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Lighting, a Simple Switch to save Energy

Elena Zhukova & Berno Ram

Philips Lighting Europe

30 September 2008

asimpleswitch.com

Agenda

1. What is the issue? – energy efficiency, climate change and sustainability
2. What is the case for lighting? – facts & figures
3. How to save energy? – solutions for buildings
4. What are your opportunities, and how can Philips help?

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Energy Efficiency, Climate Change & Sustainability

what is the issue?

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Already our founders believed we could do well by doing good

- Philips has reinvented itself many times, but through it all, our core, the soul of our company, remained intact. That is because it was part of our company since its inception in 1891. It is the passion to…

"Improve the quality of people's lives through timely introduction of meaningful innovations"

Anton and Gerard Philips …

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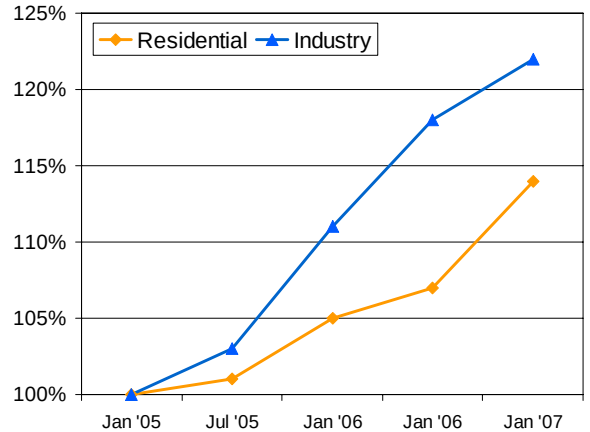
Sustainability: our business opportunity

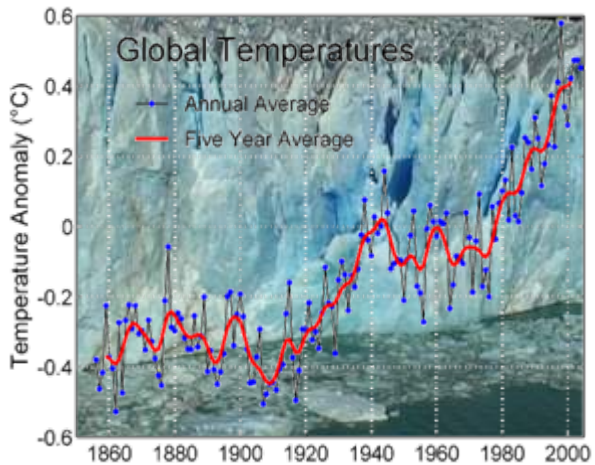
Over the next 50 years, the rapidly growing world population will add significant stress to an already strained healthcare system.

9,000,000,000+

people sharing this planet by 2050

Average European Electricity prices (index)





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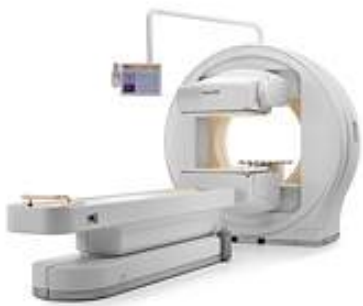
Driving Green Innovation
By 2012 we aim to:

Double total revenues from Green Products to 30%



Double investment in Green innovations to EUR 1 billion

Improve our operational energy efficiency by 25%

"We believe that big changes start small and that every one of us should contribute to saving our planet."
Gerard Kleisterlee, September 2007

High performance externally recognized

Member of Dow Jones Sustainability Indexes 04

Member of Dow Jones Sustainability Indexes 05

Member of Dow Jones Sustainability Indexes 06

SB20 The World's Top Sustainable Stocks

KLD INDEXES

Dow Jones Sustainability Indexes Member 2007/08

MOST SUSTAINABLE CORPORATIONS GLOBAL 100

Global leader in Sector Leisure Goods

"The early inclusion of sustainability in its strategic planning enabled Philips to identify two global challenges as key business drivers: energy and healthcare. In response, the company is refocusing its own activities and solutions around these themes in order to profit from new market opportunities and generate added value."

