users, customers (e.g. training, operation) [yes] [no]

Other

[3] Would you have taken **similar or the same activities** without participating in the GreenLight Programme? Please highlight one of the following brackets and explain why
[yes] [no] _____

[4] What are your main **benefits** by participating in the Programme in comparison with your anticipation? Please highlight one of the brackets for each item below and give your comments. Please enter quantitative data in the **Annex** of this Questionnaire.

Energy savings [more than] [less then] [approx. as much as] initially anticipated
Cost reduction [more than] [less then] [approx. as much as] initially anticipated

Improvement of lighting quality [more than] [less then] [approx. as much as] initially anticipated

Raising environmental awareness in your organisation [more than] [less then] [approx. as much as] initially anticipated

Improvement of environmental image for customers, visitors etc. [more than] [less then] [approx. as much as] initially anticipated

Other

[5] Are you satisfied with the results **after** introducing energy efficiency measures?
Please highlight one of the brackets for each item below, give your comments and/or some examples.

Implementation costs [yes] [no]

Technical improvements [yes] [no]

Acceptance from personnel, users, customers [yes] [no]

Other

[6] What is your overall **evaluation** of the European GreenLight Programme? Please highlight one of the brackets for each item below, and give your comments.

How **satisfied** are you with the achievements through this Programme?
[very satisfied] [satisfied] [dissatisfied]

What should be done to **improve** the Programme?

Could you consider implementing **other energy efficiency projects**, e.g. by participating in the GreenBuilding Programme? (<http://re.jrc.ec.europa.eu/energyefficiency>) [yes] [no] [perhaps]

IV. Winners of the GreenLight Awards

2003

1. Statoil (Norway)
2. Apoteket AB (Sweden)
3. Comune di Trezzano Rosa (Italy)
4. Lorentz Casimir Lyceum (the Netherlands)
5. Monte dei Paschi di Siena (Italy)
6. Neukauf Merz (Germany)

2004

1. Athens International Airport (Greece)
2. Carrefour Italia (Italy)
3. City of Hamburg (Germany)
4. City of Helsinki Educational Department (Finland)
5. City of Zurich (Switzerland)
6. Dolce & Gabbana (Italy and Germany)
7. Futebol Clube do Porto (Portugal)
8. Gemeente Sittard-Geleen (The Netherlands)
9. Groupe Casino (France)
10. DnBNOR ASA v/Vital Eiendom AS (Norway)

2005

1. San Paolo IMI (Italy)
2. Provincia di Reggio Emilia (Italy)
3. TIM (Greece) – today WIND
4. Auchan (France)
5. Q8 (Denmark)
6. Centocor (the Netherlands) – today SenterNovem
7. Halliburton (Norway);
8. EDP (Portugal)
9. McDonald's (Europe)
10. Wipark (Austria)

2006

1. City of Oslo (Norway)
2. COOP (Italy)
3. Gates Europe nv (Belgium)
4. Hospital Universitario Virgen de las Nieves de Granada (Spain)
5. Nyborg Municipality (Denmark)
6. Philips (The Netherlands)
7. Piraeus Bank (Greece)
8. Servicio Extremeno de Salud (Spain)
9. SP-Tråtek (Sweden)
10. Stadt Graz (Austria)
11. Stadt Frankfurt am Main Hochbauamt (Germany)
12. swb Netze Bremerhaven (Germany)
13. Vodafone Portugal (Portugal)
14. Zehnder Group Produktion Graenichen (Switzerland)

2008

1. Dumaplast NV (Belgium)
2. Stadsbestuur Sint-Niklaas (Belgium)
3. Municipality of Gorna Oryahovitsa (Bulgaria)

4. Zlin Municipality (Czech Republic)
5. Town of Kladno (Czech Republic)
6. Bic (France)
7. Communauté Urbaine de Dunkerque (France)
8. Kautex Textron GmbH (Germany)
9. Unicredit (Italy)
10. Comune di Piombino (Italy)
11. Kaunas Municipality (Lithuania)
12. Stadhuis Amsterdam (The Netherlands)
13. DSM (The Netherlands)
14. Instituto Superior de Engenharia do Porto (Portugal)
15. METROREX (Romania)
16. Parliament House (Romania)
17. PREDILNICA LITIJA d.o.o. (Slovenia)
18. TAIM-TFG S.A. (Spain)
19. Vattenfall Service Nord AB (Sweden)

