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Analysis of the electricity end-use in EU-27 households

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Introduction

- Between 2004-2007 the energy end-use consumption in the EU-27 Member States decreased, while electricity end-use consumption in EU-27 grew slowly, but at a lower rate than the economic growth.

- The paper summarises the result of JRC in-depth survey on the electricity consumption in residential buildings in the enlarged EU, the first findings of the preparatory studies for implementing the Eco-design Directive, as well as other recent analysis and studies on different aspects of the electricity final consumption in EU-27.

Background

- Bottom-up survey of end-use electricity consumption for the residential and tertiary building sector
  - Annual data gathering workshop (proceedings online): Ispra 2003, Brussels 2004, Tallin 2005, Budapest 2006, Krakow 2007, Ljublijana 2008, Istanbul 2009
  - Periodic status report with an overview of end-use electricity consumption in buildings (2003, 2006, 2008)

    'Tradable Certificates for Energy Savings (White Certificates) - theory and practice-' http://re.jrc.ec.europa.eu/energyefficiency/pdf/publications/White%20cert%20Report%20final.pdf

- Survey on Energy Services Companies, Database of European ESCOs
  - Continuous survey, reports every 2 yrs. 'Latest Development of Energy Service Companies across Europe - A European ESCO Update –' http://re.jrc.ec.europa.eu/energyefficiency/pdf/EnEff Report 2006.pdf

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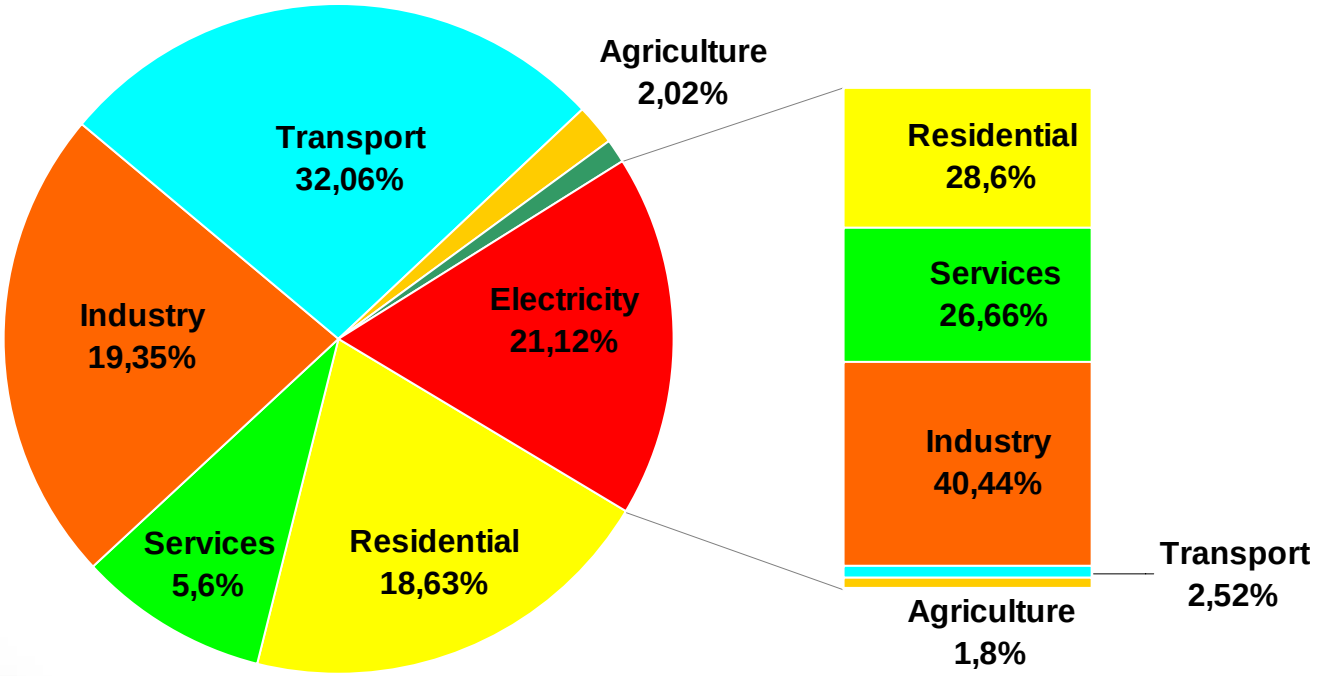
Final energy consumption in 2007 (EU-27)



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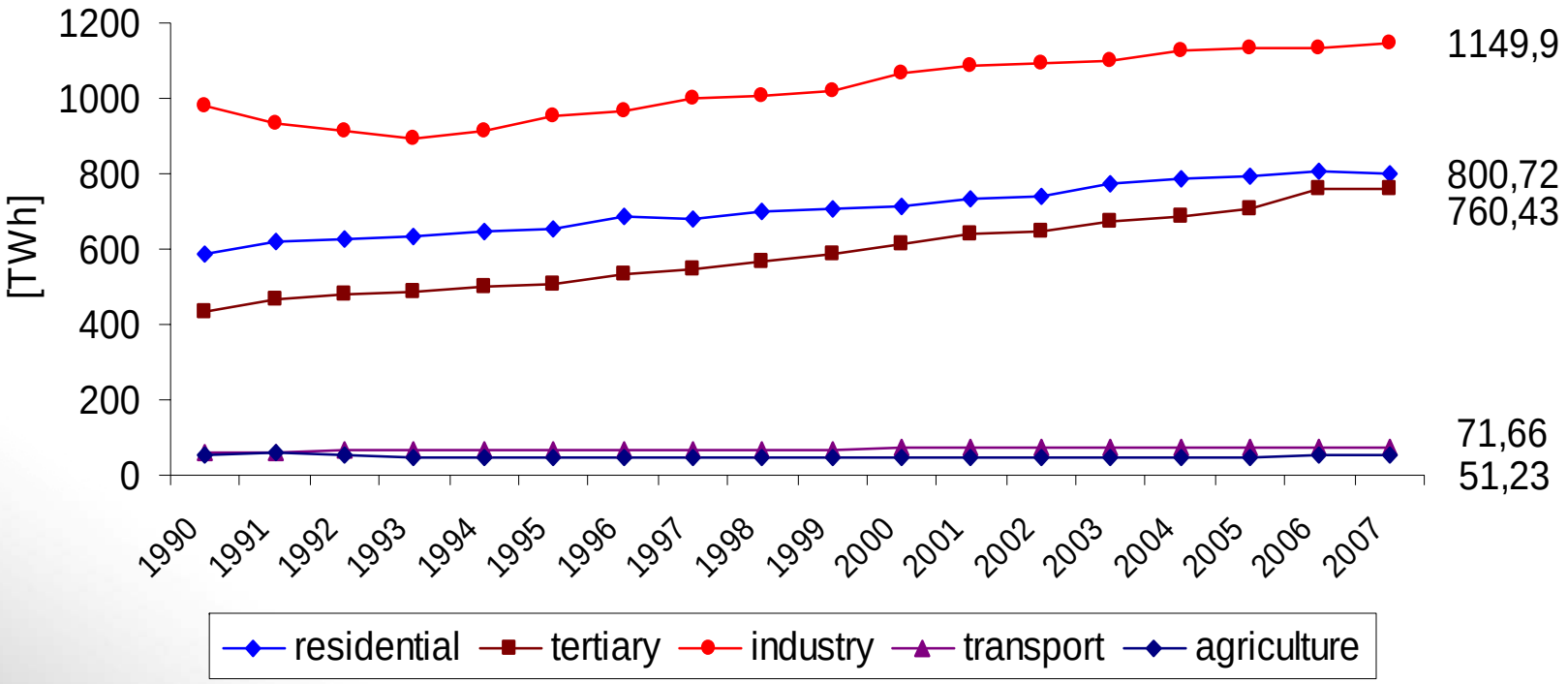
Final Electricity consumption trends

