Australia's contribution on Standby Power

Lloyd Harrington
Energy Efficient Strategies (consultants to the AGO)
PO Box 515 Warragul Victoria 3820 Australia
lloyd@energyefficient.com.au

Shane Holt
Australian Greenhouse Office
GPO Box 621 Canberra ACT 2601 Australia
shane.holt@ea.gov.au

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Abstract

Standby power consumption is now a significant issue. The number of products with a standby component in households appears to be increasing rapidly. Measurements in many countries have estimated that standby may be as high as 12% of residential electricity consumption in some economies and this is likely to grow without firm action by governments. However, it appears that a low standby future is both technically feasible and cost effective.

Standby power consumption is becoming a necessary element of many household products (improved control and increased sophistication), but paradoxically, while consumers appear to be concerned about standby, there is little information available in the marketplace. Due to low power levels and unusual current waveforms, standby power can be difficult to measure with accuracy. Standby is an international problem, in that many of the products with a standby component are internationally traded goods, so therefore it warrants an international solution.

Australia is taking a leading role in development and implementation of standby policy. Actions include active participation in IEC work to development a test method for standby, regular store measurements in Australia of standby power for a wide range of new products offered for sale each year, and the development of a standby strategy which aims to get all target products to below 1 Watt by 2010. The strategy provides a clear and well structured framework for industry and governments to cooperate and achieve standby targets. A range of policy measures are contemplated, from industry targets and voluntary agreements in the early stages to regulatory action in cases where adequate progress is not achieved.

World Context

Standby is a world problem

Concerted international action is essential to rein in standby power since so many products are traded internationally. The problem will become more intractable once more networked products with high standby power requirements have been purchased for use in offices and homes (IEA 2001, *Things That Go Blip In The Night*, p 12).

Within this vision, the International Energy Agency believes that, within ten years, products with optimized power management could be the norm rather than the exception. The IEA believes that member countries, working with industry, consumers and other interested parties, can encourage the design and introduction of new, more efficient appliances that meet the needs of both consumers and the environment. The IEA emphasizes international collaboration as the key to overcoming standby power.

Standby power is the energy used by an appliance while plugged in but not actually carrying out its central function. Standby power is a relatively new design feature that in many cases delivers a service that consumers' value. Many products are designed to draw standby power 24 hours a day, seven days a week, every month of the year so that they can react more quickly when consumers want the product to operate. Standby powers core functions or senses communication to the product waiting to provide full services. The power is consumed not while the appliance is being fully utilized but while it awaits instruction; while it is "standing by".

In too many cases, however, standby power serves no useful function or operates at excessive levels for the background task being performed. Any standby policy must balance the undoubted consumer benefit of standby against its excessive energy use in comparison to best practice standby. Thirty or maybe twenty years ago, consumers could turn off their appliances secure in the knowledge that their power demand would just stop. Today, their meters show continuing demand despite even their best endeavours to stop it.

Standby is a big problem

Quantifying the size of the excessive standby has exercised the minds of many experts in several different groups and fora in developed countries.

Table 1: Standby power in the household sector – summary of global measurements

Country/Region	Homes Monitored	Year	Standby Power (W)	Energy (kWh/yr)	Fraction of Total *
Australia	64	2000	87	760	12%
Australia	1	2001	112	980	
Canada/Nova Scotia	79	2001	38	329	
China/Beijing	42	2001	33	n.a.	
China/Guangzhou	115	2001	35	n.a.	
Denmark	100	2001	60	530	
France	178	1999	38	235	7%
France/Paris	1	1999	70	600	
Greece	100	2001	50	440	
Italy	100	2001	57	500	
Japan	36	1997	60	530	12%
Japan	42	2000	45	398	9.4%
Japan/Tokyo	1	1999	80	700	
New Zealand	29	1999	100	880	11%
New Zealand/North Island	2	2001	125	1015	
Portugal	100	2001	46	400	
Sweden	1	1997	80	475	
United Kingdom	32	2000	32	277	
USA/California	10	2000	67	590	9%
USA/California	4	2001	115	1010	
USA/Colorado	5	2001	46	405	

Source: Meier, 2002. Note *: Estimated total fraction of national household electricity consumption, where known.

The IEA's Executive Director reports that "taking all of the homes in IEA Member countries, standby power accounts for 10 per cent of residential electricity demand". In 2000, using 1997 data, the IEA estimated that the total demand for standby power in the residential sector throughout the world amounted to 15 GW or more than the entire installed wind turbine generating capacity installed at that time. (IEA 2001, p91).

The speed in which the problem of excessive standby has surfaced and the bleak prospect of increasing numbers of products with standby in homes and offices presents a challenge for public policy. Government policies can no longer present information programs to consumers advising them to "unplug the appliance" or "switch it off at the wall" as a viable response to excessive standby (who wants to reprogram their DVD recorder or video every day!). The problem cannot be fixed by consumer action alone nor even government action alone. The problem can only be redressed by suppliers choosing to design products with the best possible technology to reduce excessive standby to acceptable levels.

Governments, however, play a key role in identifying standby as a problem to industry and in developing more sophisticated measures to redress the problem (especially looking at the supply-side measures as well as demand-side education programs).

But standby is capable of being fixed, and fixed quickly

The IEA reports that "we can reduce standby power consumption by about 75 per cent using cost-effective technologies and design changes" (IEA 2001). Studies in Germany suggest that, though standby power currently draws 20 TWh per annum in private households, it could be reduced to 8 TWh within ten years if adequate measures are taken. Australian projections suggest our measures could reduce standby power by 56% by 2020 and abate 39 Mt CO_2-e over the period 2003-2020 (Wilkenfeld 2003). Potential savings are illustrated in the following figures.

