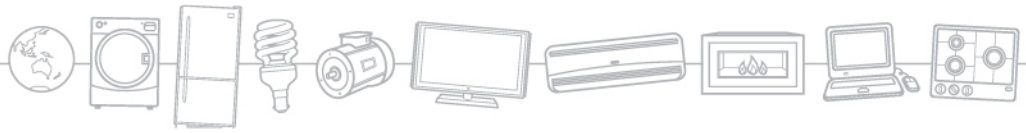
E3
Equipment Energy Efficiency

DECISION
Regulatory Impact Statement

Proposed Minimum Energy Performance Standards for Computers

Proposed Minimum Energy Performance Standards and Energy Labelling for Computer Monitors

October 2012



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Executive summary

This RIS investigates options to improve the energy efficiency of computers and computer monitors sold in Australia and New Zealand without compromising functionality or choice, and to provide information for consumers to make an informed purchasing decision.

Although technology has resulted in gains in energy efficiency which has increased the overall energy efficiency of computers, there have remained computers at the less efficient end of the spectrum that have not similarly progressed. A major contribution to the objective of improving computer and computer monitor energy efficiency would be to eliminate or substantially reduce the purchase of such energy inefficient computers**.**

Failures in the computer and monitor market including the lack of information available to consumers, insufficient incentives for suppliers to provide such information, and the complexity of features in purchasing a computer, can result in inferior decisions. Purchasing decisions can focus too much on up-front costs, with little or no consideration given to energy costs. The purchasing decisions can consequently result in energy consumption and greenhouse gas emissions in excess of efficient levels from a society's viewpoint.

At a per computer level, the potential savings may appear to be relatively minor, with the average annual savings possible from a more efficient purchase estimated at $29 for a typical office desktop and liquid crystal display (LCD) system and $3 for a home notebook in Australia. In New Zealand, the average annual savings are estimated at $NZ22 for a typical office desktop and LCD system and $NZ3 for a home notebook.

However the magnitude of the market means that the overall impact is significant. Energy consumption by computers currently represents around 3 per cent of total national energy use in both countries, with the potential to grow. Best available information suggests that by 2020 the number of computers will grow to around 53.5 million in Australia and New Zealand and the number of computer monitors will grow to 33 million. Given that the potential benefits on a per computer basis are not likely to be large, any policy response needs to be cost-effective to provide an overall net benefit.

In designing a cost-effective option consideration needs to be given to the nature of the computer market. Computers are global commodities and there is essentially no variation between models irrespective of which countries that they are supplied to. Australia and New Zealand comprise only a small proportion of global demand for computers, and mostly rely on computers and computer monitors manufactured in China, which also provides a large proportion of the world's computers and computer monitors.

Computers are also complex products, involving the configuring of a range of features such as graphics, processing speed, memory and other components. Consumers can often specifically choose from a menu of components for their purchase. Such complexity adds difficulty in designing policy responses.

Options to address the problem which ignore the global nature of the market, such as an option for a local stand-alone minimum energy performance standard, are unlikely to be cost-effective. The additional costs to suppliers to meet a stand-alone local standard which ignores international provisions, or to consumers in terms of higher prices or reduced choice, are likely to offset any benefit.

The RIS considers a regulatory proposal which comprises the following components:

- A mandatory minimum energy performance standard (MEPS) for computers and computer monitors supplied in Australia and New Zealand linked to an internationally recognised test and performance specification; and
- A mandatory labelling scheme for computer monitors that aligns with current mandatory labelling for television.

A labelling scheme is not considered appropriate for computers. The myriad of computer configurations makes it particularly difficult for consumers to compare products. Computer monitors, however, are relatively simple. A consumer can much more easily compare products. Computer monitors also represent around one quarter of the energy of a computer and computer monitor system. Specifically targeting monitors with a labelling requirement may therefore provide incremental benefits. The experience with the mandatory labelling of televisions, which are essentially the same products as computer monitors, provides some evidence that a labelling scheme for computer monitors is potentially feasible and effective. The scheme will also be linked to international standards, which helps to minimise compliance costs.

It is considered that the regulatory proposal can provide net benefits to the community, mainly because it will directly cease the supply of, or force improvements to, poorer energy performing computers and computer

monitors supplied to the market. The linking of the scheme to international standards helps contain compliance costs. The cost benefit analysis estimates that the proposal will provide a net benefit, for computers and monitors deployed between April 2013 and end 2020, of around $1.65 billion to Australia (at a discount rate of 7 per cent) and around $NZ143 million to New Zealand (at a discount rate of 8 per cent).

For such complex and dynamically evolving products as computers, there is a concern that a mandatory scheme could ban potentially beneficial products (where the benefits outweigh the costs, including external costs) and therefore stifle access to innovation and productivity benefits.

However, such concerns will be largely addressed as the mandatory MEPS will be designed to allow innovative and beneficial products. Under the proposed regulation, where a product subject to regulation offers desirable benefits, but has energy consumption above mandated standards, the regulator can exempt the product from the MEPS requirements. Potentially the energy solely associated with an innovation or benefits could be deducted to ensure the base computer system is still compliant. More generally, the product classes and configurations required to comply with the MEPS will be tightly defined, so products that fall outside these definitions, which will include computers with new and innovative features, will fall outside of the scope of the MEPS requirements,.

Considerable consultation with key stakeholder groups on the proposed regulation of computer and computer monitors was undertaken commencing in 2007 and dialogue continued until 2011. The Consultation RIS was released in Australia in October 2010, while New Zealand released their Consultation RIS in December 2011. Submissions on either of the Consultation RISs did not provide any additional data, nor propose alternatives to the recommendations in this Decision RIS.

The consultation showed that if the Government imposed a minimum standard, suppliers would prefer a mandatory scheme to a voluntary one, due to the certainty of a mandatory scheme, and as it better ensures a level playing field. It may also reflect that incumbent suppliers may benefit from the scheme providing a barrier to entry to some potential suppliers. Initial industry concerns that specialist or innovative products may not be allowed under the proposed reform were addressed once it was clarified that such products would have the potential to be exempted under the proposal, and industry did not pursue these concerns.

Industry did not generally support proposals for the labelling of computer monitors. In response to such industry concerns the proposal for the mandatory labelling will include a temporary voluntary labelling scheme to commence before the mandatory scheme in order to give all parties experience in labelling monitors.

1. Background

This section outlines background information on the sales of computers and computer monitors, on their energy use and on their emission of greenhouse gas emissions and also discusses the information about energy consumption which is currently available to consumers purchasing computers and computer monitors.

1.1. Market Penetration

In 2006, there were an estimated 24 million computers in use in Australia, roughly equally divided between the three sectors: residential, commercial and government. Penetration of computers in New Zealand appears to be similar to that in Australia, although limited data is available to confirm this.

Best available information suggests that by 2020 the number of computers will double to around 53.5 million in Australia and New Zealand and the number of computer monitors will grow to 33 million.

For computer monitors, Liquid Crystal Display (LCD) and more recently Light Emitting Diode (LED) monitor technology is replacing Cathode Ray Tube (CRT) technology in virtually all but a few specialised applications, such as the medical sector. In general LCD and LED technologies are more energy efficient than CRT technology. However, the trend towards use of larger monitors and multiple monitors is increasing energy consumption. These trends have been taken into account when calculating Business as Usual (BAU) and MEPS scenarios in the cost benefit analysis.

1.2. Increasing Energy Consumption and Greenhouse Gas Emissions

In 2010 the Australian and New Zealand residential sector electrical energy consumption of computers and computer monitors was estimated to reach 1,915 GWh and 364 GWh respectively[1]. This represents 3 per cent of energy consumption in both the Australian and New Zealand residential sectors.

Office Information and Communications Technology (ICT) equipment is also a significant energy consumer. ICT equipment is estimated to use around 14 per cent of the electricity use in commercial office buildings[2] with computers and computer monitors accounting for 25 per cent to 50 per cent of that figure depending on the type of commercial office building. In absolute terms for 2010, this is estimated to be 6,700 GWh for Australia.

The combined greenhouse emissions from the use of computers and computer monitors in the Australian residential and commercial sectors are estimated to be 8.2 Mt CO_2-e from electricity generation in 2010. The Equipment Energy Efficiency (E3) program identified computers and computer monitors as a rapidly growing area in the residential sector not covered by energy efficiency regulation.[3] While energy efficiency has improved over time for these products, there are further relatively simple and cost-effective means of increasing the energy efficiency of computers and computer monitors.

Energy efficiency performance varies across computers and computer monitors with similar features/configuration. In addition, there is often little or no information on energy performance provided in retail outlets to help consumers make an informed purchasing decision. Computers are relatively complex products involving the bundling of a range of features such as graphics, processing speed, memory and other components, which adds to the difficulty of providing comparable energy information to allow consumers to make an informed choice. Indeed, consumers may place computing attributes/performance ahead of energy efficiency.

While better design and technology is available, it is not being adopted universally by equipment suppliers, as indicated in test results from the Department of Climate Change and Energy Efficiency (DCCEE) and other international studies. In part this may reflect the fact that the supplier does not bear the costs of energy inefficiencies.

1.3. Computer Power Consumption

Utilising internationally recognised specifications, desktop and notebook computers are categorized by their configuration/components. Category A is the lowest specification, typically with one or two processor cores and less than 2 GB system memory (RAM). As more processor cores, more RAM and graphics cards are included, the category changes to B, C or D, with D being the highest specification for desktop and C the highest specification for

[1] Excel modelling is the source of this data which uses the methodology summarised in an Appendix 7 in the Supplementary Information
[2] AGL Energy presentation to GAEN 2009
[3] Projected Impact of the Equipment Energy Efficiency Program to 2020' (Wilkenfeld) January 2009, page 23

notebook. For example, a category D desktop is a high end computer with four or more processor cores, four or more GB RAM and/or a high performance graphics processing unit.

DCCEE and international testing shows a wide range of power consumption of equivalent categories of computers and computer monitors. Table 1 summarises the DCCEE test results[4] when computers are on but not in active use (idle mode). Idle mode and the higher energy consuming active use mode are the major contributors to energy consumption and consumer information, in general, is not readily available.

Table 1 : DCCEE Computer Testing Results

Computer type	Category[5]	Best (Watts)	Worst (Watts)	Average (Watts)
Desktop	A	17.6	99.0	62.8
Desktop	B	26.6	73.2	54.6
Desktop	C	67.9	162.8	104.4
Notebook	A	12.2	18.2	14.7
Notebook	B	9.8	37.4	17.7

In summary, the test results indicates the computer market includes many models consuming much higher energy than other models in the same category having similar performance. These results correlate well with international studies. Within the computers tested, there is no apparent correlation between price and energy performance between equivalent categories of computers.

1.4. Monitor Power Consumption

Computer monitor power data in Australia and New Zealand is limited, however as computer monitors are globally traded products the consumption data for this RIS draws upon the comprehensive test data gathered by the US Environment Protection Agency (EPA) for their ENERGY STAR® program. The EPA tested 109 LCD computer monitors and published test data including screen size, resolution and power .

For each screen area band and resolution, there is a wide range of power consumption between best and worst and there are many examples where larger screens consume less than smaller screens. In summary, there are many models, even though compliant with the previous version 4.0 of the ENERGY STAR®, that consume much more energy than those of similar or even greater size.

1.5. Energy Information at point of Sale

In 79 computers randomly selected and purchased from retail sources for testing under the Equipment Energy Efficiency (E3) program, there was virtually no energy performance information provided on the product at the point of sale. There is little information available to consumers regarding the energy performance of computers and computer monitors and they are unaware of the benefits of energy efficiency and conservation and how to realise them.

This is evidenced by the 2009 DCCEE testing of desktop computer models that identified 41 per cent did not use power management functions enabled as shipped, to automatically reduce energy consumption in periods of non-use. Power management, irrespective of a computer's or computer monitor's power demand, can simply and cheaply achieve significant energy consumption reductions with virtually no disruption to the functionality of the devices.

Based on the increases in market penetration of computers and computer monitors and the lack of improvements to energy efficiency in these appliances, the Australian Government embarked on a consultation process with key stakeholders with the aim of creating a path of action to improve energy efficiency.

[4] E3 Computers and Energy Efficiency in Australia report June 2009

[5] Link to energystar webpage for version 5 of computer specification

2. Problem

2.1. What are the potential problems?

The problems revolve around how efficient computers are in their use of energy and how this affects the behaviour of consumers in their purchases. There are two potential areas of concern. One relates to the provision of and access to information on energy use and the other area relates to how consumers' choices can affect other people and the broader community.

The information problems are about consumer choice, and whether they have sufficient information and understanding to make a purchasing decision.

To make an informed decision, a consumer needs to consider two different types of costs in regard to the purchase of a computer: the initial up-front, or capital, cost of the computer and the running cost or cost of operating the computer. The initial up-front cost is the sale price or purchase price, which can be easily understood by a purchaser. However, the operating cost, which in the case of computers and computer monitors mostly relates to energy use, is much less clear, although it can form a major component of the total cost of ownership. A decision made without appropriate knowledge or consideration of the operating costs is unlikely to be efficient.

Estimates of average annual savings from purchasing more efficient computers[6] indicates that consumers are purchasing computers with little regard to their energy efficiency, and also indicates that consumers could change their purchasing decisions to achieve better energy efficiency outcomes without any material effect on costs, functionality or performance of a computer.

In itself such consumer behaviour does not necessarily justify Government intervention. For example, if consumers consider that the additional effort in comparing the energy efficiency of computer makes and models is not worth the additional savings, then this would not call on Government intervention. However, if this behaviour reflects a market failure, where for example impediments in the market result in information not being efficiently provided, there is, at the least, a theoretical case for Government intervention.

The other area of concern relates to how a consumer's decisions affects other people or the broader community. This can be viewed as an externality. A typical externality is pollution, which can be created as part of the production process or energy consumption of a product. The cost imposed by the pollution is not part of the consumption decision, resulting in a less than optimal efficiency outcome.

In the case of computers, and other electrical appliances, the major externalities generated from energy consumption are increased pressures on the electricity grid and greenhouse gas emissions. Currently, the consumption decision in purchasing a computer, from a financial perspective, is being made without regard to the energy used or greenhouse gas emissions which will be imposed, which is a clear market failure. Another externality relates to how increasing demand raises security of supply issues and generation requirements, which adds support to the case to better enforce more efficient energy use.

2.2. Carbon Pricing and Emission Trading Schemes will not address all the market failures

If the only market failure was the externality regarding greenhouse gas emissions, there would be no other Government intervention required following the introduction of a carbon pricing scheme (Australia) or an emissions trading scheme (New Zealand). Both of these schemes will result in carbon emissions being incorporated in the price of energy use, and the economically efficient outcome could be achieved without further government intervention.

The New Zealand government is aiming for a 50 percent reduction in greenhouse gas emissions from the 1990 levels, by 2050. If there is a comprehensive global agreement to reduce greenhouse gas emissions, New Zealand will commit to reducing emissions by up to 20 percent below 1990 levels by 2020, if certain conditions are met.

The New Zealand Emissions Trading Scheme is currently the primary intervention to reduce emissions across all sectors of the economy, including the energy sector. The scheme places a price on carbon emissions in the energy sector, and it is already a feature of investment decisions and a factor in improving the competitiveness of low emissions alternatives.

[6] Punchline Energy cost benefit analysis July 2012

Additional policies to help lower emissions in New Zealand, involve focusing on developing more renewable energy in all forms, including for electricity, biofuels and direct heating. These are also outlined in the Energy Strategy. One aim is that 90 per cent of New Zealand's electricity needs come from renewable resources by 2025, as long as this does not disrupt the security and reliability of supplying electricity.

Around three quarters of New Zealand's electricity is currently generated from renewable, low emissions sources. This means that electricity generation contributes proportionately less to New Zealand's emissions profile than generation does in Australia.

Among other impacts, the New Zealand Emissions Trading Scheme gives electricity consumers an incentive to reduce their electricity consumption. However, it is unlikely that this would lead directly to improvements in the energy efficiency of computers (computer manufacturers are not subject to the New Zealand Emissions Trading Scheme), or enable consumers to identify products that use less electricity, without other changes in the market (such as the consistent application of MEPS and labelling).

Neither the New Zealand nor Australian scheme will effectively address the problems regarding information in the computer market. Garnaut[7] (2008) makes the point that, regardless of a carbon price, the market's efficient adoption of established technologies and practices may not be efficient as it requires individuals to know:

- the options available;
- the approximate costs and benefits of the different options;
- how to deploy the options (including hiring experts); and
- the cost of investigating the options.

Garnaut argues that if the information barriers regarding efficiency standards are caused by market failures, a government may be able to intervene to improve the efficiency of the market. This appears to be the case in regard to appliances such as computers (the following discussion is largely based on Garnaut (2008)[8]).

One market failure relates to the information that is available to consumers on appliances, and suppliers having considerably more information than a consumer. Consumers may not be able to determine the ongoing energy used by an appliance without research or outside assistance. This allows opportunism, as a product manufacturer could mislead a buyer on the efficiency and efficacy of a product, which the buyer is unable to verify.

Information regarding the energy performance of a computer can also tend to have some public good characteristic. Although, overall the community would benefit from the information being provided there are insufficient incentives for any stakeholder to obtain this information, including suppliers who may be best placed to access the information.

In a situation where consumers have difficulty in determining whether a product is energy efficient or not, consumers may be wary to trust any energy efficiency claims of manufacturers arising from their purchasing choice.

Even where people have access to information, the complexity may result in decisions which are sub-optimal. In the case of computers, a consumer may give too much weight to the up-front costs, and too little to on-going or energy cost in operating a computer. Operating costs reflect future use and energy costs, which are uncertain and difficult to forecast.

A carbon pricing scheme will not directly address such issues. At the most, given the increase in energy costs the scheme may provide an additional incentive for a consumer to obtain the required information, as the greenhouse gas costs will fall on consumers and not on society in general. This is not likely to be a major additional incentive, as the additional carbon costs would be minor compared to the overall operating and capital costs of a computer, and the uncertainty would persist.

Although a carbon pricing scheme would incorporate greenhouse gas emissions in pricing decisions, the remaining market failures regarding information would still likely result in excessive greenhouse gas emissions from energy used by computers. The market failures tend to result in purchasing decisions which do not fully incorporate energy costs, resulting in more energy consumption from less efficient products.

If there is no cap on greenhouse gas emissions, the emission by computers beyond the efficient level would result in an addition to overall greenhouse gas emissions. Under a cap and trade scheme, there would be no overall addition to greenhouse gas emissions than that allowed under the cap. However, the emission of greenhouse gas from computer energy consumption above the efficient level would be at the expense of production which generates greenhouse gas emissions in more productive sectors, resulting in a net welfare loss to the economy.

[7] The Garnaut Climate Change Review: Final Report, Commonwealth of Australia 2008

[8] The Garnaut Climate Change Review: Final Report, Commonwealth of Australia 2008

2.3. The nature and scope of the problem in practice

Whether the theoretical justification means that the Government should intervene depends not only on the scope of the problem, in terms of depth and breadth, but also on how the market operates in practice, and the consequent ability of the Government to cost-effectively intervene to improve outcomes.

The depth of the problem can be viewed from the perspective of an individual appliance. Test results discussed in this DRIS show that computers in the same category and similar performance can have vastly different energy consumption characteristics. The tests show, for example, that a relatively energy inefficient performing desktop computer (Category D) can use around 140 per cent more energy than the most efficient computer in the category and 56 per cent more than an average computer in the category. Computers purchased for these tests also indicate that there is no apparent correlation between price and energy performance.

In practice the potential energy savings may have little impact on a consumer's purchasing decision even if the Government successfully intervened to provide consumers more complete information. Given the relatively small size of the savings per unit, consumers may not change their behaviour to purchase a more efficient computer. Whilst every computer system is used differently, the estimated average annual savings[9] can be calculated by multiplying the estimated energy reduction by the average tariff. The following estimates are based upon typically deployed products and usage.

For Australia, using a 2012 tariff of 22.5 cents per kWh the average annual savings are:

- $29 for an office desktop and LCD system;
- $16 for a home desktop and LCD system;
- $13 for an office notebook; and
- $3 for a home notebook.

For New Zealand, using home and office tariffs of 23.7 and 17.1 cents per kWh respectively the average annual savings are:

- $NZ22 for an office desktop and LCD system;
- $NZ17 for a home desktop and LCD system;
- $NZ10 for an office notebook; and
- $NZ3 for a home notebook.

Such savings may not be considered relevant for a consumer given the initial up-front costs, which are likely to dominate a consumer's cost comparison. A home desktop computer and computer monitor may cost between $1,000 and $2,000 or more depending on the features, so whether the additional energy costs of $16 or more per year over an average five year ownership will affect the purchasing decision is not clear. The additional $3 or more per year for a home notebook/laptop computer, which can cost $500 to $800 or more, is unlikely to change a consumer's purchasing decision.

Moreover, purchasing a computer is a decision which includes consideration of a range of criteria and a purchaser is likely to put a number of these features above energy consumption. Also, in many instances a consumer would not be able to find computers with similar features where they can compare energy consumption in a consistent and meaningful manner. Suppliers often provide purchasers with a range of configuration options and features to choose from to obtain their preferred product, adding to the complexity for a consumer to assess the energy efficiency of a computer.

Although the problem is not significant from a consumer's perspective, evidence indicates that there will be some opportunities to reduce energy use fairly simply with changes to computer performance characteristics. During the DCCEE testing of computers it was found that 41 per cent of desktop computer models did not have power management enabled out-of-the-box. In contrast, 100 per cent of all notebook/laptop computer models tested did have power management enabled out-of-the-box; however 36 per cent had power management time settings that were unlikely to be activated. These functions, irrespective of a computer's or computer monitor's power demand, can simply and cheaply achieve significant energy consumption reductions with virtually no disruption to the functionality of the devices.

In regard to the breadth of the problem, in 2006 there were more than 24 million computers in use in Australia, with projections that by 2020 the number of computers will reach around 46 million. Despite limited data being available for New Zealand the penetration of computers appears to be in proportion to Australia. In the absence of reliable information to the contrary, it is assumed that the number of computers in New Zealand is proportional to the number in Australia: about 4.8 million.

Total energy consumption by computers represents around 3 per cent of total national energy use[10], with only a proportion of this consumption, that excess consumption used by inefficient products, which comprises the problem. Overall, therefore, the scope of the problem is not large. Nevertheless, any increase in the efficient use of

[9] Punchline Energy cost benefit analysis July 2012

[10] Excel modelling is the source of this data which uses the methodology summarised in Appendix 7.

energy would result in ongoing gains. The problem is significant enough to at least allow consideration of options to address the issue. Although the excessive greenhouse gas emission are minor compared to total emissions generated in Australia, they are nevertheless material compared to targeted greenhouse gas emissions reductions, and will grow over time.

2.4. The nature of the computer market

The dynamic nature of the computer and computer monitor market adds to the complexity in designing policy responses in this area. The introduction of digital technology into such areas as telephony, television and computers means that consumer demands, historically served by specific products, are now available on a diverse range of products. For example, movies, television shows and music are readily available on line resulting in increased use of computers and monitors to both download and play them.

This has raised concerns about how the US energy standard, ENERGY STAR®, could treat such products. Meier[11] raised such concerns and noted that the problem is actually more serious for mandatory efficiency standards because they must address all of the products whereas voluntary programs can exclude exotic devices representing small fractions of the sales. Similarly, Steenblik et al[12] (2006) considered that the rapid pace at which computer technology was evolving was a major reason why voluntary measures for energy efficiency in computers have been used more widely than mandatory standards.

Another major consideration in the ability of the Government to cost-effectively intervene is the global nature of the computer manufacturing industry. Virtually all computers purchased in Australia and New Zealand are manufactured overseas, with most manufactured in China. In 2009-10 Australia imported around $6.1 billion worth of computers. Of these, $3.5 billion worth of imports were from China with the rest largely from other countries in the Asian region[13].

Although the supply of computers in Australia and New Zealand is dominated by a relatively small number of international brand names, mostly manufactured in China, there are also other importers and local 'white box' suppliers that build computers utilising imported components. 'White box' computers are mostly limited to the desktop market and not the notebook market due to the simplicity of assembly of components into an enclosure (the 'white box').

China also dominates the global market, manufacturing approximately 80 per cent of the world's notebook and desktop computers. Of the USA's $100 billion in computer imports, more than half are from China[14].

China's manufacturing domination indicates the global nature of the product, with computers manufactured for different countries being largely similar. Australian and New Zealand represent only a small proportion of the global market. As noted in a 2006 OECD Report[15] "as personal computers, especially portable computers, have become a globalised commodity variation is mainly found in combinations of features among models, not in the models available across countries."

From an Australian or New Zealand consumer's perspective this is clearly beneficial, providing local consumers with access to low cost products which reflect large economies of scale and low labour costs. This, however, makes the policy problem more complex, making it difficult for the local market to provide a local response to the problem, as well as having important implications regarding the design of cost-effective regulatory options to address the problem.

