Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

German-French Expert Workshop on Standby and IPP

Date: Thursday 31.05.2007

Venue: Deutsches Technikmuseum, Berlin

Status of the EuP Preparatory Study Lot 6 on Standby and Off-mode Losses

Dr. Nils F. Nissen

Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration IZM

Dept. Environmental Engineering

Gustav-Meyer-Allee 25, 13355 Berlin, Germany

Tel.: +49 / 30 / 46 40 31 32

Email: nils.nissen@izm.fraunhofer.de

URL: http://www.izm.fraunhofer.de

Fraunhofer IZM Institut Zuverlässigkeit und Mikrointegration

bio Intelligence Service

COnception Developpement Durable Environnement

Deutsche Umwelthilfe

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Fraunhofer IZM / Bio IS Consortium Lot 6

Institution	Contact	Telephone	Email
IZM	**Fraunhofer Institute for Reliability and Microintegration, Department Environmental Engineering, Berlin, Germany** Project Management, experts in micro-systems technology with a strong background in eco-design eco-assessment (http://www.izm.fraunhofer.de)		
	Nils F. Nissen	+49.30.46 40 31 32	nils.nissen@izm.fraunhofer.de
	Karsten Schischke	+49.30.46 40 31 56	karsten.schischke@izm.fraunhofer.de
	Lutz Stobbe	+49.30.46 40 31 39	lutz.stobbe@izm.fraunhofer.de
Bio IS	**Bio Intelligence Service S.A.; Ivry-sur-Seine, France** Environmental consulting, LCA, eco-design; expert in consumer behaviour, policy effects; market analysis (http://www.biois.com)		
	Véronique Monier	+33.1.56 20 28 98	veronique.monier@biois.com
CODDE	**Conception Developpement Durable Environnement; Paris, France** Environmental experts with close links to the French electronics industry specifically (http://ww.codde.fr)		
	Linda Lescuyer	+ 33.1.45 05 70 67	llescuyer@codde.fr
DUH	**Deutsche Umwelthilfe e.V., Berlin, Germany:** NGO, experts regarding consumer interests and consumer behaviour, public relations for “Green Electronics” (http://www.duh.de)		
	Eva Leonhardt	+49.30.25 89 86 12	leonhardt@duh.de

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Thank you to the stakeholders

Many thanks for all the valuable contributions, instructive information, the time and resources you spend supporting the EuP preparatory study Lot 6.

Please continue this dialogue by actively reviewing the reports in written form.

Please support your comments with data / sources.

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

EuP Lot 6 Status in Short

- Tasks 1-7 published as Draft Final Reports for commenting
- Stakeholder Meeting in Brussels on May 4th 2007

Remaining steps:

- Individual data corrections and updates in Tasks 2 (market) to 6 (BAT) - especially regarding computers
- Publishing Task 8 for commenting (scenarios and policy)
- Revision and completion of Task 7 (improvement options, option combinations)
- Submitting Final Report to Commission (and then for publication)

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Intention of Lot 6 “Standby and Off-mode Losses”

- Reduce power consumption in **standby** and reduce/avoid **off-mode losses**
- Lot 6 is **horizontally** addressing these targets to all EuPs
- Product specific measures can **overrule** the **Lot 6 requirements**
- Lot 6 is about indicating the environmental **significance** of these power consumption issues and **improvement** potentials

Lot 6 Main Steps and Terms

- Product **modes** covered in Lot 6
- Functions considered as Lot 6 **standby functions**
- Similarities of products used to structure the discussion → **Product-Use-Cluster** (PUC)
- Product investigation scope, exemplified with so-called **product cases**
  - For each product case: market data and trends, user behaviour and average use times, power consumption per mode
- The resulting **base cases**, for which the 2005 status and potential improvement options and strategies will be explored

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Results of Tasks 1, 2 and 3

Task 1: Definition (Product category and performance assessment)

Task 2: Economic and Market Analysis (Stock data and market trends)

Task 3: Consumer Behavior and Local Infrastructure (Real life efficiency, end-of-life)

Task 4: Technical Analysis Existing Products (System and product life cycle phases)

Task 5: Definition of Base Case (Environmental impact assessment, life cycle costs)

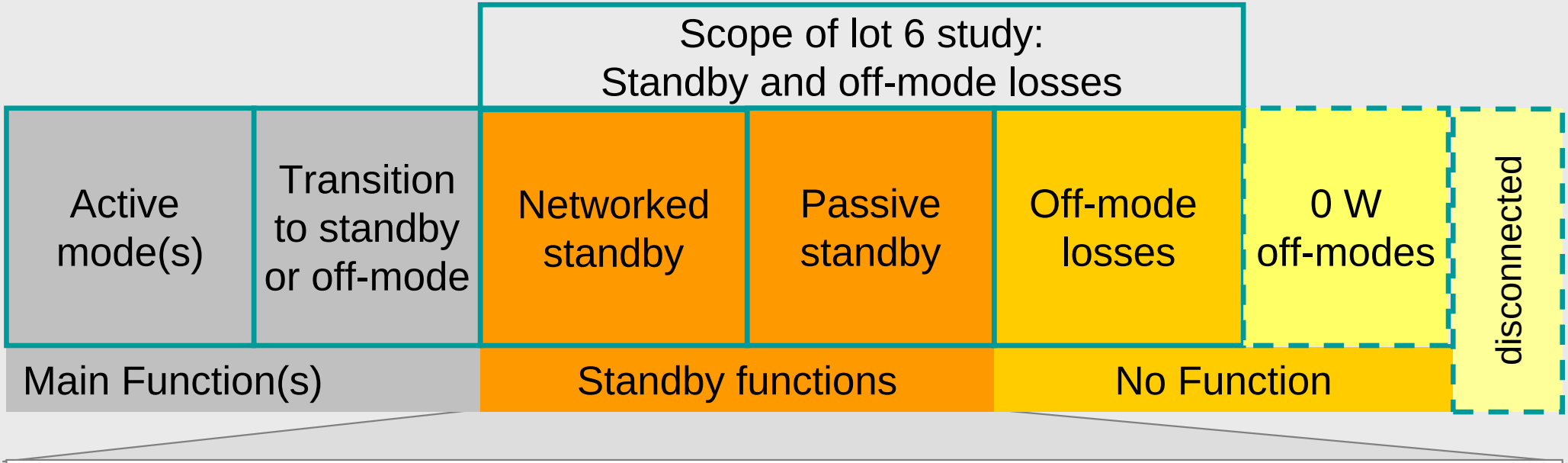
Task 6: Technical Analysis BAT (products, prototypes, components)

Task 7: Improvement Potential (Options, impacts, costs, LLCC, BAT, BNAT)

Task 8: Scenario, Policy, Impact and Sensitivity Analysis

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Lot 6 Differentiated Modes and Functions



Lot 6 Standby Function Clusters

➔ Passive Standby

- Reactivation: remote control reactivation, self reactivation (timer), switch reactivation
- Continuous functions: information / status display, energy for information storage, sensor-based safety functions

➔ Networked Standby

- Additionally: network integrity communication, wake-up (reactivation) over network

Off-Mode Definition

- An EuP is considered in **off-mode**, when it is not offering any function, while it is connected to the power source, i.e. when no function is offered to the user (or a connected system).

  (Remark: On-switch located on the main part of the EuP is in fact a function available in off-mode, but does not change the classification)

- **Off-mode losses** occur, when the EuP is in off-mode, but is still consuming energy.

- When no power source is connected, the EuP is **disconnected**. Disconnected mode is only relevant for capturing the use patterns more precisely.

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Revised Definition with Allocation of IEC Definitions

Lot 6 Modes	Active Modes	Transition to standby and off-mode	Lot 6 standby (Passive or Networked)	Off-Mode losses	Off-Mode 0 Watt	Disconnected
Functions	At least one main function continuously on / active Time limited function cycle, programmable job	One or more main functions are off (typical energy save or ready modes) Active Network Download	<u>Reactivation Function:</u> Remote Control, Sensor, Timer, Switches <u>Continuity Function:</u> Display, Memory, Safety <u>Network (→Networked standby)</u> Wake-up and status only	No function (except reactivation switch)		
IEC Standard						
IEC 62018	Full on, normal load	Energy saving	Energy saving / lowest power		(not covered)	(not covered)
IEC 62087	On play On record	Active Standby High	Passive Standby, Active Standby Low (with network)	Off		
IEC 62301	On / active		if lowest power mode then equals standby	if lowest power mode then equals standby	if lowest power mode then equals standby	(not covered)
IEC 62075 (CDV)	On max On normal	Energy saving On idle	Energy saving	Soft off	Hard off	No load

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Product Scope for the Lot 6 Investigations

Distinction 1	by energy type					
	electrical				*non electrical*	
	Mains operated EuPs	*Other electricity networks, i.e. low voltage supply and higher voltages*	*other electricity sources e.g. solar*	*mixed electricity sources e.g. solar + grid*		
Distinction 2	by application sectors					
	Home appliances	**Office equipment**	*Building infrastructure*	*Infrastructure (energy, com)*	*Public, commercial, industrial (excluding offices)*	
Distinction 3	Special cases by specific product characteristics					
	Battery operated (primary, secondary)	*Mobile products, while connected to electricity network*	**EPS/chargers in no-load condition**	*Autarkic energy harvesting*	*Always fully on products*	

bold: in scope; *italic: out of scope*

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Glimpse of the Reduction Process

- **Product classification** (based on Bruce Nordman, LBNL) **~230 Classes** (in Lot 6 Annex)
- **Candidates** selected according to probable standby and off-mode features: **94 Classes** (listed in Task 1 document)
- Choose **representatives for mode combinations** (PUCs) and mix of simpler and more complex products, covering household and office EuPs without those considered building infrastructure
- **15 product cases defined**
- Details
  - 3 complex cases "TV+", "PC+ (home)" and "PC+ (office)" calculated from 18 individual sub-product assumptions
  - in total 34 assumption sets make up the 15 product cases