V. GreenLight Partners at the end of 2008

1	"Oswietlenie Uliczne i Drogowe" sp. z o.o.	41	Board of Housing Partnership Bernardynska 20	81	Comune di Busso (CB) C/O
2	A/S "Latvijas balzams"	42	Bosch Usine de Rodez	82	Comune di Carbonia (CL)
3	A/S Valmieras Piens	43	Bright Special Lighting S.A.	83	Comune di Careri
4	Abita H2	44	BSGO "de Duizendpoot" As	84	Comune di Carlantino (FG)
5	Acroni, d.o.o.	45	BSGO 'Op het Boseind'te Maasmechelen	85	Comune di Casalciprano (CB)
6	ADEME Centre d'Angers	46	Bundesrealgymnasium Waidhofen an der Ybbs	86	Comune di Casalvieri (FR)
7	ADEME Centre de Sophia Antipolis	47	BVBA VANDEZANDE	87	Comune di Cava dei Tirreni (SA)
8	Advansa GmbH	48	Camara Municipal de Lisboa	88	Comune di Cerva(CZ)
9	Aeroporto G. Marconi di Bologna Spd	49	Camara Municipal de Montijo	89	Comune di Chianni (PI)
10	Aeropuertos Españoles y Navegación Aérea (AENA)	50	Camara Municipal de Oliveira de Azemeis	90	Comune di Colli A Volturmo (IS)
11	Agence de Maitrise d'Ouvrage des Travaux du Ministère de la Justice	51	Camara Municipal de Sintra	91	Comune di Costa Masnaga
12	Águas do Cávado, SA	52	Carrefour Hypermarchés SAS	92	Comune di Fagnano Olona (VA)
13	Ainazi Municipality	53	Carrefour Italia	93	Comune di Fauglia (PI)
14	Ajuntament de la Vila Reial de Benigánim (Valencia)	54	Centocor International	94	Comune di Ferrandina (MT)
15	Ajuntament de Torroella de Montgrí	55	Centrum Praha Jih – Chodov s.r.o.	95	Comune di Foiano di Val Fortore (BN)
16	Akademiska Hus I Göteborg AB	56	Christiaan Huygens College	96	Comune di Galatina (LE)
17	Alanod Aluminium Veredlung GmbH & Co KG	57	Cinkarna Celje, d.d.	97	Comune di Galatone (LE)
18	Alstom Power Generation, AG, Werk Bexbach	58	Citadis	98	Comune di Gerenzano (VA)
19	Arcor Flexibles Transpac	59	Citi - Barcelona Service Center (BSSC)	99	Comune di Giuggianello
20	Apoteket AB, Lokalenheten	60	Citigroup	100	Comune di Giuliano Teatino (CH)
21	Aquaquímica, Lda	61	Città di Cossato	101	Comune di Guagnano (LE)
22	Areva T&d AG	62	Città di Torino	102	Comune di Laino Borgo (CS)
23	ASRIR - Centre de Dialyse Michel Basse	63	City Hall Iasi	103	Comune di Laino Castello
24	Assedic Unedic	64	City of Harelbeke	104	Comune di Latiano (BR)
25	Athens International Airport	65	City of Helsinki, Education Department	105	Comune di Lecce dei Marsi (AQ)
26	Auchan France	66	City of Kamien Pomorski	106	Comune di Lenola (LT)
27	Ayuntamiento de Alfara del Patriarca	67	CNM Textil, a.s. – Oskava	107	Comune di Lomazzo (CO)
28	Ayuntamiento de Macastre	68	Coca Cola Enterprise	108	Comune di Luvinata
29	Ayuntamiento de Potries	69	COMET d.o.o.	109	Comune di Magisano(CZ)
30	Ayuntamiento de Sinarcas (Valencia)	70	Communaute Urbaine de Dunkerque	110	Comune di Marciana Marina (Livorno)
31	Azienda Sanitaria Locale n.3 Genovese	71	Commune de Saint Etienne de Crossey	111	Comune di Martignano (LE)
32	Bacau City Hall	72	Commune di Calimera (LE)	112	Comune di Martignano (LE)
33	Beerse Metaalwerken N.V.	73	Comune di Agerola(NA)	113	Comune di Melissano
34	Berlin - Rotes Rathaus	74	Comune di Aradeo (LE)	114	Comune di Mertano (LE)
35	BIC Conte	75	Comune di Arosio (CO)	115	Comune di Miggiano (LE)
36	Bicyclezone Dide Sport Bvba	76	Comune di Avetrana (TA)	116	Comune di Monopoli (BA)
37	Biofarmaceutika, LEK d.d. (Sandoz)	77	Comune di Belcastro(CZ)	117	Comune di Montalbano Jonico
38	Birstonas Municipality improvement service	78	Comune di Berchidda	118	Comune di Mormanno (CS)
39	Bispen AS	79	Comune di Brognaturo (VV)	119	Comune di Nardo' (LE)
40	Bloom S.r.o	80	Comune di Bugnara (AQ)	120	Comune di Parabita (LE)

