

## Standby and off-mode: Recommendations for policy design

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### 1. Summary

Thanks to a 2008 decision under the EU Ecodesign Directive, the energy losses in passive standby and off modes of a broad range of products have been substantially reduced in the recent years. This is a positive progress, yet the fight against such energy waste is far from being over.

On the one hand, there is an opportunity to further reduce the consumption in passive standby and off modes through new minimum requirements. The technology is available for this, and the additional savings can still be significant.

On the other hand, the EU policy is jeopardised by the booming of standby modes not covered by the 2008 regulation, that is 'active' or 'networked' standby modes. These sleep modes that maintain connectivity to a data network are mushrooming both on computing and electronic products, as well as on a growing number of more traditional appliances. It is necessary to improve their design quickly through a similarly simple and horizontal regulation targeting networked standby modes.

**The decision of the EU to revise the 2008 standby regulation in order to cover networked standby is the chance to implement the improvements suggested in this paper.**

### 2. Background

The European Union has decided in 2008 to limit the standby and off-mode energy consumption of a broad range of products and equipment. This decision followed the famous '1 Watt' call from the International Energy Agency in the 2000's. According to EU Regulation 1275/2008/EC, household appliances, household IT equipment, consumer electronics, electric toys, leisure and sports equipment have to fulfil the following requirements:

	Since January 2010	From January 2013
Maximum power consumption in off mode	1 Watt	0.5 Watt
Maximum power consumption in a passive standby mode without information display	1 Watt	0.5 Watt
Maximum power consumption in a passive standby mode with information or status display	2 Watt	1 Watt

*(Note: a simple green or red light is not considered to be an information or status display)*

The regulation also imposes that products are shipped with an auto-power down feature sending them automatically into passive standby or off mode when they are not providing their main function (unless inappropriate for the intended use).

This regulation is one of the success stories of the EU Ecodesign policy. It is simple and straightforward, applying evenly without complicated exemptions or sub-categories. It has had a clear impact on the market, forcing manufacturers to pay more attention to standby losses and putting an end to sometimes shocking standby power levels of 20 W or more. The expected savings from this measure are 35 TWh/year by 2020 (nearly as much as the residential electricity consumption of Sweden).

As regards the level of compliance, the few studies available suggest that a significant proportion of products on the market may still be non-compliant (around 30%). However, these studies were performed too close to the entry into force of the requirements. It is likely that the rate of

compliance has now improved. As highlighted in an evaluation study on the Ecodesign Directive completed in 2012: *'an increased impact of the Directive (...) can be expected for the coming period.'*

The EU is now facing two main challenges:

- Bringing the power consumption of passive standby and off modes further down.
- Regulating the standby consumption of products that need to maintain a constant connection to a data network (so-called 'networked products' and 'networked standby'). Such products are currently excluded, because they usually either never go into standby or require more energy to keep a network connection (to internet, bluetooth, a home network, etc.). Networked products are rapidly expanding with the widespread use of wi-fi and cloud computing and represent a major threat to energy savings.

The EU has started discussions on networked standby and is expected to adopt some provisions for these modes in March 2013 through a revision of Regulation 1275/2008/EC.

### 3. Best available Technologies

The measurement of the passive standby and off mode consumption of electricity-using products is well standardised and easily available, especially since the EU Ecodesign regulation makes it binding to indicate such values in the technical documentation.

Several selections of the best products presented on Topten Europe ([www.topten.eu](http://www.topten.eu)) mention the passive and/or off mode consumption. As of September 2012, here is an overview of the levels found on Topten Europe products:

Product group	TVs	Monitors	DVD players*	Washing machines	coffee machines	inkjet printers	laser printers	luminaires
<i>Number of products in Topten sample</i>	118	48	11	24	24	19	37	61
Average off-mode power (W)		0.34		0.25		0.36	0.34	
Best performer off-mode (W)		0.1		0.05		0.2	0.1	
Average passive standby (W)	0.24	0.41	0.51	1.3	0.43			0.47
Best performer passive standby (W)	0.1	0.1	0.2	0.75	0.15			0.2
<i>% of products with a hard-off switch or quasi-0 W mode</i>	3%	15%		29%	24%		38%	43%

(\* Data for DVD Players are extracted from Topten Switzerland and not Topten Europe)

These figures are not representative of the entire market but give a good indication of what manufacturers are able to do. It appears that off and passive standby modes can technically go below 0.3 W. This is probably true for a wide range of products.

Concerning networked standby modes, a first problem stems from products that actually never go into standby because of their network connection. It can be due to inadequate design or improper data protocols, leading to huge energy losses because the products always stay in on-mode. As an illustration, the Topten Europe team identified in its own office a multifunctional printer that used to consume as much as 56 Watt 24/7 because of an improper protocol preventing the product to enter

into sleep mode! Here, the obvious good practice is to design auto-power down features that can work with all data protocols and do not prevent inadvertently the switch to standby.

