Energy policy of Australia

The **energy policy of Australia** is subject to regulation and fiscal influence of the three levels of Government in Australia, however State and Federal energy policy deals with primary industries, such as coal.

Federal energy policies continue to support the coal mining and natural gas industries through subsidies for fossil fuel use and production as these industries export and significantly contribute to the earnings of foreign exchange and government revenues. Australia is one of the most coal-dependent countries in the world.[1] Coal and natural gas, along with oil based products, are currently the primary sources of Australian energy usage, despite the fact that the coal industry produces approximately 38% of Australia's total greenhouse gas emissions. Federal policy is beginning to change with the publication of the Garnaut report and Carbon Pollution Reduction Scheme White Paper, announcement of an Emissions Trading Scheme to commence in 2010 and announcement of a national mandatory renewable energy target of 20% share of electricity supply in Australia by 2020.[2]

State energy policies such as Mandatory Renewable Energy Targets ensure that renewable energy contributes a greater percentage of the countries energy supply.

Due to Australia's reliance on coal and gas for energy, in 2000 the country was the highest emitter of greenhouse gases per capita in the developed world, irrespective of whether or not emissions from land clearing were included.[3] It is also one of the countries most at risk from climate change according to the Stern report.

Renewable energy commercialisation in Australia is an area of relatively minor activity compared to the fossil fuels industry. Australia's renewable energy industries are diverse, covering numerous energy sources and scales of operation, and currently contribute about 8–10% of Australia's total energy supply. The major area where renewable energy is growing is in electricity generation following the introduction of government Mandatory Renewable Energy Targets.[4]

Power production

History and governance

After World War II, New South Wales and Victoria started integrating the formerly small and self-contained local and regional power grids into large state-wide systems run centrally by public statutory authorities. Similar developments occurred in other states. Both of the industrially large states cooperated with the Commonwealth in the development and interconnection of the Snowy Mountains Scheme.

Rapid economic growth led to large and expanding construction programs of coal-fired power stations (black coal in NSW, brown coal in Victoria) and by the 1980s complex policy questions had emerged involving the massive requirements for investment, land and water.

Between 1981 and 1983 a cascade of blackouts and disruptions was triggered in both states, resulting from generator design failures in NSW, industrial disputes in Victoria, and drought in the storages of the Snowy system (which provided essential peak power to the State systems). Wide political controversy arose from this and from proposals to the New South Wales Government from the Electricity Commission of New South Wales for urgent approval to build large new stations at Mardi and Olney on the Central Coast, and at other sites later.

The Commission of Enquiry into Electricity Generation Planning in New South Wales was established, reporting in mid 1985. This was the first independent enquiry directed from outside the industry into the Australian electricity system. It found, among other matters, that existing power stations were very inefficient, that plans for four new stations, worth then about $12 billion, should be abandoned, and that if the sector were restructured there should be sufficient capacity for normal purposes until the early years of the 21st century. This forecast was achieved. The Commission also recommended enhanced operational coordination of the adjoining State systems and the interconnection in eastern Australia of regional power markets.[5]

The NSW Enquiry marked the beginning of the end of the centralised power utility monopolies and established the direction of a new trajectory in Australian energy policy, towards decentralisation, interconnection of States and the use of markets for coordination. Similar enquiries were subsequently established in Victoria (by the Parliament) and elsewhere, and during the 1990s the industry was comprehensively restructured in southeastern Australia and subsequently corporatised.

Following the report by the Industry Commission on the sector [6] moves towards a national market developed. Impetus towards system wide competition was encouraged by the Hilmer recommendations.[7] The establishment of the National Electricity Market in 1997 was the first major accomplishment of the new Federal/State cooperative arrangements under the Council of Australian Governments.[8] The governance provisions included a National Electricity Code, a central market manager, the National Electricity Market Management Company, NEMMCO, and a regulator, National Electricity Code Administrator (NECA).

Following several years' experience with the new system and a number of controversies [9] an energy market reform process was conducted by the Ministerial Council on Energy [10].

As a result, beginning in 2004, a broader national arrangement, including electricity and gas and other forms of energy, was established including a national regulator, the Australian Energy Regulator, (AER), and with the national markets and transmission operations and planning processes managed by the Australian Energy Market Commission, (AEM), and the Australian Energy Market Operator, (AEMO).