Related to the global nature of the computer market, is how energy efficiency standards are implemented internationally. Most countries do not impose mandatory energy performance standards on computers with only Japan, South Korea and Russia (with an obsolete requirement) having mandatory requirements[16]. The USA, countries in the European Union, China, Canada, New Zealand and Taiwan have voluntary standards.

The ENERGY STAR® test and performance specifications, although voluntary, are the closest thing to an international standard. The ENERGY STAR® program allows eligible computers and monitors to display the ENERGY STAR® logo. ENERGY STAR® requirements for computers were first developed and implemented in 1994. The ENERGY STAR® V5.0 specification which set revised voluntary standards for computers was introduced from July 2009 and has subsequently been amended to ENERGY STAR® V5.2 to allow for additional networking specifications. ENERGY STAR® V5.2 provides metrics for calculating the maximum allowed typical

[11] "The future of Energy Star and other voluntary energy efficiency programs" (2003) Alan Meier, International Energy Agency

[12] "Can energy-efficient electrical appliances be considered "environmental Goods""? OECD Trade and Environment Working Paper No. 2006-04 by Ronald Steenblik, Scott Vaughan and Paul Waide

[13] Composition of Trade, Australia 2009-10, Department of Foreign Affairs and Trade December 2010

[14] Computer Manufacturing Industry Profile, First Research, 2011

[15] "Can energy-efficient electrical appliances be considered "environmental Goods""? OECD Trade and Environment Working Paper No. 2006-04 by Ronald Steenblik, Scott Vaughan and Paul Waide

[16] "Can energy-efficient electrical appliances be considered "environmental Goods""? OECD Trade and Environment Working Paper No. 2006-04 by Ronald Steenblik, Scott Vaughan and Paul Waide

annual energy consumption of computer types, enablement of “built in” power management functions and minimum power supply efficiency levels.

The majority of countries that have voluntary standards have harmonised them with the ENERGY STAR® requirements, resulting in it becoming a de facto international standard. These countries include Canada, New Zealand, Taiwan and the European Union. However, many European products are also labelled with a different standard, TCO (Tjänstemännens Centralorganisation) Certification, a combined energy usage, ergonomic and environmental rating from the Swedish Confederation of Professional Employees. Although commonly associated with computer monitors, TCO standards now also cover computers, keyboards, printers, mobile phones and office furniture.

In December 2000 the United States and the European Communities signed an administrative agreement on the co-ordination of labelling programs for energy-efficient office products. Under the Agreement the ENERGY STAR® program is the recognised reference standard within the European Union for computers, monitors, printers, fax machines, copiers, scanners and multifunctional electrical office equipment.

Although intended to be a voluntary efficiency standard, the ENERGY STAR® requirement has been mandated for US Federal Government purchasing and by some US state governments. This has promoted compliance with the standards in the USA.

The Australian Government ICT Sustainability Plan 2010-2015 introduced in August 2010 requires all Australian Government agencies to adopt mandatory environmental standards in ICT procurement including compliance with the current ENERGY STAR® requirement.

2.5 Problem – conclusion

There is clearly a potential for market failures in the Australian and New Zealand computer markets. Although those relating to greenhouse gas externalities will be addressed by a carbon pricing scheme, some market failures relating to information about energy consumption will persist. Such market failures will generally result in more energy being used than that which is optimal, and consequently also result in more than the efficient level of greenhouse gas emissions from computer use.

However, the case for Government intervention is somewhat less clear cut from a pragmatic perspective. The scope of the problem is not major, for example at a consumer level the savings possible in using more energy efficient computers and computer monitors is generally not significant. However, the use of computers is broad, and growing, and while the overall scope of the problem is not major in terms of inefficient levels of energy use or greenhouse gas emissions, the cumulative impact is likely to be material.

A general observation is that although better design and technology to improve the energy efficiency of computers has been developed it has not been fully implemented by computer manufacturers. Although many computers are achieving higher levels of energy efficiency there remains computers at the less efficient end of the spectrum that have not similarly progressed. This lag perhaps indicates that the design and technology improvements are not being efficiently utilised for such computers, as is occurring in the rest of the market, perhaps due to some market impediments.

In any case, the assessment of the scope of the problem indicates that to achieve a net benefit to the community it is imperative that any Government intervention is cost-effective. Any intervention needs to recognise the global nature of the computer manufacturing industry and the consequent implications this has in regard to imposing additional costs on manufacturers and consumers. Options which treat computer manufacturing as a domestic industry, without recognition of the need for manufacturers to supply a larger market than Australia and New Zealand, are likely to impose costs on suppliers and consumers which exceed any potential benefits. Any option also needs to recognise the dynamically evolving nature of the computer industry.

3. Objectives and Options

The specific objectives of the proposed policy for computers and computer monitors are:

> **To improve the energy efficiency of computers and computer monitors sold in Australia and New Zealand without compromising functionality or choice, and to provide information for consumers to make an informed purchasing decision.**

Although technology has resulted in gains in energy efficiency, which has increased the overall average efficiency of computers, there have remained computers at the less energy efficient end of the spectrum that have not similarly progressed. A major contribution to the objective would be to eliminate or substantially reduce the availability of such inefficient computers**.**

3.1 The options considered

There are a number of options which would address the problem outlined, and potentially achieve the objective.

3.1.1. Business as Usual

Under the BAU option suppliers will continue to not be required to register their products or to undertake testing for the purposes of energy efficiency performance in order to supply computers to the local market.

It is reasonable to assume that under the BAU case there would be a gradual improvement in energy efficiency over time.

The BAU option is a legitimate choice for decision makers to consider in response to the problem, particularly given that the depth of the problem is not significant, and that any alternative needs to be highly cost-effective to be preferable.

3.1.2. Minimum Energy Performance Standards for Computers and Computer Monitors

Under a Minimum Energy Performance Standards (MEPS) scheme a supplier will be subject to certain energy performance standards for their computer and computer monitors, either under a voluntary arrangement or mandated by regulation.

Mandatory MEPS for Computers and Computer Monitors

Under a mandatory MEPS scheme a supplier would only be able to legally supply computers which meet a certain energy performance standard. Two approaches for a mandatory energy performance standard scheme are outlined below.

A Local Stand-Alone Mandatory MEPS for Computers and Computer Monitors for Australia and New Zealand

A local stand-alone local scheme would allow the performance standard to be set to meet local requirements without regard to requirements in other countries.

Each product would need to be tested specifically for the Australian and New Zealand market. For any product which tests above the MEPS level, the supplier would need to either remove the product or to re-configure it to meet the MEPS level.

Mandatory MEPS for Computers and Computer Monitors linked to an International Standard

Linking a scheme to an internationally recognised standard will recognise the global nature of the computer market. Specifically, the local standard could be linked to the ENERGY STAR® standard. Although voluntary, the ENERGY STAR® specification is widely complied with, and it is used as a voluntary standard throughout the world including in the European Union, Canada, New Zealand and Taiwan. However, it has been mandated for US Federal Government purchasing and for some US state government purchasing.

Under the option, computers and computer monitors would be tested based on ENERGY STAR® specifications, using Typical Energy Consumption (TEC) methodology for computers and power for monitors based upon screen area and resolution. TEC is a metric of measured power in four operational modes (on, idle, sleep and off) combined with annual time weightings in each mode. The actual time weightings depend upon the computer's networking attributes. Further details on the ENERGY STAR® specifications and their application to MEPS are in Appendix .

Responsibility for compliance with the MEPS will lie with the supplier of the product. Each product will need to be registered locally, which will be able to be done on-line via a registration website.

Where a computer and computer monitor has been tested overseas using ENERGY STAR® specifications the test results can be used to obtain approval in Australia and New Zealand. If the product has not been successfully tested to the ENERGY STAR® specification, the supplier can undertake an in-house test (or contract a third party supplier to conduct a test), and provide the results via the internet.

A complication arises for computers which include components that exceed the baseline configuration (such as additional hard disk drives, extra system memory, discrete TV and audio tuner cards and discrete graphics cards). This can be addressed by providing additional allowances in terms of kWh permitted for these additional components. Also, suppliers can register family of products, with a family consisting of a baseline computer and different combinations of addition components, under one registration (this is discussed further in the impact analysis section). The allowances and definitions for additional components will be taken from the European Commission's proposed Tier 1 levels in their Energy related Products (ErP) Lot 3 program which builds upon ENERGY STAR® Version 5.2.

A mandatory program would apply to new stock of computers and computer monitors within the scope of the joint Australia/New Zealand Standard that are manufactured or imported on or after the implementation date.

Voluntary MEPS for Computers and Computer Monitors

A voluntary option would seek to encourage equipment suppliers to only provide computers and computer monitors which meet certain minimum energy efficiency levels without any regulatory requirement, with compliance encouraged, for example, by a Ministerial media release. Compliance with voluntary standards can also be encouraged by government purchasing polices and so can be linked to scheme such as the Australian Government ICT Sustainability Plan 2010-2015 which requires computers and computer monitors supplied to the Australian Government meet the current ENERGY STAR® specifications

As discussed, the main examples of international voluntary MEPS are the ENERGY STAR® specifications V4.0 and V5.2 for computers and V4.1 and V5.0 for computer monitors. To participate in the ENERGY STAR® scheme, for example, a supplier needs to register and have their product tested in approved test laboratories, and may re-configure some products to meet the specifications.

Under a voluntary scheme, suppliers would be able to voluntarily supply computers and computer monitors for certification in order to gain a listing on, say, a website. The scheme could be supported by the use of voluntary endorsement labels, which would provide recognition to suppliers participating in the scheme.

The Government could also intervene with some regulatory requirement for suppliers to advice of their non-compliance, such as on a label stating that the product has not successfully tested for the voluntary MEPS. This would still leave it up to the supplier to decide if they wish to test their product. Where a product is tested and meets the standard, the supplier can register the product which will allow the supplier to include a label which advises that the product has successfully tested for the voluntary standard. For those products which have not successfully tested, they would need to advise of this on a label.

3.1.3. Labelling for Computer and Computer Monitors

A mandatory label can provide some guidance to consumers which can offset gaps in their information.

Mandatory Labelling for Computer and Computer Monitors

Mandatory energy labelling requires the application and display of a comparative energy performance label on products and packaging. It would be designed to present highly technical information in a format that can be readily understood and provides consumers with a comparison of the energy performance standard of one product to another.

Under this option, when a computer is offered for sale it will be required to display a label that shows the star rating and other useful information about energy consumption. For example, as currently applies to a number of whitegoods, the label could give the appliance a star rating from one to ten stars. Energy labels have been used for over 20 years in Australia, most notably for refrigerators, freezers, clothes washers and dryers, air conditioners and, since 2009, televisions.

The current Energy Rating Label has two main features that provide consumers with the following information:

- A comparative assessment of the model's energy efficiency through a star rating scale.
- The comparative energy consumption (usually kilowatt hours/year) which provides an estimate of the annual energy consumption of the appliance based on the tested energy consumption and information about the typical use of the appliance in the home.

The Star Rating of an appliance is determined from the energy consumption and size of the product. These values are measured under local standards which have internationally recognised procedures for testing energy

consumption and minimum energy performance criteria. The label is applied prior to reaching the retail level, but retailers need to ensure all products on display have the required labelling.

One option is to require labelling for an individual component of a computer rather than a computer as a whole, which has many configurations. The most obvious candidate would be computer monitors, given their relative simplicity, and as they represent around one quarter of the energy consumption of a desktop computer and computer monitor system.

This would be similar to the current labelling for televisions. Since October 2009 Australian states and territories have implemented a scheme which requires registration of all models of televisions supplied in Australia. This followed the implementation of a voluntary energy labelling scheme for televisions, which was introduced in July 2008.

Under a mandatory labelling scheme for computer monitors, as is currently done for televisions, each computer monitor supplied in Australia would be required to be registered and each monitor would need to display an energy rating label.

ENERGY STAR® has adopted measuring methodologies for computer monitors that are consistent with those it has introduced for television, which can also be applied to computer monitors. Specifically, the proposed performance levels could align with ENERGY STAR® V5.0 and labelling for monitors are aligned to the proposed Tier 2 TV MEPS but with a reduced residual power allowance given that monitors do not have a TV tuner. Televisions are not included in the scope of this RIS.

Voluntary Labelling for Computers and Computer Monitors

A voluntary labelling option would be similar to mandatory labelling, without any regulated requirements with similar information provided.

3.1.4. Education campaigns

The Government or industry supported by Government could undertake an education campaign. The campaign could be targeted, as much as possible, at the areas of information failure. Such a broad education campaign, however, could not provide specific information on individual products. It could provide advice of a general nature, such as what a consumer should consider in purchasing a computer, and how to consider operating costs in making an optimal choice.

4. Impact Analysis

This section assesses the options outlined in the Options Section. Although all the options are potentially feasible, they may not be sufficiently cost-effective to provide net benefits. This is assessed in this section.

4.1. Business as Usual

Under the BAU option it will not be necessary for suppliers to register their products or to undertake testing for the purposes of energy efficiency performance in order to supply computers and computer monitors to the local market. However, many suppliers to the local market are already undertaking testing to participate in overseas voluntary programs and locally, under the Australian Government ICT Sustainability Plan 2010-2015, computers and computer monitors supplied to the Australian Government are required to meet the current ENERGY STAR® specifications.

As time progresses under the BAU option, there is likely to be changes to the current market arrangements. The market is likely to respond to the problems and market failures to some degree. As consumers become more aware of energy use they may better understand operating costs and suppliers may therefore have greater incentives to provide information. Higher energy costs and increased recognition of greenhouse gas implications could encourage this. Gains in communications technology may assist consumers to obtain better information.

Progress in the development of computers and computer monitors globally will also provide for improvements in energy efficiency of computers and computer monitors in Australia and New Zealand. As Australia and New Zealand are essentially a small part of the global computer and computer monitor market, major international regulatory initiatives, as well as voluntary initiatives, will be likely to result in a growing proportion of computers and computer monitors in Australia and New Zealand meeting higher international energy efficiency standards. BAU will also include local progress as more suppliers comply with local schemes such as the Australian Government ICT Sustainability Plan 2010-2015 introduced in August 2010.

Nevertheless, the scope of the problem is likely to grow as more and more computers are owned by people in Australia and New Zealand. At the individual consumer level, energy use may increase, irrespective of efficiency gains, as consumers demand more powerful computers and larger monitors.

Testing by DCCEE[17] (formerly Department of the Environment, Water, Heritage and the Arts (DEWHA)) indicates that problems will persist under the BAU case. Although technology has resulted in gains in energy efficiency which has increased the overall average efficiency of computers and computer monitors over the past, at the less efficient end of the spectrum there has continued to remain very inefficient computers and computer monitors in the market that have not similarly progressed.

4.2. Minimum Energy Performance Standards (MEPS) for Computers and Computer Monitors

A MEPS scheme will essentially cease suppliers from providing certain products into the Australian and New Zealand markets, or else suppliers will need to re-configure computers and computer monitors to have them meet the standard. Such impacts are potentially large on affected suppliers, but are an intrinsic part of the objective of a MEPS scheme, which is to ensure that those very poor energy performing products in the marketplace are removed.

4.3. Mandatory MEPS for Computers and Computer Monitors

Enforcing a MEPS scheme would essentially ensure that poor energy performing computers and computer monitors are removed from the market. The question is whether this can be achieved cost-effectively, and without impeding consumers obtaining access to a range of products which can best meet their requirements. As noted in the options section, this RIS considers two approaches to mandatory MEPS for computers and computer monitors: a local stand-alone approach and one linked to international schemes.

[17] link to energyrating web page on computers and computer monitors

4.3.1. A Local Stand-alone Mandatory MEPS for Computers and Computer Monitors for Australia and New Zealand

A stand-alone local scheme would allow the performance standard to be set to meet local requirements without regard to requirements in other countries. This would allow for considerable flexibility in the local approach.

Such an option is likely to be costly. A standard set purely for Australia and New Zealand could impose substantial additional costs on suppliers. The proposal would result in all products requiring testing for the local region, with no ability to use test results undertaken for standards in other countries.

There would be little certainty for suppliers if they would be eligible for the Australian or New Zealand market irrespective of whether they meet international standards. It is likely that many more computers and computer monitors would require re-configuration compared to a scheme linked to international standards. Consequently, it is likely to further increase costs to consumers as well as limit the range available to consumers.

As discussed in the problem section, a cost-effective option is required to allow any chance of an overall net benefit, and this is unlikely for a scheme which does not recognise the global nature of the market.

Also, the major benefit of this option is that it allows for a mandatory standard which is designed for local conditions. But the marginal benefits of a scheme designed for local conditions compared to a scheme linked to international standards are not likely to be large, given the global nature of the computer and computer monitor market, where conditions in one country do not require a product to be markedly different to a product supplied in another country.

4.3.2. Mandatory MEPS for Computers and Computer Monitors linked to an International Standard

Specifically, under this option the local standard would be linked to the ENERGY STAR® specification. Although originating in the USA, ENERGY STAR® has been adopted throughout the world including in the European Union, Canada, New Zealand and Taiwan. Although voluntary, it has been mandated for US Federal Government purchasing and for some US State governments. This has promoted compliance with the standards in the USA market more generally.

The Australian Government ICT Sustainability Plan 2010-2015 introduced in August 2010, which requires all Australian Government agencies to comply with the current ENERGY STAR® standard, will also encourage compliance with the standard.

Consequently, a scheme in Australia and New Zealand which follows the ENERGY STAR® standard will allow a large number of companies to continue to supply their products to the Australian and New Zealand markets without significant additional burden. A large majority of computers and computer monitors supplied to the US market are likely to be eligible (subject to utilising a power supply for local conditions).

Under the proposed mandatory MEPS all suppliers will be required to register their product via the internet. If the product has already been tested and met the ENERGY STAR® specification in another country, it would only be necessary for the supplier to register these results locally. The compliance cost imposed on suppliers would not be significant for the large proportion of suppliers that are ENERGY STAR® compliant. A charge to cover administrative costs will be imposed on businesses to register their products, and it is likely to be around $440[18].

However, further complexities arise for products which include additional components to a baseline computer (components such as additional hard disk drives, extra system memory, discrete TV and audio tuner cards and discrete graphics cards). This would be handled by providing an additional allowance, in terms of kWh use, for each extra component added to the baseline configuration. For example, for each additional GB of memory added to a baseline desktop computer, it is proposed an additional 1 kWh in energy use is allowed for the MEPS.

The need to undertake this adds complexity and consequently costs. However, such arrangements are successfully implemented as part of voluntary schemes in Europe, as well as under the ENERGY STAR® scheme in the USA.

The methodology proposed to handle the additional components is based on the European standards, with the allowances and definitions taken from the European Commission's proposed Tier 1 levels in their Energy related Products (ErP) Lot 3 programs.

During consultation industry stakeholders advised they considered that the European scheme of handling add-ons was more practical and provided more specific categories for additional components than under the ENERGY STAR® scheme. The European Standards are specifically designed to allow assessments of additional components to ENERGY STAR® approved products. Also, the metrics for testing for European standards are in line with those for the testing for the ENERGY STAR® specification, which means that results from testing for one standard can be used to test for compliance with the other, and consequently for the proposed mandatory MEPS scheme for Australia and New Zealand.

Under this option, to reduce the costs of registering different models in a family of products, suppliers will be able to register a family of products in a single registration. That is when a supplier has approved a computer product

[18] As under the *Greenhouse and Energy Minimum Standards (GEMS) Act 2*012 which will impose fees for MEPS.

which consists of a baseline product and a number of additional components – defined as a family - any product which consists of a combination of the baseline product and the components can also be approved as part of the same registration and approval process.

Evidence from testing[19] undertaken locally by DCCEE shows that for both notebook and desktop computers around 36 per cent of the computers tested would potentially fail to meet the proposed MEPS (however the overall impact depends on the deployment of the various categories).

For models not complying, adoption of MEPS may require design, hardware and software changes, which has the potential to increase average production costs. The potential production cost increases could result in initial retail price increases of $30[20] for desktop computers and $15 for notebook computers to implement the MEPS requirement. An increase of $5 is expected for computer monitors.

DCCEE and international testing also indicates that consumers will not substantially lose access to a range of computers and computer monitors with lower up-front costs, irrespective of their energy use. The testing showed that the computer market includes many models consuming much higher energy than other models in the same category having similar performance, and also indicated that there is no correlation between price and energy performance between equivalent classes of computers.

The main concern from a policy perspective is the potential for a mandatory MEPS to reduce the choices available to consumers. By its nature, a mandatory scheme will reduce choice or force suppliers to use better components to make products compliant. This is part of its benefit, as it stops consumers from making sub-optimal decisions and consequent over-consumption of energy.

However, where the proposal impedes choices which would have otherwise increased the net welfare of the community (by increasing consumer utility more than the costs, including any negative externalities) the proposal would be imposing negative outcomes. That is, where a product will no longer be available, if the consumer cannot find the functionality in another computer and would have been willing to pay for the additional energy costs, including external costs, then reducing choice would not lead to good outcomes. Whereas, if the mandatory MEPS results in energy inefficient computer being no longer available, but the same functionality is still available to consumers in an energy efficient computer then, society will be better off even though choice has been reduced.

The impact of the scheme in not allowing decisions which would have provided net benefits is a particular concern given the nature of the products. Computer technology is dynamically evolving, with computer features and use liable to undergo large changes fairly quickly. Cutting edge computers with new technology and features may require a relatively large amount of energy. This may include, for example, highly valued technology which users may be willing to pay a huge premium for (as often occurs with new technology) or it may be cutting edge computer technology which provides productivity gains. The treatment of such products is a major concern in regard to whether an option is beneficial to the community.

Such concerns, however, will be largely addressed under the design of the proposed MEPS. Under the proposal a Standard is made by a 'determination' and these will apply to tightly defined product classes. For example, regulations will apply only to certain tightly defined desktop/integrated computers, notebook and tablet computers. It will not apply to any product that falls outside these definitions, including 'high end' products.

Although MEPS is designed to handle additional features through treating them as add-ons, it is likely that some particularly innovative products will not be able to be handled under the add-on arrangements. In such cases, however, it is likely that these products will not be subject to the MEPS scheme as their features make them, in effect, different products to those within the definition of the scope of the MEPS. A wide range of computing technologies, including any development that constitutes a 'high end' desktop or integrated computer, will consequently be exempt from the MEPS scheme.

Where a product falls within the definition for compliance with the MEPS with energy consumption above permitted levels but is desirable for some reason, there will be provisions, as there are under current mandatory MEPS schemes, to exempt product models from regulations. That is, the regulator can exempt specified product models from the MEPS requirements, or any other aspect of the determination.

The circumstances the regulator can take into account when providing exemptions are not restricted. The regulator will be able to consider whether consumers may be prepared to pay for this high level of energy use to obtain the benefits provided by the new technology, as well as the effect on energy consumption and greenhouse gas emissions. Exemptions can apply to all or limited supplies or uses of relevant technology. The proposed system for exemptions was supported by industry, which noted that it provides greater clarity than the informal system of 'regulators rulings' that has previously applied.

Moreover, a mandatory scheme provides considerable certainty, where suppliers which are only providing compliant computers can be assured that their competitors are also supplying compliant computers. This certainty was a major reason why the major suppliers tended to support a mandatory scheme during the consultation process. This may partly reflect that a higher regulatory standard could provide something of a barrier to entry to

[19] Link to energyrating web page on office equipment energystar computers and monitors

[20] Link to web page for white paper on costs for computers to comply

the market and is therefore likely to favour incumbents. However, the provision to allow for innovative products to be exempted from MEPS compliance should help ensure that incumbents are not protected against the entry of beneficial products to the market.

4.3.3 Voluntary MEPS for Computers and Computer Monitors

The flexibility of a voluntary option gives it some advantages. As noted, although most products which do not comply with a MEPS will be products with poor energy performance and taking them away from the market will provide net benefits, there may be some other products which although they do not comply with the standard provides significant benefits that offset their high energy use. Voluntary schemes allow suppliers the flexibility to assess whether the demand for a product would be sufficient to supply the product despite the product not meeting a voluntary standard.

The problem, however, with a voluntary scheme is whether it would actually be effective in stopping the supply of poor energy performing computers. While a voluntary scheme allows a supplier the flexibility to provide beneficial non-compliant computers, they are also allowed to supply non-compliant computers which impose a net cost on the community. A formal voluntary scheme may impose additional persuasion on suppliers to supply only energy efficient products than under BAU. Nevertheless, a supplier would still be likely to only voluntarily comply with the scheme if it received a net benefit from participating (or at least did not incur a net cost). The USA experience indicates that a voluntary scheme, where it is supported by a procurement requirement, can result in fairly large availability of compliant products. However, there are still a large number of energy inefficient computers on the US market.

A major supplier may respond fairly positively to a voluntary standard. A supplier who sells a large number of different products where some are below the standard may withdraw the lower performing products, as the firm may be able to pursue sales of its more energy efficient brands to offset the foregone sales. Such a firm may also consider it effective from a promotional perspective to be able to promote its entire brand as meeting the voluntary standard.

