Submission of
the Australian Conservation Foundation
on
Productively Commission Inquiry into the Economic and Environment Potential Offered by Energy Efficiency

November, 2004

I. Setting the Context

See also Climate Action Network Australia's Submission to the Productivity Comission for a broad environment group perspective on energy efficiency.

Energy policy in Australia cannot be looked at without acknowledgement of the wider context of climate change and Australia's international legal oblications. The UN's climate convention, which has been ratified by the Australian Government, commits governments to avoiding "dangerous" levels of climate change and to stabilising the climate in a time frame that allows natural systems to adapt, food production not to be threatened and for economic development to proceed in a sustainable manner.[1] In 1997, world leaders agreed to the Kyoto Protocol which sets legally binding targets or limits on greenhouse gas pollution for industrialised nations. It is acknowledged that the targets set in Kyoto will not meet the objective of the convention but Kyoto is the first step along this pathway. International talks on developing new commitments for the period after 2012 are set to start within the next 12 months.[2]

In order to meet our international obligations, to help ensure a safe and healthy environment and economy for our children and ourselves as part of a package of policies and measures the Federal Government must **set a national target to reduce greenhouse emissions by at least 60% below 1990 levels by 2050 and:**

a. To establish real progress towards the long-term target, set a 20% reduction target by 2020.
b. Acknowledging that temperature increases of 2°C above pre-industrial levels would have severe impacts on Australia such as catastrophic impacts on the Great Barrier Reef, join the EU in committing to ensuring that global temperatures do not exceed this level.

a. Setting Targets is in Australia's National Interest

Stabilising the climate is in Australia's nation's interest: Australia is highly vulnerable to climate change.[3] Recent droughts and decreases in rainfall from south-western to south-eastern Australia illustrate the enormous social and economic cost to the nation of failing to tackle climate change. The cities of Perth, Adelaide, Melbourne and Sydney are all suffering water restrictions and our farmers are increasingly suffering crippling droughts. As climate change continues, these trends are expected to continue and worsen.[4]

A 2°C increase in global temperatures above pre-industrial levels must be avoided: Many scientists[5], the European Union[6], the international environment community[7] and more recently even industrialists such as Lord John Brown, Group Executive of BP[8] advocate that global temperature increases above 2°C are too dangerous to contemplate. Scientific studies have projected that allowing global temperatures to increase above 2°C could have the following consequences:

- The Great Barrier Reef: Catastrophic damage with around 90% of the Great Barrier Reef bleaching every second year.[9] One estimate suggests that by 2020 the total estimated loss to local Queensland communities due to damage to the Great Barrier Reef ranges from $3.5 to $8 billion.[10]

- Terrestrial Ecosystems: In Northern Australia's Wet Tropics rainforests catastrophic regional extinctions and all 65 regionally unique vertebrates are projected to lose up to 90% of their core environment.[11] In regions that cover some 20% of the Earth's land mass some 35% of species would need to shift beyond their current climatic ranges, or adapt to new climates. Those that failed would become extinct.[12] While all of Kakadu's fresh water wetlands could be lost.[13]

- Global Impacts: With a 3°C warming, 3.3-5.5 billion people may be living in places experiencing large crop losses.[14] Close to 2.4-3.1 billion additional people could be at risk from water shortages with a warming of around 2.5°C and 3.1-3.5 billion additional persons at risk at 2.5-3°C warming.

Major reductions in greenhouse pollution are required in the short and long-term if we are to stabilise the climate: To avoid an increase in temperature of 2°C industrialised countries need to reduce greenhouse emissions by 60-80% by 2050.[15] By 2020 industrialised nations need to have reduced their emissions by more than 20%.[16] In response to a UK Royal Commission report on climate change and energy the Prime Minister Tony Blair pledged the UK Government to cut its emissions of carbon dioxide, the main greenhouse gas, by 60% by 2050, France is committed to a 75% reduction by 2050 and the German Government has signalled it will commit to reduce its emissions by 40% by 2020 if the EU commits to a 35% reduction over the same period.

Starting now and setting targets creates certainty for business and helps avoid costly and disruptive action:[17] A commitment to set a national target and roadmap would stimulate real action now and avoid more dramatic, disruptive and expensive changes later on. It would place Australia in an ideal position to capitalise on being among the leaders in developing a

low emissions economy. Setting short and long-term targets will provide an overall framework within which early, well-planned action can take place. It allows industry and the economy as a whole (including the jobs and skills base) to adjust within a reasonable timeframe. It allows industry to plan with certainty and in the course of normal capital replacement cycles. It helps avoid the risk of having large assets stranded by unplanned, ad hoc or "emergency" government responses. It will encourage new technologies, industries and innovators to come forward to meet the challenge we face as a nation.

Strong emission reduction targets are both necessary and achievable: Establishing targets requires political vision and leadership. And to be meaningful they need to be backed up by policy measures to ensure they are achieved. Action to achieve them needs to start now. Such leadership is being shown in other parts of the world. In the UK, scientists warned the government in 2000 that: "*The challenge climate change poses for the world is so fundamental however that a complete transformation in the UK's use of energy will be an essential part of an effective global response.*"[18] In response to this the UK government produced an Energy White Paper that sets out how the nation will achieve its national target of a 20% reduction in greenhouse pollution by 2010 and 60% by 2050 with little impact on the economy.[19] In Australia, the Clean Energy Future for Australia report concluded that:[20] "*The barrier to …* [a 50% reduction in carbon dioxide emissions from the stationary energy sector by 2040] *is not that the clean technologies cannot produce enough energy at relatively affordable prices, nor is it that the cleaner fuels are not available. The barrier is a lack of achievable policies and strategies for facilitating the transition to new fuels and commitment by decision-makers."*

b. Energy Efficiency has Key Role to Play in Meeting Emission Targets

As agreed in Kyoto, Australia has adopted a short-term target of an 8% increase in greenhouse emissions by 2008-12 (over 1990 levels). It has also acknowledged the need for major global emissions reductions of the order of 50-60% by 2050.[21] The generous land clearing deal Australia demanded at Kyoto means that we are within striking distance of our 108% Kyoto target despite projected emissions from the energy sector being some 40% over 1990 levels. Beyond Kyoto, however, most emissions reductions will have to come from reduced emissions from fossil fuel use. The stationary energy sector is responsible for around 50% of total emissions and will therefore have the major role to play. There are a wide range of options for reducing energy related emissions through improved end-use energy efficiency and lower emission and renewable energy supply, with improved energy efficiency holding particular promise.[22]