Coal fired power

The main source of Australia's electricity generation is coal. In 2003, coal-fired power plants generated 77.2% of the country's total electricity production, followed by natural gas (13.8%), hydropower (7.0%), oil (1.0%), biomass (0.6%) and solar and wind combined (0.3%).[11] Coal-fired plants also constitute a majority of generating capacity. The total generating capacity was approximately 44,771 MW in 2002.[12] Depending on the price of coal at the power station, the long run marginal cost of coal based electricity at the power stations in eastern Australia is between 3 and 5 cents per kWhr, which is between $30 and $50 per MWhr. In Victoria brown coal stations produce electricity for less than $30 per MWhr.[13] In 2003, coal fired plants produced 58.4% of the total capacity, followed by hydropower (19.1%, of which 17% is pumped storage), natural gas (13.5%), liquid/gas fossil fuel-switching plants (5.4%), oil products (2.9%), wind power (0.4%), biomass (0.2%) and solar (0.1%).[14]

Hydro electric power

Hydroelectricity accounts for 6.5–7% of Australian electricity generation.[11] [15] The Snowy Mountains Scheme is a massive water diversion, storage and hydro-electric scheme, which takes water from the eastern slopes of the Australian Alps (part of the Great Dividing Range) in eastern Victoria and southern New South Wales through pipes, tunnels and aqueducts into a series of dams, for use in hydro-electric power generation and irrigation in the Murrumbidgee and Murray valleys. The scheme created two major artificial lakes, Lake Eucumbene and Lake Jindabyne as well as a number of smaller lakes and ponds.

Talbingo Dam

Wind power

As at June 2009 wind power generation capacity is 1.494 GW [16] and accounts for about one per cent of national electricity generation, some 9 per cent in South Australia.[17] A Carbon Market Economics report projects over 10 GW of new wind power capacity by 2016 is possible if renewable energy targets are met.[18]

Solar power

Solar energy is used as a "fuel" for heating water, in addition to its role in producing electricity through photovoltaics.

Less than 1 per cent of Australian electricity currently comes from solar power generation.[15] This is mainly due to the higher cost per kW than other power sources because of the cost of solar panels. Innovative applications of photovoltaic technology being developed in Australia include concentrating systems to focus the solar energy on to a smaller area of higher efficiency cells and the use of building integrated photovoltaics, where the PV cells perform architectural or structural functions as well as power generation, thereby offsetting some of the cost.[19]

A major 154 MW photovoltaic (PV) Solar power station in Victoria is planned, which will be the biggest and most efficient solar photovoltaic power station in the world. The power station will cost $420 million and have the capability to concentrate the sun by 500 times onto the solar cells for ultra high power output. The Victorian power station will generate clean daytime electricity directly from the sun to meet the annual needs of over 45,000 homes with zero greenhouse gas emissions.[20]

Wave power

The Australian government says new technology harnessing wave energy could be important for supplying electricity to most of the country's major capital cities. A wave farm near Fremantle in Western Australia operates through a number of submerged buoys, creating energy as they move with passing waves. The Australian government has provided more than $US600,000 in research funding for the technology developed by Carnegie, a Perth company.[21]

Nuclear power

Jervis Bay Nuclear Power Plant was a proposed nuclear power reactor in the Jervis Bay Territory on the south coast of New South Wales. It would have been Australia's first nuclear power plant, and was the only proposal to have received serious consideration as of 2005. Some environmental studies and site works were completed, and two rounds of tenders were called and evaluated, but the Australian government decided not to proceed with the project.

Queensland introduced legislation to ban nuclear power development on 20 February 2007.[22] Tasmania has also banned nuclear power development.[23] Both laws were enacted in response to a pro-nuclear position, by John Howard in 2006,[24] and the release of the Switkowski report into nuclear power.[25]

An independent panel of Australian scientists and nuclear experts have been critical of the findings of the Switkowski nuclear inquiry. They found that the Switkowski report relies on some flawed assumptions which reveal a bias towards nuclear power on economic, technological, health and environmental grounds.[26]

John Howard went to the November 2007 election with a pro-nuclear power platform but his government was soundly defeated by Labor, which is opposed to nuclear power for Australia.[27] [28]

Costs

Coal fired power stations produce electricity between 3 and 5 cents per kWhr, which is between $30 and $50 per MWhr. In Victoria brown coal stations produce electricity for less than $30 per MWhr.[13] Coal subsidies from the government are the second largest associated with fuel subsidies. Due to domestic production, coal fired power stations pay much less for fuel than the international market price. Major Australian power plants such as Macquarie Generation, CS Energy, Stanwell and Delta Electricity pay 1.36 cents/kWh. By comparison, coal-dominated utilities in the United States paid 1.37–2.44 cents/kWh.

