

# **EuP Preparatory Study Lot 6 Standby and Off-mode Losses**

## **Literature and Annexes for Task Reports**

Final Report

Compiled by Fraunhofer IZM

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### *Disclaimer*

The findings presented in this report are results of the research conducted by the IZM consortium and the continuous feedback from a wide range of stakeholders. The statements and recommendations presented in the final report however are not to be perceived as the opinion of the European Commission.

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## Intention and Status of Document

This is the literature & annexes part for the final report version of Lot 6, to accompany Tasks 1 to 8.

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## 10. Annexes

### Annex 1-1: Product Naming and Classification

Product classification based on [Nordman 2006]. The classification has been extended with additional product classes, and for the use in this study larger “main categories” have been introduced. The classification covers domestic and office equipment, but also products considered “building installation” within the Lot 6 study.

The intention of this detailed (but still not exhaustive!) listing is primarily for introducing uniform product names (i.e. the product class names) and the allocation of these products to the main categories.

Lot 6 Main Categories	Product Classification (Naming)	Categories by Nordman	Source (BN, ISI, IZM)
<b>ICT&amp;AV</b>			
ICT&AV	Amplifiers	Audio	Source Nordman
ICT&AV	Cassette Deck	Audio	Source Nordman
ICT&AV	CD Player	Audio	Source Nordman
ICT&AV	Equalizer (audio)	Audio	Source Nordman
ICT&AV	Pre-amplifier	Audio	Source IZM
ICT&AV	Receiver (audio)	Audio	Source Nordman
ICT&AV	Tuner	Audio	Source Nordman
ICT&AV	Turn table	Audio	Source Nordman
ICT&AV	Audio minisystem	Audio	Source Nordman
ICT&AV	Stereo, portable	Audio	Source Nordman
ICT&AV	Radio, table	Audio	Source Nordman
ICT&AV	CD Player, portable	Audio	Source Nordman
ICT&AV	other portable audio players	Audio	Source IZM
ICT&AV	other media Player	Audio	Source ISI
ICT&AV	Charger, digital music player	Audio	Source Nordman
ICT&AV	Musical keyboard	Audio	Source Nordman
ICT&AV	Electrical piano / other el. instruments	Audio	Source IZM
ICT&AV	Home theatre system	Audio	Source Nordman
ICT&AV	Karaoke machine	Audio	Source Nordman
ICT&AV	Subwoofer	Audio	Source Nordman
ICT&AV	Speakers, powered	Audio	Source Nordman
ICT&AV	speakers, wireless (base station)	Audio	Source Nordman
ICT&AV	speakers, wireless (speakers)	Audio	Source Nordman
ICT&AV	Desktop	Computer	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

<b>Lot 6 Main Categories</b>	<b>Product Classification (Naming)</b>	<b>Categories by Nordman</b>	<b>Source (BN, ISI, IZM)</b>
ICT&AV	Media server	Computer	Source IZM
ICT&AV	Notebook	Computer	Source Nordman
ICT&AV	PDAs / Smartphones, -> PDA charger	Computer	Source IZM
ICT&AV	PDAs / Smartphones, -> PDA cradle	Computer	Source IZM
ICT&AV	Computer display, CRT	Display	Source Nordman
ICT&AV	Computer display, LCD	Display	Source Nordman
ICT&AV	Computer display, Plasma	Display	Source Nordman
ICT&AV	digital photo frame	Display	Source IZM
ICT&AV	Game console, portable	Display	Source Nordman
ICT&AV	Projector, projector slide	Display	Source Nordman
ICT&AV	Projector, projector video	Display	Source Nordman
ICT&AV	Television, large CRT	Display	Source Nordman
ICT&AV	Television, standard CRT	Display	Source Nordman
ICT&AV	Television, LCD	Display	Source Nordman
ICT&AV	Television, Plasma	Display	Source Nordman
ICT&AV	Television, rear projection	Display	Source Nordman
ICT&AV	Television, Television/VCR	Display	Source Nordman
ICT&AV	Copiers	Imaging	Source Nordman
ICT&AV	Fax Machines, inkjet	Imaging	Source Nordman
ICT&AV	Fax Machines, laser	Imaging	Source Nordman
ICT&AV	Fax Machines, thermal	Imaging	Source Nordman
ICT&AV	Multi-function device, inkjet	Imaging	Source Nordman
ICT&AV	Multi-function device, laser	Imaging	Source Nordman
ICT&AV	Printers, inkjet	Imaging	Source Nordman
ICT&AV	Printers, laser	Imaging	Source Nordman
ICT&AV	Printers, photo	Imaging	Source Nordman
ICT&AV	Printers, other consumer+office segment	Imaging	Source IZM
ICT&AV	Printers, other printer applications	Imaging	Source IZM
ICT&AV	Scanner, flatbed	Imaging	Source Nordman
ICT&AV	Scanner, handheld	Imaging	Source IZM
ICT&AV	Scanner, other	Imaging	Source IZM
ICT&AV	Hub, ethernet	Networking	Source Nordman
ICT&AV	Hub, usb	Networking	Source Nordman
ICT&AV	Modem, cable	Networking	Source Nordman
ICT&AV	Modem, DSL	Networking	Source Nordman
ICT&AV	Modem, POTS	Networking	Source Nordman
ICT&AV	DSL splitter	Networking	Source IZM
ICT&AV	Print server	Networking	Source IZM
ICT&AV	Router, ethernet	Networking	Source Nordman
ICT&AV	Wireless access point	Networking	Source Nordman
ICT&AV	Room antennas / amplifiers	Networking	Source IZM

<b>Lot 6 Main Categories</b>	<b>Product Classification (Naming)</b>	<b>Categories by Nordman</b>	<b>Source (BN, ISI, IZM)</b>
ICT&AV	CD recorder	Peripherals	Source Nordman
ICT&AV	Dock, PDA	Peripherals	Source Nordman
ICT&AV	External computer accessories, other	Peripherals	Source IZM
ICT&AV	External drive	Peripherals	Source Nordman
ICT&AV	External sound interfaces	Peripherals	Source IZM
ICT&AV	Speakers, computer	Peripherals	Source Nordman
ICT&AV	Set-top-boxes, analog cable	Set-top	Source Nordman
ICT&AV	Set-top-boxes, digital cable	Set-top	Source Nordman
ICT&AV	Set-top-boxes, digital cable with PVR	Set-top	Source Nordman
ICT&AV	Set-top-boxes, internet	Set-top	Source Nordman
ICT&AV	Set-top-boxes, satellite	Set-top	Source Nordman
ICT&AV	Set-top-boxes, satellite with PVR	Set-top	Source Nordman
ICT&AV	Answering machine	Telephony	Source Nordman
ICT&AV	Caller ID unit	Telephony	Source Nordman
ICT&AV	Charger, mobile phone	Telephony	Source Nordman
ICT&AV	Home and SoHo telephone systems	Telephony	Source IZM
ICT&AV	Phone, Standard corded phone	Telephony	Source IZM
ICT&AV	Phone, Comfort phone / Video phone	Telephony	Source IZM
ICT&AV	Phone, cordless	Telephony	Source Nordman
ICT&AV	Phone, cordless with answering machine	Telephony	Source Nordman
ICT&AV	Phone, Additional charger cradle	Telephony	Source IZM
ICT&AV	Phone, Base station with computing/network interface	Telephony	Source IZM
ICT&AV	charger, still camera	Video	Source Nordman
ICT&AV	charger, video camera	Video	Source Nordman
ICT&AV	DVD, player	Video	Source Nordman
ICT&AV	DVD, recorder	Video	Source Nordman
ICT&AV	HD-Recorder	Video	Source IZM
ICT&AV	VCR	Video	Source Nordman
ICT&AV	VCR/DVD	Video	Source Nordman
ICT&AV	Videocassette rewinder	Video	Source Nordman
<b>Small household appliances</b>			
Small household appliances	Automatic griddles	Electronic housewares	Source Nordman
Small household appliances	Blanket	Electronic housewares	Source Nordman
Small household appliances	Blender	Electronic housewares	Source Nordman
Small household appliances	Bread makers	Electronic housewares	Source Nordman

<b>Lot 6 Main Categories</b>	<b>Product Classification (Naming)</b>	<b>Categories by Nordman</b>	<b>Source (BN, ISI, IZM)</b>
Small household appliances	Broiler	Electronic housewares	Source Nordman
Small household appliances	Can opener	Electronic housewares	Source IZM
Small household appliances	Clock	Electronic housewares	Source Nordman
Small household appliances	Clock, radio	Electronic housewares	Source Nordman
Small household appliances	Coffee grinder	Electronic housewares	Source IZM
Small household appliances	Coffee makers, residential	Electronic housewares	Source Nordman
Small household appliances	Corn popper, air	Electronic housewares	Source Nordman
Small household appliances	Corn popper, hot oil	Electronic housewares	Source Nordman
Small household appliances	Deep fryer, residential	Electronic housewares	Source Nordman
Small household appliances	Egg cookers	Electronic housewares	Source Nordman
Small household appliances	Espresso maker, residential	Electronic housewares	Source Nordman
Small household appliances	Food processor	Electronic housewares	Source Nordman
Small household appliances	Food slicer	Electronic housewares	Source Nordman
Small household appliances	Frying pan	Electronic housewares	Source Nordman
Small household appliances	Hand mixer	Electronic housewares	Source Nordman
Small household appliances	Heating pad	Electronic housewares	Source Nordman
Small household appliances	Hot plate (kitchen)	Electronic housewares	Source Nordman
Small household appliances	Iron	Electronic housewares	Source Nordman
Small household appliances	Juicer	Electronic housewares	Source Nordman
Small household appliances	Kettle	Electronic housewares	Source Nordman
Small household appliances	Kitchen machines / mixers	Electronic housewares	Source Nordman
Small household appliances	Knife	Electronic housewares	Source Nordman
Small household appliances	Mug warmer	Electronic housewares	Source Nordman
Small household appliances	Oven, microwave	Electronic housewares	Source Nordman
Small household appliances	Pasta maker	Electronic housewares	Source Nordman

