Eco-design of Energy using Products

Standby issues in the European Context

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International Conference on Standby Power

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Bio Intelligence Service

Pioneer in the quantification tools and support for decision

- Specialists in the measurement environmental and health quality of products and services in France and Europe

- At the interface of the environment and products, a large range of services for public and private decisions makers

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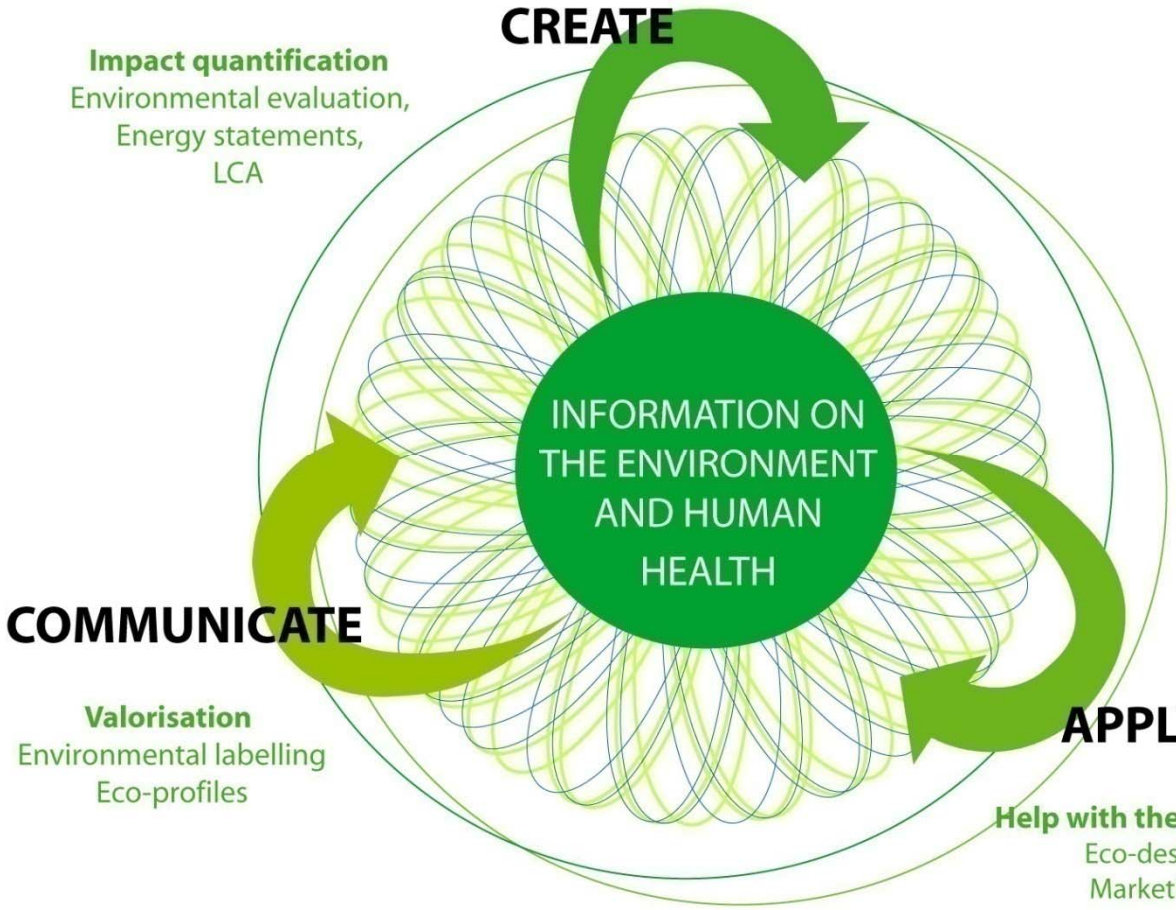
- Industrial ecology
- Nutritional health

For a wide variety of sectors:

- Agri-food
- Construction
- Retail
- Energy
- Industry
- Transport
- Waste
- Services

BIO's activities



Since 1989, our references include:

Structure

- A brief introduction to the EuP Directive
- Various procedures leading up to implementing measures (legislation)
- Timeline, the status and results of selected preparatory studies
- Example of “Standby and Off-mode losses” study to explain the EuP process

Disclaimer

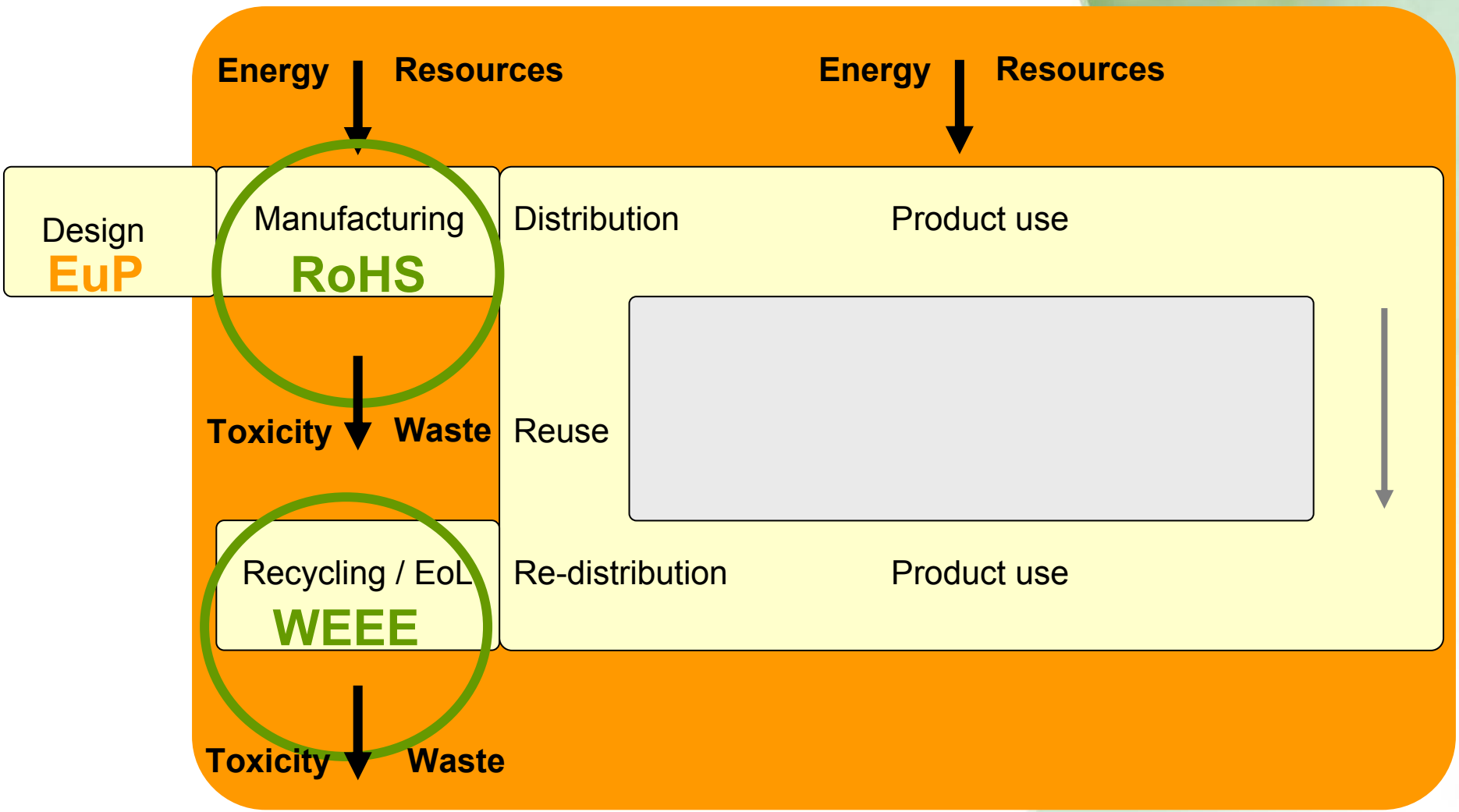
- *The presentation is a consultant’s summary of the EuP process and not necessarily endorsed by the EU Commission*

EuP Directive

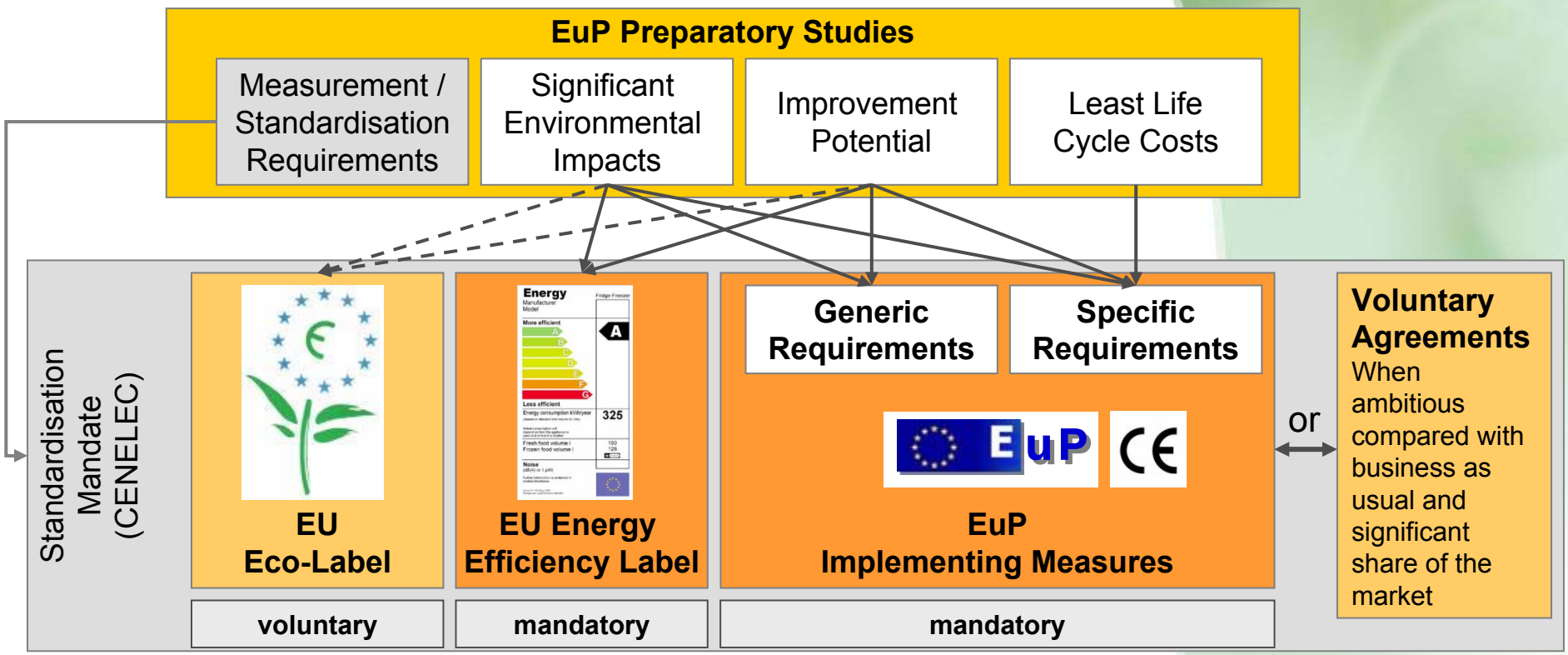
European **Framework Directive** for the setting of eco-design requirements for **E**nergy **u**sing **P**roducts (2005/32/EC)

