

**Energy Allstars Product Database –
Proposed Use in Government Procurement**

Report to the

Australian Greenhouse Office

by

George Wilkenfeld and Associates Pty Ltd

May 2005

**GEORGE WILKENFELD AND ASSOCIATES Pty Ltd
ENERGY POLICY AND PLANNING CONSULTANTS**

PO Box 934 Newtown NSW 2042 Sydney Australia
Tel (+61 2) 9565 2041 Fax (+61 2) 9565 2042 e-mail: geosanna@ozemail.com.au

Contents

<i>Contents</i>	2
<i>Summary</i>	3
<i>Glossary</i>	7
BACKGROUND	8
<i>The Energy Allstars Product Database</i>	9
<i>Potential Value to Government Purchasers</i>	11
<i>This Study</i>	14
GOVERNMENT EQUIPMENT AND ENERGY PURCHASES	17
<i>Total Procurement</i>	17
<i>ICT Procurement</i>	18
<i>Energy Allstars Equipment Purchases</i>	19
<i>Energy Consumption</i>	21
<i>Running Costs in Relation to Capital Costs</i>	23
PURCHASING PRACTICES	26
POTENTIAL ENERGY AND LIFETIME COST SAVINGS	28
<i>Savings</i>	28
<i>Costs</i>	34
CONCLUSIONS	37
<i>References</i>	39
<i>Appendix 1 State and Territory Product Priorities</i>	41
<i>Appendix 2 Estimates of Energy Costs as Percentage of Lifetime Costs</i>	43
<i>Appendix 3 Potential Energy, Cost and Greenhouse Gas Savings</i>	46

Summary

Government agencies (Commonwealth, State, Territory and Local) account for a significant share of national energy use, and for an important share of the market for energy-using products. Electricity consumption by governments totals about 4,900 GWh per annum (equivalent to about half the electricity used in the state of Tasmania) at a cost of over \$580M per year.

This study estimates the energy used in the range of products that are purchased by governments which fall within the scope of the National Appliance and Equipment Energy Efficiency Program (NAEEEP), and the potential for reduction in energy use and expenditure through the purchase of more energy-efficient products.

It also assesses the value to governments of using the Energy Allstars database of energy-efficient equipment towards the objective of increasing the energy-efficiency of product purchases. The Energy Allstars website specifies agreed criteria for 'High Efficiency' products and gives access to the database of models which meet the criteria. The website also enables users to conveniently calculate lifetime energy costs for any product listed, using whatever energy prices, discount rates and other parameters they chose to specify. The purchasing agency (or the tenderer) could then simply add this cost to the tender price to indicate lifetime costs.

Findings

The body of the report estimates capital and running costs for the Commonwealth, each State and Territory Government and for Local Government as a whole. Direct annual expenditure by all Governments on the products covered by the Energy Allstars database is estimated at about \$1,527M per annum. Computer hardware accounts for about 71% of this, office equipment for 20%, and consumer electronics (eg TV, video), lighting products, appliances and air conditioners for the other 9%.

The direct lifetime energy consumption associated with each year's government purchases of Energy Allstars-covered equipment is about \$394M. Most office equipment and lighting is installed in air-conditioned spaces, so the cost of removing the heat brings total lifetime energy cost to about \$513M, or about \$109M per year spread over the life of the equipment. Appliances differ from computers in that they remain in service longer and use far more energy in relation to their capital costs. Consumer electronics, lighting products, appliances and air conditioners account for about 58% of annual energy costs, even though they account for only 9% of capital costs.

The annual expenditure on energy purchases has been used to estimate the potential energy savings, and hence cost savings, from increases in the energy-efficiency of the equipment purchased. The preliminary estimate is that the widespread purchase and optimum use of Energy Allstars products would reduce the energy use of newly installed computers by 7% after 6 years, and up to 15% for appliances.

If strategies to encourage purchase of energy-efficient products are put in place in 2006 and build up to maximum effect by 2011, government expenditure on the energy consumed by Energy Allstars covered products (which accounts for the majority of

government non-transport energy use) could be about 10% below business-as-usual (BAU) by 2011 and 12% below by 2020. This would represent a saving of about \$48M per annum by 2011, rising to \$71M per annum by 2020 (Figure S1). On these assumptions, the cumulative total energy savings to governments could total \$727M by 2020, with a net present value of over \$300M (at a discount rate 10%).

These savings can be achieved at relatively low cost. The integration of Energy Allstars into procurement practices will mostly involve changes in content rather than new activities or channels. The more energy-efficient equipment which Energy Allstars will promote will in many cases cost the same, or if more expensive, the difference will be exceeded by the value of lifetime energy cost savings and so represent better overall value for money – otherwise agencies will not purchase them.

The greenhouse gas reductions associated with the electricity saving could reach 520 kt CO₂-e per annum by 2020, and average 280 kt CO₂-e in each year of the Kyoto commitment period (Figure S2). About 45% of the saving would come from computers (and the associated indirect air conditioning energy), 29% from lighting and 16% from appliances.

Conclusions

There appears to be a potential for significant savings in government expenditure through the purchase of products that have lower energy use and hence lower lifetime costs. However, the magnitude of this potential is somewhat speculative at this stage, because the data on the current pattern of government purchases available to this study was incomplete.

Much of the potential lies in the purchase of more energy-efficient lighting, appliances and air conditioners, rather than computers or office equipment. This is because:

- the energy share of lifecycle costs is far higher for lighting, appliances and air conditioners;
- many government purchasers already specify the Energy Star power management criteria for computers and office equipment (which, if utilised, will realise much of the energy savings potential) whereas there are no widespread high-efficiency criteria for other product categories.

Purchasing agencies would benefit from assistance with:

- Guidance on ‘high efficiency’ criteria for energy- (and water-) using products
- Identifying the products that meet those criteria; and
- Systematically calculating the lifetime costs of alternative purchases.

The Energy Allstars database is expressly designed to provide this assistance, so integrating it more closely into purchasing procedures would be of considerable value to government agencies.

Figure S1 Projected reduction in annual expenditure by governments on energy use by Energy Allstars-covered products, 2005-2020

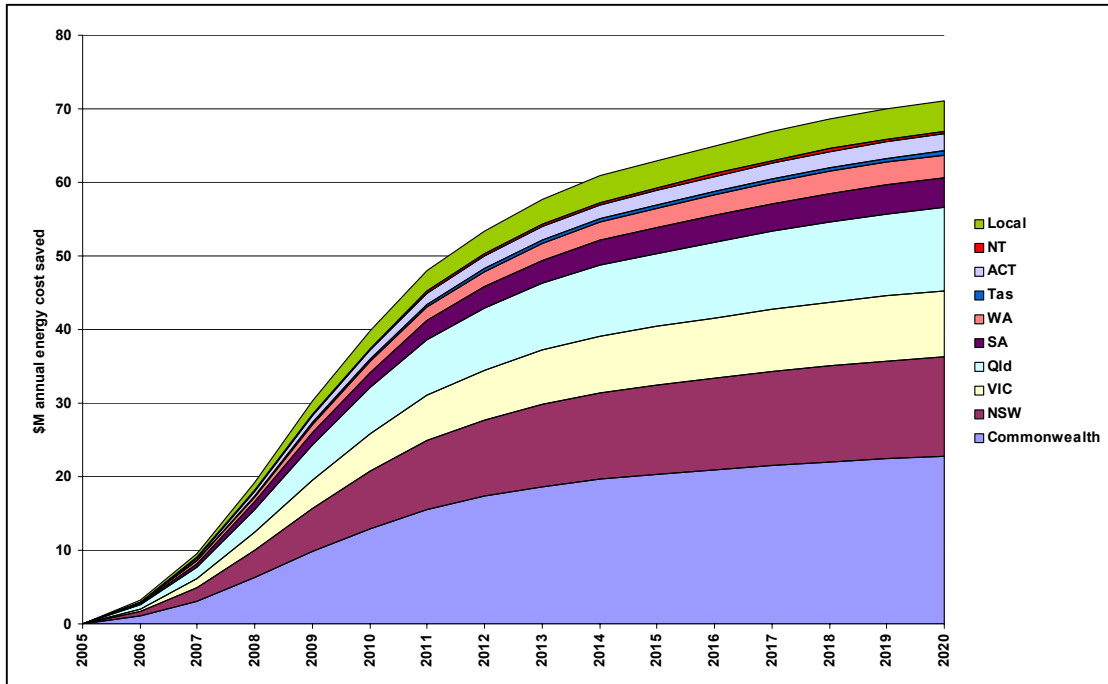
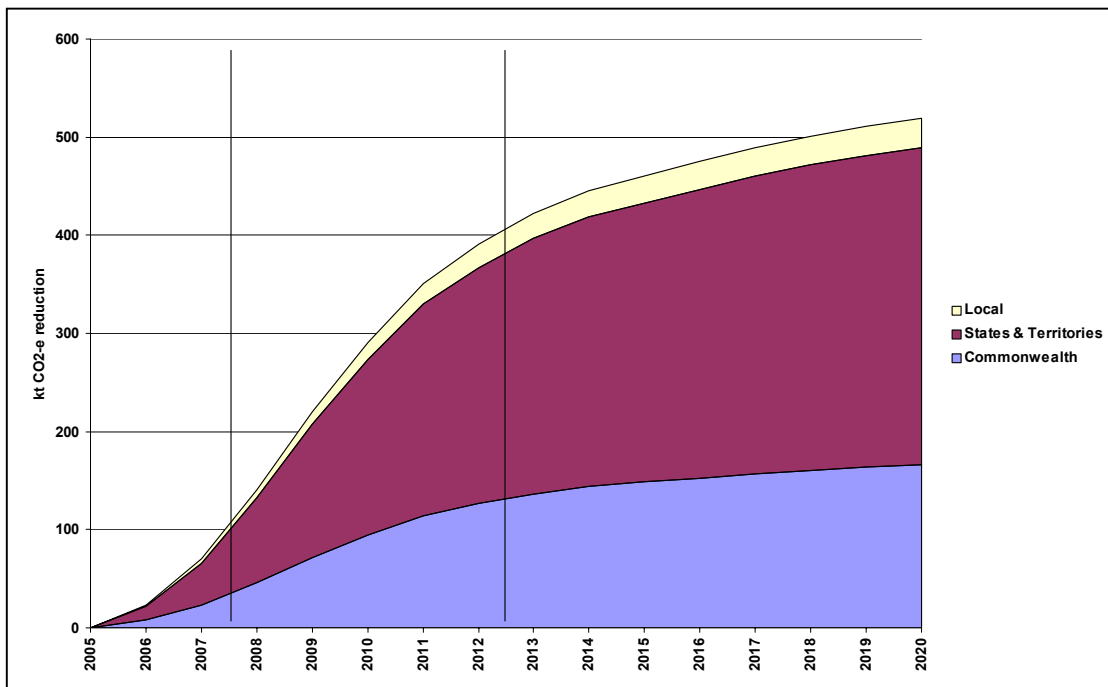


Figure S2 Projected reduction in greenhouse gas emissions from government use of Energy Allstars-covered products, 2005-2020



However, on the information available for this study, purchasing arrangements and procedures vary significantly by jurisdiction, so the best way to integrate the use of Energy Allstars may well be different for each government. If the use of Energy Allstars grows, the site itself could become a focus for gathering data that will assist its further development and assess its impacts.

For the time being, the most effective way for Energy Allstars to support the energy efficient purchase and use of computer equipment is to reiterate the value of power management, which can be done by referring users to the Energy Star website. Maintaining an up-to-date list of complying equipment may well be unnecessary, if Energy Star compliance is already part of government contract specifications. In the longer term, it is possible that Energy Allstars will adopt more stringent energy efficiency criteria than Energy Star, and will list the models complying with those criteria.

One practical problem to be resolved is how to combine data about product price, energy use and energy costs for government users of Energy Allstars. Each jurisdiction is likely to face different (and confidential) contract prices for the same products. If users are sufficiently trained and motivated, they can obviously enter product prices and energy prices into the Energy Allstars calculator themselves, but a more user-friendly way would be for each jurisdiction to link its private data set to the product data in Energy Allstars.

Glossary

AGO	Australian Greenhouse Office
APCC	Australian Procurement and Construction Council
BAU	Business as Usual
CA	Capital assets
Direct energy	Energy use by products
G&S	Goods and services
HE	High Efficiency (a designation controlled by Australian Standards)
ICT	Information and communications technology
Indirect energy	Energy used by air conditioners to remove the heat released through the direct energy use of products within air-conditioned areas
MEPS	Minimum Energy Performance Standards
NAEEEP	National Appliance and Equipment Energy Efficiency Program
NPV	Net present value

Background

Government agencies (Commonwealth, State, Territory and Local) account for a significant share of national energy use, and for an important share of the market for energy-using products. For some products routinely purchased by government agencies, the operating energy costs are comparable to the initial purchase price.

Many governments' purchasing policies include a general intention to purchase products with low environmental impacts over their service lives, but the ways of giving effect to those intentions vary considerably.

Some agencies specify that products purchased must meet specified energy performance criteria (eg comply with Energy Star standby power consumption criteria, or achieve a given number of stars on the energy label). Some agencies encourage a procedure for calculating a 'lifetime cost' that includes energy and other operating costs as well as capital cost. However, there is no consistency in the way that lifetime costs are calculated.

In December 2004 the Chair of the Ministerial Council on Energy (MCE), wrote to the Chair of the Australian Procurement and Construction Ministerial Council (APCMC) seeking support to implement a National High Energy Efficiency Procurement Policy.