Smaller suppliers which only provide a few different products would face different circumstances. Such a supplier would be likely to lose a large proportion of their local sales if it withdrew a product, with little ability to offset the foregone revenue.

Further, as noted, Australia and New Zealand represent only a small proportion of sales in a global computer market, with computers and computer monitors sold locally dominated by global suppliers who also supply foreign markets. Most of the major suppliers to Australia and New Zealand already supply in countries where a voluntary code applies (such as the USA and Europe). A similar voluntary scheme in Australia and New Zealand is unlikely to result in significant additional compliance. Those international suppliers with products that do not comply with international voluntary standards are unlikely to comply with a local voluntary standard, given that they have chosen not to participate in similar schemes in other countries where they also supply their products.

For suppliers to significantly adapt to a voluntary scheme it would therefore appear to need a significant demand side response. An effective demand side response would, at the least, require that consumers are aware of what products comply and those which do not. A supplier providing non-compliant products would have no incentive to advice consumers that their products are non-compliant, as this is very likely to substantially reduce sales.

A mandatory label advising of non-compliance would provide considerable help for an otherwise voluntary scheme to effectively achieve the objective. The scheme could remain voluntary to the extent that it is a matter of choice for a supplier to test and register a product. It would, however, be mandatory for the product to be labelled. Given that the supplier will decide whether it is worthwhile to do the testing and registering, the scheme should be relatively low cost, with suppliers able to not participate if they consider that the costs of registering are too high to make registration worthwhile.

The scheme will allow consumers a clear choice between products which have been shown to meet the standard, and those which have not proved that they have. As noted, one of the main ways to achieve the objective is to effectively cease or significantly reduce the purchase of poor energy performing computers. Although this option will not abolish such products, identifying these so clearly could substantially reduce the number of poor energy performing products purchased.

There would be little incentive for consumers to continue to purchase these poor energy performance products unless the products are less expensive or have additional features, and as noted elsewhere in the RIS evidence suggest that this tends not to be the case. Even consumers with little product or energy awareness are likely to be put off from purchasing a product with a label advising that the product does not comply with a standard, particularly where there are likely to be similar and compliant computers at a similar price.

As industry is generally not supportive of labelling measures, there may be difficulties in obtaining a critical mass of support for a voluntary scheme. However, although a voluntary standard, even including labelling advising on whether a product has been tested and registered, will not achieve 100 per cent compliance, it may, nevertheless, reduce the purchase of inefficient computer sufficiently to obtain real benefits, while still providing suppliers with the flexibility of supplying non-compliant products.

4.4 Labelling for Computer and Computer Monitors

As the problem revolves around information, requiring suppliers to include information with their products through labelling directly addresses a major part of the market failure. This could be approached through either a mandatory or voluntary scheme.

4.4.1. Mandatory Labelling for Computer and Computer Monitors

The information failure relates to the lack of sufficient information provided to consumers in purchasing computers and computer monitors. Mandatory labelling would therefore help improve the efficiency of consumers' purchasing decision.

However, the problem also relates to the ability of consumers to properly understand the implications of the information, which requires forecasting the use of the product and the associated energy costs. The complexity of this may still leave many consumers excessively focussing on up-front costs. A large proportion of consumers are also likely to continue to give energy efficiency only minor consideration given the complexity of the features a consumer has to consider in purchasing computers.

This option would impose similar testing requirements as required for the mandatory MEPS option. The results from the testing of the product will identify the appropriate standard, and results for testing undertaken for international standards can be used by a supplier.

The option also has similar complexities as for the mandatory MEPS option, given that many purchases comprise more than just a baseline computer product. As proposed for the mandatory MEPS option, this could be handled by providing an additional allowance for each star rating, in terms of kWh permitted, for each extra component added to the baseline configuration.

However, whereas an addition of a component under MEPS would result in the product either being continued to be compliant or non-compliant, under a labelling scheme each additional component will result in maintenance of the rating or a new rating from the ten (star) ratings standards. This would mean that there would be a large and complex matrix of potential ratings for a computer comprising a baseline product and various components. The complexity facing a consumer, particularly a consumer comparing between products with different features, could make the information provided by labelling difficult for purchasers to use.

Also, a labelling scheme may be problematic for a purchasing decision where the consumer chooses additional components, with the additional components selected after the baseline computer has been decided on. The purchasing decision may be based on the information about the computer when it was on display and in its baseline form, and labelled accordingly. The actual computer purchased may potentially have a different energy performance standard without the purchaser able to respond to this. This compares to a mandatory MEPS scheme where a product is either compliant or not.

Similar to the mandatory MEPS option, a mandatory labelling scheme could be simplified to a degree by allowing suppliers to register a family of products consisting of a baseline computer and additional components, under one rating, and consequently allowing each combination of the baseline computer and components within the family to have the same energy ranking. This, however, would lessen the preciseness of the information, and consequently reduce its value to purchasers.

It is likely to be more effective to require labelling only for computer monitors. A computer monitor is a relatively simple product compared to a computer and accounts for one quarter of the total energy consumed by a desktop computer system. Specifically targeting monitors with a labelling requirement may therefore provide benefits in a cost-effective manner.

The experience with the labelling of televisions provides some evidence of the potential impact of such an option. Technological convergence has resulted in televisions and computer monitors being essentially the same product. Both are essentially global products - only the tuner in a television is specifically subject to local broadcasting requirements.

Under the mandatory labelling scheme for televisions each television sold is required to display an energy label. The experience indicates that such a mandatory labelling requirement is at least feasible, with Australia and New Zealand still able to attract a large number of imported televisions following the introduction of the scheme in October 2009 – this followed a trial of a voluntary energy labelling scheme which was undertaken to help assess the feasibility of the proposal.

The experience also indicates that such a scheme may be effective. Television labelling has seen the average energy efficiency of new products improved at a rate of 20 per cent per annum[21] for the first 18 months of the program.

The proposed computer monitor labelling scheme, like the current television labelling scheme, would recognise international arrangements, at least to some degree. The energy rating label (with the ten star high-efficiency band) would be specific to Australia and New Zealand, but the rating attained would be based on internationally

[21] Link to energyrating web page tracking television efficiency

recognised testing. Specifically it will be based on the standard testing undertaken for ENERGY STAR® requirements. Therefore, products which have tested for ENERGY STAR® compliance will not have to be subject to further testing.

Suppliers will need to register (and pay an administration fee of $440) and provide the results through an online registration form. This will calculate, in real time, the rating for the product. If the product has been tested for ENERGY STAR® compliance, which is likely for a majority of products, it is a matter of providing information from the ENERGY STAR® test results. Otherwise, it will be necessary to undertake the appropriate testing, either in-house or by a third party provider, which would cost between $500 and $1000 per test (based on the prices paid by DCCEE for compliance testing of computers and computer monitors).

While a MEPS scheme will ensure poor energy performing computer monitors are not purchased, labelling will allow consumers to make better decisions about the computer monitors remaining in the market. This may not be significant for all consumers, but can provide an incremental benefit for consumers seeking better energy use outcomes. US Environment Protection Agency (EPA) testing of computer monitors indicates that there is a wide range of power consumption between best and worst and there are many examples where larger screens consume less than smaller screens. Given the differences, providing advice to consumers may allow them to make savings and better align their purchases with their requirements. It may also provide a positive supply side response from suppliers, as has occurred with televisions.

Overall, the additional benefit may not be significant. However, the relatively simple nature of computer monitors and linking the scheme to international practice means that the scheme can be cost-effective, and could provide net benefits.

4.4.2. Voluntary Labelling for Computers and Computer Monitors

A voluntary labelling option would face similar problems to the mandatory labelling option, with the same implementation issues. In practice there would be a lack of incentive for suppliers to comply, with suppliers of poor energy performing computers unlikely to volunteer to advice of the low energy efficiency of their products.

4.5. Education campaigns

An education campaign, whether undertaken by the Government or industry supported by Government, could provide advice of a general nature, such as what a consumer should consider in purchasing a computer and computer monitor, and the need to consider operating costs in making an optimal choice and how these can be calculated.

The information failure, however, is not so much about such general information; it is more about specific information regarding the performance of individual products. The option would therefore not result in markedly increasing the ability of consumers to make more efficient purchasing decisions, and would therefore not be likely to fully meet the objectives of the policy. Moreover, a consumer is likely to not have much of an incentive to apply any knowledge obtained from an education campaign, given that the savings possible to an individual consumer from using more energy efficient computers and computer monitors is generally not significant.

4.6. Regulatory Proposal

A regulatory proposal consisting of a MEPS for computers and computer monitors and mandatory labelling scheme for computer monitors will be investigated further in this RIS.

4.6.1. Regulatory Proposal for Computers

The regulation will impose MEPS upon notebook, integrated and desktop computers and small-scale servers. Labelling in any form will not apply to these computer equipment types.

The following are the key features of this regulatory proposal:

- Mandatory Minimum Energy Performance Standard (MEPS) for computers be implemented not earlier than 1 April 2013.
- MEPS levels will be stipulated in an Australian and New Zealand Standards document based on aligning with the ENERGY STAR® V5.2 metrics.
- The computer regulation will be based on Typical Energy Consumption (TEC), where TEC is a metric of measured power in three operational modes (idle, sleep and off) combined with annual time weightings in each mode. The actual time weightings depend upon the computer's networking attributes.
- Desktop and integrated computers are categorized from ENERGY STAR® as A, B, C or D and notebook computers are categorized as A, B or C. Each category of desktop, integrated and notebook computers depends upon number of processor core(s), system memory (RAM) and the attributes of the discrete graphics card(s) if utilised.

- Each category has a baseline component configuration for which there is a maximum TEC allowance (the MEPS).
- A computer which includes components that exceed the baseline configuration or are not included in the baseline configuration (such as additional hard disk drives, extra system memory, discrete TV and audio tuner cards and discrete graphics cards) is able to use additional allowances for these additional components building on the baseline to create its own unique TEC. The allowances and definitions are taken from the European Commission's proposed Tier 1 levels in their Energy related Products (ErP) Lot 3 program which builds upon ENERGY STAR® Version 5.2.
- For desktop, integrated and notebook computers, power management shall be enabled within a maximum of 30 minutes for a computer and within a maximum of 15 minutes for the computer monitor/display. The regulation also specifies network and wake management requirements when in sleep or off modes, depending upon the market sector for which the computer is manufactured.
- Computers powered from an external power supply (EPS) are already required by a separate regulation to use only a performance mark III or better EPS as per AS/NZS4665.2. The continuation of this separate MEPS will be reviewed once the TEC MEPS for these products is in place.
- Small-scale servers (SSS) are categorized as A or B depending upon processor core quantity and system memory. These products are required to meet regulatory targets in the idle and off modes. For category A the maximum idle power allowed is 50 Watts and for category the maximum idle power allowed is 65 Watts. Off mode for both categories is 2 Watts maximum with an additional 0.7 Watts maximum for SSS with wake on LAN enabled at shipment.

For a single computer model, with an annual manufacturing quantity of less than or equal to 200 units, the following alternatives to TEC apply (this alternative is known as deemed-to-comply):

- The desk top computer model is exempt from the TEC requirements if it uses an 80Plus Silver internal power supply (IPS) exceeding 85 per cent, 88 per cent and 85 per cent when tested at 20 per cent, 50 per cent and 100 per cent of rated power respectively. Power factor shall meet or exceed 0.9 when tested at 100 per cent of rated power. Minimum efficiency standard for the deemed-to comply provisions to be called up in the AS/NZ Standard for computers.
- Similarly, a computer model using an EPS will be exempt from TEC requirements if it uses an EPS meeting the requirements of energy performance mark V as per AS/NZS 4665.1
- Those models will still need to comply with all other MEPS requirements.

4.6.2. Regulatory Proposal for Computer Monitors

The regulation will impose both MEPS upon standalone computer monitors having a viewable diagonal screen size less than or equal to 76cm (30") and mandate energy efficiency labelling for these computer monitor equipment types.

The following are the key features of this regulatory proposal:

- Mandatory MEPS for monitors be introduced not earlier than 1 April 2013.
- Voluntary labelling of monitors to commence as soon as practicable with mandatory labelling scheme for Australia implemented not earlier than April 2013 and to coincide with the introduction of Tier 2 TV MEPS.
- A mandatory labelling scheme for computer monitors be implemented that aligns with the mandatory labelling Tier 2 TV MEPS to be implemented not earlier than April 2013.
- MEPS levels will be stipulated in an Australian and New Zealand Standards document based on aligning with the ENERGY STAR® V5.0 metrics.
- The computer monitor regulation will be based on defined requirements for three operational modes: Off mode, Sleep mode and On mode.
- Any computer monitor with a television tuner is excluded from this specification (as they would be included in the television MEPS already in place).
- Monitors accessing the allowance for using Automatic Brightness Control (ABC) when measuring On Mode power must have ABC enabled as the default option out of the box.
- The monitor must operate with at least one mechanism enabled by default that allows the display to automatically enter Sleep or Off Mode.
- Computer monitors powered from an external power supply (EPS) are already required by a separate regulation to use only a performance mark III or better EPS as per AS/NZS4665.2. The continuation of this separate MEPS will be reviewed once the TEC MEPS for these products is in place.

- The proposed performance levels align with ENERGY STAR® V5.0 and labelling for monitors are aligned to the proposed Tier 2 TV MEPS but with a reduced residual power allowance given that monitors do not have tuners and DTV decoding.

4.7. Cost Benefit Analysis

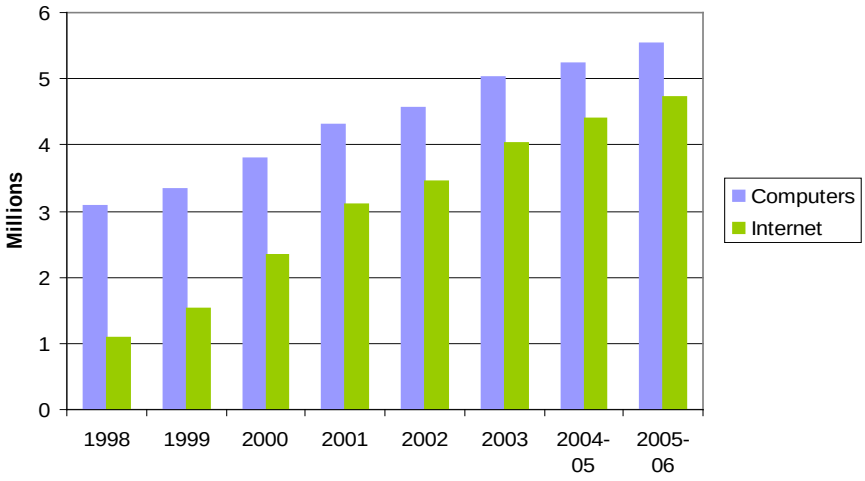
This section outlines the results of the Cost Benefit Analysis of the proposed regulatory options. The modelling is based upon the proposed MEPS levels and does not include potentially more stringent MEPS (with associated costs and benefits), which if considered, would be subject to a further RIS.

4.7.1. Methodology

The base year for the initial review was 2006. This was based upon Australian Bureau of Statistics data (ABS) for residential computer use and data for ICT use in business compared to historical data from the International Telecommunications Union.

The ABS data[22], as shown in **Figure 1**, indicated continued growth in household access to computers and the internet. This data only addresses households with computer access, not the total number of computers (some households have more than one computer). ABS data from 2005 indicates there were some 6.45 million computers in Australian households.

Figure 1 : **ABS household data for computers and internet access - Australia**



Initial estimates were made to forecast stock and product mix in the residential and office sectors to 2014 using conservative and high growth scenarios, based upon historical ABS data and published sales data from International Data Corporation (IDC) However, with consultation with the Australian Information Industry Association (AIIA) and other industry stakeholders, these initial estimates were adjusted to reflect a more accurate representation of stock forecast, with particular consideration to the increasing use of notebook and netbook computers and the dominance of LCD computer monitor technology over CRT computer monitors in virtually all but a few specialised applications, such as the medical sector.

Data from Statistics New Zealand is limited to 2001 and 2006; however the 2006 penetration is similar to Australia as shown in Table 2 and, as such, New Zealand product stock is in proportion to the Australian stock and product mix.

[22] ABS 8146.0 Household use of information technology 2006-07

Table 2 : Household computer and internet penetration, Australia and New Zealand

Country	Internet 2001	Computers 2001	Internet 2006	Computers 2006
New Zealand[23]	37%	45%	64.5%	71.6%
Australia[24]	31%	51%	59%	68%

Various assumptions have been made in this Cost Benefit Analysis that relate to the energy consumption of computers and computer monitors and indirect impacts (such as heating and cooling). Detailed discussions of these assumptions are provided in Appendix A.

4.7.2. Results of Cost Benefit Analysis

The cost benefit analysis is based upon estimates of non-compliant computers and monitors sold from April 2013 to the end of 2020 and benefits stream beyond 2020 until all these products sold are retired from use after 2020. That is, the energy analysis does not include compliant products as their energy in the BAU and MEPS cases are the same. Registration costs for compliant products are included in the cost benefit analysis.

In this section, results are presented for their direct energy consumption only. That is, the impacts on heating and cooling systems is not included, however if they were, then the net benefit and hence benefit cost ratio would be greater, as would net greenhouse gas emission savings.

The cost benefit analysis estimates that for Australia, at a 7 per cent discount rate, the proposal will provide net benefits of around $1.65 billion in present value terms over 13 years, achieving a net benefit ratio of 5.4. Table 3 shows the proposal will save an estimated 9,926 GWh in energy and 7.8 Mt in greenhouse gas emissions for Australia.

Table 3 : Cost Benefit Estimates – Australia

Australia Cumulative 2013 to 2025	2012 Dollars		
Discount rate	7%	3%	10%
Total benefit A$ M	$2,025.9	$2,571.3	$1,714.4
Total cost A$ M	$375.3	$434.4	$339.2
Net benefit A$ M	$1,650.6	$2,173.0	$1,375.2
Benefit Cost Ratio	5.40	5.92	5.05
Energy Saved GWh	9,926		
Greenhouse gas emissions reductions Mt CO2-e	7.8		

The cost benefit analysis estimates that for New Zealand, at an 8 per cent discount rate[25], the proposal will provide net benefits of around $NZ143 million in present value terms, achieving a net benefit ratio of 2.66. Table 4 shows the proposal will save an estimated 1,814 GWh in energy and 720 kt in greenhouse gas emission for New Zealand.

[23] http://www.stats.govt.nz/NR/rdonlyres/BA872497-4B85-4386-8395-3ACBEBDA7C4A/0/householduseofict2006hotp.pdf

[24] ABS 8146.0 Household use of information technology 2006-07

25 The discount rate used for New Zealand of 8 per cent was advised by the Regulatory Impact Analysis Team, the Treasury, New Zealand.

Table 4 : Cost Benefit Estimates – New Zealand

New Zealand Cumulative 2013 to 2025	2012 NZ Dollars		
Discount rate	8%	6%	10%
Total benefit NZ$ M	$222.5	$248.4	$200.3
Total cost NZ$ M	$79.8	$85.6	$74.7
Net benefit NZ$ M	$142.7	$162.8	$125.6
Benefit Cost Ratio	2.66	2.77	2.56
Energy Saved GWh	1,814		
Greenhouse gas emissions reductions kt CO_2-e	720		

In regard to composition of the costs and benefits for Australia, as shown in **Table 5** (at a discount rate of 7 per cent), the benefits in the analysis are totally comprised of energy savings, which provide benefits of $2.03 billion in present value terms over 13 years, which more than offset the estimated additional product costs of $374 million and program costs (or government administrative costs) of $1 million.

Table 5 : Cost Benefit Estimates by Category – Australia

Australia Cumulative 2013 to 2025	2012 Dollars		
Discount rate	7%	3%	10%
Benefits			
Energy cost saving to consumers Total benefit A$ M	$2,025.9	$2,571.3	$1,714.4
Costs			
Incremental product cost to consumers A$ M	$374.3	$433.1	$338.3
Program cost to taxpayers A$ M	$1.0	$1.2	$0.9
Total cost A$ M	$375.3	$434.3	$339.2

In regard to composition of the costs and benefits for New Zealand, as shown in **Table 6** (at a discount rate of 8 per cent) the benefits in the analysis are comprised of energy and carbon savings, which provide benefits of $NZ223 million in present value terms over 13 years, which more than offset the estimated additional product costs of $NZ80 million and program costs (or government administrative costs) of $0.3 million.

Table 6 : Cost Benefit Estimates by Category – New Zealand

New Zealand Cumulative 2013 to 2025	2012 NZ Dollars		
Discount rate	8.0%	6%	10%
Benefits			
Energy cost saving to consumers Total benefit NZ$ M	$212.5	$237.1	$191.2
Carbon value NZ$ M	$10.1	$11.3	$9.1
Total benefit NZ$ M	$222.5	$248.4	$200.3
Costs			
Incremental product cost to consumers NZ$ M	$79.6	$85.3	$74.5
Program cost to taxpayers NZ$ M NZ direct plus contribution to E3	$0.27	$0.31	$0.24
Total cost NZ$ M	$79.8	$85.6	$74.7

As detailed in Appendix A for each year in the period of 2013 to 2025, the modelling utilises forecast stock of each non-compliant product (both retirements and market trends), estimated MEPS energy saving by product compared to BAU compliance forecasts, forecast electricity tariffs and greenhouse gas emissions by jurisdiction.

Figure 2 to Figure 5 illustrate the ongoing impact BAU and MEPS have over time in Australia and New Zealand for products sold between April 2013 and end 2020.

