

PHILIPS

sense **and** simplicity

The Global Switch to Energy Efficient Lighting

*- The view of Philips on the relevance of Quality Standards for EE
Residential Lighting -*

Jan Denneman

VP Global Government & Industry Affairs – Philips Lighting

Global Product Efficiency 2008, Brussels, Oct 31, 2008

asimpleswitch.com

Content

- CO₂ Emissions and savings potential from Lighting
- Domestic Lighting: phasing-out incandescent lamps
 - Energy Saving Alternatives
 - Global Incandescent and CFLi phasing scenarios
 - Global CFLi Market & Demand Scenarios
 - Relative Energy Saving
 - European situation
 - Conclusions & Recommendations

Lighting – A Significant Consumer of Energy

- Lighting consumes 14% of all electricity consumption within the EU and 19% of global electricity consumption

International Energy Agency

- “Lighting requires as much electricity as is produced by all gas-fired generation and 15% more than produced by either hydro or nuclear power”.

Light's Labour's Lost – Policies for Energy-efficient Lighting. IEA



The Case for Energy Efficient Lighting

- Energy efficient lighting is one of the quickest, most practical and most cost-effective ways for Europe to save energy.
- According to our industry estimates, we could save Europe approximately
 - 42.5 Million tonnes of CO₂
 - 14.6 billion euros in running coststhrough energy efficient lighting each year (conservative estimates!)