The coal power stations receive subsidies which are calculated to be between $450 million and $1.1 billion in 2005–06. Currently, the subsidies received by several electricity generation companies prioritising in coal-fired generation appear to match or exceed the profits made by those companies in 2005–06. In other words, government subsidies appear to be directly creating profits for coal-fired generators.

The impact of removing certain electricity sector subsidies will increase the cost of electricity by about $0.05/kW or 3.9%. This would decrease demand for electricity by 1.4% and also reduce GHG Emission by about 2.7 Mt CO_2-e.

The $400 million Greenhouse Gas Abatement Program (GGAP) has already invested in 15 projects totaling $145 million to diminish 27 million tonnes of GHG during 2008–2012.[29]

- $5 million to coal-fired power stations for improving thermal efficiency
- $15.5 million for pre-drying brown coal
- $58.8 million fossil fuel subsidy for methane capture

Depreciation

The major Australian coal-fired power stations (Delta Electricity, CS Energy, Stanwell) have a 0.23 cents per kWh depreciation charge for their plants. On average, the cost of buying a plant is about $220/kW compared to the international market of $1300/kW. As these power plants age over time, their asset values decline and thus form a subsidy of $189/kW. This in turn equates to a power generation subsidy of 0.2 cents/kWh.

In 2005–06, 141TWh of electricity was harvested, with a total of $284 million for concession subsidies. All of these subsidies:

- lower the cost of coal firing
- encourage increased coal firing and depletion of fossil fuel sources
- produce higher levels of GHG emissions

These subsidies that encourage coal firing are distorting the energy market. The removal of this subsidy would cause coal power stations to lose profitability. They would be forced to raise their electricity prices to regain profits in order to compete with other energy methods.[30]

Geothermal

There are vast deep-seated granite systems, mainly in Central Australia, that have high temperatures at depth and these are being drilled by 19 companies across Australia in 141 areas. They are spending A$654M on exploration programmes. South Australia has been described as "Australia's hot rock haven" and this emissions-free and renewable energy form could provide an estimated 6.8% of Australia's base load power needs by 2030. According to an estimate by the Centre for International Economics, Australia has enough geothermal energy to contribute electricity for 450 years.[31]

The 2008 Federal Budget allocated $50M through the Renewable Energy Fund to assist with 'proof-of-concept' projects in known geothermal areas.[32]

It must be noted that any realistic attempt to harvest geothermal energy from deep hot dry rocks failed. In 2010, the Queensland Government's Parliamentary Committee on Renewables found out -from leading representatives of the Australian geothermal industry- that no electricity will be generated before 2021 by the so called deep hot rocks

technology (HANSARD).

Biomass

Biomass power plants use crops and other vegetative byproducts to produce power similar to the way coal-fired power plants work. Another product of Biomass is extracting ethanol from sugarmill byproducts. The GGAP subsidies for Biomass include ethanol extraction with funds of $7.4M and petrol/ethanol fuel with funds of $8.8 million. The total $16.2M subsidy is considered as a renewable energy source subsidy.