121	Comune di Paterno	161	Coop Consumatori Nordest	201	Faculdade de Ciência e Tecnologia da UNL
122	Comune di Pico (FR)	162	Coop Estense s.c.a.r.l.	202	Fastighets AB Brostaden
123	Comune di Pietragalla (PZ)	163	Coop Liguria s.c.a.r.l.	203	Feira Nova Hipermercados, SA
124	Comune di Piombino	164	Coop Lombardia s.c.a.r.l.	204	Firmelbo S.A / Rolanatex srl
125	Comune di Polistena	165	Coop Unione Amiatina	205	Flanders Expo
126	Comune di Ripalimosani	166	Corbioli	206	Focsani City Hall
127	Comune di Rivignano (UD)	167	CRAIOVA Railway board branch	207	Fontanars dels Alforins
128	Comune di Roccadaspide (SA)	168	Dagda town Council	208	Forsvarsbygg, utbyggingsprosjektet - Osterdalen
129	Comune di Roccaraso (AQ) C/O	169	De Regie der Gebouwen Directie Antwerpen	209	France Telecom
130	Comune di Rolo	170	DECATHLON ESPAÑA S.A.U.	210	Freie und Hansestadt Hamburg
131	Comune di Ronco All'Adige (VR)	171	Den norske Bank ASA v/Vital Eiendomsforvaltning AS	211	Fundacion Reina Sofia
132	Comune di San Nicola Da Crissa (VB)	172	Department Onderwijs en Opvoeding Stad Gent	212	Furet du Nord
133	Comune di San Severino Lucano (PZ)	173	Det Norske Radiumhospital	213	Futebol Clube do Porto
134	Comune di Sanarica (LE)	174	DEVA Municipality	214	G.E.K. S.A.
135	Comune di Santa Croce Sull'Arno (PI)	175	Distribution Casino France - Branche Supermarchés et Hypermarchés	215	Gas Natural SDG S.A.
136	Comune di Sassari	176	DIZA ARQUITECTOS S.L.	216	Gates Europe nv
137	Comune di Secli' (LE)	177	Dolce & Gabbana S.p.a.	217	Gemeente Buggenhout
138	Comune di Senise (PZ)	178	Domingos da Silva Teixeira, SA	218	Gemeente Geetbets
139	Comune di Siculiana (AG)	179	Drom Fragrances International KG	219	Gemeente Heers
140	Comune di Simbario(VV)	180	DSM Netherlands	220	Gemeente Hoegaarden
141	Comune di Spongano	181	Ducati Motor Holding spa	221	Gemeente Lebbeke
142	Comune di Teggiano (SA)	182	Dumaplast NV	222	Gemeente Londerzeel
143	Comune di Terranova Da Sibari(CS)	183	Dunkin Española	223	Gemeente Sittard Geleen
144	Comune di Torella del Sannio (CB) C/O	184	E.ON Hanse AG	224	Gemeente Tervuren
145	Comune di Torre De Passeri (AQ)	185	EDF	225	Gemeentebestuur De Pinte
146	Comune di Trevi Nel Lazio (FR)	186	EDP Distribuicao-Energia, SA	226	Gemeentebestuur Maasmechelen
147	Comune di Trezzano Rosa	187	EMGO nv	227	Gemeentebestuur Merchtem
148	Comune di Trivigno (PZ)	188	ENATE enginyeria S.L.	228	Gemeentebestuur Zingem
149	Comune di Uggiano la Chiesa (LE)	189	Endesa S.A.	229	Gemeinde Alfter
150	Comune di Veglie (LE)	190	Energetika Vítkovice a.s.	230	Gemeinde Diex
151	Comune di Villa Castelli (BR)	191	Ente Regional de la Energia de Castilla y Leon	231	Gemeinde Feistritz ob Bleiburg
152	Comune di Villalago (AQ)	192	EROSKI MERKA	232	Gemeinde Kahl c/o Gemeindewerke Kahl
153	Comune di Vinchiaturo (CB) C/O	193	Escuela Andaluza de Salud Publica S.A.	233	Gemeinde Möglingen
154	Comune di Zagarise (CZ)	194	Escuela Tecnica Superior de Ingenieria Industrial	234	Gemeinde Reißeck
155	Comune di Zollino (LE)	195	Ethniki S.A.	235	Gemeinde Trebesing
156	Consejo Económico & Social	196	ETN. Panken NV	236	Gemeinde Wasserburg am Bodensee
157	Consignia plc	197	Eurogara Drobeta Turnu-Severin	237	Georg Fischer GmbH & Co. KG
158	Conurma Ingenieros Consultores	198	Exoterm – IT, d.o.o.	238	Gestamp Aveiro-Industria de acessórios de automóveis SA
159	Coop Adriatica s.c.a.r.l.	199	Exotest	239	Gestiretalho - Gestao e Consultoria para a Distribuicao a retalho, SA
160	Coop Centro Italia s.c.a.r.l.	200	Facilitair Bedrijf Amsterdam	240	GKN Walterscheid GmbH