2007: 2843,24 TWh



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Residential energy consumption in EU-27 (2007)

- EU-27: Residential energy consumption dropped down by -1,55% from 1999 arriving to 284,55 Mtoe/yr but is still with 8% above 1990.
- EU-27: Residential electricity consumption rose by 13,17% on the period 1999-2007 and by 37,2% on 1990-2007, arriving to 800,72 TWh/yr, below the 2006 level by -0,72%.
- EU-27: The gas consumption rose by 9% from 1999 arriving to 113,176 Mtoe/yr, but was registered a -5,73% decrease over the period 2006-2007.
- EU-27: The GDP growth* was 20,5% from 1999 to 2007

* 2000 exchange rates

(source: Eurostat)

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Cold appliances EU-27, 2007

- The refrigerators stock reached the saturation level, having penetration rates of around 100% in all the EU-27 countries.
- The freezer market registered a significant decrease tendency in the last years, due to the increase use of combined refrigerator/freezer appliances.
- In the year 2007, the combined refrigerator/freezer appliances (2 doors appliances) took the greatest share of the sales with 59,3% and 79% on both EU-15 and NMS-12 markets.
- The electricity consumption of cold appliances was around 122 TWh/yr.
- Regulated by energy labelling, voluntary agreements and minimum efficiency requirements since 1994 and 1996, domestic refrigerators and freezers are one of the success stories of Community energy efficiency policy.
- Additional requirements are under assessment of the Regulatory Committee of the Eco-design Directive

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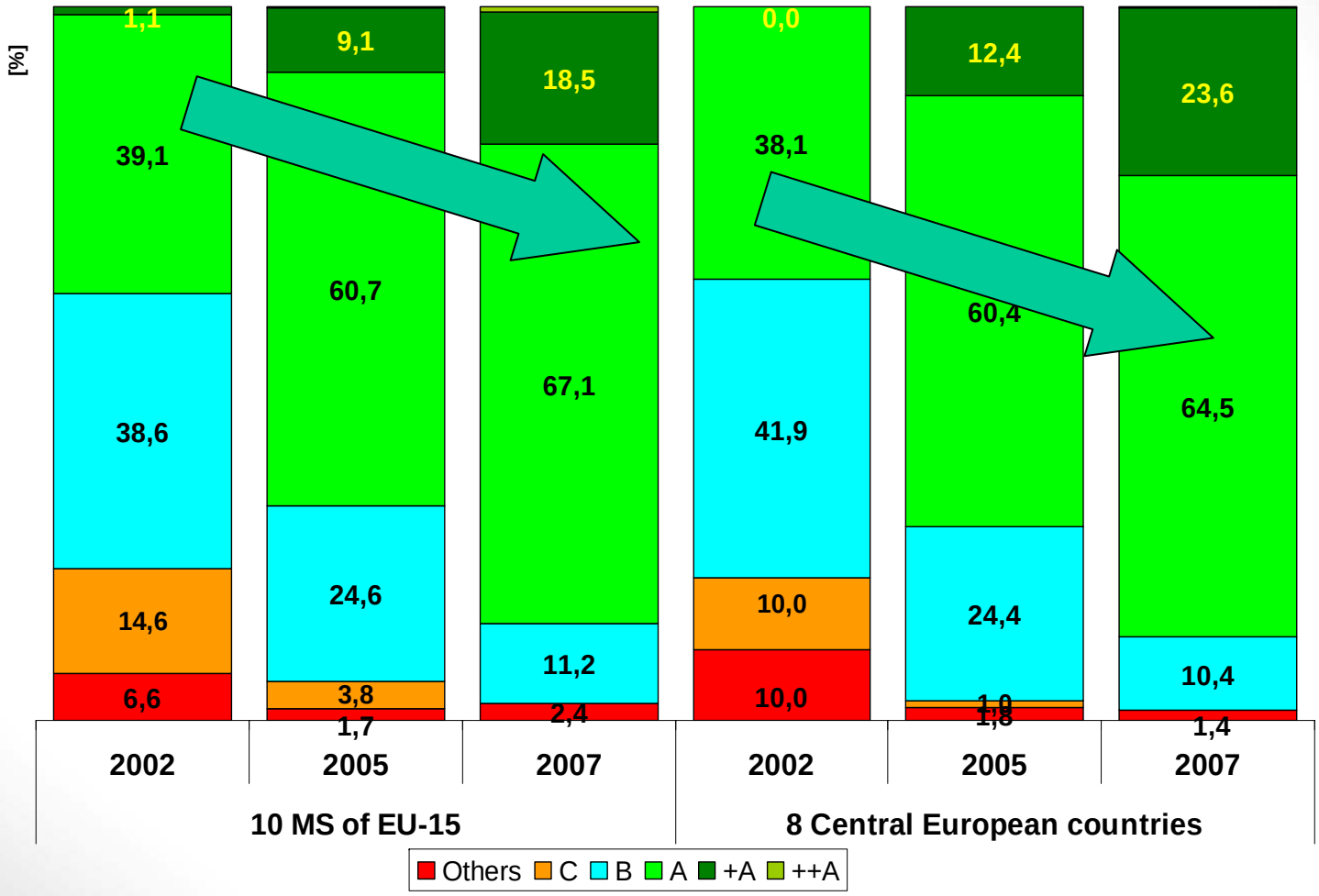
Cold appliances EU-27, 2007



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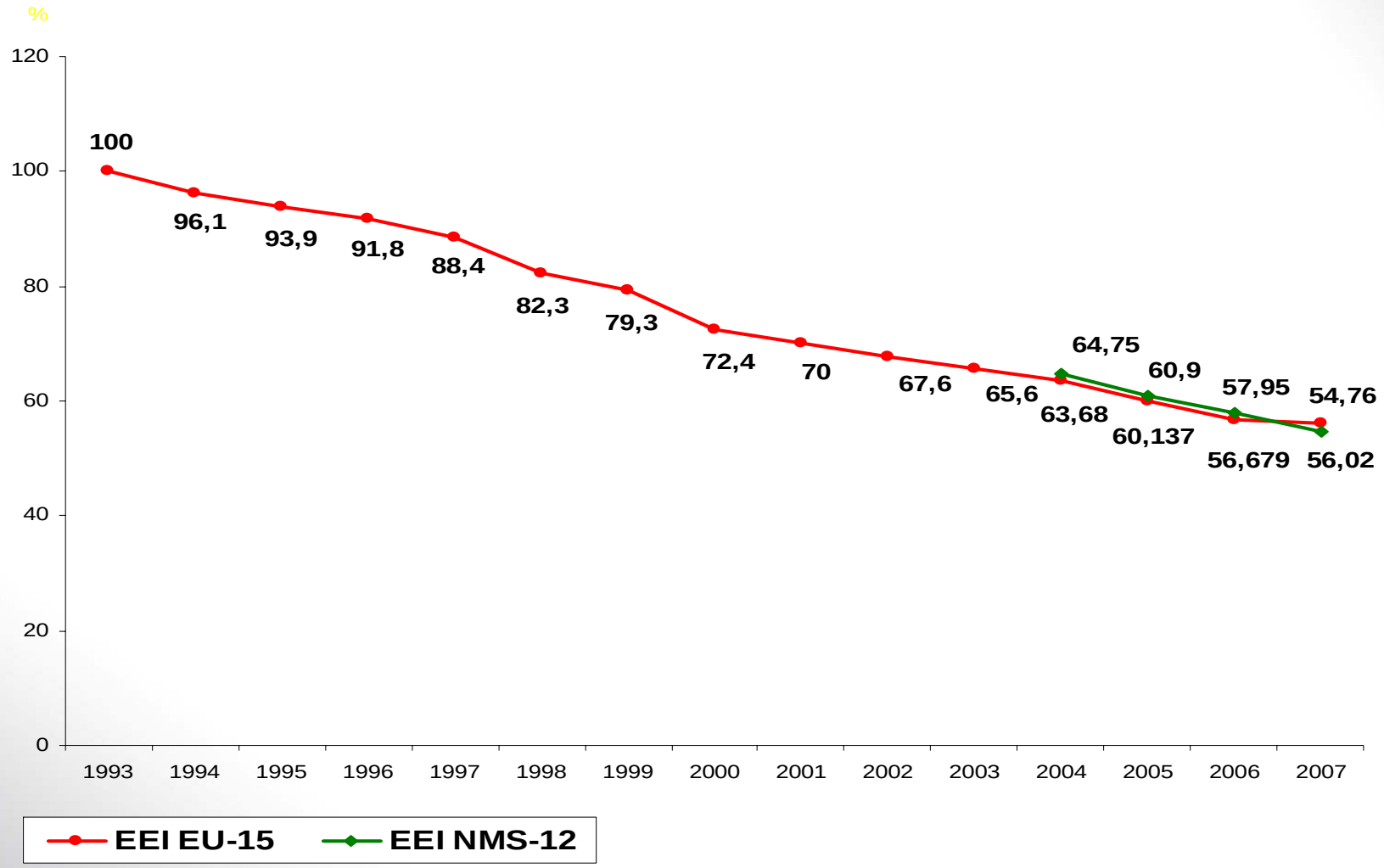
EEI for cold appliances sales



