Australian Business Council for Sustainable Energy

Submission to the National Framework for Energy Efficiency Discussion Paper

Towards a National Framework for Energy Efficiency – Issues and Challenges

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Executive Summary

Energy is central to the operation of the Australian economy and to the functioning of our homes and workplaces. How we generate it, use it, or conserve it, is critical to Australia's economic, social and environmental future. Energy efficiency should therefore rightly be a cornerstone of the energy policy of all governments.

The benefits and barriers to energy efficiency are well understood, they have been the subject of numerous reports and studies. This is a well trodden path that we do not need to go down again. The important challenge for government is to develop and implement a coherent set of policy responses that enable energy efficiency's potential to be realised and the benefits to the economy delivered.

If business is to cut the total cost of energy in a context where energy prices are unlikely to decline much further, and may increase, using less energy to do more is the key. For households, energy efficiency offers lower energy bills and improved quality of life. Energy efficiency also cuts energy costs for those who don't save energy[1], because by reducing demand, energy efficiency shifts the supply-demand balance, reducing average energy market prices for everyone.

Energy efficiency is also critical to avoiding power blackouts in hot weather. Energy-efficient buildings, appliances and equipment use less power in hot conditions, and reduce the load on the electricity supply infrastructure. This not only reduces the risk of loss of economic output, it also reduces the investment required to expand supply infrastructure.

The combustion of fossil fuel to produce electricity and meet the energy needs of our factories and homes is the largest source of greenhouse emissions. The more efficient use of energy is thus critical in significantly reducing greenhouse emissions to a level that prevents catastrophic global warming.

In the future , energy efficiency will offer increasing potential to generate extra jobs, exports and import replacements. And, by reducing the total cost of energy for business, it will enhance Australia's international competitiveness.

In the NFEE Discussion Paper, the energy savings potential identified is 50% of savings with better than an average 4-year simple payback. While these savings are substantial, the NFEE should be aiming to increase the savings potential and the proportion of it that is captured. So stretch goals that involve much larger savings should be proposed. And the emphasis of the Framework should be on driving innovation, capturing economies of scale and driving increased rates of adoption. In particular, strategies should aim to drive down costs through these paths.

The BCSE believes that government must establish a target for energy efficiency. The target could be stated in a number of different ways and in the Clean Energy Future study we believe that energy consumption growth should be limited to a minimum 25 per cent increase in 2040 compared to 2001. Given that electricity supply dominates greenhouse emissions a separate target needs to be established for electricity use.

The following five steps provide a holistic package that addresses the critical factors for delivery of effective energy efficiency improvement. Each of these elements is essential, and all are inter-connected. For example, building energy efficiency industry capacity is useless without creating demand for its services. Likewise imposing regulatory obligations without having the delivery infrastructure will lead to higher costs.

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[1] Allen Consulting Group – economic modelling for the Victorian Government in relation to the Five Star Energy Rating

1. **Introduce a broad based market price signal that can drive new investment**
   - Expansion of existing state based schemes to cover energy efficiency and extension of existing schemes to other states
   - In the longer term the implementation of a national emissions trading scheme

2. **Make energy markets work for customers**
   - Establishment of a Demand Side Management (DSM) or public benefits fund
   - Require electricity distributors to develop strategies and implement pricing approaches that encourage energy efficiency and implementation of greenhouse abatement activities;
   - Charge customers for the impact that they have on electricity system costs, specifically on a peak demand[2] basis.
   - Require distribution businesses to provide a series of standard offer rates that are available to energy efficiency, and other demand management options (including embedded generation). This would take the form of a negative congestion price that would be available for any activity that resulted in a reduction of power consumption. This creates a standard forward price, to which energy efficiency and DSM proponents would respond.

3. **Regulate for minimum energy performance in the built environment**
   - Extend and expand existing mandated minimum energy performance schemes for new residential buildings to commercial buildings
   - Mandated requirement for existing buildings to improve their performance and disclose energy performance on sale or lease
   - Government to provide funding to support cost effective energy efficiency in their own facilities and require all new leases to be minimum five star

4. **Drive a more energy efficient manufacturing industry**
   - Mandatory requirement for large energy users to undertake energy audits and report on performance, be required to undertake investment if meets minimum four year pay-back.
   - Development of cogeneration targets and incentives to support the assessment and implementation of cogeneration
   - Support the funding of feasibility studies for cogeneration and innovation in energy efficiency based on the SEAV Business Energy Innovation Initiative (BEII) model.
   - Re-institute funding support for the successful Energy Efficiency Best Practice Program that worked on an industry basis to improve energy efficiency.

5. **Develop the emerging energy services industry**
   - Build the capacity and capability to deliver cost effective and sustainable energy efficiency services and products to customers
   - Establishment of an energy services industry action agenda as a strategic long term plan for industry and government to work together to the deliver the potential of energy efficiency
   - Provide strategic funding for RDD&C for energy efficiency and sustainable energy solutions

[2] In the Charles River Associates report for Integral Energy it was found that customers without air conditioners were subsidising customers with them to the tune of $80 to $100 million per annum. The cost to add network related to peak demand was found to be $91 per kW per annum (page 26 of the report). The contribution of customers with air conditioners was about $1 per annum.

Introduction and Background

The Australian Business Council for Sustainable Energy (BCSE) welcomes the opportunity to make this submission on the National Framework for Energy Efficiency (NFEE) Discussion Paper released in November 2003. We have made a considered submission that benefits from ongoing BCSE engagement with the Australian sustainable energy industry in addition to leading research and analysis in this field.

The development of the sustainable energy industry is critical to being able to deliver on the great potential that exists in energy efficiency and Australia. Provided with the correct policy framework, the sustainable energy industry is poised to meet customers' energy needs in a manner that reduces greenhouse emissions while simultaneously increasing economic activity, jobs and investment.

For the purposes of this submission we have defined energy efficiency as any activity or measure undertaken on the customer side of the connection point that results in (i) a reduction in energy consumption at the connection point or (ii) a reduction in the use of primary fossil fuel based energy. This will include measures that result in the use of less energy to perform a given task, but will also include embedded generation and solar water heating which result in a reduction in primary fossil fuel energy use. It also includes fuel switching from electricity to gas. As an example the National Electricity Market (and regulators) focus is on the energy consumed at a customers connection point they do not distinguish between nor address what the customer does on the other side of the connection point.

Further in the case of solar energy we believe that it is meaningless to distinguish between a passively designed solar house that reduces the heating and cooling load to one where solar energy is used to heat water or where solar energy is used to generate electricity. All these approaches result in (i) a reduction in power consumption at the connection point and (ii) a reduction in primary energy and can thus be seen to be energy efficiency measures. Solar water heating and solar photovoltaics (PV) also happen to be categorised as renewable energy products. BCSE members that design and install renewable energy systems for customers that are not connected to the grid understand all too well this interdependence and the importance of reducing power consumption before sizing the renewable power system.

This submission comprises the following elements:

1. **Five steps to deliver an energy efficient future**

   This sets out a coordinated five step plan to realise the potential of energy efficiency including:
   - Introducing broad based market price signals
   - Making energy markets work for customers (actions targeting energy suppliers)
   - Regulations and mandated performance measures targeting the built environment (residential and commercial buildings)
   - Regulatory and fiscal measures targeting energy consumption in manufacturing
   - Developing the energy efficiency industry

2. **Addressing the questions and issues raised in the Discussion Paper**

   We address the specific questions and issues raised in the Discussion Paper released in November 2003.

3. **Case Studies and Examples**

   We provide a series of case studies and examples that illustrate energy efficiency's potential

4. Attachments:

4.1. Meeting peak power demand (extract from EcoGeneration magazine
4.2. BCSE Discussion Paper – "Driving Energy Efficiency" – released in November 2003
4.3. "A Clean Energy Future for Australia", released in March 2004 – Sets out a plan for cutting greenhouse gas emissions and providing reliable energy supply

About the BCSE

The Australian Business Council for Sustainable Energy (BCSE) is the peak industry association and leading advocate representing the sustainable energy industry in Australia. The BCSE was formed in September 2002 through the merger of the Australian EcoGeneration Association (AEA) and the Sustainable Energy Industry Association (SEIA). The BCSE represents the broader sustainable energy industry covering renewables, waste-to-energy and gas-fired generation as well as energy efficiency.

The BCSE has more than 250 organisations as members ranging from installers and designers of renewable energy systems to large project developers and equipment manufacturers and including both energy retailers and energy service providers.

In the future, energy efficiency will offer increasing potential to generate extra jobs, exports and import replacements. And, by reducing the total cost of energy for business, it will enhance Australia's international competitiveness.

1. Five steps to deliver an energy efficient future

We have developed a policy framework that involves government taking five steps that we believe are necessary to address the critical factors for delivery of effective energy efficiency improvement.

The BCSE believes that it is essential that government establish a target for energy efficiency. In the Clean Energy Future study we believe that energy consumption growth be limited to a minimum 25 per cent increase in 2040 compared to 2001. The target could however be stated in a number of different ways ranging from (i) limiting growth in energy consumption to say half the expected "business as usual" growth rate, (ii) a fixed PJ/a energy consumption rate or (iii) energy consumption per unit of GDP or value added. Given that electricity supply dominates greenhouse emissions a separate target needs to be established for electricity use. Further interim targets need to be established in a manner that can be effectively measured.