- **Full text:**
  http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32005L0032:EN:NOT
- **Focus:**
  Improving energy efficiency, reducing environmental impacts with a lifecycle approach
- **Implementing Measures** (drafted by the EC based on Preparatory Studies)
  - Dedicated (vertical) product groups (e.g. TVs, STBs, PCs)
  - Horizontal aspects (e.g. EPS, Standby and off-mode)
- **Requirements:**
  - **Specific** (e.g. minimum values for power consumption, energy labels)
  - **Generic** (e.g. product information and assessments “eco-profile”)

Life cycle thinking



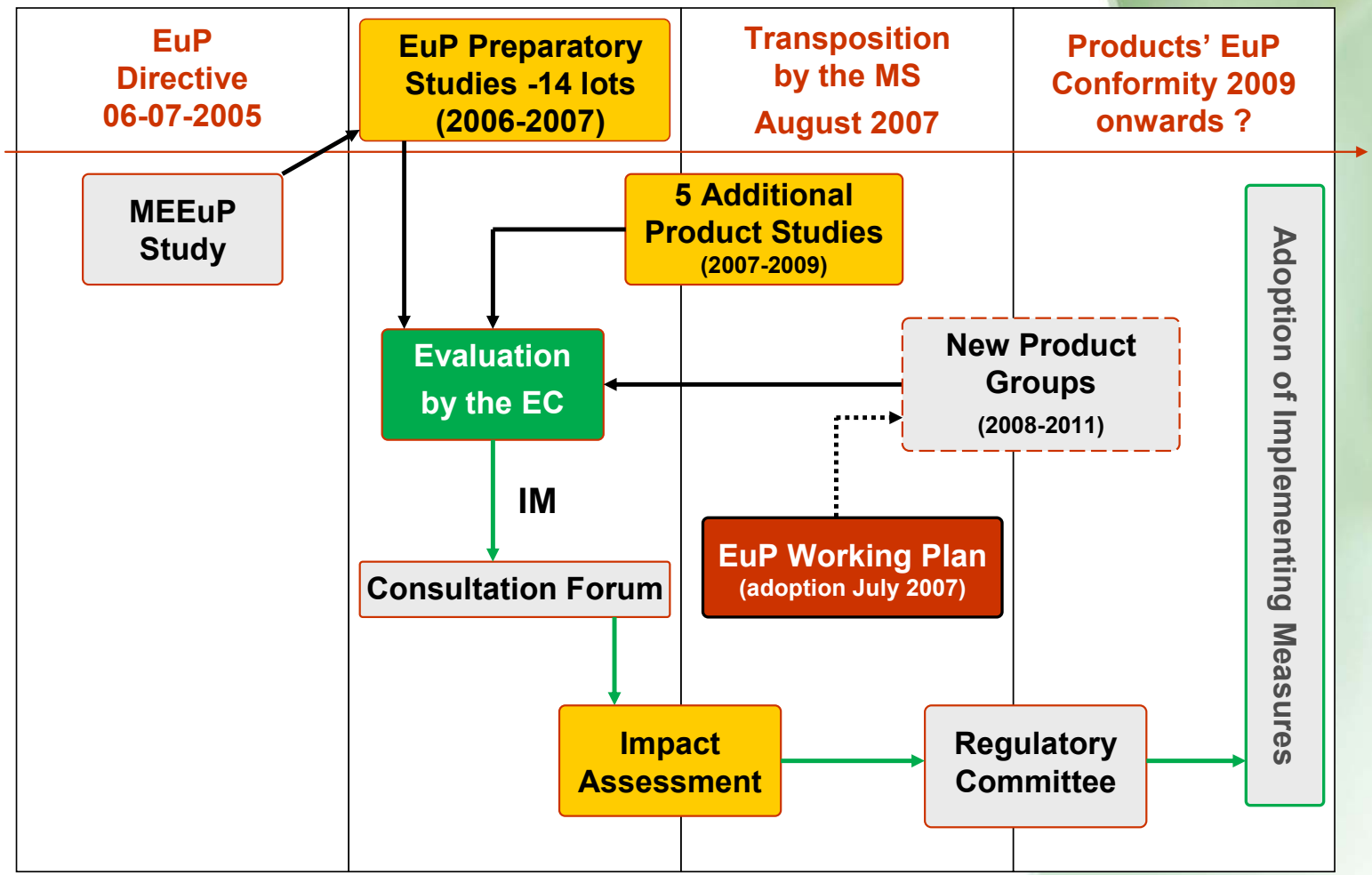
Synergies of EU Policies



Revision

- **5-10** years depending on product group and progress of technology but tiered requirements possible
- **Dynamic** but predictable to encourage improvement products while providing clarity on investments for Industry
- **Consistent** - Thresholds to be maintained (A becomes D etc. for labels)
  - Reward development of 'good' products, compatibility of incentives

EuP Process


EuP Directive 06-07-2005
EuP Preparatory Studies -14 lots (2006-2007)
Transposition by the MS August 2007
Products' EuP Conformity 2009 onwards ?
MEEuP Study
5 Additional Product Studies (2007-2009)
Evaluation by the EC
New Product Groups (2008-2011)
IM
EuP Working Plan (adoption July 2007)
Consultation Forum
Impact Assessment
Regulatory Committee
Adoption of Implementing Measures

EuP Preparatory Studies

DG TREN

Product groups covered by first 14 studies (I)

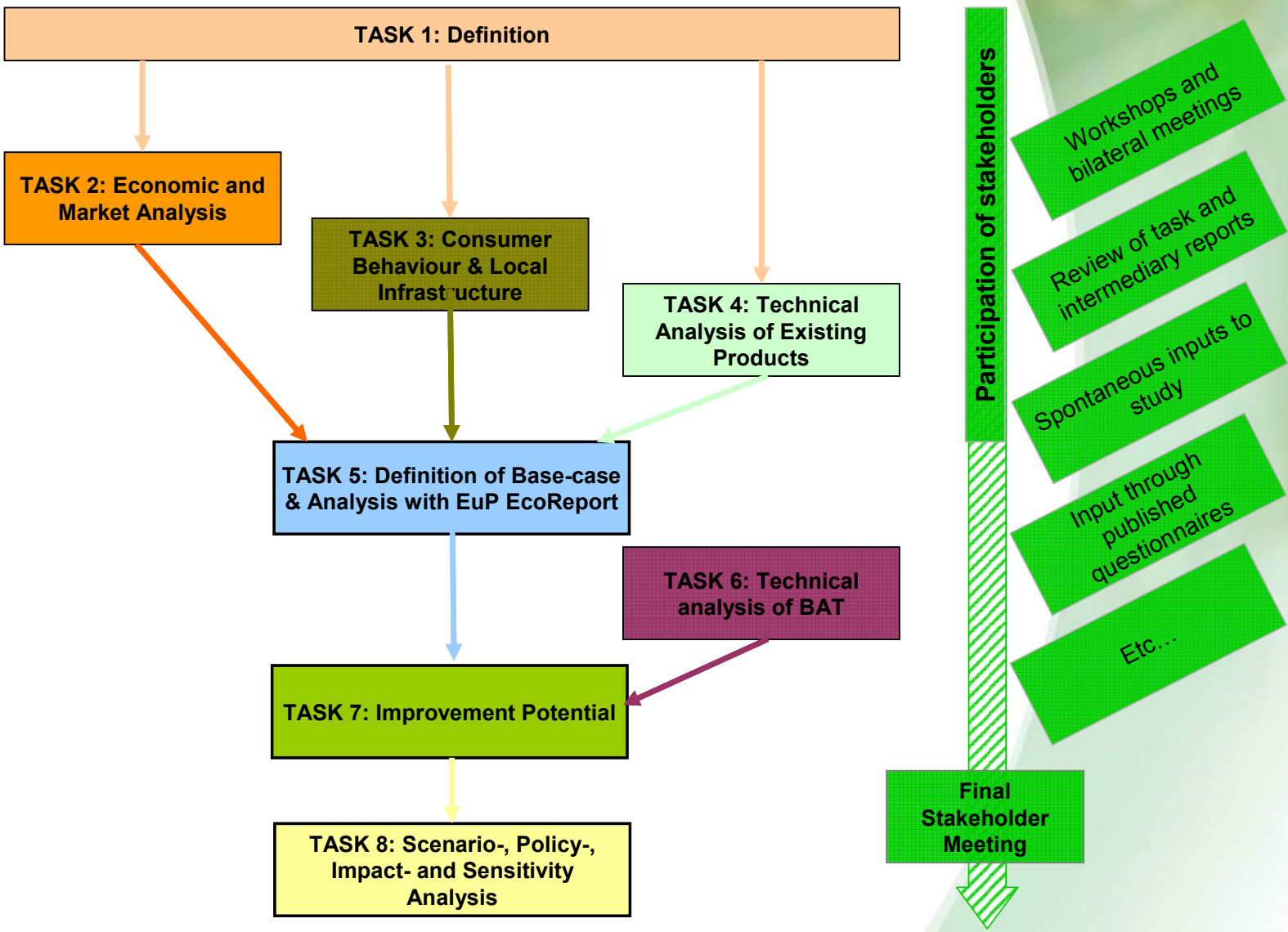
2005-2007

Lot 1: Boilers and combi-boilers (gas/oil/electric)
Lot 2: Water heaters (gas/oil/electric)
Lot 3: Personal computers (desktop, laptop, monitors)
Lot 4: Imaging equipment (copiers, faxes, printers, scanners, MFD)
Lot 5: Consumer electronics (TV)
Lot 6: Standby and off-mode losses of EuPs
Lot 7: Battery chargers and external power supplies
Lot 8: Office lighting
Lot 9: (Public) street lighting
Lot 10: Residential room conditioning appliances (air-con/vent)
Lot 11: Electric motors 1-150 kW and pumps, circulators, fans
Lot 12: Commercial refrigerators and freezers
Lot 13: Domestic refrigerators and freezers
Lot 14: Domestic dishwashers and washing machines