241	Graham Packaging Lummen NV	281	Kaunas City Municipality	321	MedicHus
242	Grohe nv-sa	282	Kaunas County Special School	322	Melia Castilla Hotels
243	Grupo Union Fenosa	283	Kaunas District Municipality	323	Metrorex s.a.
244	Halliburton	284	Kaunas Juozo Urbisio Secondary School	324	Ministère de l'Economie, des Finances et de L'Industrie Français
245	Helbig Aluminium	285	Kaunas University of Technology	325	Ministry of Environment of the Czech Republic
246	Helsingborgs City	286	Kauno Energija JSC - DH Company	326	Mitteland Molkerei AG
247	Hernandez Cabeza Hoteles, SL	287	Kautex Textron Benelux B.V.B.A.	327	Monte dei Paschi di Siena
248	HMZ	288	Kautex Textron GmbH&Co. KG	328	MSGO te Maaseik
249	HN Autotransport	289	KHLIM vzw	329	Municipality and Municipal Utility of Neunkirchen-Seelscheid (Gemeinde Neunkirchen-Seelscheid)
250	Holland Casino Breda	290	Kladno Municipality	330	Municipality of Dobrich
251	Hospital Universitario Virgen de las Nieves de Granada	291	KLP Eiendom Trondheim AS	331	Municipality of Godech
252	Hostetin Municipality	292	Koninklijk Atheneum Brasschaat	332	Municipality of Gorna Oryahovica
253	Hôtel de Ville de Lille	293	Krajský úrad Jihočeského kraje - South Bohemian Regional Authority	333	Municipality of Kruikebe
254	Hotel Mercure Europaplatz Wien	294	La Mairie de LILLE	334	Municipality of Levski
255	Hotel Mercure Salzburg	295	La Noria del Gabriel - Hotel Restaurante	335	Municipality of Smolyan
256	Hotel Princess Lanassa SA	296	La Ville de Bourg de Valence	336	Mutua Pelayo
257	Hunedoara City Hall	297	L'A.L.L.P.-Association Lyonnaise de Logistique Posthospitalière	337	Nature et Découvertes
258	Ibérica de Estudios e Ingeniería, S.A. (IBERINSA)	298	Landeshauptstadt Munchen Baureferat HA Tiefbau	338	Natuurpunt
259	IKEA	299	Landuyt NV	339	NCC Property Development Sweden
260	IKEA Czech Republic	300	Las Mobili srl	340	Neuilly Dessin
261	Immobilienverwaltung, Schulgemeinerverband St. Veit/Glan	301	Lierse Kantoormeubelen b.v.b.a	341	Neukauf Merz
262	Immograniet	302	Ljubljanske mlekarne, d.d.	342	Nielsen-Gruppen AS
263	Indoor Sporting Center NV	303	Lom Municipality	343	Nike CSC
264	ING	304	Lorentz Casimir Lyceum	344	Non Ferrum Kranj, Proizvodnja in Trgovina Kovinskih Prahov, d.o.o.
265	ING Real Estate Investment Management	305	Lug Light Factory Sp z o.o.	345	Nord Pas de Calais – Conseil Regional
266	Instituto para la Diversificacion y Ahorro de la Energia (IDAE)	306	Magazzini Gabrielli Spa	346	Novacoop s.c.a.r.l.
267	Instituto Superior de Engenharia do Porto	307	Magistrat der Landeshauptstadt Klagenfurt	347	NV Block
268	Instituto Superior Técnico, Universidade Técnica de Lisboa	308	MAGNA E.A. s.r.o.	348	Nyborg Municipality
269	Instituut Voor Energie & Milieu	309	Mairie d'Haubourdin	349	OeBB Wien Zentralverschiebebahnhof
270	Intesa Sanpaolo	310	Marghita City Hall	350	OKQ8
271	Ipercoop Sicilia Spa	311	Markt Peiting	351	Openbare Basisschool Het Palet
272	Ixocon GmbH	312	Marktgemeinde Finkenstein am Faeker See	352	Oskomera Holding BV
273	Janssen doe-het-zelf NV	313	Marktgemeinde Frastanz	353	PAN Group Craiova
274	Jelgava Municipality	314	Marktgemeinde Gössendorf	354	Papyrus nv
275	Jeronimo Martins	315	Marktgemeinde Grafenstein	355	Pfizer MV
276	Johanniter Krankenhaus Bonn (Evangelische Kliniken Bonn gGmbH)	316	Marktgemeinde Maria Saal	356	Philharmonica House "OLTENIA"
277	Johnson & Johnson	317	Marktgemeinde Metnitz	357	Philips Consumer Electronics C/O
278	Jules SAS	318	Marktgemeinde Velden	358	Piatra Neamt City Hall
279	K.O.S.A. vzw	319	McDonald's Belgium	359	Piraeus Bank
280	Kaunas Airport SE	320	McDonald's Europe Restaurant	360	Plama-Pur, d.d.

