



A prosperous low carbon future

WWF's proposal to reduce Australian greenhouse gas emissions by a third by 2030

Discussion paper

**WWF invites comments on the action plan proposed in this report.
Comments should be sent by mail to the address on the back page
or by email to enquiries@wwf.org.au**

**References, assumptions and explanatory notes to this document may be found
in the companion document entitled "A prosperous low carbon future. WWF's proposal
to reduce Australian greenhouse gas emissions by a third by 2030. Discussion Paper.
References, assumptions and explanatory notes", a copy of which is available
at www.wwf.org.au or by contacting enquiries@wwf.org.au**

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Disclaimer

Although the authors have endeavoured to address and incorporate comments raised by peer reviewers, the document does not necessarily reflect the views of those reviewers.

This document is intended to provide general guidance in the development of greenhouse gas abatement policy. While the authors endeavour to provide reliable information and believe the information contained in this report is accurate, they will not be liable for any claim by any party acting on this information.

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Executive summary

The WWF action plan

This action plan sets out policies and measures to affordably reduce Australia's greenhouse gas emissions 30% below 1990 levels by 2030.

In 2030, the Australian population is expected to have grown to almost 25 million with real Gross Domestic Product (GDP) anticipated to be two and a half times greater than it is now (a near doubling of per person GDP). Under a high emissions scenario based on Australian Government projections and without further policy action, greenhouse gas emissions are expected to grow by some 45%.

However, with priority action, emissions can be dramatically reduced using existing cost-effective efficiency measures coupled with existing (or rapidly emerging) low emission technologies, and without major structural shifts in the economy away from energy intensive industries.

This action plan seeks greenhouse gas abatement opportunities across all sectors of the economy, but relies on two key elements:

- Postponing the need for new electricity generation capacity through comprehensive efficiency improvements in the residential, commercial and industrial sectors using existing cost-effective technologies – this could postpone the need for new capacity by a decade or more.
- Ensuring all new electricity generators use existing or rapidly emerging low emission technologies – if anticipated trends are realised for solar thermal, geothermal, advanced coal technologies and carbon capture and storage, a number of low emission technologies suitable for base load are likely to emerge within the next decade.

Harnessing energy efficiency opportunities

There are significant opportunities for cost effective emission reductions in almost every sector of the economy.

Many of these are not taken up for a range of reasons that include cultural, institutional and information barriers, competing priorities and the fact that energy bills generally are a small part of overall living costs.

However, over the next 25 years virtually all appliances, vehicles and buildings will be replaced,

built, re-built or subject to major refurbishment – providing the perfect opportunity for replacement of old, redundant and inefficient technology with cost effective and efficient alternatives with lower running costs.

The measures included in this action plan build on existing policies and measures to encourage efficiency, but extend and strengthen them.

Key elements include:

- Accelerating and enhancing the work of the National Appliance and Equipment Energy Efficiency Committee in overseeing minimum standards that:
 - prevent the sale of inefficient technologies;
 - promote early adoption of new and rapidly emerging low emission technologies; and
 - raise community awareness of the benefits of energy efficiency.
- Setting minimum appliance and equipment efficiency standards, and other efficiency requirements, for new and existing facilities to include:
 - all measures where the economic benefit exceeds costs
 - an explicit valuation of greenhouse emissions; and
 - continual reviews to ensure all technological developments are incorporated as soon as possible.
- Developing programs to influence consumption patterns and consumer choice to favour low emission goods and services.

Encouraging low emission generation infrastructure

Currently the lowest cost electricity – traditional coal fired power – is also the most emission intensive.

However, if anticipated trends are realised for a number of rapidly emerging technologies (including solar thermal, geothermal, advanced coal technologies and carbon capture and storage), there are likely to be a number of cost competitive low emission technologies available within the next decade.

In order to ensure the development, deployment and use of these technologies, this action plan relies on:

- Establishing a carbon price signal through an emissions trading scheme or carbon tax – until the external cost of greenhouse gas emissions is internalised into the cost of electricity generation, cheap high emission fossil fuel technology will continue to dominate electricity generation.
- Setting minimum emissions intensity standards for new electricity generators at the level of best practice combined cycle gas turbine performance, which will exclude new investment in traditional coal power, unless it is accompanied by carbon capture and storage.
- Encouraging technology development to drive innovation and cost reductions over time.

A carbon price signal could be introduced in the form of a carbon tax, an emission trading scheme or a combination of the two.

Under a trading scheme, the traded price would depend on the cap set under the scheme and the available abatement.

However, a price of around \$25 per tonne is within the range of shadow prices being used by major Australian businesses in making significant investment decisions and would be sufficient to shift investment decisions towards low emission technology.

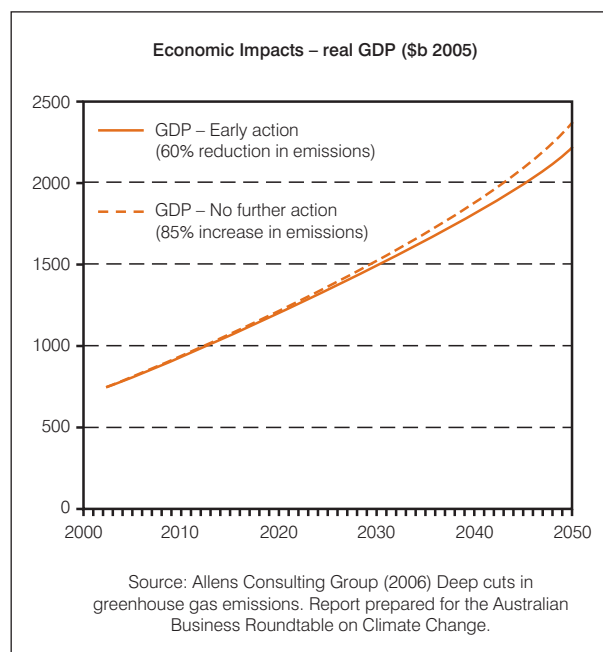
Economic costs of emission reductions

The economic cost of the 30% reduction in emissions as outlined in this action plan is affordable.

Economic modelling of the impacts of deep cuts in emissions overwhelmingly indicates continuing strong economic growth.

For example, the recent study by the Australian Business Roundtable on Climate Change (BP, IAG, Origin, Swiss Re, Visy, Westpac and ACF) found that GDP increased by 167% from 2005 to 2050 with policy action (that is that GDP is two and two thirds its current level by 2050) and the standard of living in 2050 should be equivalent to the standard of living attained in 2049 under business as usual (not taking the impacts or costs of climate change into consideration).

A recent study by the Australian Bureau of Agricultural and Resource Economics (ABARE) found similar results with respect to GDP under comparable scenarios.