The MCE has agreed on the policy and, as a means of supporting the policy, is developing an internet-accessible database (www.energyallstars.gov.au) initially listing energy efficient electrical appliances and equipment. Equipment that is efficient in the use of other forms of energy (eg gas) and water can be added later.

It is proposed that the MCE will launch the Energy Allstars website in November 2005. The MCE has proposed that the APCMC support and assist the implementation of the initiative by:

- giving preference to Energy Allstars-listed products in purchasing, provided they meet all other purchase criteria;
- promoting the Energy Allstars website as an aid in the implementation of environmentally sustainable purchasing objectives;
- linking the Energy Allstars database to their procurement databases, training materials and procurement communications channels (where appropriate).

As supplier and purchaser familiarity with the website increases, it may in due course be desirable to mandate, at least for some classes of products, that purchases be restricted to those listed on the database.

The Energy Allstars Product Database

For most energy-using products on the market there is a significant range in the energy efficiency of the models on the market. Products may provide the same level of energy service, and be of similar price and quality, but differ with regard to:

- The energy consumed when actively operating;
- The energy consumed when in standby mode, ie not performing the primary function but still drawing power (computers, printers, video and audio equipment can use more energy in standby mode than in active mode); and
- Features which assist users to minimise energy consumption – eg computers with ‘Energy Star’ power management capability are intended to reduce power progressively when in standby mode, but the ease of enabling this feature and potential for conflict with other aspects of performance such as networking, may vary from model to model.

The National Appliance and Equipment Energy Efficiency Program (NAEEEP) is a co-operative program of Commonwealth, State and Territory governments that aims to increase the average energy efficiency of residential, commercial and industrial product sold in Australia. The Program is overseen by the Ministerial Council on Energy (MCE).

The NAEEEP encompasses a range on measures, including:

- Mandatory energy labelling of a range of electrical products (soon to cover gas-using products as well);
- The Top Energy Saver Award Winner (TESAW) voluntary label, available to the most efficient 10 to 15% of energy labelled products;
- Mandatory minimum energy performance standards (MEPS) for a range of products;
- The setting of ‘High Efficiency’ (HE) criteria for certain products, to distinguish them from models which just meet MEPS; and
- The ‘Energy Star’ voluntary label for products that meet prescribed power management criteria.

The main aim of these measures is to inform prospective buyers about the energy efficiency and other energy-related features of the products they are considering, information which might not otherwise be available in a consistent and easily understandable form. This encourages buyers to give energy factors more importance in their decision, to select the models with the optimum combination of purchase price and running costs and encourages suppliers to provide more efficient products than would otherwise be the case.

MEPS are reserved for products where market barriers are such that highly cost-effective investments in energy-efficiency would be passed up, whatever information were available.

To maximise the reach, impact and value of the information which the NAEEEP collects on appliances, there is a website, www.energyrating.gov.au, listing all models registered for energy labelling, all models registered for MEPS (with HE models designated), and all models for which suppliers have sought a TESAW label.

The NAEEEP has also established a separate website, www.energyallstars.gov.au, to give prominence to the most energy-efficient products: those with a TESAW label and those which meet HE criteria. Suppliers can choose whether to have a model included in the Energy Allstars database, and if so they are requested to provide some additional information.

The NAEEEP also operates www.energystar.gov.au, which gives information about the Energy Star designation and the suppliers that support the Energy Star program, but does not list actual models. In fact, given that Energy Star is so widespread and covers so many models of computer, office and electronic equipment (many of which are on the market for only a short time before being superseded), it would be very difficult to maintain an up-to-date listing of complying products – it is more efficient to publicise the concept, the criteria and the logo.

Energy Allstars aims to increase the sales of high efficiency products by improving buyer knowledge of available products. For institutional buyers (business and government) this will help support ‘green’ procurement policies, by lowering the search costs for high efficiency products.

At present, energy criteria are the only ones used on Energy Allstars, but with the start of the Commonwealth-mandated Water Efficiency Labelling and Standards (WELS) program, water efficiency criteria can be added for products such as clothes washers and dishwashers. Also, coverage is restricted to products covered by other NAEEEP measures but in due course information about non-regulated product can be added.

Australian governments (Commonwealth, State, Territory and Local) represent an important group of potential users of the Energy Allstars database. They directly purchase a large quantity of products, they all have (or are developing) ‘green’ procurement policies, and they are constantly refining, streamlining and where practical, co-ordinating purchasing practices.

They also indirectly account for a very large volume of goods and services through their commissioning and purchase of new buildings, renovations, and occupation of leased accommodation.

Potential Value to Government Purchasers

A consistent procedure, agreed by all governments, for specifying energy-efficiency criteria and for identifying products meeting those criteria could lead to a range of benefits. The Energy Allstars database could be a central element in this approach. It could specify agreed criteria for 'High Efficiency' products, list the models that meet the criteria and offer calculation aids for comparing the value of alternative models.

For purchasing agencies, this would:

- Simplify tender and contract documents, because complex energy efficiency performance standards need not be incorporated in the documents;
- Reduce agency search costs, because the suppliers of energy-efficient equipment could be identified and located through the database;
- Ensure that the technical criteria for each product is up to date (eg if there is a re-scaling of product star rating scales, this would automatically be picked up in the database, but may not otherwise be covered in some agency tender criteria for some years);
- If listing on the database involved some independent verification and quality control, it would reduce or avoid the need for individual agencies to validate product performance data;
- Ensure consistency of energy efficiency criteria across agencies and levels of government. Over time, the increased economies of scale available to suppliers of energy efficient equipment should reduce the costs of such equipment to all purchasers, both within and outside government.

The database could also enable users to conveniently calculate lifetime energy costs for any product listed, using whatever energy prices, discount rates and other parameters they chose to specify. The purchasing agency (or the tenderer) could then simply add this cost to the tender price to indicate lifetime costs.

Clearly, the database could also substantially reduce administrative and tendering costs for suppliers of the equipment listed on it, since they would only need to register product performance data once, in a standard format rather than resubmit the data, possibly in different formats, to different agencies.

Potential Benefits

The immediate benefits for government users of the database would be to simplify and hence reduce the costs of compliance with purchasing guidelines, which increasingly call for lifetime costs and environmental impacts to be taken into account, not just purchase price.

In the medium to longer term, effective implementation of these policies should lead to significant reductions in energy costs to governments, and reductions in the

environmental impacts (eg greenhouse gas emissions) of energy use in government operations.

Potential Costs

There would also be costs and risks to basing an energy efficient product purchase policy on this approach. These would include:

- The costs of establishing and maintaining the product database. These include the costs of publicising its existence to suppliers, promoting the value to them of registering products (especially if there is a fee) and the costs of entering data and of validation and quality control procedures;
- Possibly paying higher prices than they would otherwise, due to restricted supplier competition in the event that purchasing procedures require agencies to restrict their search to products on the database;
- The risk that the database is not comprehensive, because suppliers of products that meet the criteria are unaware of the database, do not perceive sufficient value from registration, or are deterred by fees or cumbersome procedures;
- The risk that energy inefficient products not qualifying for the database might have significantly lower life cycle costs, because their low purchase price more than compensates for their higher energy consumption cost; and
- The risk that products on the database may lack other key performance attributes unrelated to energy-efficiency.

Managing Benefits and Costs

The development and phasing of the purchase procedures and the design of the product database, offer the opportunity to maximise benefits and reduce costs and risks.

Purchasing agencies could phase in their use of the product database as follows:

1. Optional use - Reference to the database in agencies' tenders would be recommended but not mandatory;
2. As a reference - Tenderers could be requested to offer products that met the energy efficiency criteria for that product as given on the database, whether or not the products were actually registered. This would motivate suppliers to familiarise themselves with the database and to register products; and
3. Mandatory use - The default would be to restrict tenders to products on the database, unless there were less than a minimum number of products (say three) of that type listed, or unless special requirements unrelated to energy performance over-ride energy efficiency criteria.

A phased approach would enable purchasing agencies and suppliers to build up their familiarity with and confidence in the database over time, and so reduce the risks to all parties. The benefits of this approach are likely to be greater with co-ordination, with milestones and progress reviews agreed between the purchasing agencies, rather than with ad hoc decisions by individual agencies.

This Study

This study was commissioned by the Australian Greenhouse Office (AGO) with the assistance of the APCC Leadership Group. The aim is to clarify the benefits and costs of:

- adopting a co-ordinated preferencing policy for high energy efficiency products; and
- using the Energy Allstars database as a central element in that policy.

The study was required to:

- (a) Estimate the magnitude (in dollar terms and product numbers) of the annual government procurement market for the products to be included in the database (see Table 1), projected over the period 2005 - 2015;
- (b) Estimate the lifetime energy consumption, energy costs and hence lifetime costs of those products (taking into account both direct energy use and indirect use via heat load on air conditioners);
- (c) Estimate the potential for increasing the energy-efficiency of government-purchased products, and hence reducing projected energy costs;
- (d) Estimate the potential for increasing the purchase price of products through
 - (i) increasing the average price of products purchased by governments (ie to the extent that more energy efficient products cost more than less efficient products), and/or
 - (ii) limiting supplier competition by restricting tendering to registered products;
- (e) Estimate the on-going administrative costs of establishing and maintaining the database of products;
- (f) Estimate the impact on agencies' administrative costs of the proposed tendering approach;
- (g) Compare the likely costs and benefits to purchasing agencies – quantitatively where possible, qualitatively if not;
- (h) Assess (in general terms) the spin-off benefits to the economy as a whole from greater government purchase support for energy efficient products;
- (i) Assess the impacts of the proposals for businesses, especially small businesses, supplying or seeking to supply those products to government;
- (j) Identify major risks to stakeholders, including government agencies and product suppliers;
- (k) Propose ways to monitor and minimise those risks; and
- (l) Assess the consistency of the approach with international obligations under Closer Economic Relations with New Zealand and the Free Trade Agreement with the

USA, with regard to comparable product databases and product energy efficiency criteria used in New Zealand government and in US Federal Government procurement.

Table 1 Energy Allstars-covered product categories

Category	Product
Major appliances	Refrigerators and freezers
	Clothes dryers
	Clothes washers
	Dishwashers
Water heaters	Electric water heaters
	Gas water heaters
Heating	Gas ducted heaters
	Gas room heaters
	Electric heaters (all types)
Cooling	Air conditioners (refrigerative, inc. reverse cycle)
	Other (evaporative coolers, fans etc)
Lighting	Fluorescent lamps
	Fluorescent lamp ballasts
	Halogen lamps & transformers
	Other lamps
	Lighting controls (eg motion detectors, dimmers)
	Luminaires (light fittings)
Computer equipment	Desktop computers
	Monitors for desktop computers
	Laptop computers
	Modems (separately purchased)
	External power supplies (separately purchased)
	PC speakers (separately purchased)
Office equipment	Photocopiers
	Printers
	Faxes
	Multi-function devices
Consumer electronics	Television sets (all screen types)
	DVD players & recorders
	Digital set top boxes
	Audio equipment
Other commercial equipment	Refrigerated display cabinets
	Boiling & chilled water dispensers
	Ice makers
	Security systems
	Smoke alarms
Industrial equipment	3-phase electric motors
	Distribution transformers

Source: see www.energyallstars.gov.au

Sources of Information

With the assistance of the APCC Leadership Group and Mark Ellis and Associates (the consultants developing the Energy Allstars database), George Wilkenfeld and Associates (GWA) sent questionnaires to representatives of the Commonwealth, State and Territory government agencies responsible for procurement policy. These covered:

- Purchases by value and quantity of the product categories covered in the Energy Allstars database;
- How lifetime cost and environmental impact considerations are given practical effect in purchasing;
- The agencies covered by central purchasing agreements, practices and contracts, and their degree of flexibility;
- Energy expenditures by government agencies;
- The availability of data on products actually purchased by agencies;
- A priority rating (high, medium, low and not applicable) for the products proposed for coverage in the database.

GWA is grateful to the APCC Leadership Group and the agencies that returned questionnaires or otherwise provided data (see References).

GWA also made use of the websites of government procurement agencies, many of which publish very informative purchasing guidelines and contract specifications.

Government Equipment and Energy Purchases

Total Procurement

Estimates of expenditure by Australian governments on goods and services, including on the types of equipment covered by Energy Allstars, proved very difficult to compile, for a number of reasons:

- The actual agencies covered by the data are not always clear - some estimates include 'inner' departmental expenditure only, some include 'outer budget' expenditure such as police stations and schools, and some include expenditures by government-owned corporations such as transport and water supply;
- Not all products are purchased under centrally-administered contracts, and even where they are, the extent of reporting back to the agency administering the contracts varies considerably;
- Many contracts cover several classes of equipment, so even if totals spent under a contract are available it is not always clear which equipment was purchased.

The APCC estimates that total annual expenditure by Commonwealth, State and Territory governments on goods and services (G&S) and capital assets (CA) was \$61,064M in 2001/02, or \$3,100 per capita (Table 2). This represented 8.5% of GDP. It does not include public service salaries, or procurement by local government.