Figure 2 : Australia – Projected Energy Consumption associated with non-compliant BAU and MEPS for computers and computer monitors

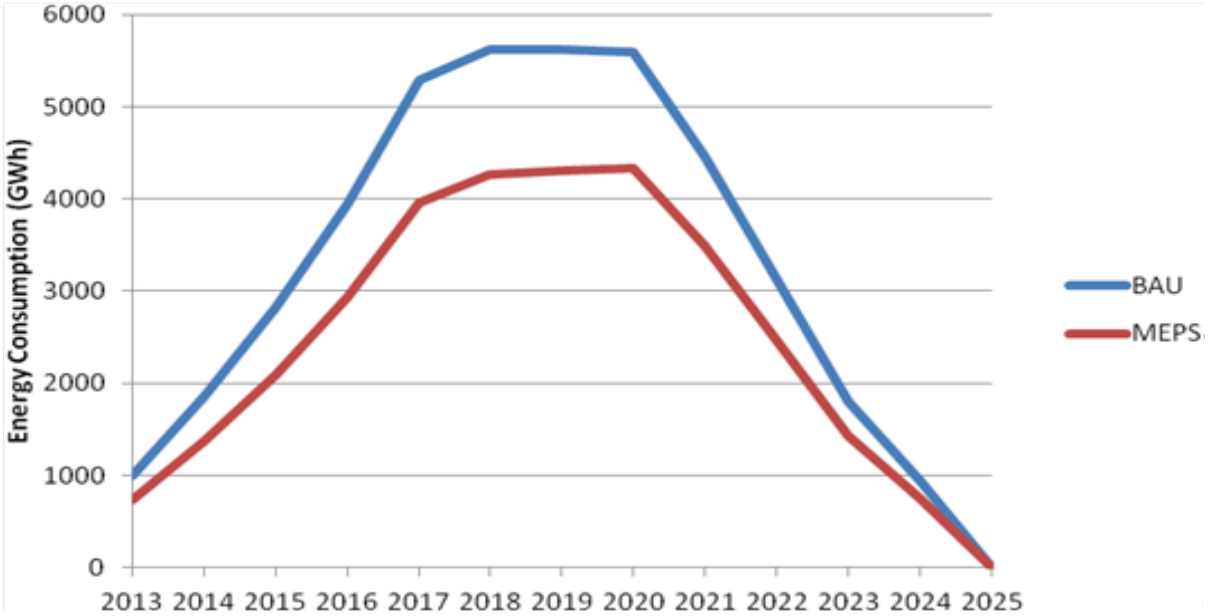


Figure 3 : Australia – Projected emissions associated with non-compliant BAU and MEPS for computers and computer monitors

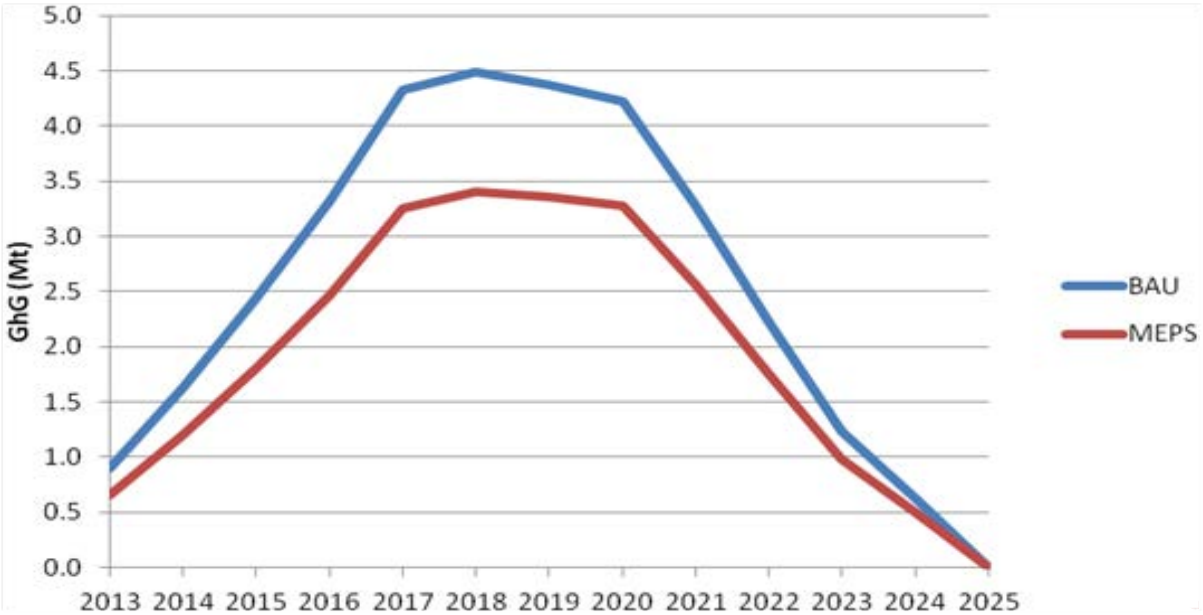


Figure 4 : New Zealand – Projected Energy Consumption associated with non-compliant BAU and MEPS for computers and computer monitors

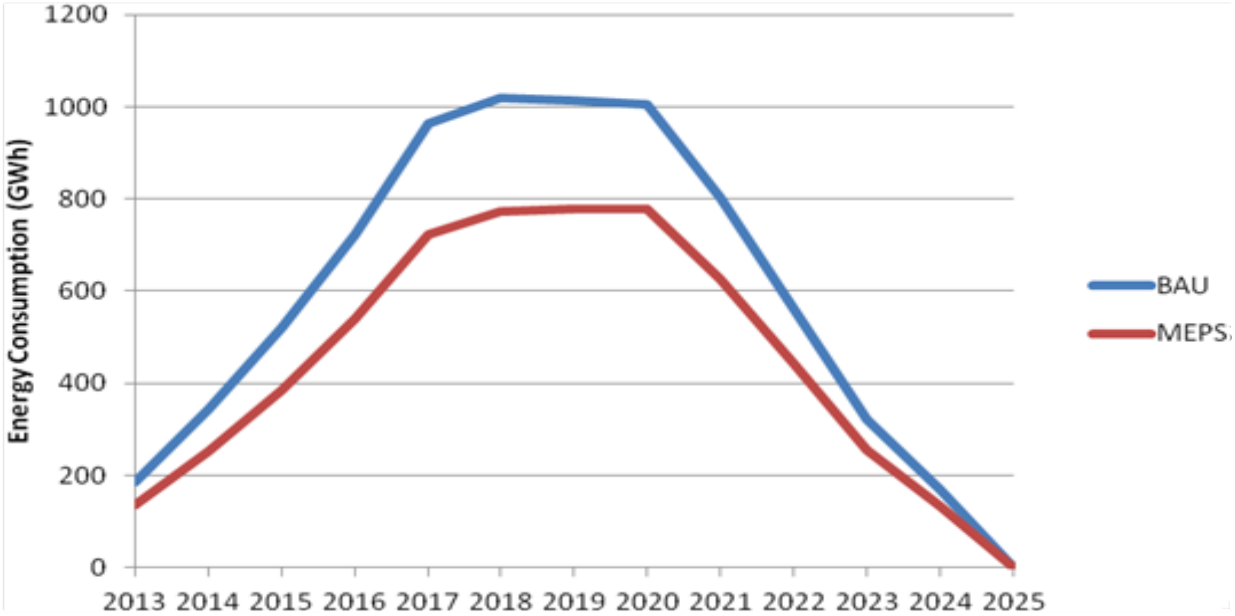
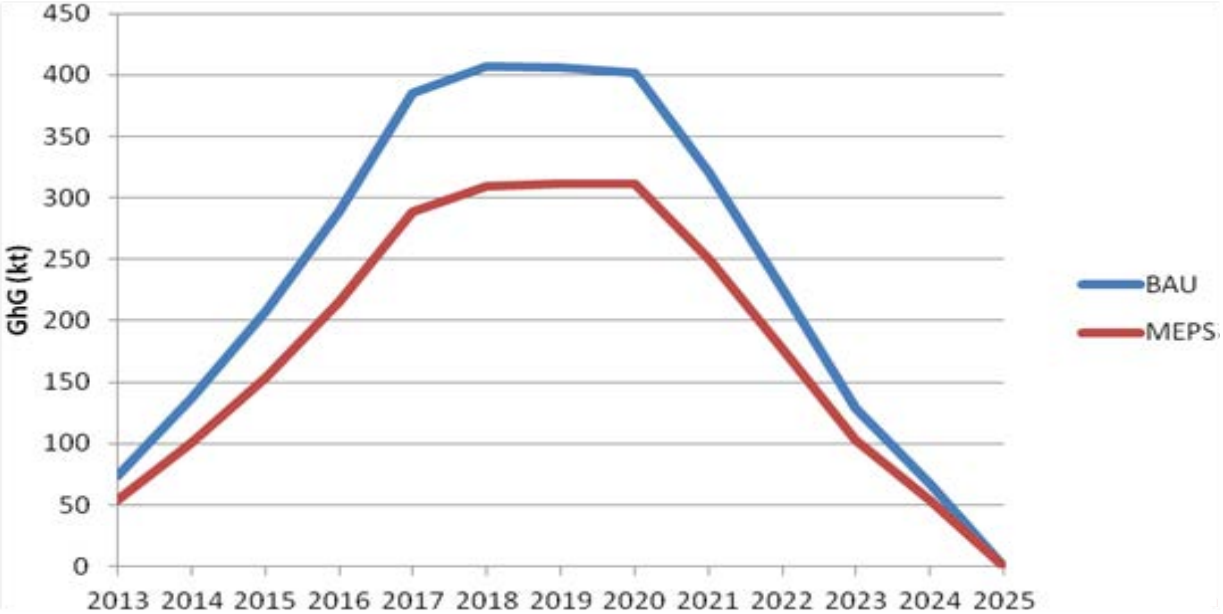


Figure 5 : New Zealand – Projected emissions associated with non-compliant Businesses Usual and MEPS for computers and computer monitors



4.7.3 Industry

Some products will require design, hardware and software changes to comply with the proposed MEPS. The potential production cost increases could result in an initial retail price increase of $30[26] for desktop computers and $15 for notebook computers to implement the MEPS requirement. An increase of $5 is expected for computer monitors. These costs are capable of being passed on to the consumer and the modelling makes this assumption. With time these costs are expected to fall. By around 2020 the retail price impacts, if any, are assumed to reduce to $13 for computers and close to zero for monitors, however the modelling is conservative and retains the $5 for monitors. Experience with the introduction of other efficiency standards indicates that price increases are often offset by reduction in cost due to technology and production gains, and coupled with the introduction of improved technology for products, such as faster processors, high performance graphics cards and other innovative features,

[26] http://web51305.aiso.net/wordpress/wp-content/uploads/2011/06/White_Paper_02.02.091.pdf

it would be difficult to determine the cost impact. Any future changes to the MEPS requirements may have price impacts but these would be subject to a further RIS process.

Approximately 35 to 50 supplier businesses in Australia, made up of importers and assemblers of computers and computer monitors, will be affected by these regulatory proposals. Responsibility for compliance with the MEPS lies with the supplier of the product. Suppliers need to alter manufacturing in the country-of-origin and/or change ordering practices to ensure only MEPS compliant products will be imported into Australia and New Zealand. These costs do not extend to significant research and development costs as the MEPS levels are set at internationally recognised and accepted levels easily attainable for all suppliers sourcing product from overseas. The Australian/New Zealand Standard is based upon and is technically equivalent to the ENERGY STAR® computer V5.2 test method and ENERGY STAR® display V5.0 test method. Testing to ENERGY STAR® specifications will be sufficient to demonstrate compliance with MEPS with no Australian market specific testing required. Testing is non-destructive and the unit tested, provided it is compliant, can be offered for sale.

Local businesses will incur ongoing compliance costs as each new model will need to be registered under state law and prudent suppliers will organise verification testing to ensure the models from overseas do indeed meet the specified MEPS and labelling requirements. Businesses will also incur ongoing costs to ensure they are aware of legislative and regulatory requirements and maintaining records and other paperwork. All these costs have been included in the modelling.

Issues with respect to registration and regulation will be addressed by a working group made up of representatives from industry, government and regulatory authorities.

4.7.4 Small Business

Although the computer market in Australia and New Zealand is dominated by large international suppliers, there are also a number of small local suppliers; these are mainly 'white box' suppliers that build computers, mostly for the desktop market, utilising imported components. Although these whitebox suppliers are small and account for a minority of computers, they comprise a large number of participants.

These suppliers in the white box computer market sector may be more significantly affected by a mandatory MEPS scheme. Small firms have less scope to provide different products, so may be more affected by a MEPS, as they are less able to change their product mix in response to regulation. They are also unable to spread costs, such as testing costs and costs of changes to production processes, over a large number of appliances.

In response to such concerns a deemed-to-comply provision was drafted for inclusion in the Australian/New Zealand Standards under the proposal. These provisions will allow smaller manufacturers and suppliers to use highly efficient power supplies as a means of demonstrating MEPS compliance, rather than undergoing testing for compliance with a MEPS.

Specifically, under the deemed-to-comply provisions, for a single computer model, with an annual manufacturing quantity of less than or equal to 200 units, the computer will be eligible under the MEPS by using energy efficient components. The deemed-to-comply provisions will allow smaller businesses to compete within the market in areas where they are best placed, such as the boutique computer market where certain purchasers have very specific requirements. Generally, under the proposal the deemed-to-comply provisions will help to reduce the larger proportional impacts of the proposal on smaller manufactures, and therefore help provide that small suppliers can continue to compete based on their ability to serve certain needs of the market.

4.7.5. Consumers

Consumers could potentially face an initial increase in the retail price of about $30 per desktop computer, $15 per notebook computer and $5 per computer monitor (typically less than 1.5 per cent of the total average retail price) as manufacturers pass on the cost of registration and compliance testing. This is expected to decline over time so that by 2020 modelling suggests that there is no real increase in retail price other than the cost of new technologies and features. However, in practice, retail prices may not be affected because suppliers are operating in a competitive market and have time to adjust their inventories to the proposed MEPS. Being conservative, the modelling includes increments in retail prices over the analysis period. Regardless, consumers are expected to recoup any additional upfront costs in the form of reduced running costs of their computer systems.

At the outset the higher retail prices represent a potential aggregate upfront cost to consumers of about $97m for Australia and NZ$22m for New Zealand. Importantly, this will be fully offset by the energy savings over their 5 year service life.

Consumer choice will be affected by the implementation of the proposed MEPS, with around 35 per cent[27] of current products potentially not demonstrating compliance with current ENERGY STAR® specifications and liable to be withdrawn from the market. The standards address efficiency performance rather than particular functions and features, and DCCEE and international testing indicates that the functions and features available to

[27] Link to energyrating website report on Energy Star computers and monitors in Australia

consumers will not be substantially affected. The major concern from a consumer's perspective is that a mandatory scheme can impede access to new and innovative products.

4.7.6. Government

The proposal will impose costs on governments to administer the program. These activities include:

- administration of the program by government officials (salaries and overheads, attendance at E3 Committee and Standards meetings, etc.);
- cost of maintaining a registration and approval capability;
- random check testing to protect the integrity of the program;
- costs of producing leaflets and other consumer information; and
- consultant costs for Standards development, market research, RIS, etc.

Based upon similar E3 programs the annual government costs have been estimated as A$150,000 for Australia, which includes a proportion of New Zealand's contribution to E3, and NZ$20,000 in New Zealand.

4.7.7. Competition

The standards will be based on international requirements, and they will therefore reflect best practice requirements which were designed to accommodate competition. Nevertheless, the proposed MEPS would restrict entry into the market. This restriction will reflect energy performance, essentially ensuring that the worst energy performing products did not enter the market. It is this feature which underlies much of the success of the proposal in meeting the objective. As with any MEPS scheme, any supplier which can meet the standard will be able to supply to market.

The adoption of ENERGY STAR® performance levels will only apply to stock manufactured or imported on or after the implementation date and industry supply capability is already geared to meet this specification. As the technology already exists to comply with the proposed MEPS, no significant competition impacts are anticipated specifically relating to obtaining suitable components or models.

Whilst difficulty was experienced in identifying/sourcing ENERGY STAR® compliant products in the Australian market in particular, analysis of the ENERGY STAR® registration web sites in the US and Europe shows that most brands represented in Australia have a range of compliant registered models available in those overseas markets.

Power management requirements should not be a reason for non-compliance, as it is merely a matter of enabling it to required settings. Due to their lesser influence at the design/manufacture stage, white box suppliers (suppliers offering specific configurations for a small order or even single unit), will need to exercise greater care when specifying components, however international voluntary programs, combined with MEPS in the Australian and New Zealand markets are anticipated to increase demand and availability of suitable components.

Also, competition will continue to be accommodated because the mandatory MEPS will be designed to allow innovative and beneficial products with relatively high energy consumption onto the market, with the regulator able to exempt products which offers desirable benefits, and given that genuinely innovative computers will be likely to fall outside the definitions requiring a MEPS.

The deemed-to-comply provisions will be included for custom-made or small computer production runs of less than or equal to 200 units produced in a year by stipulating the use of energy efficient components. This, however, is not considered to be an advantage to smaller suppliers, but rather a way to offset, at least partly, the high proportional compliance burden on smaller manufacturers. The same provision applies to larger suppliers for the same production quantities.

5. Consultation Process

Dialogue with key stakeholder groups about regulatory intervention started in 2005 with negotiations on the substance of the possible regulation commencing in 2007. The dialogue continued until 2011.

The Australia Consultation RIS was prepared in accordance with the Council of Australian Governments (COAG) best practice regulation requirements and was released for public comment on the 25 October 2010. The Consultation RIS was preceded by stakeholder consultation and dialogue surrounding possible regulation of these products which commenced in 2007 and was accelerated over the last few years. Australian industry comments are detailed in Appendix G. In New Zealand there was a similar Consultation RIS released for public comment in December 2011 with industry support and industry association comments detailed in Appendix .

In the Consultation RIS E3 sought feedback on the proposal to regulate ICT equipment (computers and computer monitors) under the MEPS program to improve existing levels of energy efficiency and performance. The proposed standard would apply to defined categories of computers and computer monitors used in all sectors of the market (residential, commercial and government) throughout Australia and New Zealand.

The equipment covered includes:

- desktop, integrated and notebook/tablet type computers;
- small scale servers; and
- common types of computer monitors[28].

Submissions were received from two industry associations and one multinational computer company. There were no submissions from user groups, consumers or consumer advocacy groups or other companies possibly reflecting the lengthy consultations preceding the consultation RIS and general support from those stakeholders who have been involved in discussing the regulatory proposals for many years.

The consultation RIS included a series of questions to guide comments from interested parties and sought any additional data suppliers might wish to place before MCE. The questions related to options available to bring about reductions in energy use and greenhouse gas emissions. The additional data was sought to test the assumptions and findings within the consultation RIS.

Submissions did not provide additional data nor propose alternatives to those included in this DRIS. However, the submissions did raise concerns about the registration process, enforcement of proposed regulation and the impact that regulation would have on products available on the market.

- The 'Administrative Guidelines for the Appliance and Equipment Energy Efficiency Program of Mandatory Labelling and MEPS[29] sets out the requirements for registering products in Australia and New Zealand. All regulated product sold in Australia have to be registered.
- The established registration process allows suppliers/manufacturers to register product using in-house test report provided tests are conducted using the relevant standard.
- A working group made up of representatives from industry, government and regulatory authorities will be established to address registration and regulation issues before the regulations commence.
- Modelling in the Consultation RIS has used the TEC limits as set out in ENERGY STAR® V5.2 for computers and V5.0 for monitors. With a specification, albeit voluntary, in place for over 3 years it is reasonable to assume the majority of computers available on the market would meet this standard.

There was also concern about the proposed MEPS level for particular low volume segments with a proposal to manage that process and the treatment of high performance products.

- In order to avoid potentially onerous and costly situations for relatively small orders, a deemed-to-comply provision has been drafted for inclusion in the Australian/New Zealand Standards. This will allow manufacturers and suppliers to use highly efficient power supplies as a means of demonstrating MEPS compliance.

[28] The technical, engineering description of these products is currently available at: Link to energystar website page for computer V5 specification and will be included in a forthcoming Standards Australia publication.
[29] Link to energyrating web page for administration guidelines

- Normal exceptions will apply for equipment used for medical or similar purposes and exceptions can be applied for under the normal registration process in addition, including an exception process for product groups or technologies are not able to meet the proposed MEPS level which provide marked benefits.
- To address the issue of performance display technology not currently being able to comply with the ENERGY STAR® Displays V5.0 limits, the Australian/New Zealand Standard will exclude these types of displays from the proposed MEPS regulation.

Appendix G and Appendix provide a list of stakeholders and concerns raised in their submission, and outlines the concerns were responded to.

In the months since comments closed, the E3 committee has engaged industry in a discussion about labelling options, an area where industry were not supportive of the consultation RIS proposals. Computer monitor labelling remains an issue where stakeholder groups have not resolved a consensus.

In March 2007 as part of the process of preparing the Consultation RIS, Winton Sustainable Research Strategies (WSRS) was commissioned to undertake a study to investigate community attitudes on the possible introduction of energy efficiency labelling of televisions sets and home computers. The report, *Community Attitudes to the Possibility of Energy Efficiency Labelling of Television Sets and Home Computers*[30], indicates wider community support for the regulatory proposals and with technology convergence apparent, consumer stakeholder groups urge mandatory labelling. Industry groups have generally not supported mandatory labelling.

The proposal recommended to MCE in this DRIS reflects discussions between industry and Government positions on labelling. To address industry concerns regarding labelling the following measures were included as part of the mandatory labelling proposal:

- A voluntary labelling scheme will be launched as quickly as possible in 2012 (based on the successful television scheme) which will give all parties experience in labelling monitors.
- The scope of the mandatory scheme has been reduced as additional exemptions based on industry representations to address specific, legitimate concerns will be incorporated into the mandatory proposal.
- The mandatory labelling scheme advocated in the consultation RIS has been delayed by 6 months from the original proposal to allow all parties more time to adjust.
- The delay also means that the performance algorithm for monitors will match the second tier television mandatory algorithm also commencing in April 2013 in Australia.

[30] Link to energyrating web page on energy labels

6. Conclusion

The evidence supplied by stakeholders or collected by regulatory authorities in this RIS suggests that the BAU option is unlikely to be optimal in this market. The computer and computer monitor market, with its information failures and other complexities, is likely to continue to provide for inferior purchasing decisions, and consequently result in consumption of energy and emission of greenhouse gas in excess of efficient levels.

In the future, the BAU case could become less problematic as demand for energy consumption information will grow. Due to factors such as higher energy costs, including the pricing of carbon, and increasing recognition of greenhouse gas implications, consumers are likely to want accurate and improved energy efficiency information to factor into their decision making which may provide an incentive for suppliers to provide more information. Nevertheless, the present information failures are likely to persist, and the breath of the problem, due to increased computer use and ownership, is likely to grow.

Long term market analysis has shown that despite technology gains improving the energy efficiency of the majority of models, computers with poor energy performance continue to be supplied to the market. This is an indication that the problem will not fix itself under BAU case.

The regulatory proposal outlined in the RIS comprises implementation of the following options:

- A mandatory minimum energy performance standard (MEPS) for computers and computer monitors supplied in Australia and New Zealand linked to an international specification ; and
- A mandatory labelling scheme for computer monitors that aligns with current mandatory labelling for television.

Although the impacts of this proposal are uncertain, given that Australia and New Zealand will be among the first countries to have a mandatory minimum energy performance standard for computers and computer monitors, overall it is likely to provide net benefits to the economy, with the modelling, which has been accepted by industry and other stakeholders, projecting net benefits to the community.

The benefits are for the most part due to the regulatory proposal ceasing the supply of poorer energy performing computers and computer monitors in the market. In effect, the proposal will remove the opportunity for consumers to make inferior purchasing decisions by not allowing them access to these poorer energy performing products. It will also incrementally improve purchasing decisions regarding computer monitors by the provision of reliable and accurate information (star ratings and annual energy use).

Although the benefits of the regulatory proposal on competition and purchaser choice are difficult to predict, regulatory agencies are confident about the rigor of the analysis presented in this RIS. The energy efficiency limits have been settled over lengthy negotiations with suppliers and match announcements for other national markets (thereby promoting common standards amongst participating OECD countries). The experiences with the regulation of other products, chiefly TVs and air-conditioners, also suggest that suppliers in the marketplace will be able to compete on energy efficiency performance and still provide sufficient model choice. The industry has had many years notice of the regulatory intention.

The cost benefit analysis undertaken estimates that the scheme will provide net benefits to the community. The analysis estimates that, over 13 years, the proposal will provide a net benefit of around $1.65 billion to Australia (at a discount rate of 7 per cent) and around $NZ143 million to New Zealand (at a discount rate of 8 per cent).

Of the options considered, the regulatory proposal will provide the most significant reduction in energy consumption and greenhouse gas emissions, and achieve such reductions with the most certainty. It is estimated that proposal will save around 9,926 GWh in energy and around 7.8 Mt in greenhouse gas emissions in Australia, with savings of 1,814 GWh in energy and around 720 kt in greenhouse gas emissions in New Zealand.

The question, however, is what impact the proposal will have on the supply of computer and computer monitors both in terms of additional costs and reduction in choice.

Under the regulatory proposal, with Australia and New Zealand representing only a small proportion of sales in a global computer market, less efficient products may need to be re-configured or withdrawn from sale. The regulatory proposal minimises the impact of these changes by linking the scheme to existing international energy performance specification recognised and endorsed by industry. Linking the scheme to these international specifications helps minimise compliance costs – for example, the results for tests undertaken for international requirements can be used for the proposed local scheme. Nevertheless, the scheme may increase the costs of some computers, and potentially reduce choice in the short term.

The proposed standards will harmonise with ENERGY STAR® specifications, an internationally applied voluntary scheme. This will provide considerable certainty for international suppliers with ENERGY STAR® compliant products that their products will be compliant with local standards. The US and the EU in particular have expressed interest in the proposed regulatory arrangements; however their strict, and somewhat inflexible, requirements to negotiate with industry and legislative partners (EU) are reported to be hampering regulatory action in the near term.

The potential for the regulatory proposal to reduce choice is of most concern from a policy perspective. To the extent to which the proposal reduces choices which would have otherwise lead to inferior purchasing decisions, the outcome is beneficial. However, where the proposal impedes choices which would have otherwise increased the overall welfare of the community (by increasing consumer utility more than the costs, including any negative externalities) the proposal would be imposing negative outcomes.

From a consumer's perspective, where an energy inefficient computer is no longer available, but the consumer can still purchase the same functionality in an energy efficient computer, society will be better off even though choice has been reduced. However, if the consumer cannot find the functionality in another computer and would have been willing to pay for the inefficiency, including the external society costs, then reducing choice would not lead to good outcomes.

Pragmatically, the major concern along these lines is that a mandatory scheme could stifle access by Australian and New Zealand consumers to new and innovative products that may provide large benefits and productivity gains.

Such concerns, however, will be largely addressed, as the MEPS will be designed to allow such products. The MEPS will very specifically apply to tightly defined product categories under the proposed regulation. Where a product falls outside the definitions, the product will be excluded from the MEPS scheme. This will apply to new features that are not part of the MEPS or where the features cannot be categorised as an add-on under the scheme. It would result in genuinely new and innovative products being treated as products which are outside the scope of the MEPS.

Moreover, where a product with the scope of the MEPS offers desirable benefits but has energy consumption above mandated standards, the regulator can exempt specified product models from the MEPS requirements. The regulator will be able to consider whether consumers may be prepared to pay for this high level of energy use to obtain the benefits provided by the new technology. The deemed-to-comply provisions for short production runs or speciality products in the regulatory proposal would allow such exotic products to be supplied from local small boutique 'whitebox' providers and other suppliers without being subject to a MEPS.

A voluntary scheme would provide suppliers with flexibility to provide innovative and beneficial products. It would be a matter for a supplier to decide if it is worthwhile to supply a new product, given the product's beneficial features and prospective demand. The issue, however, for such a voluntary scheme is whether it would be sufficiently effective in reducing purchases of poor energy performing computers in Australia and New Zealand. The USA experience after 20 years indicates that a voluntary scheme, where it is supported by a procurement requirement, can result in increased compliance.

A voluntary scheme could be supported by requiring computers to meet MEPS under government procurement requirements. It is questionable, however, if procurement requirements by the Australia and New Zealand Government would have similar impacts to the US Government requirements, given the relatively small importance of Australian and New Zealand Governments' procurement on the global computer market and even on the domestic market. Also, Australian testing shows that major suppliers generally make unique products for government contracts which are not reflective of their offerings to the general public.