Key issues are:

- Low carbon emissions are consistent with future economic prosperity.
- The most serious question is how to manage the process of adjustment and preparation for future global constraints.

Priority deployment of all cost-effective energy efficiency measures and a modest price on carbon will ensure that process is as smooth as possible and will avoid future shocks to the economy.

The data and assumptions in this report

The assumptions about population growth, GDP and energy use in 2030 are drawn from:

- Australian Bureau of Agricultural and Resource Economics (ABARE) report *Australian Energy – National and state projections to 2029-30*.

The ABARE report includes both stationary energy and transport and projects that emissions from both will double by 2030.

The ABARE report assumes no additional policies are put in place to reduce greenhouse gas emissions and that international action to deal with climate change will not significantly impact Australia.

This is unlikely given increasing global concerns about the impacts of climate change.



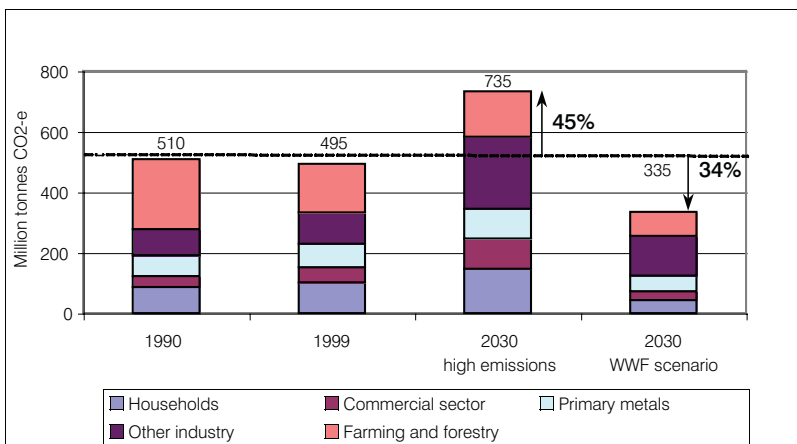
As a result, the ABARE scenario leaves Australia exposed to high carbon liabilities in the future as well as failing to capture cost-effective efficiency gains in the short term that benefit the broader economy.

The low emission scenario in this action plan takes the ABARE projections as a starting point and includes the same underlying assumptions of

economic activity, but gives priority to the reduction of greenhouse gas emissions.

It delivers a 30% reduction in greenhouse gas emissions by 2030, and sets Australia on a path to reduce emissions by 60% by 2050 and to make even greater reductions if our understanding of climate change finds they are required.

Emissions down a third by 2030 in the WWF scenario



Australian households

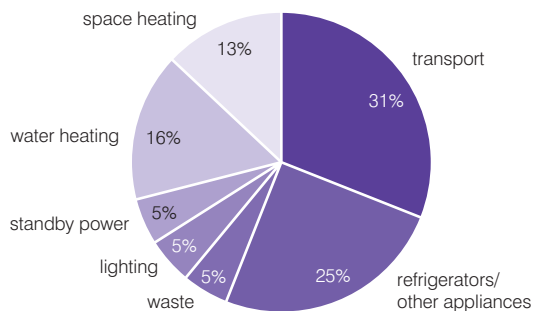
The challenge

Australia's eight million households are responsible for over 100 mt or around 20% of Australia's greenhouse gas emissions, including direct emissions from transport and waste and indirect emissions from electricity used for household appliances.

With increasing population, higher disposable incomes, increasing sizes of homes, decreasing numbers in each household and other lifestyle changes, emissions in this sector could increase by almost 70% by 2030.

At about 2.5% of household spending, energy bills generally make up a small proportion of living costs in Australia. In 2004, an average of \$23.59 was spent on energy bills a week.

Household emissions



The opportunity

There are countless reports demonstrating significant economic potential that energy efficiency offers for households, with highly efficient, cost-saving technologies available for virtually all household appliances, equipment and buildings.

In addition:

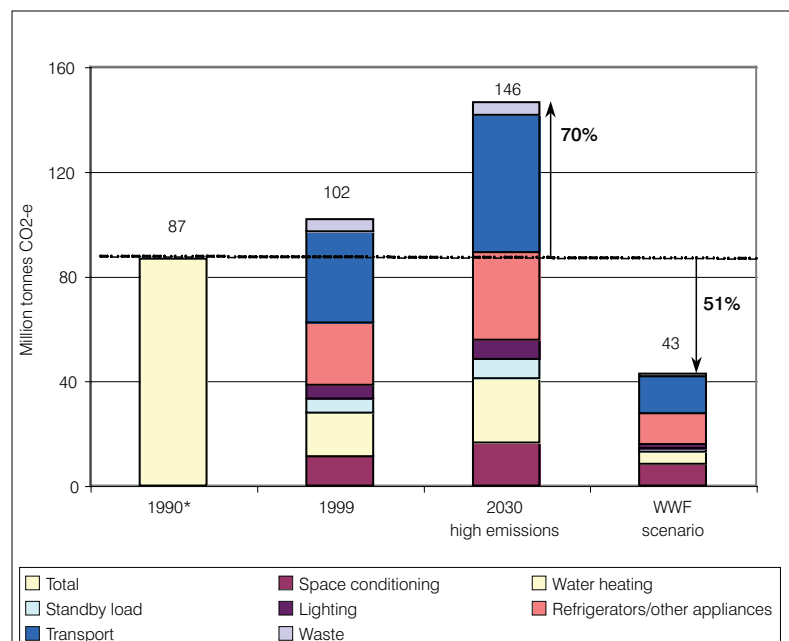
- Electricity use in water heating can be replaced with less intensive natural gas or solar heaters,
- A wide array of hybrid and other high efficiency cars are rapidly coming to market in all vehicle sizes with substantial fuel savings,
- Improved management and disposal of household waste can reduce emissions.

Around 50% emission reductions can be economically achieved in the household sector by 2030 relative to 1990 levels (around 75% below business as usual), while continuing to improve living standards.

Expected savings by technology

Appliances	
Refrigerator	75%
Standby power	70%
Lighting	80%
Water heating	
Heating system	60%
AAA showerheads	20%
Other appliances	40%
Building standards	50%
Lower electricity emissions intensity	59%
Household waste	90%
Transport	
Car efficiency	75%
Biodiesel	20%

Household emissions can be cut by about 50% by 2030



Household policies and measures

Change consumption patterns and consumer choice

Steps in the right direction

- National energy star ratings for appliances.
- NSW trials of fully featured smart metering and rollout of interval metering for Victorian homes.



Additional measures required

- All jurisdictions encourage labelling in all cases where there is a significant difference in the impact of competing goods and services.
- State and Territory Governments adopt smart metering rollout, with flexible pricing and fully featured to facilitate response to extreme peak pricing, customer feedback, and remote meter reading.