361	Plasmajet NV	401	SBSO De Richter te Genk	441	Stadt Norderstedt
362	Plataforma Solar de Almería- CIEMAT	402	SC Energobot SRL Cluj Napoca	442	Stadt Salzburg, Magistrat
363	Plaza Hotel- Craiova	403	Sci Ocean-Etude Guiraud/Bardet	443	Stadt Senftenberg
364	PortCast-Ferro Nodular, SA	404	Servicio Extremeno de Salud	444	Stadt Vechta
365	Pouget Consultants	405	SIA "Biznesa centrs TOMO"	445	Stadt Wiehl
366	Prague Marriott Hotel	406	SIA "Laine" – objekts viesnica "Laine"	446	Stadt Zürich
367	Pražská energetika a.s. – Prague energy utility	407	SIA "LIDO"	447	Stadtbeleuchtung Hagen GmbH
368	Predilnica Litija D.o.o.	408	Siemens Slovenia	448	Stadtgemeinde Althofen
369	Prienai Region Municipality	409	Sincrotrone Trieste S.C.p.A.	449	Stadtgemeinde Gmund
370	Primary School Brestovany	410	Skallerup Klit Feriecenter A/S	450	Stadtgemeinde Neusiedl am See
371	Primary School Riedberg - Frankfurt am Main	411	SKF Aeroengine France	451	Stadtgemeinde Schwechat
372	Proizvodnja Mengeš, LEK d.d. (Sandoz)	412	Società Italiana per l'Oleodotto Transalpino Spa	452	Stadtverwaltung Geldern
373	Provincia di Reggio Emilia	413	Sogelym Steiner	453	Stadtverwaltung Ludwigshafen - Bereich Tiefbau
374	Provincia di Torino	414	SOMEPIC Technologie	454	Statoil
375	Przedsiębiorstwo Energetyki Ciepłej Sp. z.o.o. w Jarocinie	415	Somewhere	455	Stora Enso Berghuizer Papierfabrik
376	Purienu Secondary School	416	Sonaecom	456	Sukromne tanecne konzervatorium Dusana Nebylu
377	Q8 Denmark	417	SOPIC SA	457	Super U Hartmann Dannemarie
378	Ramada Grand Hotel Symphony	418	SOPROCOS groupe L'OREAL	458	SUPERQUINN
379	RATP	419	Sorgenja S.p.A.	459	swb Netze Bremerhaven GmbH&Co. KG
380	Recheio - Cash & Carry	420	Soudal nv	460	TAIM-TFG S.A.
381	Reichenberg GmbH (Greeninsurance)	421	Spar (Inchicore Outlet)	461	Takeda Italia Farmaceutici S.p.A.
382	Renault Trucks SAS usine moteurs Venissieux	422	Špitálek - polyfunkčná budova	462	Tbk Sistemas de Gestió S.L.
383	Resorts ar objektu Hotel "TOSS", SIA	423	Sporthal Latem-Deurle	463	Termit d.d.
384	Riga Graduate School of Law	424	Sports hall of the Franz-Böhm School - Frankfurt am Main	464	Terres et Eaux
385	Ringsted Kommune	425	SP-TräteK	465	TESCO
386	RLDT Ltd. – Business Centre TOMO	426	Stad Mechelen	466	Teteven Municipality
387	Romanian Chamber of Deputies	427	Stad Sint Truiden	467	The Burlington Hotel
388	Rosendo Junca Forcada S.A.	428	Stad Turnhout	468	The Directorate of Public Construction and Property
389	Roularta Media Group	429	Stadbestuur Poperinge	469	The Westlodge Hotel
390	Römisch-Katholische Kirche	430	Stadsbestuur Sint-Niklaas	470	Theater Pathe Tuschinski
391	RTL TVI	431	Stadt Böblingen Baudezernat	471	Themis Construction S.A.
392	S. Darius and S. Gireno Sport Centre	432	Stadt Eschweiler	472	TIM
393	SAES Advanced Technologies SpA	433	Stadt Frankfurt am Main, Helmholtzschule	473	TIRA – Tatranská informacná a rozvojová agentúra (Tatra Information and Development Agency)
394	Salonta City Hall	434	Stadt Graz	474	TNT Express GmbH
395	Samferdselsetaten, Agency for Road and Transport in the city of Oslo	435	Stadt Griesheim	475	Toplarna Hrastnik d.o.o.
396	Samhall Support AB	436	Stadt Hofheim am Taunus	476	TOYOTA CAETANO PORTUGAL, S.A.
397	SARL RESTO PLANET	437	Stadt Kempten (Allgäu)	477	Transgas SGPS
398	SAS Estela Intermarche	438	Stadt Kufstein	478	Transport COULIER nv
399	SAS Norway	439	Stadt Lohmar	479	Trevianum Scholengroep
400	Saule Birinu Pils Ltd	440	Stadt Mechnich	480	Trust S.A.