<b>Lot 6 Main Categories</b>	<b>Product Classification (Naming)</b>	<b>Categories by Nordman</b>	<b>Source (BN, ISI, IZM)</b>
Small household appliances	Rice maker	Electronic housewares	Source Nordman
Small household appliances	Sewing machine	Electronic housewares	Source Nordman
Small household appliances	Slow cooker	Electronic housewares	Source Nordman
Small household appliances	Stand mixer	Electronic housewares	Source Nordman
Small household appliances	Tee maker	Electronic housewares	Source IZM
Small household appliances	Toaster	Electronic housewares	Source Nordman
Small household appliances	Toaster oven	Electronic housewares	Source Nordman
Small household appliances	Vacuum, central	Electronic housewares	Source Nordman
Small household appliances	Vacuum, rechargeable	Electronic housewares	Source Nordman
Small household appliances	Vacuum, standard	Electronic housewares	Source Nordman
Small household appliances	Vacuum, automated vacuum cleaners	Electronic housewares	Source IZM
Small household appliances	Waffle iron	Electronic housewares	Source Nordman
Small household appliances	Air freshener	Personal Care	Source Nordman
Small household appliances	Curling iron	Personal Care	Source Nordman
Small household appliances	Hair dryer	Personal Care	Source Nordman
Small household appliances	Heat lamp	Personal Care	Source Nordman
Small household appliances	Home medical equipment	Personal Care	Source Nordman
Small household appliances	Massager	Personal Care	Source Nordman
Small household appliances	Shaver	Personal Care	Source Nordman
Small household appliances	Epilator	Personal Care	Source IZM
Small household appliances	Toothbrush	Personal Care	Source Nordman
Small household appliances	Water softener	Personal Care	Source Nordman
<b>Large household appliances</b>			
Large household appliances	Garbage disposal	Major Appliance	Source Nordman
Large household appliances	Refrigerator, wine cooler	Major Appliance	Source Nordman

<b>Lot 6 Main Categories</b>	<b>Product Classification (Naming)</b>	<b>Categories by Nordman</b>	<b>Source (BN, ISI, IZM)</b>
Large household appliances	Trash compactor	Major Appliance	Source Nordman
Large household appliances	Water dispenser, bottled	Major Appliance	Source Nordman
Large household appliances	Clothes dryer, electric	Major Appliance (Traditional End Uses)	Source Nordman
Large household appliances	Clothes dryer, gas	Major Appliance (Traditional End Uses)	Source Nordman
Large household appliances	Clothes washer and dryer combination, electric	Major Appliance (Traditional End Uses)	Source IZM
Large household appliances	Clothes washer, horizontal axis	Major Appliance (Traditional End Uses)	Source Nordman
Large household appliances	Clothes washer, vertical axis	Major Appliance (Traditional End Uses)	Source Nordman
Large household appliances	Cook top, electric	Major Appliance (Traditional End Uses)	Source Nordman
Large household appliances	Cook top, gas	Major Appliance (Traditional End Uses)	Source Nordman
Large household appliances	Dishwashers	Major Appliance (Traditional End Uses)	Source Nordman
Large household appliances	Electric stove	Major Appliance (Traditional End Uses)	Source Nordman
Large household appliances	Freezer	Major Appliance (Traditional End Uses)	Source Nordman
Large household appliances	Oven, electric	Major Appliance (Traditional End Uses)	Source Nordman
Large household appliances	Oven, gas	Major Appliance (Traditional End Uses)	Source Nordman
Large household appliances	Refrigerator	Major Appliance (Traditional End Uses)	Source Nordman
<b>Lighting/EPS/UPS</b>			
Lighting/EPS/UPS	Dimming switch	Lighting	Source Nordman
Lighting/EPS/UPS	Emergency light, interior (commercial)	Lighting	Source Nordman
Lighting/EPS/UPS	Grow lamps	Lighting	Source Nordman
Lighting/EPS/UPS	Lamp, decorative	Lighting	Source Nordman
Lighting/EPS/UPS	Lighting installation, ballast for lighting	Lighting	Source IZM
Lighting/EPS/UPS	Lighting installation, transformer for lighting	Lighting	Source IZM
Lighting/EPS/UPS	Lights, holiday	Lighting	Source Nordman
Lighting/EPS/UPS	Low voltage landscape	Lighting	Source Nordman
Lighting/EPS/UPS	Night light, interior	Lighting	Source Nordman
Lighting/EPS/UPS	Sensor controlled lighting, Motion sensor exterior	Lighting	Source Nordman
Lighting/EPS/UPS	Sensor controlled lighting, Motion sensor interior	Lighting	Source Nordman
Lighting/EPS/UPS	Sensor controlled lighting, Photosensors, exterior	Lighting	Source Nordman

<b>Lot 6 Main Categories</b>	<b>Product Classification (Naming)</b>	<b>Categories by Nordman</b>	<b>Source (BN, ISI, IZM)</b>
Lighting/EPS/UPS	Timer, exterior	Lighting	Source Nordman
Lighting/EPS/UPS	Timer, interior	Lighting	Source Nordman
Lighting/EPS/UPS	Lighting, residential	Lighting (Traditional End Uses)	Source Nordman
Lighting/EPS/UPS	Transformer, if not covered with appliance	Power	Source IZM
Lighting/EPS/UPS	Linear external power supply, if not covered with appliance	Power	Source IZM
Lighting/EPS/UPS	Switched external power supply, if not covered with appliance	Power	Source IZM
Lighting/EPS/UPS	Power strip, Master / Slave	Power	Source IZM
Lighting/EPS/UPS	Power strip, illuminated switch	Power	Source IZM
Lighting/EPS/UPS	Surge protector	Power	Source Nordman
Lighting/EPS/UPS	Timer, general purpose	Power	Source Nordman
Lighting/EPS/UPS	Uninterruptible power supply (UPS)	Power	Source Nordman
<b>HVAC&amp;water</b>			
HVAC&water	Air cleaner, mounted	HVAC	Source Nordman
HVAC&water	Air cleaner, portable	HVAC	Source Nordman
HVAC&water	Air conditioning, evaporative cooler	HVAC	Source Nordman
HVAC&water	Ceiling fan	HVAC	Source Nordman
HVAC&water	Dehumidifier	HVAC	Source Nordman
HVAC&water	Electric Towel Heaters	HVAC	Source IZM
HVAC&water	Exhaust fan	HVAC	Source Nordman
HVAC&water	Fan, portable	HVAC	Source Nordman
HVAC&water	Fan, rangehood	HVAC	Source Nordman
HVAC&water	Fan, whole house	HVAC	Source Nordman
HVAC&water	Fan, window	HVAC	Source Nordman
HVAC&water	Furnace fans	HVAC	Source Nordman
HVAC&water	Heating, fireplace electric	HVAC	Source Nordman
HVAC&water	Humidifier	HVAC	Source Nordman
HVAC&water	Space heater, non-portable	HVAC	Source IZM
HVAC&water	Space heater, portable (electric)	HVAC	Source Nordman
HVAC&water	Space heater, portable (non-electric)	HVAC	Source Nordman
HVAC&water	Air conditioning, central	HVAC (Traditional End Uses)	Source Nordman
HVAC&water	Air conditioning, heat pump	HVAC (Traditional End Uses)	Source Nordman
HVAC&water	Air conditioning, room/wall	HVAC (Traditional End Uses)	Source Nordman
HVAC&water	Heating, boiler	HVAC (Traditional End Uses)	Source Nordman
HVAC&water	Heating, furnace baseboard, floor or wall unit	HVAC (Traditional End Uses)	Source Nordman

<b>Lot 6 Main Categories</b>	<b>Product Classification (Naming)</b>	<b>Categories by Nordman</b>	<b>Source (BN, ISI, IZM)</b>
HVAC&water	Heating, furnace central	HVAC (Traditional End Uses)	Source Nordman
HVAC&water	Heating, heat pump	HVAC (Traditional End Uses)	Source Nordman
HVAC&water	Heating, Electric Heating (convection, night storage)	HVAC (Traditional End Uses)	Source IZM
HVAC&water	Water heating, instantaneous single point of use	Water heating	Source Nordman
HVAC&water	Water heating, point of use tank	Water heating	Source Nordman
HVAC&water	Water heating, electric	Water heating (Traditional End Uses)	Source Nordman
HVAC&water	Water heating, gas	Water heating (Traditional End Uses)	Source Nordman
HVAC&water	Water heating, heat pump	Water heating (Traditional End Uses)	Source Nordman
HVAC&water	Water heating, other	Water heating (Traditional End Uses)	Source Nordman
<b>Building Infrastructure</b>			
Building Infrastructure	Breaker, AFI	Infrastructure	Source Nordman
Building Infrastructure	Breaker, GFCI	Infrastructure	Source Nordman
Building Infrastructure	Detector, carbon monoxide	Infrastructure	Source Nordman
Building Infrastructure	Detector, smoke	Infrastructure	Source Nordman
Building Infrastructure	Doorbell	Infrastructure	Source Nordman
Building Infrastructure	Fixed antenna amplifiers	Infrastructure	Source IZM
Building Infrastructure	Garage door opener	Infrastructure	Source Nordman
Building Infrastructure	GFCI outlet	Infrastructure	Source Nordman
Building Infrastructure	InterCom /Door opener	Infrastructure	Source ISI
Building Infrastructure	ISDN NTBA	Infrastructure	Source ISI
Building Infrastructure	LNB (low noise block converter)	Infrastructure	Source IZM
Building Infrastructure	Utility meter	Infrastructure	Source Nordman
Building Infrastructure	Wire losses	Infrastructure	Source Nordman
Building Infrastructure	CCTV	Security	Source IZM
Building Infrastructure	Security system	Security	Source Nordman
<b>Other</b>			
Other	Aquarium	Hobby / leisure	Source Nordman
Other	Home trainer	Hobby / leisure	Source IZM
Other	Kiln	Hobby / leisure	Source Nordman
Other	Pool	Hobby / leisure	Source Nordman
Other	Reclining chair	Hobby / leisure	Source IZM
Other	Sauna, electric	Hobby / leisure	Source Nordman
Other	Spa/hot tub	Hobby / leisure	Source Nordman
Other	Charger, hedge trimmer	Outdoor Appliances	Source Nordman
Other	Charger, weed trimmer	Outdoor Appliances	Source Nordman
Other	Coil, snow melting	Outdoor Appliances	Source Nordman
Other	Grill, outdoor	Outdoor Appliances	Source Nordman