Improve standards – electrical appliances

Steps in the right direction

- Minimum energy performance standards for appliances – these already save over \$2 in energy costs for every additional \$1 in manufacturing.
- South Australian Government commitment to ban electric storage hot water systems.



Additional measures required

- All jurisdictions accelerate the proposed extension of minimum energy appliance standards (standards are yet to be set for lighting, standby power and pool pumps).
- All jurisdictions review and update standards every two years to remove all economically inefficient appliances from the market.
- All jurisdictions amend the economic test to capture all cost-effective measures, where benefits outweigh costs, and use full long-run marginal costs to more accurately reflect the economic benefits.

Improve standards – building codes

Steps in the right direction

- Minimum energy standards for residential homes have been proposed for the Building Code.
- Victoria and NSW have recently adopted energy requirements for new homes and major refurbishments that should deliver economic savings and extensive abatement.



Additional measures required

- All jurisdictions implement proposed building standards for new homes and major renovations without delay (at a minimum adopt the best elements of the Victorian and NSW approaches) and include a two yearly review to ensure new economic opportunities are incorporated.
- All jurisdictions amend the economic test to ensure all cost effective measures are captured (i.e. benefits outweigh costs) and use full long-run marginal costs (including social and environmental benefits) to more accurately reflect the economic benefits.
- State and Territory Governments extend codes to existing homes with incentives for improved performance.
- All jurisdictions require mandatory disclosure of home energy ratings at point of sale and lease with minimum performance standards.

Waste management – source reduction and improved disposal

Steps in the right direction

- State and local government waste reduction programs.



Additional measures required

- State and Territory Governments end waste to landfill through waste avoidance, advanced recovery and disposal of residuals to bioreactors rather than traditional landfills.

National climate change commission

Steps in the right direction

- Establishment of a Senior Officials' Group by the Council of Australian Governments (COAG) to examine the scope for national co-operation on climate change policy.



Additional measures required

- All jurisdictions establish a national climate change commission similar to the National Water Commission.

Commercial sector – business, administration and services

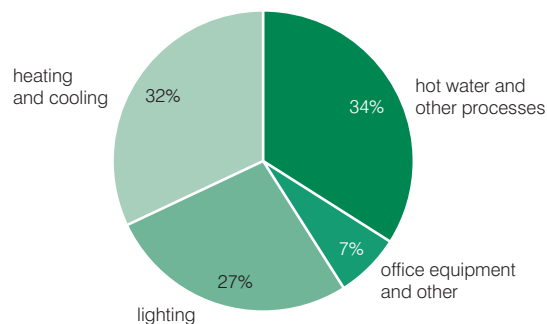
The challenge

Australia's commercial sector is responsible for over 50 mt or around 10% of national greenhouse gas emissions, primarily from building energy use. With expected strong economic growth continuing, emissions in this sector are forecast to more than double by 2030 in a high emissions growth scenario.

The commercial sector is made up of a diverse range of businesses and institutions. Around 85% of building energy emissions are from the retail/wholesale, government and administration and general business sectors. The remaining 15% of energy emissions are from cultural, hospitality, recreational and communications facilities.

Energy is predominantly from electricity, with non-electricity use accounting for around 30% of energy use, but less than 10% of greenhouse gas emissions. Energy efficiency is generally poor in this sector, with institutional and cultural barriers to use of more efficient technologies.

Commercial building energy use emissions



The opportunity

Each year, Australians invest around \$13 billion in either new buildings or major renovations of around 4% of existing buildings. This means that by 2030, almost the entire building stock will have undergone a major renovation. This renovation cycle provides an excellent opportunity to invest in efficiency savings.

Emission reduction fact

An average office building uses around 15-20 Watts of power for every square metre of lighting.

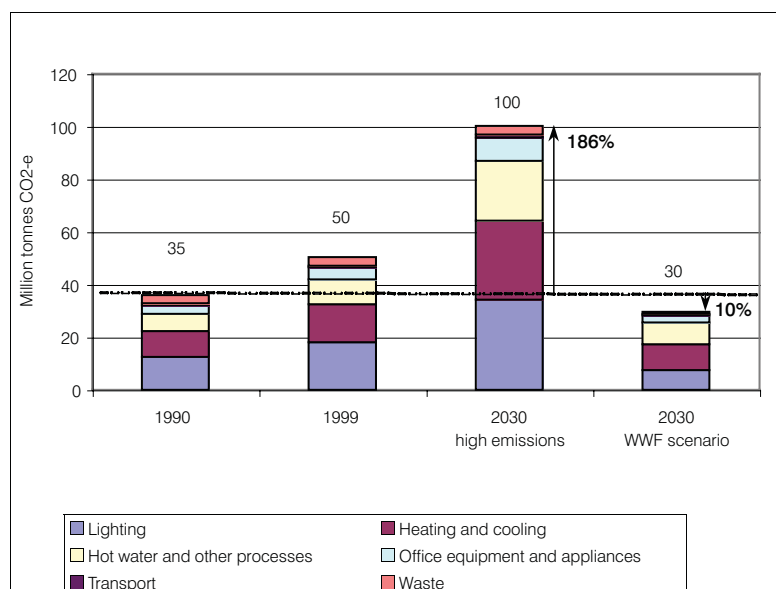
The currently proposed building code will reduce this to 10 (a 33-50% cut).

If high efficiency luminaires, low loss ballasts and motion detectors are used, levels of around 2-4 Watts are achievable with net economic benefit and a 75-90% reduction in energy use.

Expected savings by technology

Proposed building standards	20%
Improved standards using available cost effective technologies	50-70%
Lighting improvements (sensors and new technologies)	70%
Lower electricity emissions intensity	59%
Transport	
Car efficiency (e.g. hybrids)	60%
Biodiesel	20%

Commercial emissions can be cut by 10% by 2030



Policies and measures for the commercial sector

Influence consumption

Steps in the right direction

- Under a scheme developed in NSW, office buildings can achieve a greenhouse performance rating – assisting with optimal building management and providing information for prospective tenants.



Additional measures required

- All jurisdictions extend greenhouse ratings to non-office commercial buildings. Regularly review the scheme to reflect changing best practice.
- All jurisdictions require mandatory disclosure of greenhouse ratings at point of sale and lease for all buildings and tenancies.
- All jurisdictions provide incentives for net zero greenhouse impact buildings.
- All jurisdictions facilitate adoption of high efficiency solutions in data centres.

Improve standards – building energy use

Steps in the right direction

- New buildings will use 20% less energy under minimum energy performance standards proposed for the Building Code of Australia.