Lot 6 Main Categories	Product Classification (Naming)	Categories by Nordman	Source (BN, ISI, IZM)
ICT&AV	Amplifiers	Audio	Source Nordman
ICT&AV	Cassette Deck	Audio	Source Nordman
ICT&AV	Equalizer (audio)	Audio	Source Nordman
ICT&AV	Pre-amplifier	Audio	Source IZM
ICT&AV	Tuner	Audio	Source Nordman
ICT&AV	Stereo, portable	Audio	Source Nordman
ICT&AV	CD Player, portable	Audio	Source Nordman
ICT&AV	other portable audio players	Audio	Source IZM
ICT&AV	Musical keyboard	Audio	Source Nordman
ICT&AV	Home theatre system	Audio	Source Nordman
ICT&AV	Subwoofer	Audio	Source Nordman
ICT&AV	speakers, wireless (speakers)	Audio	Source Nordman
ICT&AV	Dock, notebook	Computer	Source Nordman
ICT&AV	Game console	Computer	Source Nordman
ICT&AV	Game console with internet connectivity	Computer	Source Nordman
ICT&AV	integrated-CRT	Computer	Source Nordman
ICT&AV	integrated-LCD	Computer	Source Nordman

PUC	Lot 6 Main Categories	Product Classification	Categories by Nordman
PUC 0	Small household appliances	Bread makers	Electronic housewares
PUC 0	Small household appliances	Clock	Electronic housewares
PUC 0	Small household appliances	Clock, radio	Electronic housewares
PUC 3	Small household appliances	Espresso maker, residential	Electronic housewares
PUC 1	Small household appliances	Kettle	Electronic housewares
PUC 3	Small household appliances	Tea maker	Electronic housewares
PUC 1	Small household appliances	Toaster	Electronic housewares
PUC 1	Small household appliances	Shaver	Personal Care
PUC 1	Small household appliances	Epilator	Personal Care
PUC 1	Small household appliances	Toothbrush	Personal Care

PUC	Lot 6 Main Categories	Product Classification	Categories by Nordman
PUC 3	Large household appliances	Clothes dryer, electric	Major Appliance (Traditional End Uses)
PUC 3	Large household appliances	Clothes washer and dryer combination, electric	Major Appliance (Traditional End Uses)
PUC 3	Large household appliances	Clothes washer, horizontal axis	Major Appliance (Traditional End Uses)
PUC 3	Large household appliances	Clothes washer, vertical axis	Major Appliance (Traditional End Uses)
PUC 1	Large household appliances	Cook top, electric	Major Appliance (Traditional End Uses)
PUC 3	Large household appliances	Dishwashers	Major Appliance (Traditional End Uses)
PUC 2	Large household appliances	Electric stove	Major Appliance (Traditional End Uses)
PUC 2	Large household appliances	Oven, electric	Major Appliance (Traditional End Uses)

PUC	Lot 6 Main Categories	Product Classification	Categories by Nordman
PUC 1	Lighting/EPS/UPS	Lamp, decorative	Lighting
PUC 1	Lighting/EPS/UPS	Lighting, residential	Lighting (Traditional End Uses)

PUC	Lot 6 Main Categories	Product Classification	Categories by Nordman
PUC 3	Other	Shredder	Business equipment
PUC 3	Other	Charger, battery	utility
PUC 1	Other	Power tool, cordless	utility

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Product Scope Overview

- Lot 6 Standby and Off-mode definition is for all EuPs
- Investigation scope is limited to
  - electricity operated, mains connected,
  - household and office equipment
  - EPS & chargers in these areas
- According to the PUCs and additional criteria 15 product cases have been selected

PUC	Product Case
PUC 1	EPS (mobile phone)
PUC 1	Lighting applications (stand-alone low voltage halogen lamps)
PUC 1	Radio (i.e. stand-alone)
PUC 1	Electric toothbrush
PUC 2	Oven
PUC 2 (net)	Cordless phone
PUC 2 (net)	TV+
PUC 3	Washing machine
PUC 3	DVD
PUC 3	Audio minisystem
PUC 3 (net)	Fax machines
PUC 3 (net)	PC+ (Office)
PUC 3 (net)	PC+ (Home)
PUC 3 (net)	Laser printer
PUC 3 (net)	Inkjet printer

Task 5 Overview

- The PUCs are used as structure for discussing and calculating the base cases
- Discuss off-mode (losses, switches, EPS) first
- Discuss the power levels for Lot 6 standby function clusters (passive and networked standby)
- Discuss the automated transitioning (relevance of job-based products)
- The calculations were done for the 15 product cases based on data in Task 2, 3 and 4

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Lot 6 Calculation Structure: Tasks 2 to 5

Task 2 Market

2005 stock data for 15 product cases [millions]

×

Task 3 User

Avg. hrs per mode for 15 product cases [h/d or h/y]

×

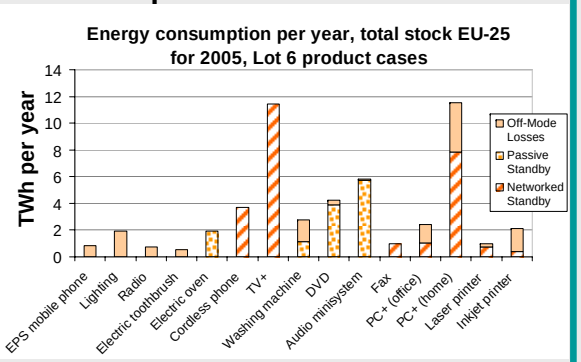
Task 4 Power

Avg. W per mode for 15 product cases [W or Wh/h]