<b>Lot 6 Main Categories</b>	<b>Product Classification (Naming)</b>	<b>Categories by Nordman</b>	<b>Source (BN, ISI, IZM)</b>
Other	Lawn mower	Outdoor Appliances	Source Nordman
Other	Timer, irrigation	Outdoor Appliances	Source Nordman
Other	Electric toys, mains connected	Toys	Source IZM
Other	Electric toys, battery operated	Toys	Source IZM
Other	Electric toys, std. rechargeable batteries	Toys	Source IZM
Other	Electric toys, special batt. pack + charger	Toys	Source IZM
Other	Electric toys, autarkic e.g. solar	Toys	Source IZM
Other	Non electric toys - e.g. gas powered	Toys	Source IZM
Other	Adding machine	Business equipment	Source Nordman
Other	Pencil sharpener	Business equipment	Source Nordman
Other	Shredder	Business equipment	Source Nordman
Other	Stapler	Business equipment	Source Nordman
Other	Typewriter	Business equipment	Source Nordman
Other	Auto engine heater	Transportation	Source Nordman
Other	Car, wheelchair or golf cart	Transportation	Source Nordman
Other	Bicycle light	utility	Source Nordman
Other	Charger, battery	utility	Source Nordman
Other	Floor polisher	utility	Source Nordman
Other	Infant monitor, receiver	utility	Source Nordman
Other	Infant monitor, transmitter	utility	Source Nordman
Other	Pet fence	utility	Source Nordman
Other	Power tool	utility	Source Nordman
Other	Power tool, cordless	utility	Source Nordman
Other	Pump, sump	utility	Source Nordman
Other	Pump, well	utility	Source Nordman
Other	Fountain, indoor	Other	Source Nordman
Other	adjustable bed	Other	Source IZM
Other	Waterbed	Other	Source Nordman

## **Australian proposal for product list**

The following list of products was published in Australia for comments in January 2007. It is an attempt to define a basket of products (divided into core basket and secondary basket) for which the standby development could be tracked more reliably over the years. It might also internationally be used to analyse country differences – if national product data is available on a comparable basis.

This would necessitate tracking market data (or household penetration rates) together with the average power consumption per product entry.

### ***Basket of Core Products (14)***

#### **Major Appliances (2)**

- clothes washers
- microwave ovens – electronic

#### **Home Entertainment Products (6)**

- televisions – CRT (conventional)
- televisions – LCD
- televisions – plasma
- portable stereos
- integrated stereos
- Digital Video Disc players (DVDs)

#### **Office Equipment (5)**

- computer monitors – CRT
- computer monitors – LCD
- computer printers – laser black and white
- computer printers – inkjet
- multi-function devices (MFDs – combination scanner, printer and fax)

#### **Other Equipment (1)**

- external power supplies (no load in addition to equipment powered)

### ***Basket of Secondary Products (another 29)***

#### **Major Appliances (6)**

- clothes dryers
- dishwashers
- clothes washer/dryer combination units
- air conditioners (any type with a single phase power plug – typically only window wall types)
- instantaneous (non storage) gas water heaters (with electronic ignition)
- microwave ovens – manual timer

#### **Home Entertainment Products (8)**

- televisions – rear projection
- set top boxes (including variations – digital/analogue tuners, hard drive)
- DVD recorders without hard drive (digital/analogue tuner)
- DVD recorders with hard drive (digital/analogue tuner)
- DVD/VCR combinations
- Video Cassette Recorders
- audio visual receivers (home theatre)
- subwoofers

#### **Office Equipment (15)**

- computers (off mode only)
- computer speakers
- computer printers – laser colour
- computer printers – inkjet

- network switches (including hubs)
- routers
- DSL or ADSL modems
- scanners
- facsimiles (fax machines)
- photocopiers – black and white (categorise by copy speed)
- photocopiers – colour (categorise by copy speed)
- telephone answering machines
- cordless phones – primary base station
- cordless phones – secondary base station
- cordless phones – with answering machine

## **Annex 1-2: International and European test standards (Task 1.2)**

This annex introduces the International and European test standards related to standby and off modes.

### **EN 62301: Household electrical appliances – Measurement of standby power**

Adapted from IEC 62301 (2005) standard of the same name, it specifies methods of measurement of electrical power consumption in standby mode. It provides general conditions for measurements (configuration of the tested equipment, environment, power supply, supply-voltage waveform, power measurement accuracy, testing instrumentation, number of tests, and time of measurement) and the test procedure.

### **EN 62018: Power consumption of information technology equipment - Measurement methods (2004)**

Adapted from IEC 62018 (2003) standard of the same name, it specifies methods of measurement of electrical power consumption in different modes during the use phase of information technology equipment (ITE). It also provides general conditions for measurement (configuration of the tested equipment, environment, power supply, supply-voltage waveform, power measurement accuracy, testing instrumentation, and time of measurement) and the test procedure.

### **EN 62087: Methods of measurement for the power consumption of audio video and related equipment (2005)**

Adapted from IEC 62087 (2002) standard of the same name, it specifies methods of measurement of electrical power consumption of audio video and related equipment. It also provides general conditions for measurement (configuration of the tested equipment, environment, power supply, supply-voltage waveform, power measurement accuracy, number of relevant digits, testing instrumentation, and time of measurement) and the test procedure.

## Annex 1-3: Other test procedures (Task 1.2)

This annex introduces the recognised test procedures which are not standards but test procedures established in the framework of an ecolabelling program or in the framework of manufacturer agreements for examples.

### Energy Star test procedures

Energy Star is a joint program introduced in 1992 by the U.S. Environmental Protection Agency and the U.S. Department of Energy. It aims at saving money and protecting the environment through energy efficient products and practices. This American Energy Star Program was then extended to other countries [Energy Star].

**Each Energy Star label provides or refers to a test procedure.** The products covered by Energy Star are classified in more than forty product families grouped in 8 main categories. Three categories representing eleven product families, dealing with standby and off-mode losses are listed below:

Most of the Energy Star labels

- give a **standby definition** related to energy consumption and functionality of products,
- give **limit values** for each product family, and
- define or refer to a test methodology for standby power consumption measurements.

Among the eleven Energy Star product families identified earlier, some refer to IEC standards:

- **IEC 62301 is used as reference** directly or indirectly (through another document, which themselves refers to IEC 62301) for all or part of the test protocol and or for all or part of the test conditions, (six product families: Battery chargers – Room air cleaners – External power supplies – Computers – Computer monitors – Imaging equipments).
- **IEC 107- 1** (IEC 107- 1:1997, “Recommended methods of measurement on receivers for television broadcast transmissions, Part 1: General considerations - Electrical measurements other than those at audio-frequencies”) **is used as reference for conditions of test of external speaker terminals**, (three product families: Consumer audio and DVD products – Cordless phones – TVs, VCRs, DCR TVs with POD slots, combination units, television monitors, and component television units).
- **IEC 555** (“Disturbances in supply systems caused by household appliances and similar electrical equipment”) **is used as reference for conditions related to testing equipment**, (three product families: Consumer audio and DVD products – Cordless phones – TVs, VCRs, DCR TVs with POD slots, combination units, television monitors, and component television units).
- **No IEC standards are used as reference** for two product families (Dishwashers – Water coolers).

In summary, IEC 62301 is used as a reference by a majority of the Energy Star test procedures for standby power consumption measurements, except the audio/video segment and cordless phones.

### ECMA test procedures: Technical report / 70: Product-related environmental declaration (2004)

This technical report of the European Computer Manufacturer Association (ECMA) specifies standby and off-mode definitions. It does not specify a test procedure but it specifies that **Energy**

**Star** programme may be used as reference **for all types of products (except TV sets** where the **IEC 62087:2002** should be used) and if suppliers do not follow the above mentioned protocols, they shall identified the applied test protocols in the designed section of the product declaration.

**FEMP: Guidelines for measurement of standby power use (in response to executive order 13221) (2002)**

The American Federal Energy Management Program (FEMP) is dedicated to help federal purchasers to identify efficient products, to provide model language for specifying efficient products in capital projects and service contracts, and to give buyers advice on everyday procurement decisions. This particular document of the FEMP specifies a standby definition and a test protocol for products non-covered by Energy Star specifications.