Additional measures required

- All jurisdictions implement proposed building standards without delay and include a regular two-yearly review of new economic opportunities.
- All jurisdictions amend the economic test to ensure all cost effective measures are captured (i.e. benefits outweigh costs) and use full long-run marginal costs to more accurately reflect the economic benefits.
- All jurisdictions require new prestige office buildings to integrate solar panels or other on-site renewables to generate at least 5% of energy demand.

Office equipment and appliances

Steps in the right direction

- Minimum energy performance standards and labelling for appliances.
- Energy Star standards for energy efficient electronic equipment have been adopted by Australia but, although compliant, office equipment is not always activated to save energy.



Additional measures required

- All jurisdictions accelerate proposed extension of minimum energy appliance standards and labelling (standards are yet to be set for lighting and standby power).
- All jurisdictions review and update standards every two years to remove all economically inefficient appliances from the market.
- All jurisdictions amend the economic test to capture all cost effective measures – where benefits outweigh costs – and use full long-run marginal costs to more accurately reflect the economic benefits.
- All jurisdictions require all Energy Star compliant equipment sold in Australia is Energy Star enabled prior to sale.

National climate change commission

Steps in the right direction

- Establishment of a Senior Officials' Group by the Council of Australian Governments (COAG) to examine the scope for national co-operation on climate change policy.



Additional measures required

- All jurisdictions establish a national climate change commission similar to the National Water Commission.

Energy-intensive trade-exposed primary metals

The challenge

Australia's primary metals industries are large and energy intensive, with only a few dozen facilities responsible for about 75 mt or 15% of Australia's greenhouse gas emissions.

Emissions are from energy use in production (e.g. coal, natural gas and electricity for thermal and chemical processes and motors), processes (e.g. emissions of perfluorocarbons (PFCs) in aluminium smelting) and transport.

Strong international competition, small cost differentials and changing market conditions have a large prospective impact on the industry's future investment, production and emissions. As a result, the outlook for "business as usual" metals production and emissions over the long term is relatively speculative and is driven by a few developments and a handful of companies.

The high emissions scenario adapted from ABARE's 2030 projections assumes slight increases in steel and aluminium production, and emission reductions for iron, steel and aluminium smelting from efficiency gains and lower intensity electricity.

Emission reduction fact

Although aluminium smelting is highly electricity intensive, using 100% Green Power in aluminium production would cost less than one cent more per soft drink or beer can.

The opportunity

Significant, ongoing technology improvements are clearly foreshadowed for primary metals. This analysis identified a number of technological developments which are either cost effective now, or likely to be under a modest carbon price signal.

Keeping pace with these improvements is essential for Australian industries, both to remain internationally competitive and to achieve substantial cuts in emissions.

Emission reduction fact

The WA HISmelt steel plant produces 30% less emissions than a typical blast furnace plant.

At the same time, the plant is able to process lower quality iron ore quicker, with more flexible production times and at a lower capital cost.

A state-of-the-art aluminium smelter uses about 15% less electricity than a typical plant through improved processes (e.g. larger efficient anodes).

Emission savings as plants are built or refurbished post 2020

US aluminium industry roadmap

Alumina, including process, heat recovery, fuel switching 37%

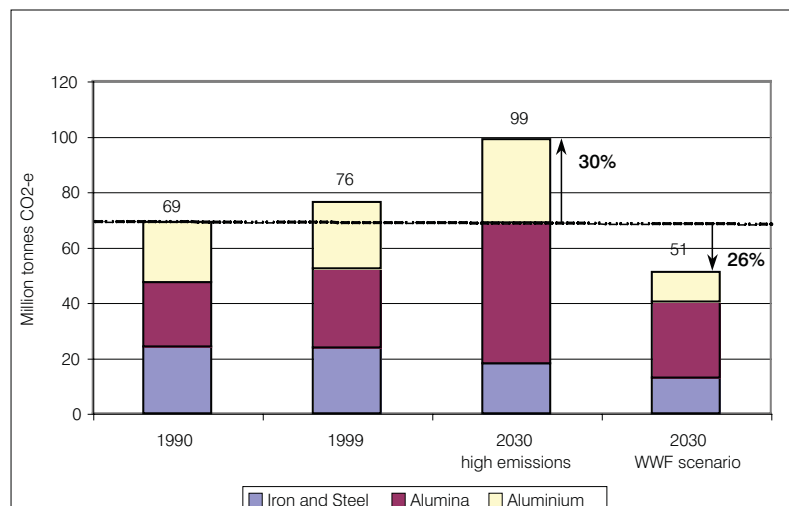
Aluminium energy-related savings, including advanced "inert" anodes and wetted cathodes 24%

Aluminium PFC and carbon process emissions – advanced "inert" anodes in smelting 100%

Iron and steel – energy-related reductions using range of process and control improvements 34%

Transport of inputs and products, including range of improvements in engines and freight methods 20%

Primary metals emissions can be cut by a quarter by 2030



Other industries

The challenge

Australia's other industries, including mining and manufacturing, are responsible for around 110 mt or 25% of national greenhouse gas emissions. These emissions are primarily generated by a wide range of processes involving motors, boilers and chemical reactions. With strong expected economic growth, emissions in this sector could double by 2030.

Manufacturing industries are highly diverse, producing chemicals, food, wood and paper, machinery, and a host of other goods. Energy is used for diverse applications, but the substantial majority is in electric motors, boilers and kilns.

Emissions growth, however, will be considerably slower than GDP growth due to reduced emissions intensity in electricity generation, modest improvements in energy efficiency, and a gradual move from electricity to natural gas.

The largest emissions increases arise from Australia's production of LNG and coal for export, helping meet the world's demand for energy.

A doubling of coal production by 2030 would also be driven by strong export growth.

Expected savings from today as facilities and equipment are refurbished

High efficiency boilers/systems	Up to 50%
Improved process controls	Up to 50%
Use of waste products for fuel	
High efficiency motors	Up to 35%
Coal mine methane management	Up to 75%
Management of refrigerants/foaming	30%
High efficiency freight technology	20%

The opportunity

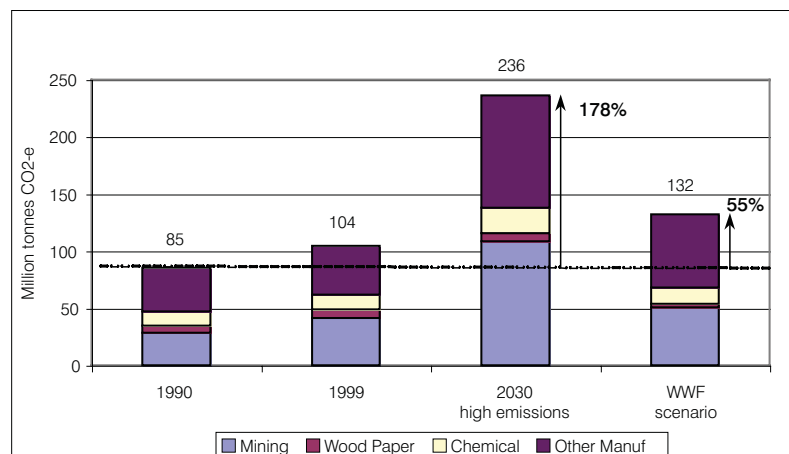
In manufacturing, as in other areas, there are extensive opportunities for cost-effective energy efficiency and emissions reduction using existing, well demonstrated technology. There are widely acknowledged and understandable reasons why many of these opportunities remain unimplemented by industry, despite the economic benefits.