While quantifying energy efficiency's potential contribution to this effort is difficult, it is widely agreed to be very large. Most supply side options have abatement costs above business-as-usual whereas energy efficiency offers many negative cost opportunities. For example, the UK expects more than half the 60% emissions reduction by 2050 to come from energy efficiency improvements.[23] Similarly, the UN's Intergovernmental Panel on Climate Change found that energy efficiency options are responsible for more than half of the total emission reduction potential of buildings, transport, and industry sectors.[24]

II. The Economic and Environmental Opportunities of Energy Efficiency

For the purposes of this submission we have focused on the stationary energy sector, as it is by far the largest source of greenhouse pollution in Australia. We also recognise that a number of other measures would therefore also be required in other sectors, such as transport. The stationary energy sector can be defined as all non-transport energy supply – this is around 75% of primary energy consumption in Australia. Its purpose is best

understood as being to deliver desired stationary end-use energy *services* to society – heat, cooling, light, motion and communications.[25]

The stationary energy sector plays a vital role in societal welfare with many energy services representing 'essential public goods'. It also represents a major investment by society in terms of the capital and operating costs of all the energy equipment involved.

Energy policy objectives generally revolve around three key issues:

- affordable and accessible energy services to meet essential needs and permit ongoing societal welfare and progress;
- security of supply to ensure its ongoing availability, and;
- environmental sustainability.[26]

Energy efficiency can play a vital role in meeting these objectives and it offers many opportunities to:

- provide energy services at lower cost,
- reduce our use of limited and polluting fossil fuel resources for the longer term, and demands on stressed energy supply infrastructure in the shorter term, and
- has some of lowest cost greenhouse emissions abatement available.[27]

A possible economic (and Australian National Competition Policy) view on the role of governments is to act when the market does not provide efficient outcomes for society, that is, market failures. These 'failures' can arise when there are monopolies, public goods, incomplete markets, information failures, a distinct investment 'Business Cycle' and externalities. Unfortunately, our energy markets demonstrate all of these market failures so there is a clear case for energy policy.

Despite the evident benefits and great potential of energy efficiency, policy intervention to promote energy efficiency is required, as:

- many of the benefits are market externalities – that is, their environmental and social 'values' are public goods, and not directly seen by decision makers, and;
- there is widespread market failure in end-use decision making, as users fail to undertake cost-effective efficiency options.

a. The Economic Potential of Energy Efficiency Savings are Substantial

The International Energy Agency (IEA) estimates that IEA country energy savings of 50-90% can be cost-effective when policies stimulate product or process redesign, market transformation and changed expectations (including in response to policy). The IEA also estimates that around 30% savings (but often much more) from business-as-usual energy consumption are available over the next two decades with today's best practice technologies.[28]

IEA estimates of potentials of 50-90% seem broadly applicable to Australia, particularly given low present levels of energy efficiency in comparison with other IEA countries. It has been argued that Australia's low energy prices in comparison with most other countries reduce this economic potential. However, energy prices in an economy reflect the prevailing policy regime. Many countries have deliberate policies of increasing energy costs for reasons that include driving greater energy efficiency.

The studies under the National Framework for Energy Efficiency (NFEE) are acknowledged to be conservative and take care to stress the many and varied assumptions and limitations required in making estimates of energy efficiency potential. Nevertheless, results suggest significant efficiency potential across the Australian economy.

Estimated Australian Energy Efficiency Improvement Potentials

Sector	Up to 4 yr payback (sector studies)	Av. 4 yr payback (sector studies)	Av. 4 yr payback	Av. 8 yr payback
Industrial	6%	13%	22%	46%
Commercial	10%	22%	28%	71%
Residential	13%	--	34%	73%

The NFEE had Allens Consulting Group use the MMRF-Green model to project the economy-wide impacts for pursuing different 'payback' targets. They also modelled the impacts of a 1% National Energy Efficiency Target (NEET). McLennan Magasanik Associates Pty Ltd have also modelled energy market impacts of a NEET. The limitations of computable general equilibrium models with modelling energy efficiency have not been highlighted by the NFEE process[29] however both results show significant economic and environmental benefits from energy efficiency. For example:

- Allens Consulting Group[30] estimate that a 50 per cent take-up rate for certain energy efficiency technologies over a 12-year period would result in GDP being around $1.8 billion higher, national employment being around 9,200 people higher and national greenhouse gas emissions from the stationary energy sector being around 32 million tonnes CO_2 lower than would otherwise have been the case.
- A report by McLennan Magasanik Associates Pty Ltd[31] analysed the economic, social and environmental impacts of adopting a National Energy Efficiency Target (NEET) to reduce the rate of growth in energy sector demand. It concluded that the economic benefits of an energy efficiency target ranged from $2.4 billion to $6.6 billion. By 2017, investment in installed capacity would be reduced by between 2,500 MW and 5,000 MW, and collective greenhouse emission savings over the period 2004 to 2025 would be equal to or greater than national greenhouse gas emissions for 2004. It concluded that, "In summary, adopting the NEET program, and meeting its objectives, will ensure that we get better use from our existing energy infrastructure and reduce emissions and supply costs ... A further advantage is that future costs can be reduced by deferring new capital investments until such time as cleaner generation technologies become less expensive."