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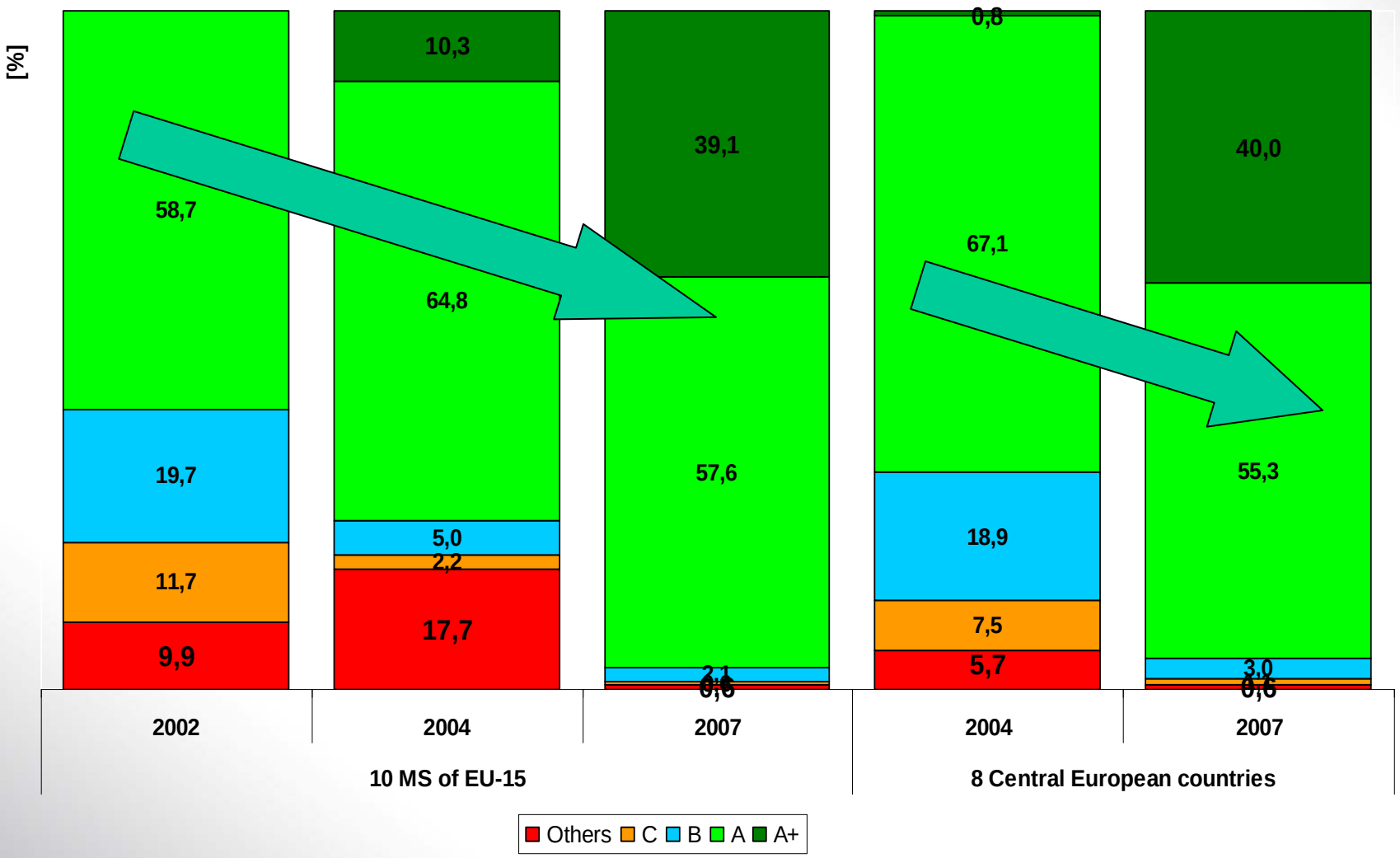
Washing machines – EU-27, 2007

- The appliances stock of washing machines reached the saturation level, with penetration rate levels around 100% in all the EU-27 countries.
- 77,3% of the sales in 8 NMS from Central Europe were washing machines with spin speed more than 800 rpm, in 10 EU-15 countries being only 33,6%.
- The electricity consumption of washing machines in 2007 was estimated at around 51 TWh/yr.
- Regulated by energy labelling, voluntary agreements and minimum efficiency requirements from 1997, it is another successful story of the EU energy efficiency policy.
- Additional requirements are under assessment of the Regulatory Committee of the Eco-design Directive