Opportunities are highly site-specific, but numerous analyses have identified significant opportunities using current technology, particularly as equipment and factories are replaced or refurbished over time.

Emission reduction fact

As a global energy supplier, Australia bears a heavy load of emissions. For example, producing LNG has historically required using about 15% of the energy content in liquefying. Coal mining also requires energy inputs, and releases fugitive methane emissions

Growth in other industrial emissions can be constrained with existing technologies by 2030



Policies and measures for primary metals and other industries

Greenhouse challenge

Steps in the right direction

- Australian Government Greenhouse Challenge Plus voluntary program.



Additional measures required

- Australian Government continue to build on program and ensure efficiency elements of the Energy White Paper are included.

Technology push for new low and no emission technologies

Steps in the right direction

- Australian Government's \$500 million Low Emissions Technology Demonstration Fund
- Australian Government's Greenhouse Gas Abatement Program
- Australian Government's Strategic Investment Co-ordination grants – HISmelt process received a \$125 million grant.



Additional measures required

- Australian Government scale up the Low Emission Technology Demonstration Fund to \$200 million per year to drive innovation and bring forward deployment of large high efficiency projects.
- Australian Government seek co-ordination of this funding with international technology development efforts.
- Australian Government set aside around 20% for smaller scale projects that have significant potential but require considerably smaller funding increments than the \$60m minimum under the current fund.
- All jurisdictions link funding assistance to any industries with commitments to implementation of other emission reduction activities (for example mandatory implementation of cost effective efficiency projects)

Emissions trading incentives/market pull

Steps in the right direction

- National Emission Trading Taskforce
- Queensland 13% gas scheme
- Australian Government mandatory renewable energy target
- NSW Greenhouse Gas Abatement Scheme – mandatory intensity targets.
- WA domestic gas set aside requirement for LNG projects



Additional measures required

- All jurisdictions make clear statements that project proponents will be liable for future carbon compliance costs.
- All jurisdictions (or the states and territories alone) introduce a market signal through a carbon price (either a carbon tax or cap-and-trade emissions trading scheme or a combination of the two) with measures to minimise negative impacts on Australia's export sector and assist in transition to lower emission technologies. A carbon price will provide clear strong market signals to encourage superior technology investment decisions.
- Include emissions of process and fugitive gases in the carbon price signal.
- Australian Government support and encourage international agreements to ensure price signals are consistent and avoid disadvantaging energy-intensive trade-exposed sectors.
- All jurisdictions require significant emitters to measure and publicly report annual emissions.
- All jurisdictions cease electricity supply subsidies for aluminium when present electricity contracts end.

International collaboration, including technological development

Steps in the right direction

- ASIA Pacific Partnership on Clean Development and Climate to promote development, deployment and transfer of clean energy technology, while recognising the need for the target and timetable approach in the Kyoto Protocol.



Additional measures required

- Australian Government ratify Kyoto Protocol and actively engage in second commitment period negotiations.
- Australian Government support the Asia Pacific Partnership on Clean Development and Climate with a firm schedule, clear quantitative goals, appropriate budgets and two-yearly reviews.
- Specifically include in the Asia Pacific Partnership on Clean Development and Climate efficient achievement of – and access to – international best practice programs (for example, the US primary metals “roadmaps” technologies).
- Australian Government ensure Australian government abatement technology co-funding is used to leverage international research and deployment work.

Mandatory audits and strategic review of new projects

Steps in the right direction

- Energy audits are mandatory for large users in Victoria and NSW and the Commonwealth Energy Efficiency Opportunities program requires detailed energy assessments and public reporting.



Additional measures required

- Australian Government implement the proposed national audit program as soon as possible. Assessments should consider energy price scenarios based on the incremental cost of energy not just average prices, and including a carbon price.
- Australian Government extend audit program to include opportunities for greenhouse emission reductions.
- Australian Government broaden coverage of national audit program beyond largest 250 energy users.

National climate change commission

Steps in the right direction

- Establishment of a Senior Officials’ Group by the Council of Australian Governments (COAG) to examine the scope for national co-operation on climate change policy.



Additional measures required

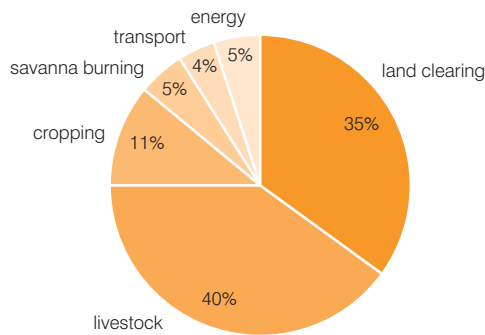
- All jurisdictions establish a national climate change commission similar to the National Water Commission.

Farming, forestry and land management

The challenge

Over 140,000 individual enterprises make up the farming, forestry and land management sectors and covers more than 60% of Australia's land mass. The sectors are responsible for about 160 mt of CO₂ equivalent emissions (CO₂e) or 30% of national emissions and are the dominant source of methane and nitrous oxide.

Farming and forestry and land management emissions



Emissions are primarily from land clearing, livestock, cropping and savanna burning. However, emissions are difficult to measure and manage, resulting in significant uncertainties.

Although emissions from land clearing have more than halved since 1990, they are still substantial and

land clearing controls in Queensland and NSW are expected to reduce them by a further 50%. The amount of carbon sequestered through tree planting is increasing and currently offsets around a third of land clearing emissions, with even further planting opportunities available.

Livestock emissions, primarily from sheep and cattle, accounted for 67 mt or 12% of national greenhouse emissions. This includes emissions from digestion (around 10-15% of energy from food intake is lost as methane), manure and soil disturbance. Methane emissions are 21 times more potent than CO₂ emissions.

Crop production contributes emissions from soil disturbance, inefficient fertiliser use and residue burning. Savanna burning is also a major contributor, but emissions are difficult to allocate between natural and human activity and are largely driven by fuel accumulation and wildfires.