The following five steps provide a holistic package with each element essential, and all are inter-connected.

1.1 Implementing a broad based market price signal

Experience with schemes such as MRET has shown that there is substantial potential for a trading scheme linked to a compliance obligation to drive least cost action within a field. The NSW Government has already introduced its Greenhouse Benchmarks Scheme. This provides a framework for energy efficiency, along with other emission abatement options, to reduce greenhouse gas emissions via a trading scheme based on NGACS – NSW Greenhouse Abatement Certificates. This can be seen as a courageous step as it is the first time that such an approach has been tried. Although this scheme has had some teething problems, partly due to the cautious approach being taken in the early days of scheme, it shows potential to play a major role in driving implementation of significant energy savings.

It is widely accepted and supported by the BCSE that a broad based emissions trading scheme should be implemented over time – however the Australian Government does not believe that the conditions are right for this to happen at present. As a result a scheme that extends and expands the NSW scheme would have merit.

The BCSE strongly supports development of a national version of a trading scheme that incorporates energy efficiency (including cogeneration). This will ensure that a greenhouse emissions cost is factored into the investment and purchasing decisions of electricity suppliers and customers. Significant investments will be required to meet Australia's growing energy needs. It is thus imperative that an emissions cost be incorporated into future investment decisions. Only in this way will we reduce the risk of building high emission assets that will become stranded over the medium term as greenhouse emission obligations start to bite.

The Allen Consulting Group prepared a report for the Council of Australian Government (CoAG) Energy Market Review on the cost effectiveness of introducing greenhouse intensity benchmarks to deliver the greenhouse abatement required to meet the 108 per cent target.

The report showed that emissions trading was marginally more cost-effective on an "impact on GDP" basis compared to an emission intensity scheme. Importantly however it showed that an emission intensity scheme (such as the NSW Benchmarks scheme) would not have

a material impact on electricity prices as opposed to emissions trading which would significantly increase prices.

The key modelling results are summarised in Table 1.

Table 1. Comparison of Emission schemes - relative to the Base Case which does not include current policy measures

	GDP (per cent change 2003-2012)	Electricity Price (per cent change in 2010)	Cost of abatement (Marginal cost/tonne in 2010)
Current Policy Mix (MRET, NGAC, GGAP etc)	-0.15	3.4	N/a
Emission Intensity Requirement	-0.04	0.1	$8.90
Emissions Trading (permits auctioned)	-0.01	5.2	$6.40

Source: page 5 of the Allens Emission Intensity Report

In developing an appropriate scheme, it is also important to develop mechanisms that bring the lifecycle benefits of energy efficiency forward to the point of decision making, and make them accessible to the decision maker to help overcome the split incentive problem. For example, deeming of savings, or firm guarantees of a period of savings that are 'bankable' are such options. These approaches were first adopted as part of MRET for smaller renewable energy systems such as solar water heaters (SWH) and PV. This has worked extremely well for SWH, which is subject to 10 years deeming ie. 10 years of output can be brought forward and claimed on the initial sale of the system. The PV deeming provisions did not work as well which enabled five years of output to be claimed at a time. The MRET review has recommended that these be improved with 15 years of output being claimed at the outset.

Broad based measures will not however be that effective in delivering energy efficiency in the residential and commercial sectors due to the diffuse nature of the activities and the relative low proportion that energy costs bear to total costs. For these sectors mandated minimum energy performance standards should be introduced which compliment existing standards.

1.2 Making energy markets work for customers (action targeting energy suppliers)

The energy supply industry plays a critical role in shaping the future of energy efficiency. Under the present market frameworks, participants in this industry have shown limited interest in pursuit of energy efficiency, either through working with customers, or through supporting development of an energy efficiency services industry.

Within a market framework, energy suppliers will only act on an issue if one or more of the following criteria is met:

- it is clearly in their short term financial and long term strategic interests
- regulators require it and are prepared to actively enforce compliance

At present, energy efficiency rates poorly on both these criteria. The NSW Government has introduced its Greenhouse Benchmarks Scheme that creates a compliance obligation and trading mechanisms that potentially creates an incentive for electricity retailers to invest in energy efficiency measures.

The Independent Pricing and Regulatory Tribunal (IPART) in its Inquiry into Demand Side Management recommended the introduction of a demand management fund. The benefits and potential of DSM are well understood – as an example in the United States more than 20 states have introduced a public benefit fund. Under these schemes a small levy is placed on electricity customers to fund energy efficiency and DSM programs.

With regard to the benefits of energy efficiency for the energy supply sector, present arrangements fail for several reasons:

- investments in energy efficiency cannot readily be included in energy distributors' asset bases, so they cannot generate revenue from consumers from this expenditure (beyond bilateral arrangements they may make with individual customers). In contrast, augmentation of the network increases the base for future regulated revenues.
- since a large proportion of the costs of energy suppliers are sunk capital costs, at almost all decision times there is more profit to be made (at least in the current regulatory period) from increasing sales than from reducing sales (and thus reducing costs)
- while energy efficiency may help to reduce peak demand, many energy efficiency measures also reduce demand at other times, reducing revenue at times when supply costs are low – this is good for customers and the environment, but not attractive to electricity suppliers
- encouraging customers to buy energy consuming equipment, even air conditioners that add to peak demand, means the electricity supply industry can increase its revenue base, while also growing sales at other times when supply costs are low but prices are relatively high. For example, while reverse cycle air conditioners increase summer peak, in most parts of Australia they increase winter electricity usage, often at the expense of gas sales.

Apart from some attempts by IPART in NSW, regulators have failed both to introduce effective mechanisms to require delivery of energy efficiency improvement and to effectively enforce mechanisms to facilitate demand side management.

There is no single 'silver bullet' to solve this. Regulators must be given Terms of Reference and reporting requirements that require them to ensure that the electricity supply industry delivers on energy efficiency and demand side management. Energy distributors and retailers must face compliance requirements and be offered incentives to exceed these requirements. Much improved data must be collected and made publicly available so that emerging 'hot spots' in networks can be identified early. Standing offers for these areas can be an effective means to support alternatives to network investment.

Electricity customers need to be provided with the appropriate price signals in order to make informed and appropriate choices about consumption and supply options. Distorted price signals facilitate unchecked growth in investment in electricity supply infrastructure and increasing use of emission intensive energy. In addition, failure to provide customers with the appropriate price signals disadvantages energy efficiency and renewable energy options. These options would be cost effective from an electricity industry perspective as well as from a societal perspective that values externalities.

Specifically:

- End use customers do not receive price signals for their use of power at peak times. The result is an explosion in air conditioner uptake with customers paying less than 5% of the true cost of supplying power. Concurrently, a customer has little incentive to undertake measures to reduce energy consumption (particularly at peak times) by investing in energy efficiency and renewable energy systems. As an example customers that install solar electricity systems only receive 43% of the value that they create. A detailed discussion is included as Attachment 1.
- Due to uniform pricing practices a number of customers, particularly those in areas where losses are high or network constraints are emerging, pay prices that are considerably lower than the long run marginal cost of supply. This makes it more difficult for PV systems, solar water heater systems and other energy efficient appliances to compete in circumstances where their application is most appropriate.
- Marginal pricing has been selectively applied in certain cases by distribution businesses to increase electricity consumption (such as off-peak water heating). Artificially low off-peak power rates have made installations of solar water heaters less competitive. Customers' market decisions are therefore being influenced with the effect of increasing greenhouse emissions.

In the context of the requirement to reduce greenhouse gas emissions and reduce investment driven by growth in peak demand, effective solutions to address market distortions include the following:

- place requirements on electricity distributors to develop strategies and implement pricing approaches that encourage energy efficiency and implementation of greenhouse abatement activities;
- progressive roll out of digital meters that will enable effective price signals to be provided to customers;
- charge customers for peak demand[3] or on the basis of their maximum demand, this is similar to approaches currently in place for larger customers;
- electricity distributors to provide a rebate to customers installing distributed power systems equivalent to alleviated, location-specific network investment cost;
- pricing for off-peak electric water heating to be cost reflective and bear a reasonable share of fixed costs and overheads;
- In the case that pricing fails to provide locational and time of use pricing, IPART should ensure that counter-balancing measures are introduced that support sustainable energy technologies such as PV, solar water heating, cogeneration and other energy efficiency measures; .
- Distribution businesses be required to provide a series of standard offer rates that are available to energy efficiency and other demand management options (including embedded generation). This would take the form of a negative congestion price that would be available for any activity that resulted in a reduction of power consumption. This creates a standard forward price, to which energy efficiency and DSM proponents would respond; and finally
- Establishment of a DSM fund or Public Benefits Fund to support DSM initiatives. Implementing a DSM fund is in accord with IPART's recommendations as part of its DSM Inquiry in 2002. As an example distributors in NSW have done very little DSM and have presided over significant growth in electricity consumption that now creates a need for over $4 billion of expenditure (over the next five years) to meet

[3] In the Charles River Associates report for Integral Energy it was found that customers without air conditioners were subsidising customers with them to the tune of $80 to $100 million per annum. The cost to add network related to peak demand was found to be $91 per kW per annum (page 26 of the report). The contribution of customers with air conditioners was about $1 per annum.

peak power needs. Financing for the DSM fund could be sourced from a number of areas, including as a proportion of future capital expenditure, a $/kWh charge or as $/kW on peak power needs. Another option that should also be considered is that funding for DSM should come out of a proportion of historical over-investment in network assets. Importantly however the funds need to be administered by an organisation independent of the distribution businesses and government.