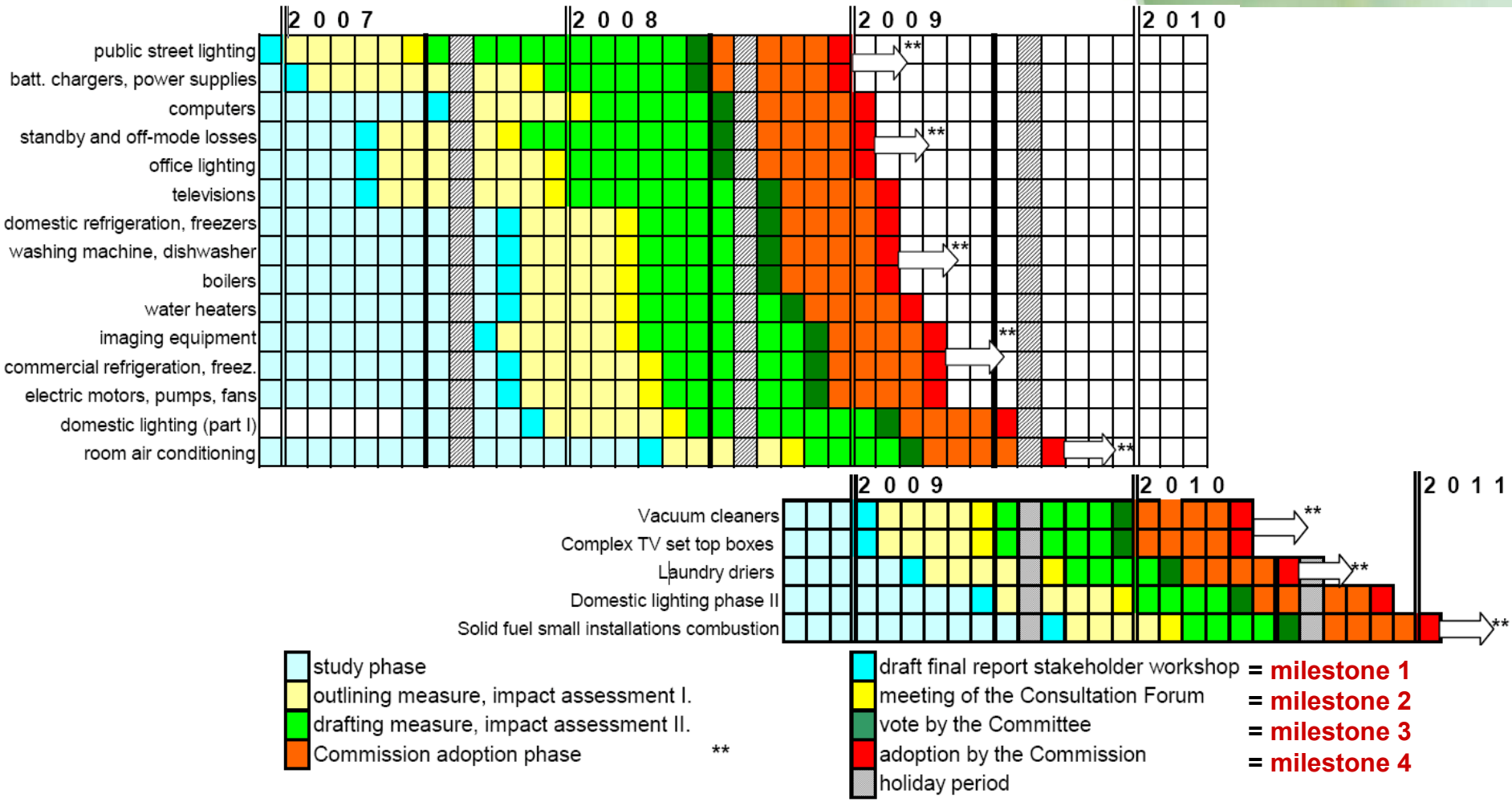
Additional 5+1 product studies (II) 2007-2009

…… Simple set-top-boxes
Lot 15: Solid fuel small combustion installations (in part. for heating)
Lot 16: Laundry dryers
Lot 17: Vacuum cleaners
Lot 18: Complex set top boxes
Lot 19: Domestic lighting

Methodology - MEEuP



EuP Timeline



Example results

Study recommendations cover

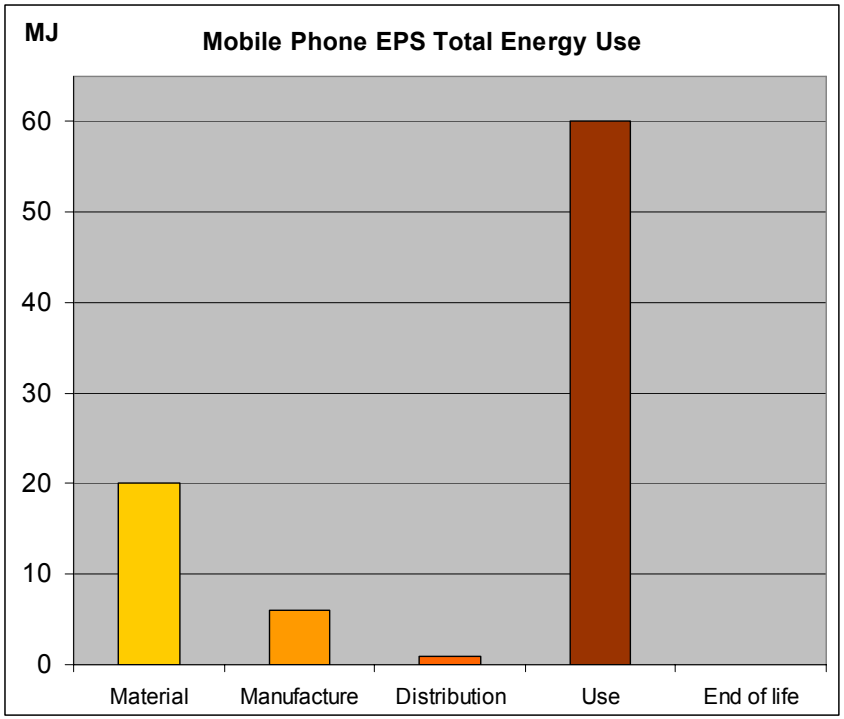
- Power consumption limits
- Minimum efficiencies
- Mandatory information requirements
- Energy efficiency labeling proposals
- Further product characteristics or functions not covered by limit values (→ proposed generic requirements)

based on definitions and scope set out in each study.

Example 1: External Power Supplies
Example 2: Standby and Off-mode Losses
Example 3: Televisions
Example 4: Imaging equipments (printer scanner, etc.)
Example 5: Set-top boxes

External Power Supplies (1)

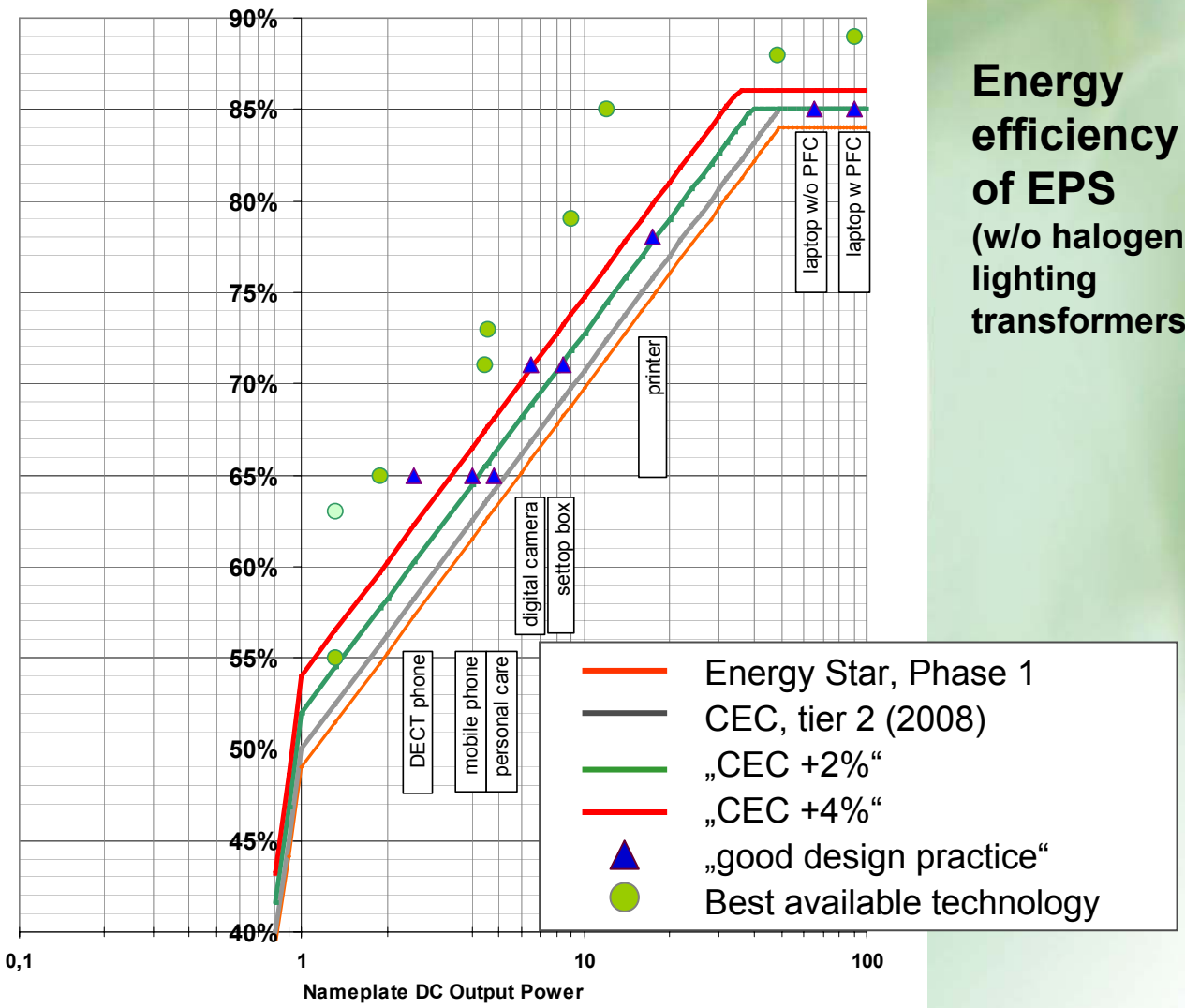
Exemplary Results for a Mobile Phone Power Supply



- **What is "significant"?**
  - **1st priority: Use phase power consumption**
    (both, energy efficiency under load and no-load losses)
  - **2nd priority: Raw materials**
    - main improvement can be achieved by change from linear to switch-mode power supplies
    - Lifetime extension reduces total material consumption "per function"
      - **standardisation of interfaces proposed as principle measure for lifetime extension)**
- Impact of the **use phase** is even more dominant for EPS with **higher wattage**

External Power Supplies (2)

Example for minimum efficiency requirement dependent on power range



Energy efficiency of EPS (w/o halogen lighting transformers)

External Power Supplies (3)

Example for minimum efficiency requirement **not** dependent on power range

Example for maximum power consumption, when not active

Energy efficiency (halogen lighting transformers)