=

Task 5 Base Cases

Part 1: EcoReport results for 15 product cases

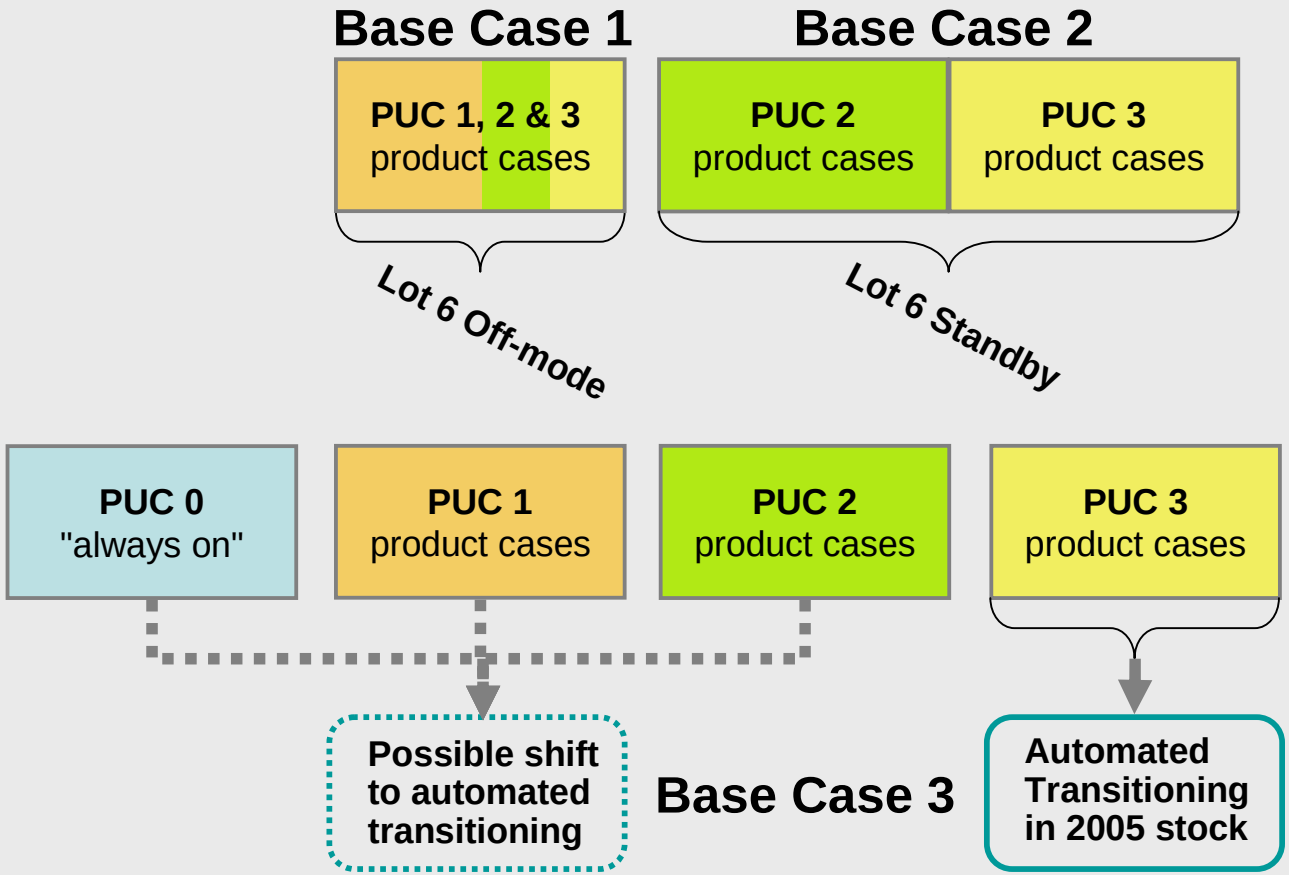


Part 2: Aggregation and discussion as 3 base cases

- Off-mode issues
- Standby functions
- Automated transitioning

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

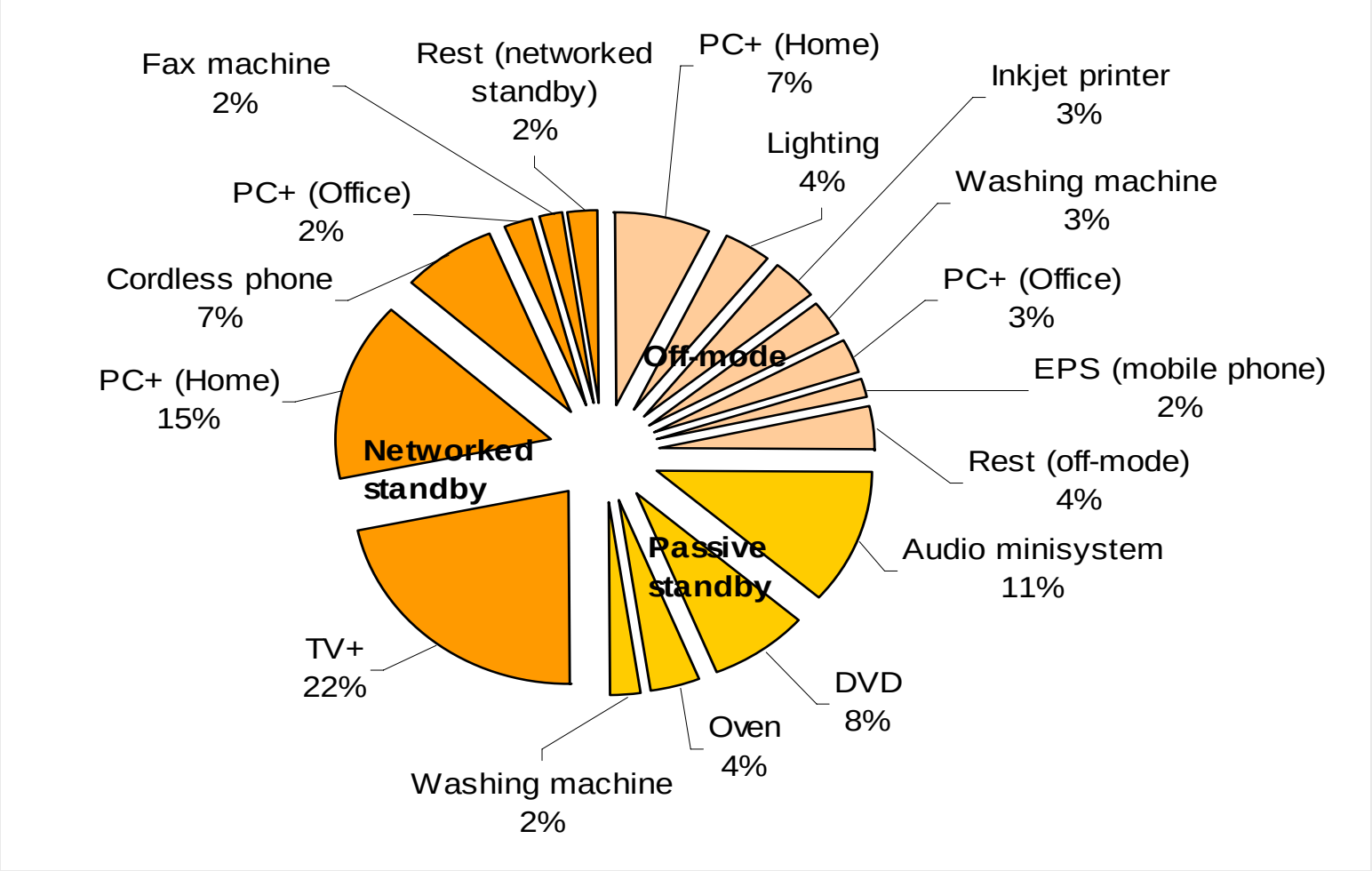
Task 5: Base Cases Overview



- **Base case 1: Off-mode Issues**
- **Base case 2: Lot 6 Standby Function Clusters**
- **Base case 3: Automated Transitioning** (or transitions into standby/off and remaining in standby/off)

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

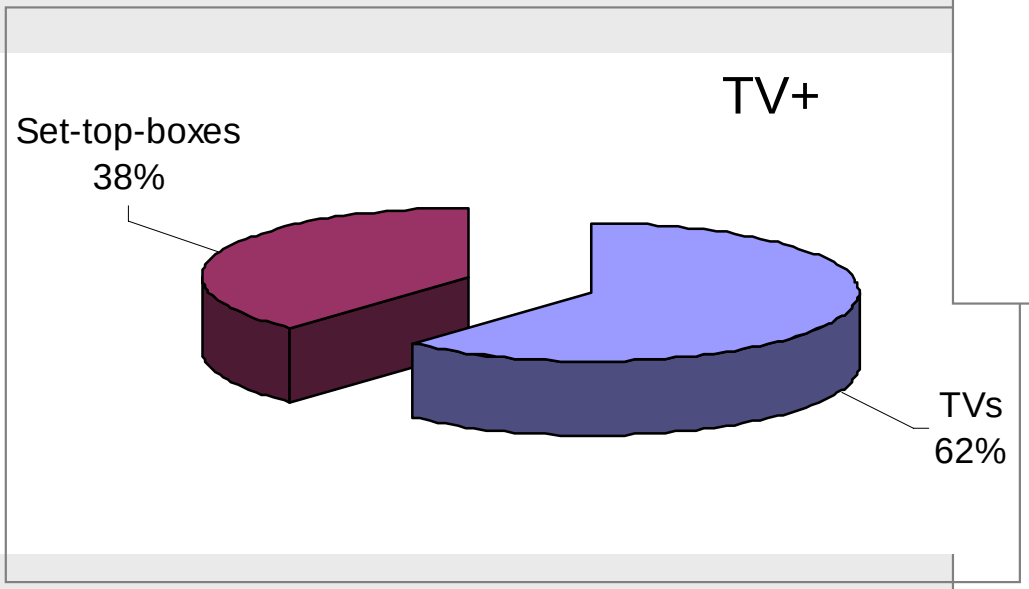
Task 5: Summary of all Contributions

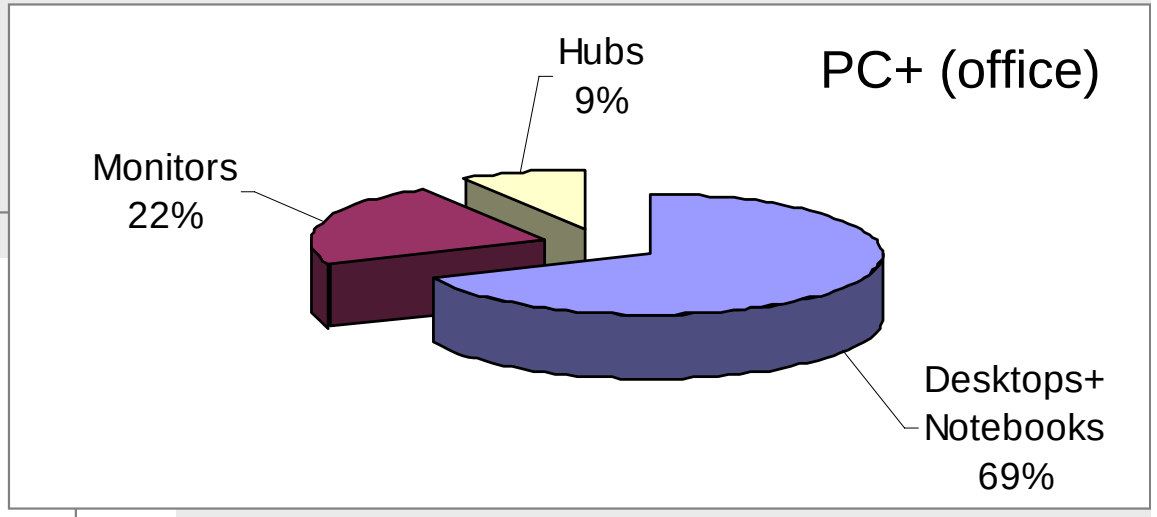


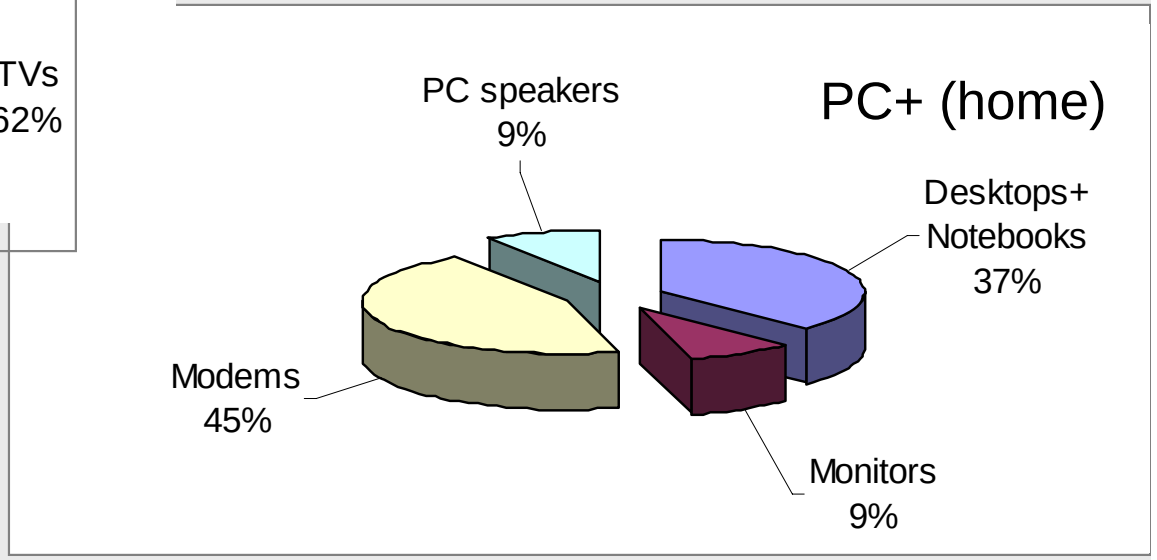
- Total per year covered by the 15 product cases:
  52 TWh or 7045 million € electricity costs (EU-25 stock 2005)