Biodiesel

Biodiesel is an alternative to fossil fuel diesels that can be used in cars and other internal combustion engine vehicles. It is produced from vegetable or animal fats and is the only other type of fuel that can run in current unmodified vehicle engines. The advantages of using biodiesels are summarised below:

- can be mixed with normal fuels (B20 is the common biofuel mixture consisting of 20% biodiesel and 80% petrol)
- produces 80% less CO_2 and 100% less sulphur dioxide
- reduces cancer risks by 90%
- biodiesels are 11% oxygen and contain no sulphur
- provides 30% more lubricity for car engines[33]

Subsidies given to Ethanol oils totaled $15 million in 2003–2004, $44 million in 2004–2005, $76 million in 2005–2006 and $99 million in 2006–2007. The costs for establishing these subsidies are $1 million in 2005–2006 and $41 million in 2006–2007.[34]

ATO biodiesel – Fuel Tax Credits Scheme [35]

However, with the introduction of the Fuel Tax Bill, grants and subsidies for using Biodiesel have been cut leaving the public to continue using diesel instead. The grants will be cut by up to 50% by 2010–2014. Previously the grants given to users of ethanol-based biofuels were $0.38 per litre, which will be reduced to $0.19 in 2010–2014.[36] [37]

Fossil fuels

Oil

Petrol

In the transport sector, fuel subsidies reduce petrol prices by $0.38/L. This is very significant, given current petrol prices in Australia of around $1.20/L. The acceptable petrol prices hence result in Australia's petroleum consumption at 28.9 GL every year.[38]

Removal of this subsidy will make petrol prices rise to around $1.60/L and thus could make certain alternative fuels competitive with petroleum on cost. The 32% price increase associated with subsidy removal would be expected to correspond to an 18% reduction in petrol demand and a Greenhouse Gases emission reduction of 12.5 Mt CO_2-e.[39]

Diesel

The subsidies for Oil-Diesel fuel rebate program are worth about $2 billion, which are much more than the grants devoted to renewable energy. Whilst renewable energy is out of scope at this stage, an alternative diesel–renewable hybrid system is highly recommended. If the subsidies for diesel were bounded with the renewable subsides, remote communities could adapt hybrid electric generation systems.[40] Energy Grants Credit Scheme (EGCS) : off-road component is a rebate program for diesel and diesel like fuels.

Petroleum subsidies

Companies involved in the extraction of the fossil fuel petroleum are given special deductions as follows:

- deduction of expenditures
- deduction of expenditures on capital and current environmental protection on pollution control and waste management
- deduction of mine rehabilitation costs

The Petroleum Resource Rent Tax (PRRT) [41]

- keeps oil prices low
- encourages investment in the 'finite' supplies of oil, at the same time considering alternatives
- removal will affect low income households

Natural gas

Australia's natural gas reserves are estimated to be 3,921 billion cubic metre (bcm), of which 20% are considered commercially proven (783 bcm). The gas basins with the largest recoverable reserves are the Carnarvon and Browse basins in WA, the Bonaparte basin in the Northern Territory, the Gippsland and Otway basins in Victoria and the Cooper-Eromanga basin in SA and Queensland. In 2003–2004, Australia produced 33.2 bcm of natural gas, of which 62% was produced in WA. The majority of WA gas is sourced from the North West Shelf. Australia produces also LNG. In 2004, LNG exports were 7.9 Mt (10.7 bcm), which represented 6% of world LNG trade.[42]

GGAP provides $26 million in subsidies for construction of natural gas fired power plants.

In addition, Australia owns a large potential for deposits of coal seam methane (CSM). The majority of these deposits are located in the black coal deposits of Queensland and NSW.[42]

On August 19, 2009, Chinese petroleum company PetroChina signed an AU$50 billion deal with ExxonMobil to purchase liquefied natural gas from the Gorgon field in Western Australia,[43] [44] considered the largest contract ever signed between China and Australia, which ensures China a steady supply of LPG fuel for 20 years, and also forms as China's largest supply of relatively "clean energy".[45] [46] This deal has been formally secured, despite relations between Australia and China being at their lowest point in years, following the Rio Tinto espionage case and the granting of visas to Rebiya Kadeer to visit Australia.[47]

Oil shale

Australia's oil shale resources are estimated to be around 58 billion tonnes or 4,531 million tonnes of shale oil. The deposits are located in the eastern and southern states with the biggest feasibility in the eastern Queensland deposits. Between 1862 and 1952 Australia mined 4 million tonnes of oil shale. The mining stopped when government support for mining ceased. More recently, from the 1970s on, oil companies have been exploring possible reserves. From 2000 to 2004 a demonstration-scale processing plant at the Stuart Deposit near Gladstone, Queensland produced over 1.5 million barrels of oil. The facility is now on care-and-maintenance in an operable condition, and the operator of the plant — Queensland Energy Resources – is conducting research and design studies for the next phase of its oil shale operations.[48] A campaign by environmentalists opposed to the exploitation of oil shale reserves may also have been a factor.[49]