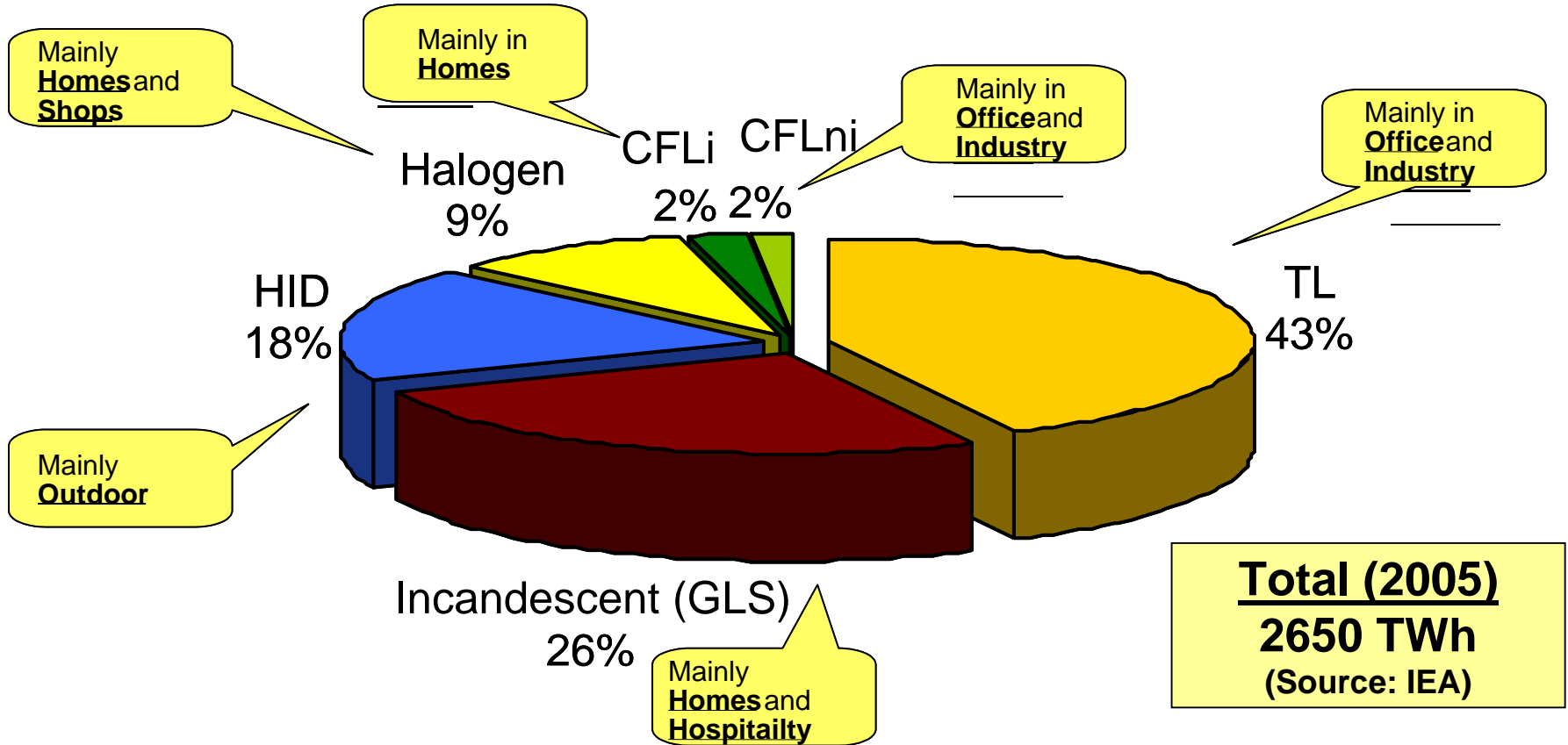


Lamps ICONIC to transition to a Low Carbon Economy...



CO₂ Emission from Lighting (Global)

From burning fossil fuels for electricity generation for Lighting



- Incandescent lamps 26% of lighting electricity use (3:1 ratio B2C:B2B)
- About 75% of lighting electricity consumption in professional lighting applications (each with similar old & new technology examples)

Estimated savings

	Savings potential (per year) *			
	CO2 (Million tonnes)	Savings potential (KWh) = 0.37 kg CO2/kWh (**)	Savings potential in Euro (***)	Euro/kWh (***)
Domestic Lighting	23	62.2	€9.3 billion	€0.15
Office Lighting	8	21.6	€2.2 billion	€0.10
Industrial Lighting	8	21.6	€2.2 billion	€0.10
Street Lighting	3.5	9.5	€0.9 billion	€0.10
Total	42.5	114.9	€14.6 billion	N/A

* This figure is based on the latest (conservative) industry estimates for the a total switch to energy efficient street, office, industry and domestic lighting in the EU (27). Detailed savings potential figures from each EU member states are in the process of being calculated by the ROMS programme.

** Figure courtesy of the International Energy Agency - 0.37kg CO2/kWh - CO2 EMISSIONS FROM FUEL COMBUSTION (2006 Edition) - II. 61

*** Figure courtesy of Philips Lighting B.V

Lamps ICONIC to transition to a Low Carbon Economy...



CE | Brussels - EC/Berlaymont | P-011945/00-03 | 08/03/2006

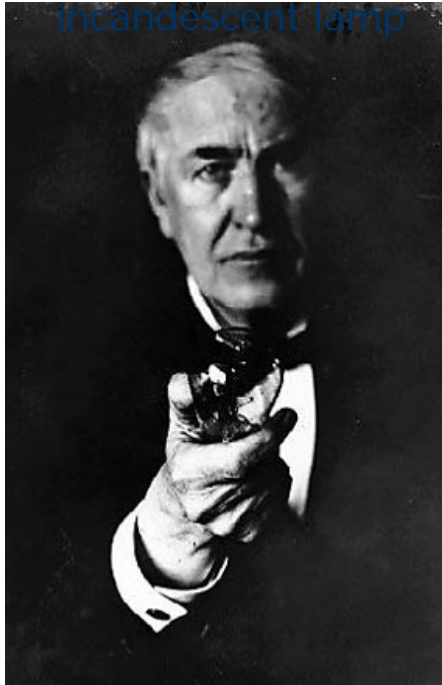


José Manuel Barroso, President of the European Commission and Andris Piebalgs, Member of the European Commission in charge of Energy at the press conference for the presentation of the Green Paper on Energy. *March 2006*

Why change a habit of a lifetime?

Thomas Edison

The inventor of the
incandescent lamp



- Consumers worldwide have been using incandescent lamps for over 100 years
- Although new efficient technology exists, old and/or inefficient technology is still readily available on the market so it is difficult to change their purchasing habits

Phasing-out Incandescent Light Bulbs

Why did we get so attached to this old technology ?

- creates lighting to support ambience
- emotional response to lighting

Appearance:

- small
- clear or matt

Lighting application:

- general lighting
- accent lighting
- decorative lighting

Qualities

- good color rendering
- warm to neutral color temperature
- production without hazardous substances
- easy to use
- immediate restart
- cheap
- dimmable
- small
- shape

but

- very low efficiency

Phasing-out GLS: Energy saving alternatives

Major improvement of light quality of energy savers



1. Compact Fluorescent Lamps (CFLi)

- **80% Energy Savings**
- Major improvements last few years (size; light; cost; ..)
- Need to balance demand and global industry capacity