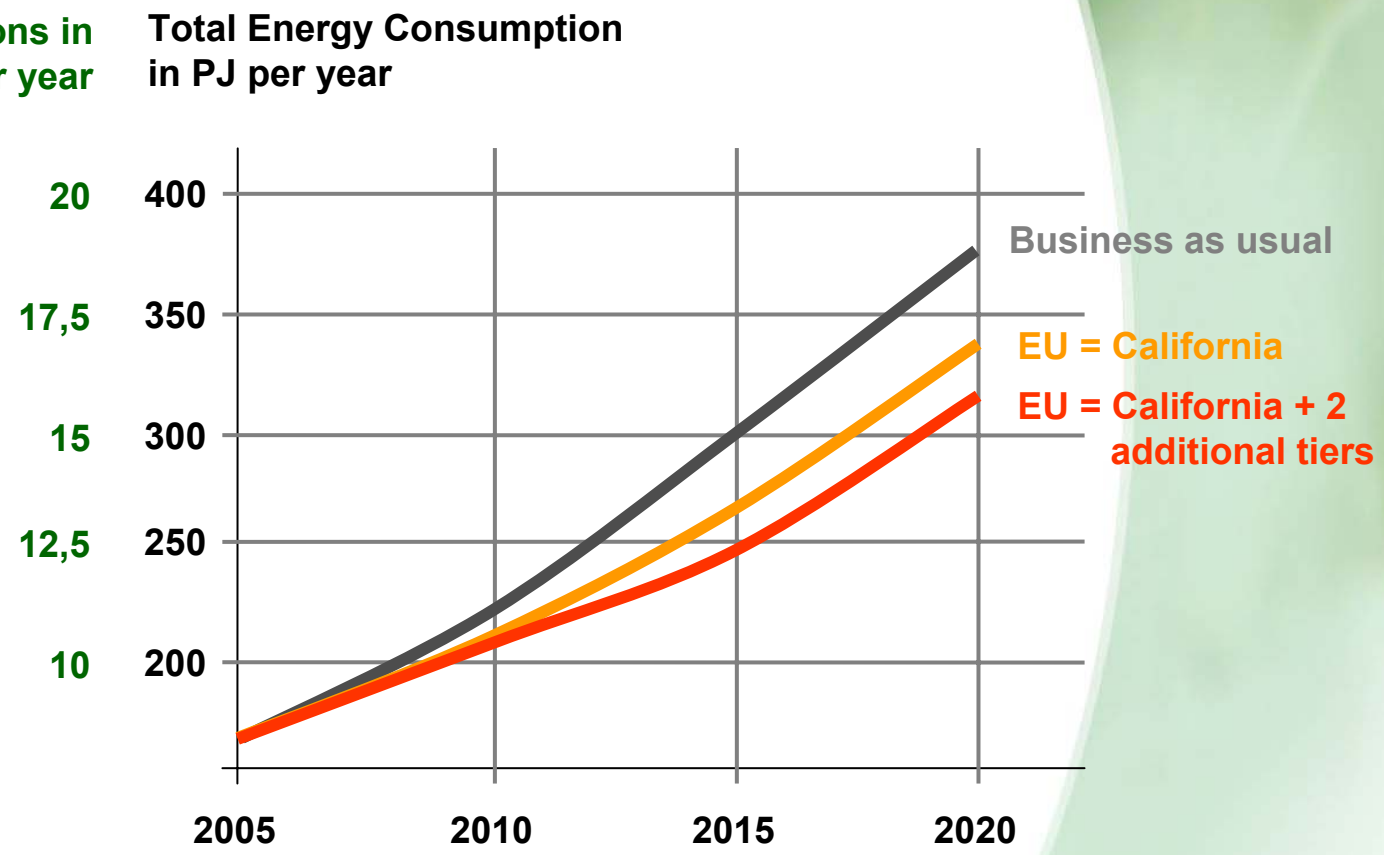
- **Minimum requirements under discussion**
  - Recommendation: *92,5% efficiency under full load*
  - de-facto ban of magnetic transformers

No-load losses

- **Minimum requirements under discussion**
  - Recommendation:
    - *0.5 W (≤ 10 W rated output power), mid-term: 0.3 W*
    - *0.75 W (> 10 W rated output power), mid-term: 0.5 W*

External Power Supplies (4)

Scenarios



EuP Standby study (1)

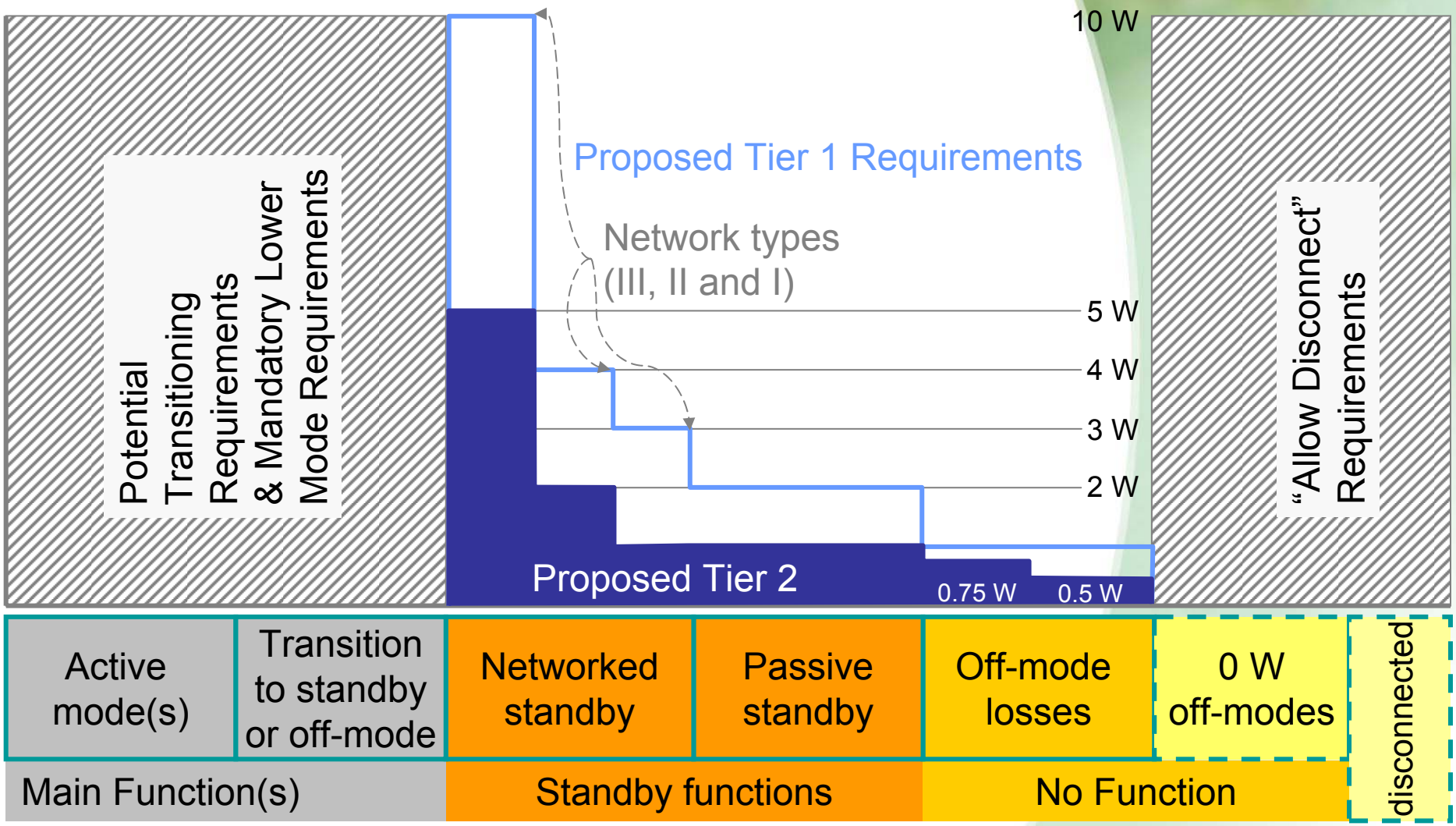
Study Definition (only Standby, not Off-mode)

- An EuP is considered to be in *Lot 6 standby mode*, when it is connected to a power source and offers a **reactivation function** (remote reactivation, self reactivation or switch reactivation). Additional functions, which may be active and consuming energy, are the following continuously running functions
- **information or status display, such as displaying the time,**
- **information storage needing continuous energy supply (volatile memory),**
- **sensor-based safety functions,**
- **network integrity communication.**
- In addition to the reactivation possibilities a deactivation function (from standby to a lower standby or from standby to off-mode) may be offered.

Standby scope (within the study)

„Mains connected EuPs in household and office workplace environments“.

EuP Standby study (2)



EuP Standby study (3)

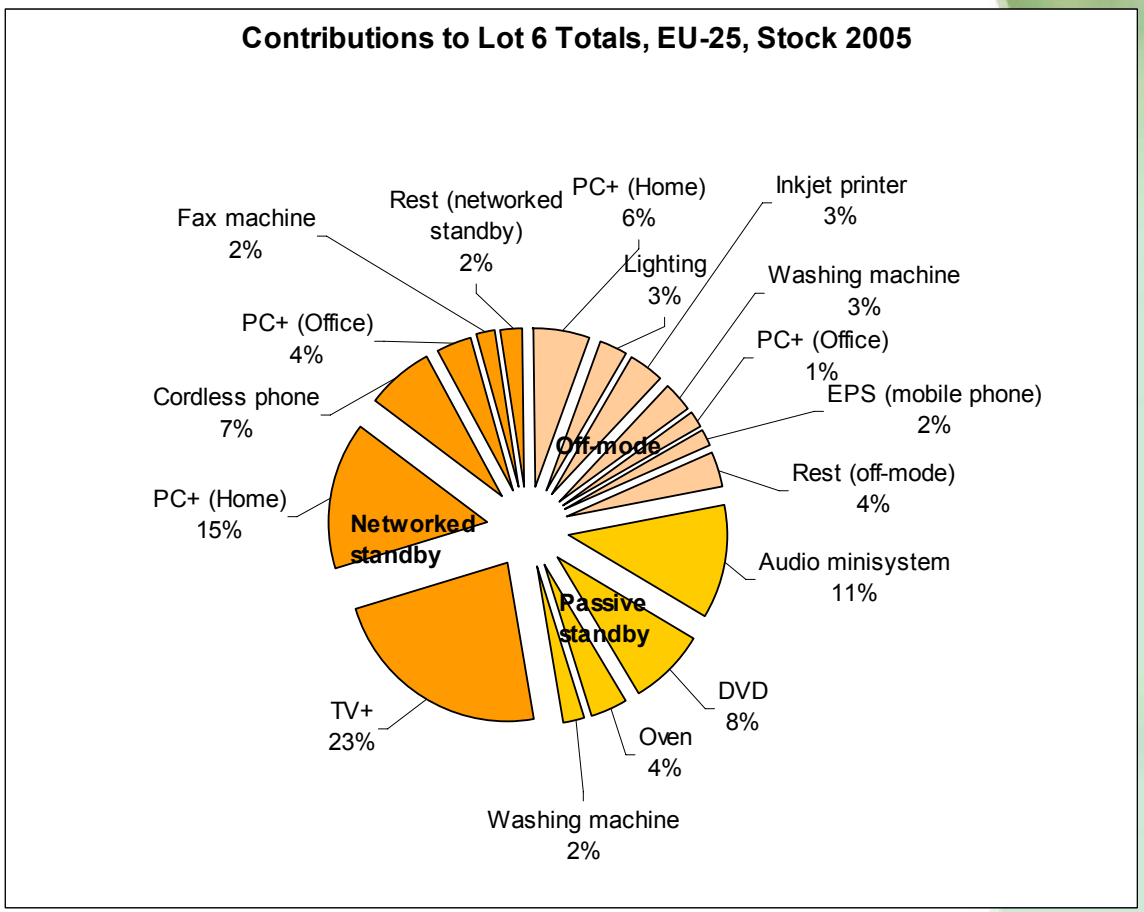
For differentiating networks a new categorization has been proposed:

Type I, "Simple networks":
Analogue signalling and signal detection, and low speed connections (<0.5 Mbps or <5 MHz, such as IrDA or a phone line without DSL).

Type II, "Standard range networks":
Standard data networks, lower speed wireless and non-continuous broadcast reception.