Table 2 Estimated Commonwealth and State expenditure, 2001/02

Jurisdiction	Goods & services \$M	Capital assets \$M	Total \$M	Notes	Popul- ation (‘000)	Goods & services \$/cap	Capital assets \$/cap	Total \$/cap
NSW	10,500	6,500	17,000	(a)(b)	6,566	1,599	990	2,589
Victoria	9,400	2,300	11,700	(c)(d)	4,786	1,964	481	2,445
Queensland	5,750	4,478	10,228	(e)	3,706	1,552	1,208	2,760
SA	1,600	NA	1,600	(f)(g)	1,506	1,062	0	1,062
WA	3,348	1,752	5,100	(f)	1,949	1,718	899	2,617
Tasmania	108	478	586		469	231	1,019	1,250
ACT	525	275	800	(f)	322	1,629	852	2,481
NT	400	350	750		208	1,919	1,679	3,598
States total	31,632	16,132	47,764		19,513	1,621	827	2,448
Commonwealth	11,970	1,330	13,300	(h)	19,513	613	68	682
All of above	43,603	17,463	61,064		19,513	2,235	895	3,129

Source: Author estimates based on data from APCC Leadership Group (shaded cells) (a) G&S expenditure by budget sector and non-budget sector, including State Owned Corporations. (b) CA expenditure includes maintenance operating expenditure. (c) G&S expenditure by Government departments approximately \$14,000M in 1998/99. Balance is expenditure by outer budget agencies. (d) Gross fixed capital expenditure (excluding capital grants and other capital outlays) by Government departments was \$1,140M in 1998/99. Balance is expenditure by non-financial corporations. (e) CA includes land and other acquired real property not normally included as procurement related expenditure. (f) Allocation of total between G&S (66%) and CA (34%) based on average for States where allocation is identified. (g) All of total allocated to G&S based on per capita expenditures. (h) Allocation based on author estimate of 90% to G&S; capital formation share lower than for States, given that Commonwealth is not directly responsible for schools, health care facilities, emergency services etc.

ICT Procurement

Of the \$43,600M expenditure on goods and services by Commonwealth and State agencies, about \$8,400M, or nearly 20%, was related to information and communications technology (ICT). Local government spent a further \$680M on ICT goods and services. The main elements in the other 80% or so of recurrent procurement expenditure (excluding construction of capital assets) were vehicles and fuel, energy, travel, postage, printing, professional services, and rental and accommodation.

The most recent ABS survey of government expenditure on ICT covers 2002/03 (ABS 2004). The results, summarised in Table 3, indicate that Governments spent \$1,001M on the purchase of computer hardware and peripherals (storage devices, outboard modems etc), and a further \$347M on communications equipment. Computer hardware expenditure is broken down in more detail in Table 4.

Table 3 Summary of ICT Expenditure by Level of Government, 2002/03

Jurisdiction	Wages & salaries ICT employees \$M	ICT contract services \$M (a)	Total operating expenses \$M	Computers & peripherals \$M	Communications equipment \$M	Software purchases \$M	Total capital expenditure \$M	Total cap + operating \$M	Share by jurisdiction
Commonwealth	836	2,270	3,106	428	188	485	1,101	4,207	46.5%
State & territory	710	2,425	3,135	498	153	412	1,063	4,198	46.5%
Local	143	366	509	75	6	88	169	678	7.0%
Total	1,689	5,061	6,750	1,001	347	985	2,333	9,083	100.0%
	18.6%	55.7%	74.3%	11.0%	3.8%	10.8%	25.7%	100.0%	

Source: ABS (2004) (a) Includes telecommunications services, outsourced IT and software maintenance.

Table 4 Annual Expenditure on Computer Hardware by Level of Government

	2002/03(a) \$M	Latest \$M
Commonwealth Government	428	NA
NSW Government	108	192 (b)
Victorian Government	114	NA
Queensland Government	142	NA
South Australian Government	47	36 (c)
Western Australian Government (ABS)	53	NA
Tasmanian Government	5	NA
ACT Government	26	NA
Northern Territory Government	3	NA
Total State Governments	498	NA
New South Wales	32	NA
Victoria	13	NA
Queensland	14	NA
South Australian Government	5	NA
Western Australia	7	NA
Tasmania	3	NA
ACT	NA	NA
Northern Territory	1	NA
Total Local Governments	75	NA
All government	1,001	NA

Source: (a) ABS (2004) (b) Annual estimate pro-rated from expenditures for first 8 months of 2004/05 (personal communication) (c) Personal communication

For the present project, questionnaires were sent to government procurement officials in each State, Territory and the Commonwealth, requesting the latest information on expenditure on the product types to be included in the Energy Allstars database. Not all responded, and not all responses were complete, but the data provided indicate that expenditure on computer hardware can vary considerably from year to year (Table 4).

Energy Allstars Equipment Purchases

Information provided by government procurement officials allows some estimates of annual expenditure on the other products covered by Energy Allstars, grouped in the following categories (see Table 1):

- Office equipment - photocopiers, printers, fax machines, scanners and products that can perform all of these functions ('multi-function devices'). Photocopier costs (purchase or lease) tend to be the largest component of office equipment contracts, which often include consumables such as cartridges, but not paper;
- Consumer electronics - Television and audio equipment, sound and image recording etc;
- Lighting equipment - lamps, and lamp fittings in accommodation where the government agency is directly responsible for lighting management. However, a large proportion (perhaps the majority) of post-construction expenditure on lighting equipment would be undertaken by the owners/managers of leased accommodation, who would recover the costs in the rental;
- Domestic heating, cooling, water heating and major appliances (electric and gas) and commercial variants of the same equipment. This includes refrigerators, dishwashers, clothes washers, dryers, water heaters, fixed space heaters, air conditioners, refrigerated display cabinets, icemakers, boiling and chilled water dispensers etc. Some of the products are purchased for kitchens, amenity or food service areas in offices, schools and other public or institutional buildings, and some are purchased for residential applications such as public housing or police, teacher or defence force housing;
- Industrial equipment such as electric motors and electricity distribution transformers. These would be relatively rare purchases for government agencies, although they may be purchased more frequently by state-owned utilities, whose purchasing now tends to be completely devolved. They are excluded from further analysis.

Apparent expenditure on these categories varies considerably according to the agency responsibilities and reporting practices in each jurisdiction, and only a few jurisdictions have provided data, so the estimates are approximate at best.

However, it appears that direct annual expenditure on the above categories combined accounts for between 20% and 30% of the products proposed to be covered by Energy Allstars, with computer hardware accounting for between 70% and 80%.

This does not capture the full extent of government-supported purchase of lighting equipment, air conditioners and major appliances or commercial equipment, since much of this would be purchased under capital contracts (eg the construction of new facilities), or by building owners and managers providing accommodation services under recurrent leases.

Direct annual expenditure by Governments on the products covered by the energy Allstars database are estimated in Table 5. The estimates for NSW, WA and SA are based on actual reported data, and the average allocation of expenditure for those States is applied to the others. These assumptions lead to the estimate that computer hardware typically accounts for about 71% (by value) of annual State and Territory government procurement of Energy Allstars-covered products, office equipment for 20% and consumer electronic, lighting and appliances, heating and cooling for about 3% each.

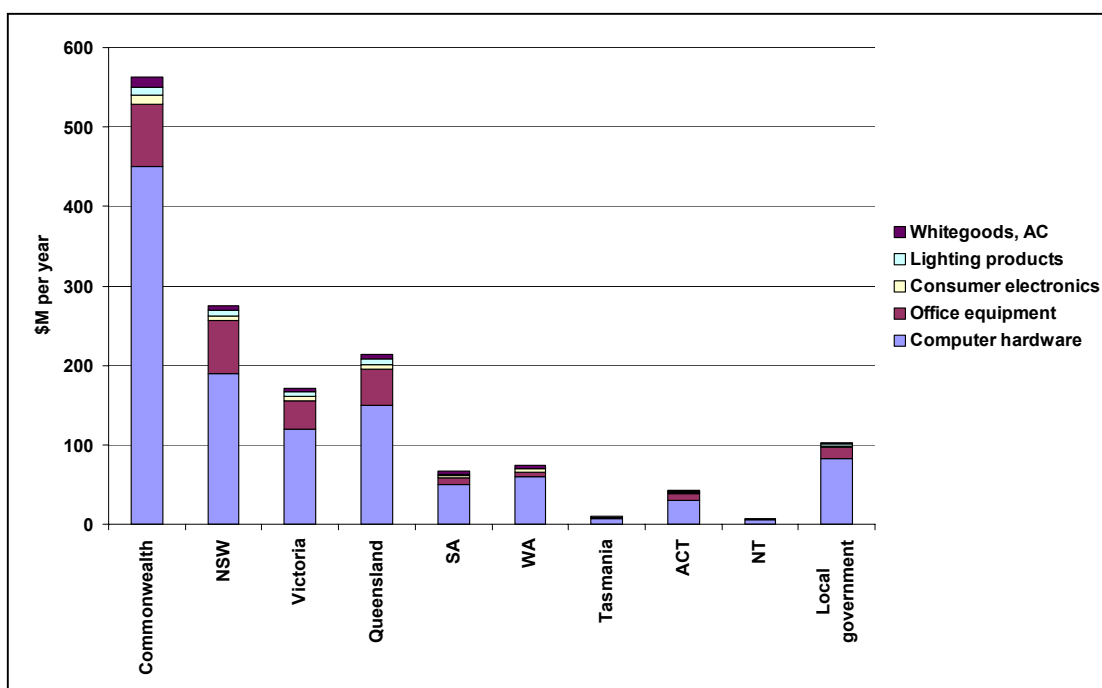
For the Commonwealth and Local governments, which provide a narrower range of direct services to the public, it is assumed that non-computer purchases account for 20% of Allstars-covered purchases, rather than the 29% average at the State level. Allocating these in the same proportion as for the States gives the values in Table 5. These estimates are illustrated in Figure 1.

Table 5 Estimated Annual Capital Expenditure on Energy Allstars-covered Products, by Level of Government

Jurisdiction	Computer Hardware		Office Equipment		Consumer Electronics		Lighting Products		Appliances, heating, cooling		Total \$M
	\$M	%	\$M	%	\$M	%	\$M	%	\$M	%	
Commonwealth	450.0	80%	78.5	14%	11.4	2%	11.0	2%	11.7	2%	563
NSW state	190	69%	66.1	24%	5.5	2%	8.2	3%	5.5	2%	275.4
Victoria state	120	70%	36.0	21%	5.1	3%	5.1	3%	5.1	3%	171.4
Queensland state	150	70%	45.0	21%	6.4	3%	6.4	3%	6.4	3%	214.3
SA state	50	75%	8.7	13%	2.7	4%	2.0	3%	3.3	5%	66.7
WA state	60	81%	5.9	8%	3.7	5%	0.7	1%	3.7	5%	74.1
Tasmania state	7	70%	2.1	21%	0.3	3%	0.3	3%	0.3	3%	10.0
ACT	30	70%	9.0	21%	1.3	3%	1.3	3%	1.3	3%	42.9
NT	5	70%	1.5	21%	0.2	3%	0.2	3%	0.2	3%	7.1
State/Territory	612.0	71%	174.3	20%	25.2	3%	24.3	3%	25.9	3%	862
NSW local	35.2	80%	6.1	14%	0.9	2%	0.9	2%	0.9	2%	44.0
Victoria local	14.3	80%	2.5	14%	0.4	2%	0.3	2%	0.4	2%	17.9
Queensland local	15.4	80%	2.7	14%	0.4	2%	0.4	2%	0.4	2%	19.3
SA local	5.5	80%	1.0	14%	0.1	2%	0.1	2%	0.1	2%	6.9
WA local	7.7	80%	1.3	14%	0.2	2%	0.2	2%	0.2	2%	9.6
Tasmania local	3.3	80%	0.6	14%	0.1	2%	0.1	2%	0.1	2%	4.1
NT local	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACT local	1.1	80%	0.2	14%	0.0	2%	0.0	2%	0.0	2%	1.4
Local Government	82.5	80.0%	14.4	14.0%	2.1	2.0%	2.0	1.9%	2.1	2.1%	103
All Governments	1144.5	74.9%	267.2	17.5%	38.7	2.5%	37.3	2.4%	39.7	2.6%	1527

Source: Author estimate based on private communications by State procurement agencies

Figure 1 Estimated annual capital expenditure on Energy Allstars-covered products, by level of government



Source: Table 5

Energy Consumption

The capital cost of equipment is only part of the lifetime cost of ownership. Energy purchases and maintenance costs also contribute. Energy costs depend on the efficiency of the equipment when operating, on the hours and patterns of use and, for computers, copiers and printers, on how power is managed when the equipment is idle.