[%]
58,7
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2004
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2004
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10 MS of EU-15
8 Central European countries
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C
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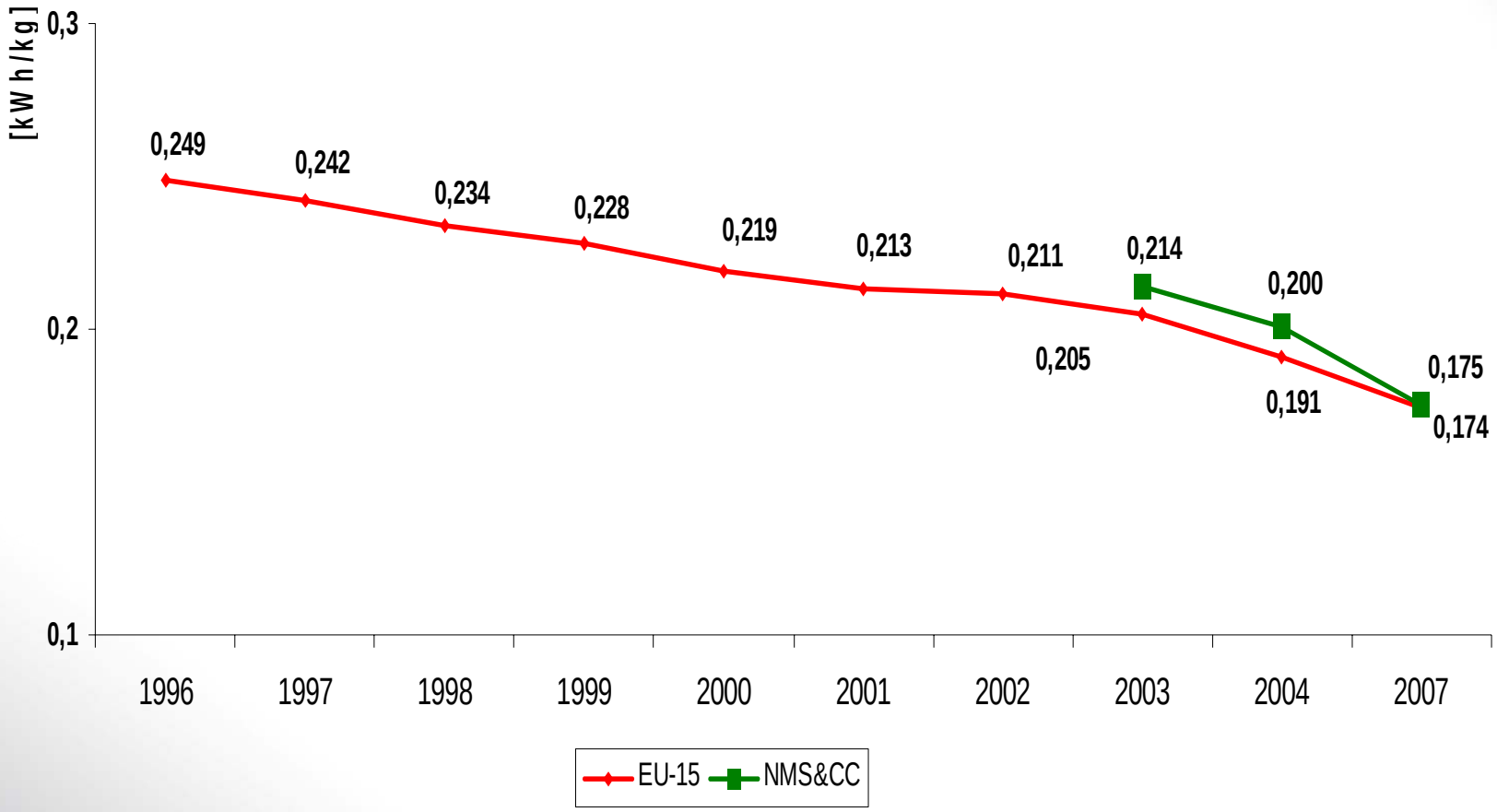
EEI for washing machines sales



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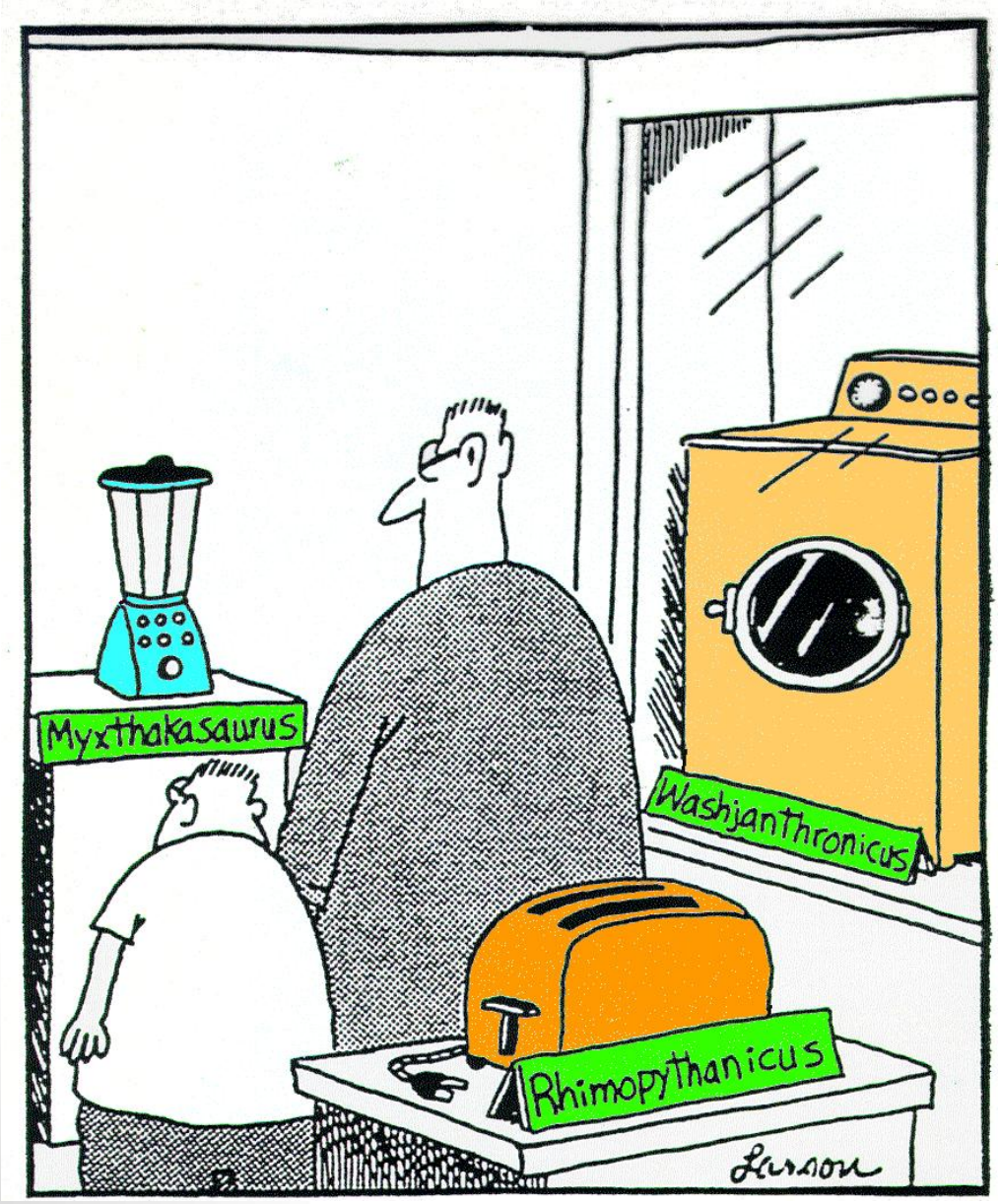