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Contributions within Complex Product Cases







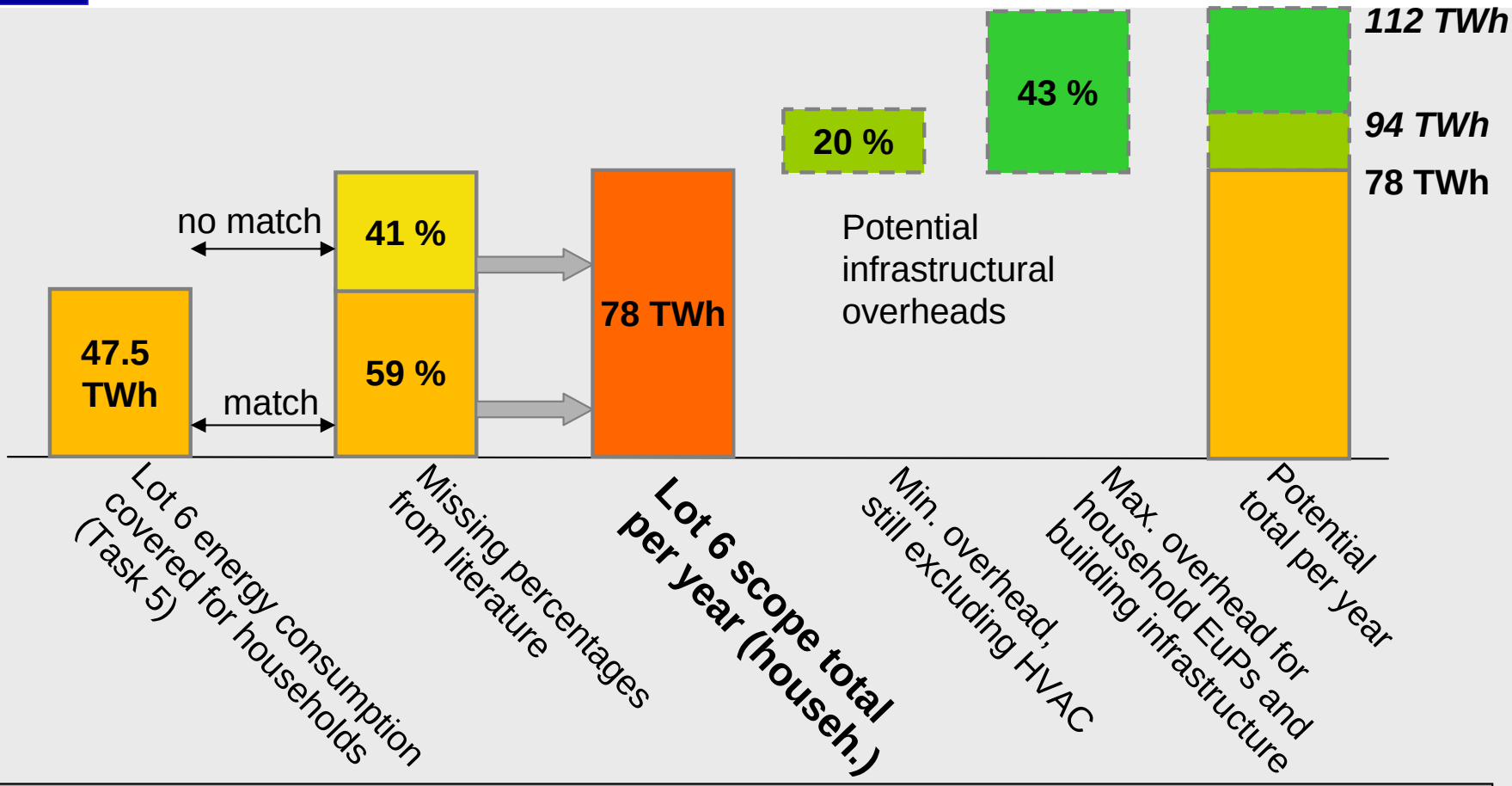
Aggregation of standby and off-mode

Task 5 Additional EU Totals Analysis

- A section on **EU-25 Totals** has been added in the Task 5 conclusion
- Keeping in mind that the 15 product cases are not statistically representative in a strict sense
  - The contribution from household and office products not included in the 15 product cases is extrapolated
  - The potential contribution from building infrastructure (excluded from the Lot 6 investigation scope) is shown

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Estimation of Total Magnitude Standby and Off-mode Losses for Households in 2005

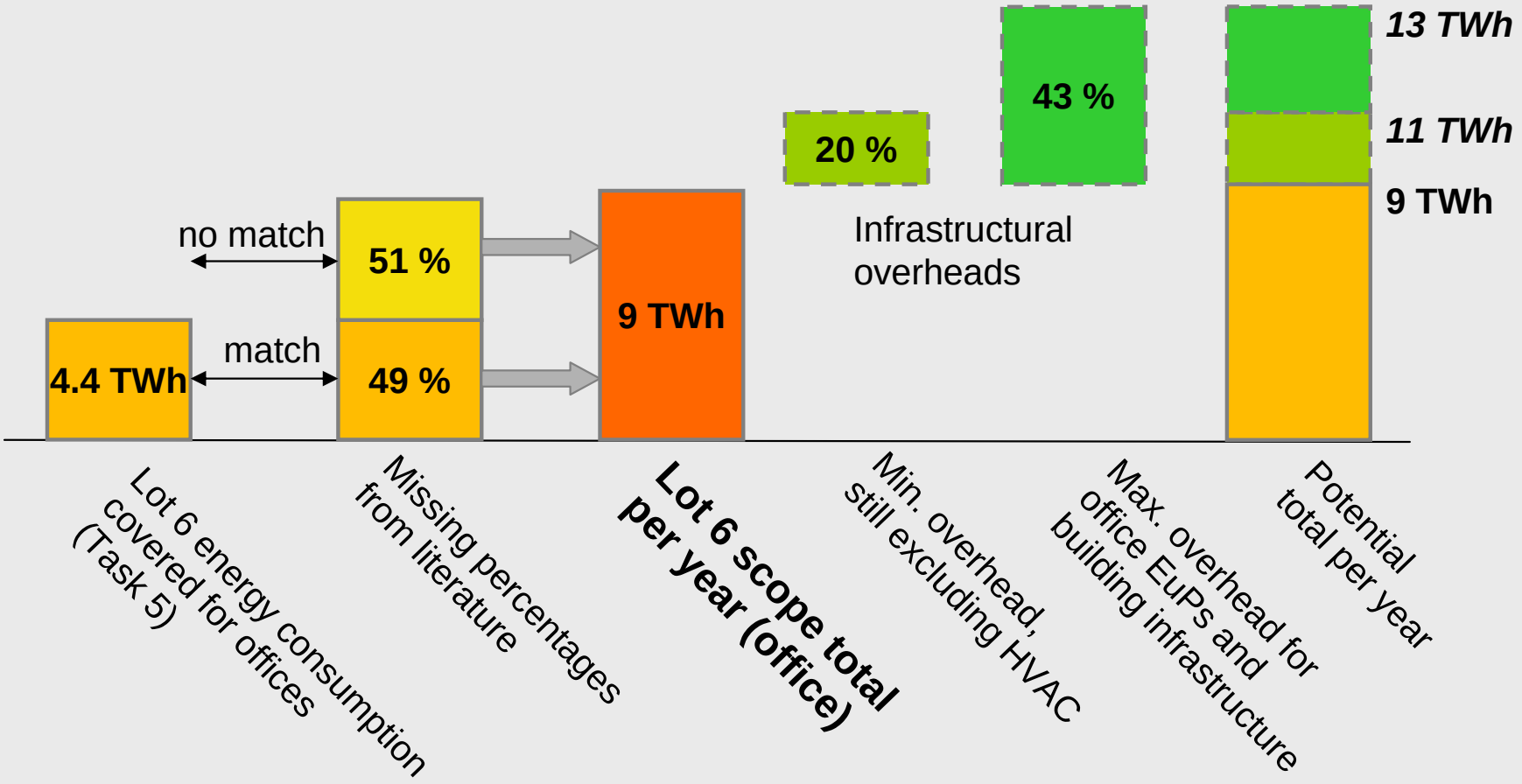


The energy consumption in TWh can also be expressed as W per household (artificial average over the whole year)

47,5 TWh:	28.2 W per household covered with the Lot 6 product cases
78 TWh:	**46 W per household, or 10.4% of hh electricity: Lot 6 scope total**
94-112 TWh:	56-66 W per household, potential total (max. 14.9% of hh electricity)

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Estimation of Total Magnitude Standby and Off-mode Losses for Offices in 2005



The energy consumption in TWh can also be expressed as W per office (artificial average over the whole year)

9 TWh: **7.5% of office electricity: Lot 6 scope total**

11-13 TWh: max. value 10.8% of office

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Draft Final Totals Estimation

The EU-25 totals of Lot 6 standby and off-mode energy consumption for 2005 amount to

- **Investigated Scope**,
  mains connected household and office equipment, extrapolated:

  87 TWh/a electrical energy

  ~914 PJ/a GER (primary energy)

- Lower infrastructure total,
  potential h&o with building infrastructure, but excluding HVAC:

  105 TWh/a electrical energy

- Higher infrastructure total,
  potential h&o with building infrastructure including HVAC electricity:

  125 TWh/a electrical energy

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Task 4 Updates after Stakeholder Meeting

- Pending updates for computers
- Desktop standby of 15 W considered too high by stakeholders
- Harmonisation with Lot 3 requested ➔ however, Lot 6 uses ***2005 stock*** data, whereas Lot 3 cites ***2005 sales***
- Proposal for compromise to be published
- The PC+ use patterns will be aligned with Lot 3 values

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Results of Tasks 6 and 7

Task 1: Definition (Product category and performance assessment)

Task 2: Economic and Market Analysis (Stock data and market trends)