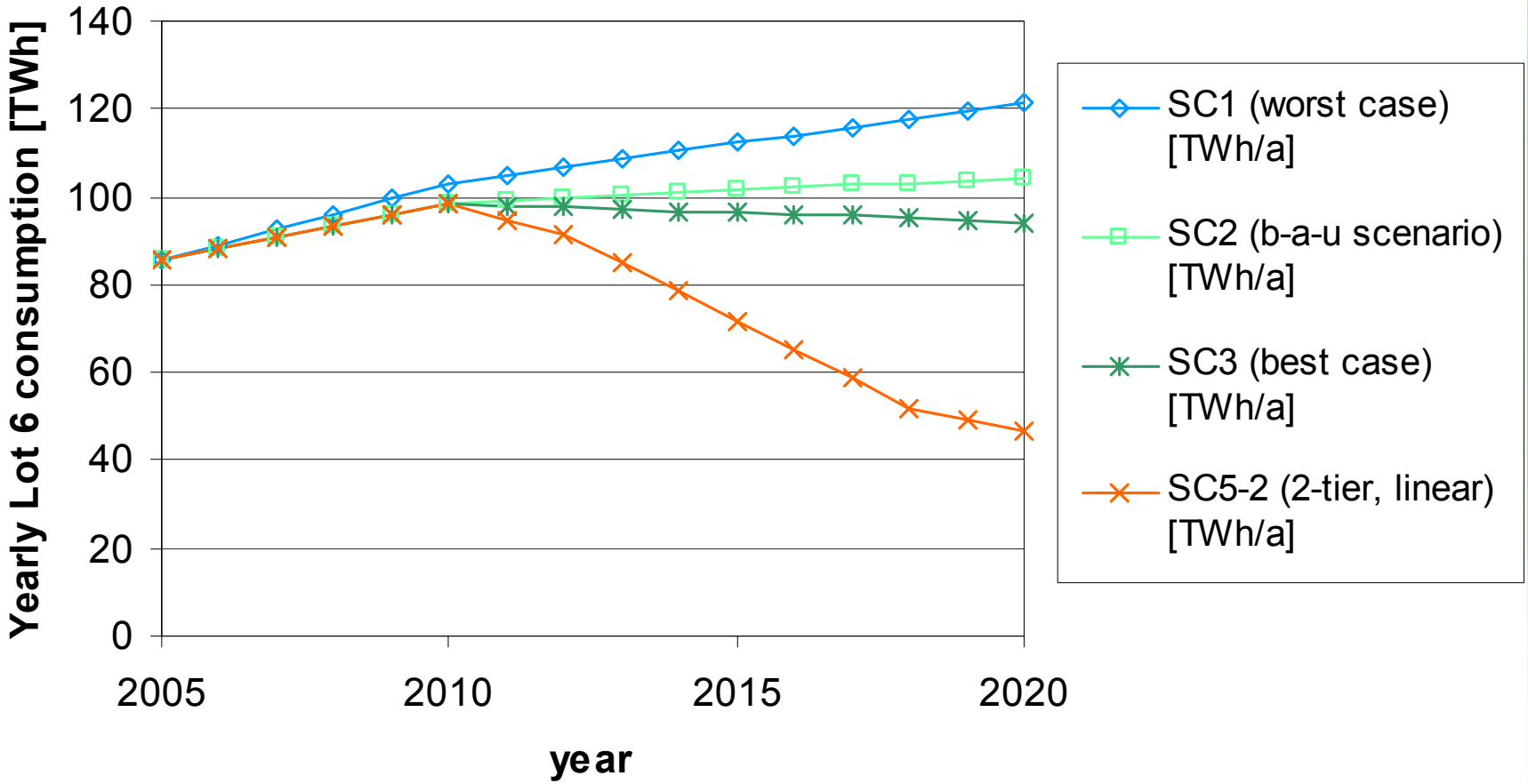
Type III, "High speed networks":
Data networks (Gbps range or >500 MHz), higher speed wireless (all WLAN types) and continuous broadcast reception.

EuP Standby study (4)



- Total per year covered by the 15 product cases:
  50,6 TWh or 6881 million € electricity costs (EU-25 stock 2005)

EuP Standby study (5)



Scenario SC5-2 shows the potential power consumption reduction with tier 1 limit values enforced in 2010 and tier 2 from 2012 on (assumption in study calculations).

EC standby proposal (1)

"**Electrical and electronic household and office equipment** dependent on energy input from the mains power source":

- product categories specified in Directive 2002/96/EC (WEEE), Annex IB with the exception of equipment not corresponding to household and office equipment
- intended for the end-user
- dependent on energy input from the mains power source
- designed for use with a voltage rating not exceeding 380 V
- also when marketed for non-household or non-office use

Explanation

- "household and office equipment" not a legal scope
- WEEE is currently considered the closest correspondence in electronics related legislation

EC standby proposal (2)

Off mode

The equipment is connected to a mains power source and provides no function. A mere indication of the off mode condition is also considered off mode.

Standby

The equipment is connected to a mains power source and provides one or more of the following functions

- reactivation function, or reactivation function and a mere indication of enabled reactivation function,
- information or status display

not considered as standby:

- preheating functions
- sensor-based safety functions
- network reactivation and network integrity functions

EC standby proposal (3)

EC Working Document

Off mode

The equipment is connected to a mains power source and provides no function. A mere indication of the off mode condition is also considered off mode.

Same as in study

Standby

The equipment is connected to a mains power source and provides one or more of the following functions

- reactivation function, or reactivation function and a mere indication of enabled reactivation function,

Same as in study

- information or status display

Same as in study

not considered as standby:

- preheating functions

Same exclusion as in study

- sensor-based safety functions

Exclusion; priority of safety functions

- network reactivation and network integrity functions

Difference compared to study; concept to be used in vertical studies

EC standby proposal (4)

Standby Power Thresholds

- Proposal by European Commission
  - 2-tier approach
    - Tier 1: one year after IM has come into force
    - Tier 2: three years after IM has come into force

	Tier 1	Tier 2
Off-mode	1 W	0.5 W
Standby (only reactivation function)	1 W	0.5 W
Standby (incl. information or status display)	2 W	1 W

EC standby proposal (5)

Mode Declaration Requirement

The manufacturer shall declare in the technical documentation file all conditions of the equipment classified as passive standby and off mode according to paragraph "Definitions", second and third subparagraph and the corresponding energy consumption measured according to the procedure in IEC 62301, first edition 2005-06, sections 4 and 5.

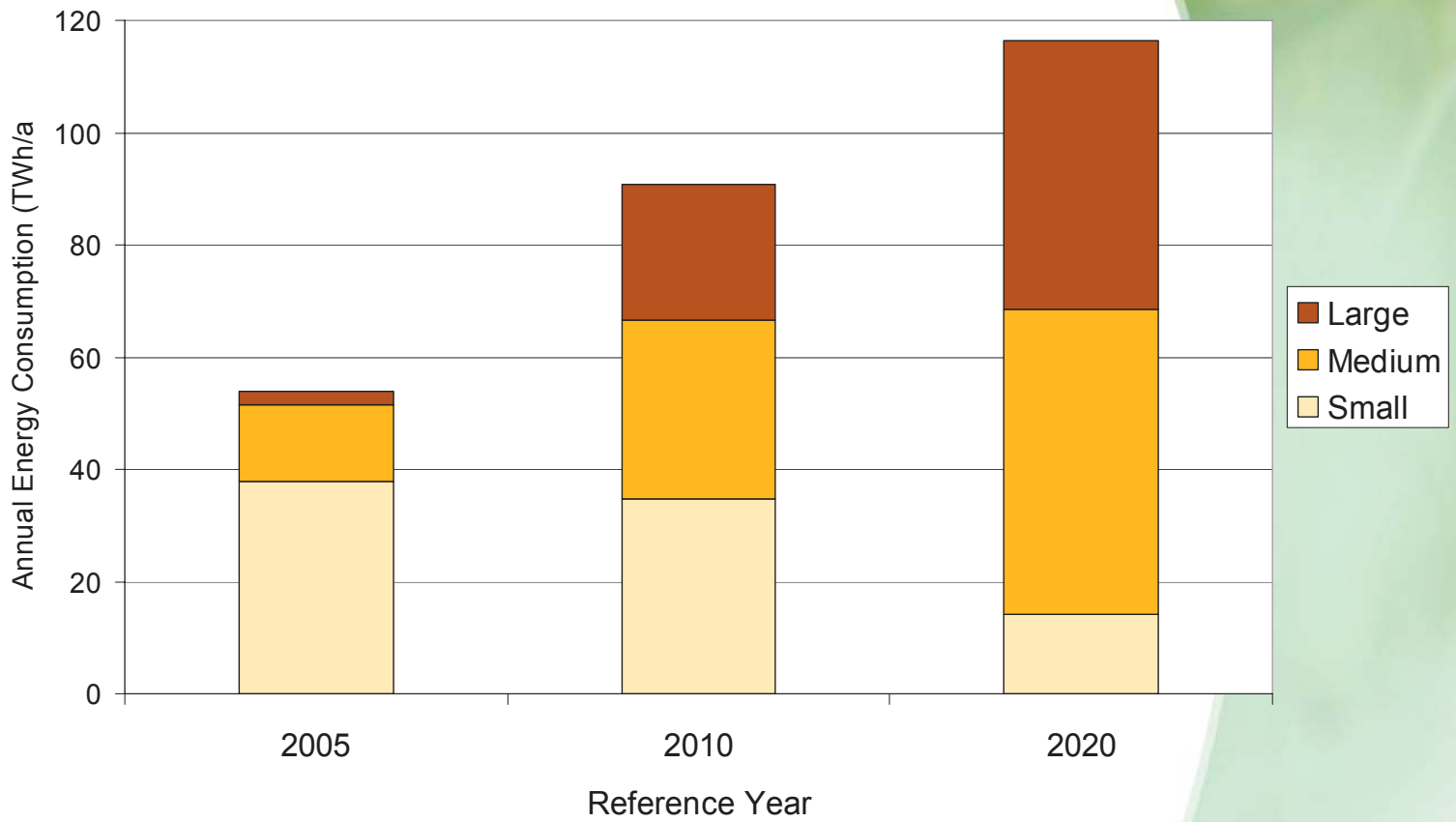
Requirement for Power Management

Equipment shall, without prejudice to good engineering practice and unless inappropriate for the intended use, offer a power management function, or a similar function that switches equipment after the shortest possible period of time appropriate for the intended use of the equipment, automatically into a condition with reduced energy consumption when the equipment is not providing the main function, or when other energy-using product(s) are not dependent on its functions.