As regards the levels of energy consumption of networked standby modes, it is not yet mandatory in the EU to declare them according to harmonised methods, so comparable data is difficult to find. On Topten Europe selections, figures collected for the sleep modes of printers as of September 2012 are:

Product group	inkjet printers	laser printers
Number of products in Topten sample	19	103
Average sleep mode power (W)	1.17	3.84
Best performer sleep mode (W)	0.7	0.8

*Note: the characteristics of the reactivation options available in these standby modes is not known (e.g. it can be reactivation from a computer but not necessarily from an internet connexion)*

More specific data on best performers in networked standby can be extracted from the 2011 EU Ecodesign preparatory study on networked standby (Lot 26). Examples of best available technologies are provided for a range of product categories:

Product group	Desktop PC	Laptop	Internet gateway	Set top box	Smart phones
Best performer for network standby requiring low network reactivity (W)	< 1.5	< 1	< 2	< 2.5	
Best performer for network standby requiring high network reactivity - very fast reactivation time (W)			6.3	3.2	< 1

The most advanced efficient networked standby modes can be found in the notebook and mobile phone technologies. They show how network connectivity and reactivity can be maintained at a very low power cost. Data presented at a workshop organised by the IEA in May 2012 mentioned networked standby power levels as low as 0.03 W for the iPhone 4 and 0.3 W for some notebooks.

Very important variations in energy consumption in networked standby modes can be observed across product categories and brands, for functions that can be quite similar. This highlights the savings potential and also the need for regulation. As an example, a recent testing campaign from Topten Switzerland on set top boxes has shown networked standby modes varying from 0.5 W up to 16.2 W.

#### 4. Market situation in Europe

Market evolution regarding standby and off mode energy consumption is essentially driven by regulation. Low standby consumption has never been a driver for differentiation on the market. The standby consumption is usually not indicated on the product advertising material nor on the Energy Labelling. (The only exception is in the recently introduced EU Energy Label for TVs, which highlights through a pictogram whether the product includes a hard-off switch or very low standby mode; however impact on consumers of this provision is not yet known). For consumers, the standby consumption is not a criteria for purchasing products. Awareness raising towards consumers has rather been focused on using 'standby-killers' at home.

The growing success of mobile and portable products has forced manufacturers to find technological solutions for limiting the energy consumption of these products in all modes due to the limitation of batteries. However, the deployment of these technologies to non-portable products has not naturally happened, hence the need for regulation.

Actually, a counter-productive trend is the belief that consumers always want shorter and shorter reactivation times to have all their products immediately ready for use. This drives some manufacturers to induce higher energy consumptions by providing 'quick-start' features or very fast reactivation from standby, requiring more power. For instance, an internet-TV can consume less than 1 W in normal standby but more than 20 W in a quick-start mode providing faster reactivation. Such trend and modes put at risk the credibility of the EU policy.

## 5. Energy consumption and saving potentials

According to the impact assessment study accompanying EU Ecodesign Regulation 1275/2008 on standby, the EU had an installed base of electronic products and appliances in the household and office sectors of approximately 3.7 billion units in 2005. This stock is assumed to grow to 4.6 billion by 2020. In off and passive standby conditions, this stock consumed 47 TWh/year in 2005. This figure should fall to 14 TWh/year by 2020 thanks to regulation 1275/2008.

The energy consumption of networked standby conditions is more difficult to grasp, as many networked products currently do not include such a low-power mode when they maintain connection to a network (they stay in on-mode or in a slightly less consuming idle-mode). The Ecodesign preparatory study on networked standby completed in 2011 considered that the stock currently requires about 50 TWh/year to maintain network reactivity, and this should grow up to 90 TWh/year by 2020 if no action is taken. Through regulation, this additional forecasted consumption of 40 TWh/year could be avoided cost-effectively.

The urgency to regulate networked standby appears very clearly in these figures. The EU must quickly finalise and adopt requirements in this field and grasp the **40 TWh per year** savings potential. First indications from the impact assessment study prepared by the European Commission in Autumn 2012 confirm a potential of savings of 35 to 40 TWh per year by 2020, increasing to about 50 TWh/year by 2025.

It is also arguable that consumption in off and passive standby modes could be further decreased. An electricity-using product that is used 2 hours per day will be in standby or off mode 8,000 hours per year. A (seemingly modest) difference of 0.5 Watt in the latter modes has a yearly consequence of 4 kWh. Applied to the 30 energy-using products that can be found in a typical house nowadays, it represents 120 kWh / year, which is as much as what some A+++ fridges consume. Based on rough own calculations, an additional limitation of off and passive standby at the level of 0.3 W would save an additional **5 to 6 TWh per year** in the EU.