Figure 1: Household standby power projections in Australia – base case

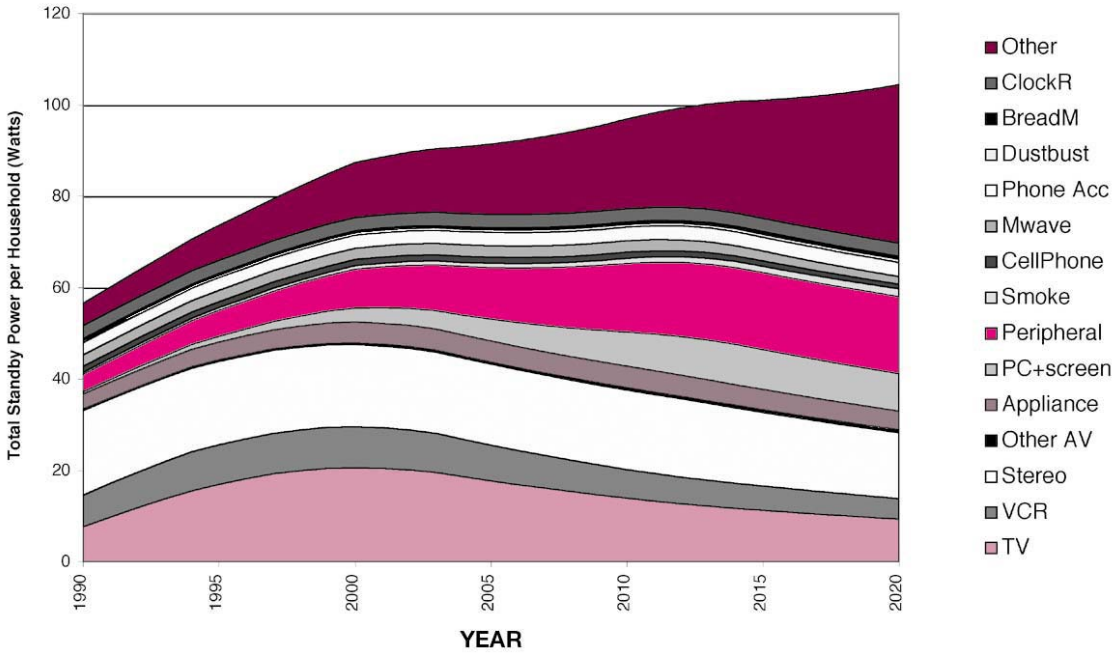
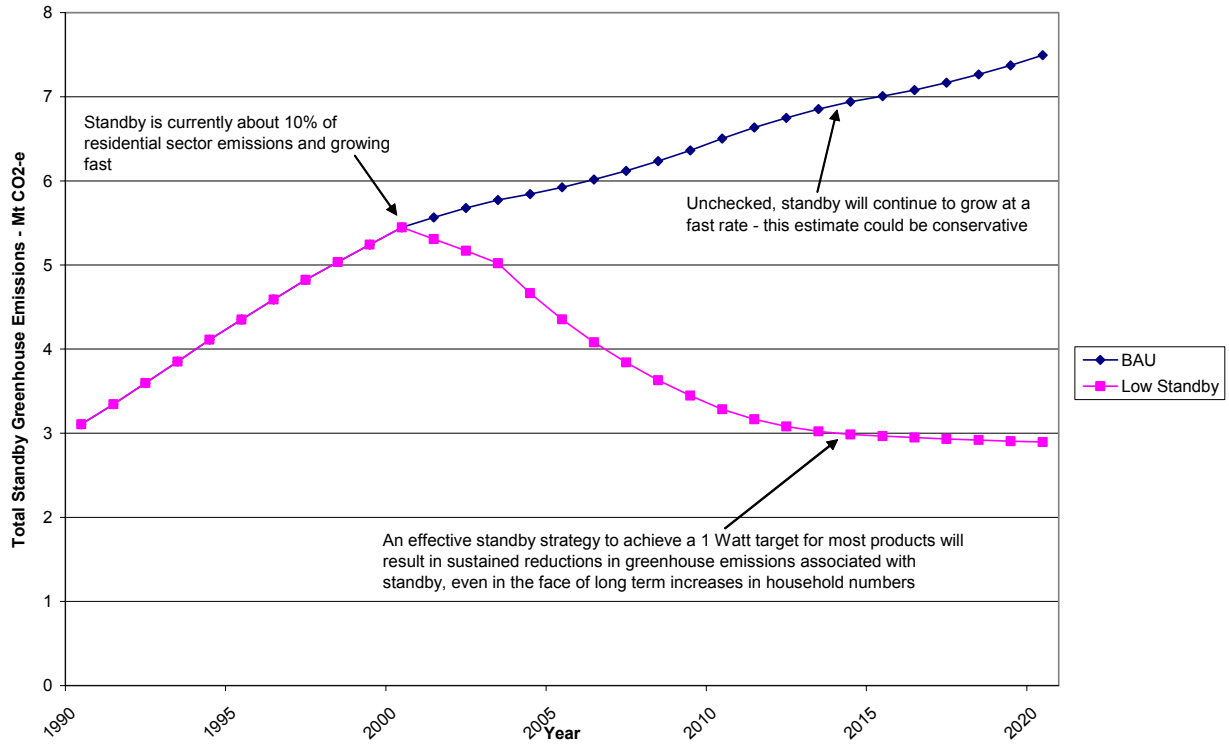


Figure 2: Projections of residential standby power, Australia (2 scenarios)



The reasons such dramatic reductions are touted in the academic literature is that fixing standby is not difficult if addressed at the design stage. The "cost" of fixing standby is predominantly good product design practice.

Removing excessive standby generally does not require expensive components; rather the design engineering specification should include standby functions to operate at best available technology levels.