1.3 Action targeting the built environment (residential and commercial buildings)

The energy that we consume in our buildings (residential, commercial and services sectors) accounts for 50 per cent of total electricity consumption. Consumption is growing at a faster rate than manufacturing, mining and agriculture and importantly peak demand is growing at a faster rate again.

Other important characteristics of these sectors are that buildings have very long lives and that energy costs are a very small component of total operating costs which means that energy consumption barely figures in design, purchasing and investment decisions of these sectors. This has important policy ramifications when we consider the best approach to deliver on the significant energy efficiency potential.

1.3.1 New buildings and equipment:

- Implement mandated minimum performance standards for new commercial buildings based on the Australian Building Greenhouse Rating Scheme (ABGRS). The minimum performance standards should initially include a five star requirement for new commercial buildings (including fitout). This builds upon and expands mandated measures being implemented in Victoria and NSW for new residential homes.
- For new residential houses, implement mandated minimum greenhouse performance standards covering base building and key appliances. A minimum five star energy efficiency performance should be applied to the base building and key appliances.
- Measures should also focus on verifying actual performance after construction (for example, modelled on the ABGRS Commitment Agreement)
- Approaches should be comprehensive covering all major energy consuming activities – including major fixed equipment (including solar hot water and embedded generation such as PV). This is similar to the approach adopted in BASIX
- Acceleration of minimum performance standards for appliances and equipment (including labelling). The present program averages minus $30/t CO2 avoided, so a much more aggressive approach is justified as all potential to $0-10/tCO2 should be captured
- Signal a move towards zero net lifecycle greenhouse gas emissions for new commercial buildings with offsets allowed for compliance.
- Mandated metering for new buildings to be time of use meters capable of import and export measurement and also capable of monitoring and management of major loads.

1.3.2 Existing buildings:

- Mandated minimum performance standards for existing buildings to be progressively implemented to achieve four star rating (five star for tenancies).
- Mandatory annual energy reporting (including base building data available for tenants) for non-residential buildings and progressive improvement based on a rolling 5 year average baseline.
- Mandatory energy rating of all dwellings (including major fixed appliances and equipment) at time of sale or lease. This builds upon the successful ACT scheme that requires all homes advertised for sale to have their energy consumption rated and disclosed.
- Ratings for existing buildings to include the greenhouse performance of key appliances such as solar water heating as well as embedded generation such as PV.
- Extend the new Residential Building Greenhouse Rating Scheme being developed by the Sustainable Energy Development Authority (NSW) which provides benchmarking against actual energy bills, diagnostic advice and technical support, to a national scale.

1.3.3 Government leadership:

Governments to show leadership by ensuring that they implement cost-effective energy efficiency projects for all departments and agencies.

- All government buildings and tenancies to be minimum five star rating on ABGRS basis;
- government to provide funding for their own agencies to invest in all energy efficiency measures with a real rate of return exceeding 2-3 percent above the long term bond rate ;
- buildings and tenancies to report performance publicly and achieve leading edge performance ; and
- public housing (including private housing for which rents are subsidised) to achieve leading edge performance and report publicly at an aggregate level.

1.4 Manufacturing industry

Energy consumption in manufacturing industry is dominated by the consumption of natural gas for heat raising and process use. As a result significant opportunities exist for the uptake of cogeneration particularly when existing steam raising plant needs to be replaced. End-use electricity consumption while smaller than natural gas in PJ/a terms is still significant and its associated greenhouse gas emissions amount to 40 percent of total power use. There is a strong case to drive improvement in electricity as well: this supports adoption of cogeneration, as well as electricity efficiency and fuel substitution activities.

The incorporation of a carbon price signal in the energy market will be an important driver for new investment and innovation particularly for energy intensive industry. There are a number of other measures that will help to reduce energy consumption and waste in manufacturing, these include:

- Mandatory requirement for large energy users to undertake energy audits and report on performance, and possibly achieve specified rates of improvement (based on rolling 5 or even 10 year averages). Industry to be required to undertake investment if meets minimum 4 year pay-back;
- Development of cogeneration targets and incentives to support the assessment and implementation of cogeneration;

- Support the funding of feasibility studies for cogeneration and innovation in energy efficiency based on the SEAV Business Energy Innovation Initiative (BEII) model. While still in its early days it is showing considerable promise. The BCSE and the Australian Industry Group are involved on the steering and assessment committee;
- Re-institute funding support for the successful Energy Efficiency Best Practice Program that worked on an industry basis to improve energy efficiency. This scheme would compliment the BEII approach above;
- Conduct independent research into 'best possible practice' performance targets for systems and processes in industry and use this to benchmark performance;
- Mandate individual metering, controls and feedback systems for all energy consuming equipment rated at more than 5 kWand also require design estimates of power demand to be provided to the client for benchmarking purposes; and
- The Australian Taxation Office (ATO) should be required to re-interpret its definition of maintenance (eligible for 100% tax deduction in year of work done) to include the cost of upgrades to best practice standards, as approved by AGO or DITR

1.5 Development of an energy services industry

Government should provide financial and regulatory support for the development of an energy services industry and the development of an energy services action agenda. The development of energy efficient products and services represents a growing global market and will be extremely important to meet global emissions reduction and supplying electricity infrastructure and services to the 2 billion people in the world that do not yet have access to electricity.

- improve data collection and availability so that potential energy efficiency opportunities can be identified;
- establish training and certification schemes for tradespeople, designers, contractors and consultants regarding best practice energy efficiency, and require or encourage use of certified people in government projects;
- provide support for the expansion and extension of energy performance contracting as a delivery mechanism for energy efficiency;
- develop and promote tools (including web-based calculators, rental of specialised equipment, etc) for consumers and market intermediaries to assess performance, benchmark, diagnose problems;
- development of an energy services industry action agenda; and
- provide strategic funding for RDD&C for energy efficiency and sustainable energy solutions.

The BCSE has been actively involved in the development of the renewable energy action agenda and is currently coordinating its implementation. The renewable energy action agenda sets out a plan for how government and renewable energy industry can work together to deliver an industry with sales of $4 billion by 2010. Importantly the Australian Government has also made funding available under the Renewable Energy Industry Development (REID) program to support industry development activities. As an example the BCSE has received funding over the last four years to develop a standards training and accreditation program for the design and installation of renewable energy systems. We believe that the approach that has been implemented for renewables could also be successfully applied to energy efficiency. In fact an action under the Renewable Energy Action Agenda was the creation of an energy efficiency Action Agenda.

The energy services industry action agenda would set out a strategic framework for how industry and government would work together to develop this industry to a stage where it is

contributing significantly to GDP and exports and delivering energy efficiency outcomes in a competitive manner. The BCSE is happy to work with government to deliver such an action agenda and we would be happy to coordinate its eventual implementation as we are doing with the Renewable Energy Action Agenda.

2. Response to Discussion Paper Issues

2.1 Broad Issues

2.1.1 Making consultant's reports available

The BCSE is disappointed that the consultant's report that outlines the assumptions and detail of the modelling has not been made available. This would have better informed the BCSE's submission. Transparency is critical to effective consultation.

2.1.2 Focus on "end-use-energy" leads to wrong priorities

The focus of the Discussion Paper is on targeting the largest end-use energy savings – which leads to a concentration on large, energy-intensive industry. This is a very narrow way of setting priorities. In reality, multiple criteria should be applied to selection of high priority areas. These might include:

- activities/sectors driving investment in new energy supply infrastructure, such as peak supply capacity
- cost-effectiveness of savings potential
- extent to which energy efficiency initiatives may support future economic development, specifically employment creation.
- contribution to greenhouse mitigation (saving one end-use unit of mainland electricity reduces emissions and primary energy use by much more than saving one unit of natural gas)
- growth trends within a sector, sub-sector or activity, especially where this is linked to investment in new plant and equipment and economic development
- impacts on export and import replacement competitiveness

Application of this wider range of criteria would lead to greater emphasis on the commercial and, to some extent, the residential sector and low energy intensity industrial sub-sectors. Energy consumption in these sectors is dominated by electricity, which produces significantly higher greenhouse emissions and is considerably more expensive on an "end use" basis. On a per PJ basis electricity is four times more expensive than natural gas.

Further the significant growth in peak power demand in the commercial and residential sectors is causing considerable concern amongst government policy makers[4]. Growth in demand has triggered massive levels of network investment with $5 billion committed in NSW alone over the next five years.

2.1.3 National coordination – not "lowest common denominator"

With regard to the role of national coordination, it is important that efforts to improve national coordination do not impact adversely on efforts being made by individual jurisdictions. There is a tendency for national approaches to adopt a 'lowest common denominator', and this must be avoided in energy efficiency, where its early stage of development and the importance of encouraging innovation mean that a diversity of approaches can help to identify the best solutions, and provide a mechanism for piloting new approaches, even though they lack consistency. For example, appliance energy labelling and residential building energy codes were developed at an individual or joint state

[4] The Chairman and Chief Executive of Western Power resigned following blackouts in Western Australia caused by increasing demand and a lack of generation capacity to meet it.

level, and have only progressed to national status after evolving for a decade or more. Various jurisdictions have developed and applied different industry and business energy efficiency programs in efforts to find the elusive successful package. Experience with building codes has also highlighted the significance of regional cultural, historical, climatic and infrastructure factors that impact on implementation of energy efficiency issues. So those pursuing national coordination should not be given power to veto or constrain regional action: they should have to demonstrate that their initiatives will achieve larger savings and will support and enhance local action.