The opportunity

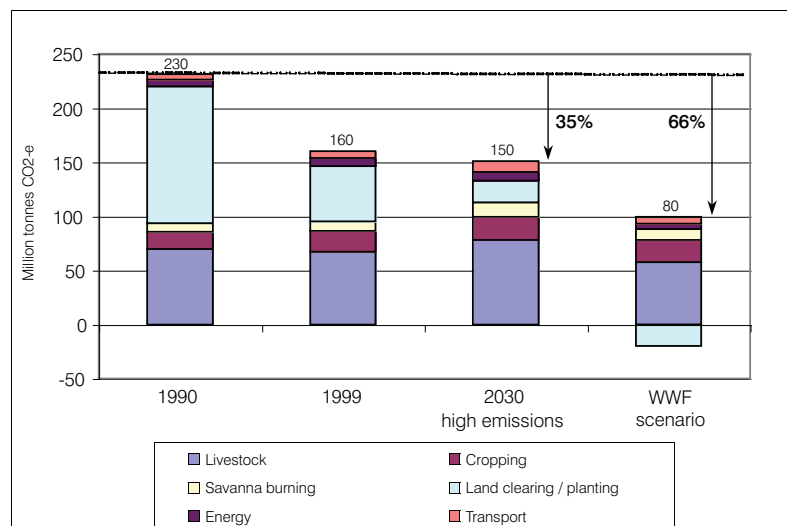
Current land and water reform processes are likely to result in significant changes to Australian agriculture and future emissions are therefore difficult to project with any degree of accuracy. However, it is imperative that greenhouse risks and opportunities are considered in determining appropriate future land uses, including adapting to the impacts of climate change.

Possible savings from today*

Land clearing restrictions to ensure no net clearing	100%
Livestock emission reductions through selection, feed management and vaccinations	30-35%
Fertiliser application optimisation	25-80%
Manure use for energy and fertiliser	50-100%
Savanna fire management	50%
Vehicle efficiency and biofuels	50%
Energy efficiency / process improvements	25%

* Many of these opportunities are several years away from widespread implementation and require further research.

Farming and forestry emissions



Policies and measures in farming, forestry and land management

General sector wide initiatives

Steps in the right direction

- Government-Business Climate Change Dialogue – Agriculture and Land Management Working Group.



Additional measures required

- All jurisdictions include research on reducing emissions as a priority area for funding under existing research and development partnerships (and link government funding to this priority).
- All jurisdictions undertake a communications campaign about the implications of climate change for the agricultural sector and opportunities for new markets (e.g. biofuels).
- All jurisdictions work with the sector to incorporate greenhouse emissions into appropriate management tools and establish emissions reporting to build capacity and understanding.

Livestock

Steps in the right direction

- A range of research projects underway.



Additional measures required

- All jurisdictions assess the greenhouse outcomes from management options, including animal selection, pasture feed and waste management.
- All jurisdictions assess potential for market-based measures to promote less greenhouse intensive practices and include offset credits for manure use for bioenergy and fertiliser in emissions trading.

Land clearing and tree planting

Steps in the right direction

- Queensland and NSW land clearing restrictions
- National Heritage Trust funding for tree planting and NSW credits under Greenhouse Gas Abatement Scheme.



Additional measures required

- All state and territory jurisdictions tighten land clearing restrictions to a no net emissions on a catchment basis (and require sinks credits to be created before clearing to minimise risk of sinks not eventuating).
- All jurisdictions provide funds (potentially from emissions trading revenue) for net increases in sinks on a property wide basis.

Cropping

Steps in the right direction

- Information programs including minimum tillage and better fertiliser use.



Additional measures required

- All jurisdictions assess the greenhouse outcomes from different crop management and include in best practice guidelines.

National climate change commission

Steps in the right direction

- Establishment of a Senior Officials' Group by the Council of Australian Governments (COAG) to examine the scope for national co-operation on climate change policy.



Additional measures required

- All jurisdictions establish a national climate change commission similar to the National Water Commission.



Transport and urban form

The challenge

Although transport emissions are included in the previous end use sectors, a separate transport section is included to provide additional details on technologies and policies and measures due to the significant level of emissions and projected growth.

Transport emissions are growing rapidly, already more than 23% above 1990 levels, and ABARE anticipates that they will be more than 60% above current levels by 2030. Transport emissions are dominated by road transport, which accounts for 80% of emissions, and is followed by air transport (13%), water, rail and pipeline transport.

Urban transport emissions are increasing, not only as population increases, but as a result of:

- High and growing levels of car ownership – every second person in Australian and US cities has a car and Australia has the highest level of urban car ownership per GDP.

- High levels of car use and particularly private car transport – 79% in Australian cities compared to 50% in Europe and 42% in wealthy Asian cities.
- Increasing size and power of cars.
- Decreasing use of public transport as a share of transport.

The opportunity

There is a considerable range in the emissions performance of existing vehicle technologies and Australia doesn't need to rely on major technological breakthrough to have a significant impact.

Improvements in urban form have additional benefits including less time spent travelling to work, less urban congestion, less urban pollution and better human health.

Policies and measures for transport

Invest in cleaner, safer and more reliable public transport and better urban form

Steps in the right direction

- Central Area Transport Services – free city routes in Perth city.



Additional measures required

- Australian Government implement a mechanism which allows public transport to compete for Federal transport funding on favourable terms with road. A good model could be the United State's Transport Equity Act.
- All jurisdictions promote mixed use development and greater urban density.
- Australian Government implement recommendations 4-11 of the House of Representatives' Standing Committee on Environment and Heritage report *Sustainable Cities*.

Change consumption patterns and consumer choice

Steps in the right direction

- Australian Government green vehicle guide established with star ratings based on environmental performance.



Additional measures required

- All jurisdictions scale new car stamp duty and registration charges according to environmental ratings to encourage more efficient cars.
- All state and territory jurisdictions scale car registration charges according to environmental ratings and distance travelled since last registration.
- All jurisdictions initiate a public campaign to encourage shorter trips, car sharing and active transport options (walking, cycling and public transport) at a similar scale to the Do the Right Thing campaign.

Encourage more efficient corporate fleets

Steps in the right direction

- Australian Government green vehicle guide established with star ratings based on environmental performance.



Additional measures required

- Australian Government implement recommendation 8 of the House of Representatives' Standing Committee on Environment and Heritage report *Sustainable Cities*.
- Australian Government negotiate voluntary corporate targets to encourage higher fleet performance beyond the minimum standard, with credits that can be traded between manufacturers as well as annual public reporting.
- All jurisdictions require corporate car fleets to disclose average fleet ratings to assist prospective customers to select appropriate fleet.
- Australian Government remove perverse incentives under fringe benefits tax arrangements for increased corporate travel and the purchase of inefficient vehicles.