Standby field measurements of new products in retail outlets has shown that for some product types there is a huge variation in the standby power, even though the features and functionality of products appear to be the same. For example, standby mode of televisions (where the product can be activated by a remote control) varies from as little as 0.5 W to as much as 35 W, with an average of 5.9 W in early 2003 (EES et al 2003). A similar range for TVs was found in similar surveys undertaken in 2002 and 2001. Nearly 25% of models had a standby of less than 1 Watt in 2002 and 2003, indicating that low standby is now technically feasible in mass produced products. Similarly, standby for DVD players varied from a minimum of 0.1 W to a maximum of 5.7 W (average of 1.7 W). A similar pattern is displayed for many products with standby.

Fortunately, DVD standby power for new models appears to be falling quickly just as the ownership is increasing rapidly: it was estimated that as of late 2002 some 25% of households now owned a DVD player, which is a spectacular growth rate from their introduction in 1998. As part of the governments standby strategy, a limit of 1 Watt maximum on standby has been proposed by 2006 (NAEEEC 2003).

Australia as an example of a nation trying to address standby

Australia initially examined what a sovereign nation can do……..

Before reporting on recent Australian efforts, it is worthwhile to set the scene confronted by government officials and energy-efficiency experts when raising standby power with industry in 1999. With access to the work of North American experts like Alan Meier and Karen Rosen and some European endeavours, the Australian Greenhouse Office commissioned similar work to test the penetration of standby into the residential sector. Table 1 shows that many products with a standby component now have very high penetration and ownership levels in Australia.

Table 2: Appliance saturation, penetration, ownership and mean age, Australia, end 2000

Appliance	N (sample)	Penetration #	Ownership #	Average Age
Televisions	797	99.6%	1.900	8
Clock Radios	644	80.4%	1.398	
VCRs	712	89.0%	1.206	6
Stereos	675	84.3%	1.190	8
Mobile Phones	527	65.8%	1.051	2
Electric Kettles	713	89.0%	0.949	4
Microwaves	713	89.0%	0.925	7
Personal Computers	460	57.4%	0.734	4
Smoke Detectors	267	33.4%	0.664	
PC Monitors	426	53.2%	0.661	
Printers	412	51.5%	0.593	4
Speakers	363	45.4%	0.583	
Cordless Home Phones	376	46.9%	0.508	
Answering Machines	321	40.1%	0.417	
Electric Shavers	274	34.2%	0.389	6
Play Station/Game Consoles	215	26.8%	0.319	
Plug in Air Fresheners	129	16.1%	0.281	
Dustbusters	199	24.9%	0.257	
Coffee Machines	186	23.2%	0.249	7
Bread Makers	174	21.7%	0.219	3
Electric Toothbrushes	133	16.6%	0.205	2
Fish Tanks	119	14.9%	0.182	
Fax Machines	136	17.0%	0.172	5
Scanners	126	15.7%	0.163	2
Laptops	98	12.2%	0.141	
DVDs	66	8.2%	0.089	2
Digital TVs **	53	6.6%	0.073	
Multi-Function Devices	47	5.9%	0.062	4
Photocopiers	35	4.4%	0.047	4

Note #: Ownership is average number of appliances per household, penetration is households with 1 or more appliances.
Note **: The reported incidence of digital TV ownership was surprisingly high as the service in Australia was only commenced within a few weeks of the survey. Respondents may have incorrectly said that they have digital TV when in fact they had cable or satellite based pay TV.

Australia, an importer of many consumer appliance technologies, was in an invidious position (through exchange rate, market size and the past import practices, and our 240 Volt, 50 Hertz electricity system resulting in higher standby losses than other electrical systems) of probably having the worst standby figures in the developed world. Australian government officials sought to develop a consensus on the appropriate response.

But quickly recognized the need for international action

In March 2000, the Australian Government convened a forum with key industry representatives to discuss a way forward. This forum set the agenda within Australia, not by identifying future policies but through identifying the key issues for resolution.

Standby is here to stay

Despite the relative newness of standby as a sales feature, no-one argued for a return to previous technology. Any form of ban of the standby function would be seen as ludicrous and could not be supported by any of the parties.

Standby is not important to purchasers

Australian suppliers pointed out the increasing consumer demand for products with the standby feature and the relative insignificance most purchasers place on excessive standby when purchasing products (through lack of knowledge). They suggested that a lack of interest from consumers explained why the marketplace has not addressed excessive standby power. However, consumers can hardly be expected to be concerned about standby where there is little information available. For industry to respond to officials' suggestions, they would need a clear and unequivocal statement from government as to the importance of standby power.

Standby is difficult to measure

Australia suppliers advised that they have little information on the standby power of many of their products as they were not asking for that data from original equipment manufacturers. International databases were limited and disputes were evident as to the definitions to be used for standby.

Standby is an international problem

Australian suppliers suggested that they were rarely in a position to direct or even influence appliance design practice. Most appliances were manufactured overseas with Australia representing 1% of the world market. Local suppliers had the choice of importing the best standby technology, which may or may not meet government standby targets.

Standby needs an international solution

At the time of the forum, neither international agreement on what constitutes standby power nor a method of testing standby levels had been reached. Australian suppliers were reluctant to assume the responsibility of developing these necessary tools in advance of the recognized international bodies.

Australia's national response – part of the international push

Following the forum, the Australian Greenhouse Office developed a four-pronged plan to address excessive standby reduction:

- A clear statement of policy from the highest levels of government;
- A commitment to participate (and lead if necessary) international endeavours to develop international standards and definitions for standby;
- A commitment to benchmark standby figures for Australia over time; and
- A long-term strategy that develops and applies agreed standby policies to particular problem products.

Statement of Policy

In August 2000, the Council of Commonwealth, State and Territory Ministers in charge of energy matters endorsed a program of work to lead Australia towards achieving the goal of "One Watt" for all consumer appliances and office equipment. They agreed to develop policies designed to ensure the maximum standby power of all appliances manufactured in or imported into Australia is One Watt. Australia was the first national government to agree to this target.