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Our focus

At Philips we improve the quality of people's lives through the timely introduction of meaningful **innovations**. Focusing on key global challenges – the growing demands for **healthcare** and **energy efficiency** – we use our expertise to develop sustainable solutions for people in all markets. It's all about **delivering value** for individuals, communities and the company.

Gerard Kleisterlee
President & CEO of Royal Philips Electronics

"I am particularly proud that Philips is leading in the lighting industry to increase energy efficiency."

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Energy Efficiency

Philips is driving the switch to energy-efficient solutions, as well as shaping the future with exciting new lighting applications and technologies.

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Climate change & Lighting

- CO_2 is a contributor to climate change, CO_2 is emitted during electricity production and lighting consumes electricity

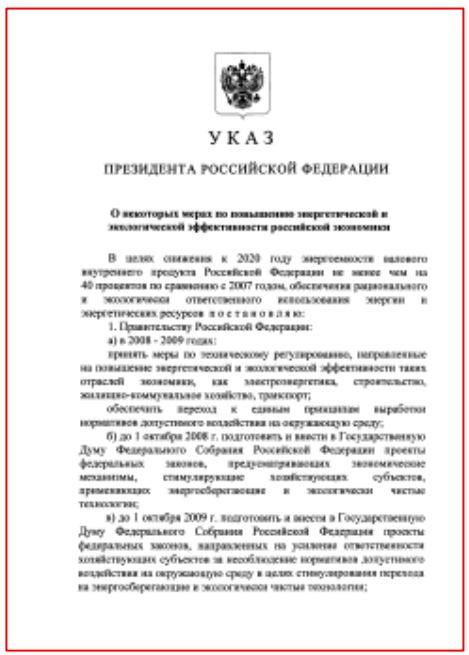
Region / country	kg CO_2 / kWh
World	0,510
EU-27	0,373
Russia	0.325
North America	0,530
Latin America	0,262
Asia	0,652
Rest of the World	0,673

Emissions depend strongly of used fuel en mix.

Political statements Energy Efficiency

The President of Russia Dmitry Medvedev signed a decree according to which energy efficiency of Russian economy have to be reduced by 40 percent by 2020 year compared with 2007 year.

Dmitry Medvedev, President Russian Federation



УКАЗ

ПРЕЗИДЕНТА РОССИЙСКОЙ ФЕДЕРАЦИИ

О некоторых мерах по повышению энергетической и экологической эффективности российской экономики

В целях снижения к 2020 году энергоемкости валового внутреннего продукта Российской Федерации не менее чем на 40 процентов по сравнению с 2007 годом, обеспечения рационального и экологически ответственного использования энергии и энергетических ресурсов п о с т а н о в л я ю:

1. Правительству Российской Федерации:

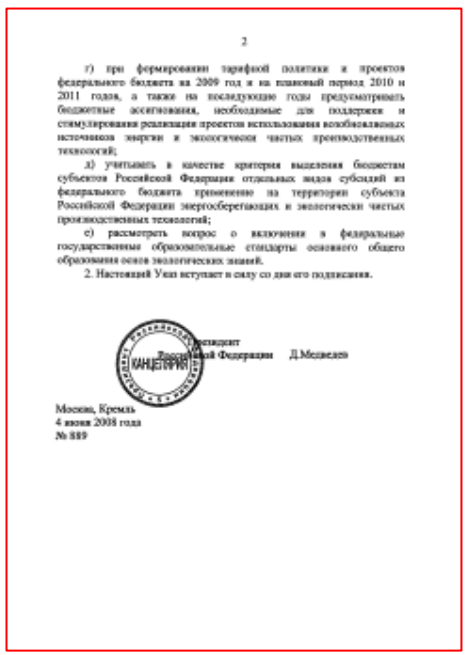
а) в 2008 - 2009 годах:

принять меры по техническому регулированию, направленные на повышение энергетической и экологической эффективности таких отраслей экономики, как электроэнергетика, строительство, жилищно-коммунальное хозяйство, транспорт;

обеспечить переход к единым принципам выработки нормативов допустимого воздействия на окружающую среду;