481	Turbomecanica SA	494	Verkehrslenkung Berlin	507	Volvo Parts Gent
482	Typsa Ingenieros Consultores y Arquitectos	495	Vesta Forsikring AS	508	Vossloh-Schwabe Optoelectronic GmbH & Co. KG
483	UNICER - Bebidas de Portugal SGPS, S.A.	496	VG Nicolaus GmbH	509	Vytautas Magnus University
484	Unicoop Firenze s.c.a.r.l.	497	Viesnica Latvija, A/S / Reval Hotel Latvia	510	VZW Sportdienst Kruishoutem
485	Unicoop Tirreno S.c.	498	Vildor S.A.	511	Warsaw University of Technology-Faculty of Environmental Engineering
486	UniCredit SpA	499	Ville de Bron	512	WIPARK Garagen AG
487	Universidade de Coimbra	500	Ville de Lyon	513	WWF/Adena (Fondo Mundial para la Naturaleza)
488	University of Oradea	501	Ville de Saint-Priest (Rhône - France)	514	WZC Sint-Jozef
489	Urząd Miasta Stołecznego Warszawy	502	Ville d'Illkirch-Graffenstaden	515	Xella Porobeton, d.o.o.
490	Valeo Transmissions	503	Virga Jesse	516	Zakład Energetyczny Szczecin - Oświetlenie Ulic Sp. z o.o.
491	VAS "Latvijas dzelzceļš" (LDz) infrastruktūras parvalde	504	Vlaamse Milieumaatschappij	517	Zehnder Group Produktion Gränichen c/o
492	Vattenfall Service Nord AB	505	Vodafone (Greece)	518	Zlin Municipality
493	Vennootschap Mechelse Veilingen c.v.b.a.	506	Vodafone Portugal	519	Zuiderzeemuseum

VI.Partners joining the GreenLight Programme in 2009

520	"Élizabethes Centrs" Ltd.	534	Hiller Logistik GmbH & Co. KG	548	Région Rhône-Alpes, collectivité territoriale de droit français
521	Administration of Teichi Nature Reserve	535	HOSPITAL PROVINCIAL DE CASTELLÓN	549	Rīgas Miesnieks SC
522	Alytus City Municipality	536	Kaunas „Versmės“ Secondary Schoul	550	SARL BREIZH MULTISERVICES/BREIZH EOLIENNE
523	Assa s.c.c.	537	LIG	551	Shopping center „SAVAS“
524	Belchatow City Office	538	Linde Gas, a.s.	552	SIP STROJNA INDUSTRIJA, d.d.
525	Black&Decker	539	MERCATOR, d.d.	553	Spółdzielnia Budowlano - Mieszkoniowa "Spółdom" v Lublinie
526	BVBA SPSGE Distribution Centre Staples Tongeren	540	Městská Část Praha 2, Úřad městské části Praha 2	554	Stadt Villingen-Schwenningen
527	Catholic University College Ghent	541	MILLIKEN	555	Stadtgemeinde Fürstenfeld
528	City of Toruń/Miejski Zarząd Dróg w Toruniu	542	Municipality of Lom	556	Tartu City Government
529	CLUJ-NAPOCA Municipality	543	Národní divadlo/The National Theatre	557	Urząd Mejski w Pabianicach
530	Danfoss, Sp.z.o.o.	544	NH HOTELES	558	Viesnica Ridzene Ltd
531	DECATHLON IULIU MANIU	545	Philips Lighting Poland S.A.	559	VINCI Construction France (VCF), Construction du Siège de la Direction Déléguée, Rhône/Alpes Sud, Bourgogne, Franche Comté, Auvergne
532	GROUPE AFFINE	546	Plama-Pur, d.d.	560	WAMEX, Sp.z.o.
533	H.W.Böhmer GmbH u. Co.KG, Bio-Logistikhalle Mönchengladbach	547	Primary School Byšice		

VII.National Contact Points

Austria

Christina Spitzbart
Buildings & Heating
Austrian Energy Agency
Mariahilfer Straße 136
1150 Vienna, Austria
Tel.: +43 1 586 15 24 119
Fax: +43 1 586 15 24 340
E-mail: Christina.Spitzbart@energyagency.at
Web: www.energyagency.at

Belgium

Mr. Claude Rappe
Ministère de la Région Wallonne
Direction Générale des Technologies, de la Recherche et de l'Energie
Avenue Prince de Liège, 7
B-5100 Jambes, Belgium
Tel.: +32 081 33 56 28
Fax: +32 081 30 66 00
E-mail: c.rappe@mrw.wallonie.be
Web: www.mrw.wallonie.be/dgtre

Mr. Eddy Deruwe
Centre Urbain/Stadswinkel asbl
Boulevard Anspach-iaan 59
B-1000 Brussels, Belgium
Tel.: +32 02 219 40 60
Fax: +32 02 219 35 91
E-mail: centre.urbain@curbain.be
Web: www.curbain.be

Mr. Geert Flipts
Vlaams Energieagentschap
Koning Albert II-iaan 20 - bus 17
B-1000 Brussels, Belgium
Tel.: +32 02 553 46 15
Fax: +32 02 553 46 01
E-mail: geert.flipts@vea.be
Web: www.energiesparen.be