2. Energy Saving Halogen (ESH)

- Up to **50% Energy Savings**;
brilliant, high quality light
- Replacement ranges launched

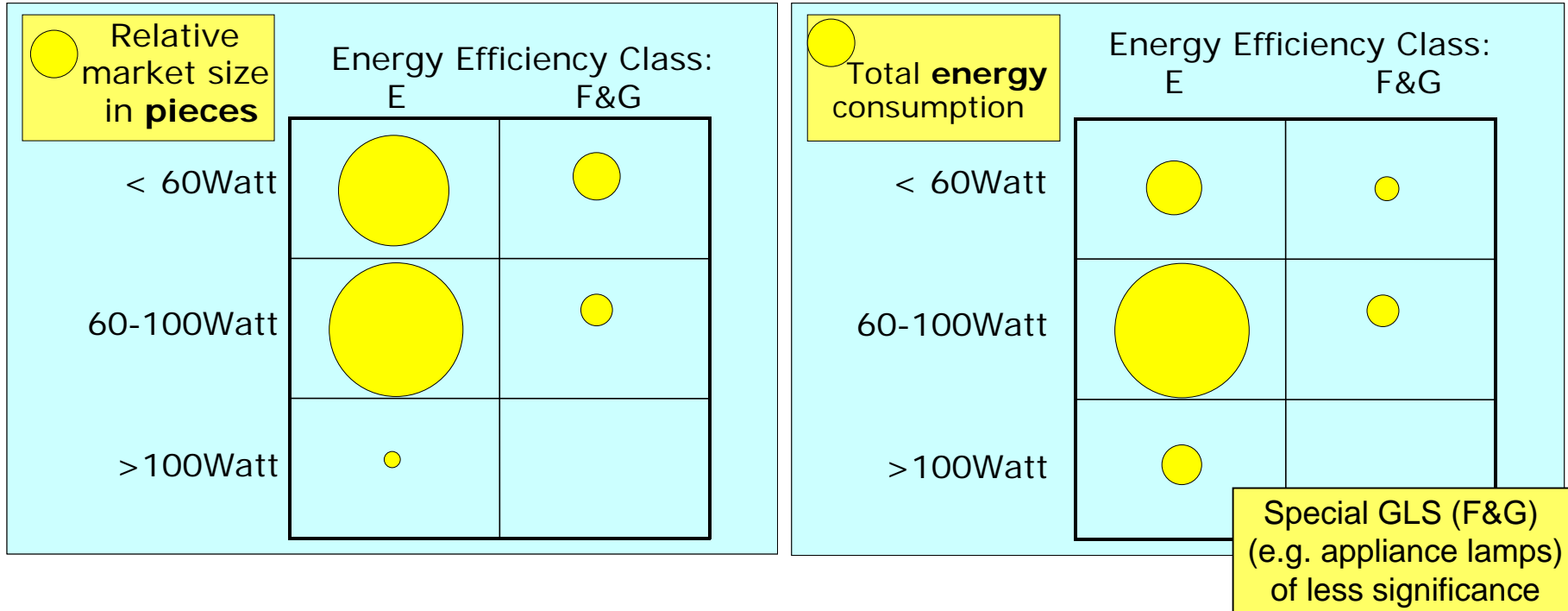


3. Solid State Lighting (LED`s)

- Currently for **decorative** replacements
- **Today limited** but fast improving **light output**

Relative Incandescent Market Size

Wattage and Energy Consumption Distribution



- Largest market volume in 60 to 100W GLS, followed by 15-40W
- By far largest energy consumption by 60 to 100W ranges
- Fastest and largest savings when phase-out prioritizes 60 to 100W GLS

Global Incandescent and CFLi phasing Scenarios

Residential Lighting Market Volumes (2007)