While it can be argued that a national approach may minimise duplication and reduce the cost and complexity for participants, the reality is that many local or regional jurisdictions are keen to be leaders in energy efficiency, and national coordination risks undermining their efforts unless the national approach facilitates leading edge innovation and public recognition of the achievements of each jurisdiction. A particularly important issue for national coordination is the introduction of standard 'currencies' for recognition of energy efficiency, such as star rating schemes (with associated standard test procedures, minimum standards, data collection and publication, enforcement mechanisms, etc) and even certificates that can be used for trading schemes. But national schemes should then allow different jurisdictions to set appropriate targets and operate their own schemes utilising these common tools.

2.1.4 Other Barriers identified

BCSE agrees that all of the barriers identified in Section 5 of the Discussion Paper exist and can be significant, although the significance of each barrier varies with circumstances.

A key barrier not included in the Discussion Paper, but raised in a presentation at the November 2003 SEAV/BCSE Energy Efficiency Conference relates to taxation structures.

As outlined by the representative of PriceWaterhouseCoopers at the conference, a typical Australian business is likely to apply funds in the following hierarchy:

1. Carry out maintenance but not upgrade efficiency, as this is immediately fully tax deductible: upgrading plant performance to improve efficiency would be interpreted by the Australian Tax Office (ATO) as an improvement, which is eligible only for a depreciation claim
2. Where equipment was installed prior to 1999 and requires more than just maintenance, carry out upgrades rather than replace equipment: upgrades to pre-1999 equipment are still eligible for accelerated depreciation, while replacement equipment is ineligible.

This framework provides a perverse incentive to avoid investment in new equipment that is typically far more efficient (and more productive) than older equipment. And, since Financial Officers are very influential in corporate decision-making, it is likely that this distortion carries excessive weight within many businesses. To illustrate the problem of driving equipment replacement, the CEO of the Plastics and Chemical Industry Association (PACIA), in a presentation at the November 2003 SEAV/BCSE Energy Efficiency conference noted that new plastics processing equipment typically used 40% less energy than existing equipment: but this benefit was insufficient to justify replacement. The existence of this disincentive structure does not necessarily mean that taxation frameworks should be changed, as they are developed within a much broader context. However, energy efficiency policy needs to recognise the existence and impacts of these disincentives, and introduce mechanisms that offset or outweigh them.

Another important barrier is that the flow-on productivity, product quality and other benefits of more efficient plant and equipment are often poorly documented, yet these are often of greater financial value than the energy savings. For example, energy efficient new plant is often more compact and frees up shopfloor space, more flexible in operation (reducing business overheads at times of lower demand), creates less waste heat (providing a more comfortable working environment), reduces maintenance costs (for example, avoiding specialised computer centre air-conditioning through energy efficiency can save tens of thousands of dollars per year on maintenance contracts, worth much more than the energy saved). A comprehensive business case needs to be made.

All the barriers listed in the Discussion Paper, as well as those outlined above, can be major, depending on the actual circumstances. To deliver an energy efficient outcome, the necessary products and services must exist and be reasonably priced. Further, all players in the chain of participants in the process must either perceive a benefit to themselves from selection of the energy-efficient option, or be neutral to the outcome. Where a decision maker is not responsible for the future costs associated with a decision, this criterion is not fulfilled, and policy measures are needed to change price signals, regulate action, or motivate decision makers to act.

2.2 Priorities in addressing barriers

BARRIER	PRIORITY	COMMENTS
Information availability and access	High	A fundamental (but not sufficient) requirement
Information programs don't overcome behavioural barriers and inertia		This barrier is an outcome of other barriers such as lack of incentives, as well as the structure and quality of information strategies
Energy is a small cost, considered not worth much effort to save Lack of access to expertise or tools to identify opportunities and implement savings	High	Can be addressed by addressing split incentives and other barriers Regulatory approaches will often work best If an agent who wants to pursue energy efficiency cannot get assistance to save energy, then we are failing to capitalise on an opportunity. Support the expansion of energy performance contracts and the development of an energy services industry
Limits on availability of capital		This barrier really results from lack of knowledge, evidence of performance, and low priority: there is usually money available if something is considered important and financially worthwhile. Energy performance contracts could assist.
Application of a higher hurdle rates of return for energy efficiency investments		This is a consequence of lack of information and evidence, combined with failure to consider energy efficiency as a core element of business
Incentives split: decision maker is often not the beneficiary of the savings – also, future	High	Resolution of the split incentive problem, and increasing the present day significance of future savings relative to today's cash flows are key issues

savings are often heavily discounted		
Uncertainty about continuity and scale of government measures	High	Government's behaviour is a key signal to others. If government is seriously committed to energy efficiency within its own operations, expects its suppliers to perform, and provides stable and effective measures to drive energy efficiency in the marketplace and wider community, then this will send an important message. Also, stop-start government programs disrupt business development and undermine investment strategies.
Energy efficiency is not integrated into training and education of key players	High	Education and training of existing and new market intermediaries in energy efficiency is a critical element of the infrastructure for delivery of energy efficiency
Lack of data on outcomes of past energy efficiency measures and actions	High	To make a business case, solid evidence of past performance is critical. This information provides an important source of data for RD&D, as it provides diagnostic feedback and clarifies where opportunities or problems may exist
Organisational and cultural inertia		This barrier is an outcome of other barriers
Lack of national coordination of government policy		While this can be a barrier to effective outcomes, experience also shows that national coordination can, itself, become a barrier to progress. This issue is discussed above.
Taxation structures	High	As discussed above, present taxation structures provide significant disincentives to invest in new plant and equipment, and hence work against energy efficiency
Documentation of complementary benefits	High	Since the complementary non-energy benefits of many energy efficiency measures are financially more significant or offer other valued benefits (such as improved comfort), their documentation is important in motivating action.

Section 6: What are the challenges to achieving more?

General challenges:

CHALLENGE	RESPONSE	COMMENTS
Incentives and support to mainstream ee	Agree	Governments seem reluctant to pursue effective incentives. Is it because of concerns about the political impact of raising the revenue? Or concerns that shifting cost impacts to decision-makers will be politically difficult?
Build a self-sustaining ee industry	Agree	This means driving education, training, RD&D, certification of products and services, and creating market 'pull'
Build expertise and ensure it is available to consumers	Agree	Beyond development of expertise, support infrastructure is needed. For example, it is very difficult for households and small business to access people who can help them to analyse and diagnose energy waste problems. In many cases, traditional contractors, consultants or salespeople have vested interests in energy-wasteful solutions (such as

		selling larger capacity equipment) or lack diagnostic skills. Their perspectives are also typically fairly narrow, and they are not trained to consider holistic systems-based solutions, which is where most savings can be captured. Most service businesses at present offer only a limited range of products, which means they are less likely to promote holistic solutions: for example, appliance retailers who sell airconditioners rarely sell shading and insulation products as well.
Make ee easier and cheaper to implement	Agree	Initially this means incentives and building ee industry capacity, but over time, economies of scale will drive costs down. However, incentives need to encourage ongoing innovation, and ensure that cost reductions flow through to consumers. Often targeting rebates at manufacturers can be cost-effective, as their value is amplified by the avoided cost margins placed on sales by each participant in the chain of distribution, wholesaling and retail.
Reduce inertia and motivate to capture ee opportunities	Agree	Traditionally, the 'simple' solution here has been to propose an increase in energy prices. However, not only is this politically difficult, but the elasticity of response is low, so large price increases would be required to achieve significant changes in behaviour if only economically motivated response is considered. A package of measures is needed to shift costs to decisionmakers, provide incentives for innovation, etc
Make ee a higher priority for decisionmakers	Agree	Governments are reluctant to increase energy prices (which won't necessarily have a big impact on ee priorities anyway) but shifting future costs to the point of decisions makes sense – but is unpopular with decisionmakers who have traditionally avoided confronting the lifecycle cost impacts of their actions, such as builders, developers, salespeople
Ensure investors in ee capture the benefits	Agree	In some cases this requires restructuring of mechanisms so that decisionmakers bear the cost of failure to invest in energy efficiency. For example, in the building industry, it is difficult to conceive of a mechanism whereby a developer or builder could claim a percentage of ongoing energy savings from the energy bills of the occupants. However, if the developer or builder must include the cost of achieving specified levels of performance or lifecycle costs of energy/greenhouse gas emissions, then they will attempt to limit overall building costs including those lifecycle costs, and thus they will implement energy efficiency measures that reduce the total cost of compliance.
Facilitate access to capital for ee investment	Agree	As noted earlier, this is likely to be an outcome of effective measures addressing other barriers.
Get relevant, consistent, non-duplicative information to the right people at the right time	Agree	There are several dimensions to this issue. Governments have a legitimate and important role to provide information on opportunities for sustainable energy, in the same way as they provide information to the minerals and fossil fuel industries on resources. This means government should provide information for appliance and equipment manufacturers, DSM consultants, etc on parts of

		the grid and times where energy efficiency and DSM could be most profitable, provide technology briefs to manufacturers on innovations that could be incorporated into their equipment or processes, and so on. The infrastructure for delivery of products and services also needs to be built. Government has key roles in training and certification, development of standards and test procedures, and in operating schemes that require appropriately certified contractors and products to be used for their own projects, those of their suppliers, and to encourage demand for certified suppliers in the private sector and households.
Increase monitoring and feedback on programs to government and consumers	Agree	There is a serious lack of data on energy use of most equipment and appliances, despite the national energy labelling scheme. For example, there is no standard information on energy use of televisions, computers, standby power used by security systems, etc, etc. Further, governments need to collect sales data and associated energy use characteristics to inform policy development and modelling of energy futures. Tracking and public reporting of actual performance of buildings and industry performance is also important. At present, claims of commercial confidentiality block some aspects of effective reporting: government must support development of standards and methods of reporting, just as it has done for financial accounting and reporting.
Develop consistent long-term national ee approach while allowing for regional initiatives	Agree	The development of standard 'currencies' for trading and compliance, similar to MRET certificates, or at least mechanisms for determining equivalence of different 'currencies' is important if regional initiatives are to co-exist with national approaches. It is important that requirements for national coordination do not stifle innovation and leadership at the regional level.