## **Annex 1-4: Detailed comparison of the parameters extracted from the main test standards. (Task 1.2)**

The parameters exposed in the following documents will be compared in this annex.

- EN 62301: Household electrical appliances – Measurement of standby power,
- EN 62018: Power consumption of information technology equipment - Measurement methods,
- EN 62087: Methods of measurement for the power consumption of audio video and related equipment,
- Energy Star Program Requirement (ESPR) for room air cleaners,
- ESPR for water coolers,
- ESPR for consumer audio and DVD products,
- ESPR for cordless phones,
- ESPR for TVs, VCRs, DCR TVs with POD slots, combination units, television monitors, and component television units,
- ESPR for computer monitors,
- ESPR for computers Final Draft that will be effective on 20<sup>th</sup> July 2007,
- FEMP: Guidelines for measurement of standby power use.

### ► *Configuration of the tested equipment*

After analysing the documents listed above, with the exception of standard EN 62087, the configuration of the tested equipment imposed are the same: the equipment must be in a configuration representative of its typical utilisation.

Configuration refers to which hardware / software parts and versions are tested as a unit and which settings are “configured” before the test. ESPR for computers also add some system requirements, as in the configuration of the equipment that “the unit under test must be connected to an Ethernet network switch capable of the unit under test highest and lowest network speeds.”

### ► *Environment*

#### *Ambient temperature*

After analysing these documents, it seems that  $23 \pm 4$  °C could be a good compromise. (Some of these documents also specified the case where a (range of) temperature is given by the manufacturer but do not include the temperature range specified by the test procedure.)

#### *Air speed*

For documents IEC 62301, ESPR for room air cleaners, air speed shall be  $\leq 0.5$  m/s. For document FEMP: Guidelines for measurements of standby power use, air speed shall be 0.5 m/s. For document ESPR for water coolers, air speed must be natural. For other documents air speed is not specified.

#### *Humidity*

The document ESPR for computer monitors requires a relative humidity between 30 and 80 % and the ESPR for computers requires a relative humidity from 10 to 80 %. For other documents humidity is not specified.

### *Network connection*

The ESPR for computers adds this parameter: “The network connection must be live during all tests“.

### *Time allowed to the equipment to stabilise before measurement (equilibration time)*

Most of the test procedures specify a time allowed to the equipment to stabilise before measurement, indeed in most cases the power consumption is not steady just after the equipment enter a mode (active, standby or off). The document IEC 62301 distinguishes two cases: where the value is steady (variation of less than 1 % over three minutes) or not steady. The time allocated to the equipment to stabilise should be at five minutes even for the steady case. For the non-steady case no minimum stabilizing time is given. In the ESPR document for room air cleaners, the equipment is allowed to stabilise for at least five minutes before the measurement. In ESPR documents for consumer audio and DVD products (TVs, VCRs, DCR TVs with POD slots, combination units, TV monitors, and component TV units), the measurement is performed after the unit reaches operating temperatures and the readings on the power meter stabilise (approximately 90 minutes). In ESPR document for cordless phones, the measurement is performed after the unit reaches operating temperatures and the readings on the power meter stabilise (this time may vary depending on the product). In ESPR document for computer monitors, the measurement is performed after a warm up time of at least 20 minutes. In IEC 62018, the measurement is performed for minimum one minute after the equipment enters standby mode. For IEC 62087, the measurement is performed 15 minutes after the equipment enters standby mode. In ESPR document for water coolers, FEMP guidelines, and ESPR for computers, for measurements of standby power use, no time of warm up is specified.

### *Duration of measurement*

IEC 62301 distinguishes two cases: where the power consumption value is steady or not steady. The time of measurement is not specified in the first case and in the second case it must be at least three minutes or one or more full “standby operation cycles”. In ESPR document for room air cleaners, time of measurement is at least five minutes. In IEC 62087, ESPR for consumer audio and DVD products, ESPR for cordless phones, ESPR for TVs, VCRs, DCR TVs with POD slots, combination units, TV monitors, and component TV units, and ESPR for computer monitors, time of measurement shall be sufficiently long to measure correct average value. In FEMP document (Guidelines for measurements of standby power use), time of measurement shall be not less than five minutes, as long as needed to achieve a resolution of  $\pm 0.1$  W in the calculation of average power use and is calculated as following:

Minimum duration (in minutes) = [meter resolution (Wh) / required accuracy (W)] x 60 (min/h).

In ESPR document for water coolers, the energy consumed is measured in a 24 hour period. In ESPR document for computers, the time of measurement of standby mode is a five minutes period, (during that five minutes period true power values are recorded every second in order to get an average value). In IEC 62018, no measurement time is specified.

### ► *Test instrumentation*

Depending on the standard, the characteristics of test instrumentation that are required include accuracy, resolution, crest factor rating, bandwidth, period of calibration, and line impedance.

The most complete documents regarding these aspects are ESPR documents for consumer audio and DVD products, ESPR for cordless phones, and ESPR for TVs, VCRs, DCR TVs with POD slots, combination units, TV monitors, and component TV units. However, IEC 62018 and the ESPR document for computers are easier to understand.

► ***Number of relevant digits***

In ESPR document for room air cleaners, test results must be rounded to the second decimal place. In ESPR documents for consumer audio and DVD products, ESPR for cordless phones, ESPR for TVs, VCRs, DCR TVs with POD slots, combination units, TV monitors, and component TV units, the percent of uncertainties tolerated is + 10 % / - 0%. In ESPR document for computer monitors, a steady value (variation of less than 1 % over three minutes) is required. In FEMP document, the average power consumption is rounded to the nearest 0.1 W. In IEC 62087, the number of relevant digits is related to the accuracy of the measurements. In IEC 62301, IEC 62018, and ESPR for computers and ESPR for water coolers, no number of relevant digits or percent of uncertainty is specified.

It seems that the most demanding document is the document ESPR for room air cleaners.

► ***Power supply***

Depending on the document the characteristics of power supply that are required include voltage, total harmonic distortion, and frequency.

All documents unless the ESPR for room air cleaners are really complete regarding this aspect.

► ***Number of units required for test***

Only the ESPR document for computer monitors specifies this point.

► ***Number of test per equipment***

Only IEC 62301 and FEMP Guidelines for measurements of standby power use specify this point.

## **Annex 1-5: Mandatory requirements on standby and off-modes power consumption. (Task 1.3)**

This annex describes the documents which provide mandatory standby and off mode power consumption requirements.

### **Executive order 13221: Energy efficient standby power devices (31/07/01)**

Through this document the American president ordered that **each American (executive) agency**, when it purchases commercially available, off-the-shelf products that use external standby power devices, or that contain an internal standby power function, **shall purchase products that use no more than one watt in their standby power consuming mode**. If such products are not available, agencies shall purchase products with the lowest standby power wattage. Agencies shall adhere to these requirements, when life-cycle cost-effective and practicable and where the relevant products utility and performance are not compromised as a result. By December 31, 2001, and on an annual basis thereafter, the Department of Energy, in consultation with the Department of Defense and the General Services Administration, shall compile a preliminary list of products to be subject to these requirements. The Department of Energy shall finalise the list and may remove products considered inappropriate for listing. Independent agencies are also encouraged to comply with the provisions of this order.

### **FEMP: Federal Energy Management Program [US FEMP 2]**

The “**American energy policy act**” of 2005 (P.L. 109-58) **require federal buyers to purchase Energy Star®-qualified (see Section 1.3.2.2.1) or FEMP designated products**. FEMP helps federal purchasers to identify efficient products, provides model language for specifying efficient products in capital projects and service contracts and gives buyers advice on everyday procurement decisions. FEMP publishes a series of *Purchasing Specifications for Energy-Efficient Products*.

### **New Direction for Energy Independence, National Security, and Consumer Protection Act**

In this American law (see also Section 1.3.1.1) definitions for standby, active and off mode are given [GovTrack.us 2007]:

- The term ‘active mode’ means the condition in which an energy using product is connected to a mains power source, has been activated, and provides one or more main functions.
- The term ‘off mode’ means the condition in which an energy using product is connected to a mains power source and is not providing any standby or active mode function.
- The term ‘standby mode’ means the condition in which an energy using product is connected to a mains power source and offers one or more of the following user oriented or protective functions:
  - (I) To facilitate the activation or deactivation of other functions (including active mode) by remote switch (including remote control), internal sensor, or timer.
  - (II) Continuous functions, including information or status displays (including clocks) or sensor-based functions.

### **Energy conservation Law**

This Japanese law stipulates manufacturers’ judgment standards as an **obligation** to make efforts to **reduce energy consumption in the household and private transport sectors**. To reach this aim, **the law prescribed the creation of the Top Runner Program**. This program allows reducing energy consumption in the household and private transport sectors by improving the energy efficiency in the use phase of the selected products.

The “Energy conservation law” sets three criteria for these products, which determine when policy makers should consider the application of the Top Runner Program (Article 18 of the “Energy Conservation Law”). These criteria are:

- products that are used in large quantities in Japan;
- products that consume a considerable amount of energy in the use phase;
- products, which have a high energy efficiency improvement potential.

Twenty one product groups are currently included in the Top Runner Program. These product groups include most of the electrical and electronic appliances and gasoline, diesel and LPG vehicles. **For each product group, the top runner criteria have to be respected.**

### **Act on the promotion of the purchase of Environment friendly products**

This Korean Act stipulates that from July 2005 public agencies are obligated to purchase Eco label certified products. It makes reference to Korean ecolabelling program conducted from April 1992 and described in the following section.