Global

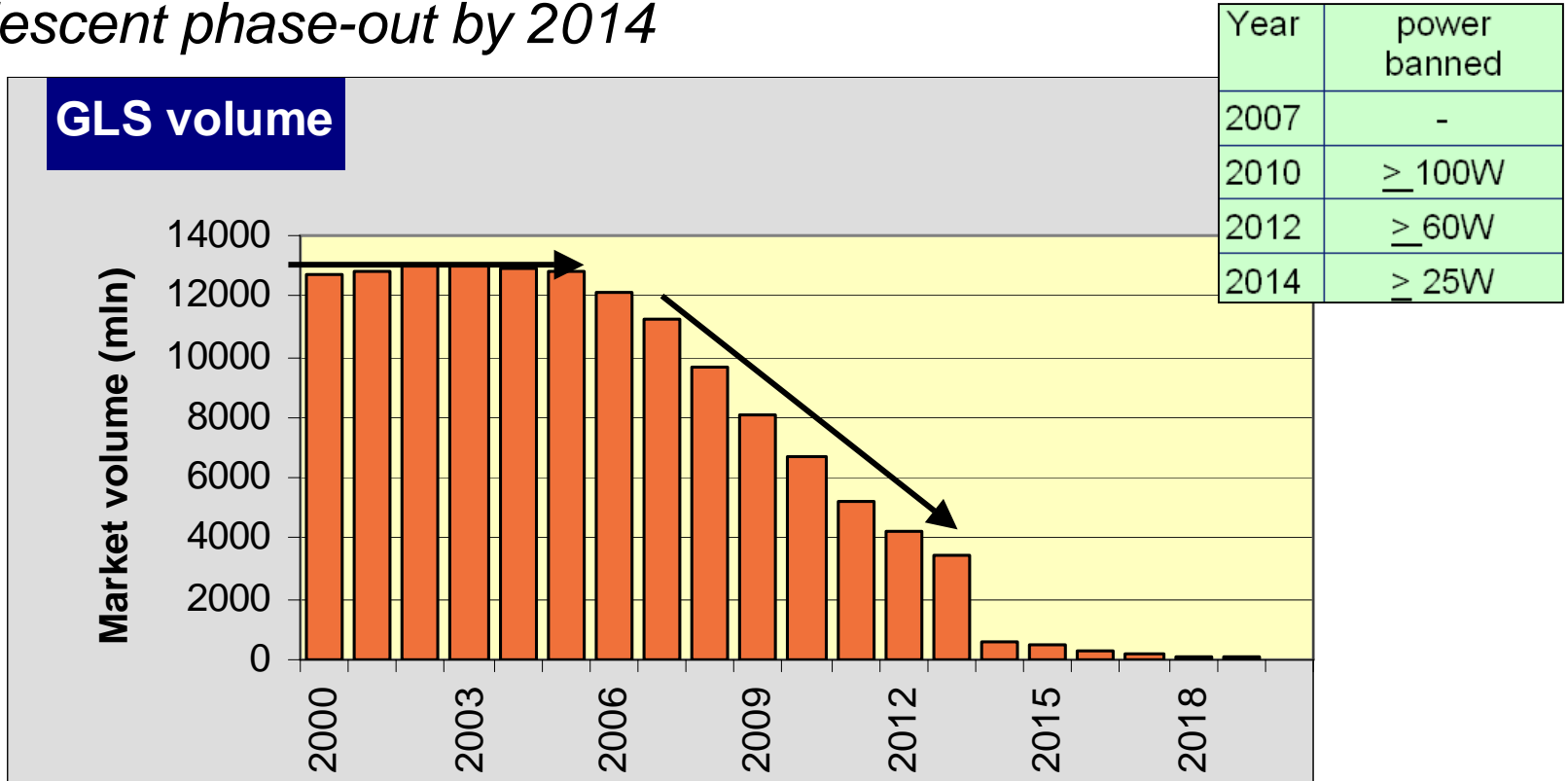
- Global annual incandescent demand **12.5 billion**
 - Global annual energy savers demand **2.5 billion**
- } **800TWh**
- Installed incandescent base approximately **15 billion**
 - Installed energy savers base approximately **5 billion**



Note: 1 Bio CFL lamps will roughly fill 15.000 40ft containers (180 km)