Bulgaria

Ms. Miroslava Petrova
EnEffect
1 Hristo Smirnenski Blvd., Sofia 1164, Bulgaria
Tel.: +359 2 963 1714
E-mail: miki@eneffect.bg
Web: www.eneffect.bg

Croatia

Mr. Ivan Pržulj
North-West Croatia Regional Energy Agency
Dužice 1
10000 Zagreb, Croatia
Tel.: +385 1 3098 315
Fax: +385 1 3098 316
E-mail: iprzulj@regea.org
Web: www.regea.org

Czech Republic

Mr. Juraj Krivosik
SEVEn, the Energy Efficiency Center
Americká 17
120 00 Prague 2, Czech Republic
Tel.: +420 2 2425 2115/2424 7552
Fax: +420 2 2424 7597
E-mail: juraj.krivosik@svn.cz
Web: www.svn.cz

Denmark

Mr. Peter Bach
ENS, Danish Energy Agency
Amaliegade 44
DK-1256 Copenhagen, Denmark
Tel.: +45 33 92 68 18
Fax: +45 33 91 55 81
Email: pb@ens.dk
Web: www.ens.dk

Mr. Casper Kofod
Energy Piano
L.F. Cortzensvej 3
DK-2830 Virum, Denmark
Tel.: +45 40 459 876
Fax: +45 45 858 041
E-mail: CK@Energyplane.dk

Estonia

Mr. Villu Vares
OPET Estonia
Paldiski Road 1 - EE-10137 Tallinn, Estonia
Tel.: +372 662 1612
E-mail: villu@eeri.ee; villuv@online.ee

Finland

Mr. Kimmo Rautiainen
Motiva Oy
P.O.Box 489
FIN-00101 Helsinki, Finland
Tel.: +358 (0) 424 281 220
Fax: +358 (0) 985 653 199
E-mail: kimmo.rautiainen@motiva.fi
Web: <http://www.motiva.fi>

France

Mr. Bruno Lafitte
ADEME
500 route des Lucioles
F-06560 Valbonne, France
Tel.: +33 04 93 95 79 58
Fax: +33 04 93 65 31 96
E-mail: bruno.lafitte@ademe.fr
Web: www.ademe.fr

Germany

Ms. Annegret-Cl. Agricola
Deutsche Energie-Agentur GmbH
Rational Energy Use in the Electricity Sector
Chausseestr. 128a
D-10115 Berlin, Germany
Tel.: +49 030 726 16 56 51
Fax: +49 030 726 16 56 99
E-mail: agricola@deutsche-energie-agentur.de
Web: www.deutsche-energie-agentur.de

Ms. Mechthild Zumbusch
Berliner Energieagentur GmbH
Französische Str. 23
10117 Berlin, Germany
Tel.: +49 30 29 33 30 62
Fax: +49 30 29 33 30 93
Email: zumbusch@berliner-e-agentur.de
Web: <http://www.berliner-e-agentur.de>

Greece

Dr. Lena Lampropoulou
CRES, Centre for Renewable Energy Sources
19th Km Marathon Ave.
GR-19009 Pikermi, Greece
Tel.: +30 210 660 3257
E-mail: llampro@cres.gr
Web: www.cres.gr

Hungary

Mr. Tibor Bertok
Energy Centre Hungary
Ráday u. 42-44 – H-1092 Budapest, Hungary
Tel.: +36 1 456 4309
E-mail: tibor.bertok@energiakozpont.hu
Web: www.energiakozpont.hu

Ireland

Mr. Hannes Mac Nulty
Sustainable Energy Ireland
Wilton Park House, Wilton Place
Dublin 2, Ireland
Tel.: +353 (0) 1 808 2030
Email: hannes.macnulty@sei.ie
Web: www.sei.ie

Italy

Mr. Daniele Forni
FIRE, Fed. It. per l'uso Razionale dell'Energia
via Anguillarese 301
I-00123 Roma, Italy
Tel.: +39 06 3048 3482
Fax: +39 06 3048 6449
E-mail: greenlight@fire-italia.org
Web: www.fire-italia.org

Latvia

Mr. Claudio Rochas
Ms. Julija Bulgakova
Ekodoma
Noliktavas street 3-3 - LV-1010 Riga, Latvia
Tel.: +371 732 3212
E-mail: claudio@ekodoma.lv
Web: www.ekodoma.lv

Lithuania

Mr. Romualdas Skema
Lithuanian Energy Institute
Breslaujos str. 3, LT - 44403, Kaunas, Lithuania
Tel.: +370 37 401 802
Fax: +370 37 351 271
E-mail: skema@mail.lei.lt
Web: www.lei.lt

The Netherlands

Mr. Piet Heijnen
SenterNovem
PO Box 17
NL-6130 AA Sittard, The Netherlands
Tel.: +31 46 4202 2668
Fax: +31 46 4528 260
E-mail: P.Heijnen@senternovem.nl
Web: www.senternovem.org