### **Australia standby power strategy 2002-2012 [Australian SPS]**

In August 2000, all Australian jurisdictions agreed to:

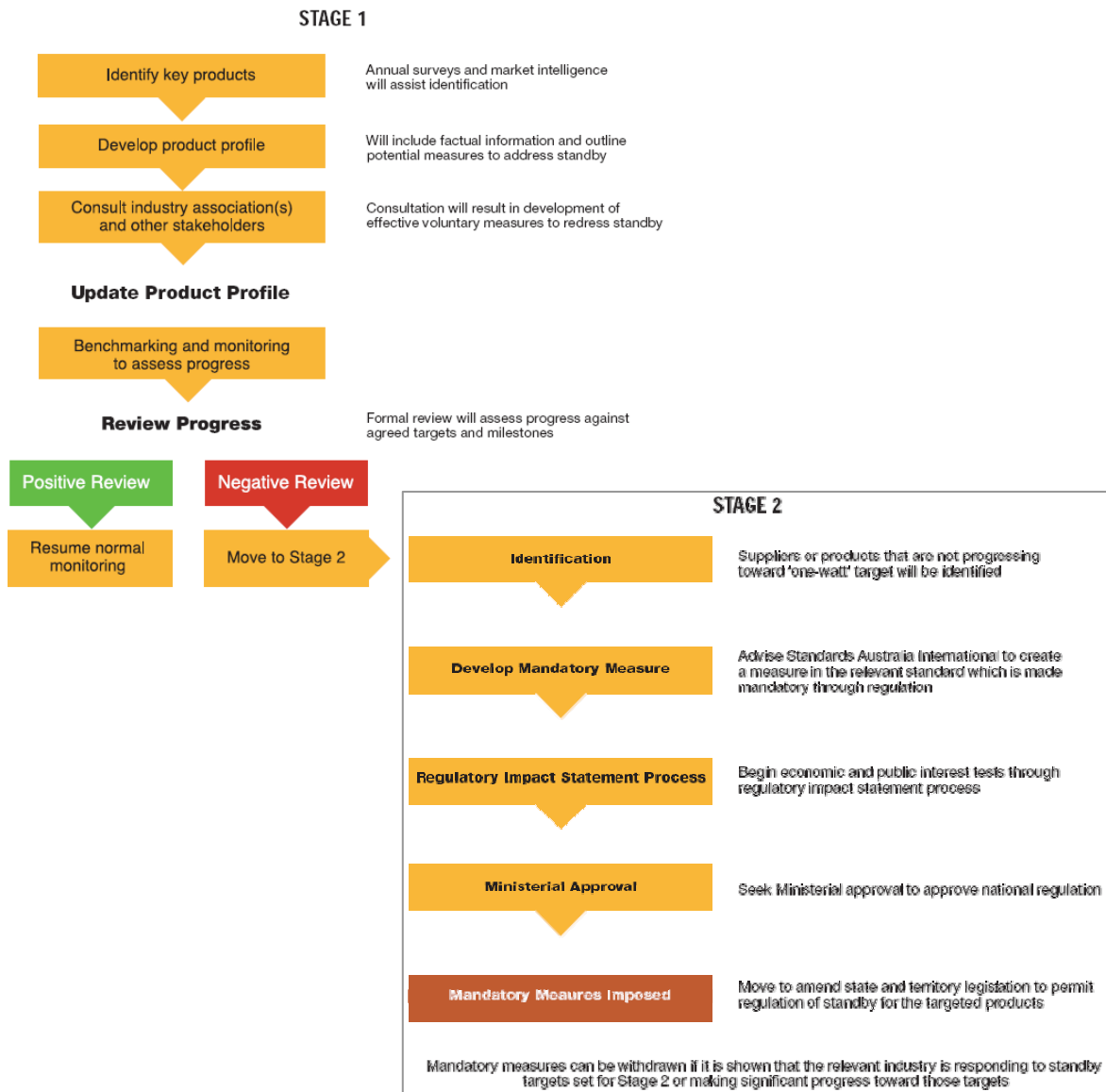
*"...pursue efficiencies in standby power consumption of energy-consuming products, through support for the International Energy Agency's One -Watt program, and endorse its incorporation into the...program of work."*

In the context of the IEA “One watt” initiative, the Equipment Energy Efficiency Committee (E<sub>3</sub> Committee), on behalf of the Australian Ministerial Council on Energy, was looking for ideas and a response to a discussion paper consultation process in 2002. In a process throughout 2002, government agencies consulted with stakeholders about ideas to reduce standby. The standby strategy is a result of that dialogue with stakeholders.

The Ministerial Council on Energy published the national Standby Power Strategy - "Money Isn't All You're Saving" in late 2002 with the aim of minimising standby power losses. The strategy contained a wide range of possible policy measures to address unnecessary standby power losses and implemented some measures for particular product types. The strategy was a world-first and set a clear plan over ten years to ensure the standby power used by target products reached acceptable levels by 2012.

Within this timeframe, specific product types may be identified as "at risk" of using excessive standby and will therefore be targeted for specific action. Each product will then be dealt with in potentially a two stage action plan designed to reduce standby to levels that are acceptable for these product groups as quickly as economically viable. (Twenty seven standby "product profiles" (e.g. bread makers, burglar alarm, photocopiers) have been developed between 2002 and 2004 for each product type or product category.)

The whole standby power strategy could be summarised by the two following graphs:



Source [Australian SPS]

So if voluntary measures related to standby losses do not give positive review, this Australian Standby Power Strategy will induce the creation of mandatory requirements related to standby power losses.

### Minimum Energy Performance Standard in Australia and New Zealand [MEPS]

The mandatory energy rating labels that indicate the efficiency of appliances and equipment have been used in Australia for nearly 20 years. In the mid 1980's it starts with labelling of domestic refrigerators. Since 1999 higher levels of energy efficiency across a range of appliances and equipment has been achieved with the use of Minimum Energy Performance Standards (MEPS). These MEPS are used in Australia and in New Zealand.

Most of the MEPS deal about energy efficiency and do not deal directly about standby and off-mode losses, except the MEPS for the electric storage water heaters and the proposed MEPS for home entertainment products.

Since 1 October 1999, every electric storage water heater manufactured in or imported into Australia or New Zealand must comply with Minimum Energy Performance Requirements. These

requirements have been reviewed in October 2005 (see the Table below entitled Requirement for electric storage water heaters).

Rated Hot Water Delivery (litres)	Maximum Allowable Standing Heat Loss (kilowatt hours/day) October 2005
<25	0.98
25	0.98
31.5	1.05
40	1.12
50	1.19
63	1.33
80	1.47
100	1.61
125	1.75
160	1.96
200	2.17
250	2.38
315	2.66
400	2.87
500	3.15
630	3.43

The standing heat loss is measured at a nominal 20°C ambient air temperature and a water storage temperature of 75°C (for most tanks), giving a ambient air/hot water temperature difference of 55K. The test measures the energy consumed over a number of complete thermostat cycles and is normalised to a heat loss per 24 hour period. No hot water is drawn off during the test (static standing heat loss test).

The National Appliance and Equipment Energy Efficiency Committee (E3 Committee) proposes to work toward **MEPS regulations on home entertainment products** commencing not earlier than during 2008 with a commitment that these requirements not become more stringent earlier than October 2012. Specific details are outlined in the Table below:

Home Entertainment Product Type	Stage 1 MEPS - $\geq$ 2008		Stage 2 MEPS - $\geq$ 2012	
	Passive standby	Off	Passive standby	Off
Without video recording capabilities	4 watts	0.3 watts	1 watt*	0.3 watts
With video recording capabilities	6 watts	0.3 watts	1 watt*	0.3 watts

\* Auto power down to passive standby after 30 minutes of no AV input or inactivity is also required

A temporary exemption process will be established for those product groups that can not meet the targets in a cost effective manner. It is anticipated that this will cover a small segment of product types as complying products already exist in most product groups.

## **Annex 1-6: Mandatory requirements on standby and off-modes losses labelling. (Task 1.3)**

This annex describes the document which provide mandatory standby and off mode losses labelling.

### **Directive 2002/40/EC**

This directive is entitled “Commission directive 2002/40/EC of 8 May 2002 implementing council directive 92/75/EEC with regard to energy labelling for household electric ovens”. **This directive indicates that the providing of information about the equipment and have to contain the declaration of the power consumption when no heating function is performed and the oven is in the lowest power consuming mode.**

## Annex 1-7: Voluntary programs related to standby and off-modes losses. (Task 1.3)

This annex describes voluntary programs which provide recommendations related to standby and off mode power consumption.

### International Energy Agency: “1-watt Plan” [IEA 2005]

In 1999, the IEA proposed that all countries harmonise energy policies to reduce standby power use to no more than one watt per device. The proposal contained 3 elements:

- Participating countries would seek to lower standby to below 1 watt in all products by 2010
- Each country would use measures and policies appropriate to its own circumstances
- All countries would adopt the same definition and test procedure

Some actions have been initiated in some specific countries, following this plan. Australia and Korea have formally adopted the one-watt plan. President Bush signed the Executive Order n°13221 (see above in the Section 1.3.1.1). Energy Star and the European Code of Conduct have established voluntary programs to promote energy-efficient power supplies (necessary to achieve standby levels of one watt or less). Other countries, notably Japan and China, have undertaken strong measures to reduce standby power use.

### European Union Stand-by Initiative [EU Stand-by Init.]

1997: As a first step the European Commission concluded a **negotiated agreement** with individual consumer electronic manufacturers and the EU trade association **EACEM to reduce the stand-by losses of TVs and VCRs.**

1999: A **Commission Communication** to the Council and the European Parliament on **Policy Instruments to Reduce Stand-by Losses of Consumer Electronic Equipment** set the political frame for further actions in this field. As a result **two Codes of Conduct, for External Power Supplies and for Digital TV Services,** were introduced. The requirements indicated in these codes of conduct are not mandatory.