Global Incandescent Demand Reduction

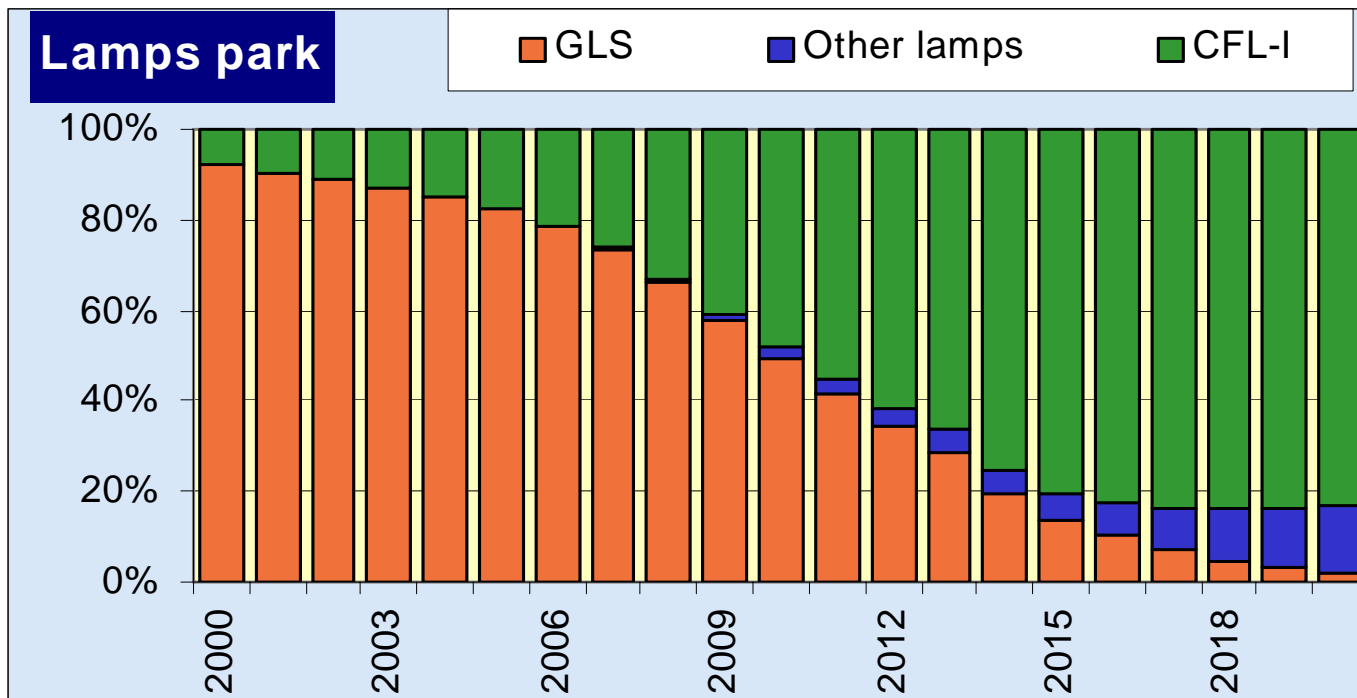
Incandescent phase-out by 2014



- Global incandescent demand has started to decline since 2006
- Step-wise phase out starting with higher wattages results in a steep decline of global GLS demand between 2006 and 2014
- Small special incandescent volumes in the `tail` (a.o. appliance lamps)

Global Installed Socket Base Transition

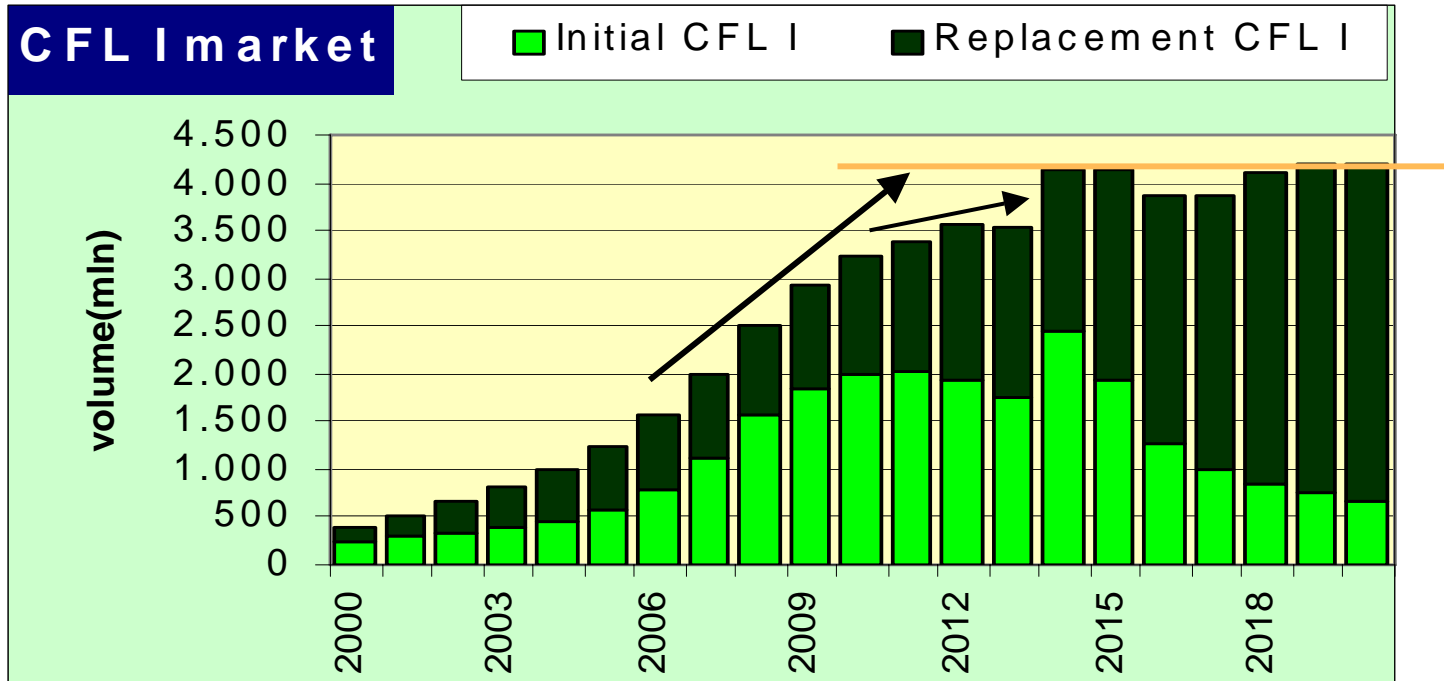
Incandescent phase-out & CFL/ESH/LED phase-in