б) до 1 октября 2008 г. подготовить и внести в Государственную Думу Федерального Собрания Российской Федерации проекты федеральных законов, предусматривающих экономическое механизмы, стимулирующие хозяйствующих субъектов, применяющих энергосберегающие и экологически чистые технологии;

в) до 1 октября 2009 г. подготовить и внести в Государственную Думу Федерального Собрания Российской Федерации проекты федеральных законов, направленных на усиление ответственности хозяйствующих субъектов за несоблюдение нормативов допустимого воздействия на окружающую среду в целях стимулирования перехода на энергосберегающие и экологически чистые технологии;



2

г) при формировании тарифной политики и проектов федерального бюджета на 2009 год и на плановый период 2010 и 2011 годов, а также на последующие годы предусматривать бюджетные ассигнования, необходимые для поддержки и стимулирования реализации проектов использования возобновляемых источников энергии и экологически чистых производственных технологий;

д) учитывать в качестве критерия выделения бюджетам субъектов Российской Федерации отдельных видов субсидий из федерального бюджета применение на территории субъекта Российской Федерации энергосберегающих и экологически чистых производственных технологий;

е) рассмотреть вопрос о включении в федеральные государственные образовательные стандарты основного общего образования основ экологических знаний.

2. Настоящий Указ вступает в силу со дня его подписания.

КАНЦЕЛЯРИЯ

Президент Российской Федерации Д.Медведев

Москва, Кремль
4 июня 2008 года
№ 889

Consequences of the political attention

Strong evidence of political buy in for energy efficiency

- Legislation is being developed
- Awareness of energy efficiency is being created
- Subsidies and other financing will be made available

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Facts & Figures for Lighting

What is the case for lighting?

The case for lighting - facts & figures

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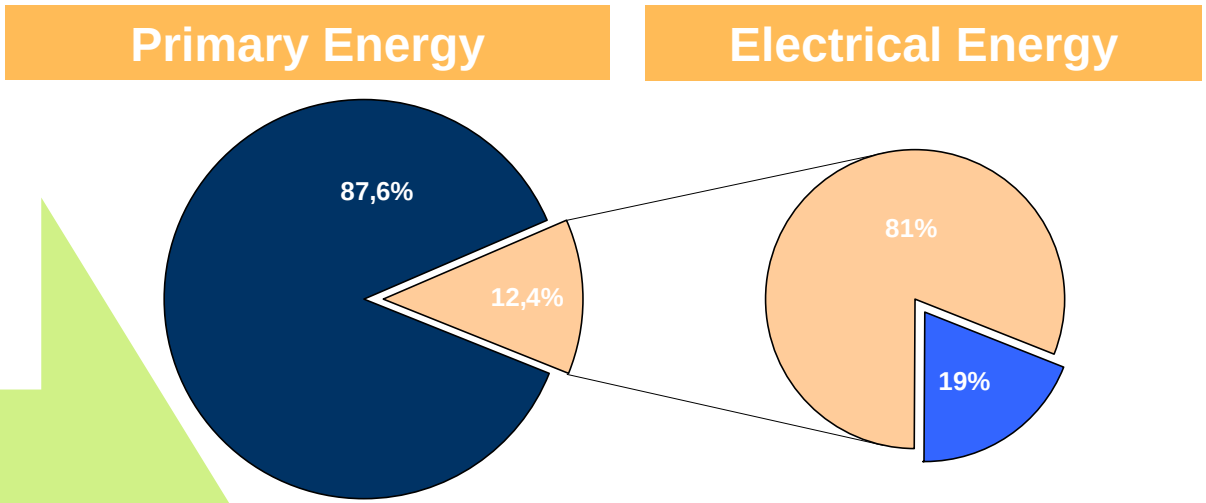
Energy Impact of Lighting

- Lighting consumes 16% of all electricity within Russia
- Lighting consumes 19% of all electricity in the world (source IEA)



Key issues

- Rising energy prices
- Global climate change
- Security of energy supply
- Economic growth