2000: A **second agreement** with individual consumer electronic manufacturers and the EU trade association **EACEM** for reducing the **stand-by losses of audio equipment** was concluded. 2003: A new agreement for TVs and DVDs was concluded.

2000: Another important piece of the Commission and EU strategy is the **Energy Star Agreement for office equipment** between the EU and the USA. (see also Section 1.3.2.2.1). This agreement allows using Energy Star requirements for office equipments but these requirements are not mandatory.

2004: The **Code of Conduct on energy efficiency of external power supplies** – version 2 – was concluded the 24 November. It provides maximal no-load mode consumption as well as energy efficiency criteria for active mode, and a test method for measurements.

2005: The “**European Climate Change Program**” indicated the urgent need to take actions to reduce stand-by losses.

2006: The **Code of Conduct on energy efficiency of digital TV service systems** - version 4 - was concluded the 10th March. It provides in its annex B the maximum power consumption target and time schedule that the equipment must meet. It provides also its own standby passive mode definition as well as the standby active mode definition and the off-mode definition.

2006: The **Code of Conduct on energy consumption of broadband equipment** was concluded the 19th July 2006. It provides in its annex B the maximum power consumption target and time schedule that the equipment must meet. It provides also its own standby mode definition as well as the off-mode definition.

A **Code of Conduct on energy consumption of Uninterruptible Power Supply (UPS)** is also currently in progress.

#### **European Committee of Domestic Equipment Manufacturers: Voluntary commitment on reducing standing losses of domestic electric storage water heaters [CECED]**

This voluntary commitment on reducing standing losses of domestic Electric Storage Water Heaters (ESWH) was developed by the European Committee of Domestic Equipment Manufacturers (CECED). This final version was agreed on 19th November 1999 and was valid only until 31st December 2003, but no new version is available. This document presents the market, the market coverage (by manufacturers). It provides also maximum allowable standing loss values that should not be exceeded by the appliances sold by the manufacturers from the first January 2001. It explains the monitoring system, as well as the reporting system and the verification step. For the verification step, it refers to HD500/S1 also known as IEC 379 untitled "method for measuring the performance of ESWH for household purposes". The purpose of this standard IEC 379 is to define the principal performance characteristics of ESWH and to describe the standard methods for measuring these characteristics (including energy performance characteristics).

#### **E-Standby Program [e-Standby Program]**

The e-Standby Program has been implemented by Ministry of Commerce, Industry and Energy (MOCIE) and Korea Energy Management Corporation (KEMCO) in Korea since April 1, 1999. It is based on the Article 13 of "Rational Energy Utilization Act". **The purpose of the program is to save standby power systematically by encouraging the manufacturers to produce and sell the energy-saving products that meet the energy- saving standards suggested voluntarily by MOCIE and KEMCO. It is a voluntary agreement program.** 18 items (Computers, Monitors, Printers, Fax Machines, Copiers, Scanners, Multifunction Devices, Energy-Saving & Controlling Devices, External Power Supply, Televisions, VCRs, Home Audio Products, DVD Products, Microwaves, Battery Chargers, Set-top-boxes, Intercom, Cordless Phones) are subject to this program.

#### **Australia [Australia AGO]**

The 1998 National Greenhouse Strategy sets out Governments policy objectives in this area in the following terms:

*"Improvements in the energy efficiency of domestic appliances and commercial and industrial equipment will be promoted by extending and enhancing the effectiveness of existing labelling and minimum energy performance standards".*

The Australian Greenhouse Office (AGO), within the Department of the Environment and Heritage, has given effect to this vision by adopting in particular the following strategy:

Voluntary programs: The AGO works in partnership with stakeholder groups to introduce programs that encourage market transformation by promoting highly efficient equipment or by identifying selected energy efficient products through appliance labelling. The AGO is currently working with its stakeholders to reduce **standby power losses**. An Energy Star agreement has been concluded between USA and Australia in 1996 (also see Section 1.3.2.1). This agreement allows using Energy Star requirements for office equipments and consumer electronics but these requirements are not mandatory.

In the framework of the Australian Standby Power Strategy, there will be also voluntary measures related to standby mode, see Section 1.3.1.1.

**IEC 62075 at CDV stage**

This standard (at the Committee Draft for Voting stage) applies to all “Audio/Video, Information and communication technology Equipment” marketed as final products. It specifies requirements and recommendations for the design of environmentally sound products regarding: life cycle thinking aspects, material efficiency, energy efficiency, consumables and batteries, chemical and noise emissions, extension of product lifetime, end of life, hazardous substances / preparations, product packaging and documentation. It does not provide any standby mode definition and it also does not provide limit values for standby or off-mode losses. It provides only general requirements on energy efficiency as well as off-modes and no load mode definitions. For off-mode it provides the following recommendations to the designer: consider design options to automatically switch from power save mode to an off-mode where practical, consider design options to reduce the power consumption in the soft off-modes to lowest values (zero watt if feasible), and consider a main power switch. If applicable, the main power switch should be placed on the product such that the user can easily reach and use it, inform the user through documentation or other means if zero watt in the state a user would consider hard off is not achievable. For the no load mode this standard specifies: “The designer shall consider design options that reduce power consumption of no load mode to the lowest value.”

## **Annex 1-8: Ecolabel and ecolabelling program related to standby and off-modes losses. (Task 1.3)**

This annex describes the ecolabels and ecolabelling programs which provide recommendations related to standby and off mode losses.

### **European Eco-label [EU Eco-label]**

A European Eco-label award scheme has been in operation since 1993, when the first product groups were established. Ecological criteria for a product group are normally established for a period of three years. Products covered by European Eco-label are classified in seven main categories.

Only two European Eco-labels deal with standby power consumption requirements. The Eco-label for computer and computer monitors refers to Energy Star for standby test procedure and requirements; and gives also additional requirements. And the Eco-label for TV provide its own requirements and refer for the test procedure to EN 50301 ("method of measurement on receivers for TV broadcast transmission").

### **GEEA: Group for Energy Efficiency Appliances [GEEA]**

This group of organizations aims at harmonizing the ongoing and/or planned voluntary informative activities in the field of home electronics and office equipment. Members are the Swiss federal office of energy (SFOE), the Danish energy authority (DEA), the Swedish national energy administration (STEM), the Austrian energy agency (E.V.A.), the German energy agency (DENA), the Netherlands agency for energy and the environment (Senter NOVEM), and the French agency for energy and the environment (ADEME).

Among the sixteen GEEA Ecolabels:

- seven do not refer to Energy Star Requirements,
- three refer for part of the definition of the modes and part of the test procedure to Energy Star,
- five refers for definition of modes and test procedure to Energy Star,
- four refer for test procedure and modes definitions to IEC 62087,
- and one completely refers to Energy Star for definition test procedure and criteria.

### **Nordic Swan [NSwan]**

The Swan is the official Nordic ecolabel, introduced by the Nordic council of ministers (Denmark, Finland, Iceland, Norway, and Sweden) in 1989. This label is available for around sixty product groups, from washing-up liquid to furniture. This label is usually valid for three years, then the criteria are revised and the company must reapply for a license.

Among the three Nordic Swan labels, which deal with standby power consumption requirements or with energy efficiency requirements:

- One refers to GEEA test methodology and modes definitions (the Nordic Swan for audiovisual equipment),
- One refers is harmonised with the Blue Angel but is going to be harmonised with Energy Star (the Nordic Swan for copying machines)
- And one refers to Energy Star (the Nordic Swan for personal computers).

### **Energy Star label [Energy Star]**

Energy Star is a joint program introduced in 1992 by the U.S. Environmental Protection Agency and the U.S. Department of Energy. It aims at saving money and protecting the environment through energy efficient products and practices. This American Energy Star Program was then extent to others countries [Hershberg]:

- 1995: Japan (only for office equipment),
- 1996: Australia (only for office equipment and consumer electronics),
- 1997: New Zealand (office equipment considering consumer electronics and other products),
- 1999: Taiwan (only for office equipment),
- 2000: European Union (only for office equipment),
- 2001: Canada (most products).

Energy Star labels have been created through this program. Products in more than 40 categories are eligible for the Energy Star. This label deals only with energy saving aspects. The Energy Star requirements, today, are not severe. Most of the equipments meet the Energy Star requirements. **Today Energy Star requirement for computer but also for room air cleaner, for dishwasher, for telephony, and for TV VCR are under revision. The goal of these revisions is to have around 25 % of product per product category that comply at the moment of specification.** EPA is considering new performance requirements for laptops, workstations, desktop computers, integrated computers, and desktop-derived servers under the new specification.

And since 2005, the “American energy policy act” requires federal buyers to purchase Energy Star®-qualified (or FEMP designated (see Section 1.3.1.1)) products.

### **Environmental Choice Program [Environmental Choice]**

ECP was created as a voluntary ecolabelling program by Environment Canada (the environment department of the Government of Canada) in 1988. In 1995, TerraChoice Environmental Services Inc., a Canadian private sector company, assumed management of the ecolabelling program, though Environment Canada still retains ownership. ECP has generated more than 40 certification criteria documents (40 environmental choice ecolabels) for products like food container, household products or electricity generators.

Among the four Environmental Choice ecolabels, which deal with standby power consumption requirements, two refer to Energy Star only for test procedure, one provides its own requirements but recognise Energy Star requirements as equivalent, and the last refers to current Energy Star requirements and test procedure.