III. Barriers and Impediments to Improved Energy Efficiency

The barriers to energy efficiency are now well understood and documented. These barriers are a result of organisational and societal behaviour, economic and regulatory disincentives as well as inadequate information. These barriers are perpetuated by a lack of expertise and existence of a self-sustaining energy efficiency industry within Australia, a taxation system which provides a disincentive to energy efficiency and information asymmetry which ensures energy users are unlikely to invest in profitable energy efficiency and engage in socially optimal energy conservation.

Bridging the energy efficiency 'credibility' gap is perhaps the greatest challenge in motivating policy makers to adopt visionary energy efficiency targets, polices and measures. While the economic potential is estimated to be very large, there is a widespread scepticism and significant other barriers such as:

- *"if efficiency was such a good idea it would have happened already*" - not necessarily given how dysfunctional present energy related markets and decision making are;
- *growing demand for energy services* means that all energy efficiency efforts will be eventually be swamped so what is the point – certainly possible without major energy efficiency efforts although most energy services eventually saturate (eg. internal house temperatures) and doing nothing means consumption would be even higher;[32]
- *rebound effects* mean that end-users saving money from increased energy efficiency just spend this money for new services that increase energy use – there is some evidence of rebound, however, its impact is generally considered to be small;[33]
- *bottom-up analysis misses the transaction costs* – its true that better informed decision making can involve time and effort, and therefore expense. However, if government policies are able to remove these transaction costs (e.g. only efficient fridges are available so people don't have to realise it matters, undertake research and then decide to buy a better one) then this argument actually supports the need for regulation, and;
- *Organisational inertia means things can't change fast:* considerable work including the NFEE has highlighted the problems of organisational and cultural inertia in hampering energy efficiency action. However, while some organisations find it easier to continue using the same technologies and processes that they already have in place, many have made radical changes to other areas of their operations such as the introduction of new types of workflows and IT systems. (The major challenge, instead, is to give organisations good reasons to pay attention to energy efficiency, as opposed to the many other business issues jostling for their attention, and then ease the path for them to actually take action.)

Furthermore, many of the benefits of greater energy efficiency are also market externalities – that is, their environmental and social 'values' are public goods. While externalities are important, however, the greater challenge may well be the present widespread market failure in end-use decision-making, from:

- *a poor understanding of energy efficiency* by key decision makers;
- *little motivation for many energy consumers*– the relatively low cost of energy, the effort required to contemplate energy efficiency options and the risks in implementing them means decisions are often driven by other priorities;
- *a range of institutional barriers to action* for even informed and motivated decision makers, including electricity industry restructuring that has defined the role of a retailer to be an electricity sales agent rather than a facilitator of cost-effective end-use energy services, and;
- *the need for coordination amongst numerous decision makers.* The ability to improve end-use energy efficiency, and the costs and benefits associated with doing so, are often spread between many players such as government planners, infrastructure providers, equipment manufacturers, service providers and owners as well as the actual energy end-users.

IV. An Energy Efficiency Policy Framework

A coherent multi-faceted policy framework, rather than any single policy instrument, will be required to drive appropriate levels of energy efficiency across the economy.[34] This is evident from the many diverse international, national, regional and local policy measures being used to target different aspects of energy efficiency, as well as the numerous and varied decision makers involved.[35]

Energy efficiency policy development also has to consider the wider policy context of the energy sector. At present, energy policy in Australia is largely driven by narrowly defined

economic supply-side restructuring objectives. The transformation of the electricity sector away from vertically integrated state-owned utilities towards market-based competition has radically changed the context for energy efficiency policy. In particular, restructuring has created energy retailers as profit-maximising energy sales agents who see improved energy efficiency as a competitor rather than a business opportunity. Also, state industry development policies that subsidise energy-intensive industries can markedly increase the energy intensity of the Australian economy and negate many of the benefits of energy efficiency improvements elsewhere.

ACF will not attempt to assess all the available policy approaches here and note the package of nine energy efficiency policy measures which have been endorsed by the Ministerial Council on Energy as part of the National Framework on Energy Efficiency process, ACF:

- supports the packages as being a significant positive step towards overcoming the barriers to energy efficiency and unlocking the potential benefits.
- urges the MCE to engage the jurisdictions to prioritise the roll out of this first stage, with a view to having made significant progress at the end of twelve months and to having the second tranche of policy measures agreed to and commenced by the end of three years.
- supports ongoing participation in the implementation and development of the National Framework on Energy Efficiency from the community, with adequate resources, and;
- seeks clarification from the MCE of the ongoing role of the community and environment NGOs in the roll out of the first stage.

In addition we want to stress what we see as some key areas of the policy debate:

- Energy industry restructuring
- State development policies
- MEPS and Building standards
- Energy efficiency licensing conditions on industrial facilities
- Government programs
- A carbon price
- An energy efficiency target

a. Electricity Industry restructuring

There had been an expectation by at least some government policy makers that the NEM would contribute to climate change objectives for reasons including increased competition in supply and energy use. Indeed, environmental improvement was included in the original objectives of energy market reform. Unfortunately, the original estimate that energy market reform would drive a 14 million tonne reduction from 'business-as-usual' greenhouse emissions by 2010 has become a projected increase in emissions.[36] Reasons appear to include the absence of carbon pricing and reduced emphasis on energy efficiency given lower electricity prices.