EC Standby proposal (conclusions)

- The EuP process offers more and **earlier stakeholder involvement**
- This is a very important opportunity for industry (but also for NGOs) to determine ***strict, effective*** but also ***realistic*** target requirements
- The **first implementing measures** are expected to be in force **in 2010** (earliest adoption in 2009; shortest transition period of 1 year)
- The **EC working documents** are mainly **based on the draft final reports** – Task 8 policy recommendations are contractors' conclusions, which may or may not be taken up by the Commission
- There is a clear focus on simple and enforceable requirements targeting energy consumption / efficiency

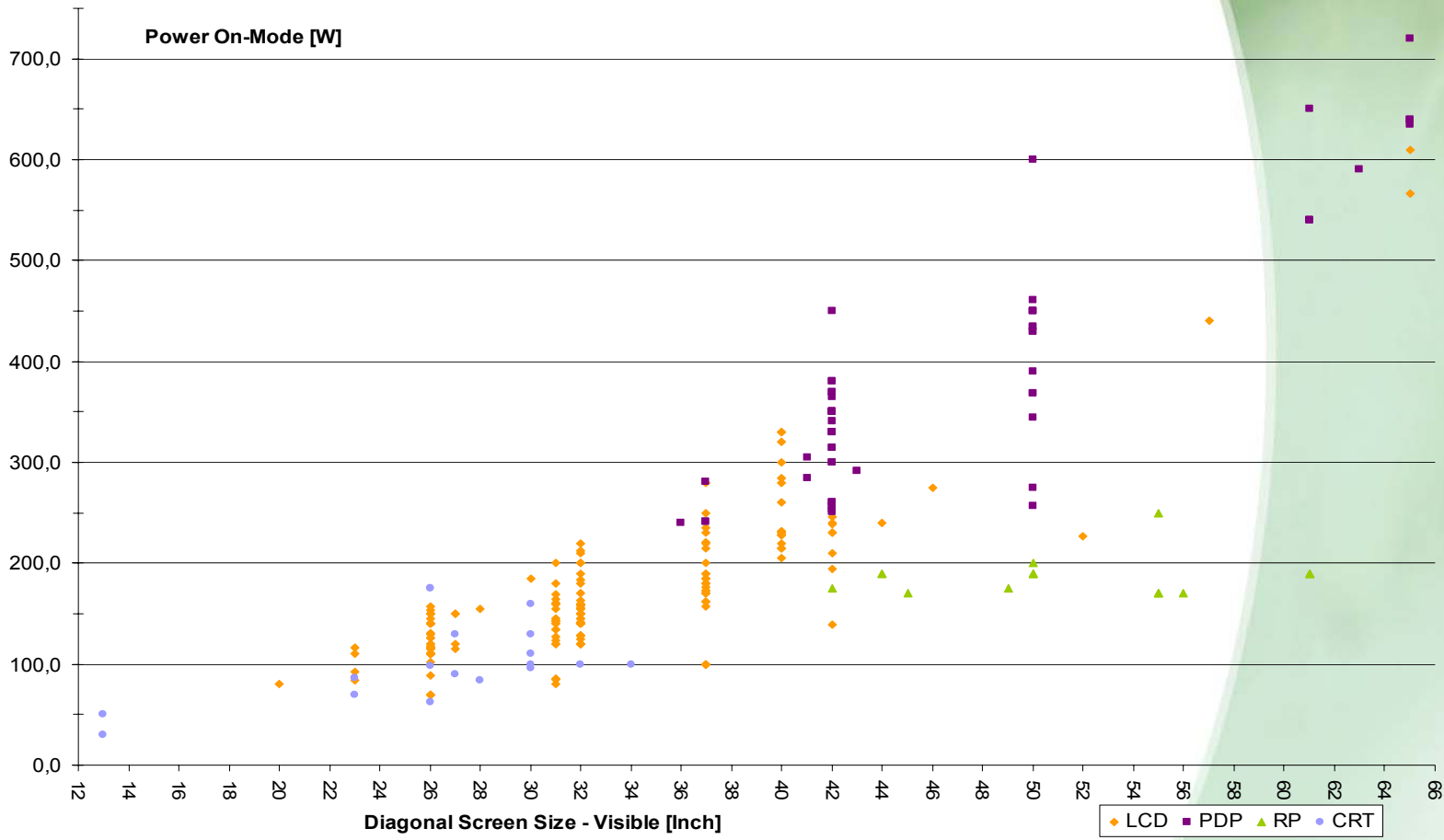
Lot 5: Televisions



Annual energy consumption in a business as usual scenario increases rapidly due to:

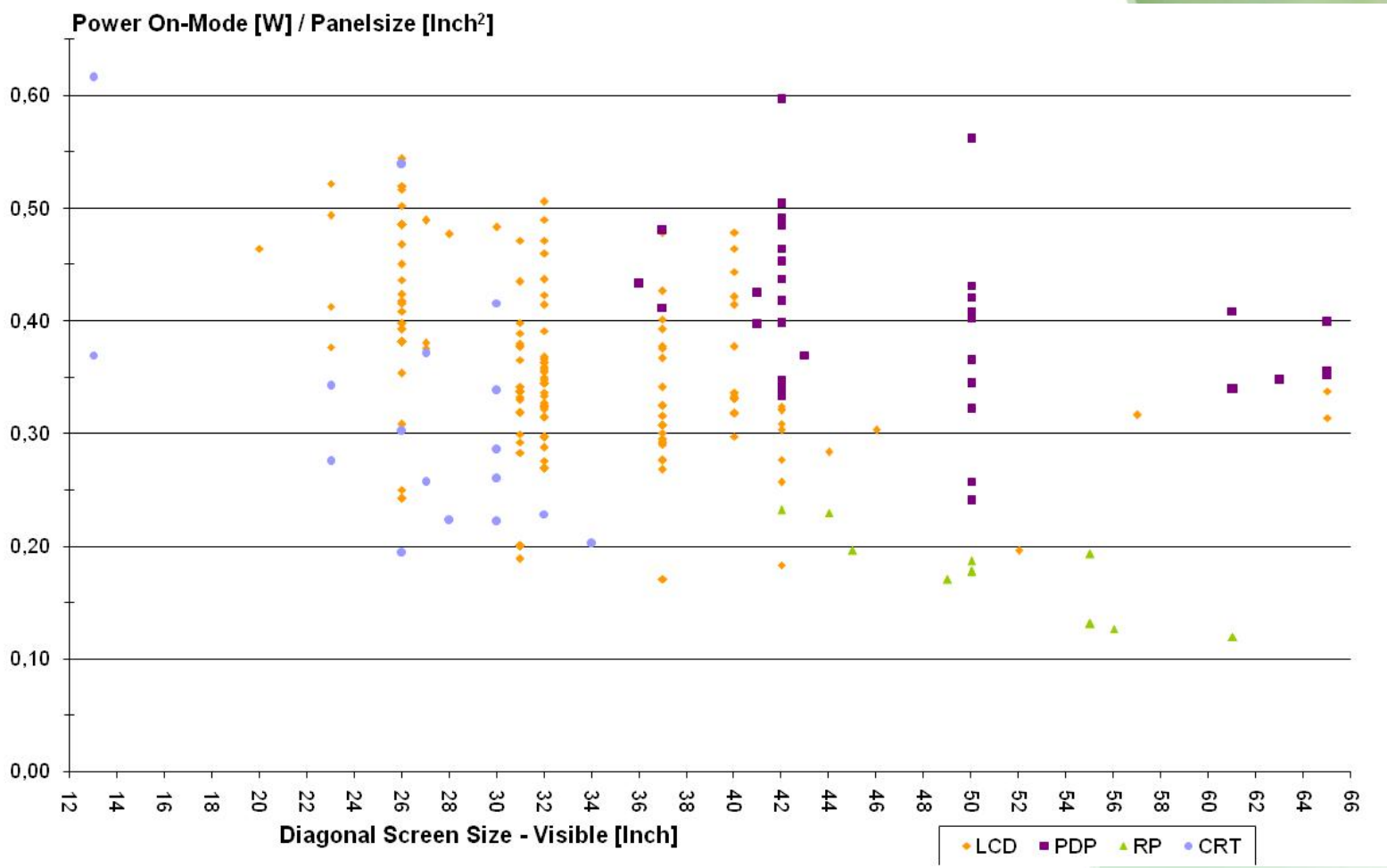
- Increased stock and viewing hours of TVs (2 devices per household)
- Fast introduction larger size flat panel TVs (high on-mode power)

Lot 5: Televisions



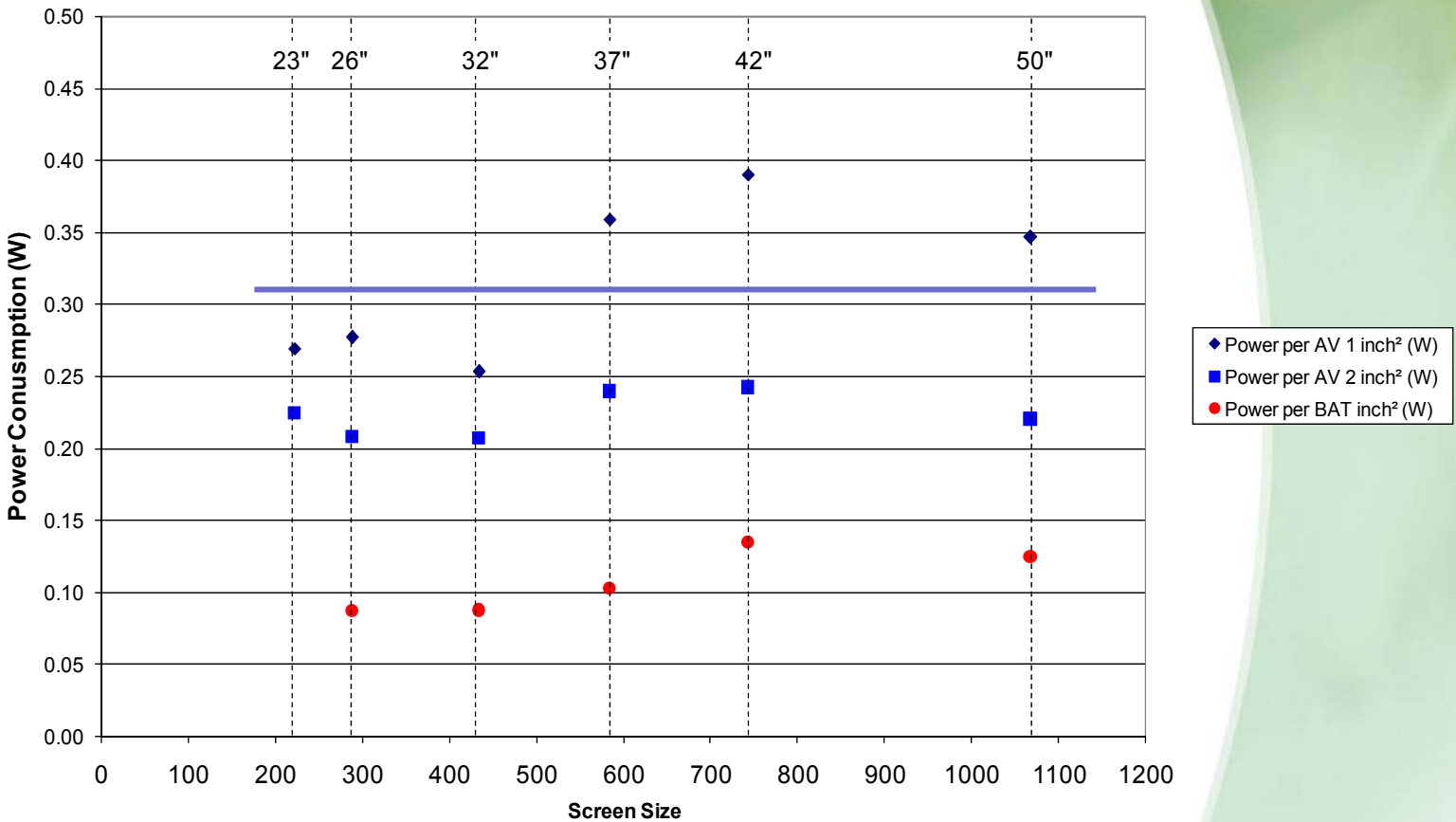
On-mode power consumption of HDready TVs in 2006

Lot 5: Televisions



Power consumption per inch²: Discrepancy between screen sizes

Lot 5: Televisions



Power Consumption per inch² minus 40 W (Pbasic)

Less discrepancies between screen sizes

Lot 5: Televisions

1. Setting of minimum on-mode power consumption requirements

- Parameter: screen size + off-set (P_{basic})
- Additional energy consumption allowance for “full HD” TVs

$$P_{TVon} = a_{Screen} \cdot b \cdot P_{ascreen} + c \cdot P_{Basic} + P_{feature}$$