### **Japanese Eco Mark [Japanese Ecomark]**

In 1989, the Japanese Environment Association (JEA) developed “The Eco Mark”, ecolabel in cooperation with the Environment Ministry and a Japanese environmental association. The implementation and management of this ecolabel is in the hands of a Japanese environmental association.

The three Eco Marks, which deal with standby, power consumption requirements or with energy efficiency requirements (Eco mark for copiers, for personal computer and personal computer monitors, and for printers) refer for all or part of the requirements to Energy Star requirements and for test procedures to Energy Star procedures.

**Korean Eco-Mark [Korean Ecomark]**

Korea ecolabelling program has been conducted from April 1992. It is certification program executed by the ministry of Environment, in line with Article 20 of the “Act on Environmental Technology Development and Support”. Within this framework, the Korean label ecomark was launched the 1<sup>st</sup> June 1992 by the Korean ministry of the environment. The Korean Eco-Mark is administered by the Korean ministry of environment.

Among the seven Eco-Mark labels, which deal with standby power consumption, five considered that the current Energy Star requirements are equivalent the requirements of the Eco Mark. Two others provide their own requirements and test methodologies.

And from July 2005, in Korea, public agencies are obligated to purchase Eco-Mark certified products in accordance with the Korean Act (see Section 1.3.1.1).

**Australian Ecolabel [Ecolabel Australia]**

Australia developed the “Environmental Choice” ecolabel in 1991. In 2001, it launched a new attempt to label environmentally preferable products, this time with the “Environmental Choice Australia” ecolabel. The Australian Ecolabel Program has been developed for general compliance to ISO 14024 and is managed by a not-for-profit organization. Certification criteria exist for 20 product groups.

Among the four Australian ecolabels, which deal with standby power consumption requirements or with energy efficiency requirements, one does not refer to Energy Star requirements (Australian ecolabel for computer), one only refers to Energy Star for standby test procedure (Australian ecolabel for printers faxes and multifunctional devices), and two refer to Energy Star test procedure and requirements (Australian ecolabel for photocopiers, for TV and video media player).

**TCO [TCO]**

TCO is Swedish office equipment Eco label. It covered products like computers mobile phones, and office furniture. A private company supports it: TCO Development. This label is Swedish but it is valid globally over the world.

Among the four TCO labels, which deal with standby power consumption requirements or with energy efficiency requirements, two refer to Energy Star for criteria, definitions of modes, and test procedure, and one refers to Energy Star and Suisse Energy 2000 for criteria, definitions of modes, and test procedure.

**Blue Angel [Blue Angel]**

The Blue Angel is the German ecolabel. It was created in 1977 on the initiative of the Federal Minister of the Interior and approved by the Ministers of the Environment of the national government and the federal states. Today the Blue Angel is divided into eleven categories covering altogether more than 80 product groups. The Blue Angel applies to product groups such as office products, computers, wood, furniture or solar technology for example. The Federal Ministry of the Environment, Nature Protection and Nuclear Safety owns the label, but the criteria are specified jointly by the Federal Office for Environment Protection and the German Institute for quality assurance and marking (RAL). The RAL institute verifies and assigns the label-licenses for the manufacturers, which have to be renewed every three years.

Due to the longer history of the development and the stronger consideration of additional aspects within the label, which are not classical environmental protection, a summary of the goals and criteria of the Blue Angel is not as clear-cut as for other environmental labels.

The central aim of the Blue Angel is to facilitate the purchase decision for pollution free and efficient products.

## **Annex 1-9: Legislation, voluntary program and ecolabel having an indirect impact on standby and off mode losses reduction (Task 1.3)**

This annex provides examples of these legislations, voluntary programs or ecolabels, which contribute through energy efficiency or energy consumption requirements in reducing standby and off-mode losses.

For example, the **European directives requiring indicating on a label the energy efficiency or the energy consumption of the appliances**, contribute indirectly in reducing standby and off-mode losses. There are quoted below:

- Commission Directive 2002/31/EC of 22 March 2002 implementing Council Directive 92/75/EEC with regard to energy labelling of household air-conditioners,
- Commission Directive 97/17/EC of 16 April 1997 implementing Council Directive 92/75/EEC with regard to energy labelling of household dishwashers and amended by Commission Directive 1999/9/EC of 26 February 1999,
- Council Directive 92/75/EEC of 22 September 1992 on the indication by labelling and standard product information of the consumption of energy and other resources by household appliances,
- Commission Directive 2003/66/EC of 3 July 2003 amending Directive 94/2/EC implementing Council Directive 92/75/EEC with regard to energy labelling of household electric refrigerators, freezers and their combinations,
- Commission Directive 98/11/EC of 27 January 1998 implementing Council Directive 92/75/EEC with regard to energy labelling of household lamps,
- Commission Directive 95/13/EC of 23 May 1995 implementing Council Directive 92/75/EEC with regard to energy labelling of household electric tumble driers,
- Commission Directive 96/60/EC of 19 September 1996 implementing Council Directive 92/75/EEC with regard to energy labelling of household combined washer-driers,
- Commission Directive 95/12/EC of 23 May 1995 implementing Council Directive 92/75/EEC with regard to energy labelling of household washing machines and amended by Commission Directive 96/89/EC of 17 December 1996.

Another example are the **requirements applicable to External Power Supplies (EPS) and linked to Energy efficiency or energy consumption** that contribute indirectly in reducing standby and off-mode losses of equipments connected to EPS (as for example laptop computers). Below are quoted some of the documents pertaining EPS and providing energy efficiency or energy consumption requirements but not quoting directly standby or off-mode losses: (The list is not exhaustive and the purpose of these documents is not developed above, because this is already the object of the Lot 7 titled “battery chargers and external power supplies”.)

### **► California Standards for External Power Supplies**

On December 15, 2004, the California Energy Commission (CEC) adopted new mandatory efficiency requirements for external power supplies sold in California. To determine the energy efficiency of external power supplies, these requirements are based on the Energy Star test method for calculating the energy efficiency of single voltage external ac/dc and ac/ac power supplies. These standards also require the international energy efficiency marking on the external power supplies.

► ***Australia and New Zealand: MEPS (Minimum Energy Performance Standards) for External Power Supplies***

Based on the Minimum Energy Performance Standards (AS/NZS 4665-2 (2005)), from 1st October 2007 most EPS manufactured or imported for sale in Australia or New Zealand will be required to meet the specified requirements, which are technically identical to the Energy Star criteria. In addition to these mandatory requirements, the standards define voluntary requirements for high efficient products; they are identical to the phase 2 requirements of the Californian energy commission standards previously quoted.

Australian and New Zealand governments also strongly encourage manufacturers and suppliers to mark products in accordance with the International Marking Protocol, (which requires energy efficiency marking), however this is not yet mandatory.

► ***Code of conduct for External Power Supplies***

Prepared by the European Commission in consultation with the stakeholders, the Code of Conduct concerns single voltage external ac-dc and ac-ac power supplies for electronic and electrical appliances. The Code of Conduct aims at minimizing energy consumption of EPS both under no-load and load conditions. It provides per range of rated output power a maximal no load power consumption. It provides also minimum efficiency criteria for active mode, as well as information about the monitoring system, and measurement method based on the Energy star test method.

**Other miscellaneous examples of legislations voluntary programs or ecolabels not directly quoting the standby and off-modes losses but providing incentive measures on energy efficiency or on energy consumption and having an impact on the standby and off-modes losses.**

► ***European Committee of Manufacturers of Domestic Equipments (CECED) voluntary commitments***

This committee has been actively working in the pursuit of energy efficiency and the promotion of a rational use of energy at all levels. In this framework, it created several voluntary commitments on reducing energy consumption of household appliances. None of them directly use the term “standby mode” or “off-mode”. These voluntary commitments are quoted below:

- Second voluntary commitment on reducing energy consumption of domestic washing machines (2002 – 2008)
- Voluntary commitment on reducing energy consumption of household dishwashers (1999 – 2004) (No new version is available)

► ***Integrated product policy***

The European Integrated Product Policy (IPP) seeks to minimise the environmental impact of the product by looking at all phases of a products' life-cycle -from extraction of natural resources until their disposal as waste - and taking action where it is most effective. This concern so many different products and actors, there can not be one simple policy measure for everything. Instead there is a whole variety of tools - both voluntary and mandatory - that can be used to achieve this objective. These include measures such as economic instruments, substance bans, voluntary agreements, environmental labelling and product design guidelines. This policy is in progress, it is probable that some of the measures used to achieve these policy objectives will deal about energy efficiency or energy consumption and maybe about standby and off-mode losses.

► ***Energy conservation law of China***

This law has been formulated the first November 1997 with a view to facilitating energy savings throughout society, improving efficiency and economic benefits of energy use, protecting the environment, guaranteeing national economic and social development and meeting the needs of people's livelihood. This law does not deal directly about standby and off-mode losses but in the long term, it may have a positive impact on energy consumption and energy efficiency and thus it may also reduce standby and off-mode losses.

► ***China Energy Conservation Project***

CECP is a program aimed at saving energy (so indirectly aimed at reducing standby and off-mode losses) and reducing emissions by stimulating manufacturers to produce more efficient products and helping consumers to make more sustainable purchase decisions. It was initiated in 1998. Specifications for products are under development. Currently the program is voluntary, but the Chinese government will consider imposing mandatory standards if compliance is low.