Value proposition = Energy efficient lighting

Savings of 40% are possible

Today

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Energy Projections Russia

Year	Minimum* [TWh]	Maximum* [TWh]	Lighting [16%]**	Saving Potential [40%]***
2010	1197	1260	192 - 202	52 - 55
2015	1426	1600	228 - 256	63 - 70
2020	1710	2000	274 - 320	75 - 88

*: Source: Magazine Profile, 28 June 2008. According to IEA info electricity use in Russia in 2005 was about 830 TWh. With 5-10% yearly growth this could increase to the numbers expressed in the Magazine

** Philips calculations estimated an average energy consumption of 16% for lighting based on market estimations.

*** Average savings are 40% based on installed park and best available technologies

Energy Savings Opportunity of Lighting

- Revolution in lighting technology during the past 10-15 years.
- More than 95% of all lighting currently installed in the Russian Federation is based on older, less energy efficient technology (developed before1970).
- Our current changeover rate to new lighting technologies is slow: e.g. Street lighting 3% p/a, Office lighting 7%.

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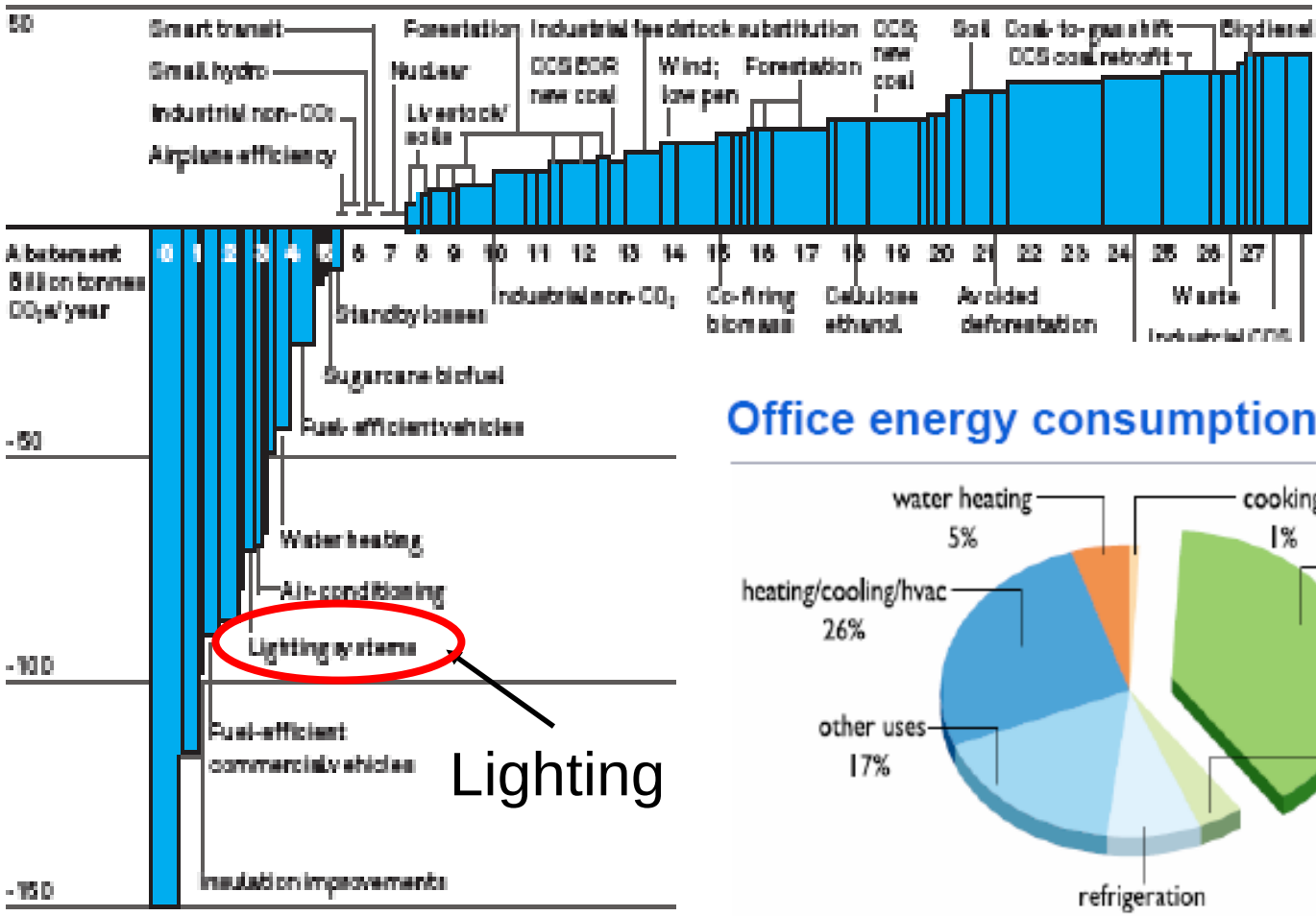
Cost effectiveness and relevance of lighting