It is also questionable, given the nature of a voluntary scheme, whether suppliers with products which do not currently meet international specifications would comply with voluntary MEPS, particularly if it involved the withdrawal of a major proportion of their products, or expensive re-configuration.

This indicates that a significant demand side response would be required for a voluntary scheme to be effective, and this may not occur unless consumers were clearly able to identify compliant versus

non-compliant products. Some comparatively minor regulatory intervention (that is, compared to mandatory MEPS) could be undertaken to support the voluntary option in this respect.

A negative label (a label indicating non-compliance) on computers which have not or cannot demonstrate compliance could potentially allow this demand response, although there is no evidence from overseas schemes that a voluntary standard for all computers (as distinct from more energy efficient computers) could provide an effective signal to Australian and New Zealand consumers. At present, industry is generally not supportive of a voluntary scheme, so there may be difficulties in obtaining a critical mass of support.

In any case, any voluntary standard, even with such labelling, will not achieve 100 per cent compliance. It may, nevertheless, reduce purchases of inefficient products sufficiently to obtain real benefits, while still providing suppliers with the flexibility of supplying non-compliant products.

Overall, it is considered that the two options most likely to provide net benefits are the voluntary scheme, with negative labelling of non-compliant computers, and the mandatory scheme of a MEPS for computer and computer monitors and labelling for computer monitors. On balance, the mandatory approach is preferred. Although a mandatory scheme may not provide the same flexibility as the BAU or a voluntary approach to allow for innovative products, the design of the mandatory scheme will allow sufficient flexibility to allow new products, as it will exempt products with new features outside the definition of a MEPS, and also allow for specific exemptions where it is considered a product can provide net benefits, despite the product's non-compliance with a MEPS. At the same time, unlike a voluntary scheme, the preferred option will directly abolish inefficient products from the market.

A mandatory scheme, although less flexible than a voluntary scheme, offers more certainty. This was a major issue in the consultation undertaken, and partly explains why the major suppliers preferred a mandatory scheme. Suppliers were keen for assurances that they would not be penalised in competing against non-compliant suppliers in a voluntary scheme. Although a mandatory scheme can favour incumbents by restricting the entry of new products, the provisions in the scheme to allow for innovative products which do not meet MEPS requirements will help ensure that competition from new technology is not impeded.

Initial industry concerns that specialist or innovative products may not be allowed under the proposed reform were addressed once it was clarified that such products would have the potential to be exempted under the proposal, and industry did not pursue this concern.

The industry submissions' main concerns were not about mandating MEPS but about a mandatory label. Computer monitors are the same form of technology as televisions where mandatory interventions with MEPS and mandatory labelling have proved very successful. Indeed, the efficiency improvement has been so large since mandatory labelling was introduced in 2009 that the labelling algorithm for televisions had to be revised within four years of commencement (such a change took 10 years for refrigerators). There is every reason to expect monitors will follow a similar path to televisions. Moreover, matching the regulatory measures on monitors and televisions will ensure that unintended market consequences do not occur; where inefficient monitors sold with a television tuner are able to compete with the much more efficient televisions now on sale. Mandatory labelling allows all competitive comparisons to be conducted using a common approach so consumers are fairly informed about the efficiency of models.

Overall the analysis indicates that a mandatory MEPS for computers and a mandatory MEPS and energy labelling scheme for computer monitors is the most beneficial option. Although there is some risk that a mandatory approach may have adverse effects on choice, there is sufficient scope under the mandatory approach to allow for Australian and New Zealand consumers to continue benefiting from the dynamically evolving nature of computer technology. Consultation with industry has indicated that this is not a major concern. Industry clearly prefers the certainty provided by a mandatory scheme over the option of a voluntary scheme.

The evidence supplied by stakeholders or collected by regulatory authorities in this RIS suggests that the BAU option is unlikely to be optimal in this market. The computer and computer monitor market, with its information failures and other complexities, is likely to continue to provide for inferior purchasing decisions, and consequently result in consumption of energy and emission of greenhouse gas in excess of efficient levels.

In the future, the BAU case could become less problematic as demand for energy consumption information will grow. Due to factors such as higher energy costs, including the pricing of carbon, and increasing recognition of greenhouse gas implications, consumers are likely to want accurate and improved energy efficiency information to factor into their decision making which may provide an incentive for suppliers to provide more information. Nevertheless, the present information failures are likely to persist, and the breath of the problem, due to increased computer use and ownership, is likely to grow.

Long term market analysis has shown that despite technology gains improving the energy efficiency of the majority of models, computers with poor energy performance continue to be supplied to the market. This is an indication that the problem will not fix itself under BAU case.

The regulatory proposal outlined in the RIS comprises implementation of the following options:

- A mandatory minimum energy performance standard (MEPS) for computers and computer monitors supplied in Australia and New Zealand linked to an international specification ; and
- A mandatory labelling scheme for computer monitors that aligns with current mandatory labelling for television.

Although the impacts of this proposal are uncertain, given that Australia and New Zealand will be among the first countries to have a mandatory minimum energy performance standard for computers and computer monitors, overall it is likely to provide net benefits to the economy, with the modelling, which has been accepted by industry and other stakeholders, projecting net benefits to the community.

The benefits are for the most part due to the regulatory proposal ceasing the supply of poorer energy performing computers and computer monitors in the market. In effect, the proposal will remove the opportunity for consumers to make inferior purchasing decisions by not allowing them access to these poorer energy performing products. It will also incrementally improve purchasing decisions regarding computer monitors by the provision of reliable and accurate information (star ratings and annual energy use).

Although the benefits of the regulatory proposal on competition and purchaser choice are difficult to predict, regulatory agencies are confident about the rigor of the analysis presented in this RIS. The energy efficiency limits have been settled over lengthy negotiations with suppliers and match announcements for other national markets (thereby promoting common standards amongst participating OECD countries). The experiences with the regulation of other products, chiefly TVs and air-conditioners, also suggest that suppliers in the marketplace will be able to compete on energy efficiency performance and still provide sufficient model choice. The industry has had many years notice of the regulatory intention.

The cost benefit analysis undertaken estimates that the scheme will provide net benefits to the community. The analysis estimates that, over 13 years, the proposal will provide a net benefit of around $1.65 billion to Australia (at a discount rate of 7 per cent) and around $NZ143 million to New Zealand (at a discount rate of 8 per cent).

Of the options considered, the regulatory proposal will provide the most significant reduction in energy consumption and greenhouse gas emissions, and achieve such reductions with the most certainty. It is estimated that proposal will save around 9,926 GWh in energy and around 7.8 Mt in greenhouse gas emissions in Australia, with savings of 1,814 GWh in energy and around 720 kt in greenhouse gas emissions in New Zealand.

The question, however, is what impact the proposal will have on the supply of computer and computer monitors both in terms of additional costs and reduction in choice.

Under the regulatory proposal, with Australia and New Zealand representing only a small proportion of sales in a global computer market, less efficient products may need to be re-configured or withdrawn from sale. The regulatory proposal minimises the impact of these changes by linking the scheme to existing international energy performance specification recognised and endorsed by industry. Linking the scheme to these international specifications helps minimise compliance costs – for example, the results for tests undertaken for international requirements can be used for the proposed local scheme. Nevertheless, the scheme may increase the costs of some computers, and potentially reduce choice in the short term.

The proposed standards will harmonise with ENERGY STAR® specifications, an internationally applied voluntary scheme. This will provide considerable certainty for international suppliers with ENERGY STAR® compliant products that their products will be compliant with local standards. The US and the EU in particular have expressed interest in the proposed regulatory arrangements; however their strict, and somewhat inflexible, requirements to negotiate with industry and legislative partners (EU) are reported to be hampering regulatory action in the near term.

The potential for the regulatory proposal to reduce choice is of most concern from a policy perspective. To the extent to which the proposal reduces choices which would have otherwise lead to inferior purchasing decisions, the outcome is beneficial. However, where the proposal impedes choices which would have otherwise increased the overall welfare of the community (by increasing consumer utility more than the costs, including any negative externalities) the proposal would be imposing negative outcomes.

From a consumer's perspective, where an energy inefficient computer is no longer available, but the consumer can still purchase the same functionality in an energy efficient computer, society will be better off even though choice has been reduced. However, if the consumer cannot find the functionality in another computer and would have been willing to pay for the inefficiency, including the external society costs, then reducing choice would not lead to good outcomes.

Pragmatically, the major concern along these lines is that a mandatory scheme could stifle access by Australian and New Zealand consumers to new and innovative products that may provide large benefits and productivity gains.

Such concerns, however, will be largely addressed, as the MEPS will be designed to allow such products. The MEPS will very specifically apply to tightly defined product categories under the proposed regulation. Where a product falls outside the definitions, the product will be excluded from the MEPS scheme. This will apply to new features that are not part of the MEPS or where the features cannot be categorised as an add-on under the scheme.

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7. Implementation and Review Process

State and Territory government agencies have committed to annually reviewing existing regulations with a view to: encouraging competition and efficiency, streamlining the regulatory environment, and reducing the regulatory burden on business arising from regulation.

Ensuring regulation remains relevant and effective can be achieved through:

3. Planning for monitoring and review of regulation as part of the development of new regulatory proposals, or
4. By incorporating sunset provisions or review requirements in legislative instruments[31]

The required regulations would be implemented under the same state and territory regulations, and be subject to the same sunset provisions, if any. Victoria and South Australia have general sunset provisions applying to their labelling/MEPS regulations as a whole, while NSW have sunset provisions applying to the inclusion of some (but not all) items scheduled.

Stocks of non-complying products that were imported or manufactured prior to the effective date of legislation affecting them can be sold for an indefinite period (i.e. products made in Australia or New Zealand or imported prior to the relevant MEPS date may be sold at any time into the future)[32]

The arrangements between the Commonwealth, State and Territory governments and Standards Australia provide that the revision of any Standards called up in energy labelling and MEPS regulations are subject to the approval of the governments.

From 1 April 2013, the Commonwealth *Greenhouse and Energy Minimum Standards (GEMS) Act 2012* will enforce requirements such as MEPS and labelling by giving the force of law to Australian Standards. The Australian Standards establish a 'voluntary' code, which will only be enforceable to the extent that it is supported by a 'determination' made under the Greenhouse and Energy Minimum Standards Act 2012.

Determinations apply to 'product classes' specified in each determination. It is the specification in a determination, not in the Australian Standard, that gives rise to legal obligations to ensure product models meet MEPS, carry labels, and are registered. Determinations will be tabled in Parliament, subject to public debate and disallowance provisions.

The published Australian Standard for computers and computer monitors, and the determination will grant it the force of law, will apply only to tightly defined product classes (section 11(2) GEMS Act). These will equate to the categories described in Section 2 of the draft Australian Standard. For example, the published standard applies only to certain desktop/integrated computers, small-scale servers and notebook and tablet computers.

The determination that grants the standard the force of law will apply only to the product classes in the version of the Australian Standard that exists at the time the determination is made – any subsequent revision of the Standard remains voluntary until such time as a new determination is issued by the Minister and tabled in Parliament.

Under section 37 of the Act the regulator will be able to provide an exemption for specified product models from the MEPS requirements, or any other aspect of the determination. The circumstances the regulator can take into account when providing exemptions are not restricted.

In regard to potential changes, in the past the MCE has adopted the principle that there should be a MEPS 'stability period', and that a cost benefit analysis would be undertaken before any revisions are proposed. The earliest possible timing of any change to any MEPS regulations discussed in this RIS would therefore depend on the date of their implementation. If they are implemented in April 2013 as proposed, the earliest possible revision would be April 2015. However, it would be necessary to carry out a study well in advance of that time, so that adequate notice could be given to industry and economic modelling demonstrating the community benefit before the change was made.

[31] Council of Australian Governments (COAG), October 2007, *Best Practice Regulation: A Guide for Ministerial Councils And National Standard Setting Bodies*, Principle 6

[32] Clause 3.2.2 in Administrative Guidelines. See: http://www.energyrating.gov.au/wp-content/uploads/2011/02/admin-guidelines.pdf

Cost Benefit Analysis - Methodology and data

Distribution of products by jurisdiction

To model energy, emissions, costs and benefits it is necessary to estimate the distribution of non-compliant products by jurisdiction. As data on ICT use by jurisdiction is not available, the model breaks down the total estimated stock by product mix based upon the households in each jurisdiction. It also assumes that the ratio of residential to non-residential usage is the same for all jurisdictions.

Unit energy consumption – Business as Usual

There have been many studies of computer and computer monitors over the last decade in many countries. The most comprehensive is the EuP Ecodesign Preparatory Study - Computers and Monitors study conducted under the auspices of the European Union's Energy using Products (EuP) Directive and published in September 200733. This study reviewed past reports from around the world and reports a high level of informed stakeholder input. In summary, the Lot 3 study estimated the annual energy consumption of computers and computer monitors for their BAU case, shown in Table 7.

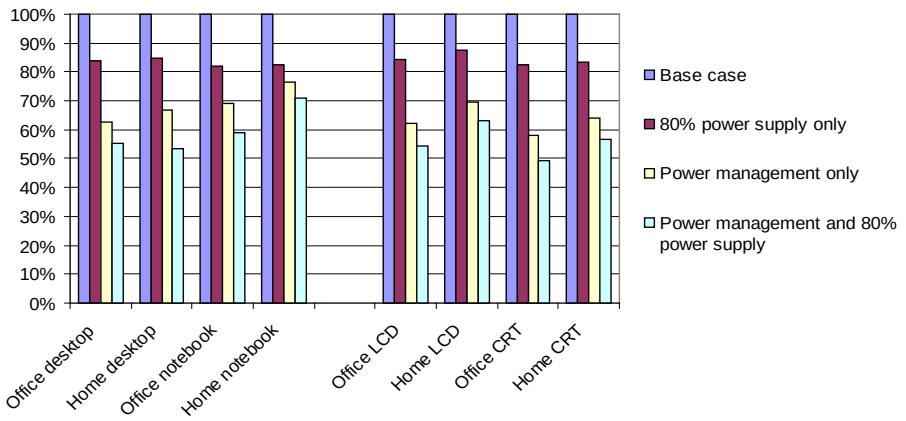
Table 7 : EuP Lot 3 average base annual energy by product and sector – kWh per year

	Residential	Office
Desktop	141.7	194.1
Notebook	59.8	97.3
Netbook	15.0	15.0
LCD	50.8	106.0
CRT	189.0	100.8

Improvements to base annual energy data

The EuP study included analysis of potential energy savings due to improving power supply efficiency to 80 per cent and the impact of enabling power management. These impacts are shown in Figure 6. This "lump sum" approach data was used in the model for the consultation RIS as the average base data for BAU and MEPS improvements.

Figure 6 : EuP Lot 3 impact of power supply efficiency and power management



[33] Link to European Union study Lot3 personal computers and monitors

Subsequent to the consultation RIS, drawing upon further DCCEE retail sampling/testing, the model has been refined and expanded allow analysis by product category/size/sector and usage. Rather than the EuP Lot 3 lump sum approach, the model allows for estimation of compliance rates by product, natural improvements for the BAU case and hence less products subject to compliance costs.

Direct energy calculation

For the BAU case, direct energy is the simple multiplication of the sales quantity of non-compliant products by their annual energy for each year of their service life. The same calculation applies to the MEPS case, where the MEPS product annual energy is used instead non-compliant BAU product energy.

Through discussion with Australian Information Industry Association (AIIA) and Intel service life is set at 5 years, which covers initial owner and subsequent owner(s) of second hand products.

Table 8 shows a very simplified example of the modelling for the BAU case and Table 9 for the MEPS case. The model is much more complex taking into parameters such as account stock growth or decline, service life, retirements and replacements which affect energy consumption in any year, due to changing compliance in the BAU case or all MEPS compliant in the MEPS case.

The yellow shaded area provides information about year to year sales of non-compliant products which is MEPS sales in the MEPS case. The green shaded shows the energy consumption of non-compliant sales in their five year service life, which is MEPS energy in the MEPS case. The blue shaded area provides year by year energy consumption and energy cost. To mimic the analysis considering sales to 2020, this example shows sales and hence MEPS compliance costs to year 7, with the energy savings streaming on until all products are retired over time.

Table 8 : Fictitious example of BAU analysis

Year	1	2	3	4	5	6	7	**BAU**	
Total annual BAU sales	10	10	10	10	10	10	10		
Non compliant %	80%	70%	60%	50%	50%	50%	50%		
Sales affected	8	7	6	5	5	5	5	Energy	
BAU unit energy	50	50	50	50	50	50	50	kWh pa	Cost
Year 1 energy	400							400	$100
Year 2 energy	400	350						750	$188
Year 3 energy	400	350	300					1050	$263
Year 4 energy	400	350	300	250				1300	$325
Year 5 energy	400	350	300	250	250			1550	$388
Year 6 energy		350	300	250	250	250		1400	$350
Year 7 energy			300	250	250	250	250	1300	$325
Year 8 energy				250	250	250	250	1000	$250
Year 9 energy					250	250	250	750	$188
Year 10 energy						250	250	500	$125
Year 11 energy							250	250	$62.5
Total	2000	1750	1500	1250	1250	1250	1250	10,250	$2,565

Table 9 : Example of MEPS analysis

Year	1	2	3	4	5	6	7	MEPS	
Total annual sales – as per BAU	10	10	10	10	10	10	10		
Non compliant %	0.8	0.7	0.6	0.5	0.5	0.5	0.5		
Sales affected	8	7	6	5	5	5	5	Energy	
MEPS unit energy	30	30	30	30	30	30	30	kWh pa	Cost
Year 1 energy	240							240	$60
Year 2 energy	240	210						450	$113
Year 3 energy	240	210	180					630	$158
Year 4 energy	240	210	180	150				780	$195
Year 5 energy	240	210	180	150	150			930	$233
Year 6 energy		210	180	150	150	150		840	$210
Year 7 energy			180	150	150	150	150	780	$195
Year 8 energy				150	150	150	150	600	$150
Year 9 energy					150	150	150	450	$113
Year 10 energy						150	150	300	$75
Year 11 energy							150	150	$38
Total	1200	1050	900	750	750	750	750	6,150	$1,538
MEPS unit compliance cost	$10.00	$9.00	$8.10	$7.29	$6.56	$5.90	$5.31	Total MEPS cost	
Year's MEPS compliance cost	$80.0	$63.0	$48.6	$36.5	$32.8	$29.5	$26.6	$317	

Simple cost benefit analysis from the examples in Table 8 and Table 9

MEPS energy savings = 10,250 – 6,150 = 4,100 kWh

Energy cost saving benefit = $2,565 - $1,538 = $1,027

MEPS incremental cost = $317

Benefit cost ratio = 3.24

Greenhouse gas emissions

Greenhouse gas emissions are calculated from the estimated energy for each jurisdiction, which is then multiplied by the standard emission factors for each jurisdiction and year. Greenhouse gas reductions are calculated to 2025, as products purchased from 2016 to 2020 will continue to reduce emissions during their 5 year service life. Greenhouse gas emission factors are shown in Appendix .

Energy cost benefits

Energy by year is multiplied by the tariffs in each jurisdiction. These tariffs were originally provided by Treasury in 2008 Dollars and are now based upon data from retailers' web sites for post June 2012. The forecast tariffs utilise the same percentage increases as the Treasury forecasts, by jurisdiction year to year. The base, post June 2012 tariffs are shown in Table 10 and estimates by jurisdiction and year are shown in Appendix J.

Table 10 : Base 2012 electricity tariffs cents per kWh

ACT	NSW	NT	QLD	SA	Tas	Vic	WA
17.00	21.85	21.22	21.59	29.89	22.85	22.25	21.87

Energy cost savings are calculated to 2025, as products purchased from 2016 to 2020 will continue to reduce energy costs during their 5 year service life.

Cost and benefit analysis

This analysis uses the NPV function in Excel with 7 per cent discount rate for Australia and 8 per cent for New Zealand. Incremental product and program costs run from 2013 to 2020. Benefits run from 2013 to 2025.

The following outlines the costs, financial benefits and other impacts:

Costs: Increased cost to government and hence taxpayers to manage the program. Cost of compliance to manufacturers and suppliers, passed on to consumers as incremental increases in cost of products.

Financial benefits: Reduced energy cost to consumers due to reduced energy consumption over the life of the product. In the New Zealand case only, where carbon savings value is included, reduced energy consumption increases the value of the benefits.

Other impacts: Reduced energy consumption/production resulting in reduced greenhouse gas emissions and contribution to meeting Kyoto targets and reduced demand on electricity networks, however no value is attributed in the cost benefit analysis.

Cost to the taxpayer

The proposed mandatory MEPS program will impose costs on governments. Some of these are fixed and some vary from year to year.

Government costs comprise:

- Administration of the program by government officials (salaries and overheads, attendance at E3 Committee and Standards meetings, etc.);
- Cost of maintaining a registration and approval capability;
- Random check testing to protect the integrity of the program;
- Costs of producing leaflets and other consumer information; and
- Consultant costs for Standards development, market research, RIS, etc.

The government costs have been estimated as follows; they are similar to the allocations made for other products regulated by E3 Committee:

Salary and overheads for officials administering the program: $50,000 per year;

Check testing, research and other costs underpinning the program: $75,000 per year, half of it borne by the Commonwealth and the other half by other jurisdictions in proportion to their population, in accordance with long-standing, cost-sharing arrangements for E3 activities; and

Printing and promotional activities at $25,000 per year.

Hence total government program costs are estimated to be $150,000 per annum and have been included in the Australian cost benefit analyses.

New Zealand program costs are estimated at NZ$20,000 per annum.

Business Compliance Costs

Compliance with the standard is the responsibility of the importer or local manufacturer of the product.

This RIS assumes that any increases in product design, construction, testing and registration costs will be passed on to customers and are included in incremental costs to consumers in the cost benefit analysis. The initial cost of testing is assumed to be borne by the manufacturers, either locally or overseas. Use of a NATA approved laboratory for computer testing is in the range of $500 to $1000 for a computer and circa $800 for a computer monitor. The cost of compliance–with the standard–is incremental to testing and registration costs, already borne by the manufacturer in compliance with other standards. These compliance costs will ultimately be amortised over the sales of the product, thus making the unit cost of compliance dependent upon the volume of sales expected.

Registration will be via the energyrating web site and as is the case of other programs testing can be undertaken in-house and there is no requirement for independent testing. Suppliers may self certify conformance to MEPS and the energy rating level claimed. These requirements are no more onerous than existing safety, Electromagnetic Compatibility (EMC) and MEPS and energy labelling registration requirements and as such should not impact such issues as time to market.

Only those products that comply with MEPS requirements and manufactured or imported on or after the implementation date will need to be registered. I.e. products, compliant or not, imported prior to the introduction date or manufactured in Australia or New Zealand prior to the introduction date may continue to be sold legally and without registration.

Estimating BAU and MEPS product annual energy and time in operating modes

Estimating the annual energy consumption of non-compliant BAU products is a function of power in idle, sleep and off modes combined with power management settings and user behaviour. The latter two affecting time in each operational mode.

Table 12 to **Table 15** show the results of an annual energy estimator model for each category of desktop computers. The same estimator has been used for all products in the residential and office sectors with estimates of usage and power management settings for each sector.

Base assumptions used in the office desktop energy estimator is that the computer is used 220 days per year, the working day is 8 hours, the computer is used for 4 hours each day and the short idle time (monitor sleep time) is 15 minutes.

The estimator has then been used to calculate annual energy for a range of computer sleep times, shown in the first column and whether or not the computer is shut down “soft off” at the end of the working day. The unit annual energy for each scenario is shown in the BAU and MEPS columns when operated with the settings shown in each table. **Table 11** shows the estimated deployment, as a percentage of stock, operated in each sleep and off combination.