Task 3: Consumer Behavior and Local Infrastructure (Real life efficiency, end-of-life)

Task 4: Technical Analysis Existing Products (System and product life cycle phases)

Task 5: Definition of Base Case (Environmental impact assessment, life cycle costs)

Task 6: Technical Analysis BAT (products, prototypes, components)

Task 7: Improvement Potential (Options, impacts, costs, LLCC, BAT, BNAT)

Task 8: Scenario, Policy, Impact and Sensitivity Analysis

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Lot 6 Calculation Structure: Tasks 5 to 7

Task 6 BAT	Task 7 Selection	Task 7 Improvement pot.	Task 8 Scenario Analysis
Best available technology examples from 15 product cases - differential product cost - differential energy use - implicit energy costs - differential materials (where possible)	**List technical improvement options** at least - differential costs - differential energy use necessary	Structure into • Options • Differential impacts • Differential costs • **Combine options** • **Determine LLCC** • Determine theoretical BAT (Single product view)	**Check suitability** of LLCC options **for generalizing** to • product cases or • base cases (Market totals view) Compare LLCC to "business as usual" Estimate totals for wider product scope (which have not been covered)
Additional BAT examples from Lot 6 investigation scope (mains connected household + office)	**Choose further usable examples for LLCC**		
Additional BNAT examples			

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Task 6 Generic Improvement Options

Off-mode

PUC 1, 2 & 3 product cases

- hard-off switch on primary side (Off1)

Off-mode + Standby

PUC 1, 2 & 3 product cases

- more efficient power supplies (O+S1,2)
- auto-standby transitions, auto-off functions (O+S3)

Standby

PUC 2 product cases | **PUC 3** product cases

- power buffering (St1a,b)
- secondary power supply (St1c)
- improved circuit design (St2a,b)
- reduced circuits powered during standby (St3)
- improve standby user settings (St4,5)
- use more efficient components, technologies (St6)

External measures

PUC 1, 2 & 3 product cases

- power strips, master slave (Ext1)
- network optimisation (Ext2)

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Task 6 Summary(1/2)

Product case		BAT Summary Lot 6 Task 6		
		Consumption in mode (W)		
		Off	Passive sb	Networked sb
EPS (mobile phone)		0.15 confirmed BAT 0.03 best BAT		
Lighting		0.2 confirmed BAT 0.002 best BAT		
Radio		no BAT, except 0 with switch		
Electric toothbrush		1 confirmed BAT		
Oven			2.5 confirmed BAT 1 possible BAT	
Cordless phone				1.2 confirmed BAT EcoDect n.a.
TV+	Television			
	CRT	0 with switch 0.1 otherwise	0.5 confirmed BAT	no values for networked TV
	LCD	0 with switch	0.2 confirmed BAT	no values for networked TV
	Plasma	0 with switch	0.3 confirmed BAT 0.1 possible BAT	no values for networked TV
	Set-top-boxes	0 with switch 0.17 soft off	0.7 when passive	7.5 confirmed BAT
Washing machine		0 with switch 0.037 otherwise	0.9 confirmed BAT 0.04 best BAT	
DVD	Player	0 with switch	0.6 confirmed BAT	
	Recorder	no hard-off found	1.2 confirmed BAT	
Audio minisystem		0 with switch	0.136 confirmed BAT	
Fax machine				0.35 confirmed BAT

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Task 6 Summary (2/2)

Product case		BAT Summary Lot 6 Task 6 Consumption in mode (W) Off	Passive sb	Networked sb
PC+(office)	Desktop	1.1 confirmed BAT 0.8 best BAT 0 with switch		2.6 confirmed BAT 0.8 best BAT
	Notebook	0 for disconnect or 0.38 for EPS		0.4 confirmed BAT
	Monitor CRT	1 confirmed BAT 0 with switch		<2 confirmed BAT
	Monitor LCD	0.01 confirmed BAT hard-off unlikely		0.37 confirmed BAT
	Hubs			0.5 confirmed BAT
PC+(home)	Desktop	see above		see above
	Notebook	see above		see above
	Monitor CRT	see above		see above
	Monitor LCD	see above		see above
	Modems	no BAT, except hard-off in cases		no BAT yet
	PC speakers	0 with switch 1.5 confirmed BAT	2.4 confirmed BAT	
Laser printer		0.036 confirmed BAT 0 with switch		0.64 confirmed BAT
Inkjet printer		0.3 confirmed BAT hard-off unlikely		<0.5 confirmed BAT 0.2 best BAT

- 1 W passive standby for most BAT products possible (except oven, DVD-rec. and PC speaker)
- In networked standby most values are in the range of 0.5 to 2.5 W (except set-top-boxes)

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Task 6 Pending BAT updates

- A number of BATs will be rechecked or exchanged according to feedback
- White goods
- DVD players / recorders
- Computers and (previously missing) modem BATs

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Note: Task 7 before revision

Task 7 Overview

- Improvement options are categorised as
- (1) Off-mode relevant options
- (2) Lot 6 passive standby options
- (3) Lot 6 networked standby options

- *Transitional improvement options have not yet been quantified.*

➔ Additional product costs are estimated per design option

➔ Differential power savings are defined per product case

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Note: Task 7 before revision

Task 7: Improvement Options Calculation Inputs

	stock 2005	assumed on-mode	networked standby		passive standby		off-mode		assumed 0 W off-mode	assumed disconnected
	Mio	h/day	W	h/day	W	h/day	W	h/day	h/day	h/day
EPS mobile phone	**780,00**									
EPS mobile phone	780,00	1,40		0		0	0,3	2,5	0	12,6
Lighting	**179,00**									
Magnetic transformer	53,70	0,50		0		0	4	5,875	0	0
Electronic transformer	35,80	0,50		0		0	0,2	5,875	0	0
with hard off switch (correction factor)	89,50	0,50		0		0	0	0	23,5	0
Radio	**114,40**			0						
Radio with losses	57,20	1,00		0		0	1,5	5,75	0	0
Radio without losses	57,20	1,00		0		0	0	0	23	0
Electric toothbrush	**42,70**									0
Toothbrush	42,70	0,10		0		0	1,4	5,975	0	0
Washing machine	**184,60**									
Washing machine	184,60	1,00	0	0	5,7	3	1,2	5	0	0
DVD	**143,30**									
DVD player	128,97	0,60	0	0	4,8	15,6	1,5	1	3,8	0

Example values from Option 1a75

➔ For each improvement option the changed assumptions / values compared to the Task 5 (Base Cases) are indicated.

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Note: Task 7 before revision

List of Improvement Options in Task 7 (Draft Final Report)

Option Number	Short Option Name	Detailed Name
Option 1a (1a25 and 1a75)	Hard-off switch (25 or 75% of users use switch)	Equip all off-mode relevant EuPs with a primary side hard-off switch
Option 1b	Lower off-mode losses	Reduce power supply side losses and possible soft switch power consumption
Option 1c	Complex hard-off circuitry	Install electronic primary side switch in conjunction with buffered or autarkic energy supply for soft switching
Option 2a	Hard-off switch for passive	Equip some passive standby relevant EuPs with a primary side hard-off switch
Option 2b	Improve power supply 10%	Improve the power supply efficiency for passive standby by 10%
Option 2c	Buffered standby energy	Using a secondary power supply, an energy buffer or autarkic energy for passive standby
Option 2d	<1W passive standby scenario	Reduce all passive standby to 1W
Option 2e	Task 6 BAT passive standby	Use the identified BAT values from Task 6 for passive standby power consumptions
Option 3a	Hard-off switch for networked	Equip some networked standby relevant EuPs with a primary side hard-off switch
Option 3b	Improve power supply 10%	Improve the power supply efficiency for networked by 10%
Option 3c	Buffered standby energy	Using a secondary power supply, an energy buffer or autarkic energy for networked standby
Option 3d	Minimal networked standby scenario	Reduce all networked standby to BAT values retaining full functionality

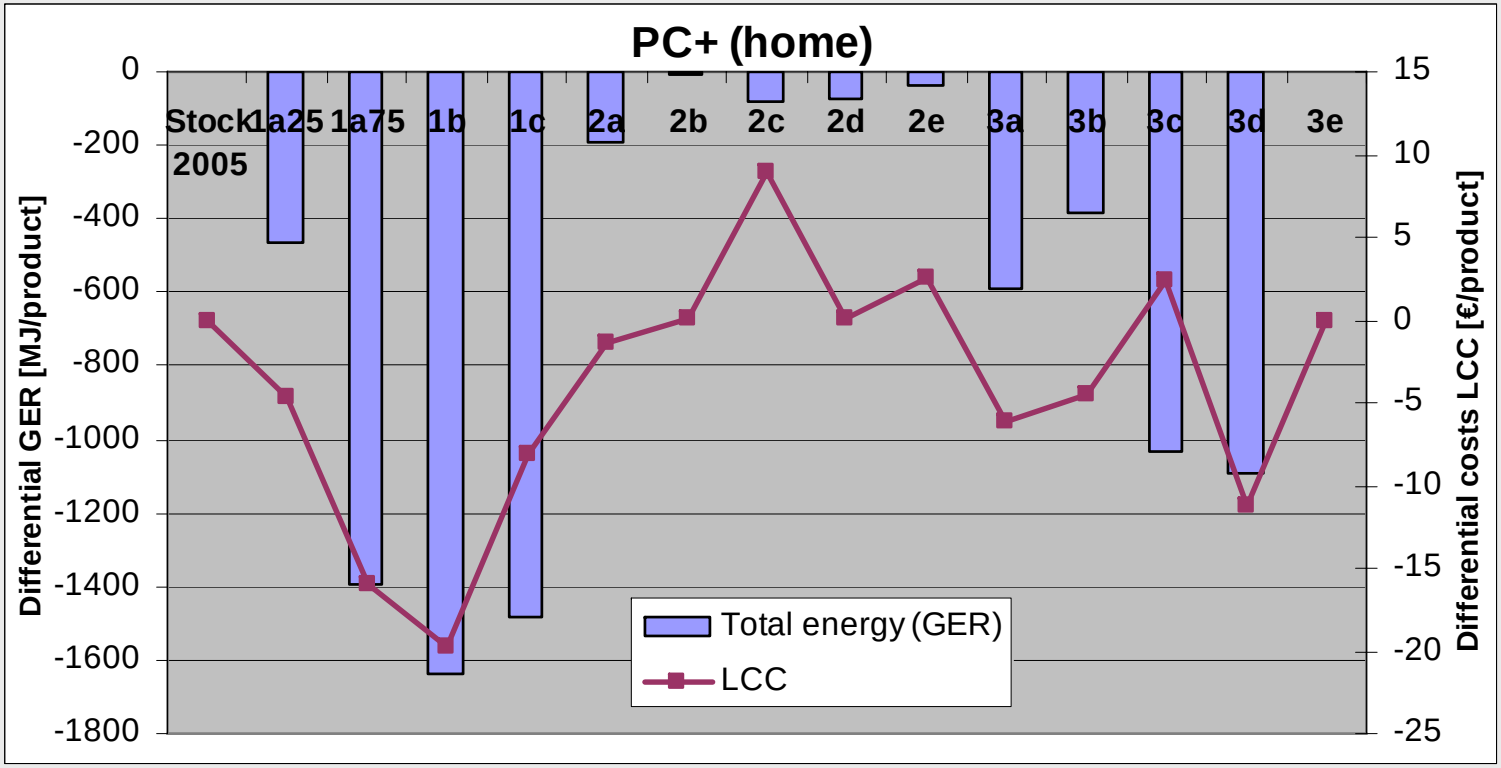
Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Note: Task 7 before revision