Exhibit 7



The cost curve provides a "map" of abatement opportunities
Cost of abatement, 2030, €/tonne CO2e

Source:
Enkvist et al. (2007)

Office energy consumption

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Lighting: one of the most efficient ways to save energy

Global savings of EUR 106 billion in energy costs per year

This equates to:

555 million tonnes of CO_2 per year

1.5 billion barrels of oil per year

Annual output of 530 medium sized power stations @ 2TWh/yr

Russian savings of EUR 6.1 billion in energy costs per year

This equates to:

19 million tonnes of CO_2 per year

247 million barrels of oil per year

Annual output of 30 medium sized power stations @ 2TWh/yr

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Savings in all applications

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At home

Outdoor

Offices

Shops

Area of lighting		Energy savings		CO_2 savings per lamp per year*
Street lighting	HPL	57%	CosmoPolis	132 kg CO_2
Retail lighting	Halo	80%	CDM	140 kg CO_2
Office & Industrial lighting	T8	61%	TL5	93 kg CO_2
Home lighting	GLS	80%	CFLi	41 kg CO_2
LEDs	GLS	80%	LED	41 kg CO_2

Barriers to Switch

Lack of awareness – people simply don't know the opportunities

- Lighting is low interest
- People don't see the electricity costs of lighting
- They are not aware of the new lighting technologies
- Often decision makers are not lighting experts

Initial investment costs

- Lack of awareness that although energy efficient lighting technologies cost a little more initially, they have fast paybacks and save large amount of energy/money during their lifetime.

No mandatory norms, standards and legislation

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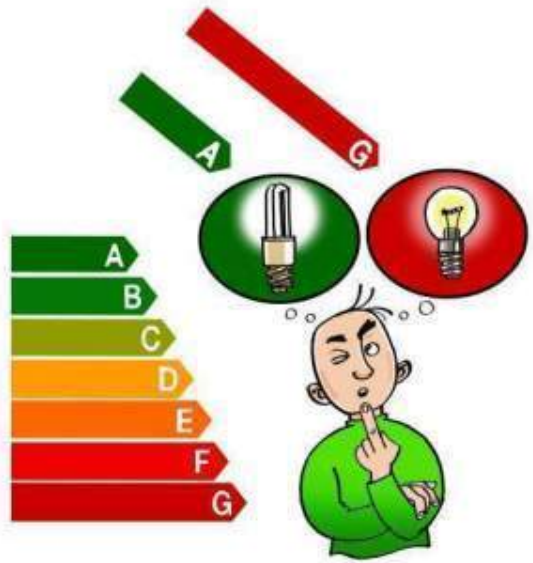
Solutions for the Switch to Class A in Energy Efficiency

How to save energy?



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Energy saving in linear fluorescent