Table 11 : Estimated deployment by computer sleep setting and shut down at day end

BAU sleep time	Shut down	Deployment of stock
30	Yes	40%
30	No	20%
60	Yes	10%
60	No	10%
Never	Yes	10%
Never	No	10%

Table 12 : Category A computer with integrated graphics – BAU non-compliant and MEPS energy

BAU sleep minutes	Shut down “soft off”	Computer unit annual energy kWh		2013 sales thousands	Total annual energy GWh	
		BAU	MEPS		BAU	MEPS
30	Yes	115.0	76.5	116.5	13.4	8.9
30	No	132.5	87.6	58.2	7.7	5.1
60	Yes	139.0	76.5	29.1	4.0	2.2
60	No	162.4	87.6	29.1	4.7	2.6
Never	Yes	139.0	76.5	29.1	4.0	2.2
Never	No	531.0	87.6	29.1	15.5	2.6
			Total GWh		49.4	23.6
			Unit average kWh		169.6	80.9

Table 13 : Category B computer with integrated graphics – BAU non-compliant and MEPS energy

BAU sleep minutes	Shut down "soft off"	Computer unit annual energy kWh		2013 sales thousands	Total annual energy GWh	
		BAU	MEPS		BAU	MEPS
30	Yes	135.1	90.1	334.7	45.2	30.2
30	No	153.8	102.0	167.4	25.7	17.1
60	Yes	164.0	90.1	83.7	13.7	7.5
60	No	190.0	102.0	83.7	15.9	8.5
Never	Yes	164.0	90.1	83.7	13.7	7.5
Never	No	635.9	102.0	83.7	53.2	8.5
			Total GWh		167.5	79.4
			Unit average kWh		200.2	94.8

Table 14 : Category C computer with category 2 dGfx – BAU non-compliant and MEPS energy

BAU sleep minutes	Shut down "soft off"	Computer unit annual energy kWh		2013 sales thousands	Total annual energy GWh	
		BAU	MEPS		BAU	MEPS
30	Yes	191.1	129.1	50.2	9.6	6.5
30	No	213.0	143.2	25.1	5.3	3.6
60	Yes	226.4	129.1	12.6	2.8	1.6
60	No	257.0	143.2	12.6	3.2	1.8
Never	Yes	226.4	129.1	12.6	2.8	1.6
Never	No	800.2	143.2	12.6	10.0	1.8
			Total GWh		33.9	16.9
			Unit average kWh		270.0	134.8

Table 15 : Category D computer with category 3 dGfx – BAU non-compliant and MEPS energy

BAU sleep minutes	Shut down "soft off"	Computer unit annual energy kWh		2013 sales thousands	Total annual energy GWh	
		BAU	MEPS		BAU	MEPS
30	Yes	220.6	149.5	11.2	2.5	1.7
30	No	244.1	164.7	5.6	1.4	0.9
60	Yes	260.5	149.5	2.8	0.7	0.4
60	No	294.0	164.7	2.8	0.8	0.5
Never	Yes	260.5	149.5	2.8	0.7	0.4
Never	No	908.5	164.7	2.8	2.5	0.5
			Total GWh		8.6	4.3
			Unit average kWh		309.4	155.6

Estimated annual operating hours in idle, sleep and off modes for BAU and MEPS

Table 16 provides information on the estimated hours per year in each mode for the calculations in the previous tables for annual energy estimations for the deployment estimates in Table 11. Each summation of idle, sleep and off hours equals 8,760, which is the number of hours in a year. There will be instances where

users will switch off the computer at the plug, however this is deemed to be of such low occurrence this mode is not included.

For the BAU and MEPS cases, deployment of stock is the estimated percentage of computers operated in each combination of sleep setting and shut down (soft off) at working day end. The estimates shown in Table 16 estimates that enablement of MEPS power management settings will reduce BAU idle mode time by an average of 876 hours. I.e. on an annual basis, 876 hours in the lower power sleep mode rather than 876 hours in the much higher idle mode.

Table 16 : Estimated annual operating hours by mode for BAU and MEPS cases

BAU sleep time setting	Shut down	Active hours	BAU idle hours	BAU sleep hours	BAU off hours	Deployment of stock
30	Yes	880	440	440	7000	40%
30	No	880	550	7330		20%
60	Yes	880	880		7000	10%
60	No	880	1100	6780		10%
Never	Yes	880	880		7000	10%
Never	No	880	7880			10%
BAU average		880	1360	2320	4200	
MEPS sleep time setting	Shut down		MEPS idle hours	MEPS sleep hours	MEPS off hours	Deployment of stock
30	60% yes 40% no	880	484	3196	4200	100%

Incremental product costs – excluding registration fees

This section of the analysis utilises cost estimates from industry and published sources as part of the consultation process in preparation for the draft consultation RIS.

Data for the impact of the proposed MEPS on consumer prices is somewhat limited. The Climate Savers Computing Initiative (CSCI) estimated in 2009 that the incremental cost to be circa US$20 for a desktop computer, of which an estimated two thirds is the power supply. However they do state “At high volumes, the cost premium with 80 percent or 90 percent power supplies are zero or very close to zero.” 2009 data from a New Zealand computer supplier indicates an increase in current wholesale price of US$10 for an 80 per cent efficient power supply, which then, allowing for profit, is similar to the CSCI estimate. Similarly the EuP study of computers and computer monitors estimated the price increment of an efficient power supply to be €9 (circa A$14.5), which is in close agreement with the other power supply estimates.

Additional details on incremental component costs are shown in Appendix D.

Example of the Model Methodology

The modelling utilises forecast stock of each product (both retirements and market trends), Estimated MEPS energy saving by product compared to BAU, forecast electricity tariffs, increasing compliance in the BAU case and greenhouse gas emissions by jurisdiction. The estimates for office desktops are shown in the following tables. For the MEPS case, sales equal the BAU non-compliant sales quantities

Modelling data - Office desktop

Table 17 : Office desktop sales and stock estimates BAU and MEPS

	2013	2014	2015	2016	2017	2018	2019	2020
Sales millions								
Cat A	0.81	0.51	0.42	0.25	0.15	0.07	0.05	0.06
Cat B	1.67	1.46	1.88	2.20	2.65	2.52	1.68	1.96
Cat C	0.25	0.30	0.42	0.57	0.70	0.70	0.53	0.69
Cat D	0.06	0.05	0.08	0.13	0.18	0.21	0.14	0.17
BAU non-compliance sales in year								
Cat A	36%	34%	31%	29%	26%	24%	21%	19%
Cat B	50%	48%	45%	43%	40%	38%	35%	33%
Cat C	50%	48%	45%	43%	40%	38%	35%	33%
Cat D	50%	48%	45%	43%	40%	38%	35%	33%
BAU non-compliant stock	11.42	9.64	8.21	6.96	6.07	5.67	5.47	5.19
BAU compliant stock	6.26	7.24	8.18	8.93	9.60	9.79	10.07	10.42
MEPS non-compliant stock	9.71	6.90	4.27	1.72				
MEPS compliant stock	7.97	9.98	12.13	14.18	15.68	15.46	15.53	15.61

Table 18 : Office desktop BAU non-compliant energy use - GWH

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Energy in year of sale												
Cat A	49	29	22	12	6	3	2	2				

Cat B	168	139	169	187	212	189	118	127				
Cat C	34	39	51	65	76	71	50	61				
Cat D	9	7	12	17	23	24	16	17				
Energy by year												
Cat A	49	78	101	113	119	73	45	25	13	6	4	2
Cat B	168	307	476	663	875	897	876	834	647	435	245	127
Cat C	34	73	124	189	264	301	312	322	257	182	111	61
Cat D	9	15	27	44	66	82	91	97	80	57	33	17
Total energy in year	259	473	728	1008	1325	1353	1324	1278	997	680	392	207

Table 19 : Office desktop MEPS energy use – GWH

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Energy in year of sale												
Cat A	24	14	11	6	3	1	1	1				
Cat B	79	66	80	89	101	90	56	60				
Cat C	17	19	26	32	38	35	25	30				
Cat D	4	3	6	8	11	12	8	9				
Energy by year												
Cat A	24	37	48	54	57	35	22	12	6	3	2	1
Cat B	79	145	226	314	415	425	415	395	306	206	116	60
Cat C	17	36	62	94	132	150	156	161	128	91	55	30
Cat D	4	8	14	22	33	41	46	49	40	29	17	9
Total energy in year	124	227	349	484	637	651	638	616	481	328	190	100

Table 20 : Office desktop - Annual energy cost – BAU and MEPS - $ millions

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Average tariff – cents per kWh	24.77	27.00	28.02	29.03	30.04	31.05	32.06	33.07	34.09	35.11	36.13	36.68
BAU $ millions	$64	$128	$204	$293	$398	$420	$425	$423	$340	$239	$142	$76
MEPS $ millions	$31	$61	$98	$141	$191	$202	$205	$204	$164	$115	$69	$37

Table 21 : Office desktop - MEPS costs - $ millions

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Registration	$0.80	$0.69	$0.86	$1.00	$1.22	$1.20	$0.85	$1.06				
Component	$38.46	$21.64	$13.24	$14.96	$17.39	$16.23	$10.78	$12.46				
Apportioned program cost	$0.03	$0.04	$0.04	$0.04	$0.04	$0.04	$0.04	$0.05				
Total cost	$39.30	$22.37	$14.14	$16.01	$18.65	$17.47	$11.68	$13.57				

Table 22 : Office desktop - Cost and benefit summary - $ millions

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Energy cost saving	$33.5	$66.6	$106.1	$152.2	$206.8	$217.9	$220.0	$218.7	$175.8	$123.4	$73.3	$39.3
MEPS costs	$39.3	$22.4	$14.1	$16.0	$18.6	$17.5	$11.7	$13.6				

Table 23 : Office desktop - NPV summary - $ millions at 7% and benefit cost ratio

NPV Benefit	NPV MEPS costs	Net benefit	Benefit cost ratio
$1,060	$120	$940	8.82

Table 24 : Office desktop - NPV summary - $ millions at 7% and benefit cost ratio

NPV Benefit	NPV MEPS costs	Net benefit	Benefit cost ratio
$1,060	$120	$940	8.82

Modelling data - Residential desktop

Table 25 : Residential desktop - sales and stock estimates BAU and MEPS

	2013	2014	2015	2016	2017	2018	2019	2020
Sales millions								
Cat A	0.48	0.29	0.22	0.13	0.06	0.04	0.02	0.02
Cat B	0.99	0.83	1.00	1.12	1.16	1.37	0.71	0.70
Cat C	0.15	0.17	0.22	0.29	0.31	0.38	0.22	0.25
Cat D	0.03	0.03	0.04	0.06	0.08	0.11	0.06	0.06
BAU non-compliance sales in year								

Cat A	36%	34%	31%	29%	26%	24%	21%	19%
Cat B	50%	48%	45%	43%	40%	38%	35%	33%
Cat C	50%	48%	45%	43%	40%	38%	35%	33%
Cat D	50%	48%	45%	43%	40%	38%	35%	33%
BAU non-compliant stock	6.47	5.44	4.59	3.94	3.45	3.15	2.91	2.61
BAU compliant stock	3.13	3.68	4.16	4.53	4.75	4.76	4.69	4.54
MEPS non-compliant stock	5.46	3.85	2.35	1.05	0.00	0.00	0.00	0.00
MEPS compliant stock	4.14	5.28	6.39	7.43	8.20	7.91	7.61	7.15

Table 26 : Residential desktop - BAU non-compliant energy use - GWH

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Energy in year of sale												
Cat A	20	11	8	4	2	1	0	0				
Cat B	79	63	72	76	74	82	40	37				
Cat C	15	16	20	24	24	28	15	16				
Cat D	4	3	5	6	7	10	5	5				
Energy by year												
Cat A	20	31	39	44	46	27	16	8	4	2	1	0
Cat B	79	142	214	290	364	367	344	309	233	159	76	37
Cat C	15	30	50	74	98	111	111	107	83	59	31	16
Cat D	4	7	11	18	25	31	33	33	27	20	10	5
Total energy in year	117	211	315	425	533	537	504	457	347	239	118	57

Table 27 : Residential desktop - MEPS energy use – GWH

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Energy in year of sale												
Cat A	13	7	5	3	1	1	0	0				
Cat B	53	42	48	51	49	55	27	24				
Cat C	10	11	13	16	16	19	10	11				

Cat D	3	2	3	4	5	7	3	3				
Energy by year												
Cat A	13	21	26	29	30	17	10	5	3	1	1	0
Cat B	53	95	143	194	243	245	230	206	155	106	51	24
Cat C	10	21	34	50	66	75	75	72	56	40	21	11
Cat D	3	4	8	12	17	21	22	22	18	13	6	3
Total energy in year	78	140	210	284	356	359	337	306	232	160	79	38

Table 28 : Residential desktop - Annual energy cost – BAU and MEPS - $ millions

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Average tariff – cents per kWh	24.77	27.00	28.02	29.03	30.04	31.05	32.06	33.07	34.09	35.11	36.13	36.68
BAU $ millions	$29	$57	$88	$123	$160	$167	$162	$151	$118	$84	$43	$21
MEPS $ millions	$19	$38	$59	$82	$107	$111	$108	$101	$79	$56	$28	$14

Table 29 : Residential desktop - MEPS costs - $ millions

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Registration	$0.47	$0.39	$0.46	$0.51	$0.53	$0.65	$0.36	$0.38				
Component	$22.71	$12.26	$7.02	$7.61	$7.59	$8.84	$4.56	$4.46				
Apportioned program cost	$0.02	$0.02	$0.02	$0.02	$0.02	$0.02	$0.02	$0.02				
Total cost	$23.20	$12.67	$7.50	$8.14	$8.13	$9.51	$4.94	$4.86				

Table 30 : Residential desktop - Cost and benefit summary - $ millions

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Energy cost saving	$10	$19	$29	$41	$53	$55	$54	$50	$39	$28	$14	$7
MEPS costs	$23.20	$12.67	$7.50	$8.14	$8.13	$9.51	$4.94	$4.86				

Table 31 : Residential desktop - NPV summary - $ millions at 7% and benefit cost ratio

NPV Benefit	NPV MEPS costs	Net benefit	Benefit cost ratio
$399	$63	$336	6.33

Modelling data – Office notebook

Table 32 : Office notebook - sales and stock estimates BAU and MEPS

	2013	2014	2015	2016	2017	2018	2019	2020
Sales millions								
Cat A	0.66	0.60	0.44	0.36	0.23	0.20	0.11	0.05
Cat B	1.34	1.64	1.65	2.10	2.12	2.44	1.98	1.88
Cat C	0.20	0.36	0.37	0.54	0.55	0.66	0.59	0.61
BAU non-compliance sales in year								
Cat A	36%	34%	31%	29%	26%	24%	21%	19%
Cat B	50%	48%	45%	43%	40%	38%	35%	33%
Cat C	50%	48%	45%	43%	40%	38%	35%	33%
BAU non-compliant stock	6.86	6.50	6.10	5.68	5.29	5.15	4.92	4.69
BAU compliant stock	4.44	5.73	6.78	7.85	8.61	9.11	9.42	9.72
MEPS non-compliant stock	5.52	4.01	2.55	0.92	0.00	0.00	0.00	0.00
MEPS compliant stock	5.78	8.22	10.33	12.62	13.90	14.27	14.34	14.41

Table 33 : Office notebook - BAU non-compliant energy use - GWH

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Energy in year of sale												
Cat A	15	13	9	7	4	3	1	1				
Cat B	58	68	65	78	74	80	61	53				
Cat C	16	27	26	36	35	39	33	31				
Energy by year												
Cat A	15	28	37	43	47	35	23	15	9	5	2	1
Cat B	58	127	191	269	343	365	357	345	268	194	114	53
Cat C	16	43	69	106	140	164	169	174	138	103	64	31
Total energy in year	89	197	297	418	531	563	550	535	414	302	180	85

Table 34 : Office notebook - MEPS energy use – GWH

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Energy in year of sale												
Cat A	9	8	5	4	2	2	1	0				
Cat B	36	41	40	47	45	49	37	32				
Cat C	10	17	16	22	21	24	20	19				
Energy by year												
Cat A	9	17	22	26	29	21	14	9	5	3	1	0
Cat B	36	77	117	164	209	222	217	210	163	118	69	32
Cat C	10	26	42	64	86	100	103	106	84	63	39	19
Total energy in year	54	120	181	255	323	343	335	326	253	184	110	52

Table 35 : Office notebook - Annual energy cost – BAU and MEPS - $ millions

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Average tariff – cents per kWh	24.77	27.00	28.02	29.03	30.04	31.05	32.06	33.07	34.09	35.11	36.13	36.68
BAU $ millions	$22	$53	$83	$121	$159	$175	$176	$177	$141	$106	$65	$31
MEPS $ millions	$13	$32	$51	$74	$97	$107	$107	$108	$86	$65	$40	$19

Table 36 : Office notebook - MEPS costs - $ millions

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Registration	$0.62	$0.76	$0.75	$0.94	$0.95	$1.11	$0.94	$0.92				
Component	$14.92	$15.01	$11.46	$13.93	$13.39	$14.87	$11.79	$10.87				
Apportioned program cost	$0.03	$0.04	$0.04	$0.04	$0.03	$0.04	$0.05	$0.04				
Total cost	$15.57	$15.82	$12.24	$14.92	$14.37	$16.02	$12.77	$11.83				

Table 37 : Office notebook - Cost and benefit summary - $ millions

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Energy cost saving	$9	$21	$33	$47	$62	$68	$69	$69	$55	$41	$25	$12
MEPS costs	$15.57	$15.82	$12.24	$14.92	$14.37	$16.02	$12.77	$11.83				

Table 38 : Office notebook - NPV summary - $ millions at 7% and benefit cost ratio

NPV Benefit	NPV MEPS costs	Net benefit	Benefit cost ratio
$512	$85	$426	5.99

Modelling data – Residential notebook

Table 39 : Residential notebook - sales and stock estimates BAU and MEPS

	2013	2014	2015	2016	2017	2018	2019	2020
Sales millions								
Cat A	0.18	0.21	0.18	0.15	0.10	0.08	0.06	0.03
Cat B	0.37	0.57	0.67	0.86	0.94	0.97	1.04	1.23
Cat C	0.06	0.13	0.15	0.22	0.24	0.26	0.31	0.40
BAU non-compliance sales in year								
Cat A	36%	34%	31%	29%	26%	24%	21%	19%
Cat B	50%	48%	45%	43%	40%	38%	35%	33%
Cat C	50%	48%	45%	43%	40%	38%	35%	33%
BAU non-compliant stock	1.76	1.81	1.90	1.86	1.88	1.98	2.06	2.17
BAU compliant stock	1.44	1.91	2.41	2.90	3.37	3.75	4.16	4.71
MEPS non-compliant stock	1.38	1.04	0.69	0.15	0.00	0.00	0.00	0.00
MEPS compliant stock	1.82	2.69	3.61	4.61	5.24	5.73	6.22	6.87

Table 40 : Residential notebook - BAU non-compliant energy use - GWH

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Energy in year of sale												
Cat A	2	2	2	1	1	1	0	0				
Cat B	7	11	12	14	15	14	14	16				
Cat C	2	4	4	6	6	6	7	8				
Energy by year												
Cat A	2	4	6	7	8	6	5	3	2	1	1	0
Cat B	7	18	30	44	59	66	69	73	58	44	30	16

Cat C	2	6	10	16	23	27	30	34	28	22	15	8
Total energy in year	11	28	46	68	89	99	104	110	89	67	46	24

Table 41 : Residential notebook - MEPS energy use – GWH

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Energy in year of sale												
Cat A	1	1	1	1	1	0	0	0				
Cat B	5	7	8	10	10	10	10	11				
Cat C	1	3	3	4	4	4	5	6				
Energy by year												
Cat A	1	3	4	5	5	4	3	2	1	1	0	0
Cat B	5	12	20	30	40	45	47	50	40	30	20	11
Cat C	1	4	7	11	16	19	21	24	19	15	11	6
Total energy in year	8	19	31	46	61	68	72	76	61	46	31	17

Table 42 : Residential notebook - Annual energy cost – BAU and MEPS - $ millions

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Average tariff – cents per kWh	24.77	27.00	28.02	29.03	30.04	31.05	32.06	33.07	34.09	35.11	36.13	36.68
BAU $ millions	$3	$8	$13	$20	$27	$31	$33	$36	$30	$23	$17	$9
MEPS $ millions	$2	$5	$9	$13	$18	$21	$23	$25	$21	$16	$11	$6

Table 43 : Residential notebook - MEPS costs - $ millions

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Registration	$0.17	$0.27	$0.31	$0.39	$0.42	$0.44	$0.49	$0.60				
Component	$4.17	$5.23	$4.67	$5.74	$5.90	$5.88	$6.19	$7.08				
Apportioned program cost	$0.01	$0.01	$0.01	$0.02	$0.01	$0.01	$0.03	$0.03				
Total cost	$4.35	$5.51	$4.99	$6.14	$6.34	$6.34	$6.70	$7.71				

Table 44 : Residential notebook - Cost and benefit summary - $ millions

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Energy cost saving	$1	$2	$4	$6	$8	$10	$10	$11	$9	$7	$5	$3
MEPS costs	$4.35	$5.51	$4.99	$6.14	$6.34	$6.34	$6.70	$7.71				

Table 45 : Residential notebook - NPV summary - $ millions at 7% and benefit cost ratio

NPV Benefit	NPV MEPS costs	Net benefit	Benefit cost ratio
$78	$35	$43	2.22

Modelling data – Office monitor

Table 46 : Office monitor sales and stock estimates BAU and MEPS

	2013	2014	2015	2016	2017	2018	2019	2020
Sales millions								
38 to 43 cm	0.03	0.05	0.04	0.05	0.01	0.02	0.02	0.02
48 cm	3.16	1.87	2.23	2.47	4.75	3.97	1.90	2.26
56 cm	0.08	0.10	0.11	0.17	0.16	0.17	0.17	0.18
61 cm	0.07	0.05	0.06	0.08	0.10	0.08	0.05	0.06
BAU non-compliance sales in year								
38 to 43 cm	50%	48%	45%	43%	40%	38%	35%	33%
48 cm	50%	48%	45%	43%	40%	38%	35%	33%
56 cm	50%	48%	45%	43%	40%	38%	35%	33%
61 cm	50%	48%	45%	43%	40%	38%	35%	33%
BAU non-compliant stock	9.50	7.91	6.66	5.55	4.42	3.78	3.55	3.27
BAU compliant stock	8.15	8.95	9.71	10.32	11.24	11.66	11.97	12.33
MEPS non-compliant stock	7.28	4.71	2.35	0.07	0.00	0.00	0.00	0.00
MEPS compliant stock	10.38	12.16	14.02	15.81	15.66	15.44	15.52	15.60

Table 47 : Office monitor - BAU non-compliant energy use - GWH

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Energy in year of sale												
38 to 43 cm	1	1	1	1	0	0	0	0				
48 cm	93	52	59	62	111	87	39	43				
56 cm	3	4	4	6	5	5	5	5				
61 cm	3	2	3	4	4	3	2	2				
Energy by year												
38 to 43 cm	1	2	3	4	4	4	3	2	1	1	1	0
48 cm	93	145	204	266	377	372	359	343	281	169	82	43
56 cm	3	7	11	16	21	23	24	25	19	14	9	5
61 cm	3	6	9	12	16	16	15	15	11	7	4	2
Total energy in year	100	159	226	298	418	414	401	384	312	192	96	50

Table 48 : Office monitor - MEPS energy use – GWH

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Energy in year of sale												
38 to 43 cm	1	1	1	1	0	0	0	0				
48 cm	57	32	36	38	68	53	24	26				
56 cm	2	2	2	3	3	3	3	3				
61 cm	2	1	2	2	3	2	1	1				
Energy by year												
38 to 43 cm	1	1	2	2	2	2	2	1	1	1	1	1
48 cm	57	89	125	162	230	227	219	209	172	103	57	89
56 cm	2	4	7	10	13	14	15	15	12	9	2	4
61 cm	2	4	6	8	10	10	10	9	7	5	2	4
Total energy in year	61	98	139	183	256	254	246	236	192	118	61	98

Table 49 : Office monitor - Annual energy cost – BAU and MEPS - $ millions

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Average tariff – cents per kWh	24.77	27.00	28.02	29.03	30.04	31.05	32.06	33.07	34.09	35.11	36.13	36.68
BAU $ millions	$25	$43	$63	$86	$126	$129	$128	$127	$107	$67	$35	$18
MEPS $ millions	$15	$26	$39	$53	$77	$79	$79	$78	$65	$41	$21	$11

Table 50 : Office monitor - MEPS costs - $ millions

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Registration	$1.07	$0.69	$0.84	$0.99	$1.86	$1.62	$0.85	$1.04				
Component	$8.34	$5.10	$5.92	$6.56	$11.56	$9.48	$4.66	$5.27				
Apportioned program cost	$0.04	$0.03	$0.04	$0.04	$0.05	$0.05	$0.04	$0.04				
Total cost	$9.46	$5.82	$6.80	$7.59	$13.47	$11.15	$5.56	$6.36				

Table 51 : Office monitor - Cost and benefit summary - $ millions

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Energy cost saving	$10	$17	$25	$33	$49	$50	$50	$49	$41	$26	$13	$7
MEPS costs	$9.46	$5.82	$6.80	$7.59	$13.47	$11.15	$5.56	$6.36				

Table 52 : Office monitor - NPV summary - $ millions at 7% and benefit cost ratio

NPV Benefit	NPV MEPS costs	Net benefit	Benefit cost ratio
$369	$49	$320	7.47

Modelling data – Residential monitor

Table 53 : Residential monitor - sales and stock estimates BAU and MEPS

	2013	2014	2015	2016	2017	2018	2019	2020
Sales millions								
38 to 43 cm	1.35	0.62	0.67	0.94	1.69	1.59	0.41	0.36
48 cm	0.38	0.18	0.20	0.26	0.47	0.45	0.12	0.11
56 cm	0.19	0.09	0.10	0.13	0.24	0.23	0.06	0.06