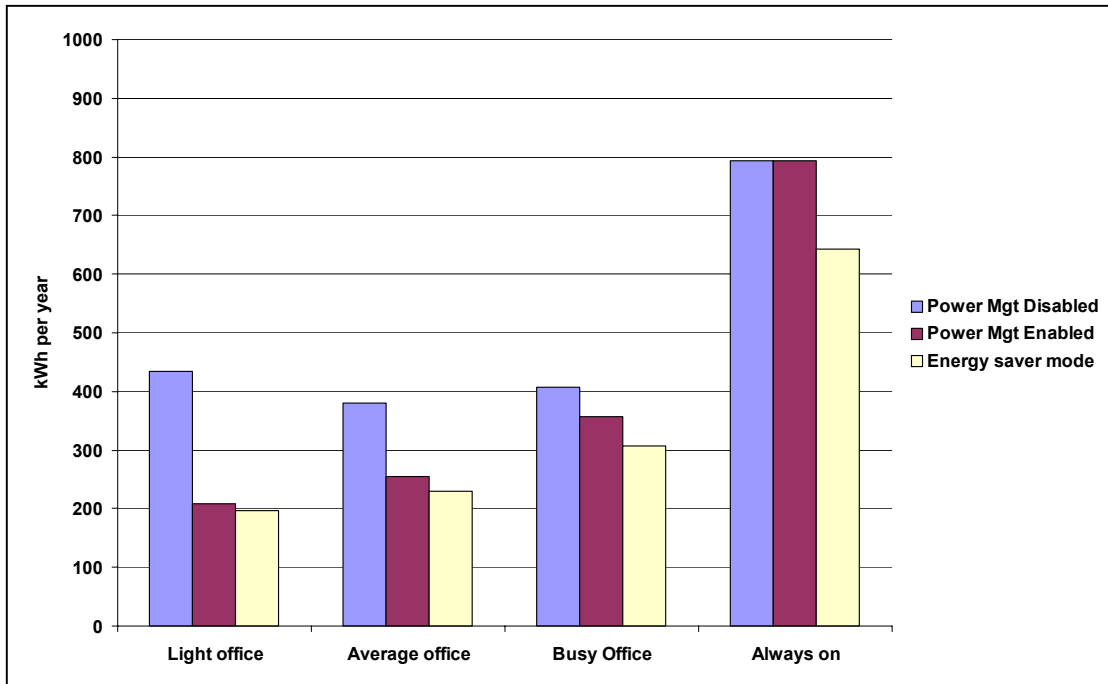
Power management capabilities are now incorporated in nearly all computers and office equipment sold in Australia and indeed around the world, and in many consumer video and audio products as well. The presence of these features is indicated by the 'Energy Star' logo, owned by the United States Environment Protection Agency, which also sets the technical criteria.

Many state government purchasing criteria already specify that desktop computers, VDUs, laptops, copiers, printers and fax machines must meet Energy Star criteria. This generally means that the product should be installed with power management features enabled, although they are sometimes disabled by users due to technical problems (eg incompatibility with network requirements)¹ or convenience (eg unwillingness to wait for copiers to come out of sleep mode). Also, users can select different levels of power management available, which interact in different ways with individual work patterns.

For these reasons it is difficult to predict the amount of energy that will be saved by the presence and settings of power management. Appendix 2 gives estimates for different product types; some of these estimates are illustrated in Figure 2 and Figure 3.

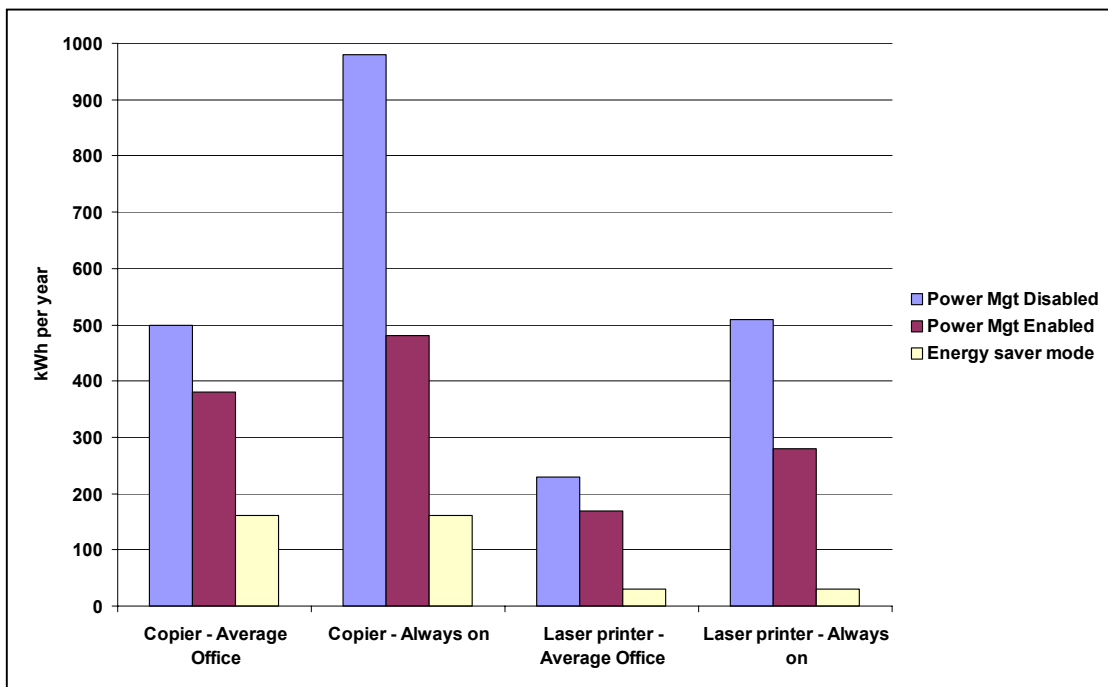
¹ Incompatibility between network needs and power management can be minimised by specifying 'Wake-on-Lan' capability, as in the latest NSW Government contract (NSW 2005).

Figure 2 Estimated energy use by typical desktop computer with 17” LCD monitor



Source: Appendix 2

Figure 3 Estimated energy use by typical copier and laser printer



Source: Appendix 2

A computer-VDU pair that is always on, even outside office hours, would consume about 800 kWh per year. In an average office this can be reduced by 70% through switching off and power management. The use of a laptop computer in place of a desktop can lead to energy reductions of similar magnitude. For copiers and printers,

the optimum use of power management alone can produce energy savings of 70-90%, even if the unit is always on.

These energy savings are available to governments through selecting inherently less energy intensive products (eg laptop rather than desktop computers), specifying Energy Star capability, ensuring the capability is enabled, and working with users to ensure it stays enabled and that equipment is switched off outside work hours. The scope for further energy savings by selection between different Energy Star products is limited. However, products may have more extensive power management capabilities than the minimum Energy Star criteria, and there are inherent energy differences between some product categories (eg desktop's and laptops), and these could be indicated in the Energy Allstars database.

Running Costs in Relation to Capital Costs

Computers and office equipment provide complex services in which energy consumption represents a relatively small proportion of lifetime energy cost, compared with capital cost and consumables such as inks, toners and paper. It is estimated that lifetime energy costs average about 10% of the capital costs for computer equipment and 12% for office equipment (see Appendix 2). Of course, the ratio can be far higher for those copiers and printers that are purchased for intensive use.

Appliances differ from computers in that they remain in service longer (an average of 15 years rather than 4) and use far more energy in relation to their capital costs – typically 1.3 times as much for refrigerators and up to 2.6 times as much for water heaters, taking into account only heat losses, not energy to heat water). Lighting equipment has an even higher ratio of energy use to capital cost – typically about 4.4.

Multiplying the capital cost of equipment purchases by the energy/capital cost ratio gives the direct lifetime energy consumption associated with each year's government purchases of Energy Allstars-covered equipment as about \$394M (Table 6). Most office equipment and lighting is installed in air-conditioned spaces, so the cost of removing the heat brings total lifetime energy cost to about \$513M. Figure 4 illustrates how this is distributed among the various layers of government.

Table 6 Estimated Annual Energy Expenditure on Energy Allstars-covered Products, by Level of Government (direct and indirect energy)

	Computer Hardware	Office Equipment	Consumer electronics	Lighting Products	Appliances heating, cooling	All products
Capital cost \$M (Table 5)	1144.5	267.2	38.7	37.3	39.7	1527
Energy/capital cost (a)	10%	12%	10%	440%	200%	31%
Average service life	4 yrs	6 yrs	6 yrs	4 yrs	12 yrs	4.7 yrs
Direct lifetime energy cost	114.5	32.1	3.9	164.1	79.5	394
Proportion in air-conditioned space	90%	90%	90%	80%	40%	NA
Total lifetime energy cost \$M (b)	155.7	43.6	5.3	216.6	92.2	513
% of total	30%	8%	1%	42%	18%	34%
Annual energy cost	38.9	7.3	0.9	54.2	7.7	109
% of total	36%	7%	1%	50%	7%	100%

(a) Appendix 2 – assumes 13c/kWh (b) Includes air conditioning energy consumption at COP of 2.5

Figure 4 Estimated annual energy expenditure on Energy Allstars-covered products, by level of government (direct and indirect energy)

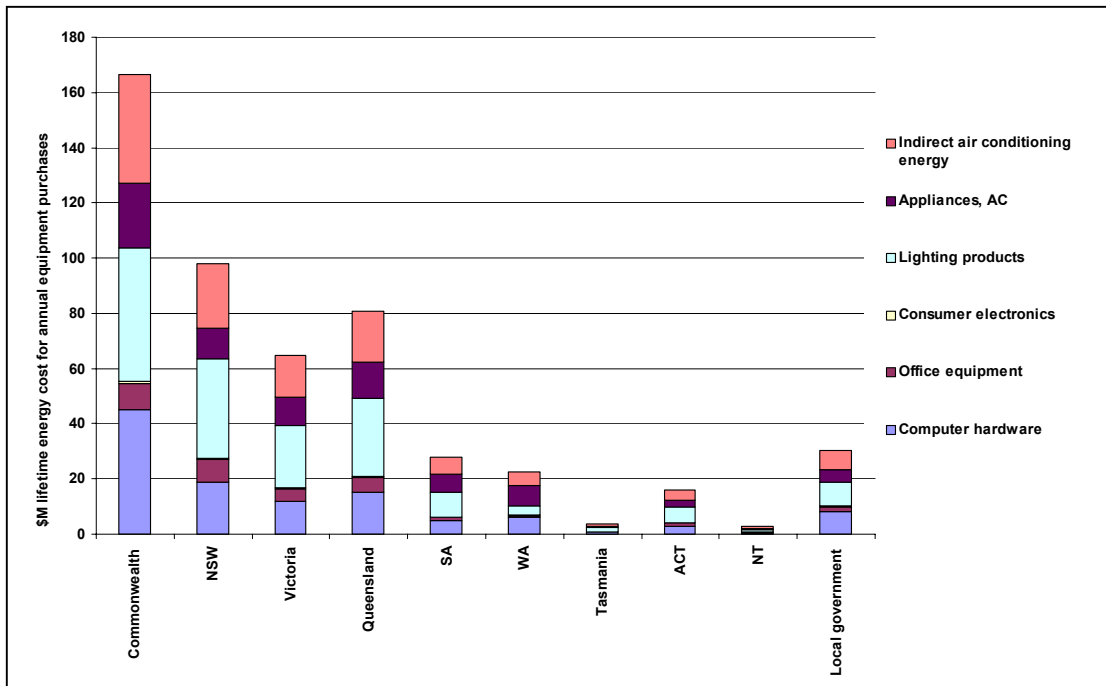
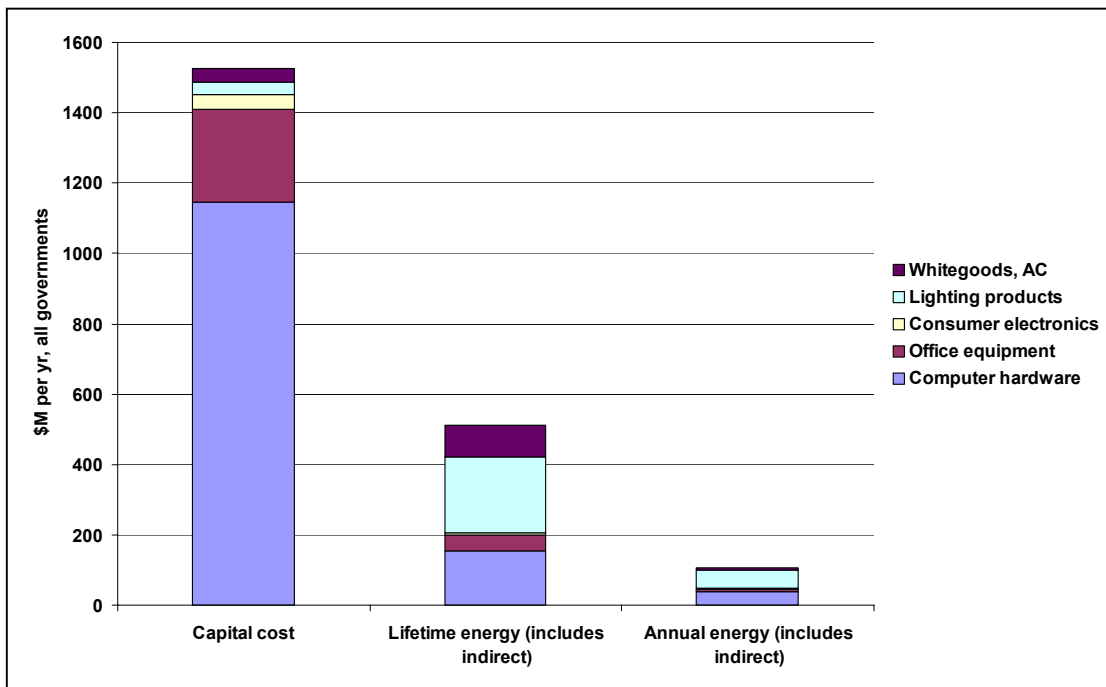


Figure 5 Capital costs, lifetime energy costs and annual energy costs associated with each year's purchases of Energy Allstars-covered equipment, all governments



Of course, the lifetime energy costs are not all incurred in the same year. For short-life products (computers and lighting equipment) they are spread over 4 years on average, and for long-life products (appliances and water heaters) they are spread over 12 years on average. Figure 5 illustrates the magnitude and shares of the capital costs, lifetime

energy costs and annual energy costs associated with each year's equipment purchases by all governments.