This statement of principle sent a clear message to industry and provided a coherent structure for a diverse range of policies designed to combat excessive standby power consumption.

The Commonwealth Government went further and announced in October 2001 a policy to purchase only equipment that complies with the US Environmental Protection "ENERGY STAR" standard, where it is available and fit for the purpose.

Participation in International Endeavours

The Council also agreed to continue to support international cooperative programs to help reduce excessive standby. Since so many appliances and components are traded internationally, they acknowledged that consistent approaches (such as test methods, standards and associated voluntary projects) would not only lead to better environmental outcomes but could benefit manufacturers by reducing costs and barriers to trade.

Australia agreed to contribute to the IEA work program for standby. Australian delegates participated in each of the IEA's three standby workshops. Australia funded the work of the chair of IEC TC59 Working Group 9 which is developing an international test method for the measurement of standby power for appliances. Annex A records the important steps taken on developing the international test method. It is hoped that this process will be concluded in 2004.

Regular Measurement of Standby

The Council also agreed to fund an annual survey of consumer appliances and office equipment sold on the Australian market. Annex B records the outcome of three surveys conducted in January of 2001, 2002 and 2003.

Money isn't all you're Saving – Australia's standby power strategy 2002 – 2012

The development of this ten-year strategy is the final plank of the 2000 commitment by the Australian Government to stamp out unnecessary standby power (MCE 2002). A copy is available from www.energyrating.gov.au in the electronic library. It is the culmination of considerable industry and community consultation and sets out:

- A long-term plan for the measures to combat excessive standby consumption;
- The 40 product types initially targeted in 2003 and 2004 and the process for identifying future products;
- The procedure for setting standby targets; and
- The sanctions that could be applied should suppliers not meet targets.

In December 2002, the AGO secure agreement from the US Environmental Protection Agency to provide unfettered access to the Energy Star labelling scheme for all products traded internationally currently within that scheme. This means the Energy Star logo can be used in Australia as the symbol of best standby product in its class.

The AGO has also agreed to participate in the IEA's work program on computers and communication technology.

So what is unique about Australia's response?

The Australian plan has three features that may be of interest to European policy makers.

The first is that Australia has gone beyond a statement of principle (One Watt) applying to all products to:

- identifying actual problem products; and
- identifying the process for set the standby target to be met by individual products.

In circumstances where a product meets One Watt that is an end to the matter but if the best available technology can only reach a higher level, a second or even third iteration may be necessary. The timetable for review of a wide range of product groups is set out in the following tables.

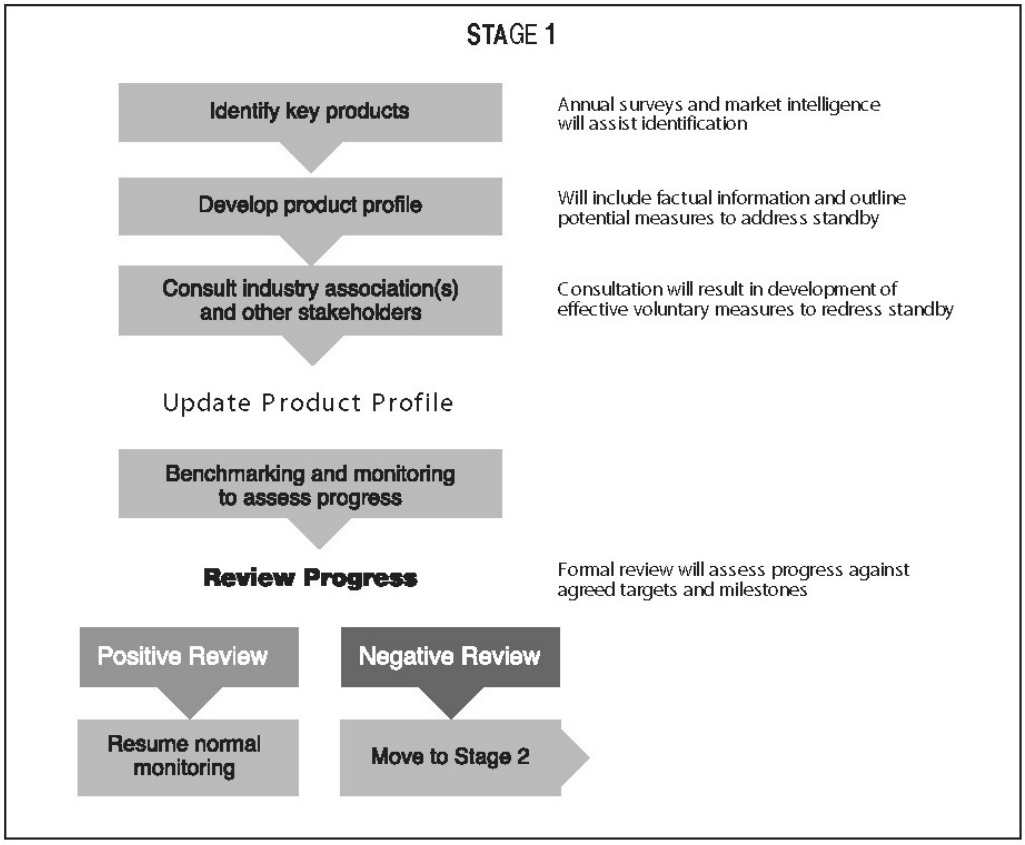
Product Groups Prioritised for "Immediate" Action	Number of Products	Time Frame for Progressive Release of Individual Product Profiles within each Group
Information Technology Group A[1]	6	From early 2003
Entertainment Group A[2]	7	From early 2003
Major Appliances Group A[3]	4	From mid 2003
Small Appliances Group A[4]	3	From mid 2003

1: Includes personal computers, PC monitors, photocopiers, printers, scanners and multi-function devices.
2: Includes analogue TVs, digital TVs, VCRs, DVDs, digital TV set top boxes and converters, pay TV set top boxes, integrated and portable stereos.
3: Includes clothes washers, clothes dryers, dishwashers and air conditioners.
4: Includes external power supplies, smoke detectors and microwave ovens.