61 cm	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
BAU non-compliance sales in year								
38 to 43 cm	50%	48%	45%	43%	40%	38%	35%	33%
48 cm	50%	48%	45%	43%	40%	38%	35%	33%
56 cm	50%	48%	45%	43%	40%	38%	35%	33%
61 cm	50%	48%	45%	43%	40%	38%	35%	33%
BAU non-compliant stock	4.98	4.11	3.36	2.76	2.11	1.67	1.43	1.12
BAU compliant stock	4.61	5.01	5.38	5.71	6.09	6.24	6.18	6.03
MEPS non-compliant stock	3.65	2.28	0.96	0.00	0.00	0.00	0.00	0.00
MEPS compliant stock	5.94	6.84	7.79	8.48	8.20	7.91	7.61	7.15

Table 54 : Residential monitor - BAU non-compliant energy use - GWH

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Energy in year of sale												
38 to 43 cm	25	11	11	15	25	22	5	4				
48 cm	8	4	4	5	8	7	2	2				
56 cm	5	2	3	3	5	5	1	1				
61 cm	0	0	0	0	0	0	0	0				
Energy by year												
38 to 43 cm	25	36	47	62	87	84	79	72	57	32	10	4
48 cm	8	12	16	20	28	28	26	23	19	11	3	2
56 cm	5	8	10	13	19	18	17	15	12	7	2	1
61 cm	0	1	1	1	2	2	1	1	1	1	0	0
Total energy in year	39	56	74	97	136	131	123	112	89	50	15	7

Table 55 : Residential monitor - MEPS energy use – GWH

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Energy in year of sale												
38 to 43 cm	14	6	6	8	14	13	3	2				

48 cm	5	2	2	3	5	4	1	1				
56 cm	3	1	2	2	3	3	1	1				
61 cm	0	0	0	0	0	0	0	0				
Energy by year												
38 to 43 cm	14	20	27	35	49	48	45	41	32	18	5	2
48 cm	5	7	9	12	17	16	15	14	11	6	2	1
56 cm	3	5	6	8	11	11	10	9	7	4	1	1
61 cm	0	0	1	1	1	1	1	1	1	0	0	0
Total energy in year	22	32	42	56	78	75	70	64	51	29	9	4

Table 56 : Residential monitor - Annual energy cost – BAU and MEPS - $ millions

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Average tariff – cents per kWh	24.77	27.00	28.02	29.03	30.04	31.05	32.06	33.07	34.09	35.11	36.13	36.68
BAU $ millions	$10	$15	$21	$28	$41	$41	$39	$37	$30	$18	$6	$3
MEPS $ millions	$6	$9	$12	$16	$23	$23	$23	$21	$17	$10	$3	$1

Table 57 : Residential monitor - MEPS costs - $ millions

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Registration	$0.62	$0.30	$0.34	$0.48	$0.89	$0.87	$0.24	$0.22				
Component	$4.67	$2.14	$2.31	$3.07	$5.39	$4.95	$1.24	$1.07				
Apportioned program cost	$0.02	$0.01	$0.01	$0.02	$0.03	$0.03	$0.01	$0.01				
Total cost	$5.32	$2.45	$2.66	$3.57	$6.31	$5.85	$1.49	$1.30				

Table 58 : Residential monitor - Cost and benefit summary - $ millions

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Energy cost saving	$4	$6	$9	$12	$17	$17	$17	$16	$13	$7	$2	$1
MEPS costs	$5.32	$2.45	$2.66	$3.57	$6.31	$5.85	$1.49	$1.30				

Table 59 : Residential monitor - NPV summary - $ millions at 7% and benefit cost ratio

NPV Benefit	NPV MEPS costs	Net benefit	Benefit cost ratio
$122	$22	$100	5.54

Appendix C

The ENERGY STAR® Program and its application for the Regulatory Proposal

The E3 Committee agreed to use ENERGY STAR® as the preferred means of measuring the energy efficiency of computers and monitors in Australia and New Zealand because:

1. It is recognised and accepted internationally and used by international suppliers of computers and monitors;
2. Its use is encouraged by Australian Information Industry Association (AIIA);
3. It was developed in the USA as an endorsement scheme to identify the more efficient products available in the marketplace so can support the voluntary monitor labelling scheme;
4. It can support government procurement type activities – the US and Australian Governments now specify the latest version for all federal government computer and computer monitor procurement;
5. It has stood the test of time with the scheme now having 15 years of experience and five versions to reflect the development of the technology; and
6. It specifies the typical energy consumption (TEC) per year for operational times in a variety of modes in the current V5.2 specification, which came into effect in 2009 as V5.0.

Australian and New Zealand industry sources have previously identified these features as a necessary pre-condition to accepting regulation[34].

The ENERGY STAR® Program is jointly managed by the United States Department of Energy and the United States Environmental Protection Agency. Since 1999 the Program has been successfully transforming the market in the US towards more efficient products in a wide variety of categories. It aims to identify the top 25 per cent of products in the space of a couple of years in terms of energy efficiency, so specifications are regularly updated to keep pace with market developments. In the case of computers and computer monitors ENERGY STAR® has become the de-facto international energy efficiency standard for these products. ENERGY STAR® has been adopted by many countries around the world, including the European Union and New Zealand.

ENERGY STAR® for computers was first developed and implemented in 1994 with various improvements since. The specification, ENERGY STAR® V5.0, was introduced from July 2009 and has been amended to 5.2 to allow for additional networking specifications.

The Australian market for computers and computer monitors is similar to that in the US and Europe (in terms of the timing of product launches) and there is no reason why ENERGY STAR® compliant products could not be supplied here in a timely fashion. However, currently there is no driver to supply more efficient products to the Australian market and market research indicates that Australia may have become a dumping ground for inefficient computer products as more and more countries demand ENERGY STAR® V5.0 compliant products. This may change, however, with the recent release of the Australian Government ICT Sustainability Plan 2010 – 2015 requiring all Australian Government agencies to purchase ICT equipment that comply with current versions of ENERGY STAR®.

Computers

The E3 Committee agreed to use ENERGY STAR® V5.2 for Computers as the MEPS baseline[35].

A committee was established under the auspices of Standards Australia to develop and now has published the required Australian and New Zealand Standard (AS/NZS5813). This two part standard covers Method of

[34] Hewlett Packard representation at 23 April 2009 meeting.

35 In their response to the consultation RIS the AIIA proposed that MEPS for computers adapt Ecma-383/IEC-62623/European Commission methodology with respect to allowances for Discrete Graphics and discrete TV tuner and audio cards. Industry claim that the Discrete Graphics allowances as set out in ENERGY STAR® V5.2 are not scalable and do not reflect modern high performing products. The use of EC style allowances will be part of future ENERGY STAR® V6.0 considerations. E3 accepted this proposal and EC allowances are part of the AS/NZ Standard.

Test (Part 1) and Minimum Energy Performance Standards (Part 2). The ENERGY STAR® V5.2 (computers) provides metrics for calculating the maximum allowed typical annual Energy Consumption (TEC) of computer types, mandatory enablement of “built in” power management functions and minimum power supply efficiency levels.

The proposed MEPS for defined categories of computers, based upon ENERGY STAR® specification version 5.2 and EC energy allowances for configurations over the base configurations in the version 5.2 specifications are outlined below.

Table 60 : Typical Energy Consumption Base (TEC) requirements

	Desktops and Integrated Computers (kWh)	Notebook Computers (kWh)
TEC (kWh) per annum	Category A: ≤ 148.0 Category B: ≤ 175.0 Category C: ≤ 209.0 Category D: ≤ 234.0	Category A: ≤ 40.0 Category B: ≤ 53.0 Category C: ≤ 88.5

Table 61 : Discrete Graphics Adders – Desktop and Integrated Computers

	Discrete Graphics Adders (TEC kWh)						
	G1	G2	G3	G4	G5	G6	G7
Cat. A discrete graphics adders	46	70	95	118	140	225	394
Cat. B discrete graphics adders	46	70	95	118	140	225	394
Cat. C discrete graphics adders	46	70	95	118	140	225	394
Cat. D discrete graphics adders	46	70	95	118	140	225	394
Additional Graphics Adders (CAT A, B, C and D)	46	70	95	118	140	225	394

Table 62 : Discrete Graphics Adders – Notebook Computers

	Discrete Graphics Adders (TEC kWh)						
	G1	G2	G3	G4	G5	G6	G7
Cat. A Discrete Graphics Adders	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cat. B Discrete Graphics Adders	4	12	24	30	36	66	146
Cat. C Discrete Graphics Adders	N/A	N/A	37	43	49	79	159
Additional Graphics Adders (Cat B,C)	17	25	37	43	49	79	159

Table 63 : Capability adders (TEC kWh)

	Desktop and Integrated Computers	Notebook Computers
Memory (TEC_{memory})	1 kWh (per GB over base memory) *Base Memory*: Categories A, B and C: 2 GB Category D: 4 GB	0.4 kWh (per GB over base memory) *Base Memory*: All categories: 4 GB
Additional Internal Storage ($TEC_{storage}$)	25	3
Discrete TV Tuners (TE_{tv})	35	2.1
Discrete Audio Cards (TEC_{audio})	36	

Small-scale servers

Table 64 : Power requirements for small-scale servers

Category	Idle mode	Standby (off mode) WOL disabled	Standby (off mode) WOL enabled*
A	≤50.0 W	≤2.0 W	≤2.7 W
B	≤65.0 W		

* The Standby (Off mode) power limit for WOL enabled applies only if the computer is shipped with WOL enabled.

Computer Monitors

Since 2008 the US EPA decided to include the International Electrotechnical Commission (IEC) television energy efficiency method of test for larger size monitors in ENERGY STAR® V5.0 (displays). This is the same methodology mandated in Australia for televisions. This development means that monitors can be subject to both mandatory MEPS and labelling where maximum values for sleep, off and on power are set. The proposed MEPS for computer monitors is line with these specifications and therefore reflect the convergence of display technology.

Table 65 : Maximum sleep and off mode power for all computer monitors

Sleep mode	Off mode
≤ 2.0 W	≤ 1.0 W

The proposed MEPS for computer monitors, based upon ENERGY STAR® V5.0, Tier 1 levels are as follows:

Table 66 : Maximum on mode power for computer monitors without automatic brightness control enabled by default

Display category	Maximum on mode power Watts
Diagonal Screen Size < 76.2 cm Screen Resolution ≤ 1.1 MP	$P_O = 6*(MP) + 0.00775*(A) + 3$
Diagonal Screen Size < 76.2 cm Screen Resolution > 1.1 M	$P_O = 9*(MP) + 0.00775*(A) + 3$

Where Po = maximum on mode power, MP = Display Resolution (megapixels) and A = Viewable Screen Area (square centimetres).

For computer monitors where automatic brightness control is enabled by default, on mode (P_{avg}) power is as calculated in the following equation and shall be equal to or less than the values specified in Table B6.

$P_{avg} = 0.8*P_h + 0.2*P_l$

Where:

P_{avg} = the average on mode power consumption in Watts, rounded to the nearest tenth of a Watt

P_h = the on mode power consumption in high ambient lighting conditions

P_l = the on mode power consumption in low ambient lighting conditions

NOTE: The formula assumes the display will be in low ambient lighting conditions 20% of the time.

As for computers a committee was established under the auspices of Standards Australia to develop and now has published the required Australian and New Zealand Standard (AS/NZS5815.1) for computer monitors and has published the draft for public comment of AS/NZS5815.2. This two part standard covers Method of Test (Part 1) and Minimum Energy Performance Standards (Part 2). The ENERGY STAR® V5.0 (monitors) provided the metrics for calculating MEPS for defined sizes of computers monitors.

Appendix D

Cost increment estimates

Incremental retail costs comprise the component cost and the registration cost. The modelling utilises the incremental retail prices due to components as shown in **Table 67** and registration costs in **Table 68**.

Table 67 : Incremental retail prices due to components

	2013	2014	2015	2016	2017	2018	2019	2020
Desktop								
Cat A	$27.50	$19.03	$9.91	$10.26	$10.63	$11.02	$11.41	$11.82
Cat B	$30.25	$20.93	$10.90	$11.29	$11.70	$12.12	$12.55	$13.01
Cat C	$33.00	$22.83	$11.89	$12.32	$12.76	$13.22	$13.69	$14.19
Cat D	$35.75	$24.73	$12.88	$13.34	$13.82	$14.32	$14.84	$15.37
Notebook								
Cat A	$13.65	$11.85	$9.91	$10.26	$10.63	$11.02	$11.41	$11.82
Cat B	$15.02	$13.04	$10.90	$11.29	$11.70	$12.12	$12.55	$13.01
Cat C	$16.38	$14.22	$11.89	$12.32	$12.76	$13.22	$13.69	$14.19
Monitor								
15/17 "	$4.75	$4.92	$5.10	$5.28	$5.47	$5.67	$5.87	$6.08
19 "	$4.99	$5.17	$5.35	$5.55	$5.75	$5.95	$6.17	$6.39
22 "	$5.23	$5.41	$5.61	$5.81	$6.02	$6.24	$6.46	$6.69
24 "	$5.46	$5.66	$5.86	$6.07	$6.29	$6.52	$6.75	$7.00

Table 68 : Registration costs per model with high registration fee

Product registration	A$400	In line with proposed GEMS legislation		
Registration labour	A$200	Assuming 4 hours at $50 per hour		
Standards	A$200	Typical cost of a 2 part standard		
Testing costs (computers)	A$500 – A$1,000 Average A$750	Typical cost of test at NATA accredited lab. In house test reports are acceptable for product registration so this is not necessarily a cost for each model for every supplier.		
Net sample cost	A$500	Testing is non-destructive, so the computer can be sold if compliant.		
Total cost	A$1,850	Divide by sales of model.		
Sales volume	200	1,000	5,000	10,000
Cost per sale	$9.25	$!.85	$0.37	$0.19

Monitor – costs as above with $800 test cost.	A$800	Typical cost of test at NATA accredited lab. In house test reports are acceptable for product registration.		
Total cost	A$1,900	Divide by sales of model.		
Sales volume	200	1,000	5,000	10,000
Cost per sale	$9.50	$1.90	$0.38	$0.19

Appendix E

Overseas Policies, Programs and Measures

As summarised in this section, many countries, accounting for the majority of the world's population, have introduced programs to address market failure in reducing or limiting the energy consumption of computers and computer monitors. Whilst these are mostly voluntary in nature, additional directives by some governments require that their agencies purchase compliant computers and computer monitors.

A number of governments and organisations are interceding to address market failures in the energy performance of computers and computer monitors. Significant worldwide activities are in place to analyse current and achievable power and energy performance, particularly in the European Union, the USA, the UK, Japan, China and Korea.

From the following summary tables it is evident that there are a number of various measures. Among the international measures, the US ENERGY STAR® program is the most tested and practiced specification and is proposed as the best available model for standards and specifications in Australia and New Zealand.

Comparison of computer and computer monitor programs

Other programs exist around the world but they are often based upon ENERGY STAR® or parts thereof.

Table 69 : Computers - Summary of Programs and Initiatives

Country	Program	Date	Type	Notes
European Union	Eco-label – the Flower	2005	Voluntary	PCs and notebooks – sleep 5W, Off 2W
EU	ENERGY STAR®	July 2009	Voluntary	Replica of US ENERGY STAR® 5.0
Global	TCO Label	2005	Voluntary	PCs – sleep 5W, off 2W Notebooks – sleep 4W, off 2W
The five Nordic countries	Nordic Eco-labelling. The swan	2005	Voluntary	PCs and notebooks – sleep 5W, Off 2W
Germany	Blue Angel	2006	Voluntary	PCs On (ACPI S3) 4.5W Off 2.5 – 3.5W depending upon wake up. Notebooks On (ACPI S3) 3.5W Off 2W
6 EU countries	Group for energy efficient appliances	2006	Voluntary	PC, notebook, desktop computers Sleep 5W Off 2W Idle 70W
China	CECP	2003	Voluntary	Sleep 10W, off 3W. Time to sleep = 30 minutes
Korea	KEMCO	2003	Voluntary	Default sleep time and maximum power [36]
Korea	KEMCO	2005-7	Voluntary	Energy Boy label if <1W sleep. External power supplies 0.5 – 0.75W
Korea	KEMCO	2009	Mandatory	External power supplies – ENERGY STAR® tier 1
Korea	KEMCO	2010	Mandatory	1 W warning or compliance label
Australia	Energy Allstars	2005	Voluntary	Notebook, desktop computers and workstations Sleep 1 5W Integrated computers Sleep 1 7W Desktops and workstations Sleep 2 2W Notebooks Sleep 2 0.5 (AS/NZS4665) Integrated computers Sleep 2 3W
USA	Executive Order 13221/FEMP	2001	Recommended for Federal purchases	Standby/off only. Desktop ≤ 2W, Integrated computer ≤ 3W, Notebook ≤ 1W, Workstation ≤ 2W
USA	Energy Policy Act 2005	Sept. 2005	Requires federal agencies to buy either ENERGY STAR® products or products designated as energy efficient by the Federal Energy Management Program (FEMP).	
USA	Executive Order13423/FEMP	2007	Requires federal agencies to activate ENERGY STAR® 'sleep' features on computers and computer monitors and mandates that federal agencies buy EPEAT registered (ENERGY STAR®) products.	
Japan	Top Runner	2007	The Top Runner program aims to raise energy performance of future	

[36] Link to The Collaborative Labeling & Appliance Standards Program (CLASP) website

			products above that of the most energy efficient product in the current market. 2007 targets have been set for a range of computer classifications and performance is measured by the average of standby and idle power per million calculations. Compliance is measured weighted average efficiency of shipments in each classification. I.e. a manufacturer can supply compliant and non compliant product as long as the weighted average meets the target for the classification. Top Runner also includes specifications for hard disk drives.

Table 70 : Computer monitors - Summary of Programs and Initiatives

Country	Program	Date	Type	Off	Sleep	Active
USA and EU	ENERGY STAR® V5.0 for displays up to 30 inches	2009	Voluntary	1W	2W	Metric based on area and resolution for displays ≤ 30 inches
USA and EU	ENERGY STAR® V5.0 for displays between 30 and 60 inches	2010	Voluntary	1W	2W	Metric based on screen area for displays > 30 inches and < 60 inches
USA	ENERGY STAR®	2005	Voluntary	2W	4W	30 + (38 x MP) W
USA	ENERGY STAR®	2006	Voluntary	1W	2W	If Megapixels (MP) < 1, then 23W If MP ≥ 1, then 28 x MP
EU	ENERGY STAR®	2007	Voluntary	1W	2W	
Global	TCO Label	2006	Voluntary	1W	2W	
EU	Eco label the Flower	2005	Voluntary	1W	2W	
Germany	Blue Angel	2006	Voluntary	1W	2W	
6 EU countries	Group for energy efficient appliances	2006	Voluntary	1W	2W or 2.3W with USB	
Australia	Energy Allstars	2005	Voluntary	1W	2W	
China	CECP	2003	Voluntary	2W	4W	NA Default sleep time = 15 minutes
Korea	KEMCO	2004	Voluntary	2W	4W	NA
USA	Executive Order 13221/FEMP	2001	Recommended for Federal purchases	1W	NA	NA
USA	Energy Policy Act 2005	2005	Requires federal agencies to buy either ENERGY STAR® products or products designated as energy efficient by the Federal Energy Management Program (FEMP).			
USA	Executive Order13423/FEMP	2007	Requires federal agencies to activate ENERGY STAR® 'sleep' features on computers and computer monitors and mandates that federal agencies buy EPEAT registered (ENERGY STAR®) products.			

Other broader environmental programs exist, such as the Climate Savers Computing Initiative and Electronic Product Environmental Assessment Tool (EPEAT), which include compliance with prevailing ENERGY STAR® computer specifications as a minimum.

Appendix F

Forecasts of Computer and Computer Monitor Stock

Introduction

This Appendix describes the assumptions, estimates, data sources and methodology for stock estimates.

A simple model was developed using data from a "desktop" survey for the presentation of "order of magnitude" results at the Australian Information Industry Association (AIIA) Sustainable Futures Forum in Melbourne in October 2007. This original data was based upon two scenarios - high growth and conservative market growth. Subsequently, the model has been refined to estimate product quantities by category or size.

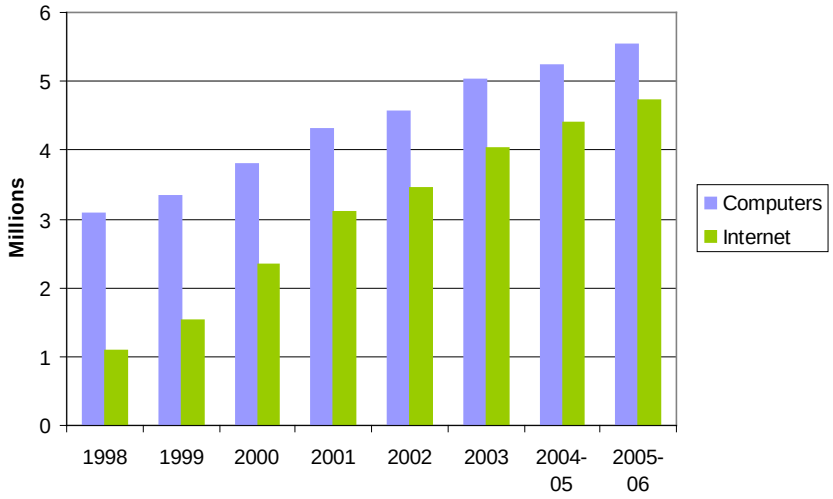
- Growth/decline of product stock, lifetime of products for the quantity of replacement products and incremental cost of MEPS compliant products.
- Stock of each product (BAU and MEPS) in the residential and office sectors, split by jurisdiction i.e. state, territory and New Zealand to 2020 then declining from 2020 as products are retired from service.

The key element in any energy analysis is to establish the base stock of products and agreement on forecasts of future stock levels, product mix and lifetime.

The base year for the initial review was 2006. This was based upon Australian Bureau of Statistics data for residential computer use and data for ICT use in business and compared to historical data from the International Telecommunications Union.

Australian Bureau of Statistics (ABS) data, as shown in Figure E1, indicated continued growth in household access to computers and the internet. This data only addresses households with computer access, not the total number of computers. That is, some households have more than one computer. ABS data for 2005 indicates there were some 6.45 million computers in Australian households.

Figure 7 : ABS[37] household data for computers and internet access - Australia



[37] ABS 8146.0 Household use of information technology 2006-07

First run estimates were made to forecast stock and product mix in the residential and office sectors to 2014 using the conservative and high growth scenarios, based upon historical ABS data and published sales data from IDC.

These forecasts were discussed with James McAdam, then General Manager - Strategy and Policy in the AIIA, who advised that the base estimate should be 24 million computers in Australia split into one third in the residential sector and the balance in the non-residential sector (office, government etc.). Subsequently, via stakeholder forums, meetings and other communications, the stock forecast and product mix has been set as per the following chart which in product volume is relatively similar to the initial conservative scenario, but extended to 2020. Principal input to this came from Josh Millen (AIIA) in December 2008, particularly with respect to forecast product mix and later verbal agreement from Sean Casey (Intel) in May 2009 that the forecasts were in close agreement to the Intel forecasts. A key point in the following charts is increasing use of notebooks (NB) and netbooks at the expense of desktop (DT) computers. Even more profound is the dominance of LCD computer monitor technology over CRT computer monitors in virtually all but a few specialised applications, such as the medical sector.