It is estimated that lighting equipment account for only 2.4% of annual capital purchases (Table 5), but 42% of the lifetime energy costs associated with those purchases, and fully 50% of the annual energy costs (Table 6). Similarly, appliances and air conditioning represent only 2.1% of annual capital costs but 18% of lifetime energy costs. This underscores the value to governments of selecting more energy-efficient lighting and appliances.

The above estimates apply to a yearly 'cohort' of equipment purchases made up more or less as described in Table 5. Total government expenditure on energy is made up of the overlapping annual energy use of previous cohorts of purchases, as well expenditure on the energy consumption of equipment not purchased directly by government – especially tenant light and power in rented or leased accommodation.

Expenditure by governments on electricity proved very difficult to estimate. Table 7 presents the author's best estimate of annual electricity consumption and expenditure by agencies of the Commonwealth, State and Territory governments and by Local Government. This indicates total electricity consumption of nearly 4,900 GWh per annum (equivalent to about half the electricity used in the state of Tasmania) at a cost of over \$580M. This is roughly consistent with the addition of about \$110M of annual electricity consumption from new equipment purchases each year (Table 6), the average service life of equipment and the progressive retirement of equipment purchased in earlier years.

Table 7 Estimated Annual Expenditure on Electricity Purchases by Commonwealth, State and Territory governments

	GWh	\$M
Commonwealth (a)	1,528	183
NSW (b)	563	68
Victoria (b)	636	84
Queensland (b)	860	86
SA (a)	500	65
WA (c)	408	53
Tasmania (a)	54	5
ACT (c)	31	4
NT (c)	3	0.4
State and Territory Governments	3,054	366
Local Government (all states) (c)	292	35
Total of above	4,875	584

(a) Electricity consumption reported in Energy Use in the Australian Government's Operations 2002-2003, AGO, December 2003; expenditure estimated. (b) Author estimates, based on partial data provided by states. (c) Author estimates based on comparison with other states.

Purchasing Practices

Environmental Standards and Lifetime Costs

All of the government procurement agencies that responded to our questionnaire already have, or are developing, guidelines to encourage the purchase of products which are resource efficient and have low environmental impacts. However, there is a very wide range in the degree of guidance (or leeway) given to agencies in interpreting the guidelines, and the extent of information and other support for giving effect to the guidelines in practical ways.

In some cases the only guidance is that purchasing should be based on ‘value for money’ and that value should be considered over the operating life of a product, but with no guidance on the relative importance of capital and operating costs. In other cases, some State Treasuries produce workbooks or sample formulae for discounted cash flow analysis.

The degree of central control over product specifications, the range of products and services covered by central contracts, the flexibility for agencies to purchase off-contract and the quality and extent of product information provided to agencies are all highly variable.

Of the product type covered by Energy Allstars, computer equipment purchases appear to be the most commonly subject to some central control, followed by office equipment - not surprisingly, since these categories are estimated to account for over 90% of capital expenditure on Energy Allstars-covered equipment.

In NSW, all agencies must purchase computer equipment under a whole-of-government contract (ITS 2000). This specifies a ‘minimum configuration level’ for desktop computers, file servers and workstations, which includes meeting the US EPA’s Energy Star standards (NSW 2005a). Energy Star does not appear to be mandatory for laptops, copiers, printers or fax machines, although, given that these are made for a world market, it would be difficult to purchase models which do *not* meet Energy Star.

NSW State Procurement also operates a website called ‘smartbuy®’ which ‘allows NSW government agencies and other organisations to browse, select and purchase goods and services online from approved suppliers to government.’ There are no minimum performance levels for the electrical appliances, air conditioners or consumer electronic products covered by contracts, but the product information listed on smartbuy® includes the energy label rating, where available.

Other jurisdictions have different ways of promoting energy efficient purchases. In some cases whole-of-government contracts for appliances may include products, which are selected partly on the basis of energy efficiency – eg meeting a minimum specified star rating – but it is not mandatory for agencies to use those contracts.

Where contracts refer to star ratings there is a risk that the criteria are locked in for a period of years, and do not take account of the dynamics of the labelling system, at least for some categories of product. For example the re-basing of the labelling scheme in

2000 meant that for a while there were very few models on the market meeting 5 stars but, with accelerated rates of efficiency improvement, there are now so many that a further filter – such as a listing on Energy Allstars - is required to identify the most energy efficient.

Purchasing Administrative Costs

The cost to governments of developing product specifications and establishing and administering procurement contracts is significant. The study of which we are aware found that the cost of the purchasing function across all Queensland Government departments was approximately 1% of the total cost of purchased goods and services.

Applying this ratio to the estimate of annual purchases of Energy Allstars-covered products (Table 5) suggests that the total cost of contract administration for such products amounts to about \$15M per year for all Australian governments.

Some of these costs would be fixed (ie independent of purchase volumes) and some would be variable. The costs of developing guidelines and supports for resource-efficient purchases would be largely fixed, and carried by the agency responsible for procurement policy. If the guidelines and supports are well designed, then the variable search and costs for purchasing agencies can be significantly reduced.

It is not possible to estimate the impact on procurement costs of better use of search tools such as Energy Allstars. However, in a situation where many governments are giving practical effect to general principles of 'value for money' and 'sustainability' in purchasing, the cost to purchasing agencies of developing their own criteria and of meeting those requirements through their own research could lead to a significant increase in their overall costs. Therefore it is timely to bring ready-made supports, such as the Energy Allstars database, to their attention.

Potential Energy and Lifetime Cost Savings

Savings

From the annual expenditure on energy purchases, it is possible to estimate the potential energy savings, and hence cost savings from increases in the energy efficiency of the equipment purchased. This has been done by modelling three factors:

- The demand for energy services in the government sector - for the purposes of this illustration this is projected to increase at 2.5% per annum, slightly less than the projected rate of GDP growth. All else being equal, the capital cost of equipment purchases and their energy consumption would also increase at this rate, if equipment and energy prices remain constant in real terms;
- The underlying, or 'business as usual' (BAU) increase in the energy efficiency of products. Even without active measures the energy efficiency of most product groups sold in Australia increases from year to year due to technological change and the import of products from countries with high energy prices and/or stringent minimum energy performance standards (MEPS); and
- The additional increase in energy efficiency brought about by active measures and programs, such as those involving greater use of Energy Allstars and other supports to resource-efficient purchasing and better power management of computer and office equipment.

The interaction of these three factors is illustrated in

Figure 6 (computers only, for clarity) and **Figure 7** (all Energy Allstars-covered product groups). The diagrams are based on the assumptions summarised in Table 8. Each line indicates electricity consumption in relation to 2005. The electricity consumption of each successive cohort of purchases would follow the top line if there were no changes in energy efficiency. However, the underlying increase in energy efficiency means that growth in energy use would follow the centre line – still increasing, compared with 2005, but less rapidly. With active energy-efficiency programs, the rate of growth in electricity use will be lower still – in fact energy use could remain constant for some years, until continuing growth in the demand for computing services and the exhaustion of the potential of the energy-efficiency measures take over and drives consumption up again.

The use of Energy Allstars in purchasing is the type of program that would have a natural limit. There would be a rapid reduction in energy use during the first years as more agencies use Energy Allstars to purchase more efficient products than would otherwise be the case, but once this effect reaches its maximum potential (or 'saturates') the rate of improvement reverts to the background BAU rate. The index line reverts to a parallel track, although at a lower energy consumption level. In simple terms, the area between the BAU line and the 'with-measure' line represents the energy saved by the measure.

It is assumed, for the purpose of this illustration, that the widespread purchase and optimum use of Energy Allstars products would reduce the energy use of newly installed computers by 7% after 6 years, and up to 15% for appliances (Table 8).

Figure 6 Indexed electricity consumption projection for computer equipment purchased by all Australian governments

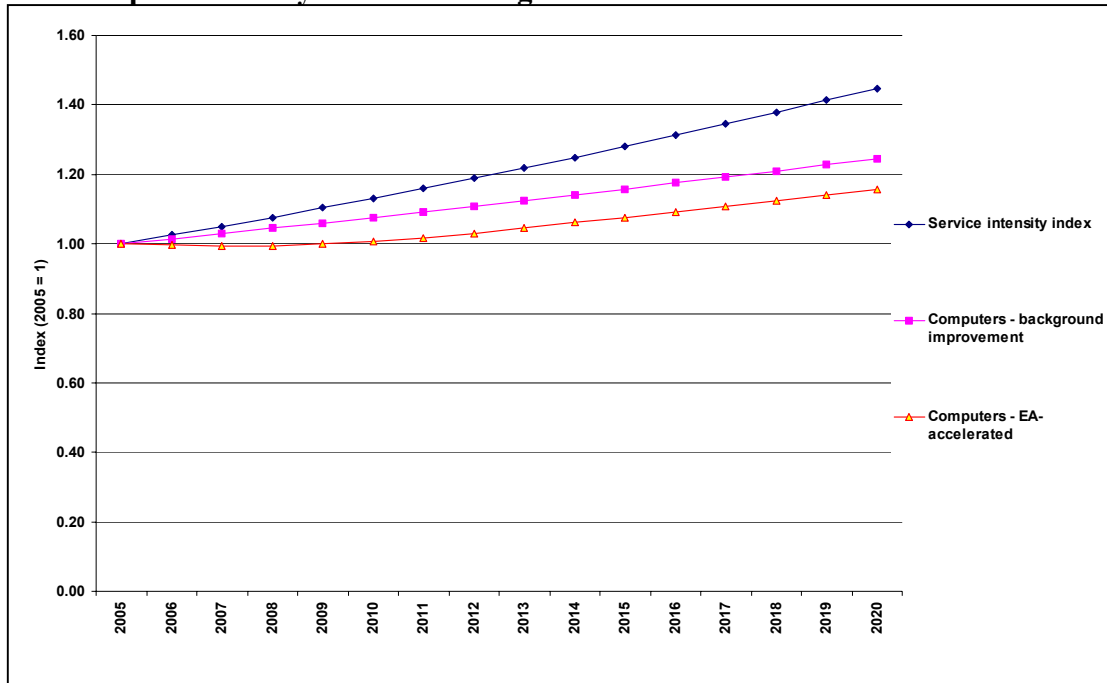


Figure 7 Indexed electricity consumption projection for all Energy Allstars-covered equipment purchased by all Australian governments

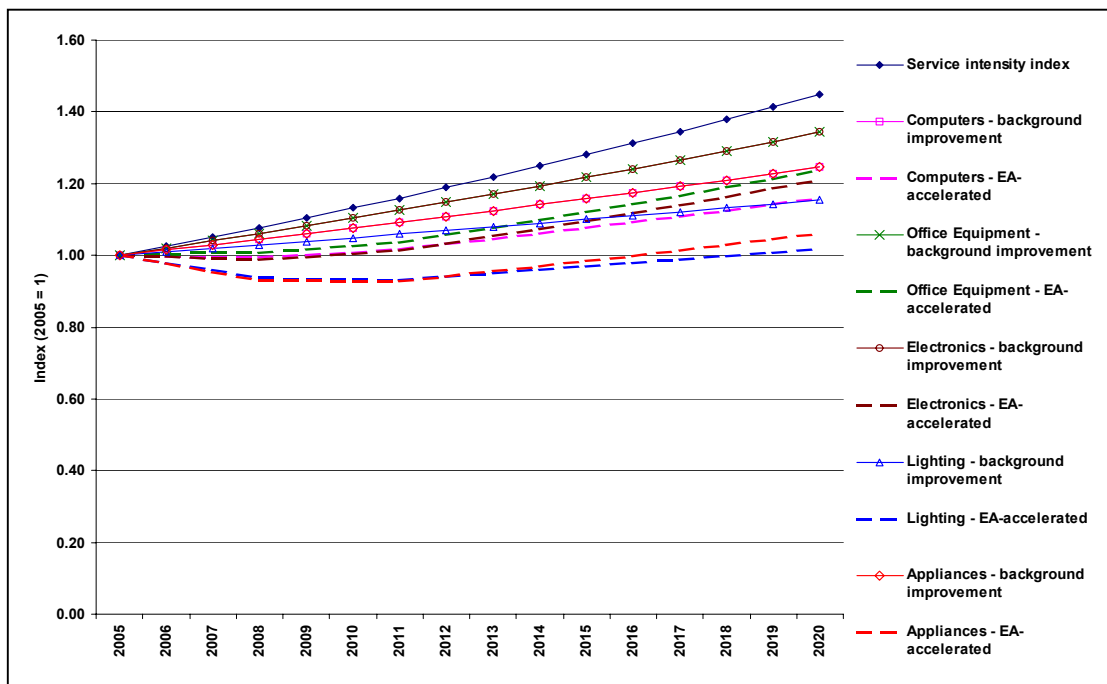


Table 8 Main Assumptions behind Projections in

Figure 6 and Figure 7

Product group	BAU efficiency increase		2005	2006	2007	2008	2009	2010	2011	2012
Computers	1.0%	Energy Index(a)	1.000	0.990	0.980	0.970	0.961	0.951	0.941	0.932
		Measure effect(b)	0%	1.7%	3.3%	5%	5.7%	6.3%	7%	7.0%
Office Eq	0.5%	Energy Index(a)	1.000	0.995	0.990	0.985	0.980	0.975	0.970	0.966
		Measure effect(b)	0%	1.7%	3.3%	5%	6.0%	7.0%	8%	8.0%
Electronics	0.5%	Energy Index(a)	1.000	0.995	0.990	0.985	0.980	0.975	0.970	0.966
		Measure effect(b)	0%	2.3%	4.7%	7%	8.0%	9.0%	10%	10.0%
Lighting	1.5%	Energy Index(a)	1.000	0.985	0.970	0.956	0.941	0.927	0.913	0.900
		Measure effect(b)	0%	3.0%	6.0%	9%	10.0%	11.0%	12%	12.0%
Appliances	1.0%	Energy Index(a)	1.000	0.990	0.980	0.970	0.961	0.951	0.941	0.932
		Measure effect(b)	0%	3.7%	7.3%	11%	12.3%	13.7%	15%	15.0%

(a) Electricity consumption of annual cohort of new equipment, compared with 2005 cohort, based on BAU efficiency increase rate. (b) % reduction in Energy Index due to impact of measure.