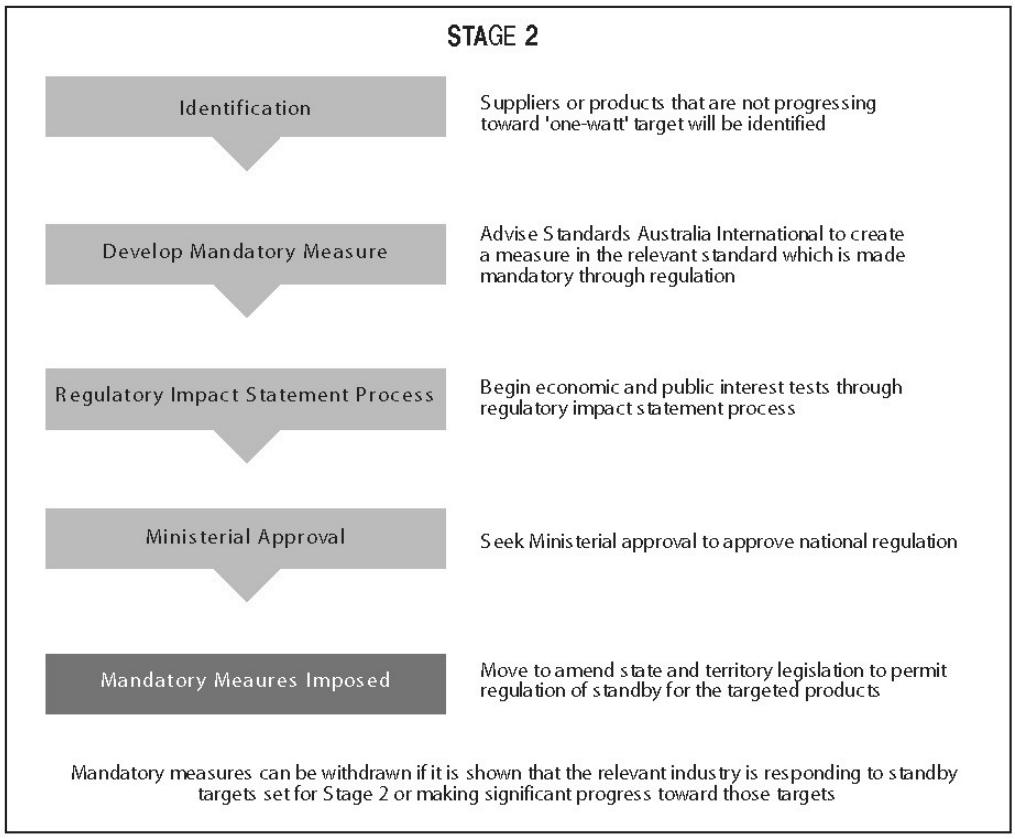
Product Groups Prioritised for "Subsequent" Action	Number of Products	Time Frame for Progressive Release of Individual Product Profiles within each Group
Information Technology Group B[5]	4	From mid 2004
Entertainment Group B[6]	Multiple	From mid 2004
Major Appliances Group B[7]	Multiple	From early 2005
Small Appliances Group B[8]	Multiple	From early 2005

5: Includes fax machines, laptop computers, modems and PC speakers with separate power supply.
6: Includes separate sound system components (receivers, amplifiers, tuners, CD players and tape decks).
7:Includes water heaters (gas with mains connection), space heaters (electric & gas with mains connection), ovens and ranges (electric and gas with mains connection), cooktops (electric and gas with mains connection) and rangehoods.
8: Includes bread makers, coffee machines, security systems, electric rolladoors, networked/smart home products and motion detectors.

The second is that Australia has introduced a potential two-stage process. The initial stage allows industry time to address excessive standby using voluntary measures.



Stage 2 escalates matters to include mandatory action underpinned in regulation.



The third stage is the range of measures that may be used with a particular product to achieve the standby power target. The Ministerial Council has agreed to authorize a range of measures best suited to address standby for that particular product type.

ENERGY STAR: This tool works by identifying "early adopting" suppliers whose products meet the specified standby target (where applicable: some ENERGY STAR requirements for some products do not cover standby). The particular products carry the ENERGY STAR logo identifying them as amongst the most energy efficiency of their type.

Industry Codes of Conduct: In circumstances where a product type or group of related products are identified as a potential problem, an industry-wide voluntary agreement could be employed. The agreement would seek to focus the attention of suppliers on standby in the design of locally manufactured products or when ordering the imported product. This type of arrangement is suitable where there is a reasonably high degree of industry cohesion for the product type and a substantial majority of the market is covered by parties to the agreement.

Australian Standards to Specify Standby Targets: Australian governments work with Standards Australia International (SAI) to use relevant Australian Standards to identify and publicise standby targets for particular products. The publication of standby targets in official Australian Standards provides a ready mechanism for communicating with industry.

Annual In-store Measurement Surveys: Australian governments will conduct annual surveys of the standby power levels choosing a representative "basket" of electrical products. The main objectives of the surveys are to quantify the magnitude and range of electricity used in standby mode by new appliances and equipment and to compare the annual results within each product group in order to track the industry's progress in reducing standby power consumption. See Annex B for a summary of results from the 2003 survey.

Publication of Product Statistics: Where a product is identified as requiring a standby target, suppliers of those products would be asked to provide detailed standby data directly to government on a regular basis. Self-reporting, annual surveys and some product verification testing will provide data to measure improvements over time.

Appliance Energy Rating Label: Products which are within the scope of the appliance labelling program will have standby incorporated into the energy consumption values shown on the energy label. All relevant standards will be revised by 2006 to include standby power consumption in addition to energy use measured during actual operation.