Figure 8 : Australian computer stock forecast - millions

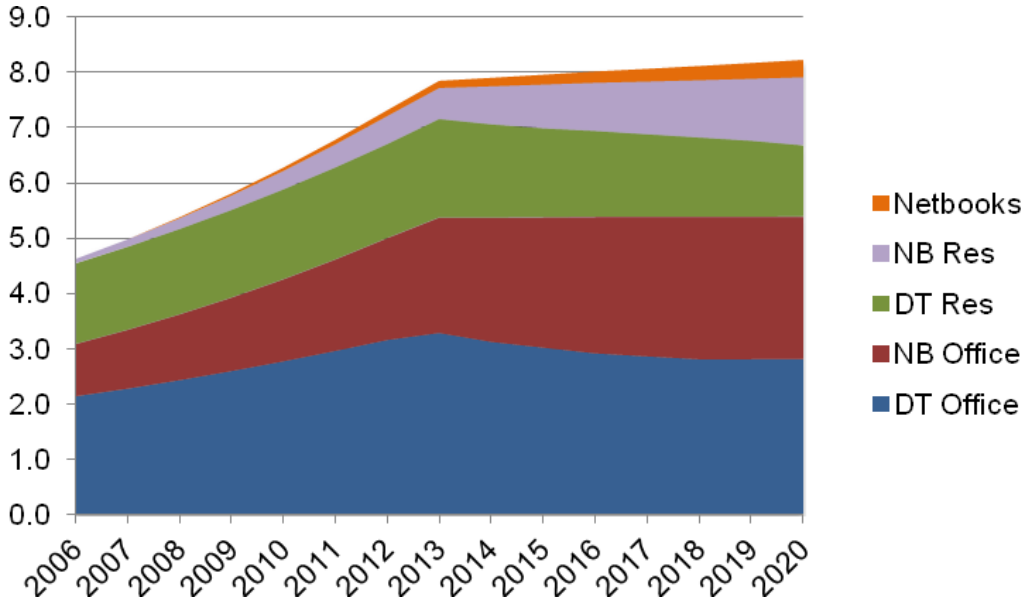
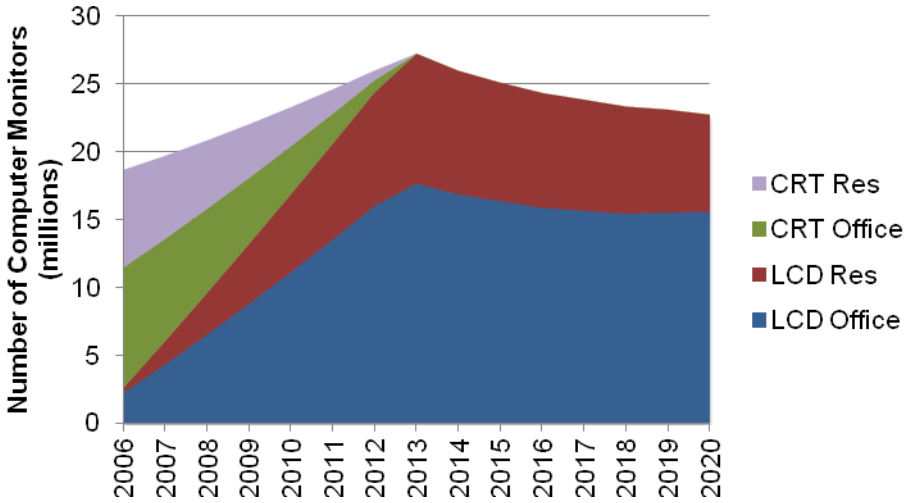


Figure 9 : Australian computer monitor stock forecast - millions



Data from Statistics New Zealand[38] is limited to 2001 and 2006, however the 2006 penetration is similar to Australia as shown in Table E1 and, as such, New Zealand product stock is in proportion to the Australian stock and mix.

Table 71 : Household computer and internet penetration, Australia and New Zealand

Country	Internet 2001	Computers 2001	Internet 2006	Computers 2006
New Zealand	37%	45%	64.5%	71.6%
Australia	31%	51%	59%	68%

Distribution of products by jurisdiction

To model energy, emissions, costs and benefits it is necessary to estimate the distribution of products by jurisdiction. As data on ICT use by jurisdiction is not available, the model breaks down the total estimated stock by product mix based upon the households in each jurisdiction. It is also assumes that the ratio of residential to non-residential usage is the same for all jurisdictions.

[38] http://www.stats.govt.nz/NR/rdonlyres/BA872497-4B85-4386-8395-3ACBEBDA7C4A/0/householduseofict2006hotp.pdf

Australian Submission Response Table

Submission Ref #	Submission summary	Response
AIIA R1	Adapt Industry proposed 75 percentile V5 TEC targets or relaxed limits based on Australian shipping system population (ENERGY STAR® V5 and Non- ENERGY STAR® V5 measured data based on sell-in shipments).	Modelling in the Consultation RIS has used the TEC limits as set out in E*V5.0. No data has been made available on Australian shipping system population so the impact on energy consumption cannot be assessed. In the absence of any data TEC limits as set out in E*V5.0 will be used.
AIIA R2	Consider provision for additional adders that are not part of ENERGY STAR® V5 (TV Tuner; Discrete Audio). These components, when part of system configuration, have a significant impact on the annualised energy TEC contribution, currently not accounted for in system base TEC requirements	Adders for components such as TV Tuners and Discrete Audio have not been determined in either E* or ECMA/IEC specifications at this stage and to add them to our MEPS standard would not be harmonising with international standards. However, adders for such components may be considered when accepted as part of international standards. Testing for MEPS should be carried out with such components disabled.
AIIA R3	To increase and improve efficiency in the entire market, ensure all Computers have an internal power supply (IPS) that is at the very least compliant to IPS 80Plus © Bronze efficiency; or, EPS Performance mark IV as per AS/NZS4665.2; and system Power Management compliance.	These are minimum specifications for power supplies (internal and external) as set out in E*V5.0 which will be used to establish MEPS levels for all computers, desktop and notebook, imported into Australian and New Zealand. AS/NZS is to be prepared for IPS.
AIIA R4	Industry proposes that MEPS for Computers adapt *Ecma-383/IEC-62623* Discrete Graphics methodology and following Industry proposed allowances (Simply relying on ENERGY STAR® V5 category/ discrete graphics methodology for new AUS/NZ MEPS program intending to cover all PC market segments, will result in excluding a large numbers of systems from the market unless certain exemptions can be made for products with those capabilities. Accordingly, adjustments to the framework are needed to ensure that the	Where ever possible E3 seeks to harmonise specifications with internationally accepted or endorsed specifications. For computer and computer monitors the accepted specifications are US and EU based it is therefore agreed that for Tier 1 of MEPS for computers *Ecma-383/IEC-62623* Discrete Graphics methodology will be used wherever possible to determine the allowances (adders) for discrete graphics. The allowances will be determined, in consultation with industry, in the standards development process and set out in Part 2 of the AS/NZS.

	regulation can be inclusive of energy efficient discrete graphics products).	
AIIA R5	The industry proposes that the Australian/New Zealand Computer Standard development is harmonised with existing IEC standards.	The Consultation RIS already addresses the issue of harmonising standards and it is proposed that Australia seek representation on the relevant IEC standards development committee. In Part 1 of the Interim standard testing and definitions will be based on IEC 62623.
AIIA R5A	The ENERGY STAR® Framework (testing procedures and TEC framework which supports both ENERGYSTAR V5.0/V5.2 specification and scales to the future V6.0 specification).	A recommendations of the Consultation RIS was to commit to considering further rounds of MEPS that takes into consideration changes to the E* Framework with the introduction of future E* specifications (E*V6.0).
AIIA R5B	Ecma-383/IEC-62623 Standard with global applicability (Example: ErP Lot 3, ENERGY STAR® V5.0/V5.2, China PC EE Standard, AUS/NZ MEPS, Future ENERGY STAR® V6, etc).	Australia is actively involved and supports moves to global standards. Proposal is to have Standards Australia publish an interim standard, a standard that would be acceptable for the introduction of viable regulations. Australian Standard can call up acceptable (IEC) standard after the interim period.
AIIA R6	That the Government meet Equipment Energy Efficiency (E3) Committee stated goals in the RIS: 'Australian and New Zealand standards adopt the definitions and terminology of the US and European ENERGY STAR® program to provide for internationally harmonised specifications...'.	The Australia Standard proposed for computers and computer monitors is based on the current E*V5.0 specifications. Any deviation from the definitions and terminology used in E* is purely to localise the language used and local terminology.
AIIA R7	Relax Internal Power Supply (IPS) Efficiency requirement from 80Plus© Gold (87, 90, 87) to 80Plus© Silver (85, 88, 85). Industry agrees with *deemed-to-comply* notebooks external power supply requirements (compliant with performance mark V as per AS/NZS4665).	E*V5.0 specification has 80Plus© Bronze (82, 85, 82) has the minimum standard for IPS. The deemed-to-comply provision is intended for short run or specialist computers however, the use a higher efficiency IPS goes some way to ensuring that energy efficiency gains are still available to the consumer. The use of 80Plus© Silver as opposed to 80Plus©Gold will not impact greatly on the intent of the deemed-to-comply provision and provides some small benefit to suppliers. Computers in this category are estimated to be less than 3% of the market.
AIIA R8	Exempt high-end systems within CAT D Desktop and CAT C Notebooks systems from the regulation, based on Industry proposed exempt definition.	Industry estimates are that CAT D Desktops and CAT C Notebooks account for <3% of the market for computers. Consideration will be given to including this class of computer in the deemed-to-comply provisions whereby the computer must have a high efficient power supply. In the case where the high end computer is based on a lower category computer e.g.

		optioned or configures for purpose, MEPS should apply to the base computer.
AIIA R9	Systems shipped with FreeDOS or Linux should be exempt from AUS/NZ MEPS requirement (see Annex 3 for details).	No data is available on the number of computers shipped with FreeDOS or Linux. E*5.0, on which the AS/NZS is based, does not list installed operating systems for testing. Systems intended for the commercial and government sector are the most likely to be shipped with FreeDos. With these sectors accounting for 66% of the estimated stock of computers in Australia exempting them would significantly impact on the estimated energy savings. FreeDOS and Linux are only likely to affect power management requirements. By default testing should be carried on computer with a standard operating system e.g. Windows or OSX (Apple).
AIIA R10	The development of MEPS specifications will need an additional 3-6 months to finalise the requirements relating to Spec limits, allowances, and other requirements.	MEPS levels and allowances will be set-out in the Part 2 relevant AS/NZS. The development of the standard is currently underway in consultation with industry. It is anticipated that an interim standard will be ready for publication prior to the proposed introduction of MEPS on 30 June 2011.
AIIA R11	Enforcement of Computers and Computer Monitors MEPS comes into place 18 months after the regulations are in place. (Note: Effective date for product compliance is based on manufacturing date of the product).	The recommendation in the consultation RIS was for MEPS to be implemented not earlier than 30 June 2011. This recommendation was based on the use of E*V5.0 as the test specification, a specification that had been in place since July 2009 and one that the industry had suggested should be used. Having consideration for the use of ECMA/IEC proposed Discrete Graphics methodology enforcement of MEPS should be deferred to 1April 2012 to allow industry time to implement changes to their testing regimes.
AIIA R12	12 months of exemption after effective date, for product models already placed on the market prior to the regulation effective date.	NAEEEC 'Administrative Guidelines for the Appliance and Equipment Energy Efficiency Program of Mandatory Labelling and Minimum Energy Performance Standards' Para 3.2.2 states: 'Where a product is not regulated for energy efficiency prior to the implementation of MEPS for the first time, products that were manufactured in Australia or imported before the MEPS implementation date may be sold without the need for any registration'.
AIIA R13	Regulations should rely on manufacturer data and not require independent testing and / or registration – (a) If registration is required, register by Test Report submission only. (b) Registration to allow 30 days lead time after	The established registration process allows suppliers/manufacturers to register product using in-house test report provided tests are conducted using the relevant standard. Regulators will require the normal registration process to be followed. Paragraph 4.1 of the 'Administrative Guidelines states: All products that are subject to the relevant legislative requirements

	product is introduced into market and not registration based on pre-introduction.	described in these Guidelines must be registered before being offered for sale.
AIIA R14 (monitors)	Adapt Industry proposed 75 percentile V5 TEC targets or relaxed limits based on Australian shipping system population (ENERGY STAR® V5 and Non- ENERGY STAR® V5 measured data based on sell-in shipments).	Modelling in the Consultation RIS used E*V5.0 specification for testing of monitors. No data has been made available on Australian shipping system population so the impact on energy consumption cannot be assessed. In the absence of any data TEC limits as set out in E*V5.0 will be used.
AIIA R15 (monitors)	In addition to recommendations 10, 11, 12, 13, an exemption should be provided that allows higher performance displays described above and in Annex 1 to be exempt from the regulation.	No information is provided on the number of higher performance displays likely to be available on the market. Normal exceptions will apply for equipment used for medical or similar purposes and exceptions can be applied for under the normal registration process.
AIIA R16	AIIA recommends that Australia should recognise the value of self-declaration and eliminate the need for local import registration.	Paragraph 4.1 of the 'Administrative Guidelines for the Appliance and Equipment Energy Efficiency Program of Mandatory Labelling and Minimum Energy Performance Standards' states: All products that are subject to the relevant legislative requirements described in these Guidelines must be registered before being offered for sale.
Apple	Market Restriction: The MEPS proposal sets energy efficiency limits based on the existing voluntary ENERGY STAR® V5.0 program TEC requirements. Making these limits mandatory for computers will prevent a significant number of mainstream configuration PCs from being sold in Australia.	Modelling in the Consultation RIS has used the TEC limits as set out in E*V5.0. Testing for E*V5.0 and the earlier E*V4.0 (introduced in July 2007) are identical the difference being application of the TEC levels based on test results in E*V5.0. With a standard, albeit voluntary, in place for over 3 years it is reasonable to assume the majority of computers available on the market would meet this standard.
Apple	Product Labelling: Apple does not support the application of a physical label to the product or packaging.	It has already been accepted and conveyed to industry that there will be no labels on computers. Labels on monitor's remains an option and any consideration on the introduction of a labelling scheme will be deferred until April 2015.
Apple	Monitor Limits: Apple supports an exemption for performance displays. Higher quality display panels (e.g. IPS and VA) with wide viewing angles and high colour accuracy require more backlighting than standard display panels (e.g.	Currently ENERGY STAR® and the IEC are working with industry to develop energy performance standards for displays that include computer monitors. The review should also consider the outcome of these negotiations and the possible move to a harmonised global standard for displays and TVs. Any decision on exemptions will be considered following the outcome of

	TN) I f these displays are not exempted, then limits aligned with the requirements of ErP Lot 3 on mode power limits for high end monitors with IPS and VA displays should be specified. Automatic brightness control test methods should also be included in the test criteria.	international effort on an agreed standard for monitors.
Apple	Registration/Declaration of Conformance: Whilst Apple understands that products already meeting and registered to ENERGY STAR® V5.0 in the United States, would be deemed-to-comply in Australia and would not require further testing, it is unclear as to how those products would be acknowledged in Australia. Apple would recommend the following process; Manufacturers register the company and product on an Australian energy website with a link to the manufacturer's external Declaration of Conformity web page (similar to EU); Manufacturers maintain their own technical file package with test reports form certified bodies; Australian regulators would be free to audit manufacturer's technical file packages on a spot check basis; Australian regulators would be free to perform market surveillance testing on a limited number of models to be paid for by the manufacturer; This process is in place in Europe and works well.	The 'Administrative Guidelines for the Appliance and Equipment Energy Efficiency Program of Mandatory Labelling and Minimum Energy Performance Standards' sets out the requirements for registering products in Australia and New Zealand. All regulated product sold in Australia have to be registered. The use of test reports using ENERGY STAR® V5.0 would be acceptable for registration purposes. The established registration process allows suppliers/manufacturers to register product using in-house test report provided tests are conducted using the relevant standard. Regulators will require the normal registration process to be followed. The check testing process is set out in Attachment 6 of the Administrative Guidelines. Any changes to the normal registration process will be subject to negotiations with the regulators.
Apple	Registration Timing: A short grace period would be incorporated in the process to allow for registration of new products shortly after their introduction date. This would avoid issues associated with confidentiality around a new product launch.	The 'Administrative Guidelines for the Appliance and Equipment Energy Efficiency Program of Mandatory Labelling and Minimum Energy Performance Standards' sets out the requirements for registering products in Australia and New Zealand. Any changes to the normal registration process will be subject to negotiations with the regulators. The issue with confidentiality around a new product launch will be raised with the regulators.

Apple	Introduction Date: Apple does not believe that an introduction date of 30 June 2011 allows sufficient time for compliance.	The introduction of MEPS is contingent on any required legislation calling up the relevant AS/NZS. Development of the standard is progressing with the aim to have an interim standard ready for 30 June 2011. The standard is based on E*specification that have been in place since July 2007 and is well understood by industry however, with the likely introduction of ECMA/IEC Discrete Graphics methodology a further period of time will be considered for companies to make changes to their testing regimes.
CESA	REGISTRATION DELAY PROBLEMS: Currently, there are unacceptable delays encountered by suppliers registering products for energy efficiency. Delays of two months are common. This will become worse should computers and computer monitors require registration unless steps are taken immediately to improve registration facilities to speed up processing. Unlike whitegoods, computer designers change features regularly. It is imperative that new designs reach markets quickly for suppliers to gain a marketing edge on competitors. Time from software development to production to delivery to market is a few months, unlike changes in hardware or power supplies which take significantly longer. Computer suppliers simply cannot wait two months to have registrations approved before the product can be released to the market. We have raised this issue many times with the Department but there has been no improvement in the time taken to register products. We could not support a registration requirement for these products unless registration times are significantly reduced. Regulators should appoint third party bodies to accept registrations, similar to that used in the electrical safety regime.	The 'Administrative Guidelines for the Appliance and Equipment Energy Efficiency Program of Mandatory Labelling and Minimum Energy Performance Standards' sets out the requirements for registering products in Australia and New Zealand. CESA has raised this issue with the regulators on a number of occasions. It is an issue for the regulators to resolves such problems with the registration process. A working group will be established to address the registration and regulation issues before the regulations commence

CESA	COMPUTERS MONITOR ENERGY LABELLING: It has been suggested that computer monitors should carry an energy label and that the process would be similar to that used to label television sets. There are however major differences between the supply of computer monitors and television sets. Firstly, television receivers destined for Australia have to be configured for the Australian television broadcast system, which is different to most markets. This means that during production, the manufacturer knows which units/models are for Australia so that energy labels can be attached prior to packaging. However computer monitors are designed for Global application. They contain multi-voltage power supplies and are regularly packaged with a variety of power cords or plug adaptors to suit the mains outlets in a variety of countries. After packaging, they are warehoused and may be drawn down by a variety of markets according to demand at the time. During production, the manufacturer cannot be sure where the individual products will be sold. The vast majority will usually not be destined for Australia. Attaching an Australian energy label would not be economical and would be confusing for other markets. Secondly, unlike television sets, the vast majority of computer monitors are sold without being displayed for sale in retail outlets. It makes no sense to insist that all computer monitors be labelled when the vast majority will not be seen at retail level.	Monitors, unlike TVs, are globally traded goods and are not necessarily manufactured or configured specifically for the Australian/New Zealand market. According to manufacturers the application of an Australian only energy label at the point of manufacture may be problematic. However, with the test method for computer monitors becoming more aligned with that used for TVs it is proposed that the use of performance labels, similar to those used for TVs, be reviewed in April 2015. Currently ENERGY STAR® and the IEC are working with industry to develop energy performance standards for displays that include computer monitors. The review should also consider the outcome of these negotiations and the possible move to a harmonised global standard for displays and TVs.
CESA	INTRODUCTION OF REGULATIONS AND GRANDFATHERING: Whilst CESA agrees with the AIIA recommendation R11, that the MEPS	NAEEEC 'Administrative Guidelines for the Appliance and Equipment Energy Efficiency Program of Mandatory Labelling and Minimum Energy Performance Standards' Para 3.2.2 states: 'Where a product is not regulated

	requirements are applied 18 months after the regulations are enacted (most probably 18 months after the publication of the standards), we believe that instead of recommendation R12, normal grandfathering provisions should apply to those products already within the country at the time the regulations are enacted. Specifically, the MEPS requirements do not apply to products already within Australia prior to the regulations being enacted.	for energy efficiency prior to the implementation of MEPS for the first time, products that were manufactured in Australia or imported before the MEPS implementation date may be sold without the need for any registration'.

New Zealand Submissions: (as prepared by EECA)

Consultation on computer and monitor MEPS and labelling proposal

November 2011

Submission received from New Zealand Computer Society (NZCS) and New Zealand Information and Communication Technologies Group (NZICT).

Summary of submission:

The NZCS and NZICT have sent in a joint submission, with the NZICT group members including HP and Dell. The NZCS and NZICT groups were concerned that they had not been consulted with at an earlier stage, and requested the consultation period be extended by 3 months. This would provide more opportunity for feedback from local assemblers.

They were confused about the labelling, and were unsure whether computers would have to be labelled as well as monitors. They recommend voluntary labelling with no mandatory requirements in 2012, and do not wish to have computer labelling for New Zealand computer assemblers.

They are concerned about unintended consequences of a MEPS for servers due to changes in technology, for example businesses may have to buy 3 servers that meet MEPS, instead of the latest version which has 3 'virtual' servers contained in 1 server.

They say some homes or offices will wish to buy high end gaming or graphical products that would not be available with the new standards due to high energy use.

In their view the cost of measuring energy performance in low run quantities would be prohibitive.

The group says they support sustainability in computing and reduction of energy usage, and note that local green initiatives such as efficient chips and virtualization have seen a drop in physical servers required in businesses. They would like to see increased consumer and manufacturer education around energy usage.

However the group are 'unconvinced that mandatory standards will have any material impact on energy usage, while at the same time imposing unnecessary cost onto the manufacturers of computers, especially New Zealand companies focusing on niche white box markets'.

For these reasons the group do not support the implementation of mandatory minimum energy performance standards for computers in New Zealand and would prefer EECA to maintain a voluntary approach to energy labelling only.

Response from EECA

EECA are willing to allow one month more consultation time. We would request in particular that the NZCS and NZICT group provide evidence of their views that the costs of compliance for white box suppliers are incorrect or prohibitive.

We are surprised that this is seen as a major cost. At the consultation meeting, a local assembler confirmed our understanding that it would cost about $25 for a compliant internal power supply, and that they were capable of in house testing to the standard. For white box suppliers, in house testing is not required for runs of less than 200 computers, but it would be required for larger runs. Independent testing or ENERGY STAR® certification in the US is not required and there is no cost to register a product in New Zealand.

We would like more information about the number and type of businesses that you say would be unreasonably affected by the proposed MEPS. EECA intended to cover most graphics requirements by adding extra graphics allowances (Ecma 383) to the ENERGY STAR® V5 requirements. Gaming machines with a hand held device instead of a keyboard are not covered by the MEPS.

EECA would like to clarify that there are no requirements for energy rating labelling of computers. It is proposed for monitors only. We note your request that energy rating labels on monitors should be remain voluntary and we will look into this further. We are willing to extend the timeframe to implement mandatory labelling for monitors. This could be delayed to about April 2013 in Australia and New Zealand.

EECA note the point about 3 in 1 servers and keeping up with new technologies, for this reason it is intended to reconsider the MEPS in a few years time to keep up with new technologies.

While we note that the NZCS and NZICT disagree, EECA are convinced that due the millions of computers and monitors sold, their high energy use, and the efficient technologies available, the net benefits of this proposal are significant.

Greenhouse gas emission factors

Projected marginal emissions-intensity of electricity supply by Jurisdiction 2006-2020

Emission Factors	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ACT	0.870	0.857	0.843	0.829	0.805	0.782	0.758	0.734	0.710	0.686	0.661	0.637	0.613	0.588
NSW	0.870	0.857	0.843	0.829	0.805	0.782	0.758	0.734	0.710	0.686	0.661	0.637	0.613	0.588
NT	0.740	0.740	0.739	0.739	0.737	0.736	0.734	0.732	0.731	0.727	0.722	0.718	0.714	0.710
QLD	0.903	0.885	0.868	0.850	0.833	0.817	0.800	0.783	0.767	0.749	0.730	0.712	0.694	0.676
SA	0.876	0.866	0.855	0.845	0.832	0.820	0.807	0.795	0.782	0.768	0.754	0.739	0.725	0.710
TAS	0.729	0.723	0.716	0.710	0.702	0.693	0.685	0.676	0.668	0.657	0.647	0.637	0.626	0.616
VIC	1.101	1.068	1.034	1.000	0.970	0.940	0.909	0.879	0.848	0.818	0.788	0.759	0.729	0.699
WA	0.754	0.746	0.737	0.729	0.718	0.708	0.698	0.688	0.677	0.665	0.653	0.641	0.629	0.617
NZ	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4

All values state-wide average kg CO_2-e per kWh delivered, taking into account transmission and distribution losses (combustion emissions only).

Appendix J

Projected tariffs cents per kWh

Aust. cents per kWh	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ACT	17.00	18.82	20.60	21.39	22.19	22.98	23.77	24.56	25.35	26.14	26.93	27.72	28.14	28.19
NSW	21.85	24.76	27.66	28.56	29.47	30.37	31.28	32.18	33.09	34.00	34.90	35.81	36.29	36.35
NT	21.22	22.71	23.93	24.62	25.30	25.99	26.67	27.35	28.04	28.72	29.41	30.09	30.47	30.54
QLD	21.59	23.57	25.49	26.56	27.63	28.70	29.77	30.84	31.91	32.97	34.04	35.11	35.71	35.82
SA	29.89	32.48	34.92	36.28	37.64	39.00	40.35	41.71	43.07	44.43	45.79	47.15	47.83	47.81
TAS	22.85	24.94	26.98	28.11	29.24	30.37	31.51	32.64	33.77	34.90	36.03	37.17	37.73	37.70
VIC	22.25	24.29	26.27	27.37	28.48	29.58	30.68	31.78	32.89	33.99	35.09	36.19	36.79	36.85
WA	21.87	23.59	25.12	25.97	26.83	27.68	28.54	29.39	30.25	31.10	31.96	32.81	33.34	33.53
New Zealand NZ cents per kWh														
Commercial	17.09	17.09	17.09	17.09	17.09	17.09	17.09	17.09	17.09	17.09	17.09	17.09	17.09	17.09
Residential	23.69	23.69	23.69	23.69	23.69	23.69	23.69	23.69	23.69	23.69	23.69	23.69	23.69	23.69

DECISION: Regulatory Impact Statement

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