The projected annual expenditure by the three levels of government on the energy use of Energy Allstars-covered products (including the indirect air conditioning load) is shown in

Figure 8. The BAU case embodies the assumptions of a steady 2.5% per annum increase in the demand for energy services, offset by the background improvements in the energy efficiency summarised in Table 8. The ‘with-measures’ case assumes a more rapid increase in energy efficiency through a strong preference for the purchase of more efficient products. The Energy Allstars database would play a role in promoting such a preference, but most likely as part of a range of interlinked measures, rather than as the sole measure.

Assuming that these measures take effect in 2006 and build up to maximum effect by 2011, government expenditure on the energy consumed by Energy Allstars-covered products (which accounts for the majority of government non-transport energy use) could be about 10% below BAU by 2011 and 12% below by 2020. This would represent a saving of about \$48M per annum by 2011, rising to \$71M per annum by 2020.

Table 9 and Figure 9 break these projected savings down by levels of government. On these assumptions, the total cumulative energy cost savings to governments could total \$727M by 2020, with a net present value of over \$300M (at a discount rate 10%). About 45% of the saving would come from computers (and the associated indirect air conditioning energy), 29% from lighting and 16% from appliances (Figure 10).

Table 9 Projected Energy Savings, 2006-2020

	\$M reduction 2011	\$M reduction 2020	\$M 2006- 20Undiscoun ted	\$M 2006-20 at 10% disc.
Commonwealth	15.6	22.8	234	98
NSW	9.4	13.5	140	58
VIC	6.1	9.0	92	38
Qld	7.6	11.3	115	48
SA	2.6	4.0	40	16
WA	1.9	3.2	30	12
Tas	0.4	0.5	5	2
ACT	1.5	2.3	23	10
NT	0.3	0.4	4	2
Local	2.9	4.2	43	18
Total	48.1	71.1	727	302

Figure 8 Projected annual expenditure by governments on energy use by Energy Allstars-covered products, 2005-2020

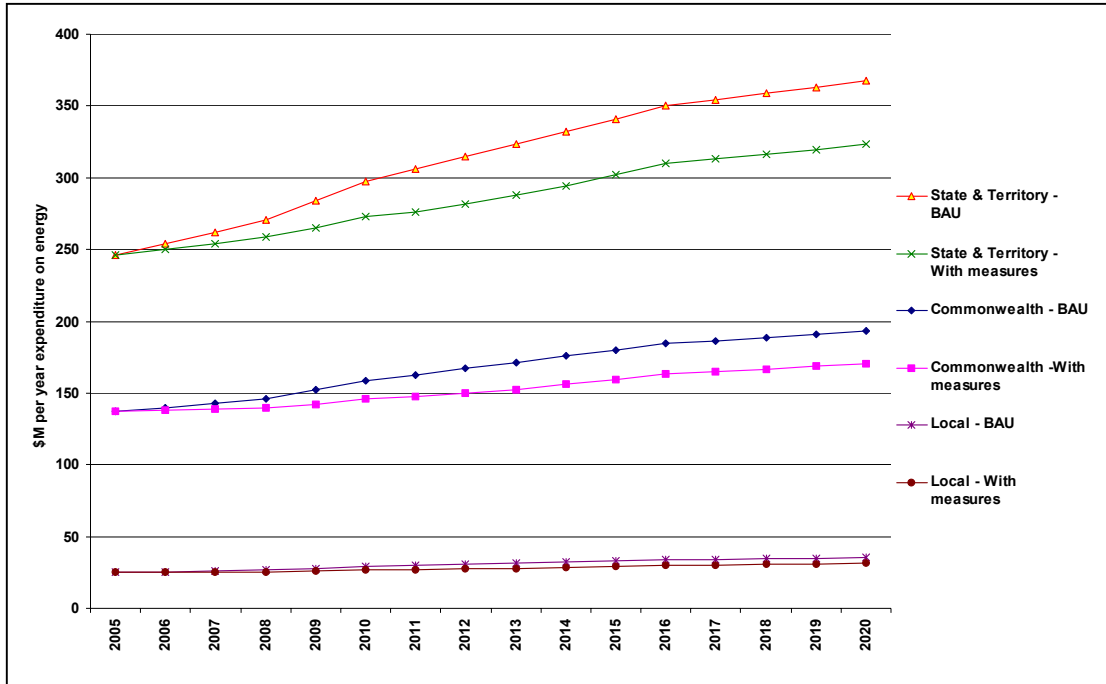


Figure 9 Projected reduction in annual expenditure by governments on energy use by Energy Allstars-covered products, 2005-2020

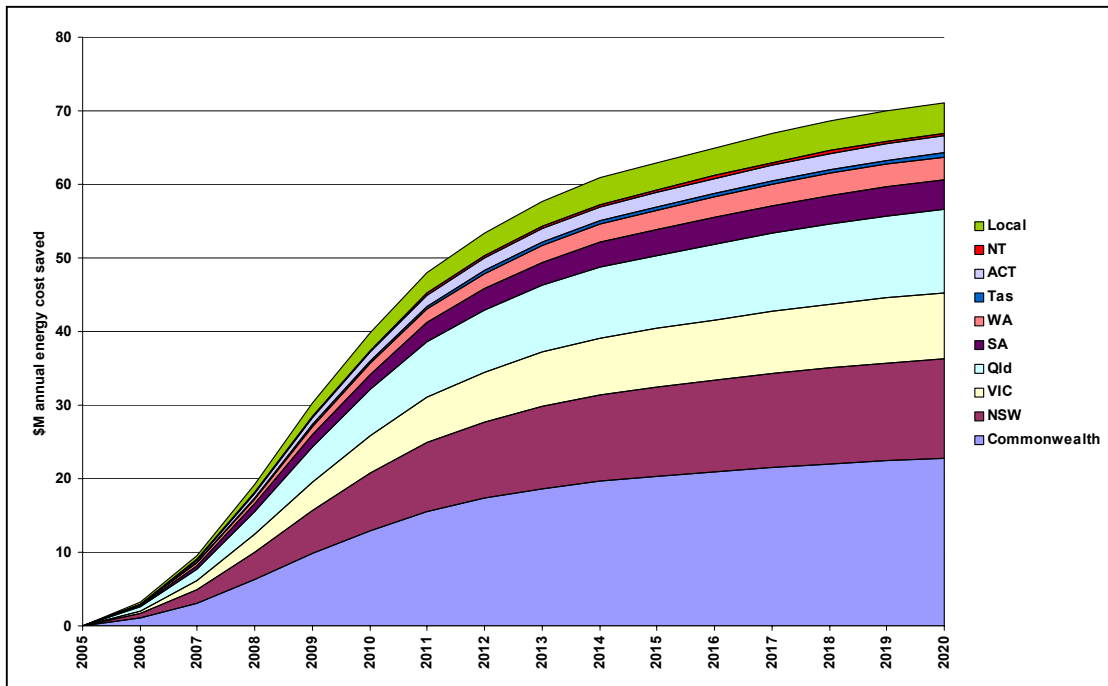


Figure 10 Projected reduction in annual expenditure governments on energy use by Energy Allstars-covered products by product type, 2005-2020

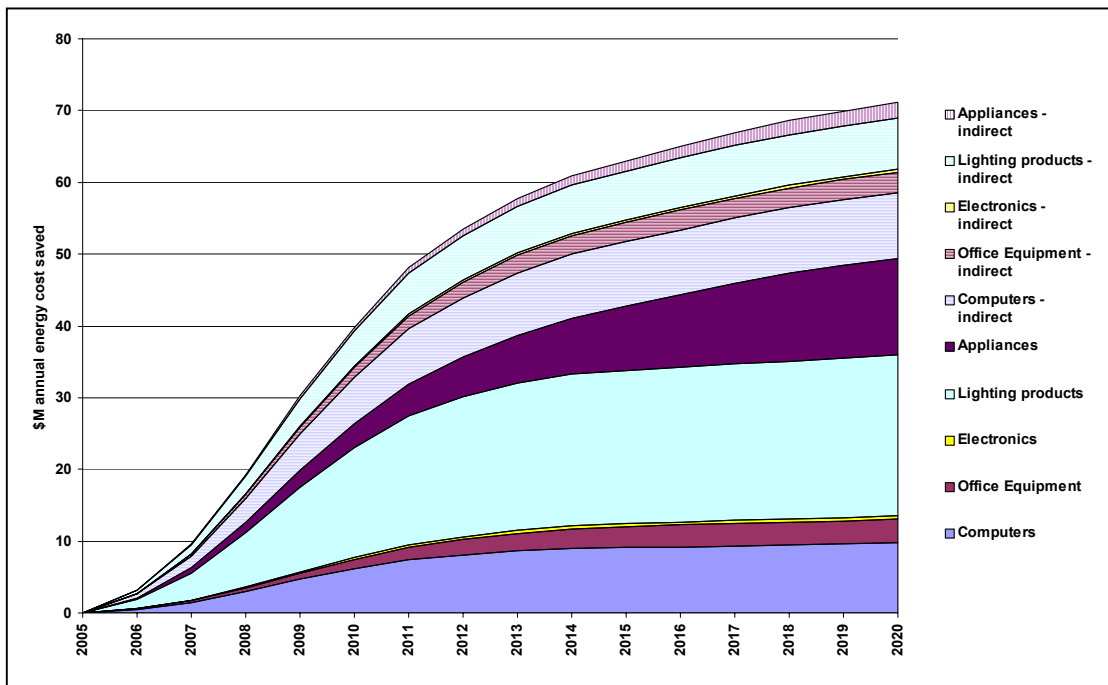
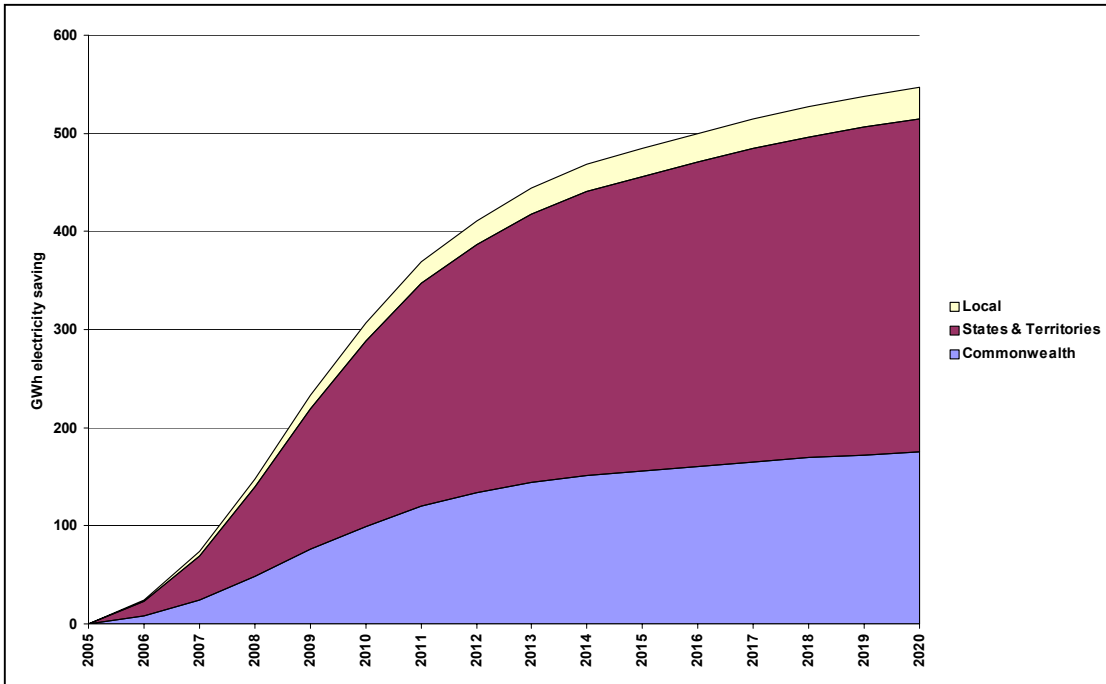
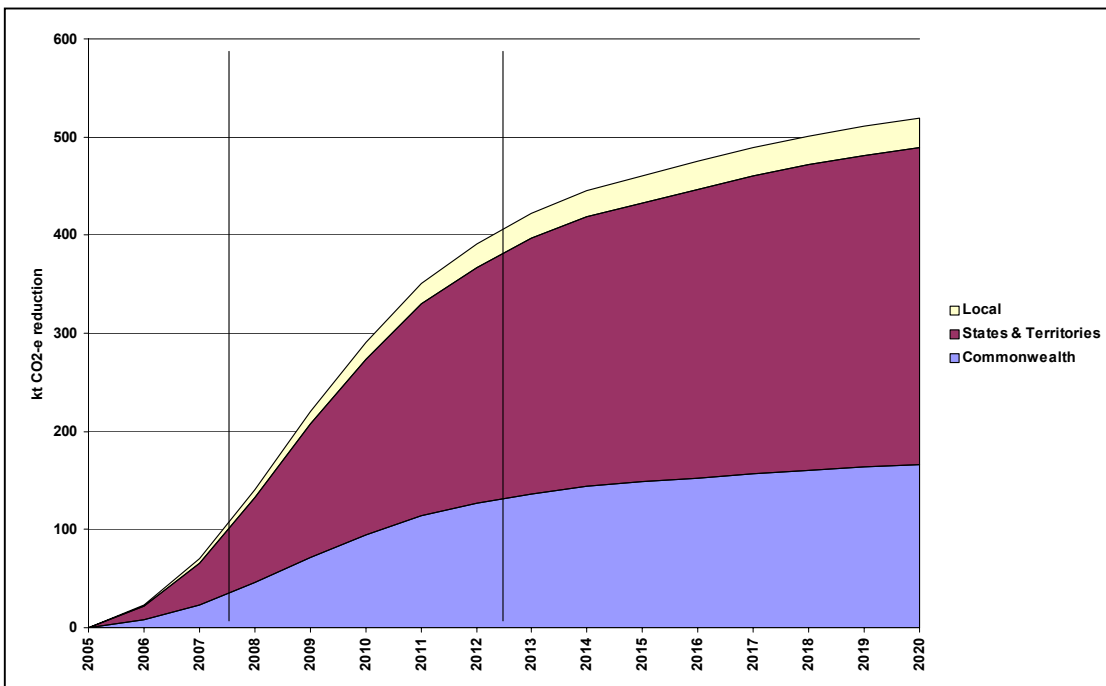