Other general challenges include:

Encouraging governments to act decisively where the bulk of the community would benefit from ee policies, even when some powerful interest groups oppose effective action. As Machiavelli once pointed out, potential beneficiaries from change are quiet, while those who fear they will be adversely affected are noisy. Indeed, some who can benefit may also be seen to be opposing change as a strategy to confuse their competitors

Assisting the coal industry and other resource industries to recognise that ee is in their interests: the more energy the rest of the economy saves, the less pressure there is to switch to lower greenhouse impact energy sources and for large industry to cut greenhouse gas emissions for a given greenhouse target

Sector-specific challenges: industrial; commercial; residential; conversion; intermediaries

Industrial

CHALLENGE	RESPONSE	COMMENTS
Inertia of attitudes and cultures	Agree	This is a significant factor, amplified by staffing cutbacks and outsourcing of technical work
Embedding energy efficiency into top business		If energy cost alone were the issue, it can be argued that energy per se need not be a top priority

priorities such as productivity improvement		for senior management in many businesses. If energy cost is less than 2% of input costs (as it is for most Australian business) and offsetting all greenhouse gas emissions (eg through energy efficiency improvement, or offsets such as green power or the AGO Greenhouse Friendly program) would add less than 1% to input costs, the reality is that energy is not an issue that should take a lot of senior management time. The problem is that energy efficiency investment is not being managed rationally by many businesses – they are under-investing, and the consequences of this include increasing greenhouse gas emissions and lower financial returns. There is certainly potential for energy efficiency improvement to contribute to business productivity and innovation benefits, and for the converse, too. This provides a case for business to focus more on energy efficiency than might be justified just on the basis of energy costs alone.
Stimulating energy innovation	Agree	This is certainly a challenge. Part of the challenge is that technical innovation (and technical innovators) are on the fringe of decision making in most businesses. The main focus of most organisations is to keep product (or services) rolling out the door: the cost of an unnecessary stoppage of production far exceeds the likely short term benefits of most energy saving measures, so a very conservative approach is usually taken. Further, cutbacks in staffing and outsourcing mean there is less likelihood that detailed analysis and optimisation of processes will occur under normal operating circumstances. Demonstration of energy efficient solutions; underwriting risks of loss of production; bench top or small scale trials to assess impacts on product quality; favourable tax frameworks and training/education, information programs, subsidies of partnerships with research and educational institutions, etc can all play roles in stimulating innovation.
Expanding coverage and influence [of programs and measures] to SMEs	Agree	For most SMEs, energy is a small component of business costs, and they are short on expertise to manage technical issues. At the same time, most energy audits are superficial, and do not necessarily identify the core energy waste issues: and the solutions often involve cross-cultural action, management of split incentive problems (eg the boiler house gets the savings but the maintenance team funds the improvement), or require access to external expertise – which no-one wants to fund from their own budget. Improving internal energy metering and monitoring, introducing benchmarking at the system level within plants, public reporting requirements, and

		mandatory efficiency improvement requirements are some of the options that may improve SME performance.
Assisting middle management to present a successful business case to executive management	Agree	Monitoring and measurement of equipment and system performance, along with documentation of non-energy benefits, underwriting of risks associated with energy efficiency measures, and demonstration of performance of new solutions are important support mechanisms. Independent technology assessments and education and familiarisation of consultants, contractors and sales people regarding energy efficient solutions can also be important.
Encouraging opportunities for thinking beyond customary approaches	Agree	There is potential for the energy efficiency sector to form alliances with other business innovators to promote more creative energy efficiency strategies. For example, the Energy Efficiency Best Practice program was found to offer a valuable practical mechanism for driving broad cultural and organisational change within some organisations. EEBP also found that involving technical experts with knowledge from another industry could often open up new ways of thinking about problems, as they did not carry the assumptions of people within the industry. Research into the basic physics and chemistry of processes and modelling of 'best possible practice' solutions and systems-based analysis, instead of focusing on marginal improvement were also found to facilitate innovation.
Engaging all personnel across a site in energy management thinking	Agree to some extent	It's not really a matter of engaging all personnel: rather it is important to engage representatives of the different cultural and administrative groups from across the organisation, so that cross-cultural solutions can be explored and the key groups that need to be involved in delivering solutions are involved and develop ownership of the solutions. What's more, the problem that needs to be solved may not be perceived by most to be an energy problem, but may relate to product quality, lack of plant capacity, communication, staff comfort, or other issues. And the opportunities and benefits may also be far broader than energy savings: for example, improved staff morale or attitudes of the local community. The challenge is to link these issues to improving energy efficiency so that energy efficiency is seen as one of the best ways of achieving the objectives of the organisation and key groups and individuals within it.

Note that by referring to end-use consumption, the impression is given that the commercial sector uses only 15% as much energy as industry. But since over two-thirds of the commercial sector's energy use is in the form of electricity, its primary energy use (and greenhouse contribution) is more significant. For example, the wholesale/retail sub-sector, with greenhouse gas emissions of more than 18 Mt per annum, is the third highest sub-sector in the economy with regard to non-transport energy-related greenhouse gas emissions, behind emissions from metal products and mining (much of which results from LNG production). Further, this is the fastest growing non-transport energy sector, so actions implemented today are likely to have amplified impacts in the future. Much of the commercial sector's activity is not directly export oriented or import replacement, and energy is a relatively small component of input costs, even though price per unit paid for energy is often quite high, so measures that address this sector (as long as they have a societal cost less than, say $10/tonne) offer potential for significant economic and greenhouse benefits with minimum impact on Australia's international trade position.

CHALLENGE	RESPONSE	COMMENTS
Inertia of attitudes and cultures	Agree	Across the commercial sector, non-transport energy is less than 0.5% of business input costs. Few services businesses have in-house expertise. So this is a significant challenge. It is important to motivate using more than just financial pressures (eg peer group, public image, etc) and to make energy efficiency improvement as easy as possible.
Stimulating energy innovation in commercial building design and construction	Agree	The fragmentation of the development, design and construction process, and the split between this and the fit-out, tenancy and building management make this outcome extremely challenging! Mechanisms such as the Building Code of Australia, Australian Building Greenhouse Rating Scheme and Green Building Tool are providing some mechanisms to stimulate activity, but more is needed. Stronger minimum standards (such as 5 star ABGR) and stronger incentives (such as zero net lifecycle greenhouse gas emissions) that shift the cost impact onto developers so they will seek to optimise their costs are needed. Demonstration projects, training of designers and engineers, and incentives to incorporate energy efficient and demand management features such as in-house metering, load management capability, sensors, etc can all help. Certification of professionals and tradespeople who can demonstrate that projects they have contributed to really work is also needed, as are mechanisms for public reporting on actual performance of buildings Benchmarks for buildings other than office building (which are already covered by ABGRS) are urgently needed. These can be improved over time as an increasing number of buildings report on performance.
Supplying high-performing energy-efficient buildings	Agree	See above It would be a useful signal if only buildings with demonstrated good performance were eligible for architectural and other awards. One specific strategy could be to visit and assess previous

		winners of architectural awards, and report on their performance – good or bad, in high profile articles in architectural and engineering media.
Stimulating energy-efficient upgrades and refurbishment of existing buildings	Agree	Training of the fit-out industry and requirements or incentives for tenancy energy efficiency are needed to drive action on tenancy energy. Model lease clauses that require building owners to disclose core building energy use data to tenants and to achieve benchmark performance are needed, along with incentives or requirements to comply.
Ensuring building tenants are aware of building energy costs and the options for reducing these	Unsure	This may have surprisingly little impact on behaviour, as these costs are typically very small for tenants relative to their total business costs, which are usually dominated by staff costs and rental of floor space. For building owners, energy costs are often significant, but that is because their staff costs are relatively low. Linking tenant energy to publicly visible simple schemes such as the ABGR star rating, and environmental programs, may provide stronger incentives. For example, the cost of paper can exceed the tenant energy costs for many businesses, so linking energy saving and paper saving can build interest in action.
Improving the energy management skills of building management	Agree	Training and certification are needed, but in many cases, lack of adequate metering, load management control, benchmarking and diagnostic tools limit capacity to improve efficiency.
Demonstrating the operational effectiveness and non-energy benefits of low-energy design buildings	Agree	Post-occupancy studies, surveys, monitoring etc are useful, but an effective communication strategy will be needed to place articles and information in strategic magazines and other media.
Effectively demonstrating government commitment and leadership	Strongly agree	Governments have been among the poor performers, particularly in new building projects, where budget cutting has often led to removal of energy efficiency features, cogeneration, etc. High profile public reporting is critical.