- It took 25 years for CFLi to occupy 20% of the global socket base by 2005
- A fast increase of the global CFLi socket base to 75% will take place by 2014
- Due to the dependence of replacement cycles on average burning hours, the remaining 20% GLS socket base will gradually disappear until 2020

Global CFLi Market

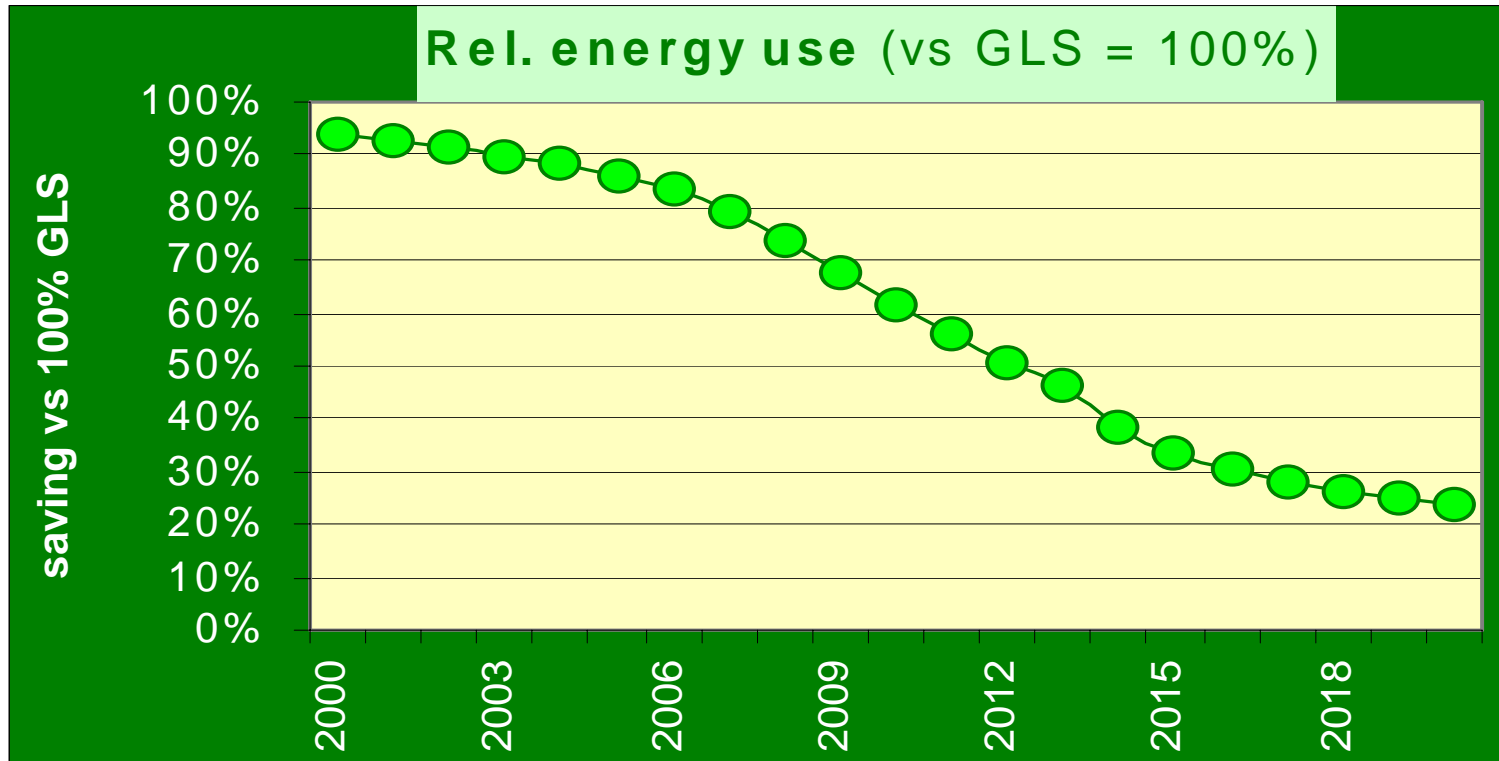
Growth and levelling out of global CFLi demand