Product Case PC+(home)

PC+(home): PUC 3 (job-based)

- Covers desktop and laptop PCs, including monitors, dialup modems, broadband modems, PC speakers
- other peripherals powered via computer in principle included
- off-mode losses from soft off switch
- standby functions include network reactivation
- speakers shown as passive standby



Improvement Options - Revision

- The options are **fully** rearranged
- **Option combinations** and ranking is added
- Include differential materials for some options (indicated in report) - rough estimates possible via trade-off charts
- Determine **point of LLCC** for each product case and across product cases
- Incorporate feedback to Tasks 6 and 7 (specific values, questions of differentiating available features)

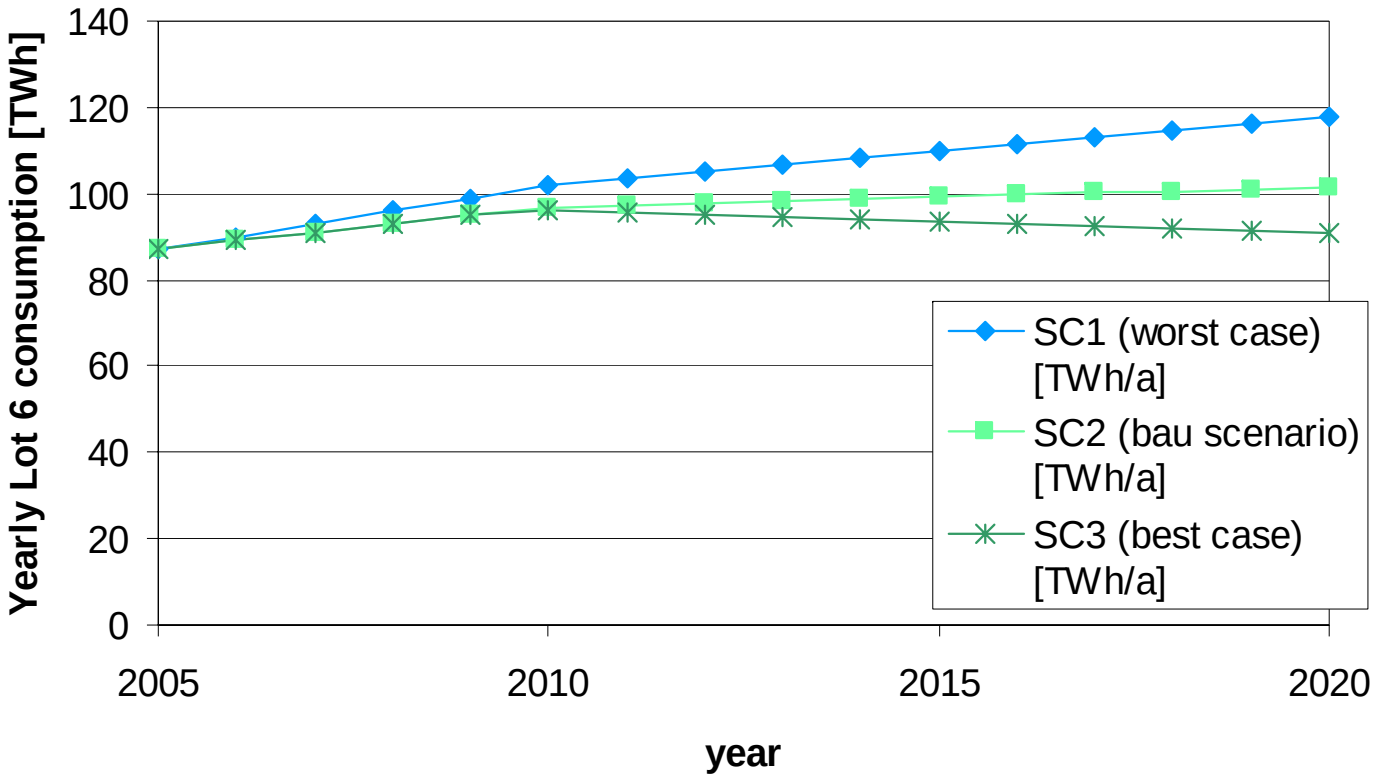
Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Task 8 Scenario, Policy and Sensitivity Analysis

- Not yet published for stakeholder review
- **Scenarios:** In what time frame and to what extend can the trend be changed through an impementing measure
- **Policy:** The contractor's (!) recommendations regarding e.g. possible limit values, possible mandatory information requirements, possible generic requirements, definition, standards, scope, need for exemptions, typical redesign cycle ...
- **Sensitivity:** Check relevance of some major assumptions, e.g. electricity price, most important use patterns or power consumption levels

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

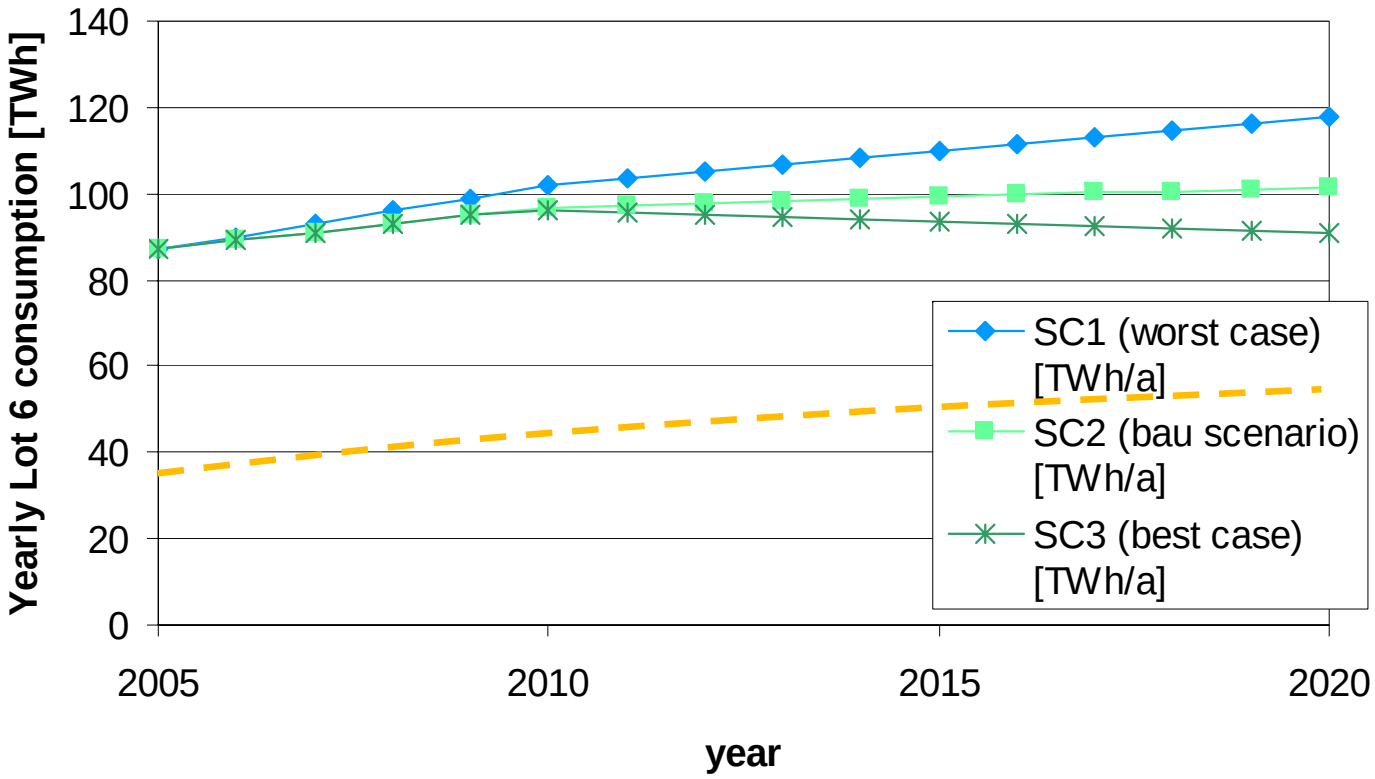
Task 8 Preview: Scenarios



- 3 initial scenarios
- SC1 assume average 2005 stock power consumption for new products
- SC2 assume reduction of average Lot 6 by 1% per year **(Business as usual, bau)**
- SC3 assume positive impact from other requirements (worldwide and EU) after 2010