Residential

CHALLENGE	RESPONSE	COMMENTS
Lack of information for decision making, combined with consumer and market intermediary attitudes, behaviours and cultures	Agree	Comparative energy information is not available for most household appliances and equipment (despite energy labelling of whitegoods), there is no public information on realistic benchmarks against which households can assess their performance (although NABERS and SEDA's new home rating scheme will begin to overcome this gap). Diagnostic advice is also needed so that householders can respond if they find they are high emitters. A key problem is the misinformation that is

		widespread – for example the belief that low voltage halogens are energy-efficient; that it is cheaper to leave heaters or coolers running continuously, and so on. Most market intermediaries have vested interests in selling more energy-intensive equipment, as they make more profit, while few sell integrated packages that deliver energy services at least cost (eg few air conditioner sales outlets sell shading and insulation). Few intermediaries carry out sufficient analysis to correctly downsize equipment for energy efficient situations: certification of intermediaries (and promotion of their capabilities) who can deliver energy efficient solutions
Accelerate refurbishment of housing stock for greater energy efficiency	Agree	A key weak point at present is the lack of practical options to retrofit insulation to walls of existing buildings: RDD&C is needed to overcome this vacuum. Large quantities of old, inefficient equipment is running but is under-utilised in homes: information on the unnecessary cost impacts of this equipment and programs to remove it show potential for significant savings.
Ensure disclosure of housing energy performance to empower buyers and tenants, such as in the ACT	Agree	Targeting provision of information at a time when large amounts of money are changing hands can be very effective. However, ratings should cover all major fixed equipment as well as the building envelope
Ensure segments of the community with limited resources are not disadvantaged	Agree	Many low income households are tenants who live in thermally poor houses and caravans and pay high costs for hot water and heating, while often owning old, faulty major appliances. This is a difficult sector to target, but an important one. It should also be remembered that reducing their energy costs and improving comfort can also reduce expenditure on financial support and health care programs, while energy efficiency can be a focus of employment creating and community development programs Pricing strategies can adversely impact on low income households unless the price signals are limited to those who are in a position to respond – for example, new cost-reflective tariffs may be applied to new homes or buyers of new air conditioners, but if applied to existing situations, some may become victims.

A key additional challenge in the residential sector is the need for commercialisation of ee equipment that also meets householders' aesthetic and other criteria (eg attractive light fittings with compact fluorescent lamps).

Conversion Sector

The energy conversion industry has been disappointingly slow to pursue energy efficiency measures both within its own operations and through involvement of customers. This reflects a serious shortcoming in the structure and rules of energy markets.

In theory, the energy conversion industry has much to gain from improvements in energy efficiency, particularly where it would defer or avoid the need for additional investment in supply capacity. However, energy suppliers seem to have a preference to grow base demand while managing peaks through interruptibility mechanisms, rather than through energy efficiency. This partly reflects a lack of recognition that some energy efficiency measures have disproportionate impact during peak periods – for example, building insulation and draught proofing work best when the temperature difference between outdoors and indoors is greatest. It also reflects the signals sent to energy suppliers by the existing energy market mechanisms. Part of the problem is that energy suppliers are concerned at the loss of potential revenue resulting from energy efficiency measures at times other than peak periods.

Intermediaries

CHALLENGE	RESPONSE	COMMENTS
Attitudes, behaviours and culture towards energy and willingness to advocate and innovate	Agree, but it must be recognised that many pressures force them to act in the ways they do	For many intermediaries, energy efficiency adds to the cost, time and complexity of servicing a client's needs. Further, energy efficient options may have lower profits (eg because equipment may be downsized) or may involve referring potential customers to different intermediaries, or involving several intermediaries because one does not have all the required skills or knowledge. And having expertise in this area attracts many who just want to talk about options rather than pay for products and services. Even some who are seen as implementers of energy efficiency may limit capture of energy efficiency opportunities by self-censoring, not being up-to-date on costs and products, failing to engage with key people in organisations, inadequate analysis of situations, lack of specialised skills, and so on. Government could play important roles with support information, training, certification, development and maintenance of tools, etc
Making it more profitable to sell energy efficiency	Agree	Packaging of integrated solutions, multi-skilling of trades people, incentives for customers, comparative evaluation tools, demonstrations and many other actions can be pursued by governments to support this objective.
Ensuring energy markets deliver low cost energy services, not just low energy prices	Agree	There is a need for political leaders to shift their emphasis from aiming to deliver low energy prices to delivering low overall energy bills. Energy market reform must create incentives for participants to deliver integrated energy services, not just energy.
Creating an environment for intermediaries to	Agree, but difficult in many cases	Not all intermediaries provide advice to clients, but those who do must have available products and systems that can reliably deliver energy efficient

advocate energy efficiency to clients		outcomes while providing them with profits, avoiding call-backs, and satisfying their perceptions of customers' non-energy criteria.
Motivating intermediaries to provide energy efficiency services		See above
Increasing incentives for energy retailers to provide energy efficiency services	Agree	Only when a middle manager in an energy retailer can be confident that energy efficiency will benefit his or her career and success, and the company's profitability more than would growing demand will this happen.

Intermediaries require significant skills development, and new analytical and diagnostic tools. They need to see significant 'consumer pull' or demand for energy efficiency. At a time when many intermediaries are specialising and cutting back on complexity, this can be counter to trends within their industries. The energy efficiency sector is changing rapidly, and it is difficult to keep up to date without effective information support systems.

Possible solutions to address the challenges

The BCSE believes that government must establish a target for energy efficiency. The target could be stated in a number of different ways ranging from (i) limiting growth in energy consumption to say half the expected "business as usual" growth rate, (ii) a fixed PJ/a energy consumption rate or (iii) energy consumption per unit of GDP or value added. Given that electricity supply dominates greenhouse emissions a separate target needs to be established for electricity use.

The following five steps provide a holistic package that addresses the critical factors for delivery of effective energy efficiency improvement. Each of these elements is essential, and all are inter-connected. For example, building energy efficiency industry capacity is useless without creating demand for its services. Likewise imposing regulatory obligations without having the delivery infrastructure will lead to higher costs.

1. **Introduce a broad based market price signal that can drive new investment**
   - Expansion of existing state based schemes to cover energy efficiency and extension of existing schemes to other states
   - In the longer term the implementation of a national emissions trading scheme

2. **Make energy markets work for customers**
   - Establishment of a Demand Side Management (DSM) or public benefits fund
   - Require electricity distributors to develop strategies and implement pricing approaches that encourage energy efficiency and implementation of greenhouse abatement activities;
   - Charge customers for the impact that they have on electricity system costs, specifically on a peak demand[5] basis.
   - Require distribution businesses to provide a series of standard offer rates that are available to energy efficiency, and other demand management options (including embedded

[5] In the Charles River Associates report for Integral Energy it was found that customers without air conditioners were subsidising customers with them to the tune of $80 to $100 million per annum. The cost to add network related to peak demand was found to be $91 per kW per annum (page 26 of the report). The contribution of customers with air conditioners was about $1 per annum.

generation). This would take the form of a negative congestion price that would be available for any activity that resulted in a reduction of power consumption. This creates a standard forward price, to which energy efficiency and DSM proponents would respond.

3. **Regulate for minimum energy performance in the built environment**
   - Extend and expand existing mandated minimum energy performance schemes for new residential buildings to commercial buildings
   - Mandated requirement for existing buildings to improve their performance and disclose energy performance on sale or lease
   - Government to provide funding to support cost effective energy efficiency in their own facilities and require all new leases to be minimum five star

4. **Drive a more energy efficient manufacturing industry**
   - Mandatory requirement for large energy users to undertake energy audits and report on performance, be required to undertake investment if meets minimum four year pay-back.
   - Development of cogeneration targets and incentives to support the assessment and implementation of cogeneration
   - Support the funding of feasibility studies for cogeneration and innovation in energy efficiency based on the SEAV Business Energy Innovation Initiative (BEII) model.
   - Re-institute funding support for the successful Energy Efficiency Best Practice Program that worked on an industry basis to improve energy efficiency.

5. **Develop the emerging energy services industry**
   - Build the capacity and capability to deliver cost effective and sustainable energy efficiency services and products to customers
   - Establishment of an energy services industry action agenda as a strategic long term plan for industry and government to work together to the deliver the potential of energy efficiency
   - Provide strategic funding for RDD&C for energy efficiency and sustainable energy solutions

Further policy options are described in the attached discussion paper – "Driving Energy Efficiency", which is also available at www.bcse.org.au.

Other comments, recommendations and feedback

1. Unit prices for energy

In identifying potential for savings, there is also value in looking at the price paid per unit of energy within sectors and sub-sectors, as some businesses pay quite high energy prices and may therefore have significant cost-effective opportunities for savings. For example, hot bread shops are quite energy intensive, but also pay high electricity prices, as they are treated as small commercial customers.