Figure 11 Projected reduction in annual electricity use by government holdings of Energy Allstars-covered products, 2005-2020



The greater use of Energy Allstars and related measures could reduce electricity consumption in the government sector by nearly 550 GWh per annum by 2020 (Figure 11). The greenhouse gas reductions associated with the electricity saving could reach 520 kt CO₂-e per annum by 2020, and average 280 kt CO₂-e in each year of the Kyoto commitment period (Figure 12).

Figure 12 Projected reduction in greenhouse gas emissions from government use of Energy Allstars-covered products, 2005-2020



Costs

The monetary costs to governments of using the Energy Allstars database in the purchasing of Energy Allstars-covered products are very difficult to estimate at present.

The main costs would be:

1. Establishment and maintenance of the database;
2. Revising purchase contracts, supporting documents and selection aids to take account of Energy Allstars;
3. Promoting the database to those in purchasing agencies most likely to make use of it and training personnel in its use;
4. Promoting the Energy Allstars database to suppliers as a showcase for sales to government;
5. Establishing links from existing websites and databases (eg the NSW 'smartbuy') to Energy Allstars;
6. Purchase of higher cost products than would otherwise be the case.

The AGO has advised that it is already committed to establishing and maintaining the Energy Allstars database as an aid to private consumers who wish to restrict their search to the most energy efficient products, and for non-government product specifiers and businesses. There would be no additional costs to be borne by government users. The listings may be expanded to some extent to accommodate products of greater interest to government, but the additional cost to the AGO would be negligible.

It could become a requirement of government contracts that suppliers must list the technical characteristics of the products they offer on the Energy Allstars website, so agencies can quickly compare energy efficiency, water efficiency (where relevant) and other key performance aspects of alternative models, as well as their purchase price. This could add some administrative costs to suppliers (although listing is free). On the other hand it could reduce supplier costs in the medium term by making it unnecessary to provide technical details in each standing contract or tender, and by allowing specifications to be updated on-line. Therefore the overall cost impacts on suppliers may well be neutral.

Central procurement agencies would need to devise guidelines for how the individual agencies in their jurisdictions should make use of the Energy Allstars database in their purchasing. They would then have to alert the responsible staff and possibly train them in its use. As there are already established modes of communication between central procurement agencies and other agencies, and they are regularly updated as buying policies evolve and as contracts are renewed, the introduction of Energy Allstars-related training would be largely a matter of changing content rather than undertaking new activities. Furthermore the Energy Allstars website itself can function as a training site. Therefore this area too is likely to be cost-neutral.

One area where procurement agencies may need to undertake new work is in the linking of their existing databases and internet sites with Energy Allstars. The Energy Allstars site has a lifetime cost calculator, but will only be able to list product prices where these are publicly available (eg recommend retail prices). For products under government contract the price is likely to be well below RRP, and the supplier is not likely to be willing to list it on a public website. It is also possible that contract prices to different governments, and possibly even to different agencies of the same government will differ. Similarly, energy costs to different agencies will also differ.

Therefore the only practical ways to combine the data necessary for prospective government purchasers to carry out a lifetime cost analysis are:

- Purchasers could take the energy data from the Energy Allstars site and combine it manually with product price and energy price data obtained from elsewhere;
- Purchasers could enter the product price and energy price information on the calculator on the Energy Allstars site; or
- Purchasers could use a government-only website pre-loaded with product and energy prices which also pulls in data from the Energy Allstars site. This would require some modification of existing procurement websites, or development of new ones, and could represent a cost to governments.

However, the costs are likely to be minor in relation to the total cost of procurement activity related to Energy Allstars-covered products (estimated at about \$15M per year, nationally), and costs incurred by central procurement agencies could well be more than outweighed by administrative cost savings to purchasing agencies.

The final class of costs are those associated with the purchase of more energy efficient products.

For some products the correlation between cost and energy efficiency is very weak. ‘Longitudinal’ research for the NAEEEP has found that the average energy efficiency of all household appliances has been rising at the same time as their real prices have been falling (NAEEEP 2003). ‘Cross-sectional’ analyses of the relationship between price and efficiency for air conditioners and electric motors on the market at the same time have also found very weak correlations (GWA 2000, 2000a). For other products there are discrete energy efficiency levels, successive levels embody different design, quantity or quality of materials, and there is a clear relationship between price and efficiency – for example, fluorescent lamp ballasts (GWA 2001).

Given this uncertainty, one approach to the cost-effectiveness of purchasing more energy efficient products is to determine the maximum price increase that would be justifiable under a given scenario of energy reductions. Table 10 illustrates this for the projected energy savings described above. If the average price that governments pay for the products in question increases no more than 2.2%, the net present value (NPV) of the energy savings will exceed the NPV of the capital cost increases.

Applying the tests to product categories individually, however, reveals major differences. Because computers, office equipment and electronic products use relatively little energy in relation to their purchase price, price increases for break-even must be 1% or less. As use of the Energy Allstars database will most likely steer purchasers to products with more sophisticated power management capabilities, which are often embodied in software and so impose near-zero costs, holding price increases to less than 1% is quite conceivable.

For lighting products and appliances, where energy accounts for a much higher ratio of lifetime costs, the price increases can be as high as 42% and 12% respectively. This gives significant scope to change purchase preferences while still remaining within the limits.

Table 10 Limits of Price Increases to Maintain Cost-Effectiveness

Category	NPV \$M 2006-20 (10% discount rate)			Maximum price increase for break-even
	Projected Energy saving (Table 9)	Projected capital costs, BAU	Limit of capital costs for break-even	
Computers	\$89.3	\$10,218	\$10,308	1%
Office Equipment	\$24.1	\$2,385	\$2,409	1%
Electronics (TV, audio)	\$3.5	\$346	\$349	1%
Lighting products	\$140.6	\$333	\$474	42%
Appliances	\$44.3	\$355	\$399	12%
Total	\$301.7	\$13,637	\$13,939	2.2%

Conclusions

There appears to be a potential for significant savings in government expenditure through the purchase of products that have lower energy use and hence lower lifetime costs. However, the magnitude of this potential is somewhat speculative at this stage, because the data on the current pattern of government purchases available to this study was incomplete.

Much of the potential lies in the purchase of more energy efficient lighting, appliances and air conditioners, rather than computers or office equipment. This is because:

- the energy share of lifecycle costs is far higher for lighting, appliances and air conditioners;
- many government purchasers already specify the Energy Star power management criteria for computers and office equipment (which, if utilised, will realise much of the energy savings potential) whereas there are no widespread high efficiency criteria for other product categories.

It is estimated that lighting equipment account for only 2.4% of annual capital purchases of Energy Allstars-covered equipment, but 42% of the lifetime energy costs associated with those purchases. Similarly, appliances and air conditioning represent only 2.1% of annual capital costs but 18% of lifetime energy costs. This underscores the value to governments of selecting more energy efficient lighting and appliances.

Purchasing agencies would therefore benefit from assistance with:

- Guidance on ‘high efficiency’ criteria for energy (and water) using products;
- Identifying the products that meet those criteria; and
- Systematically calculating the lifetime costs of alternative purchases.

The Energy Allstars database is expressly designed to provide this assistance, so integrating it more closely into purchasing procedures would be of considerable value to government agencies.

However, on the information available for this study, purchasing arrangements and procedures vary significantly by jurisdiction, so the best way to integrate the use of Energy Allstars may well be different for each government. If the use of Energy Allstars grows, the site itself could become a focus for gathering data that will assist its further development and assess its impacts.

The development of Energy Allstars is currently proceeding in phases. If government users are to be engaged, then the phasing needs to take their priorities into account. Respondents were asked to indicate their priorities, and the responses received are summarised in Appendix 1. This was a limited sample, and the results should be considered indicative only, but some patterns did emerge. The products that scored more than one expression of interest were:

- Refrigerators and freezers
- Electric water heaters
- Gas water heaters
- Electric heaters (all types)
- Air conditioners (refrigerative)
- Evaporative coolers
- Lighting products (all types)
- Computer equipment (all types)
- Office Equipment (all types)
- Televisions
- 3-phase electric motors

There was relatively little interest in other major household appliances, commercial equipment or minor items such as modems, speakers or security systems. It also suggests some inconsistency with regard to stated interest in water efficiency, since the main water-using products (dishwashers and clothes washers) were not indicated as high priority. At the same time it is not clear how many 3-phase electric motors are actually purchased as motors – not as part of other equipment - by the type of government agencies covered by central procurement arrangements.

Also, it is not entirely clear what value Energy Allstars can add regarding computer equipment other than reiterating the value of power management, which can be done simply by referring users to the Energy Star website. Attempting to maintain an up-to-date list of complying equipment may well be very difficult, given the vast number of model designations and combinations of components, and of little practical value to users, if Energy Star compliance is already part of government contract specifications (as it is in NSW at least). In fact, an incomplete listing of computer equipment may undermine user confidence in the parts of Energy Allstars which are likely to be of real value.

One practical problem to be resolved is how to combine data about product price, energy use and energy costs for government users of Energy Allstars. Each jurisdiction is likely to face different (and confidential) contract prices for the same products. If users are sufficiently trained and motivated, they can obviously enter product prices and energy prices into the Energy Allstars calculator themselves, but a more user-friendly way would be for each jurisdiction to link its private data set to the product data in Energy Allstars.

References

ABS (2004) *Government Technology, Australia* Australian Bureau of Statistics, 8119.0, July 2004.

Green Office Guide: A guide to help you buy and use environmentally friendly office equipment, National Appliance and Equipment Energy Efficiency Committee, 2001

GWA (2000) Draft for Public Comment: *Regulatory Impact Statement: Minimum energy performance standards and alternative strategies for electric motors*, George Wilkenfeld and Associates for Australian Greenhouse Office, September 2000.

GWA (2000a) Draft for Public Comment: *Regulatory Impact Statement: Minimum energy performance standards and alternative strategies for airconditioners and heat pumps*, George Wilkenfeld and Associates for Australian Greenhouse Office, September 2000.

GWA (2001) *Regulatory Impact Statement: Minimum energy performance standards and alternative strategies for fluorescent lamp ballasts: Final*. George Wilkenfeld and Associates for Australian Greenhouse Office, August 2001.