Far greater attention has to be paid to retail market design and demand-side decision-making. Specific energy efficiency, as well as wider sustainability objectives need to be built into the processes of the new Australian Energy Regulator (AER) and Australian Energy Market Commission (AEMC).[37] In particular, the role of retailers in the restructured energy industries should be re-specified as energy service facilitators.

b. State development policies

State and Federal development policies are a key determinant of energy demand, and therefore need to make full consideration of the energy consumption and climate change implications of developing energy-intensive industries.

The link between Australia's economic potential and energy intensive industry development is not as strong as often argued. For example, the Aluminium smelting industry consumes almost 15% of Australia's electricity generation yet contributes only 0.15% of Australian GDP or around A$1 billion while receiving electricity price subsidies estimated at A$210 million to more that $250 million a year.[38]

Energy intensive industries are responsible for a large proportion of energy demand. A policy choice to continue to subsidise and promote them should be taken only after full consideration of its energy and climate change implications. Any such subsidies should be made in a transparent manner as targeted 'industry development', not potentially concealed through low cost energy deals and exclusion from environmental instruments such as emissions trading.

Wider development policies also matter. Patterns of transport links and urban development are our most long-lived infrastructure assets. Choices that work against energy efficiency will take a long time to correct.

c. MEPS and Building Standards

It is estimated that some 40% of world energy use occurs in buildings and there are many cost effective options for energy efficiency improvements. Getting buildings right is particularly important as they are one of our longest-lived infrastructure investments. Getting urban design right is even more important. For example, the UK's *Energy White Paper*'s major policy proposals are higher building and product standards.

Minimum Energy Performance Standards(MEPS):
Electrical appliance use has increased significantly in recent decades and MEPS is a proven and effective mechanism which has seen progressive improvements in the efficiency of appliances around the world.[39] MEPS should be extended to cover all appliances and minium standards should be strengthened over time. There is also a clear role for governments in pushing the frontier of efficiency in equipment through procurement strategies, and R&D and demonstration support.

Mandated Building Rating Schemes:
In 1990, the building sector was responsible for 27.6 % of Australia's energy-related greenhouse pollution.[40] Not only are environmental impacts from the building sector significant in proportion to productivity, they are rapidly increasing. The Australian Greenhouse Office reported in 1999 that based on estimated projections, between 1990 and 2010, residential buildings would increase their contribution to greenhouse pollution by 17% or 8.1 million tonnes (Mt) per annum while commercial buildings would double their contribution to greenhouse gas pollution (an increase of 94% from 32Mt to 63Mt).[41] This means that in terms of demand, commercial buildings are the fastest growing source of greenhouse gas pollution in Australia.

The case of market failure in addressing the greenhouse impact of Australian buildings is particularly clear. In 2003 AMP Henderson analysed the risk exposure of Australian industry sectors to climate change. They found that the property sector was one of the most vulnerable and least ready.[42] The disjuncture between supply side and demand side drivers

in the structure of the property industry contributes to the failure of market approaches. Furthermore, the inefficiency and lack of carbon-readiness in the property sector will impact on other sectors of the economy both public and private. The absence of adequate environmental performance standards in the building code means that the entire industry, including industry leaders, are held back by the industry laggards. Minimum standards would create a level playing field, economies of scale, and the skills that would benefit industry leadership in addressing energy efficiency. The market penetration of voluntary rating schemes has been limited to a small percentage of building stock. This means that while they may complement regulation by recognising best practice, they can not replace the need for mandated building environmental performance.

It is more efficient (and more cost effective), to improve the environmental performance of a building via standards set in the project planning phase than to encourage retro-fitting of existing buildings. Buildings that are not designed to be energy efficient, effectively pass on the costs of energy inefficiency and the need for future retrofitting to building owners and tenants.[43] While the Australian Building Codes Board (ABCB) has made some progress in introducing minimum energy efficiency standards for residential buildings the introduction of energy efficiency provisions to the building code has tended to be too little and too late. It will be almost a decade after the Prime Minister committed to building energy efficiency standards in 1997[44] that these standards will be introduced for commercial buildings. Furthermore, the residential energy efficiency standards that were introduced were too low and were quickly usurped by State Government building regulations. ACF supports many of the findings of the Productivity Commission Draft Report into the Reform of Building buildings.[45]

Regulation in Australia, in particular, that the ABCB should be given a mandate to address the environmental impact of buildings through setting performance based environmental standards – including energy efficiency.

However it is crucial that the Government also addresses the energy efficiency of existing buildings through combination of market signals and mandated approaches. Government procurement policy should include energy efficiency requirements for all Government office buildings and be Australian Building Greenhouse Rating Scheme (ABGRS) rated. Major refurbishments, and renovations should be included in the ambit of mandated building standards through the Building Code. ACF supports the Commonwealth Government's commitment to working with the States to introduce mandatory disclosure of building energy performance at the point of lease and point of sale as announced in the recent Energy White Paper. The ABGRS is the most appropriate tool to implement this commitment for commercial buildings because there is already industry knowledge in the use of the scheme, and because it is performance based and therefore a fairer reflection of the buildings energy use. In addition, existing buildings should be encouraged to improve their energy performance by at least one star through additional policy mechanisms such as landlord tax incentives.

d. Energy efficiency licensing conditions on industrial facilities

Requiring industrial facilities to undertake regular independent energy audits, report on their performance and undertake energy efficiency actions that fall within some reasonable payback period is a promising approach. It is implemented by State licensing authorities such as the EPA or equivalent. The Federal Government's Energy White Paper also proposed a measure to require assessments and public reporting of action, but it does not include a mandate on action.