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Lighting – EU-27, 2007

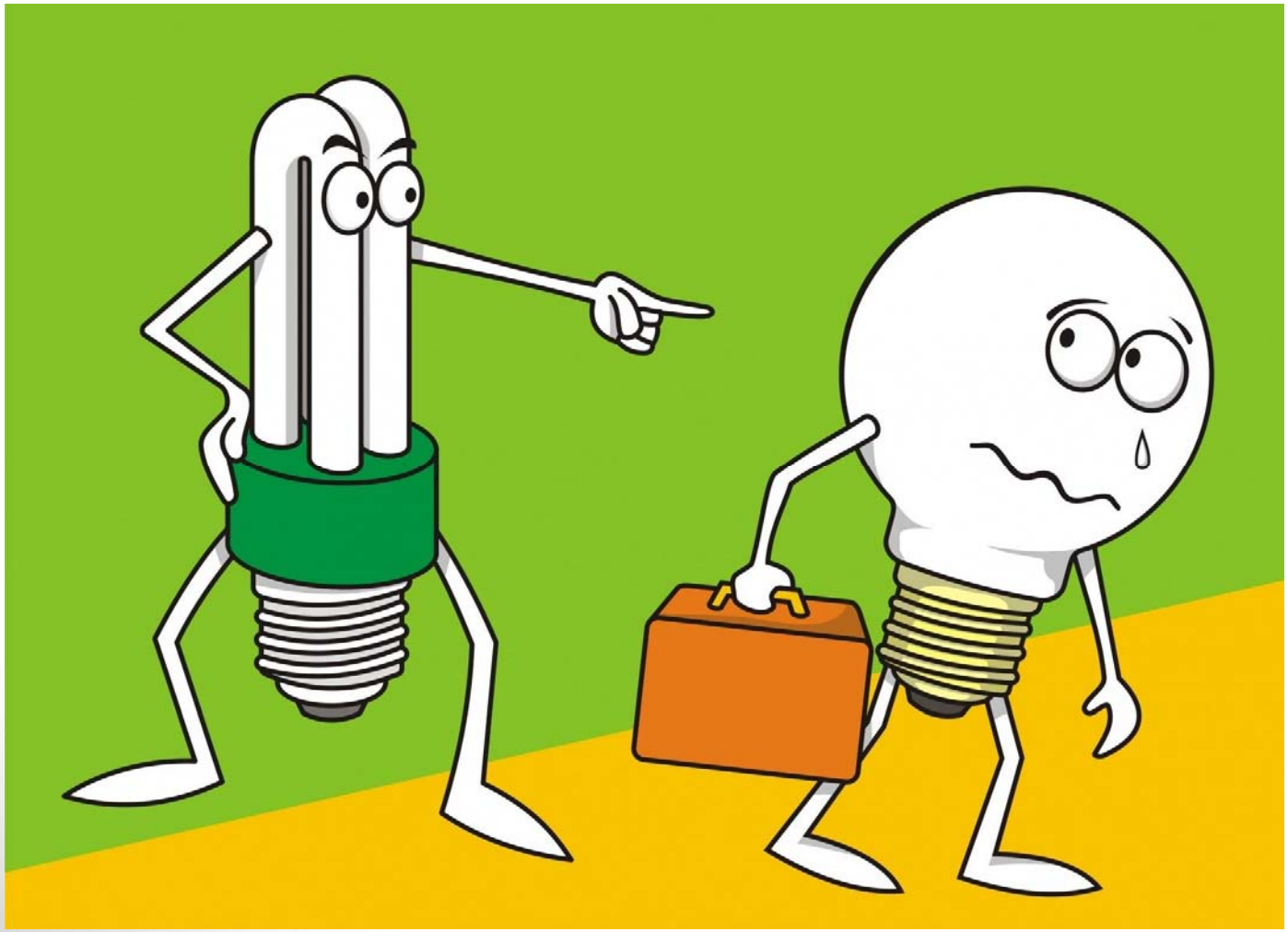
- Compact Fluorescent Lamps (CFLs) represent one of the most efficient solutions available today for improving energy efficiency in residential lighting. The recent drop in price, improvement in quality together with several information and promotion campaigns have had a positive impact on sales.

- The CFL penetration was strongly stimulated in many MSs due to some specific national policies and measures, like the white certificate schemes in the UK and Italy. There has been a 340% increase in the apparent consumption of CFL from 145 million in 2003 to 628 million in 2007.

- In 2007, the incandescent lamps (GLS) still had the dominant position on the market and also of the existing stock taking 54%. One third (33%) of the sold non-directional GLS lamps are 60W and 31,6% are 40W.

- Lighting represents 10,5 % of the residential electricity consumption in the EU-27, being the third main consumer after electricity for heating and cold appliances. From the estimates, residential lighting is responsible for around 84TWh/yr in 2007. The equivalent electricity consumption of the incandescent lamps represents around 50%, halogen lamps being responsible for around 30% of residential lighting consumption.

- The most promising emerging technology are LEDs what are covered by the energy efficiency requirements in the measure and are A-class lamps.



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Lighting – EU-27, 2007

- In March 2009 the European Commission adopted an eco-design regulation to improve the energy efficiency of household lamps, which envisages the progressive phase-out of incandescent bulbs starting in 2009 and finishing at the end of 2012.

Date	Non-clear lamps				Clear lamps						
	Requirement energy class	Incandescent	All halogen	CFLs	Requirement energy class	Conventional halogen				Halogen C	Halogen B
						≥100 W	≥75 W	≥60 W	<60 W		
Today	None				None						
Sep-09	A	phased-out			C for ≥100W, E for the rest[1]	phased-out					
Sep-10	A				C for ≥75W						
Sep-11	A				C for ≥60W						
Sep-12	A				C for all						
Sep-13	Second level of functionality requirements										
Review 2014					Review						
Sep-16	A	phased-out			B / C[2]	phased-out				3	

- 1 The requirement is raised for all clear lamps to class E, phasing out F and G class incandescent and halogen lamps in all wattages already in September 2009. After the first stage, only E-class incandescent lamps remain available in some wattages until they are also gradually phased out by September 2012.
- 2 Special cap halogen lamps will be required to be at least class C, all other clear lamps will have to be at least class B.
- 3 Only special cap halogen lamps are allowed to be C-class.

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Residential Heating & cooling

- **Air conditioners (up to 12kWh)**
  - The biggest EU markets: Spain (37%), Italy (20%), Greece (15%), and southern-France (11%), where the air-conditioning systems are one of the main drivers to increases in electricity consumption and more important to electricity peak demand is the fast penetration of small residential air-conditioners and their extensive use during the summer months.

  - The overall electricity consumption of the EU-27 air-conditioning systems was around 35 TWh in 2007

- **Electric Water Heaters**
  - **8,1% of the total residential electricity consumption**
  - **In 2007, around 31,7% of the EU-27 households owned a secondary water heater, usually a small one for kitchen or bath.**

- **Space heating**
  - **Still the largest electricity residential consumers- around 150 TWh**
  - **Countries as France, Ireland, Italy, Austria and Denmark, developed specific programmes for high efficiency condensing boilers.**

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Television

- The EU-27electricity consumption in 2007 was around 60 TWh of which 54 TWh are in on-mode and 6 TWh are in standby/off-mode.

- On the TVs market dramatic changes in technology happened and will take place, driven by the technology change. Four main factors influence the market development:
  - Flat Panel displays (flat TVs)
  - Larger Screen Sizes
  - Digital television broadcasting
  - High resolution television (HDTV)