Set minimum standards for vehicle fuel efficiency

Steps in the right direction

- Voluntary average vehicle fleet fuel efficiency target agreed between the Australian Government and the car industry to meet by 2010 for passenger vehicles, a further voluntary 4WD target was to be set in 2004 but is yet to be agreed.



Additional measures required

- All jurisdictions, establish minimum fuel efficiency standards for passenger and light commercial vehicles set at least at the current voluntary target and based on emerging hybrid performance. Two yearly reviews should include emerging technologies and all measures with net benefit based on full long-run marginal costs.

Encourage biofuels

Steps in the right direction

- Fuel excise rebate for up to 350ML of biodiesel each year.
- The Prime Minister's Biofuels Taskforce to examine the benefits and impacts of biofuels.



Additional measures required

- Australian Government reform fuel excise so that it is based on net full lifecycle carbon emissions rather than energy content.

National climate change commission

Steps in the right direction

- Establishment of a Senior Officials' Group by the Council of Australian Governments (COAG) to examine the scope for national co-operation on climate change policy.



Additional measures required

- All jurisdictions establish a national climate change commission similar to the National Water Commission.

Electricity generation

The challenge

Some 35% of Australia's total greenhouse gas emissions are emitted in the generation of electricity that is consumed by various end users including: households, commercial buildings and industry. This document allocates these emissions to the various sectors.

Electricity is generated primarily from coal, with brown and black coal together accounting for 76% of Australia's electricity generation. Renewable energy contributes around 8% of which about 85% is hydro. On average, just over one tonne of CO₂ is emitted for every megawatt hour of electricity generated in Australia. Coal is the most greenhouse intensive fuel, with new generators emitting around 0.85 tonnes of CO₂ for every megawatt hour, compared to gas which is currently around 0.4tCO₂e/MWh and renewable energy which does not emit at all.

Total emissions from electricity generation are expected to grow rapidly as increasing energy demand is met through construction of new coal and gas plants. However, some modest efficiency improvements and an increasing share of gas will result in a slight decline in emissions intensity.

Australia is currently in the fortunate position of having many years before major new commitments to base load plant might be needed. Over the next decade, most new capacity will be to meet extreme peaks, where low capital cost gas turbines are the natural

choice. Where additional base load plants are needed sooner, commitments have already been made to high efficiency, low emission gas plants.

The need for new base load commitments can be further postponed through extensive opportunities for energy efficiency that provide financial benefits to the whole economy and substantially reduce demand in 2030, even while per capita GDP doubles.

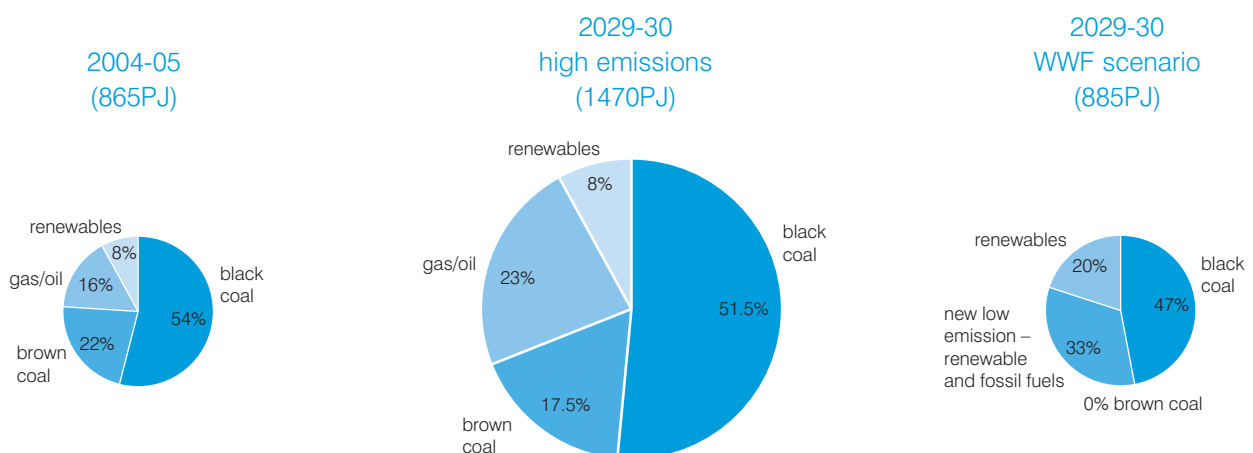
However, even with declining energy demand, new generation will be required as existing high emissions coal plants age and are retired. A moderate carbon price will mean that investment in a range of low emission technologies would be economic.

The opportunity

As the intensive energy efficiency efforts outlined in previous sections reduce total consumption and coal generators are retired and replaced by significantly lower emission plants, the overall emissions intensity could be reduced by some 59% by 2030 relative to the high emissions scenario.

This is a "worst case" scenario as it assumes that new generation intensity is equivalent to existing high efficiency gas plants (combined cycle gas technology or co-generation plants). If new capacity is met with renewable energy or "advanced" coal technology with carbon capture and storage, even greater reductions would result.

Electricity generation by source

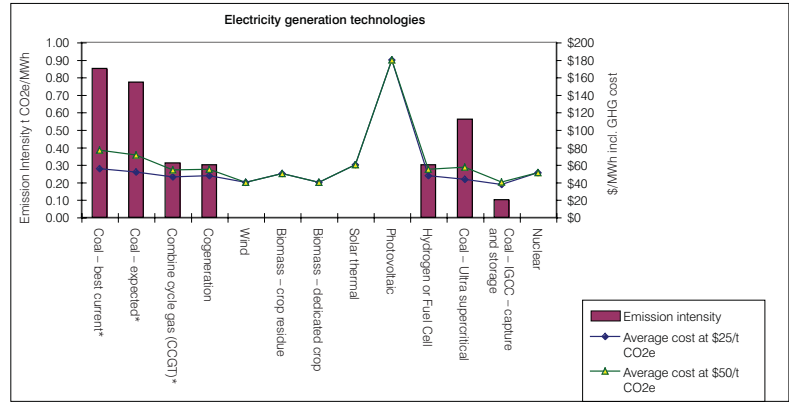




Emission intensities (t CO₂e/kWh)

Current Australian average	1.03
Coal – integrated gasification combined cycle (IGCC) or ultra supercritical	0.6
Gas combined cycle turbine	0.4
Hydrogen or fuel cells	Varies
Co-generation – gas/biomass	0-0.2
Coal – IGCC ultra supercritical with capture and storage	0.1
Nuclear	0
Renewables – biomass wind, solar thermal, ocean, photovoltaic	0

Technologies – cost and emission intensities



The above costs include generation only. Distributed generation (such as co-generation and some photovoltaics), avoid some of the costs of transmission and distribution. Carbon intensities can vary considerably for some generation sources. Nuclear power for example has low intensities if high grade uranium ore is used, but this increases as ore grade declines.