## Annex 2-1 (2-1 to 2-6 Tables for Task 2)

**Annex 2-1: Population and number of households per EU-25 countries for 2004 and household size**

<b>Data for 2004</b>	<b>Population (in 1000)</b>	<b>Households (in 1000)</b>	<b>Household size</b>
AT	8114	3339	2.4
BE	10396	4402	2.4
CY	730	223	3.3
CZ	10211	4216	2.4
DE	82532	39200	2.1
DK	5398	2498	2.2
EE	1351	485	2.8
EL	11041	3664	3.0
ES	42345	14831	2.9
FI	5220	2386	2.2
FR	59901	25439	2.4
HU	10117	3863	2.6
IE	4028	1288	3.1
IT	57888	22811	2.5
LT	3446	1357	2.5
LU	452	172	2.6
LV	2319	526	4.4
MT	400	128	3.1
NL	16258	7052	2.3
PL	38191	13855	2.8
PT	10475	3505	3.0
SE	8976	4449	2.0
SL	1996	685	2.9
SK	5380	1900	2.8
UK	59652	25479	2.3
EU-15	382676	160515	2.38*
NMS	74141	27238	2.73*
EU-25	456817	187753	2.43*
Source: [Europop]			
*at EU-15, NMS and EU-25 level, the household size is the weighted average household size.			

**Annex 2-2: Population and derived number of households per EU-25 countries for 2000 to 2005**

<b>Country</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>
BE	10239.1	10263.4	10309.7	10355.8	10396.4	10445.9
CZ	10278.1	10266.5	10206.4	10203.3	10211.5	10220.6
DK	5330	5349.2	5368.4	5383.5	5397.6	5411.4
DE	82163.5	82259.5	82440.3	82536.7	82531.7	82500.8
EE	1372.1	1367.0	1361.2	1356.0	1351.1	1347.0
EL	10903.8	10931.2	10968.7	11006.4	11040.7	11075.7
ES	40049.7	40476.7	40964.2	41663.7	42345.3	43038.0
FR	60481.6	60853.1	61235.9	61615.3	61984.0	62370.8
IE	3777.8	3833.0	3899.9	3963.7	4027.7	4109.2
IT	56929.5	56967.7	56993.7	57321.1	57888.2	58462.4
CY	690.5	697.5	705.5	715.1	730.4	749.2
LV	2381.7	2364.3	2345.8	2331.5	2319.2	2306.4
LT	3512.1	3487.0	3475.6	3462.6	3445.9	3425.3
LU	433.6	439.0	444.1	448.3	451.6	455.0
HU	10221.6	10200.3	10174.9	10142.4	10116.7	10097.5
MT	380.2	391.4	394.6	397.3	399.9	402.7
NL	15864	15987.1	16105.3	16192.6	16258.0	16305.5
AT	8002.2	8020.9	8065.1	8102.2	8140.1	8206.5
PL	38653.6	38254.0	38242.2	38218.5	38190.6	38173.8
PT	10195	10256.7	10329.3	10407.5	10474.7	10529.3
SI	1987.8	1990.1	1994.0	1995.0	1996.4	1997.6
SK	5398.7	5378.8	5379.0	5379.2	5380.1	5384.8
FI	5171.3	5181.1	5194.9	5206.3	5219.7	5236.6
SE	8861.4	8882.8	8909.1	8940.8	8975.7	9011.4
UK	58785.2	58999.8	59217.6	59437.7	59699.8	60034.5
EU-15	377187.1	378701.2	380446.2	382581.6	384831.2	387193.0
NMS	74877	74396.9	74279.2	74200.9	74141.8	74104.9
<b>EU-25</b>	<b>452064.1</b>	<b>453098.1</b>	<b>454725.4</b>	<b>456782.5</b>	<b>458973.0</b>	<b>461297.9</b>
<b>EU-25 households = EU-25 population/2.4</b>	<b>188360.0</b>	<b>188790.9</b>	<b>189469.1</b>	<b>190326.2</b>	<b>191238.7</b>	<b>192207.6</b>

**Annex Tables 2-3 to 2-6 on halogen lighting****Annex 2-3: Share of halogen light bulbs in households (% of light bulbs)**

	Denmark	Greece	Portugal	Italy
Kitchen	30	7.5	0	0
Bedroom	17.5	2.5	8.89	2.5
Living/dining room	20	5	5.56	12.5
Bathroom	32.5	5	10	0
Outside/garage	5	0	0	0
Entrance/hall	25	8.75	6.67	2.5
Annexes	5	0	0	0
Office	15	2.5	15.56	5

**Annex 2-4: Number of halogen light bulbs per room and per household**

	Denmark	Greece	Portugal	Italy
Kitchen	5.88	1.63	1.50	3.00
Bedroom	4.25	2.63	2.25	4.25
Living/dining room	4.00	6.13	5.50	5.50
Bathroom	3.13	2.63	2.25	2.50
Outside/garage	3.13	0.00	0.88	1.25
Entrance/hall	2.75	4.75	1.25	3.88
Annexes	2.25	2.75	1.00	2.75
Office	2.25	2.13	1.38	1.75
<b>TOTAL</b>	<b>27.64</b>	<b>22.65</b>	<b>16.01</b>	<b>24.88</b>

**Annex 2-5: Average number of light bulbs per lamp and per room in households**

	Denmark	Greece	Portugal	Italy
Kitchen	2.47	1.30	1.50	1.14
Bedroom	1.26	1.17	1.29	1.21
Living/dining room	1.6	2.04	2.20	1.83
Bathroom	2.5	1.31	1.50	1.25
Outside/garage	2.78	0.00	1.00	1.11
Entrance/hall	1.69	2.00	1.25	1.48
Annexes	1.8	1.38	1.00	2.20
Office	1.29	1.70	1.22	1.27

**Annex 2-6: Share of halogen light bulbs per wattage in households (in % of existing halogen bulbs)**

	<b>Denmark</b>	<b>Greece</b>	<b>Portugal</b>	<b>Italy</b>
<15 W	17.65	0.00	0.00	0.00
<25 W	58.82	9.50	18.46	0.00
<35 W	7.06	3.00	13.85	0.00
< 45W	8.82	16.50	4.62	0.00
<55W	2.35	23.00	26.92	0.00
<255W	4.71	13.00	36.15	28.75
<355W	0.59	19.50	0.00	58.75
<550 W	0	16.50	0.00	12.50
<b>TOTAL low voltage (&lt; 55W)</b>	<b>94.7</b>	<b>52</b>	<b>63.85</b>	<b>0.00</b>

## Annex 3-1 (3-1 to 3-5 Using times of devices not covered by the product cases)

### Annex 3-1. PUC 1 devices

On/ Off Products (PUC 1)			
Category	Device	Active /On time [h/d]	Off time [h/d]
Small household appliances	Hot plate	0.20	23.80
	Kettle	0.20	23.80
	Epilator	0.00	24.00
	Shaver	0.05	23.95
	Hair dryer	0.05	23.95
Others	Power tool	0.01	23.99
	Electric toys	0.10	23.90

### Annex 3-2. PUC 2 households

On/ Standby products in households (PUC 2)					
Category	Devices	Standby time [h/d]	Off-mode (losses) [h/d]	Off-mode time [h/d]	On-mode time" [h/d]
ICT & AV	Speakers, powered	2.4	14.6	6.4	0.5
	Subwoofer	16.1	3.2	0.0	4.7
	Stereo, portable	9.4	9.4	4.7	0.6
	Phone, Comfort Phone	23.6	0.0	0.0	0.4

### Annex 3-3. PUC 2 office

On/ standby products in offices (PUC 2)					
Category	Devices	Standby time [h/d]	Off-mode losses [h/d]	Off-mode time [h/d]	On-mode time [h/d]
ICT & AV	Phone, Comfort phone	23.1	0.0	0.0	0.9
	Answering machine	23.9	0.0	0.0	0.1

**Annex 3-4. PUC 3 households**

<b>Job based products in households (PUC 3)</b>					
<b>Category</b>	<b>Devices</b>	<b>Standby time [h/d]</b>	<b>Off-mode losses [h/d]</b>	<b>Off-mode time [h/d]</b>	<b>On-mode time [h/d]</b>
ICT & AV	Scanner	16.2	1.4	6.4	0.1
	Copiers	0.1	12.0	12.0	0.1
	VCR	15.2	3.8	3.8	1.3
	DVD, recorder	15.2	0.0	7.6	1.3
	HD-Recorder	15.2	0.0	7.6	1.3
	Amplifier, CD Player etc.	10.3	3.4	6.8	3.4
	Game console (net)	0.0	7.1	16.6	0.3
	Answering machine	23.9	0.0	0.0	0.1
Large household appliances	Dishwasher	2.4	20.8	0.0	0.7
	Washing machine and dryer combination	3.0	19.5	0.0	1.5
	Clothes dryer	3.0	20.6	0.0	0.4
Small household appliances	Coffee maker	0.3	23.6	0.0	0.1
	Espresso maker	3.0	21.0	0.0	0.0
	Microwave	23.8	0.0	0.0	0.2
	Toaster	0.1	23.9	0.0	0.0
Others	Charger, battery	0.5	23.5	0.0	0.0
	Projector, video	12.1	3.6	3.6	4.7
	Charger	0.1	2.4	21.5	0.0

**Annex 3-5. PUC 3 office**

<b>Job-based products in offices</b>					
<b>Category</b>	<b>Devices</b>	<b>Standby time [h/d]</b>	<b>Off-mode losses [h/d]</b>	<b>Off-mode time [h/d]</b>	<b>On-mode time [h/d]</b>
ICT & AV	Scanner (flatbed, handheld)	15.8	3.6	4.4	0.3
	Copiers	5.7	14.1	3.5	0.6
	Projector, video	4.7	4.7	14.1	0.5
Others	Shredder	0.1	23.9	0.0	0.0
	Charger (still camera, video camera)	0.3	6.2	17.3	0.2