In June 2008 it was revealed a joint venture between MEC Resources and Bounty Oil had begun plans to establish offshore oil drilling facilities between the Central Coast and Newcastle.[50]

Federal Government

Institutions

The responsible governmental agencies for energy policy are the Council of Australian Governments (COAG), the Ministerial Council on Energy (MCE), the Ministerial Council on Mineral and Petroleum Resources (MCMPR), the Commonwealth Department of Resources; Energy and Tourism (DRET), the Department of Environment and Heritage (DEH), the Australian Greenhouse Office (AGO), the Department of Transport and Regional Services, the Australian Competition and Consumer Commission (ACCC), the Australian Energy Market Commission, the Australian Energy Regulator and the Australian Energy Market Operator.

Energy strategy

In the 2004 White Paper *Securing Australia's Energy Future*, a number of initiatives were announced to achieve the Australian Government's energy objectives. These include:

- a complete overhaul of the fuel excise system to remove AU$1.5 billion in excise liability from businesses and households in the period to 2012–13
- the establishment of a AU$500 million fund to leverage more than AU$1 billion in private investment to develop and demonstrate low-emission technologies
- a strong emphasis on the urgency and importance of continued energy market reform
- the provision of AU$75 million for Solar Cities trials in urban areas to demonstrate a new energy scenario, bringing together the benefits of solar energy, energy efficiency and vibrant energy markets
- the provision of AU$134 million to remove impediments to the commercial development of renewable technologies
- incentives for petroleum exploration in frontier offshore areas as announced in the 2004–05 budget
- new requirements for business to manage their emissions wisely
- a requirement that larger energy users undertake, and report publicly on, regular assessments to identify energy efficiency opportunities.[51]

Green paper on Carbon Pollution Reduction Scheme

This Green Paper was released on 16 July 2008 by Senator the Honourable Penny Wong at the National Press Club in Canberra, ACT, Australia.

Key Points

1. Payments to carers, pensioners and seniors will be increased to counter rising costs.
2. Low-income earners to receive extra payments through the tax system. Family assistance payments would also be reviewed through the Budget.
3. The aim is to create an incentive for businesses to decrease emissions.
4. 2010 start-up date only an "intention".
5. Includes about 75 per cent of Australia's emissions
6. About 1,000 businesses that emit more than 25,000 tonnes of carbon a year will be required to buy permits and monitor and report their emissions.
7. Electricity generation, transport, emissions released from oil and gas production, industrial processes and waste will all be included in the scheme from the start.
8. Agriculture will not be included any earlier than 2015, with a final decision to be made in 2013.
9. Deforestation is not included but forestry can be included on a voluntary basis and receive permits for sequestration, or the burial of carbon.
10. Large greenhouse gas emitters like the aluminium and cement industries to get some free permits.
11. Petrol will be included but there will initially be 100% offset of cost increases by reduction in the fuel excise.

12. The fuel price will be adjusted periodically over the next three years after which the system will be reviewed.
13. Once a cap is set, carbon permits per tonne will be auctioned with a price set by the market., with
14. Businesses will know within a five-year timeframe what the carbon emission cap would be, and can trade permits.
15. Coal-fired energy generators will receive limited but as yet undefined direct assistance at the beginning of the scheme.
16. Climate Change Action Fund to be set up to support capital investment and improve energy efficiency for businesses.

Criticisms

1. On a net basis this is a tax on the top 40% of income earners which will then be used largely to subsidise the coal industry in attempts to develop carbon capture and storage in Australia, so called clean coal.
2. Deforestation is not included in the scheme where there will be reforestation in spite of the significant timing differences, uncertainty of reforestation and effect of leaving old growth forests vulnerable.
3. It is unclear what level of carbon price will be sufficient to reduce demand for coal fired power and increase demand for low emissions electricity like wind or solar.
4. No commitment to maintain Mandatory Renewable Energy Target.
5. The scheme fails to address climate change caused by burning of coal exported from Australia.