System Improvement

100%

E

Halo-phosphate TL

Electro-magnetic gear

-10%

90%

D

Up lamping

MASTER TL-D Eco

-25%

70%

C

Up gearing

HF Performer for TL-D

-15%

60%

B

Renovation

Smartform MASTER TL-5 HF-Performer

-50%

30%

A

Controls

Actilume HF-Regulator

Up-lamping: MASTER TLD Eco

Energy savings more than 10%
High quality light ra >80
Retrofit with standard T8

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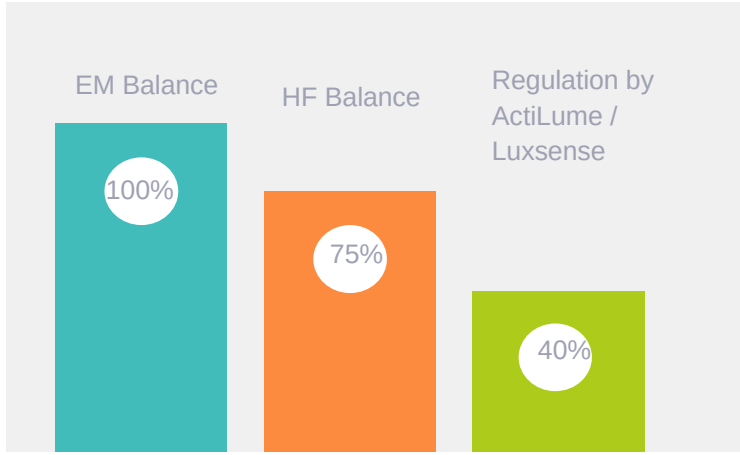
SmartForm

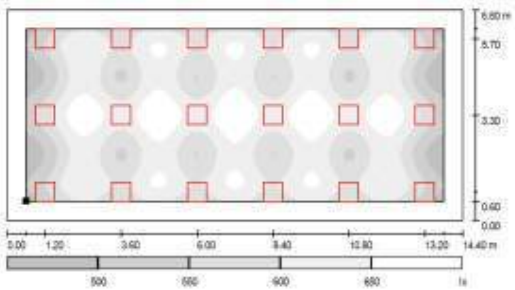
- Ultra flat height (TBS460)
- Good finishing details of housing and optics
- Diversity in light-technical solutions
- Energy saving (green product)



- Up to standard & extended specifications
- Sufficient diversity for specification market
- High quality of visual appearance
- Perfect optic technology
- Full filling most installation needs

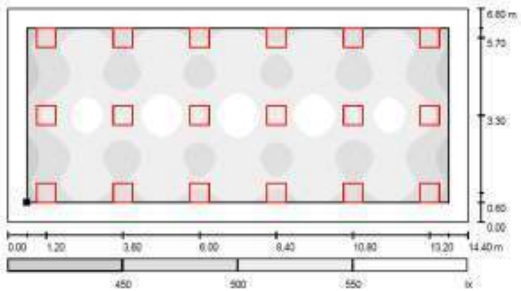
SmartForm lighting concept: Best energy efficiency

TL-D installation, 4x18W/830 D6
Conventional ballast



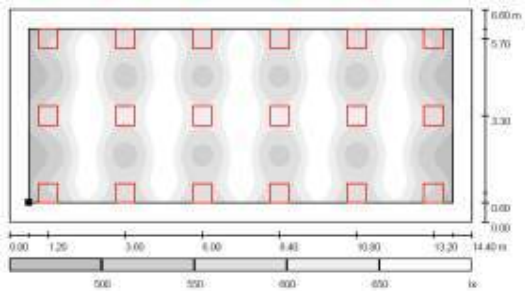
E_{av} = 610 lux
Installed power: 19 W/m^2

TL5 installation
SmartForm, 3x14W/830 D8-VH
Electronic ballast



E_{av} = 510 lux
Installed power: 9 W/m^2

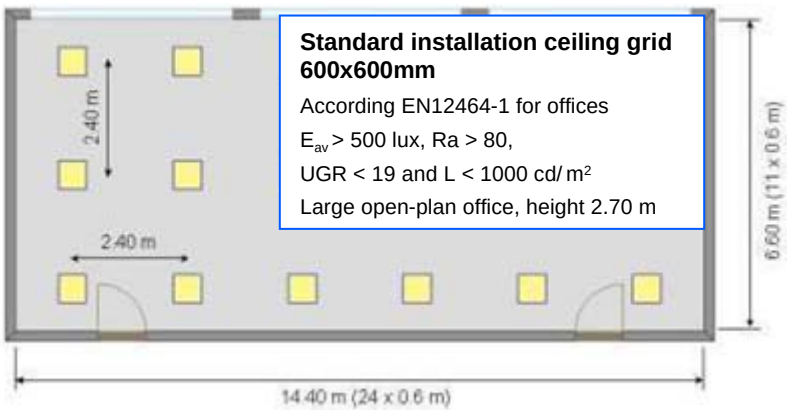
TL5 installation, 4x14W/830 D6
Electronic ballast