The Victorian EPA has recently implemented such a program based on 3 year paybacks for all medium to large energy users – a world leading initiative. Public review will be required to assess the strengths and weaknesses of this approach, and ways that it might be improved. Nevertheless, it appears to be a valuable policy tool that should be supported and extended to other states.

e. Government leadership by example

Governments have a long yet mixed history of implementing energy management programs. These programs allow government to reduce its own energy consumption, associated costs and production of greenhouse gases, support a local sustainable energy services industry, and lead by example, thus both demonstrating the potential and providing valuable information on appropriate design and implementation of energy efficiency programs in the wider community.

Recent Australian experience includes Commonwealth, NSW and Victorian government energy management programs. Of these, the Commonwealth program has probably been most successful to date, with total energy use (excluding Defence operational fuel) falling by 15.4% since 1997/98. The NSW program has had isolated success and although energy use is estimated to have fallen by 2.3% between 1995-6 and 2001-02, this is well short of its 15% target. The Victorian program seems to be making progress in reducing transport energy use, but progress in building energy efficiency is uncertain so far.[46]

These programs should be pushing the frontiers of energy efficiency in equipment and buildings in keeping with government's role of advancing the public interest, and its resources to undertake higher risk options. Its schemes require targets at the agency (authority) level, support including financing to undertake energy efficiency actions, and public reporting requirements.

f. A price for carbon

Australia has some of the lowest electricity and gas prices in the world. Furthermore, and in line with other IEA countries the real costs of energy in Australia have generally been falling over the last two decades.

The relationship between energy prices and energy efficiency is complex, but important. Many decision makers are not currently motivated by energy prices which represent only a small proportion of expenditure – domestic stationary energy costs in Australia are typically less than 5% of expenditure, while these costs of most businesses are even less. Changes in energy prices may not greatly motivate changes in energy efficiency decisions by these participants – they are 'price inelastic'. At the same time, there are some industries for which energy costs are a significant component of costs.[47] These participants might be expected to be more responsive to energy price increases, and are therefore an appropriate target for pricing policies.

Higher energy prices also expand the potential to put policies in place that drive energy efficiency. Given that energy users are concerned with what they pay for energy services, rather than the unit costs of energy, higher prices with higher efficiency can work together to avoid major price rises while driving efficiency improvements.

Carbon levies and emissions trading are two ways to change the price of energy in a way that drives emission abatement and hence supports energy efficiency actions. It makes little sense to exclude energy intensive industry from such arrangements as they are amongst the most likely to respond to price. However, for many decision makers energy prices alone

are insufficient to drive enhanced energy efficiency and other policies will be required. We also note the need to ensure social equity by enabling low-income consumers to be protected from any impact on electricity prices.

V. Energy Efficiency Targets

Developing an effective energy efficiency policy requires:

- measuring key aspects of energy efficiency;
- analysing these to identify opportunities for policy intervention based on unrealised potential for energy efficiency to deliver on economic, social and environmental objectives;
- setting energy efficiency targets to drive energy efficiency and measure progress, and;
- developing policy measures to deliver all of this.

Energy efficiency targets have important policy roles and as the IEA notes: "specific, quantitative and meaningful targets are a key element of energy efficiency policy".[48] Targets have an important policy role as expressions of political will in setting out strategic visions of policy directions. Overall progress can also be measured against these targets. They also have a policy role in the design and assessment of particular policy programs.[49]

Targets should be set according to policy objectives and three major policy objectives for the stationary energy sector, and their meaning for energy efficiency policy are:

- *economic* – improvements to energy efficiency should be used where they deliver desired energy services at lower cost, and hence greater economic benefit than energy supply – commonly referred to as its *economic potential*;
- *energy security* – reducing energy consumption effectively increases the availability of fossil fuels and reduces stress on the energy supply infrastructure; this can however be very difficult to quantify, and;
- *environmental* – climate science suggests that major emission reductions from our energy systems are required order to avert dangerous climate change. Both energy efficiency and cleaner energy supply will play a role, but energy efficiency's role is likely to be the more important at least in the short-term. At the same time, energy efficiency reduces all of the other environmental impacts of energy supply.

Targets to achieve energy efficiency's economic potential are typically calculated by identifying energy efficiency activities that have financially attractive returns on investment (ROI) or 'payback periods' for end users yet aren't actually being taken up. For example, the NFEE takes this general approach.

However, these approaches can have important limitations, including:

- *Misclassification of economic potential* as what is 'financially appropriate for individuals' whereas the role of government policy in energy markets is to make individual decision making deliver optimal societal outcomes.[50,51]
- *Requires future estimates* of policy measures and energy costs that are essentially unknown.
- *Neglects positive externalities of energy efficiency* – such as its proven ability to create more jobs than equivalent spending on energy supply and reduce the adverse economic impacts of dangerous climate change.

- *Can't capture the dynamics of energy efficiency* – technical progress in energy efficiency technologies and changes to energy policy can dramatically change this economic potential.

Therefore setting targets on only economic potential is a mistake. The economic and environmental drivers for energy efficiency suggest that very stringent targets are required and feasible. As the UK government notes: "The cheapest, cleanest and safest way of addressing all our goals is to use less energy."[52]

Strategic overall targets should be visionary to drive effort in the medium to longer term to counter natural short-term variation in energy consumption, and allow time for the energy transformation required. Their key role is to highlight the need for action, and measure progress.

They must also target actual reductions in energy use. Greenhouse emissions reductions targets from 1990 levels of perhaps 20% by 2020 and 60% by 2050 for developed countries don't firmly quantify actual targets for energy efficiency. Nevertheless, it is near unavoidable that real energy consumption has to be reduced from present levels by 2020 – small deviations from business as usual energy consumption growth are not an option.[53] For countries including Australia with growing energy consumption, very large policy efforts and some time will be required to turn this growth around – there can be no delay.[54]

Australia will require a hierarchy of many targets and other countries including the EU and NZ have highlighted the importance of such a hierarchy.[55]

A structured hierarchy of many indicators and targets is needed given the very different roles they play in the policy process[56], and the problems of measuring energy efficiency. Macro indicators at the top of this hierarchy provide a basis for inter-country comparisons and performance towards strategic targets. However, they provide little information about the effective of actual policy measures. Increasing disaggregation can increase the sensitivity of comparisons, establish benchmarks and develop industry strategies.[57] Specific bottom-up indicators are often the most useful for driving and assessing specific policy programs.