2. Addressing peak demand

There is also potential for synergies between energy efficiency strategies and efforts to avoid the need to increase peak energy supply capacity or, where appropriate, base load supply capacity. The emphasis in policy analysis regarding management of peak summer electricity demand has been mostly placed on management of 'needle peaks' using interruptibility clauses in customer contracts, remote control of non-critical loads, and pricing signals. Such strategies seem intended to reduce the cost of managing

peak demand while leaving ongoing growth in demand at other times (and the bulk of revenue of the electricity suppliers) untouched. While this may be in the interests of the electricity supply industry, it is not necessarily in the economic or environmental interests of society as a whole.

Energy efficiency strategies offer the potential to achieve multiple objectives with regard to both demand and total consumption. They reduce peak demand, total energy bills, and greenhouse gas emissions. Different energy efficiency measures have different profiles of savings, so that they can both reduce total consumption and help solve demand problems. For example:

- improvements in the thermal characteristics of building envelopes reduce heating and cooling requirements most when the temperature difference between indoors and outdoors is most extreme. For a building with relatively high internal heat generation, a thermally excellent envelope may actually increase cooling energy requirements in warm but mild conditions, but this does not detract from the value of the thermal improvements at times of peak demand (and the associated potential to reduce the capital cost and capacity of cooling systems). At present, few financial analyses of building thermal improvements place appropriate value on their role in reducing peak energy demand.
- Efficient commercial lighting systems reduce peak-intermediate demand by reducing the consumption of electricity per square metre. Where lighting controls are installed, demand is reduced around the end of the working day (when household cooking, home entertainment and space conditioning loads peak), and also when it is sunny. So controls can disproportionately reduce demand around the time of day when peak summer demand occurs.
- Smart commercial heating systems that limit outdoor air supply during warm-up in winter can significantly reduce winter morning peak demand, as well as providing improved comfort for occupants
- Refrigeration equipment's demand normally increases with temperature. High efficiency refrigeration equipment therefore disproportionately reduces demand when it is hottest: if refrigeration cabinets are more efficient, food is less likely to deteriorate during supply interruptions.
- Reduction of standby power usage reduces base load demand.

Intelligent application of energy efficiency measures can therefore offer superior outcomes for society than narrow demand management strategies.

3. Modelling and energy use details

The economic modelling of energy efficiency scenarios for the NFEE seems to imply a large up-front capital cost in the early years of an energy efficiency program, reflected in a period of lower economic growth. In practice, well-designed energy efficiency strategies can use a mix of no/low capital cost savings measures and higher capital cost measures to ensure that the overall cash flow is positive from the start of the program and, in many cases, capital can be provided from accumulated savings.

3. Case Studies and Examples

3.1 Industry Energy Savings

Energy Intensive Industry

It is commonly considered that energy intensive industry is efficient, because energy is a major component of operating costs. However, there are large potential savings available in most cases. Some of the case studies discussed below show how saving energy can be achieved in a variety of ways, not just through energy efficiency improvement within processes.

Cement

Cement manufacture is an energy intensive activity, consuming between 3-9 GJ/tonne. Most of Australia's cement is now manufactured using the more efficient 'dry' process, which requires 3-4 GJ/tonne, although some 'wet' process plants still operate, leading to an average energy cost of over 5 GJ/tonne.

A key method of reducing the energy intensity of cement is blending with other cementitious materials such as fly ash (from power stations) and blast furnace slag (from steel mills). These cement extenders have a very low energy cost, usually just the transport and grinding energy. At present around 20% of final cement content is cement extender. Depending on the strength and setting properties required, up to 85% cement extender can be used. Recently, use of cement with 50-60% cement extender content has begun to become accepted, after the high profile *60L Green building* in Melbourne used 60% extender in its construction. Tom Wauer, technical manager at Independent Cement, Port Melbourne, is expert in this area, as are the staff at CSIRO Highett.

For the 60L Green Building and other recent projects in Melbourne, concrete with 50-60% cement extender content was actually slightly cheaper than conventional product.

A shift to best practice cement manufacture and an average of 50% cement extender could reduce energy consumption per tonne to under 2 GJ/tonne, 60% below the present value, at no extra cost Further, as each tonne of pure cement liberates around 0.5 tonnes of CO2 from the chemical process, dilution of the cement with extender reduces this impact as well.

The cement industry's total greenhouse gas emissions in 2001 were approximately 5.6 Mt CO2e, of which about half were process emissions (NGGI, 2001).

In the longer term, alternatives to conventional calcium-based cements could further reduce emissions and energy use. For example, in Tasmania, TecEco cement products have been developed using magnesium-based materials. These are kilned at half the temperature of calcium-based cements, and can also be blended with high proportions of extenders. Further, they absorb more CO2 during curing without it adversely affecting strength.

CSIRO is conducting research aimed at reducing cement-related energy use and greenhouse gas emissions. The following is from http://www.csiro.au/csiro/ghsolutions/s7.html:

"CSIRO is pursuing a number of strategies to reduce these emissions:

- indirect fired rotary kiln technology (able to achieve considerable energy savings)
- accelerated microwave curing of concrete and ceramic products (saving energy and so estimated to reduce CO_2 emissions by 40%, at lower costs)
- development of new binders capable of reabsorbing up to 80% of the CO_2 released in calcination.

"In addition to acceptance within the marketplace, attainment of these outcomes is being based on a coherent 5-10 year strategy that includes a suite of projects:

- fundamental research to further develop understanding of microwave interaction with cementitious materials to enable mathematical simulation for optimising accelerated curing processes
- development of a new process for controlling the accelerated curing of thin pre-cast concrete
- similar work for large pre-cast concrete elements
- development of mathematical models to predict performance of new kilns
- demonstration of a radical new design of kiln for cement and lime production
- demonstration of new binders and incorporation of these binders into useful
- products."

Contact on low energy cement processing; CSIRO Building, Construction & Engineering Swee Liang Mak, tel 03 9252 6111, Swee.Liang.Mak@dbce.csiro.au
Contact on low energy, low emission kilns; CSIRO Building, Construction & Engineering
Jeff Symons, tel 03 9252 6178, jeff.symons@dbce.csiro.au

Significant quantities of concrete are simply used as 'filler' in many situations. Optimised design, incorporation of other materials (eg steel reinforcing, polymers, etc) and use of space fillers such as waffle pods in concrete slab floors are reducing the amount of concrete required for a given task.

The overall outcome of the above strategies

Glass

Production of glass in Australia is predominantly for glass containers. Around 80% of energy is used by the furnace, and 20% is electricity used within plants.

The glass container industry has reduced energy consumption per container in several ways:

- improved process efficiency
- reduced weight of containers – by over 30% in many cases
- incorporation of more cullet (recycled glass), which reduces the energy requirements of the process – by 1997 cullet content was up to 45%

Further savings can be achieved by adopting cogeneration: this could cut greenhouse gas emissions per unit of production by at least 30%. No Australian glass production facility has yet adopted cogeneration.

Further lightweighting, including composite solutions such as plastic-coated bottles, can also contribute to additional savings.

It is also possible to increase the percentage of cullet in glass containers – replacing virgin materials with cullet saves 74% of energy (Grant et al, 1999) (see http://www.southernwaste.com.au/services/glass.html)

While savings to date have been of the order of 40% per container, further savings of 40% seem feasible over time.

However, since containers can be made of different materials, there is also potential for energy savings (both in processes, and in transport) by using lighter, lower energy content, more easily recyclable (or high recycled content) materials. In this sense, PET and some other plastics provide potential for further savings through switching materials.

BP

Internationally, BP committed in 1997 to cut its greenhouse gas emissions from operations by 10% by 2010. In 2002, Greg Bourne, Asia Pacific Manager (check) announced that the 2010 target had been reached – at a profit. An internal emissions trading system was a key mechanism for driving improvement.

DuPont

DuPont have held energy consumption steady since 1990 while increasing production by 35%. They have committed to maintain energy consumption at this level until 2010, despite further increases in production. (www.pewclimate.org).

Australian Vinyls. (from Greenhouse Challenge agreement)
Australian Vinyls achieved its Greenhouse Challenge targets during 2001/2002 through partial transfer of production to its more efficient Laverton plant and closure of the Altona plant, together with the other Greenhouse Gas reduction actions detailed below.

Operation of three large refrigeration plant compressors with colder cooling water is saving approximately 9% of the power consumed, saving 1,120 tonnes/year. Tuning combined heating /cooling control systems has prevented mixing of hot and cold water saving 250 tonnes/year. Operation of cooling water pumps has been optimised resulting in ongoing savings of a further 860 tonnes/year. The total cost of all this work was less than $10,000.

Optimisation of existing equipment is continuing particularly with regard to the operation of two steam-stripping columns. Anticipated savings are over 3,000 tonnes/year. Additionally a low-cost solution to reduce power of another cooling water pump is expected to save 450 tonnes/year.

Present emissions are around 80,000 tonnes CO2 per year.

Qenos – formerly Kemcor (from Greenhouse Challenge Agreement)

A joint venture of Exxon Chemical and Mobil Chemical, Kemcor Australia manufactures ethylene, polyethylene and synthetic rubber at three sites in Altona, Victoria. Kemcor Australia employs over 800 people and in 1995 had sales of $417 million from polyethylene, synthetic rubber, olefins and specialty polymers.