E_{av} = 600 lux
Installed power: 12 W/m^2

50% energy savings

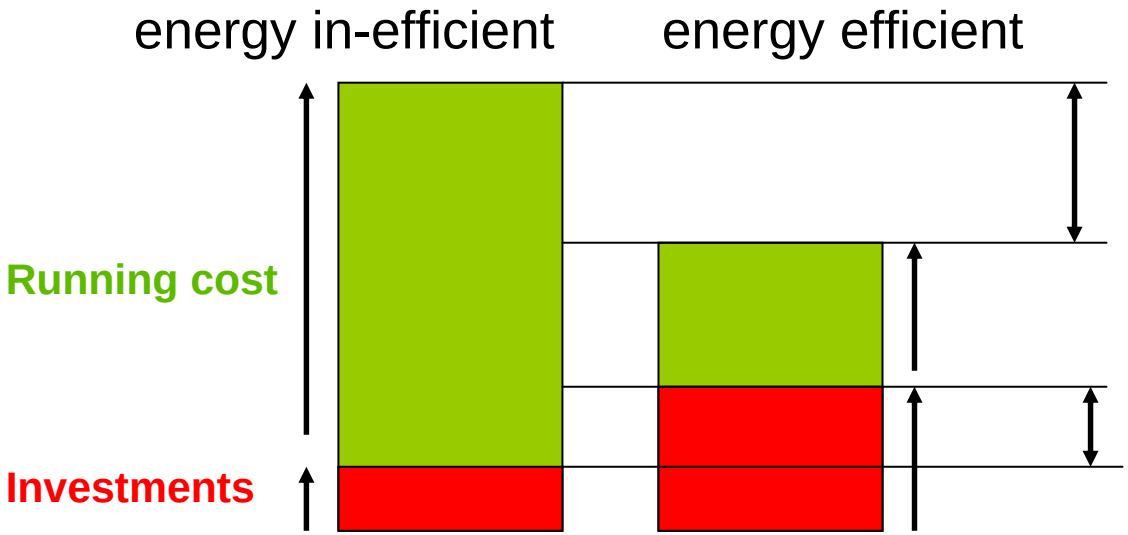
25% energy savings



Standard installation ceiling grid 600x600mm
According EN12464-1 for offices
E_{av} > 500 lux, Ra > 80,
UGR < 19 and L < 1000 cd/ m^2
Large open-plan office, height 2.70 m

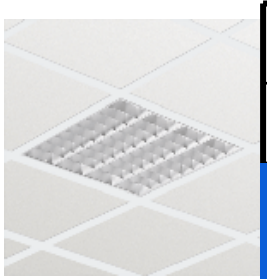
- With **D8-VH** (Very High output optic): **9 W/m^2**
- **Extra savings with controls, 30-50%:**
  - Using day-light linking with **Luxsense OR**
  - Using daylight linking & presence detection with **ActiLume**
    - **From 9 W/m2 to 6 - 4,5 W/m^2**
    - **Results**: **lower COO and reduced CO_2 output**

The cost of lighting: Total cost of ownership



Energy saving,
Cost reduction,
Less CO_2 emissions
Less Mercury
Less Waste

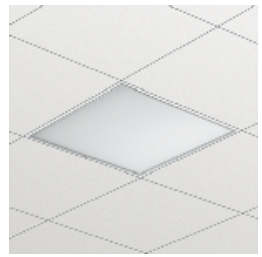
Increased investments



Old technology

- TL-D 33
- EM Gear
- <60% LOR

Not in line with lighting norm	In line with lighting norm		
P: 100W, E: 300 kWh	P: 47W, E:141 kWh		
With dimming additional savings possible between 30-50%, resulting in reducing payback times with 1– 2 years	Pay back time vs electricity cost kWh		
	0.05 €	0.10 €	0,15 €
	8 year	4.5 year	3 year
Mercury: 16 mg/yr	Mercury: 0.5 mg/yr		
Waste: 106 g/yr	Waste: 27 g/yr		