Norway

Mr. Kaare M. Skallerud
Lyskultur
P.O. Box 65
N-1321 Stabekk, Norway
Tel.: +47 32 21 35 53
Fax: +47 32 89 10 56
Mobile: +47 915 123 33
E-mail: greenlight@lyskultur.no
Web: www.lyskultur.no

Poland

Mr. Ryszard Zwierchanowski
KAPE- The Polish National Energy
Conservation Agency
35, Mokotowska St.
00-560 Warszawa, Poland
Tel.: +48 22 626 0910
E-mail: rzwierchanowski@kape.gov.pl
Web: www.kape.gov.pl

Portugal

Mr. Diogo Beirão
ADENE, Agência para a Energia
Estrada de Alfragide, Praceta 1, n°47
PT-2720-537 Amadora, Portugal
Tel.: +351 21472 2800/40
Fax: +351 21472 2898
E-mail: diogo.beirao@adene.pt
Web: www.adene.pt

Romania

Mr. Tudor Constantinescu
Mr. Corneliu Rotaru
Romanian Agency for Energy Conservation (ARCE)
16 Blvd. Nicolae Balcescu
Bucaresti, Romania
Tel.: +40 213 136 002
Fax: +40 213 145 929
E-mail: constantinescu@arceonline.ro
rotaru@arceonline.ro
Web: www.arceonline.ro

Slovakia

Mr. Pavel Starinsky
Slovak Energy Agency
Bajkalska 27 - SK-827 99 Bratislava
Slovakia
Tel.: +421 2 58 248 205
Fax: +421 2 53 421 109
E-mail: pavel.starinsky@sea.gov.sk

Energy Centre Bratislava
Ambrova 35
831 01 Bratislava , Slovakia
Tel.: +421 2 593 000 99
Fax: +421 2 593 000 97
E-mail: herdova@ecb.sk
Web: <http://www.ecb.sk/>

Slovenia

Mr. Evald Kranjcevic
Jozef Stefan Institute - Energy Efficiency Centre
Jamova 39 - SI-1000 Ljubljana, Slovenia
Tel.: +386 1 588 5210
E-mail: evald.kranjcevic@ijs.si
Web: www.ijs.si

Spain

Ms. Teresa M^a Herrera Pérez
IDAE, Inst. para la Diversificación y Ahorro de la Energía
Dpto. Promoción Instituciones
C/Madera 8
E-28004 Madrid, Spain
Tel.: +34 91 456 50 42
Fax: +34 91 523 14 24
E-mail: therrera@idae.es
Web: www.idae.es

Sweden

Mr. Kalle Hashmi
STEM, Swedish National Energy Agency
P.O. Box 310
SE-631 04 Eskilstuna, Sweden
Tel.: +46 08 747 86 98
Fax: +46 08 747 86 98
E-mail: kalle.hashmi@stem.se
Web: www.stem.se

Switzerland

Mr. Paul Schneiter
S.A.F.E. Schweizerische Agentur für Energieeffizienz
Frohmoosstrasse 32 b – CH-8908 Hedingen, Switzerland
Tel.: +41 1 761 0429
E-mail: paul.schneiter@energieeffizienz.ch

United Kingdom

Dr M J Perry
ECA Support Programme Manager
Building Research Establishment (BRE)
Garston
Watford
WD25 9XX, United Kingdom
Tel.: +44 (0) 1923 664 875
Fax: +44 (0) 1923 664 097
Email: perrym@bre.co.uk

European Commission

EUR 24303 EN– Joint Research Centre – Institute for Energy

Title: The European GreenLight Programme 2000-2008 -Evaluation and outlook-

Authors: Paolo BERTOLDI, Rita WERLE, Vassilios KARAVEZYRIS, Perry SEBASTIAN

Luxembourg: Office for Official Publications of the European Communities

2010 – 110 pp. – 21 x 29,7 cm

EUR – Scientific and Technical Research series – ISSN 1018-5593

ISBN 978-92-79-15352-5

DOI 10.2788/79576

Abstract

The GreenLight Programme is a voluntary, non-residential lighting energy efficiency programme launched by the European Commission in 2000. By the end of 2008 519 Partners from 24 European countries participated in it. This report assesses the achievements of the European GreenLight Programme during the period 2000-2008.

The scope of the current analysis is to provide insight into how the GreenLight Programme expanded during the assessed period in terms of GreenLight Partners, energy savings and technologies used. Furthermore, the aim was also to gain a better understanding of the expectations, experiences and recommendations of the Partners regarding the GreenLight Programme.

The analysis is based on information received from the Partners either as part of their reporting obligations or in response to the survey asking for their feedback on the GreenLight Programme.

How to obtain EU publications

Our priced publications are available from EU Bookshop (<http://bookshop.europa.eu>), where you can place an order with the sales agent of your choice.

The Publications Office has a worldwide network of sales agents. You can obtain their contact details by sending a fax to (352) 29 29-42758.

The mission of the 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, whether private or national.