Kemcor estimates its total greenhouse gas savings at 25% between 1990 and the year 2000, a target equating to a reduction of 220,000 tonnes per year. Under its co-operative agreement Kemcor will, over the next four years, pursue savings of 80,000 tonnes per year, a reduction of 11% per year on 1995 levels, as well as continuing to search for further greenhouse gas savings beyond the year 2000

In the last full year of production(1999) Qenos recorded greenhouse gas emissions of 1.21 tonnes of CO2-e/ tonne of production, which represents a 14% reduction on the 1990 baseline figure of 1.41. This resulted from completion of a number of energy conservation projects.

At the end of 2000, Qenos permanently closed its High Pressure Polyethylene Plant and its Styrene- Butadiene Plant in Altona, which decreased emissions by approximately 100,000 tonnes of CO2-e or about 12%.

Malting

Malting consumes around 3 GJ/tonne – similar in energy intensity to cement manufacture. The DITR Energy Efficiency Best Practice Program worked with Barrett Burston malting to improve on this. Their Geelong plant, which had been benchmarked within the top 10% of world plants for energy efficiency, has achieved substantial savings of around 20%, while evaluation of options for a new plant indicated potential for 45% greenhouse gas emission savings.

Paper and Pulp

According to the Australian paper industry, average energy use for paper production is 13.3 GJ/tonne, down from 21.2 GJ in 1995-96. This reflects the impact of some much more efficient new plants, increased recycling, and improvements in existing plants.

AMCOR's botany paper recycling plant has identified and is capturing savings potential of $2.2 million per annum with payback periods of less than three years after working with SEDA, EEBP and Origin Energy. This is approximately a 15% saving. Further savings from cogeneration are feasible and potentially cost-effective, but have not been pursued to date (EEBP program)

VISY's Tumut new (2001) pulp and paper plant provides its steam and up to two-thirds of its electricity from wood waste and black liquor (sourced from biomass). The remainder of its electricity is sourced mostly from hydro. This mill is believed to be close to greenhouse neutral. When the net benefit of the carbon sink that will be created by establishment of its 30,000 hectare plantation is taken into account, the mill and its inputs could be considered to be a net sink. (BCSE case study, EcoGeneration Magazine Dec 2001/Jan 2002)

According to Nilsson et al (ACEEE, 1995), if biomass residues and black liquor were fully utilised with best practice technologies, the pulp and paper industry could be net self-sufficient for energy.

NSW case studies

Case Study – Hotel Sector

Since 1998 Sydney's Grace Hotel has introduced a number of simple energy saving initiatives with minimal capital cost that have resulted in annual energy cost savings of approximately $130,000 (earning an annual internal rate of return of 80%). It has also resulted in annual greenhouse gas emission reductions of 1400 tonnes/year.

These energy efficiency initiatives were made by the Grace Hotel as part of its commitment to SEDA's Energy Smart Business program. The program overcomes one of the key barriers to energy efficiency – technical knowledge. The Grace Hotel has worked tirelessly with a government-subsidised private sector energy consultant over the term of its program involvement.

Case Study – Banking Sector

The Commonwealth Bank, a leading Australian financial institution, introduced an energy management program in some of its NSW operations and is now achieving annual energy savings of around $400,000. The projects to date have achieved an internal rate of return of 46% and are reducing greenhouse gas emissions by approximately 4500 tonnes per year.

The bank is working with a private-sector energy consultant through SEDA's Energy Smart Business program to identify and implement energy efficiency opportunities. The program covers some 47 sites, which presents a number of challenges, according to the Bank.

To overcome this challenge, the Energy Smart Business program works directly with facility management staff to assess each site individually and develop specific programs according to the unique requirements of each.

Case Study – Government

The NSW Attorney General's Department has undertaken a $804,970 lighting and air-conditioning upgrade project at five of its courthouses, under an Energy Performance Contract (EPC). Energy Performance Contracting, pioneered by the NSW Government, is a smart way of financing energy efficiency upgrades whereby future energy savings pay for the cost of the upgrades.

Through this $800,000 investment, the government agency has achieved annual energy savings of $135,931 and greenhouse gas reductions of 1,194 tonnes.
The EPC overcame a traditional barrier to improving plant efficiency – access to capital. Attorney General's Department received capital through a treasury funded EPC thus eliminating the need to fund projects from internal funds.

Case Study – Government
Western Sydney Area Health Service has recently undertaken a comprehensive package of energy upgrades financed under the NSW Government Energy Efficiency Investment Program (GEEIP). The $465,243 project, with an internal rate of return of 16%, will return annual savings of $71,869 and reduce greenhouse gas emissions by 1,287 tonnes per annum, the equivalent of taking 286 cars off the road. GEEIP allowed the area health service to borrow the upfront costs of its efficiency projects and repay the loan through the energy savings. Once repaid, WSAHS will retain 100% of the savings.

Case Study – Commercial Property Sector
The NSW Department of Commerce, on behalf of its client, the NSW Police Service, required an innovative developer to design, construct and maintain for 15 years a building that performs at 4.5 stars under the Australian Building Greenhouse Rating (ABGR) scheme.

The ABN AMRO/Multiplex Group Consortium were the successful tenderer charged with the responsibility of delivering the high greenhouse performing building in Parramatta that will become the Police Service's new head office.

Multiplex have adopted a holistic approach to the design and management of the electrical services, mechanical plant and façade to deliver a building which uses 30 per cent less energy than a typical office building.
The Australian Building Greenhouse rating scheme, managed nationally by SEDA, allowed the NSW Police Service to procure a building that was greenhouse friendly and energy efficient. To ensure this building sustains its optimum greenhouse performance, NSW Police has entered into an ongoing agreement with Multiplex which sees an energy cost penalty for non-maintenance of the rating.

3.2 Energy Performance Contracting

The following is a list of Energy Performance contracts that have been undertaken over the last few years. The analysis is courtesy of the Australasian Energy Performance Contracting Association.
The Total Cost included below is the the total cost for the project and can also include expenditure for other plant, services and equipment that are not related to the energy savings.

Classification of Project	Total Cost $	Annual savings $ pa
HEALTH CARE		
Launceston Hospital, Tasmania	$5,000,000	$1,104,236
Royal Hobart Hospital, Tasmania	$9,650,000	$650,000
Mid Western Area Health Service, NSW	$2,100,000	$530,126
Shell Harbour Hospital, NSW	$474,000	$115,000
Hunter Valley Private Hospital, NSW	$31,000	$15,695
Lake Macquarie Private Hospital, NSW	$58,000	$34,435
Burnside War Memorial Hospital, SA	$64,000	$17,109
Greater Murray AHS (G riffith)	$938,500	$139,385
Greater Murray AHS (Albury & Wagga)	$1,000,000	$230,000
Westmead Children's Hospital, Sydney	$947,000	$175,300
Royal Brisbane Hospital	$478,060	$107,370
Subtotal	**$20,740,560**	**$3,118,656**
EDUCATION		
Liverpool District School	$945,500	$202,112
University of New England, NSW	$6,400,000	$865,410
Subtotal	**$7,345,500**	**$1,067,522**
OFFICE BUILDINGS		
Defence Plaza	$147,665	$54,115
Canon Headquarters	$84,290	$17,400
Workcover, QLD	$740,000	$123,000
Honeywell House, NSW	$264,000	$47,416
Customs House, WA	$247,000	$38,000
Septimus Roe, WA	$695,000	$60,000
Freehill, Hollingdale & Page	$147,000	$31,804
Canon Headquarters	$84,290	$17,400
Local Government Association Qld	$31,250	$15,380
Westfarmers House, Perth	$281,000	$14,000
NSW Dept. Health	$129,000	$27,125
Thiess Head Office, Qld	$61,000	$22,000
Nauru House, Vic	$300,000	$50,000
Environment ACT	$110,000	$34,300
Dept Health & Aged Care	$1,298,600	$279,643
Transport SA	$955,865	$181,834
Origin Energy National Customer Service	$298,000	$50,150
DOLA	$516,000	$91,000
Attorney general NSW - EPC No 2	$2,785,000	$388,580
Subtotal	**$9,174,960**	**$1,543,147**

Classification of Project	Total Cost $	Annual savings $ pa
OTHER BUILDINGS		
State Library of NSW	$601,891	$79,282
Paramatta Linen Service	$137,195	$32,000
Telstra Exchanges	$3,000,000	$765,000
Whitford City Shopping Centre, WA	$203,734	$54,000
Adelaide Mail Exchange	$470,000	$235,000
Central Coast Leagues Club	$1,284,000	$208,000
Towsnville Airport	$770,000	$200,000
Subtotal	**$6,466,820**	**$1,573,282**
INDUSTRIAL		
QANTAS Jet Base Boiler House, NSW	$1,240,784	$150,000
Subtotal	**$1,240,784**	**$150,000**
LOCAL GOVERNMENT		
Brisbane City Council, QLD	$1,683,000	$109,865
Hornsby Shire Council	$1,140,000	$160,000
Lake Macquarie Shire Council	$264,000	$46,000
Blue Mountains Council Stg 1	$96,408	$17,740
Brisbane City Council	$1,675,300	$218,000
Subtotal	**$4,858,708**	**$551,605**
DEFENCE		
RAAF Richmond , NSW	$265,000	$76,500
DNSDC Stores Liverpool, NSW	$394,000	$90,000
Subtotal	**$659,000**	**$166,500**
TOTALS	**$50,486,332**	**$8,170,712**