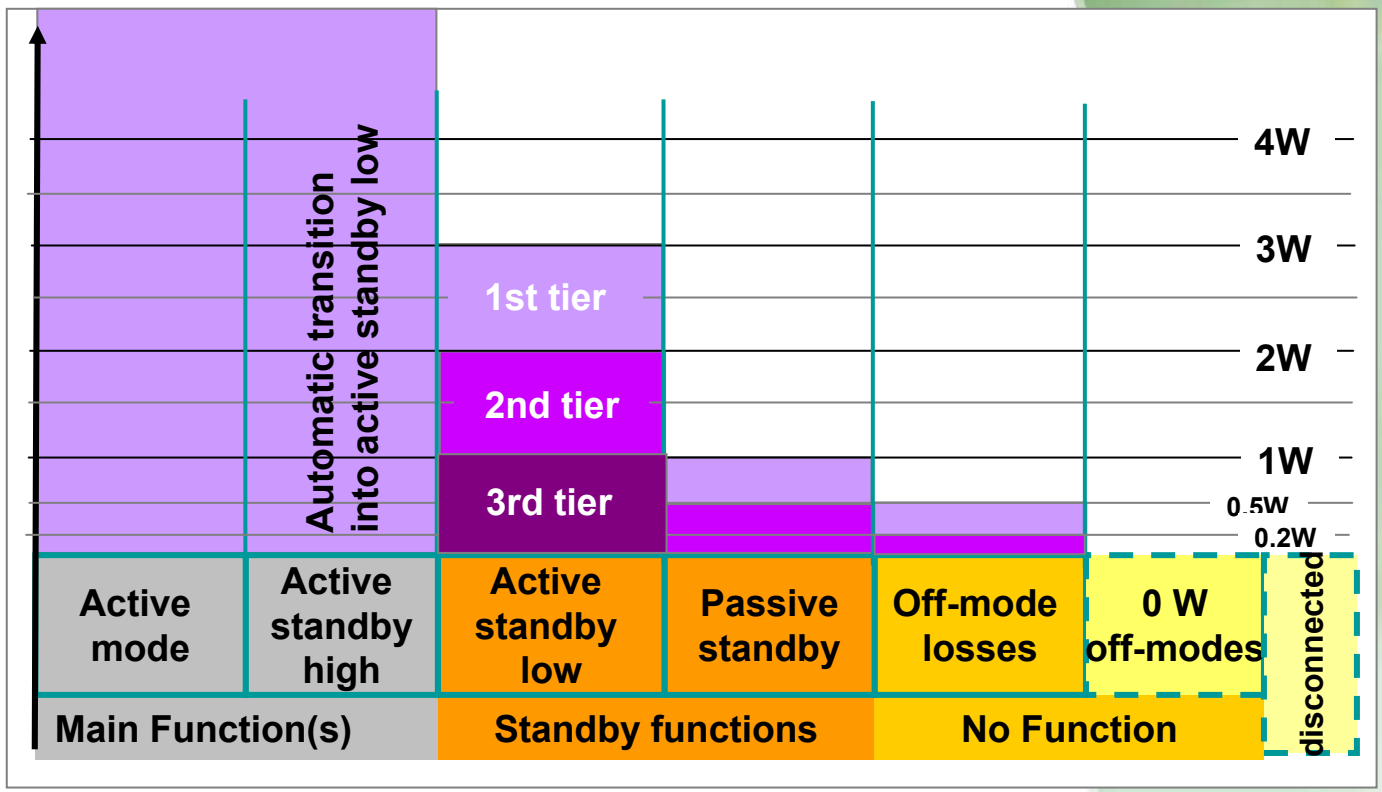
- With $P_{ascreen}$ = 0.275 W/in², P_{Basic} = 40 W
- Threshold limit for HD ready: b = 1, c = 1
  for full HD: b = 1.4, c = 1

2. Adoption of an Energy Efficiency Label

3. Setting of minimum standby and off-mode power requirements

Lot 5: Televisions

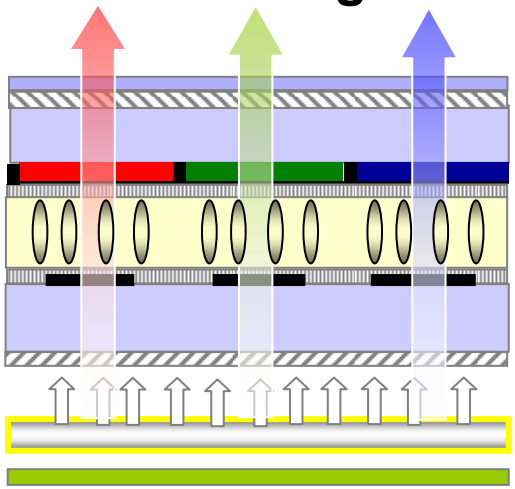
2010
2012
2015



Proposed standby and off-mode requirements

Lot 5: Televisions

LCD-TVs: High Potential for Lower Power Consumption



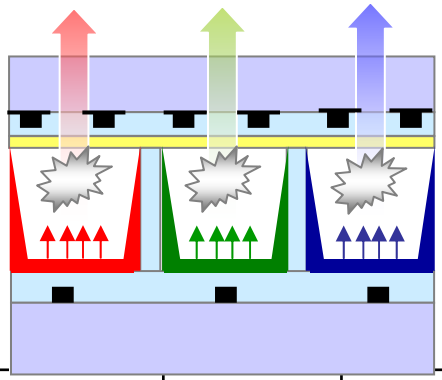
Display strategies

- Efficacy of the display (reflective polarization filter)
- Backlight unit concept: CCFL ⇨ EEFL ⇨LED
- Backlight dimming (1-D, 2-D, 3-D)
- Backlight inverter design / direct power supply
- Thermal management
- …

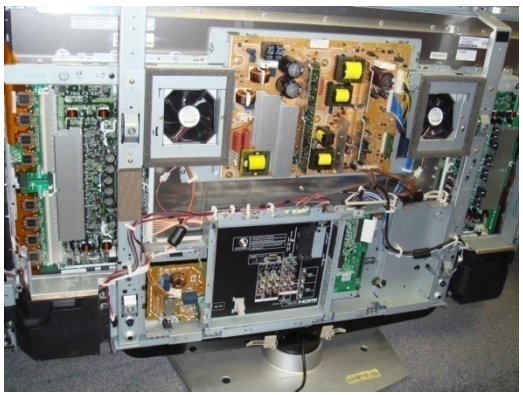
Backplane strategies

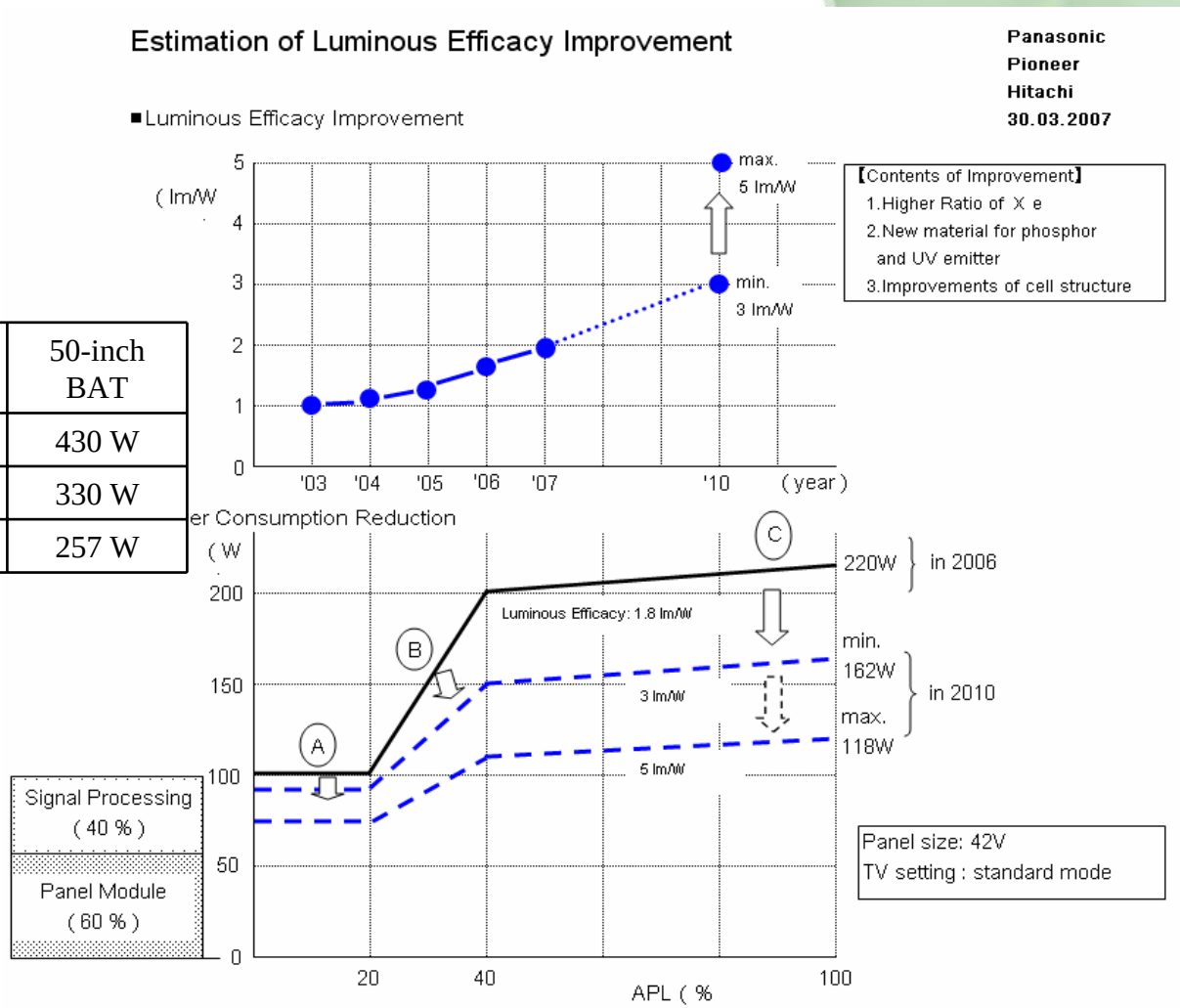
- High efficient power supply architecture
- Fewer power conversion steps / voltage levels
- Optimised components (tuner, digital signal processing, memory)
- Power management (DSP, network interfaces)
- …