## 6. Political instruments and initiatives

*EU Ecodesign regulations related to off and standby modes:*

- Horizontal Ecodesign Regulation 1275/2008/EC on simple off and standby modes (*see point 2 above for a description*)

- In a few cases, more tailored requirements for the simple off and standby modes of specific products have been set in vertical Ecodesign regulations, namely:

- TVs: off-mode is limited to 0.3 W and the requirements of the 2<sup>nd</sup> tier of regulation 1275/2008 for passive standby have been enforced earlier (2011).
- Power supplies and chargers: the no-load condition is limited to 0.3 W or 0.5 W (depending on the characteristics of the device).
- Washing machines and dishwashers: the consumption in standby and off modes is included in the calculation of the energy efficiency index, which is the basis for the minimum Ecodesign requirements.

- Specific requirements are also expected for Ecodesign regulations to come soon for computers, servers, tumble driers and luminaires.

- Addendum to Ecodesign Regulation 1275/2008/EC to cover networked standby (*to come*)

The European Commission has started in 2012 consultations and negotiations to include networked standby modes in the scope of Regulation 1275/2008/EC, with specific definitions and power limits. The latest publicly available draft dates back from December 2012.

The intention of the Commission is to apply a simple and horizontal approach (as for simple standby). This is highly welcome. However, networked standby modes are slightly more complicated and need the following refinement:

- a distinction between networked products that need a very fast reactivation from standby (e.g. an internet box providing the home telephone) and those for which reactivation time is not an essential requirement (e.g. a TV decoder that updates the list of channels during the night)
- power limits that are both ambitious and achievable across product categories
- a measurement method that can reflect the functioning of network products reactivated by network signals.

The current draft from the European Commission is based on data from 2010 and 2011. It imposes that networked products include an auto-power down function activated at delivery and sending the products to a networked standby mode after maximum 20 minutes of delay time (unless inappropriate for the intended use).

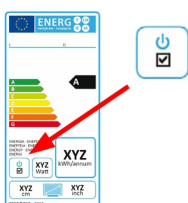
In the case of products needing high network availability and very fast reactivation (i.e. router, network switch, hub, modem, wi-fi access points, VoIP phones and video phones), this standby mode shall be limited to 12 W by January 2015 and 8 W by January 2017. For all other networked products, the standby mode shall be limited to 6 W by January 2015 and 3 W by January 2017. The requirements will apply to a wide range of consumer and office electronics and appliances. A few exemptions are considered for large printers and tele-presence systems.

The text also requires that products offer the possibility for users to disable wireless emissions when network connectivity can be provided through a cable. Last, some elements describing how products should be tested are included, as well as a clarification related to the delay time to standby for coffee machines.

This draft has some positive aspects, namely the horizontal approach, the aspiration for simplicity and the effort to be as clear as possible on testing methods. However, data presented in point 3 above suggests that power limits could be more ambitious (especially in the first tier). The draft also lacks provisions regarding inadequate data protocols that hamper standby modes, and more opportunities for users to control the functioning of their products could be included.

#### *Energy labels and consumer information:*

Information to consumers on standby consumption of products is very limited in Europe.



At the point of sale, the only existing mandatory requirement is for TV manufacturers to indicate through a pictogram on the Energy Label (introduced in 2011) whether models include a hard-off switch or quasi-0 Watt mode (i.e. below 0.01 W).

On all other existing EU Energy labels, the consumption in standby and/or off

mode is not displayed.

However, manufacturers of products covered by Ecodesign regulations have to declare the passive standby and off mode consumption of their products in the product technical fiche (e.g. for set top boxes, washing machines, dishwashers) and sometimes on free-access websites (e.g. for TVs, domestic air-conditioners, fans). But this requires consumers to look for information before their purchase, and this is not always simple as this information is not centralised.

## 7. Recommendations from Topten regarding policy design

*In the coming revision of horizontal Ecodesign Regulation 1275/2008/EC:*

- Addition of a new tier limiting off-mode and passive standby to 0.3 Watt by 2015.
- Support to a requirement stating that networked products shall go to a networked standby mode after the shortest possible time and maximum 20 minutes.
- For products needing high network availability and very fast reactivation, evidence from best available technologies on the market show that the power consumption in networked standby mode could be limited to much lower levels than currently considered by the European Commission. We suggest 6 Watt in a first tier, and 4 Watt as a longer-term target.
- For networked products that do not need very fast reactivation (i.e. all other products), the networked standby mode could also be limited to a much lower levels than currently considered by the European Commission: 3 Watt could be considered for the first tier, and manufacturers should be challenged to achieve 1 Watt in a longer-term.
- Features such as 'quick start' modes should also be covered by these power limits.
- Products should include auto-power down features that are compatible and active with all existing communication protocols and cannot be de-activated inadvertently. Users should have more control over the functioning and power management of their products to achieve further savings beyond the basic level (through easy disabling and time-programming of network features, switches to send products into passive standby, etc.). Suggestions have been made by European consumer and environmental NGOs (*see references*).
- Technical information that manufacturers have to provide in the product fiche and on free-access websites (such as energy consumption in all available standby modes) should be centralised to facilitate consumer information and comparison between products.