Minimum Energy Performance Standards (MEPS): MEPS levels could set a cap on the maximum allowable standby power for specified modes. This approach would be most straightforward for those products that are already regulated for energy efficiency. However, it could be considered for products groups that are not currently regulated for energy efficiency if the scope and magnitude of the problem warranted such an approach.

'Warning' label: An alternate approach is to use a label to identify only those products that fail to meet government's standby targets. This option draws on experience from cigarette and hazardous goods labelling. Governments could require ONLY those suppliers who fail to meet well publicised efficiency targets to attach a mandatory label to their product should it continue to fail to meet standby power targets at the end of a formal notice period. This approach has the advantage of burdening only those suppliers that fail to meet the specified targets, rather than all stakeholders.

Specific plans for each of the identified products will released over the next two years.

New policy tools

Most of these measures have been used in other jurisdictions but possibly not in as coordinated a strategy, specifically aimed at standby. The new idea is a warning label.

Possible concept for a warning label.

The Australian Greenhouse Office supports the IEA's calls to use standards and existing mandatory labels as policies for addressing excessive standard as part of the mix of measures. Standards appear most effective where standby is the major power user of the appliance and setting a minimum acceptable level conforms with international practice. In a similar vein, Australia will incorporate standby into the algorithms for appliances subject to the existing mandatory energy efficiency label. In 2003, Australia will consider bringing home entertainment and office equipment within such our mandatory energy efficiency labelling scheme.

A warning label appears to have application where neither standards nor a mandatory energy label are suitable. A mandatory warning label could be used where standby is a significant part of but not the major energy use of the appliance.

Australian governments have agreed to consider using warning labels where suppliers fail to meet well publicised efficiency targets. This approach has the advantage of burdening only those suppliers that choose not to meet the specified targets with mandatory label compliance costs and not the entire industry (because most but not all have already complied with the appliance standby target).

The Way Forward

Australia's standby plan is ready for implementation

Australia is about to embark on the third major development of its national standards and labelling program. After beginning with national appliance labelling in 1992 (this was started at state level in 1986) and expanding to include mandatory efficiency standards in 1999, standby power represents the next development of the national program. The Australian program addresses each of the IEA's seven points raised as preconditions for a standby program:

- Australia chairs the International Electrotechnical Commission (IEC) working group charged with developing a standby test method (see Annex A for details);
- Australia has agreed with the USA to use the ENERGY STAR label as a key plank of its voluntary program within Stage 1 of its national strategy;
- Australia has developed a guideline for lowering standby use for appliances not already covered by a program;
- Australia will use the internationally agreed standby targets within the ENERGY STAR scheme (or at least the standby criteria for internationally traded products);

- Australia has announced a plan to address the specific case of set-top boxes for digital television;
- Australia has already announced a commitment to incorporate standby into existing appliance energy labels;
- Australia will consider shouldering its fair share of the research necessary to stimulate low standby technologies.

The Australian program has addressed all the industry issues required for an effective national program identified back in 1999, specifically:

- a strong political mandate;
- a clear plan identifying products and likely goals;
- an appropriate mix of the policy tools; and
- a commitment to coordinate with the major economies in developing an international plan.

An international plan

The weakest measure at present is the last: coordinating with the international standby plan. That is not to say the Australian commitment is weak but rather that the international vision of a coordinated standby program is still a tantalizing apparition despite the efforts to date. In the near future, Australia wants to play a role in making the mirage a reality.

Since January 1999, the IEA has encouraged member countries to deal with standby as an project of international collaboration. Very few experts or policy makers disagree with the view that improving energy efficiency is a cost-effective way to reduce greenhouse emissions. The very low costs in addressing standby and the energy saving and emission reduction benefits of an international programs would spread over all countries. An international program would reduce administrative burdens and associated costs to government, it would leverage national and regional promotional investments and minimize the risk of developing unintended trade barriers.

An oft-used analogy used to identify energy efficiency opportunities is that of "low-hanging, ripe fruit ready for harvest". Standby power is then the "over-ripe fruit that squashes between the toes" of those harvesting. The challenge is to minimize the time wasted before harvest.

While some existing national policies and programs may appear inconsistent, the development of these national approaches has created a climate ripe for developing an agreed international approach. The international response could be seen to build on existing national policies and processes of these existing programs including those of Australia. It is time to commence the implementation phase of the international plan proposal.

Australia looks forward to working with IEA members and secretariat to develop an implementation strategy for the international plan. It will simultaneously work with the Asia Pacific Economic Cooperation (APEC) to raise the profile of standby in that important regional forum. The authors hope that the ECEEE will lend its name and endeavours to the international initiative.

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Annex A: Development of an IEC test method for standby

The International Electrotechnical Commission (IEC) technical committee TC59, which covers electric household appliances, first considered the issue of standby during 1999. At its meeting in Kyoto in October 1999, it formed an ad hoc working group to consider the issue of standby and whether the development of a test method was warranted. The ad-hoc working group concluded that standby was an important issue and that the development of an international test method could provide a sound basis for the rapidly growing international work in this area.

Accordingly, a proposal for a new standard on standby was prepared by the TC 59 ad-hoc WG on standby in May 2001 (document IEC 59/254/NP). This proposal was approved by voting of member countries in September 2001 and at its meeting in Florence in October 2001, TC59 approved the creation of Working Group 9 to continue this work to publication. Working Group 9 finalized a committee draft (CD) at its meeting in March 2002 and this was circulated for public comment in mid 2002 (document IEC 59/297/CD). As all national comments on the CD were favourable or of a minor technical nature (see compilation of comments 59/317/CC), it was initially proposed that the document proceeded to committee draft for voting (CDV) in early 2003. However, objections from CECED in February 2003 meant that the document had to be issued as a second CD (document 59/325/CD) which closed for comment in June 2003. Despite this delay, it is expected that a CDV could be ready by late 2003, with release of a final draft international standard (FDIS) and publication of a final standard (IEC62301) still expected in 2004.