Policies and measures for electricity generation

Energy efficiency to defer need for new generation

Steps in the right direction

- Broad-based energy efficiency activities.



Additional measures required

- All jurisdictions accelerate energy efficiency measures as set out in other sections – current policies are delivering on a fraction of the economic opportunity.

(not efficiency) to ensure old inefficient technology is no longer used.

- This standard should at least be set at high efficiency combined cycle gas turbine performance (i.e. less than 0.42t CO₂e/MWh) and exclude any coal investment without geosequestration.
- All jurisdictions provide incentives for old inefficient and high intensity plant to decommission after 40 years and that major upgrades require plant to meet the standards for new generation.

Generator efficiency standards

Steps in the right direction

- Australian Government voluntary generator efficiency standards.



Additional measures required

- Australian Government mandate minimum performance standards for new plant and major refurbishment for emissions intensity

Emissions trading incentives/market pull

Steps in the right direction

- National Emission Trading Taskforce
- Queensland 13% gas scheme
- Australian Government mandatory renewable energy target
- NSW greenhouse gas abatement scheme – mandatory intensity targets.



Additional measures required

- All jurisdictions make a clear statement that project proponents will be liable for future carbon compliance costs.
- All jurisdictions (or the states and territories alone) introduce a market signal through a carbon price (either a carbon tax or cap-and-trade emissions trading scheme or a combination of the two) with measures to minimise negative impacts on Australia's export sector and assist in transition to lower emission technologies. A carbon price will provide clear strong market signals to investors in new generation to consider greenhouse gas emissions.
- Australian Government support and encourage international agreement to ensure price signals are consistent and avoid disadvantaging energy intensive trade-exposed sectors.
- All jurisdictions increase or establish a mandatory renewable energy target.
- All jurisdictions require electricity generators to measure and publicly report annual emissions.

Technology push for new low and no emission technologies

Steps in the right direction

- Australian Government's \$500 million 15-year Low Emissions Technology Demonstration Fund.



Additional measures required

- Australian Government scale up the Low Emission Technology Demonstration Fund to \$200 million every year to drive innovation and bring forward deployment of large scale low/no emissions generation projects and remove the current barriers to those without access to capital.
- Seek co-ordination of this funding with international technology development efforts.
- Set aside around 20% of the Low Emission Technology Demonstration Fund for smaller scale projects that have significant potential but require considerably smaller funding increments than the \$60m minimum under the current conditions.

International technology collaboration

Steps in the right direction

- ASIA Pacific Partnership on Clean Development and Climate to promote development, deployment and transfer of clean energy technology.



Additional measures required

- Australian Government support for the Asia Pacific Partnership with a firm schedule, clear quantified goals, appropriate budgets and two yearly reviews (while recognising that this is no substitute for the timetable and target approach of the Kyoto Protocol).
- Australian Government specifically include carbon capture and storage and emerging renewable sources and commit funding through the Low Emission Technology Fund.

National climate change commission

Steps in the right direction

- Establishment of a Senior Officials' Group by the Council of Australian Governments (COAG) to examine the scope for national co-operation on climate change policy.



Additional measures required

- All jurisdictions establish a national climate change commission similar to the National Water Commission.



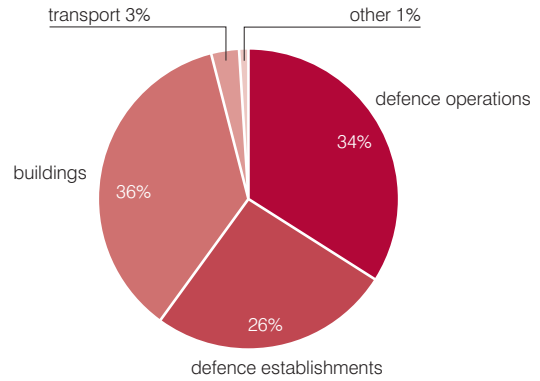
Government operations

The opportunity

Each year, the combined spending of national, state and local governments in Australia is in excess of \$300 billion.

Therefore, the government has enormous purchasing power to provide critical mass to bring new low emission technologies to market.

Australian Government emissions



Policies and measures for governments to lead by example

Buildings and energy use

Steps in the right direction

- Victorian Government commitment to purchase 10% GreenPower in all operations.
- NSW Government commitment to build and lease 5 Star greenhouse-rated buildings.
- Australian Government annual reporting of energy use to Parliament.
- South Australian Government commitment to renewable energy for public buildings.



Additional measures required

- All jurisdictions and local governments:
 - require a minimum 5 Star rating for all tenancies, new buildings and significant upgrades to existing buildings;
 - purchase minimum 5 Star rated appliances (or most efficient 5% of range if no 5 Star are available);
 - purchase Green Power for 30% of electricity by 2030 and 50% by 2050 for all agencies to drive investment in renewables and other low emission technology; and
 - require solar hot water on all government buildings that require hot water and have solar access.

Transport

Steps in the right direction

- Queensland and NSW commitments to remove eight cylinder cars from fleets and to move to fuel efficient cars.
- Newcastle City Council biodiesel trial in fleet.



Additional measures required

- All jurisdictions and local governments:
 - provide free public transport for all employees and where unavailable provide shuttle bus services to local public transport hubs;
 - provide cars only where there is an operational requirement and purchase/lease 4 and 5 Star rated cars where available;
 - procure a minimum of 10% lower emission renewable fuels e.g. biodiesel;
 - establish video conferencing facilities in all major centres and provide flexible working arrangements to allow employees to work from home; and
 - purchase emission offsets for all air travel where unavoidable.

Service provision

Steps in the right direction

- Energy generation from some sewage treatment plants.



Additional measures required

- All jurisdictions and local governments set minimum performance standards for street lighting.

Government decision making

Measures required

- All jurisdictions require Cabinet/local council proposals to include carbon impact analysis.
- All jurisdictions to require major infrastructure proposals (e.g. roads/rail) to undertake carbon liability assessment.
- Australian Government include a greenhouse gas trigger in the Environment Protection and Biodiversity Conservation Act.

References, assumptions and explanatory notes to this document may be found in the companion document entitled "A prosperous low carbon future. WWF's proposal to reduce Australian greenhouse gas emissions by a third by 2030. Discussion Paper. References, assumptions and explanatory notes", a copy of which is available at www.wwf.org.au or by contacting enquiries@wwf.org.au



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