- Global CFLi demand has surged from 1.5 Bio (2006) to 2.5 Bio in 2008
- Already from 2010 the CFLi demand growth slows down followed by levelling off to a level of around 4.2 Bio as from 2014
- It is imperative to improve & secure adequate product quality levels in this process
- A wattage-based phasing out of incandescent includes a step-wise transition of GLS 25 & 40W lamps in 2014 (large volume)

Global Relative Energy Savings Residential Lighting

Incandescent phase-out by 2014



- The phasing-out of incandescent lamps results in a relative energy saving of 60% in 2014 and 75% in 2020
- The absolute energy savings are around 50% in 2020 due to the growth in global population and number of households

Critical Success Factors for a successful phase-out

- **Consumer choice:** a suitable range of alternative products need to be available
 - at acceptable price
 - for consumers with possible health issues with CFL-Is
- Alternative products **manufacturing and supply chain** need to be developed that meet regional and national quality standards (no empty shelves)
- In phase out program, **quality standards** need to be defined
- **Industry transition** period is needed to minimise job losses and restructuring costs
- **Investment payback** time is necessary for the development of alternative products
- Potential increased price of **other technologies** produced in the affected factories if the switch is too fast, undermining European competitiveness (incl. component suppliers and packaging industry)
- **Additional financial & carbon savings are minimal** if the switch is too rapid
- **Recycling capacities need to be in place to fully protect the environment & consumers**
- A **step-wise** and no disruptive phase out program required
- **Alternative product technologies** (other than CFLi) allowed

Growing Global support to phase-out Incandescent

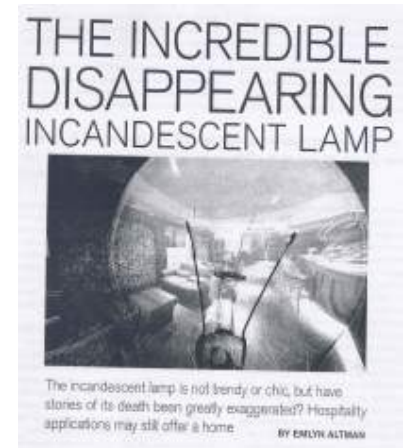
Regional and Country commitments and/or indications

Regions / Countries

- EU27
- Aus; NZ; China; Pacific Islands
- USA; Canada
- Cuba; Brazil; Argentina; Venezuela
- S-Africa

Political Platforms; NGO`s and Int. Organizations

- UN; UNEP; UNDP
- IEA; ELC; NEMA; NRDC
- WWF; Greenpeace, ASE; and many other NGO`s



➤ Incandescent lamp phase-out converging into global process

Europe: improved ELC industry proposal for step-wise phasing out

- Time frame and product portfolio:

Stage	Date ¹⁾	Main Result	Allowed products
Stage 1	September 2009	Phase-out lamps \geq 100W	CFL-I
Stage 2	September 2010	Phase-out lamps \geq 75W	CFL-I
Stage 3	September 2011	Phase-out lamps \geq 60W	CFL-I, Halogen B, Halo retro C
Stage 4	September 2012	Phase-out lamps \geq 40W	CFL-I, Halogen B, Halo retro C
Stage 5	September 2013	Phase-out lamps \geq 25W	CFL-I, Halogen B, Halo retro C