Highly specific sector, end-use and equipment targets are very important to energy efficiency policy. All sectors and all end-uses within these sectors should be systematically targeted through specific 'sharp' indicators and benchmarks. The IEA argues the goal should be to achieve the highest feasible energy efficiency in all sectors and in every case, and that minimising the lifecycle-cost for equipment and processes should be considered a minimum standard.[58] This will need many 'sharp' targets. [59]

A hierarchy of targets and indicators are therefore required to drive energy efficiency policy.

VI. Conclusions

1. Beyond Kyoto Protocol targets most greenhouse emission reductions will have to come from reduced emissions from fossil fuel use generally and the energy sector in particular. While quantifying energy efficiency's potential contribution to this effort is difficult, it is widely agreed that it must play a central role.

2. Energy efficiency also has a clear role to play in meeting energy policy objectives but this requires active policy support to overcome the many barriers to its uptake.

3. The potential of energy efficiency is very large and implementing strong energy efficiency policies and measures will have significant environmental, social and economic benefits.

4. A coherent multi-faceted policy framework, rather than any single policy instrument, will be required to drive appropriate levels of energy efficiency across the economy. Important policies include:

    a. Electricity Industry restructuring: Specific energy efficiency, as well as wider sustainability objectives need to be built into the processes of the new Australian Energy Regulator (AER) and Australian Energy Market Commission (AEMC). In particular, the role of retailers in the restructured energy industries should be re-specified as energy service facilitators.

    b. State development policies: Energy intensive industries are responsible for a large proportion of energy demand. A policy choice to continue to subsidise and promote them should be taken only after full consideration of its energy and climate change implications. Any such subsidies should be made in a transparent manner as targeted 'industry development', not potentially concealed through low cost energy deals.

    c. MEPS: MEPS should be extended to cover all appliances, be strengthened over time.

    d. Building Standards: Mandated Environmental Performance should be extended to all new building types, and existing building stock should be addressed by including refurbishments and renovations in the requirements of the Building Code; mandatory disclosure of the energy efficiency of buildings at point of lease and sale, and through government procurement policy, perhaps initially through requirements on renovations and retrofits.

    e. Energy efficiency licensing conditions on industrial facilities: Requiring industrial facilities to undertake regular independent energy audits, report on their performance and undertake energy efficiency actions that fall within some reasonable payback period is a promising approach. A public review will be required to assess the strengths and weaknesses of this approach, and ways that it might be improved. Nevertheless, it appears to be a valuable policy tool that should be supported and extended to states other then Victoria.

    f. Government leadership by example: Government programs should be pushing the frontiers of energy efficiency in equipment and buildings in keeping with government's role in advancing the public interest, and its resources to undertake higher risk options. Its schemes require targets at the agency (authority) level, support including financing to undertake energy efficiency actions, and public reporting requirements.

    g. A price for carbon: Carbon levies and emissions trading are two ways to change the price of energy in a way that drives greenhouse gas emission abatement and hence supports energy efficiency actions. However, for many decision makers energy prices alone are insufficient to drive enhanced energy efficiency and other policies will be required. We also note the need to ensure social equity by enabling low-income consumers to be protected from any impact on electricity prices.

5. Australia will require a hierarchy of energy efficiency targets. However, setting targets only economic on potential is a mistake and they must be also based on environmental and other social needs.

References:

[1] UN Framework Convention on Climate Change, Article 2, 1992.

[2] The Kyoto Protocol calls for starting new talks on next steps to take place by 2005. See Article 9.2; Article 3.9

[3] Pittock P, Wratt D, Basher R, et al. (2001), **Australia and New Zealand**. in McCarthy JJ, Canziani OF, Leary NA, et al. (eds) *Climate Change 2001: Impacts, Adaptation, and Vulnerability*, Cambridge University Press, UK. (http://www.grida.no/climate/ipcc_tar/)

[4] Pittock P, Wratt D, Basher R, et al. (2001), **Australia and New Zealand**. in McCarthy JJ, Canziani OF, Leary NA, et al. (eds) *Climate Change 2001: Impacts, Adaptation, and Vulnerability*, Cambridge University Press, UK. (http://www.grida.no/climate/ipcc_tar/)

[5] See following for examples: Hansen J (2003), **Can we defuse the global warming time bomb?.** *naturalScience*, posted Aug. 1, 2003. (http://pubs.giss.nasa.gov/abstracts/2003/Hansen.html); W Hare. Assessment of Knowledge on Impacts of Climate Change – Contribution to the Specification of Art. 2 of the UNFCCC. Special Report prepared for WGBU. Potsdam, Berlin, Germany, 2003. (http://www.wbgu.de/wbgu_sn2003_ex01.pdf); O'Neill BC, Oppenheimer M (2002), **Dangerous Climate Impacts and the Kyoto Protocol**. *Science* 296: 1971-1972.

[6] European Community (1996). Climate Change - Council conclusions 8518/96 (Presse 188-G) 25/26. VI.96.

[7] CAN International (2002), **Preventing Dangerous Climate Change: Position Paper on the Adequacy of Commitments,** released at COP8 New Delhi, India.

[8] Browne J (2004) **Beyond Kyoto**. Speech to Council on Foreign Relations, New York, 24 June 2004 (http://www.bp.com/genericarticle.do?categoryId=98&contentId=2018970)

[9] Jones RJ (2003), **Managing climate change risks**. Paper prepared for: *OECD Workshop on the Benefits of Climate Policy: Improving Information for Policy Makers*, Working Party on Global and Structural Policies, ENV/EPOC/GSP(2003)22/FINAL, OECD, Paris.