PDP-TV: Improvement of luminous efficiency / full HD critical

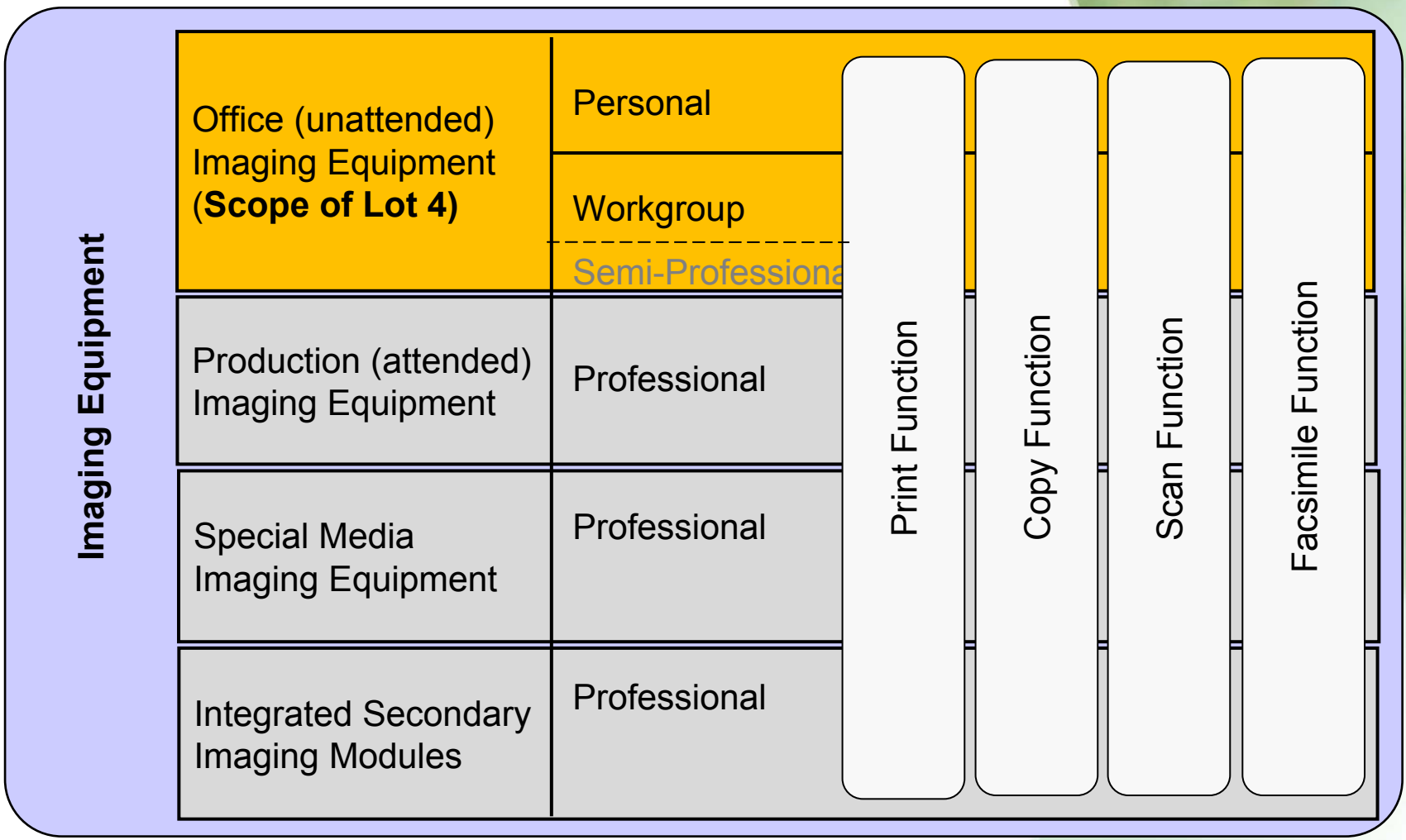


PDP power consumption	37-inch BAT	42-inch BAT	50-inch BAT
2005	300 W	330 W	430 W
2006	240 W	260 W	330 W
2007	191 W	204 W	257 W





Lot 4: Imaging Equipment



Lot 4: Imaging Equipment

Main Marking Technologies (Inkjet and EP)

Total (EP+IJ):
91% in stock*
95% in images

*Excluding:
Flatbed scanner
Document scanner
Digital duplicator
Mailing machines

Electro Photography (EP)

- 16% total market share according to number of stock*
- 85% total market share according to image output
- market distinction by imaging speed (volume technology)
- market trend: speed and color
- high power consumption through thermal fixing process

Ink-Jet (IJ)

- 75% total market share according to number of stock*
- 10% total market share according to image output
- market distinction by imaging quality (value technology)
- market trend: speed and photo
- standby and off-mode power consumption critical due to low print volume

Market Trends: MFD and Color

Current trends:

- Market shift from EP-Copier/SFD to EP-Copier/MFD almost complete
- Market shift from EP-Printer/SFD to EP-Printer/MFD ongoing and in conjunction with shift to color (color-capable)
- Mono EP-Printer (high speed volume printer) still considerable market
- Market shift form IJ-SFD to IJ-MFD ongoing (approx. 50%/50% in 2005 and approx. 25%/75% in 2010)
- MFDs and Color become mainstream due to performance and price

Further trends:

- Compact photo printer (various marking technologies)
- Business IJ-Printer (up to 30 ipm)
- Dye Sublimation (DS) and Solid Ink (SI) gain market share

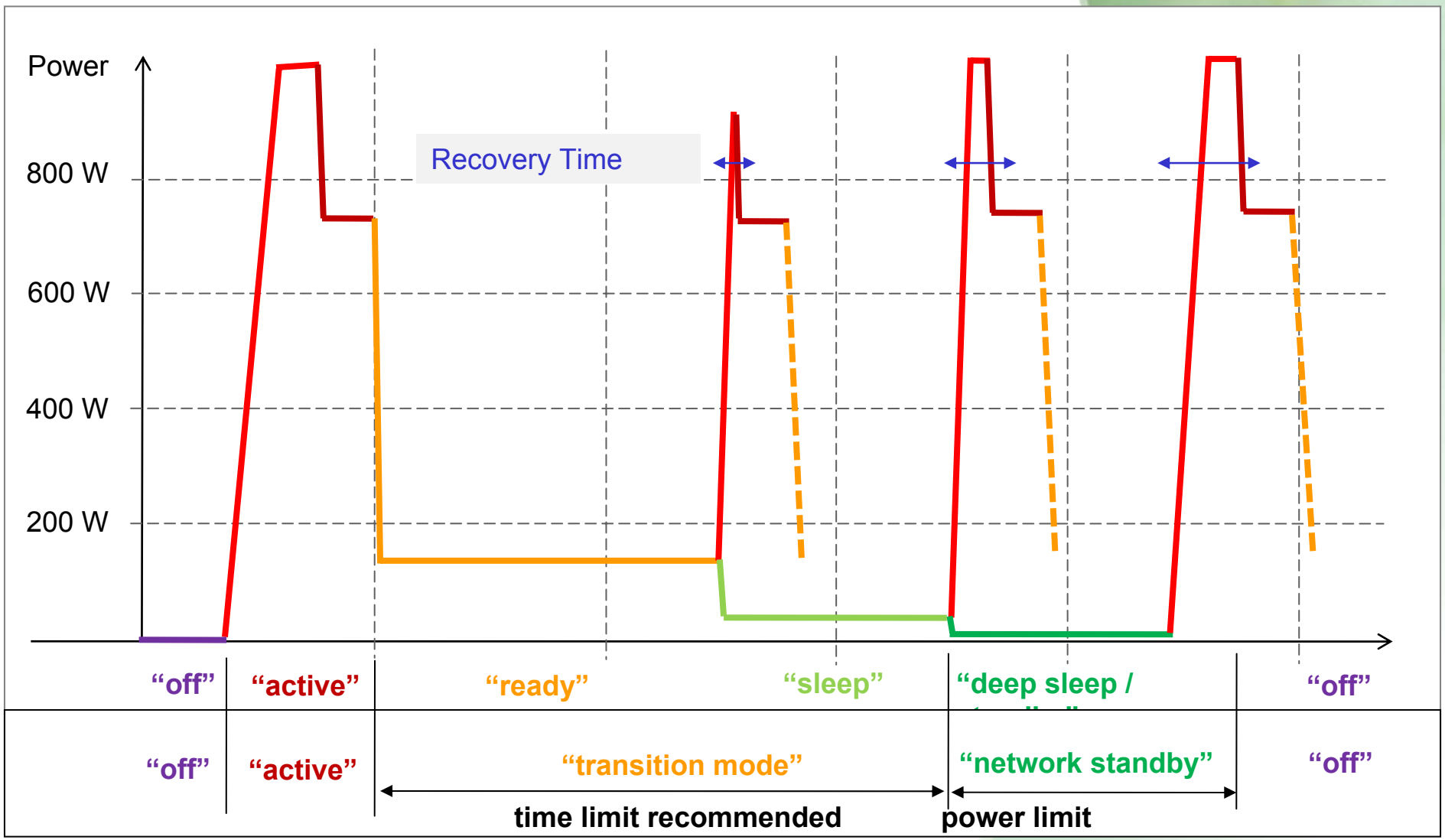
Lot 4: Imaging Equipment

The eco-impacts of the assessed base case are related to:

- **Energy efficiency (power consumption & power management in use)**
- **Resource efficiency (particular electronics and bulk plastics)**
- **Consumables efficiency (paper utilization, toner and ink yield)**
- **Specific emissions (ozone and micro dust)**

Lot 4: Imaging Equipment

Harmonization of Mode Definitions



Set-top boxes (1)

Two EuP preparatory studies:

The conditional access is the criteria for discriminating a simple and a complex STB (lot 18).

		Conditional Access	
		No	Yes
Always-on functions used	No	Simple STBs	Complex STBs
	Yes		

Generally, a simple STB is DTA converter, and a complex STB is required to watch pay-TV.

Set-top boxes (2)

Complex set-top boxes

They can be discriminated either by their **transmission platform**:

- Terrestrial
- Satellite
- Cable
- DSL

Or by their **level of complexity** *(draft proposition)*:

- Basic STB with conditional access (CA)
- STB with CA and return path
- STB with CA, return path and second tuner
- STB with CA, return path, second tuner and HDD/PVR
- STB with CA, return path, multiple tuner, HDD/PVR and HD capability

Set-top boxes (3)

	Box Internet consommation/ Heure (Wh)		Décodeur TV consommation/ Heure (Wh)		Consommation annuelle (kWh) (*)	Coût annuel (*)	Efficacité (*)
	En veille	En fonction-nement	En veille	En fonction-nement			
Alice 	8,6	9,2	11	11,7	**173**	19 €	23 %
Darty 	9	9,3	21 (**)	21 (**)	**263 (**)**	29 € (**)	20 % (**)
Free 	8,2	8,4	14	16,5	**198**	22 €	23 %
Neuf 	11,1	11,5	9,2	11,6	**182**	20 €	25 %
Orange 	8,5	9,1	7,2	9,9	**143**	16 €	26 %
Télé2 	10,5	11	7,1	7,6	**156**	17 €	25 %

EuP websites

Boilers – liquid and gaseous fuels (lot 1)	http://www.ecoboiler.org
Water Heaters (lot 2)	http://www.ecohotwater.org
Computers and monitors (lot 3)	http://www.ecocomputer.org
Printers, scanners, etc. (lot 4)	http://www.ecoimaging.org
Televisions (lot 5)	http://www.ecotelevision.org
Standby/off-mode (lot 6)	http://www.ecostandby.org
External PS and Battery Chargers (lot 7)	http://www.ecocharger.org
Lighting – street(8), office(9), domestic(19)	http://www.eup4light.net
Room air conditioning appliances (lot 10)	http://www.ecoaircon.eu
Electric motors, pumps, etc. (lot 11)	http://www.ecomotors.org
Commercial refrigeration (lot 12)	http://www.ecofreezercom.org
Domestic refrigerators (lot 13)	http://www.ecocolddomestic.org
Washing machines (lot 14)	http://www.ecowetdomestic.org
Solid fuel small combustion units (lot 15)	http://www.ecosolidfuel.org
Laundry dryers (lot 16)	http://www.ecodryers.org
Vacuum cleaners (lot 17)	http://www.ecovacuum.org
Complex set-top boxes (lot 18)	http://www.ecocomplexstb.org
Simple STB	http://www.ecostb.org