Note. Halo Socket C (Halo LV) allowed in all stages

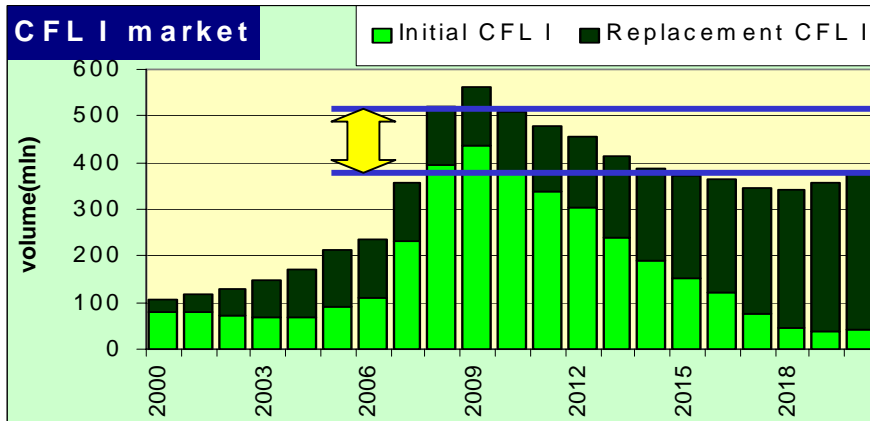
Decision should take into account **all** the Critical Success Factors.

- 1) Implementation dates per **September**, not per January, due to the light season.
- 2) Some HAL socket lamps are also available in class B

European CFLi Market Volume Demand

Disruptive Incandescent phase-out Oct 2009 vs ELC proposal

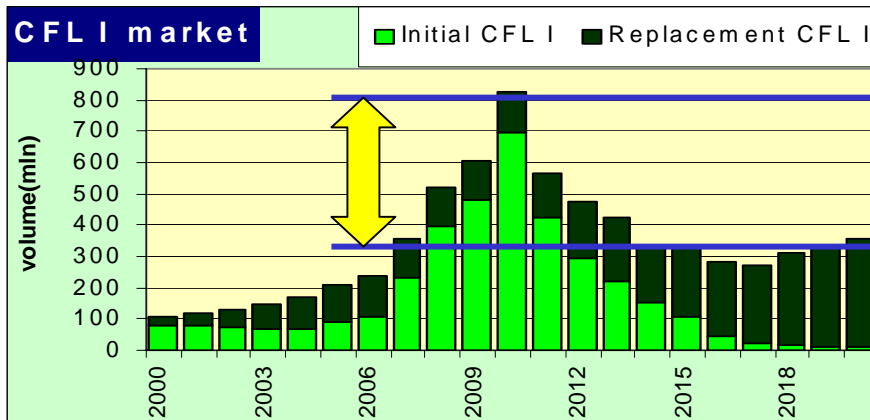
Base Case (ELC proposal)



Example: Europe

- A 2010 (Oct 2009) disruptive phase-out results in a large peak and dip in market demand (Δ about 60%)
- Resulting energy / CO₂ savings similar for both scenarios (75%)
- For Europe a disruptive scenario would have high risks
 - Empty retail shelves
 - Consumers stocking GLS
 - Labor force / Social issues
 - Deployment transition technologies (ESH/LED) requires a longer timeframe
- Strive for energy savings and successful transition

Disruptive (Proposal European Commission)



Conclusions

1. An ambitious global phase-out of general lighting incandescent light bulbs is **feasible in a timeframe until 2014**, resulting in significant energy and CO₂ savings
2. Incandescent lamps will in this timeframe **primarily be replaced by integrated Compact Fluorescent Lamps** as well as (to a lesser extend) by Energy Saving Halogen and Retrofit LED solutions
3. The incandescent phase-out scenario is developing into a **unique global stakeholder partnership program**, which – when successful - may well serve as an example for the many other `energy transitions` which need to take place in countering global climate change

Recommendations

It is recommended:

1. to aim for an average global incandescent step-wise phase-out in a **timeframe** till 2014, in order to prevent major disruptions and **risks for consumers** (empty retail shelves; insufficient EE alternatives / GLS stocking; low quality products; supply base overshoot / labor issues)
2. to create regional and global **efficiency requirements** for the phasing process in order to allow portfolio and supply base planning of replacement technologies
3. to quickly agree on a global **CFLi quality standard**, in order to protect consumer interest. Similarly **global quality standards** need to be developed on shortest possible term for **Energy Saving Halogen** and **Retrofit LED** solutions, accompanied by enforcement mechanisms

The Incandescent Lamp: A piece of future Art !