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Task 8 Preview: Scenarios

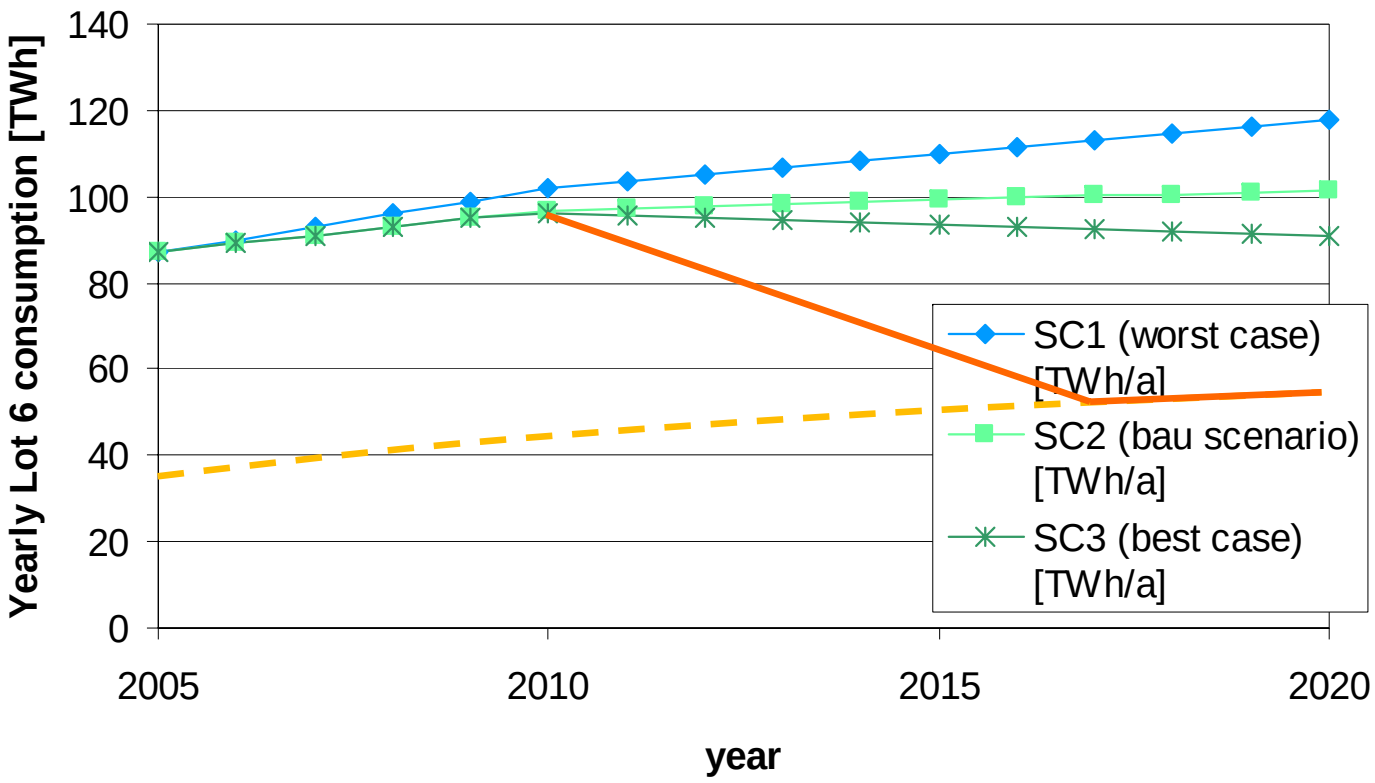


- Assume limit values or new average Lot 6 power consumption and apply to all products (target trend)

Note: the limit values / targeted improvements are example values here

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Task 8 Preview: Scenarios

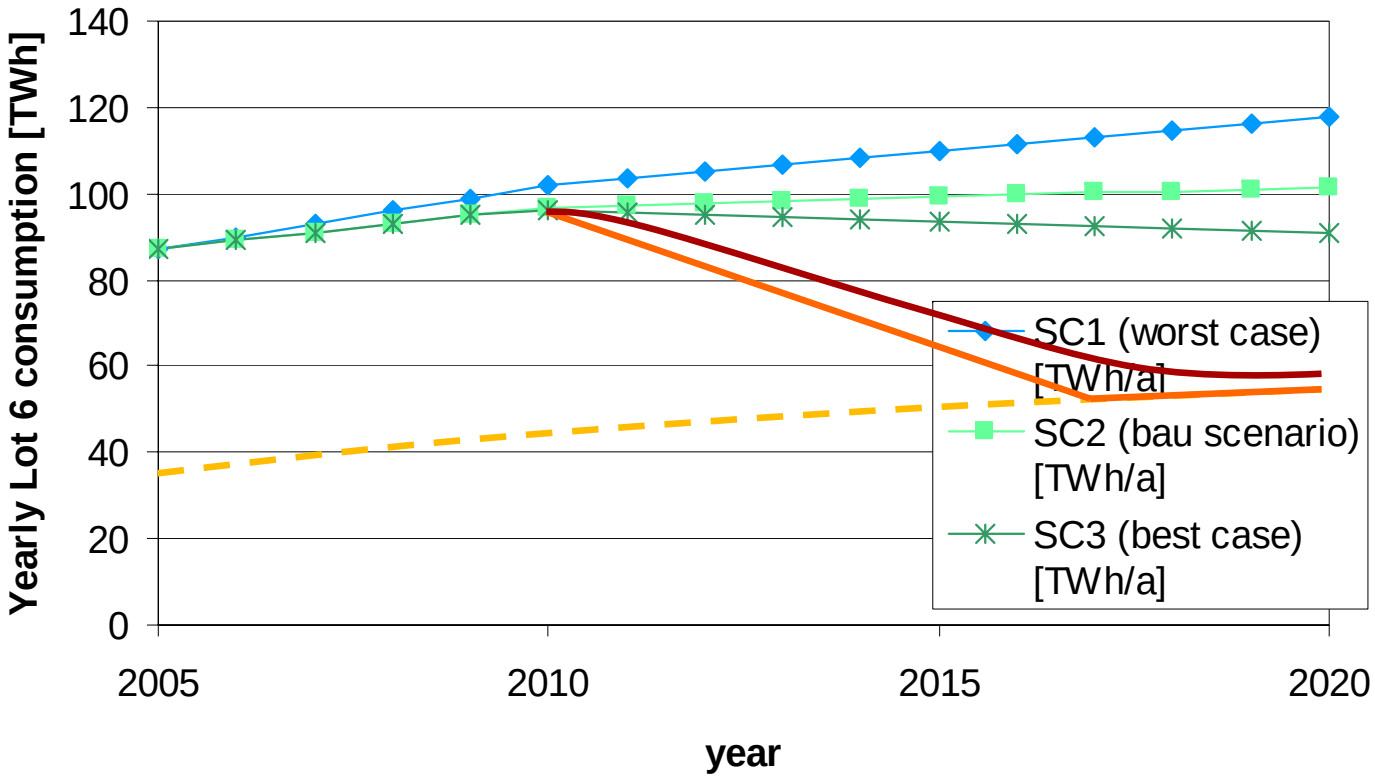


- Assume limit values or new average Lot 6 power consumption and apply to all products (target trend)
- Determine start year of compliance (for simplicity 2010)
- Model stock replacement rate: simple (linear) over averaged 8 years

Note: the limit values / targeted improvements are example values here

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Task 8 Preview: Scenarios



- Assume limit values or new average Lot 6 power consumption and apply to all products (target trend)
- Determine start year of compliance (for simplicity 2010)
- Model stock replacement rate: simple (linear) over averaged 8 years
- More realistic replacement scenario

Note: the limit values / targeted improvements are example values here

Task 8 Discussion for Limit Values

- For Lot 6 Off-mode: Limit value seems possible, primary side hard-off switch not proposed as a requirement
- For Lot 6 Passive Standby: Limit value seems possible for the listed function cluster
- For Lot 6 Networked Standby: Common limit value setting is more difficult
- The receiving/decoding/processing power consumptions vary a lot between differing "networked" solutions - from 0.5 W and below to 10 W
- "Phasing in" or two tier limit values proposed as an option

EuP Preparatory Studies – Information Updates

DG Energy and Transport

http://ec.europa.eu/energy/demand/legislation/eco_design_en.htm

Lot 4: http://www.ecoimaging.org/

Lot 5: http://www.ecotelevision.org/

Lot 6: http://www.ecostandby.org/

Lot 7: http://www.ecocharger.org/

- **Task 2 to 4 details not shown in presentation**

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Task 2 Market Data

- For Lot 6 main results are estimated **stock data** for the 15 product cases **for 2005**
- Discussion of market trends and projections for 2010 and 2020
- Most product cases are assigned to households, so stock data can be expressed as **household penetration rates**
- The TV+ case contains TV sets in different technologies plus set-top-boxes
- For PC+ (PC plus selected peripherals) home and office computers are investigated separately

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Task 2 Data Summary

Product case	Office (o) / Household (h)	2005	2010	2020
EPS mobile phone	(o/**h**)	780	863	962
Lighting	(**h**)	179	209	304
Radio	(**h**)	114.4	115.7	116.8
Electric toothbrush	(**h**)	42.7	43.6	50.6
Electric oven	(**h**)	73.0	73.9	74.7
Cordless phone	(o/**h**)	179.6	184	190.5
TV+ #	(**h**)	275.9	391.5	410.8
Washing machine	(**h**)	184.6	189.4	195.5
DVD	(**h**)	143.3	174.0	253.4
Audio minisystem	(**h**)	114.4	115.7	116.8
Fax	(**o**/h)	20.0	13.2	5.6
PC+ (office) #	(**o**)	80.5	145	193
PC+ (home) #	(**h**)	126	193	243
Laser printer	(**o**/h)	16.6	18.5	22.6
Inkjet printer	(o/**h**)	90.2	105.0	140.4
Total		**2420.2**	**2770.0**	**3279.7**