The objective of the standard is to provide a method of test to determine the power consumption of a range of appliances and equipment in standby mode (generally where the product is not performing its main function). The standard defines "standby" mode as the lowest power consumption when connected to the mains. The test method is also applicable to other low power modes where the mode is steady state or providing a background or secondary function (e.g. monitoring or display). The standard is intended to cover appliances and equipment that fall within the scope of IEC TC59, although it is acknowledged that, if desired, it can be applied to the relevant low power modes of other similar products.

Annex B: Extract from EES et al 2003 – Store survey 2003

Refer EES et al 2003 for more details.

Four major Melbourne retail stores were approached to take part in the study, which allowed measurements of a large range of appliances, across a number of manufacturers, to be taken. For each appliance, power consumption was measured while the appliance was in use (mostly home electronics), in standby (passive and/or active) and off modes, where applicable. For many appliances such as washing machines and dishwashers, it was impractical to measure the appliance in use. Other information recorded during measurements included power factor, crest factor and supply voltage. In total 573 products were measured in 2003 resulting in 1026 measurements being recorded during the survey. A total of 531 products were measured in 2001 and 635 products in 2002. Result summaries for key products are included below.

Mode Details	2001	2002	2003
Total readings off	258	380	330
Average off	1.3W	0.8W	0.9W
Total readings passive standby	440	397	325
Average passive standby	5.8W	4.1W	3.4W
Total readings active standby	101	210	216
Average active standby	11.6	11.2	8.3

Televisions *Description*: Conventional cathode ray tube (CRT) televisions.
Number of products measured in 2003: 72
Mode = off: average power 0.0W (72}
Mode = passive standby: average power 5.9W (56), maximum 35.4W.
Mode = in use: average power 79.1W (70).
Trend: The *passive standby power consumption for TVs is still high. There has been a slight decrease in average consumption in passive standby mode although the improvement in 2003 is not statistically significant.*
Notes: In off mode all models were 0.1W or less. In passive standby 12 models used less than 1W in 2003. All products had remote controls. Average size on display was 59cm.

TVs – Projection *Description*: Large projection screen televisions (mostly rear projection).
Number of products measured in 2003: 16
Mode = off: average power 0.1W (15).
Mode = passive standby: average power 2.3W (12), maximum 10.1W.
Mode = in use: average power 174.7W (16).
Trend: Standby power consumption appears to be stable.
Notes: In off mode all models were 0.1W or less. In passive standby 2 models used less than 1W. Sizes ranged from 109cm to 135cm.

TVs – Plasma *Description*: Plasma Display screens for television viewing
Number of products measured in 2003: 13
Mode = off: average power 0.7W (9).
Mode = passive standby: average power 2.4W (12), maximum 5.2W.
Mode = in use: average power 292.4W (10).
Trend: Prior to 2003 only one unit had been measured.
Notes: In off mode most models (6) were 1W or less. In passive standby 1 model used less than 1W. Sizes ranged from 106cm to 127cm. High in use power.

VCRs *Description*: Conventional VHS video cassette recorders.
Number of products measured in 2003: 25
Mode = passive standby: average power 1.7W (27), maximum 5.7W.
Mode = active standby: average power 8.0W (25).
Trend: Passive and active standby modes both appear to be trending downwards although *no statistically significant differences were noted in 2003.*
Notes: None of the units measured had an off mode. The minimum power in passive standby was 1.4W. Intermediate sleep mode (down from active standby) and "in use" were not measured as this was too time consuming.

DVD Players *Description*: Digital Video Disk players (DVD).
Number of products measured in 2003: 39
Mode = off: average power 0.1W (12)
Mode = passive standby: average power 3.0W (37)
Mode = active standby: average power 9.9W (39)
Trend: Power consumption in all modes measured display a significant downward trend.
Notes: Only a limited number of models had off mode, but most of these were 0.0W.

Stereos – Integrated *Description*: Integrated stereo systems (usually CD/tape/tuner/amp, non portable).
Number of products measured in 2003: 35
Mode = off: average power 1.6W (1).
Mode = passive standby: average power 4.1W (32), maximum 25.2W.
Mode = active standby: average power 17.4W (35).
Trend: *While there is no evident trend in active standby,* there *has been a statistically significant improvement (i.e. decrease) in passive standby consumption, but from a high base in 2001.*
Notes: Only 1 of 35 models had an off mode. In passive standby mode 31% of models used less than 1W. In 2002, 38% used more than 10W compared to just 9% in 2003.

Stereos – Portable *Description*: Portable stereo systems (usually CD/tape/tuner/amp, single case).
Number of products measured in 2003: 38
Mode = passive standby: average power 2.0W (38), maximum 6.5W.
Mode = active standby: average power 5.4W (38).
Trend: There appears to be no improvement in active or passive standby.
Notes: None of the models measured had an off mode. In passive standby mode most models used between 1W and 3W (2 models were just below 1W).

AV Receiver *Description*: Amplifiers for home theatre suitable for both audio and visual devices and usually 4+ speakers.
Number of products measured in 2003: 40
Mode = off: average power 0.3W (20).
Mode = passive standby: average power 2W (20), maximum 10.6W.
Mode = in-use: average power 43.9W (40).
Trend: Consumption in all modes appears to be stable.
Notes: Half the models had an off mode and except for one unit, all were less than 1W.

AV Receiver with DVD *Description*: Amplifiers for home theatre with built in DVD player
Number of products measured in 2003: 16
Mode = off: average power 0.1W (9).
Mode = passive standby: average power 3.2W (8), maximum 10.6W.
Mode = in-use: average power 35.8W (16).
Trend: 2003 was the first time this product was measured.
Notes: Over half the models had an off mode and all were less than 1W.