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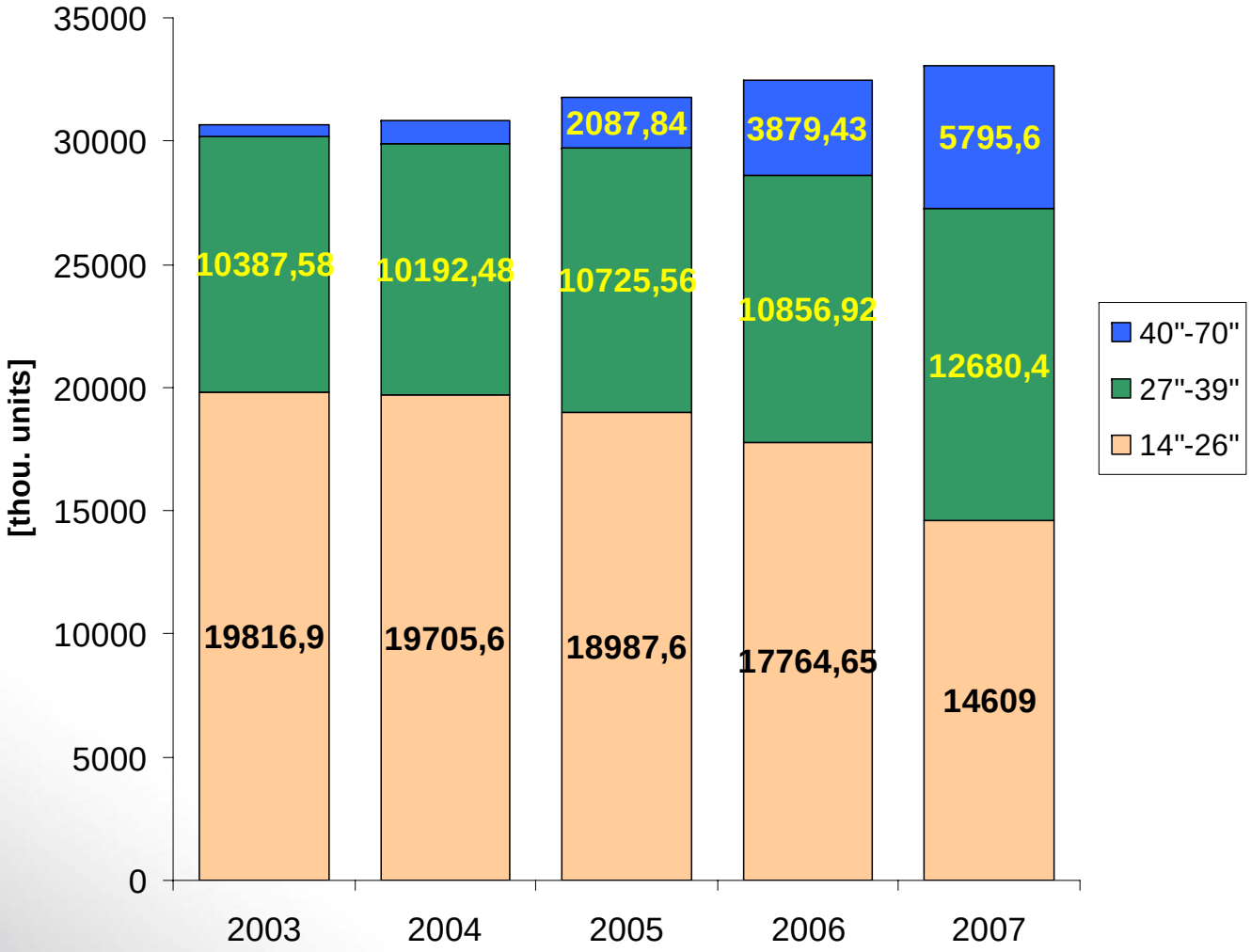
Television – sales: importance of the size



Source: GfK

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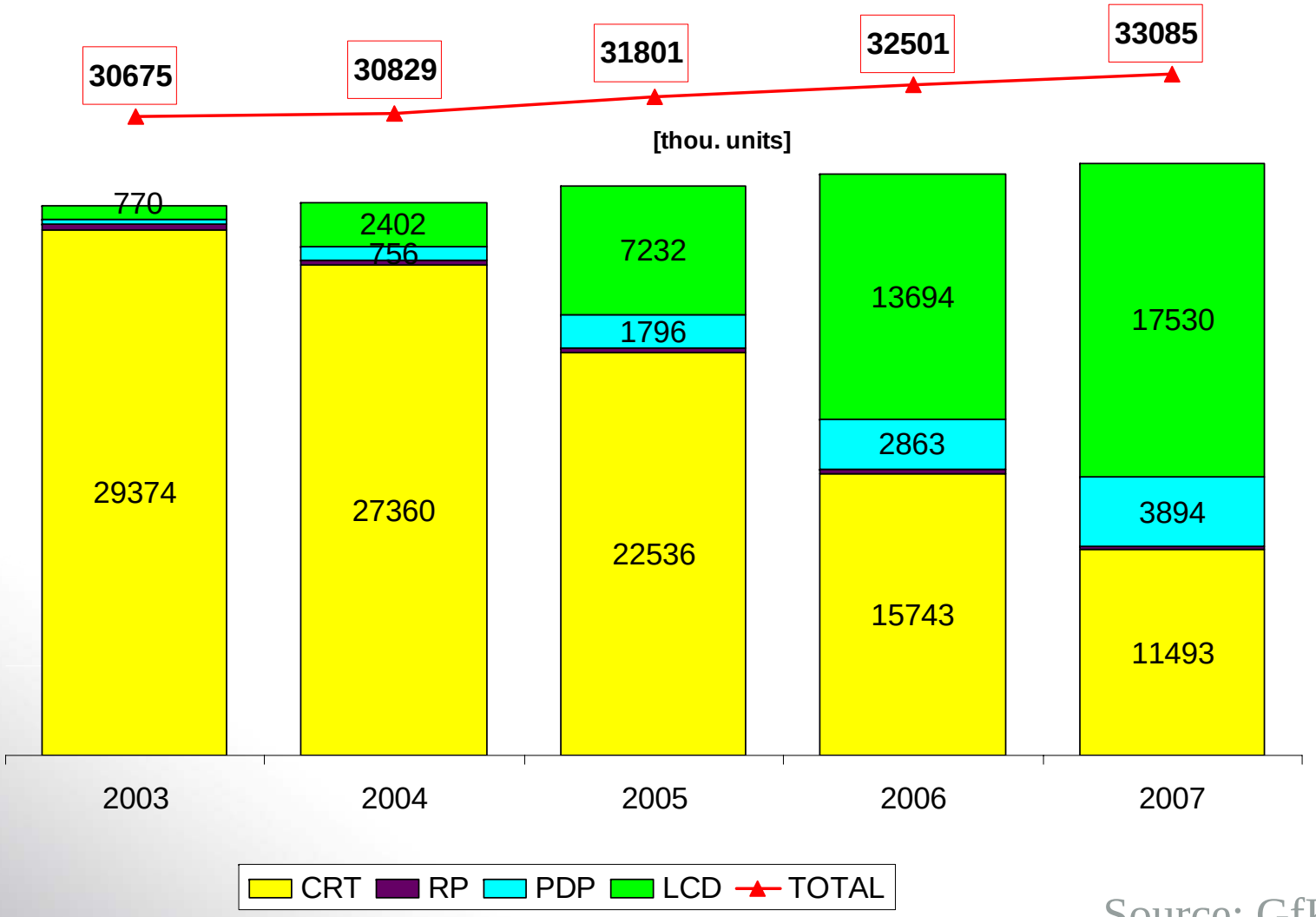
Television – market sales



Source: GfK

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Digital Television

- The EU Member States are gradually closing analogue transmissions and moving to digital broadcasting.
- Five Member States (Germany, Finland, Luxembourg, Sweden and the Netherlands) have already completed switch-off at the beginning of 2009 and by 2010 the process should be well advanced in the whole EU-27 (CZ will finalise in 2012)
- In June 2008 in EU-27 were some 103 millions digital TV subscriptions, from which 40 millions digital satellite, 17 millions digital cable, 36 millions digital terrestrial and 10 millions IPTV.
- In the next future the equipment for the reception, decoding and Interactive processing of digital broadcasting and related services will contribute more and more substantially to the electricity consumption of EU households.
- According to the penetration level, the specifications of the equipment And the requirements of the service provider, in 2007 was estimated a Total European consumption of up to 23 TWh/yr.
- CoC for Digital TV

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Information technologies

Broadband communications & equipment

- The penetration rate of broadband fix lines in EU-27 household reached 53,78% at mid-2008.
- In 2008, the EU penetration level for mobile broadband (data modems/cards/keys and other active 3G equivalent) was 6,9%. The figure must be significantly bigger, as time as France, the Netherlands and the UK did not report on.