[10] Hoegh-Guldberg O, Hoegh-Guldberg H (2004), **The implications of Climate Change for Australia's Great Barrier Reef: People and Industries at Risk**. WWF Australia, Queensland Tourism Industry Council, Sydney.

[11] Williams SE, Hilbert DW (2004), **Climate Change Threats to the Biological Diversity of Tropical Rainforests in Australia**. in WF Laurance, C Peres (eds) *Emerging Threats to Tropical Forests*, in press.

[12] Thomas CD, Cameron A, Green RE, et al. (2004), **Extinction risk from climate change**. *Nature* 427: 145-148.

[13] Hare W (2003), **Assessment of Knowledge on Impacts of Climate Change – Contribution to the Specification of Art. 2 of the UNFCCC**. Special Report prepared for WGBU. Potsdam, Berlin, Germany (http://www.wbgu.de/wbgu_sn2003_ex01.pdf)

[14] Hare W (2003), **Assessment of Knowledge on Impacts of Climate Change – Contribution to the Specification of Art. 2 of the UNFCCC**. Special Report prepared for WGBU. Potsdam, Berlin, Germany (http://www.wbgu.de/wbgu_sn2003_ex01.pdf)

[15] CAN International (2002), **Preventing Dangerous Climate Change: Position Paper on the Adequacy of Commitments,** released at COP8 New Delhi, India.

[16] German Advisory Council on Global Change (2003) **Climate Protection Strategies for the 21st Century: Kyoto and beyond**. Berlin, Germany. (http://www.wbgu.de)

[17] See: UK Department of Trade and Industry (2003) **Energy White Paper: Our Energy Future – Creating a Low Carbon Economy**. (http://www.dti.gov.uk/energy/whitepaper/index.shtml)

[18] UK Royal Commission on Environmental Pollution (2000). **Royal Commission Calls for Transformation in the UK's use of Energy to Counter Climate Change**. News release, 16 June 2000 (http://www.rcep.org.uk/news/00-2.htm)

[19] See: UK Department of Trade and Industry (2003) **Energy White Paper: Our Energy Future – Creating a Low Carbon Economy**. (http://www.dti.gov.uk/energy/whitepaper/index.shtml)

[20] Saddler H, Diesendorf M, Denniss R (2004), **A Clean Energy Future for Australia**. WWF Australia, Sydney. (http://www.wwf.org.au)

[21] Media Release, Minister for the Environment and Heritage, Senator the Hon. Ian Campbell, 2 September 2004, (http://www.deh.gov.au/minister/env/2004/mr02sep204.html)

[22] See, for example: IPCC (2001), **Third Assessment Report**, Geneva, (http://www.ipcc.ch/) and UK Department of Trade and Industry (2003) **Energy White Paper: Our Energy Future – Creating a Low Carbon Economy**. (http://www.dti.gov.uk/energy/whitepaper/index.shtml)

[23] UK Department of Trade and Industry (2003) **Energy White Paper: Our Energy Future – Creating a Low Carbon Economy**. (http://www.dti.gov.uk/energy/whitepaper/index.shtml)

[24] IPCC (2001) **Climate Change 2001: Mitigation - Technical Summary**, The Third Assessment Report of Working Group III of the Intergovernmental Panel on Climate Change (IPCC), Geneva (http://www.ipcc.ch/)

[25] This 'services model' of the stationary energy sector is by far the most useful for energy policy development yet the role of the stationary energy sector is often taken to be the supply of energy to meet energy demand (see for example, ABARE's *Annual Energy Outlooks*). This view is likely to neglect the importance of energy efficiency.

[26] Australian energy policy objectives as outlined in the recent Australian Government (2004) **Securing Australia's Energy Future** (http://www.pmc.gov.au/publications/energy_future/index.htm) are "prosperity, security and sustainability". More formally COAG has agreed to the following national energy policy objectives: 1) Encouraging efficient provision of reliable, competitively-priced energy services to Australians, underpinning wealth and job creation and improved quality of life, taking into account the needs of regional, rural and remote areas; 2) Encouraging responsible development of Australia's energy resources, technology and expertise, their efficient use by industries and households and their exploitation in export markets; and 3) Mitigating local and global environmental impacts, notably greenhouse impacts, of energy production, transformation, supply and use. (COAG, Energy Policy Details: 8 JUNE 2001)-

[27] See, for example, the IPCC (2001), **Third Assessment Report**, Geneva (http://www.ipcc.ch/), the recent UNDP (2002), **World Energy Assessment**, Washington D.C. (http://www.undp.org/seed/eap/activities/wea/) and, closer to home, the final report of IPART's (2002), **Inquiry into demand management** (http://www.ipart.nsw.gov.au/). Other societal benefits arising from energy efficiency can include energy security concerns, industry development and job creation.

[28] Harrington P (2004), **Energy efficiency – the role of government in an international perspective**, *IEA Expert Workshop on Energy Efficiency Frontiers,* January 2004.

[29] These models actually assume that energy markets don't suffer from market failure - all cost-effective energy efficiency actions are assumed to have been taken up. Technical improvement in energy efficiency over time is generally modelled via a single yearly energy improvement factor derived from historical experience (0.6%/year in this case). Modelling cost-effective energy efficiency improvements in these models can only be done by giving them exogenous shocks.