Koreman, S (2005) *Energy Allstars*: Presentation to NAEEEP Forum, April 2005, (at <http://www.energyrating.gov.au/pubs/2005s2c-ellis.pdf>)

NAEEEP (2003) *Greening White Goods: A Report into the Energy Efficiency Trends of Major Household Appliances in Australia from 1993 – 2001*, Energy Efficient Strategies for the National Appliance and Equipment Energy Efficiency Committee, February 2003

NSW (2005) *Contract ITS 2000 Computers: Fileservers, desktops and portables*, State Procurement, NSW Department of Commerce, 15 April 2005

NSW (2005a) *Contract 390 – Photocopying Machines (Purchase or Operating Lease/Rental)*, State Procurement, NSW Department of Commerce, March 2005

NSW (2005b) *Contract 2308 – Printers, Facsimiles and Related Consumables (other than paper)* State Procurement, NSW Department of Commerce, 26 April 2005

Personal communications from:

Australian Procurement and Construction Council Leadership Group

NSW, Department of Commerce

NT, Department of Infrastructure, Planning and Environment

Queensland Purchasing

Victoria, Department of Treasury and Finance, Department of Sustainability and Environment

SA, Department of Administrative and Information Services

Tasmania, Department of Treasury and Finance

Appendix 1 State and Territory Product Priorities

A. Energy Allstars Classification	B. Product	NSW	QLD	SA	TAS	NT	
Major appliances	Refrigerators and freezers	M		L		H, M	
	Clothes dryers	L		L		L	
	Clothes washers	L		L		L	
	Dishwashers	L		L		L	
Water heaters	Electric water heaters	M		M		H	
	Gas water heaters	L		M		M	
Heating	Gas ducted heaters	L		M		NA	
	Gas room heaters	L		M		NA	
	Electric heaters (all types)	M		M		NA	
Cooling	Air conditioners (refrigerative, inc. reverse cycle)	H		H		H	
	Other (evaporative coolers, fans etc)	L		H		H	
Lighting	Fluorescent lamps	L		M		H	
	Fluorescent lamp ballasts	L		M		H	
	Halogen lamps & transformers	L		M		H	
	Other lamps	L		M		H	
	Lighting controls (eg motion detectors, dimmers)	L		M		M	
	Luminaires (light fittings)	L		M		H	
Computer equipment	Desktop computers	H		H		H	
	Monitors for desktop computers	H		H		H	
	Laptop computers	L		H		H	
	Modems (separately purchased)	L		M		M	
	External power supplies (separately purchased)	L		M		H	
	PC speakers (separately purchased)	L		M		H	
Office equipment	Photocopiers	H		H		H	
	Printers	M		H		H	
	Faxes	L		H		H	
	Multi-function devices	H	H	H		H	
Consumer electronics	Television sets (all screen types)	M		L		H	
	Video cassette recorders	L		L		H	
	DVD players & recorders	L		L		H	
	Digital set top boxes	L		L		H	

	Audio equipment	L		L		H	
Other commercial equipment	Refrigerated display cabinets	L		L		H	
	Boiling & chilled water dispensers	L		L		H	
	Ice makers	L		L		L	
	Security systems	L		L		H	
	Smoke alarms	L		L		H	
Industrial equipment	3-phase electric motors	L		M		H	
	Distribution transformers	L		M		NA	
Other	? please write in						

Appendix 2 Estimates of Energy Costs as Percentage of Lifetime Costs

Table 11 Desktop + 17" LCD monitor

	Power saver mode			\$/yr energy cost (a)			Capital cost	Service life (yrs)	% of capital costs			Energy/lifetime (enabled)
	Power Mgt Disabled	Power Mgt Enabled	Energy save mode	Power Mgt Disabled	Power Mgt Enabled	Energy save mode			Power Mgt Disabled	Power Mgt Enabled	Energy save mode	
Light office	435	208	196	56.6	27.0	25.5	\$ 1,400	3	12.1%	5.8%	5.5%	0.05
Average office	380	254	229	49.4	33.0	29.8	\$ 1,400	3	10.6%	7.1%	6.4%	0.07
Busy Office	407	357	307	52.9	46.4	39.9	\$ 1,400	3	11.3%	9.9%	8.6%	0.09
Always on	794	794	643	103.2	103.2	83.6	\$ 1,400	3	22.1%	22.1%	17.9%	0.18

Source: author estimates based on calculator at http://www.eu-energystar.org/en/en_008.htm. Computer draws 100/20/10 W in on/standby/soft off modes; VDU draws 30/5/5 W in on/stand/soft off modes respectively (a) at 13c/kWh

Table 12 Laptop (standard)

	Power saver mode			\$/yr energy cost (a)			Capital cost	Service life (yrs)	% of capital costs			Energy/lifetime (enabled)
	Power Mgt Disabled	Power Mgt Enabled	Energy save mode	Power Mgt Disabled	Power Mgt Enabled	Energy save mode			Power Mgt Disabled	Power Mgt Enabled	Energy save mode	
Light office	109	79	77	14.2	10.3	10.0	\$ 2,200	3	1.9%	1.4%	1.4%	0.01
Average office	100	83	80	13.0	10.8	10.4	\$ 2,200	3	1.8%	1.5%	1.4%	0.01
Busy Office	105	98	91	13.7	12.7	11.8	\$ 2,200	3	1.9%	1.7%	1.6%	0.02
Always on	165	165	145	21.5	21.5	18.9	\$ 2,200	3	2.9%	2.9%	2.6%	0.03

Source: author estimates based on calculator at http://www.eu-energystar.org/en/en_008.htm. Laptop draws 25/11/7 W in on/standby/soft off modes (a) at 13c/kWh

Table 13 Laptop (High-end)

	Power saver mode			\$/yr energy cost (a)			Capital cost	Service life (yrs)	% of capital costs			Energy/lifetime (enabled)
	Power Mgt Disabled	Power Mgt Enabled	Energy save mode	Power Mgt Disabled	Power Mgt Enabled	Energy save mode			Power Mgt Disabled	Power Mgt Enabled	Energy save mode	
Light office	64	40	77	8.3	5.2	10.0	\$ 3,400	3	0.7%	0.5%	0.9%	0.01
Average office	59	46	80	7.7	6.0	10.4	\$ 3,400	3	0.7%	0.5%	0.9%	0.01
Busy Office	61	56	91	7.9	7.3	11.8	\$ 3,400	3	0.7%	0.6%	1.0%	0.01
Always on	98	98	145	12.7	12.7	18.9	\$ 3,400	3	1.1%	1.1%	1.7%	0.01

Source: author estimates based on calculator at http://www.eu-energystar.org/en/en_008.htm. Laptop draws 15/4/4 W in on/standby/soft off modes (a) at 13c/kWh

Table 14 Imaging Equipment

	Power saver mode			\$/yr energy cost (a)			Capital cost	Service life (yrs)	% of capital costs			Energy/lifetime (enabled)
	Power Mgt Disabled	Power Mgt Enabled	Energy save mode	Power Mgt Disabled	Power Mgt Enabled	Energy save mode			Power Mgt Disabled	Power Mgt Enabled	Energy save mode	
Copier - Average Office	500	380	160	65.0	49.4	20.8	\$ 4000	7	11.4%	8.6%	3.6%	0.08
Copier - Always on	980	480	160	127.4	62.4	20.8	\$ 4000	7	22.3%	10.9%	3.6%	0.10
Printer - Average Office	230	170	30	29.9	22.1	3.9	\$ 1200	5	12.5%	9.2%	1.6%	0.08
Printer - Always on	510	280	30	66.3	36.4	3.9	\$ 1200	5	27.6%	15.2%	1.6%	0.13

Source: author estimates based on the *Green Office Guide* (2001) (a) At 13c/kWh

Table 15 Appliances and Lighting

	Capital cost	Service Life (yrs)	Average kWh/yr	Energy/cap costs(c)	Energy/lifetime
Refrigerators	\$ 916	15	622	132%	0.57
Water heaters	\$ 450	10	913(a)	264%	0.72
Air Conditioners	\$ 1800	15	2000	217%	0.68
Ballasts (5w) (b)	\$ 5.50	5	15	177%	0.64
Fluoros (38w) (b)	\$ 9.35	3	114	476%	0.83

Source: author estimates based on Regulation Impact Statements and annual *Greening Whitegoods* survey (a) heat losses only, not energy into hot water (b) Based on 3000 hrs/yr use (c) At 13c/kWh

Table 16 Estimated Annual Energy Expenditure on Energy Allstars-covered Products, by Level of Government

Jurisdiction	Computer Hardware		Office Equipment		Consumer Electronics		Lighting Products		Appliances, heating, cooling		Total \$M	Energy % lifetime
	\$M	% total	\$M	% total	\$M	% total	\$M	% total	\$M	% total		
Commonwealth	45.0	35%	9.4	7%	1.1	1%	48.2	38%	23.3	18%	127	23%
NSW state	19.0	25%	7.9	11%	0.6	1%	36.2	48%	11.0	15%	75	27%
Victoria state	12.0	24%	4.3	9%	0.5	1%	22.6	45%	10.3	21%	50	29%
Queensland state	15.0	24%	5.4	9%	0.6	1%	28.3	45%	12.9	21%	62	29%
SA state	5.0	23%	1.0	5%	0.3	1%	8.8	40%	6.7	31%	22	33%
WA state	6.0	34%	0.7	4%	0.4	2%	3.3	18%	7.4	42%	18	24%
Tasmania state	0.7	24%	0.3	9%	0.0	1%	1.3	45%	0.6	21%	3	29%
ACT	3.0	24%	1.1	9%	0.1	1%	5.7	45%	2.6	21%	12	29%
NT	0.5	24%	0.2	9%	0.0	1%	0.9	45%	0.4	21%	2	29%
State/Territory	61.2	25%	20.9	9%	2.5	1%	107.1	44%	51.8	21%	244	28%
NSW local	3.5	35%	0.7	7%	0.1	1%	3.8	38%	1.8	18%	10	23%
Victoria local	1.4	35%	0.3	7%	0.0	1%	1.5	38%	0.7	18%	4	23%
Queensland local	1.5	35%	0.3	7%	0.0	1%	1.6	38%	0.8	18%	4	23%
SA local	0.6	35%	0.1	7%	0.0	1%	0.6	38%	0.3	18%	2	23%
WA local	0.8	35%	0.2	7%	0.0	1%	0.8	38%	0.4	18%	2	23%
Tasmania local	0.3	35%	0.1	7%	0.0	1%	0.4	38%	0.2	18%	1	23%
NT local	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ACT local	0.1	35%	0.0	7%	0.0	1%	0.1	38%	0.1	18%	0	23%
Local Government	8.3	35%	1.7	7%	0.2	1%	8.8	38%	4.3	18%	23	23%
All Governments	114.5	29%	32.1	8%	3.9	1%	164.1	42%	79.5	20%	394	26%
Energy/capital cost (a)	10%		12%		10%		440%		200%		26%	
Average service life	4 yrs		6 yrs		6 yrs		4 yrs		12 yrs		4.7 yrs	
Proportion in air-conditioned space	90%		90%		90%		80%		40%			
Total lifetime energy cost	155.7	30%	43.6	8%	5.3	1%	216.6	42%	92.2	18%	513	34%
Annual energy cost	38.9	36%	7.3	7%	0.9	1%	54.2	50%	7.7	7%	109	

Source: Author estimate based on Appendix 2 (a) at 13c/kWh

Appendix 3 Potential Energy, Cost and Greenhouse Gas Savings

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
\$M savings																
Commonwealth	0.0	1.0	3.1	6.3	9.9	13.0	15.6	17.3	18.7	19.7	20.3	20.9	21.5	22.0	22.4	22.8
States & Territories	0.0	2.0	5.9	11.8	18.6	24.5	29.6	33.0	35.6	37.6	39.0	40.3	41.5	42.6	43.4	44.2
Local government	0.0	0.2	0.6	1.2	1.8	2.4	2.9	3.2	3.4	3.6	3.7	3.8	3.9	4.0	4.1	4.2
All governments	0.0	3.2	9.6	19.3	30.2	39.8	48.1	53.5	57.7	60.9	63.0	65.0	66.9	68.6	70.0	71.1
GWh savings																
Commonwealth	0.0	8.0	24.0	48.3	75.8	99.7	120.1	133.3	143.7	151.3	156.1	160.8	165.3	169.2	172.5	175.2
States & Territories	0.0	15.0	45.3	91.1	142.9	188.4	227.6	253.5	274.1	289.3	299.7	309.6	319.1	327.3	334.2	339.6
Local	0.0	1.5	4.4	8.9	13.9	18.3	22.0	24.4	26.3	27.7	28.6	29.5	30.3	31.0	31.6	32.1
All governments	0.0	24.4	73.7	148.2	232.6	306.4	369.7	411.2	444.1	468.3	484.4	499.9	514.7	527.5	538.3	546.9
kt CO2-e savings																
Commonwealth	0.0	7.6	22.8	45.9	72.0	94.7	114.1	126.6	136.5	143.7	148.3	152.8	157.0	160.7	163.9	166.4
States & Territories	0.0	14.3	43.0	86.5	135.8	179.0	216.2	240.8	260.4	274.9	284.7	294.1	303.2	310.9	317.5	322.6
Local	0.0	1.4	4.2	8.4	13.2	17.4	20.9	23.2	25.0	26.3	27.2	28.0	28.8	29.5	30.0	30.5
All governments	0.0	23.2	70.0	140.8	221.0	291.1	351.2	390.7	421.9	444.9	460.2	474.9	489.0	501.1	511.4	519.6
\$M Projected capital expenditure - BAU																
Commonwealth	562.5	576.6	591.0	605.8	620.9	636.4	652.3	668.6	685.4	702.5	720.0	738.0	756.5	775.4	794.8	814.7
States & Territories	861.8	883.4	905.4	928.1	951.3	975.1	999.4	1024.4	1050.0	1076.3	1103.2	1130.8	1159.0	1188.0	1217.7	1248.2
Local	103.1	105.7	108.3	111.1	113.8	116.7	119.6	122.6	125.6	128.8	132.0	135.3	138.7	142.2	145.7	149.4
All governments	1527.4	1565.6	1604.8	1644.9	1686.0	1728.2	1771.4	1815.6	1861.0	1907.6	1955.3	2004.1	2054.2	2105.6	2158.2	2212.2
\$M Projected capital expenditure - limit																
Commonwealth	562.5	587.8	602.4	617.5	632.9	648.8	665.0	681.6	698.7	716.1	734.0	752.4	771.2	790.5	810.2	830.5
States & Territories	861.8	904.7	927.4	950.5	974.3	998.7	1023.6	1049.2	1075.5	1102.3	1129.9	1158.1	1187.1	1216.8	1247.2	1278.4
Local	103.1	107.8	110.4	113.2	116.0	118.9	121.9	125.0	128.1	131.3	134.6	137.9	141.4	144.9	148.5	152.3
All governments	1527.4	1600.3	1640.3	1681.3	1723.3	1766.4	1810.5	1855.8	1902.2	1949.8	1998.5	2048.5	2099.7	2152.2	2206.0	2261.1