Information technologies

- The majority of European households (57%) had a computer and nearly half of the household population now has access to the Internet (49%)
- There has been a significant increase in Internet penetration rates across Europe since 2007 (+7 percentage points). However, the Internet access remains considerably higher in the EU15 (52%) than in the NMS12 (33%).
- This trend is most pronounced in Slovenia, and Cyprus (+14 percentage points) and the penetration rates remain the Czech Republic the highest in the Netherlands (86%), Denmark (80%) and Sweden (78%).
- Meanwhile, less than a quarter of households in Bulgaria (22%, 57% annual growth), Greece (22%, 15,7% annual growth) and Romania (24%, 100% annual growth) have Internet access.

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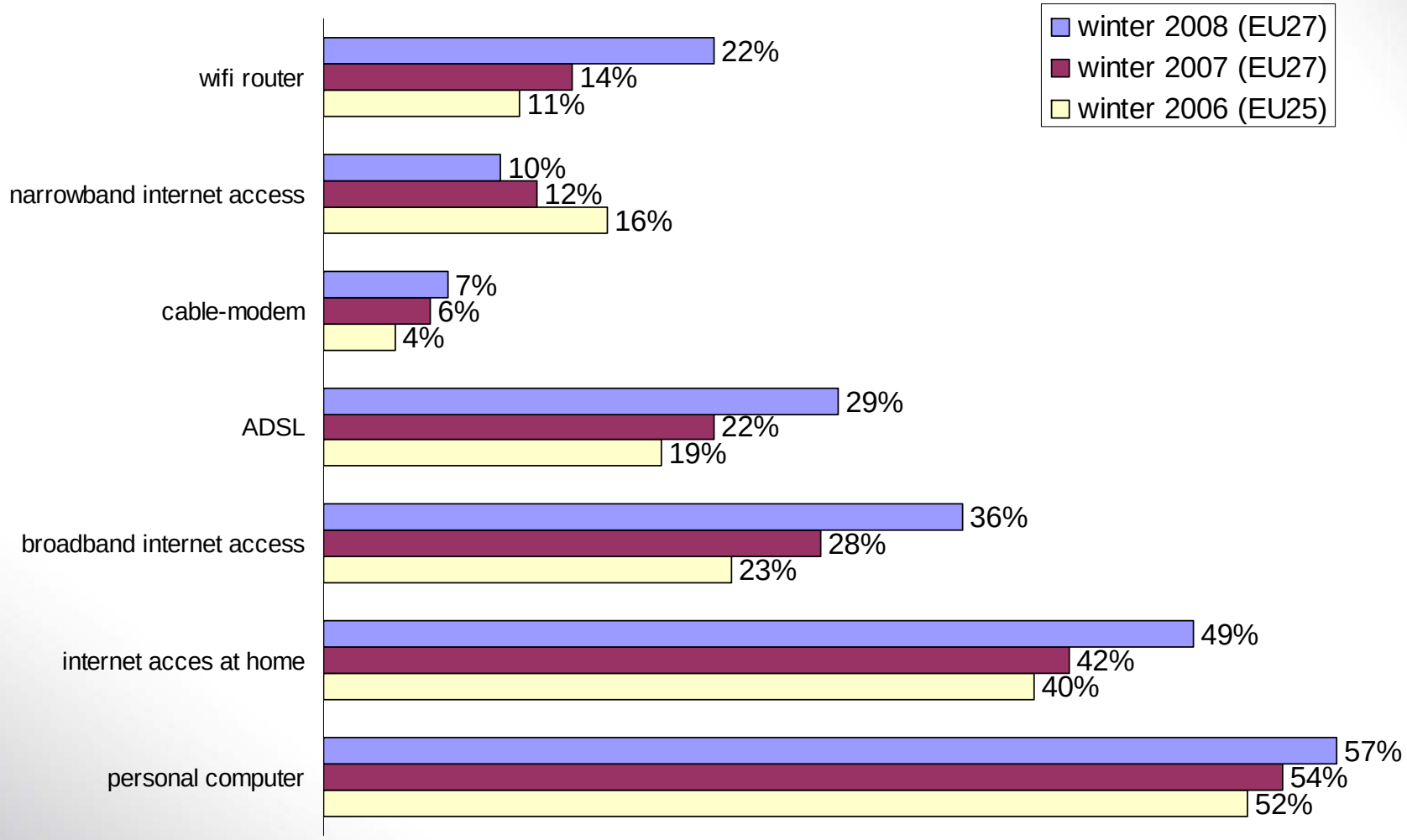
Information technologies: penetration rates



Source: Eurobarometer

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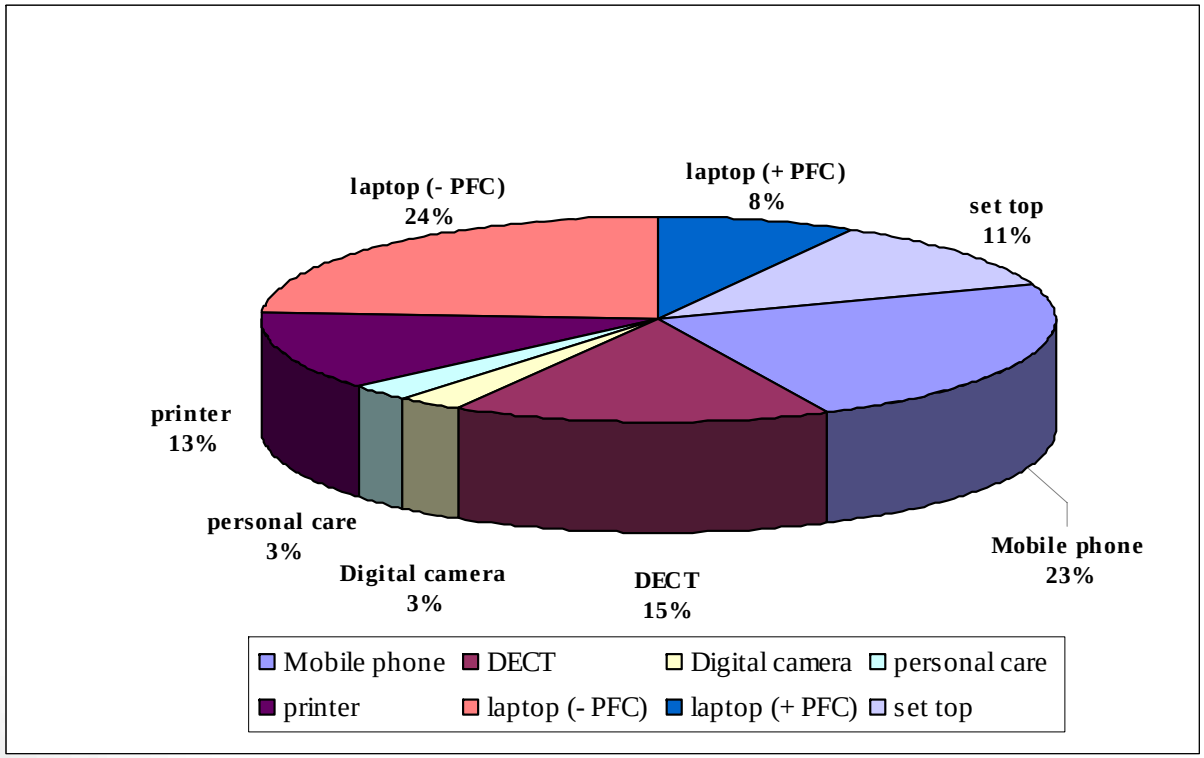
External Power Supplies

- **External Power Supplies**

  - EPS and battery chargers are important energy consumers, contributing with up to 2% at the EU residential electricity consumption.