TV+ and PC+ cases explained on next slide

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Task 2 Complex Product Cases

Product case	Office (o) / Household (h)	2005	2010	2020
TV+: TV sets	(h)	275.9	391.5	410.8
Set-top-boxes in %		20%	29%	24%
Set-top-boxes in mio		56.3	115	97.8
PC+ (office): Desktops+Notebooks	(o)	80.5	145	193
Monitors in %		55%	42%	47%
Monitors in mio		44.5	61	90
Hubs in %		8%	8%	8%
Hubs in mio		6.4	11.6	15.4
PC+ (home): Desktops+Notebooks	(h)	126	193	243
Monitors in %		83%	73%	84%
Monitors in mio		104.5	141	205
PC speakers in %		51%	51%	51%
PC speakers in mio		64.3	98	124
Modems in %		58%	58%	58%
Modems in mio		73	112	141

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Task 3 User Behaviour

- For Lot 6 main results are average use times per mode for the 15 product cases
- The discussions are structured by the product-use-clusters (PUCs); from "simple" to "complex"
- The discussions include aspects of "buying decision", i.e. is standby an issue for consumers and where would buyers get the information
- Additionally questions about use and availability of hard-off switches are addressed
- The revised Task 3 now includes average life times per product case for the LCC calculations

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Task 3 Result summary (1)

On/ Off Products (PUC 1)		
Product cases	**Active /On time [h/d]**	**Off time [h/d]**
EPS (mobile phone)	*1.4*	*10.0 (12.6)**
Lighting	*0.5*	*23.5*
Radio	*1.0*	*23.0*
Electric toothbrush	*0.1*	*23.9*

* 10 h off-mode losses and 12.6 h disconnected (update already in old Task 4+5)

On/ Standby products in households (PUC 2)					
Product cases		**Lot 6 Standby mode time [h/d]**	**Off-mode losses time [h/d]**	**0 Watt Off-mode time [h/d]**	**On mode time [h/d]**
Oven		23.8	0.0	0.0	0.2
Cordless phone		23.6	0.0	0.0	0.4
TV +	TV (all kinds) (a)	12.0	0.0	8.0	4.0
	Set-top-boxes (all kinds) (b)	20.0	0.0	0.0	4.0

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Task 3 Result summary (2)

Job based products in households					
Product cases		**Lot 6 Standby mode time [h/d]**	**Off-mode losses time [h/d]**	**0 Watt off-mode time [h/d]**	***On mode time [h/d]***
Washing machine		3.0	20.0	0.0	*1.0*
DVD		15.6	4.0	3.8	*0.6*
Audio minisystem		17.1	1.4	2.1	*3.4*
Fax		23.1	0.0	0.0	*0.9*
PC+	Desktop/ Notebook [(a)]	3.5	13.4	5.9	*1.2*
	Monitors [(a)]	2.3	10.3	10.3	1.2
	PC speakers	2.4	14.6	6.4	0.6
	Internet devices (modems, incl. WLAN)[(b)]	18.2	3.4	0.5	*1.9*
Printers, laser		1.9	13.1	8.9	*0.1*
Printers, inkjet		1.9	17.7	4.3	*0.1*

Task 3 Result summary (3)

Job-based products in offices					
Product cases		**Lot 6 Standby mode time [h/d]**	**Off-mode losses time [h/d]**	**0 Watt off-mode time [h/d]**	**On mode time [h/d]**
Fax Machine (inkjet, laser, thermal)		23.1	0.0	0.0	0.9
PC+	Desktop/ Notebook [a]	1.9	11.9	6.0	4.1
	Monitors	2.4	13.9	3.5	4.2
	Internet devices (hubs)	18.0	0.0	0.0	6.0
Printers, inkjet		6.0	14.2	3.5	0.3
Printers, laser		5.9	14.2	3.5	0.4

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Product Life Times have been added in Task 3

Use duration (life time) selected for the product cases based on indicated sources

Product case	Life time (years)	Source
EPS (mobile phone)	3.0	[BIO 2007]
Lighting	10.0	Based on [BIO 2007] and [Mietrechtspraxis]
Radio	8.7	[Schlomann 2004]
Electric toothbrush	4.0	[BIO 2007]
Oven	15.0	[Mietrechtspraxis]
Cordless phone	7.2	[Schlomann 2004]
TV+	10.0	[IZM 2006b]
Washing machine	11.0	Lot 13&14
DVD	8.7	[Schlomann 2004]
Audio minisystems	8.7	[Schlomann 2004]
Fax	8.0	[IZM 2006a]
PC+	6.0	[IVF 2006]
Laser printer	6.0	[IZM 2006a]
Inkjet printer	4.0	[IZM 2006a]

A comparison with CEN workgroup results is pending (stakeholder input)

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Results of Tasks 4 and 5

Task 1: Definition (Product category and performance assessment)

Task 2: Economic and Market Analysis (Stock data and market trends)

Task 3: Consumer Behavior and Local Infrastructure (Real life efficiency, end-of-life)

Task 4: Technical Analysis Existing Products (System and product life cycle phases)

Task 5: Definition of Base Case (Environmental impact assessment, life cycle costs)

Task 6: Technical Analysis BAT (products, prototypes, components)

Task 7: Improvement Potential (Options, impacts, costs, LLCC, BAT, BNAT)

Task 8: Scenario, Policy, Impact and Sensitivity Analysis

Task 4 Overview

- Input to EcoReports for product cases and base cases is use phase electricity only

➔ Average power level per mode per product case

- Task 4 also needs to make further assumptions for subdivisions of the market segments from Task 2, e.g. how many low voltage halogen lights do have secondary side switches

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Task 4: Power Consumption of Product Cases (1)

Lot 6 product case	Name in source	Modes outside of lot 6 scope in [W]		Standby and off-mode power consumption					
				lot 6 networked standby in [W]	mode in source	lot 6 passive standby in [W]	mode in source	lot 6 off-mode in [W]	mode in source
EPS mobile phone	EPS (LOT 7)							0.3	off
Lighting	magnetic electronic							4.0 0.2	off off
	effective 2005 mix							**1.24**	
Radio	Radios							1.5	ps
	effective 2005 mix							**0.75**	
Electric toothbrush	Rechargeable toothbrush	1.5	as					1.4	ps
Electric oven	Cooker					3.0	sb		
Cordless phone	Cordless phone base station	3.3	as	2.4	ps				
TV+	Cathode ray TV LCD TV Plasma TV Rear projection TV			6.0 3.0 3.0 2.0	sb sb sb sb			1.5 2.0 1.5 0.1	off off off off
	effective TV mix			**5.84**				**1.5**	
	Set-top-boxes			10.7	ps			0.0	off
Washing machine	Washing machine					5.7	sb	1.2	off
DVD	DVD player/recorder					4.8	as	1.5	off
Audio minisystem	Audio compact system					8.0	sb	1.5	off
Fax	Facsimiles			5.9	as				
PC+ (office)	Computer Notebook Computer PC			5.0 15.0				2.5 3.5	off off
	effective PC mix			**10.1**				**3.2**	
	Monitor Cathode ray Monitor LCD			9.75 3.55				1.15 1.35	off off
	effective monitor mix			**6.9**				**1.2**	
	Small hubs			5.0				0.0	

Mode names in sources:
- as: active standby
- ps: passive standby
- sb: standby
- off: off-mode

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Task 4: Power Consumption of Product Cases (2)

Lot 6 product case	Name in source	Modes outside of lot 6 scope in [W]		Standby and off-mode power consumption					
				lot 6 networked standby in [W]	mode in source	lot 6 passive standby in [W]	mode in source	lot 6 off-mode in [W]	mode in source
PC+ (home)	Computer Notebook			5.0				2.5	off
	Computer PC			15.0				3.5	off
	effective PC mix			**14.0**				**3.3**	
	Monitor Cathode ray			7.2				1.9	off
	Monitor LCD			2.6				1.0	off
	effective monitor mix			**4.7**				**1.5**	
	Dial-up modem			5.5				2.6	
	Broadband modem			8.2				7.5	
	Broadband modem with WLAN			13.0				13.0	
	effective modem mix			**10.2**				**2.6**	
	PC speakers			3.6				2.5	
Laser printer	Printer Laser			20.0				3.0	off
Inkjet printer	Printer Inkjet			6.0				3.0	off

Mode names in sources:
- as: active standby
- ps: passive standby
- sb: standby
- off: off-mode

Contracted by European Commission
EuP (4, 5, 6, 7) Preparatory Studies

Task 4: Mode Translations and Compatibility
→ Example for Table Format (Australian Standby Definition)

Source	Mode in source	Source Mode Description	Sub-Modes / Decisions	Lot 6 Mode	Examples
[EnergyConsult 2006]					
	In-use mode	primary function	main function or full power? Yes	Active Modes	
	Active standby	depends on device, on but no main function.	Communication equipment / network capable	Networked standby	fax, cordless phone
	Active standby	DVD-player is on, no disc playing	media players / EuPs with motors	outside scope, or transitional	CD player on, but not playing
	Active standby	chargers/EPS, while charging	regarding EPS Mobile P. - off-mode losses possible	outside scope, or transitional	cordless phone charging?
	Delay start	one-time programmed timer start	no network/ wake up on timer	Passive standby	washing machine dishwasher
	Passive standby	no mainfunction, ready to switch on, display or clock still on	network capable	Networked standby	Modem
	Passive standby		no network	Passive standby	Printer, TV
	Passive standby	chargers/EPS, while not charging		Off-Mode losses	no-load case, Cordless phone
	Off-mode	no function active or obvious, reactivation not possible	power >0 W? Yes	Off-Mode losses	TV, Stereo-Integrated
	Off-mode		power >0 W? No	Off-Mode 0 Watt	