New technology

- T5 lamp
- HF Gear
- >80% LOR

College Henri Bergson

- Customized TBS490
- ActiLume included for presence detection and daylight dependent dimming

Rundbau Gerling Konzern, Cologne, D

- Renovation of 40 year old building.
- TL-5 luminaires (arano) with omnisense;
  - Presence detection
  - Daylight regulation
- Energy saving of up to 70%

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The great opportunities of LED's

Philips Fortimo LED DLM system

Save up to 50% on energy cost

Benchmark: 2* 26W PLC downlighter:

System efficiency:
40 lm/W on the table

LUMEN PACKAGE

A breakthrough in LED Energy efficiency and Higher lumen packages

High quality, white LED light Image and status

Comparable to the best downlight in conventional technologies

PL-R Eco

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Generali Building, Paris

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Lighting norms: European standard EN 12464-1

Better lighting not only saves energy and costs, it also provides better quality light, improves the well being of people and creates a more comfortable working environment

- Lighting of indoor work places

Parameter	Quality parameter
Lighting level	E_m – Maintained illuminance
Uniformity	E_{min} / E_{ave}
Glare restriction	Unified Glare Rating
Colour rendering	R_a

– Luminous environment
– Luminance distribution
– Illuminance levels
–Maintenance factor
–Direct glare
–Indirect glare
Lighting for workstations
–*Directional lighting*
–Colour aspects
–*Energy considerations*
–*Daylight*

European standard EN 12464-1

- Example: Offices requirements:

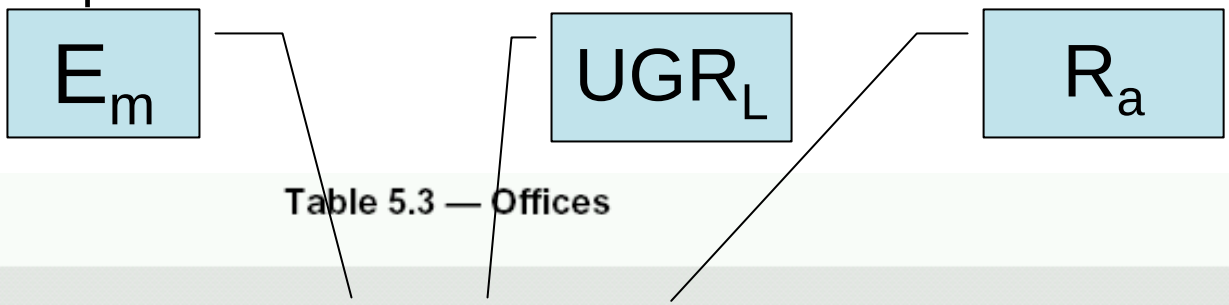

Table 5.3 — Offices

3	Offices				
Ref. no.	**Type of interior, task or activity**	**$\bar{E}_m$** lx	**UGR_L** -	**R_a** -	**Remarks**
3.1	Filing, copying, etc.	300	19	80	
3.2	Writing, typing, reading, data processing	500	19	80	DSE-work: see clause 4.11.
3.3	Technical drawing	750	16	80	
3.4	CAD work stations	500	19	80	DSE-work: see clause 4.11.
3.5	Conference and meeting rooms	500	19	80	Lighting should be controllable.
3.6	Reception desk	300	22	80	
3.7	Archives	200	25	80	

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Business Opportunity

What can you do?

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Philips, your partner in Energy Efficient Lighting!

Philips can:

- Help you to make a selection in leading energy efficient lighting solutions that reduce environmental impacts, save cost and improve quality light
- Support you in finding business opportunities using energy efficiency as a key driver for better lighting
- Guide you in merchandising responsible corporate citizenship and meet Sustainability objectives

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Accelerated Renovation – Process

Energy Benchmark

Savings Potential & Renovation Proposal

Energy Awareness

Lighting audit

Energy Audit

Lighting Plan

Total lighting solution offer including finance

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Information asimpleswitch.com


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