*In market surveillance activities:*

Levels of standby consumption should be more systematically verified by competent authorities in EU Member States, and results centralised. Large and targeted testing campaigns such as the 2010 SELINA project need to be replicated to verify the level of compliance and put more pressure on free riders.

## 8. References and Links

Most efficient products of Europe: [www.topten.eu](http://www.topten.eu)

Information on the EU Ecodesign process: [www.coolproducts.eu](http://www.coolproducts.eu)

COMMISSION REGULATION (EC) No 1275/2008 of 17 December 2008 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements

for standby and off mode electric power consumption of electrical and electronic household and office equipment

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:339:0045:0052:EN:PDF>

- Accompanying document: IMPACT ASSESSMENT C(2008) 8424 final / SEC(2008) 3070  
[http://ec.europa.eu/energy/efficiency/ecodesign/doc/legislation/sec\\_2008\\_3071\\_impact\\_assessment\\_en.pdf](http://ec.europa.eu/energy/efficiency/ecodesign/doc/legislation/sec_2008_3071_impact_assessment_en.pdf)

- Accompanying GUIDELINES  
[http://ec.europa.eu/energy/efficiency/ecodesign/doc/legislation/guidelines\\_for\\_smes\\_1275\\_2008\\_okt\\_09.pdf](http://ec.europa.eu/energy/efficiency/ecodesign/doc/legislation/guidelines_for_smes_1275_2008_okt_09.pdf)

Amendment with ecodesign requirements regarding standby, off mode power consumption of household and office equipment, draft for Regulatory Committee (2013): [http://env-ngo.eup-network.de/fileadmin/user\\_upload/Draft\\_Regulation\\_Networked\\_Standby\\_for\\_Regulatory\\_Committee.pdf](http://env-ngo.eup-network.de/fileadmin/user_upload/Draft_Regulation_Networked_Standby_for_Regulatory_Committee.pdf)

Working Document from the European Commission on networked standby (27/07/2011), together with Explanatory notes and Product topology

[http://ec.europa.eu/energy/efficiency/ecodesign/doc/2011\\_meetings.zip](http://ec.europa.eu/energy/efficiency/ecodesign/doc/2011_meetings.zip)

BIO Intelligence Service, Fraunhofer IZM: EuP Preparatory Studies Lot 26: Networked Standby Losses (2011)

<http://ecostandby.org/documents.php>

CSES, Oxford Research: Evaluation of the Ecodesign Directive (2009/125/EC) - Final Report (2012)

[http://www.cses.co.uk/ecodesign\\_evaluation/](http://www.cses.co.uk/ecodesign_evaluation/)

IEA 4E Benchmarking Document on standby power (2012)

[http://mappingandbenchmarking.iea-4e.org/shared\\_files/234/download](http://mappingandbenchmarking.iea-4e.org/shared_files/234/download)

Hans-Paul Siderius: Networked Standby – A Wake-up Call for 1W+ (paper presented at the 2012 Summer Study of the American Council for an Energy Efficient Economy)

<http://www.aceee.org/files/proceedings/2012/data/papers/0193-000276.pdf>

Topten CH: Messungen zum Stromverbrauch von Settop-Boxen

<http://www.kassensturz.sf.tv/Nachrichten/Archiv/2012/09/18/Themen/Multimedia/HDTV-Boxen-brauchen-Strom-wie-Winterthur>

Networked Standby Data Collection Methodology and Policy Development Workshop, organised by the IEA Implementing Agreement for a Co-operating Program on Efficient Electrical End-Use Equipment (4E) and the Super-efficient Equipment and Appliance Deployment (May 2012)

[http://www.iea.org/newsroomandevents/workshops/workshop/name\\_14181,en.html](http://www.iea.org/newsroomandevents/workshops/workshop/name_14181,en.html)

ANEC/BEUC comments in draft Ecodesign requirements for networked standby (October 2011)

<http://www.eupconsumer.eu/download/ANEC-BEUC-lot26-comments-12Sept2011.pdf>

- Comments from ECOS on behalf of Environmental NGOs on the Working document for a possible Ecodesign regulation on Networked Standby (September 2011)

<http://env-ngo.eup-network.de/product-groups/positions-from-environmental-ngos/>

SELINA, Standby and Off mode Energy Losses in New Appliances measured in shops (2010)

<http://www.selina-project.eu/index.cfm>

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[www.topten.eu](http://www.topten.eu)