- CoC for External Power Supplies

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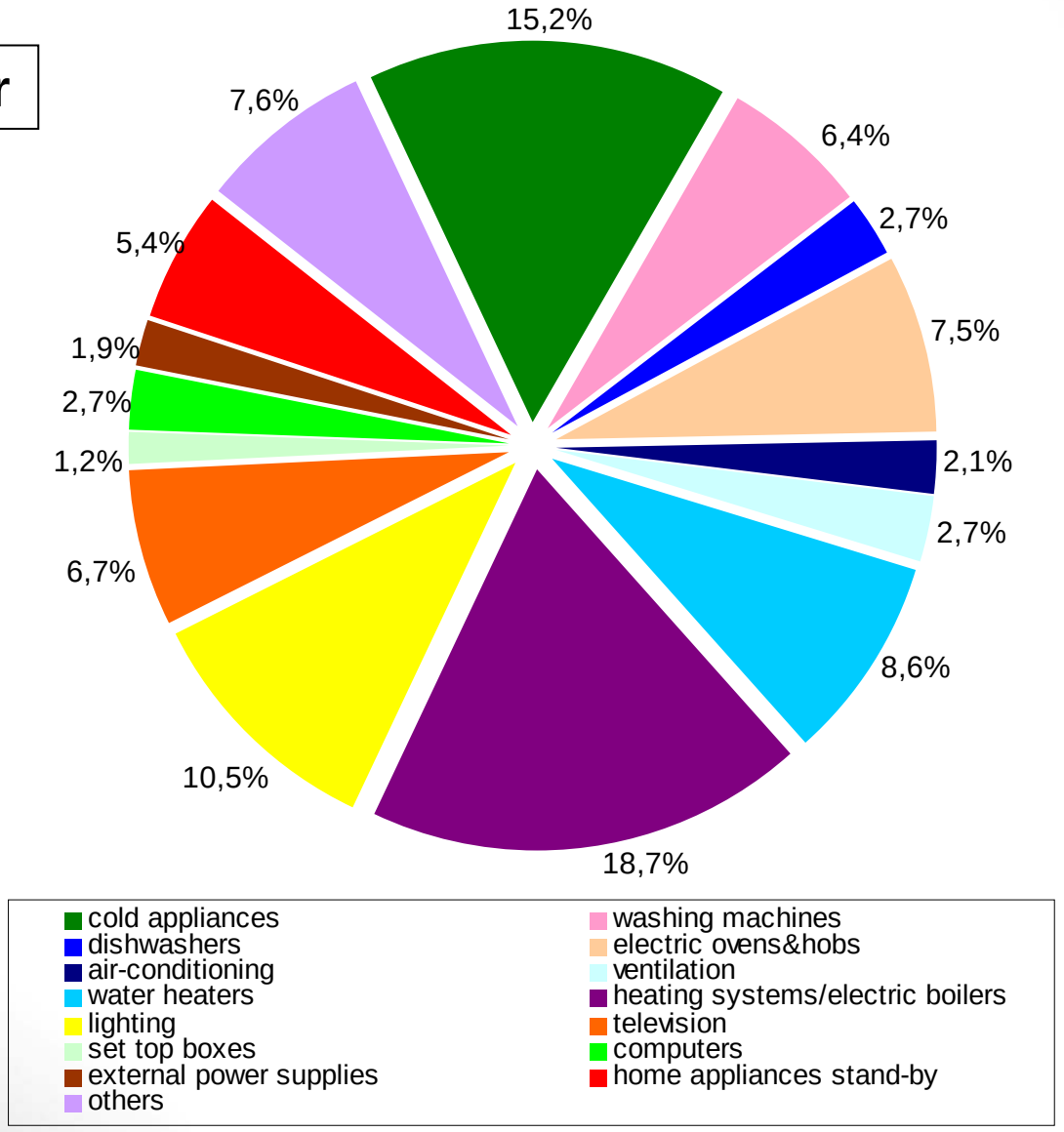
Residential electricity consumption

2007: 800,72 TWh/yr



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Conclusions (1)

- The end-use electricity consumption in 2007 was below the 2006 level and close to the 2005 consumption. Even though it may be too early to have a clear conclusion due to a warmer climate in 2007, the drop in electricity consumption seems to indicate saturation and point at the effects of EU energy efficiency policies and measures.
- Significant efficiency progresses made in the last years by the main white appliances seems to be compensated by the growing contribution of the ICT and electronics.
- While in the EU-15 the electricity consumption dropped down with almost 0,9% in 2007 compared to 2006, in the NMS-12 final electricity consumption still shows a slight grow (0,5% in 2007 compared to than in 2006). The NMS-12 trend can be explained by a faster economic growth and improvement of the living standards.
- For certain main electric appliances such as refrigerators and washing machines stock saturation has been reached in almost all the MSs and the market sales average efficiency class is A but there is still a large efficiency potential.
- Space heating: the Netherlands, Germany, the UK and Denmark more efficient condensing boilers have significant shares on both the existing stock and market sales. Several countries (France, Ireland, the Netherlands, Austria, Denmark) have developed specific national programmes offering subsidies and tax credits for high efficiency condensing boilers. However, electric space heating and water heating remain a major problem, no policy action being foreseen for the next future for these major energy consumers.

Conclusions (2)

- Compact Fluorescent Lamps (CFLs) represent one of the most efficient solutions available today for improving energy efficiency in residential lighting. The CFLs stock in residential sector has been growing and there has been a 340% increase in the apparent consumption of CFL in 2007 as compared to 2003. In December 2008, the Ecodesign Regulatory Committee and EU Member States experts endorsed the European Commission's draft regulation progressively phasing out incandescent bulbs starting in 2009 and finishing at the end of 2012.

- The labelling Directive was among the most influential political decisions from the energy efficiency point of view, contributing substantially to the market transformation for domestic appliances. After years, energy labelling became a victim of its success in efficiency improvement, being now faced to a need for a revision of energy classes (i.e. for refrigerators).

- The voluntary initiatives of the industry, as the EU Code of Conducts, have also had a very important contribution to the drop in stand by and operation energy consumption of certain products, such as external power supplies, set top boxes, broadband equipments.

- Under the EU Directive for Eco-design of the energy using products regulations for 25 product lots are already in force or under assessment. The estimate savings impact of the first 11 regulations (5 already in force) will be around 347TWh/yr by 2020, representing some 12% of the final electricity consumption in EU-27

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Eco-design&Labelling: estimated savings by 2020

Measure	Estimated savings (annual by 2020) [TWh]	Measure adoption
Stand-by (ecodesign)	35	Dec-08
Simple set-top boxes (ecodesign)	6	Jan-09
Street & office lighting (ecodesign)	38	Feb-09
External power supplies (ecodesign)	9	Mar-09
Domestic lighting (ecodesign)	39	Mar-09
Televisions (ecodesign & labelling)	43	Jul-09
Freezers & refrigerators (ecodesign & labelling)	6	Jul-09
Washing machines (ecodesign & labelling)	2	Jul-09
Dishwashers (ecodesign & labelling)	2	Jul-09
Electric motors (ecodesign)	140	Jul-09
Circulators (ecodesign)	27	Jul-09
Total savings (annual by 2020) [TWh]	347	

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Thank you for your attention