[30] Allens Consulting Group (2003), **Economic Impact Analysis of Improved Energy Efficiency**. Melbourne. (http://www.seav.vic.gov.au/ftp/energy_efficiency/nfee/Allen%20Consulting%20Group%20-%20Economic%20Impact%20Analysis%20of%20Improved%20Energy%20Efficiency.pdf)

[31] McLennan Magasanik Associates Pty Ltd (2004), **National Energy Efficiency Target**, http://www.seav.vic.gov.au/ftp/energy_efficiency/nfee/MMA_Report.pdf

[32] See a useful discussion by Owen (2004), **Energy efficiency and conservation: policies, programmes and effectiveness**, *IEA Workshop on Energy Efficiency: Past development and future potential*, April 2004.

[33] See, for example, Schipper (2000), **On the rebound? Feedback between energy intensities and energy uses in IEA countries**, *Energy Policy*, 28: 367-388.

[34] For example, the Energy Saving Trust (2002), **Putting Climate Change at the Heart of Energy Policy** (http://www.est.org.uk/uploads/documents/energyasone.pdf) states that it is "…the broad consensus of the energy efficiency community worldwide, that a package of policy instruments is required (p. 5)."

[35] See, for example IEA (2002) *Dealing With Climate Change - Policies and Measures in IEA Member Countries* (see: http://www.iea.org/dbtw-wpd/textbase/envissu/pamsdb/index.html). The IEA's (2000) DSM program on *Mechanisms for Promoting Demand-Side Management in Changing Electricity Businesses* uses a classification system with 25 broad policy mechanisms for promoting energy efficiency.

[36] MacGill I, **Some design lessons from market-based greenhouse gas regulation in the restructured Australian electricity industry,** *Energy Policy*, In press.

[37] For example, the CoAG NATIONAL FRAMEWORK FOR ELECTRICITY AND GAS DISTRIBUTION AND RETAIL REGULATION: FOREWORD AND ISSUES PAPER released in August 2004, makes no mention of energy efficiency or sustainability at all.

[38] See the AGO *Submission to the CoAG Energy Market Review,* 2002 and the Australia Institute (2002), *The Aluminium Smelting Industry - Structure, market power, subsidies and greenhouse gas emissions,* Canberra (http://www.tai.org.au/Publications_Files/DP_Files/DP44SUM.pdf).

[39] See, for example, Tony Marker's presentation for the *Energy Efficiency, Policy in Practice* workshop held at UNSW in March 2004 – available on the UNSW Electricity Restructuring Group website www.ergo.ee.unsw.edu.au.

[40] CSIRO (1999), **Scoping Study of Minimum Energy Performance Requirements for Incorporation into the Building Code of Australia**, Australian Greenhouse Office, Canberra, (http://www.greenhouse.gov.au/buildings/publications/s_study.html).

[41] Australian Greenhouse Office (1999), **Australian Commercial Building Sector Greenhouse Gas Emissions 1990-2010,** Canberra, (http://www.greenhouse.gov.au/buildings/publications/commercial.html).

[42] Woods I (2003), **Climate Change: Where are Australian Companies Positioned?** AMP Henderson Global Investors, (http://www.ieta.org/ieta/www/pages/getfile.php?docID=163).

[43] Australian Conservation Foundation (2004), **Reform of Building Regulation, Response to the Productivity Commission Draft Report**, Melbourne.

[44] Howard J (1997) **Safeguarding the Future**, (http://www.pm.gov.au/news/media_releases/1997/GREEN.html)

[45] Australian Conservation Foundation (2004), **Reform of Building Regulation, Response to the Productivity Commission Draft Report**, Melbourne.

[46] See Passey R (2004), **Review of Some Recent Australian Government Energy Management Programs**, ACRE Energy Policy Group Report, (http://www.ceem.unsw.edu.au/ceem_docs/GovEnManagmentReport.pdf).

[47] AGO (2002), *Submission the CoAG Energy Market Review*, Canberra.

[48] Harrington P (2004), **Energy efficiency – the role of government in an international perspective**, *IEA Expert Workshop on Energy Efficiency Frontiers,* January 2004.

[49] Bowie (2004), **Targets for Energy Efficiency and the Challenge of Measuring: the EU Case**, *IEA Workshop on Energy Efficiency – Past Development and Future Potential*, April 2004.

[50] Harrington P (2004), **Energy efficiency – the role of government in an international perspective**, *IEA Expert Workshop on Energy Efficiency Frontiers,* January 2004.

[51] Pears A (2002), *Submission to the CoAG Energy Market Review*, 2002.

[52] UK Department of Trade and Industry (2003) **Energy White Paper: Our Energy Future – Creating a Low Carbon Economy**. (http://www.dti.gov.uk/energy/whitepaper/index.shtml)

[53] For example, achieving a 20% reduction in energy sector emissions while energy demand grows at an average 1% year requires that the emissions intensity of energy supply has to reduce at 2.5% a year.

[54] The possible rate of change in energy consumption is limited by stock turnover of infrastructure (such as buildings and industrial plants) and equipment (eg. household appliances and electrical motors).

[55] See the NZ Energy Efficiency and Conservation Strategy, http://www.eeca.govt.nz/Strategy/faq.html

[56] For example, a study for the national Australian National Greenhouse Response Strategy to develop suitable indicators for the overall impact of of the NGRS suggested 70 indicators. See Pears A (1995), **Performance Indicators for the National Greenhouse Response Strategy**, Prepared for the Department of the Environment, Sport and Territories, Canberra, June 1995.

[57] See Pears A (1995), **Performance Indicators for the National Greenhouse Response Strategy**, Prepared for the Department of the Environment, Sport and Territories, Canberra, June 1995.

[58] Life-cycle energy costs are calculated by adding capital and discounted operating costs. The choice of discount rate is an area of major debate. In the view of many policy experts, a societal (low) discount rate is appropriate.

[59] These targets will be extremely specific – for example, average efficiency of new domestic refrigerators (kWh/Litre/year)