Dishwashers *Description*: Domestic dishwashers.
Number of products measured in 2003: 27
Mode = off: average power 1W, maximum 4.5W, 26% were 0.0W
Trend: Towards a slight increase in consumption
Notes: Soft touch controls may increase off mode consumption.

Clothes Dryers *Description*: Domestic clothes dryers.
Number of products measured in 2003: 11
Mode = off: average power 0.4W, maximum 2.5W, 73% were 0.0W
Trend: There appears to be a positive trend toward reducing standby.
Notes: Sample sizes are small so care is required when examining trends.

Washing Machines *Description*: Domestic clothes washers (front and top loading).
Number of products measured in 2003: 60
Mode = off: average power 1W, maximum 5.1W, 45% were 0.0W (60)
Trend: The reduction observed from 2001 levels appears to be being sustained in 2003.
Notes: Although some 55% of clothes washers had an off mode consumption of less than 1W, there were a significant number in the range 1-4W. Care is required when examining this trend as the samples include up to 50% front loaders which have generally had a low off mode consumption (typically 0.15W). However, front loader sales are less than 15% of total sales. Some machines had to be "tricked" into standby mode after power is first applied (normally this takes up to 30 minutes).

Computers - Box *Description*: PC/hard drive box with desktop computers.
Number of products measured in 2003: 20
Mode = off: average power 3.6W, maximum 6.3W, none consumed less than 1W.
Trend: Appears to be a slight increase in standby power consumption
Notes: Off mode consumption may allow hot key start for some models. Main change is associated with recent changes in power supply design and configuration.

Computers - Laptop *Description*: Portable or laptop computer.
Number of products measured in 2003: 9
Mode = off: average power 1.4W, maximum 2.4W, two consumed less than 1W.
Trend: 2003 was the first time these were measured

Monitors – Computer *Description*: Separate monitors for desktop computers.
Number of products measured in 2003: 14
Mode = off: average power 2.6W, maximum 6.3W.
Trend: Appears to be increasing.
Notes: The reason for any off mode consumption is unclear (possibly EMC filters).

Printers - Inkjet *Description*: Inkjet printers for personal computers.
Number of products measured in 2003: 15
Mode = off: average power 6W, maximum 10.6W, five less than 1.0W.(11)
Mode = passive: average power 2.4W, maximum 6.0W, None less than 1.0W (12)
Trend: Standby power values appear to be stable but standby power is poor.
Notes: Some models had no off switch (most were soft touch).

Breadmakers *Description*: Domestic electric breadmakers.
Number of products measured in 2003: 17
Mode = active: average power 1.6W, most in the range 1W to 3W
Trend: Little change from 2001 value (1.6W).
Notes: No models had an off button

Hand Held Vacuum *Description*: Portable battery operated vacuum cleaners (dustbusters).
Number of products measured in 2003: 18
Mode = passive standby: average power 1.1W
Mode = active standby: average power 3.2W
Trend: There appears to little change in both active and passive standby.
Notes: Passive mode is power supplied to the charging station but appliance removed. Active standby mode is when the appliance is on the charging station, battery is charging.

Microwaves *Description*: Domestic microwave ovens.
Number of products measured in 2003: 40
Mode = passive standby: average power 3.1W, maximum 6.2W
Trend: There is no statistically significant trend for microwave ovens (stable standby).
Notes: Stock values would suggest that there has been a slight reduction of standby power consumption for microwaves in recent years. All but 2 models had electronic controls. Only one manual control model had a standby consumption < 1W.

Latest data and reports on standby can be obtained from www.energyrating.gov.au in the electronic library.

Summary of Results from 2003 Standby Store Survey (Source EES et al 2003)

Appliance	Total Number of Appliances	Valid Readings: Off	Average of Off Power (W)	Valid Readings: Passive Standby	Average of Passive Standby Power (W)	Valid Readings: Active Standby	Average of Active Standby Power (W)	Valid Readings: In Use	Average of In Use Power (W)
Air Conditioner	26	26	0.6						
Breadmaker	17					17	1.6		
Digital Set Top Box	4	1	0.2	4	7.2			4	21.5
Dishwasher	27	27	1.0						
Dryer	11	11	0.4			1	3.9		
DVD Recorder	1			1	9.1	1	25.0		
Microwave Oven	40			40	3.1				
Printer - Inkjet	15	11	2.4	13	6.0				
Printer - Laser	2	2	0.0	2	3.9				
Stereo - Integrated	35	1	1.6	32	4.1	35	17.4		
Stereo - Portable	38			38	2.0	38	5.4		
TV – LCD	1	1	0.7	1	1.2			1	54.7
TV - Plasma	13	9	0.7	12	2.4			10	292.4
TV - Projection	16	15	0.1	12	2.3			16	174.7
TV - Standard	72	72	0.0	56	5.9			70	79.1
TV/VCR	2	2	0.0	2	7.8			2	50.8
VCR	25			25	3.1	25	8.0		
Washer/Dryer	3	3	1.2			2	3.3		
Washing Machine	60	60	1.0			28	3.3		
DVD Player	39	12	0.1	27	1.7	39	9.9		
Stereo - Receiver	1			1	0.6	1	13.3		
CD Amp	3			3	2.1	3	13.6		
DVD & VCR Player	6			6	4.3	6	17.3		
Computers - Box	20	20	3.6						
Computers - Laptop	9	9	1.4						
Computers - Monitor	14	14	2.6						
Espresso Machine	12	12	1.8			12	1057.5		
Hand-held Vac	18			18	1.1	17	3.2		
Home Theatre – AV Receiver	24	11	0.4	23	1.6			24	49.4
Home Theatre – AV Receiver/DVD	16	8	0.1	9	2.9			16	35.8
Home Theatre - Subwoofer	3	3	0.0			3	13.6		
Grand Total	**573**	**330**	**0.9**	**325**	**3.4**	**228**	**63.6**	**143**	**92.7**