Energy market reform

On 11 December 2003, the Ministerial Council on Energy released a document entitled “Reform of Energy Markets”. The overall purpose of this initiative was the creation of national electricity and natural gas markets rather than state-based provision of both. As a result, two federal level institutions, the Australian Energy Market Commission (AEMC) and the Australian Energy Regulator (AER), were created.[52]

Subsidies

The Australian Government provides financial support for the production and implementation of all forms of energy development. These include direct payment and tax reductions. In 2001, Australia's subsidies for the fossil fuel related market alone exceeded $6.5 billion.[53] Between 2005 and 2006, Australia's subsidies for the Energy Market ranged from $9.3 to $10.1 billion. The subsidies for fossil fuels account for 96%. 4% of the available funds for renewable and transport technologies.

Subsidies by sector

- Transport 74% at AU$7.2 billion
- Electricity 18% at AU$1.7 billion
- Other stationary 8% at AU$806 million

Total subsidies that support production and consumption of different fuels

- Oil 76% at AU$7.4 billion
- Coal 17% at AU$1.7 billion
- Gas 4% at AU$377 million
- Renewables 3% at $326 million[54]

Energy subsidy

Public agency subsidies

Geoscience Australia, the Department of Industry, Tourism and Resources & State Government energy departments are involved in the direct support of mining and fossil fuel exploitation. These agencies only provide subsidies if there is a benefit to a particular group. As forecast, the main groups concerned are from the coal industry. Thus, by providing subsidies to the coal-fired power industry, there will be an increase in fossil fuel production, lower coal costs and inevitably an increase in greenhouse gases (GHG).

Geoscience Australia (GA) provided a $107 million subsidy for energy in 2005–06. The 2006–07 budget involved 66 projects of which 11 are allocated to petroleum research and others related to mineral and mining industry. On a much smaller scale, the subsidy allocated to saving climate change was 'storage of GHG' with a subsidy of $0.6 million.[55]

The Department of Industry, Tourism and Resources (DITR), similarly to GA, provided a AU$30 million energy technology fund in 1994–95. This increased to a government-funded $1,314 million subsidy which divides into 52 branches.

95% of Australia's electricity originates from fossil fuels, which make the power industry quite profitable. The DITR supports fossil fuel research with 95% of its total budget, leaving less than 5% for renewable energy technology.[56]

Transport subsidy

Currently, 82% of all Australians live in towns and cities with a population of 25,000 or more, and by 2011 almost 62% will be living in the five major state capitals. According to the 'Peak Oil Phenomenon', when Oil reserves are at less than 50%, refining oil will be harder and cost more money. However, Australia has an alternative – natural gas reserves, which are abundant throughout the states. Due to the current fossil fuel (including oil) subsidies making oil refinement cheaper, natural gas extraction is ignored.[57]

- In 2005–06, the road construction costs was AU$4.7 billion more than the revenue received by road users. This makes the Road User Deficit the largest subsidy in the transport sectors.
- Largest government revenue in transport is AU$0.38/L fuel
- Old Scheme – Energy Grants Credit Scheme – reduced fuel revenue by AU$3.5 billion, with the addition of different fuels like LPG and natural gas which reduced fuel revenue by $710 million
- New Scheme – Fuel Tax Credit Scheme – allows a wide range of fuels and activities to be eligible for rebates and therefore the 'Road User Deficit' subsidy will increase.

State policies

Queensland

Queensland's energy policy is based on the year 2000 document called Energy Policy: A Cleaner Energy Strategy [58]. The Queensland Government assists energy development through the Queensland Department of Energy and is most noted for its contribution to coal mining in Australia.

South Australia

The South Australian Government has developed an Energy policy based on sustainability objective as well as on South Australia's Strategic Plan.

A major priority of South Australia's Strategic Plan is to reduce greenhouse gas emissions in South Australia to achieve the Kyoto target as a first step towards reducing emissions by 60% (to 40% of 1990 levels) by 2050.

Measures announced in South Australia include:

1. stabilisation of greenhouse pollution by 2020
2. legislated cuts of 60% in greenhouse pollution by 2050
3. legislated renewable energy target of 15% by 2014
4. solar feed-in tariff
5. ban on electric hot water systems.

Western Australia

In some remote areas of WA, the use of fossil fuels is expensive thus making renewable energy supplies commercially competitive. WA offers renewable energy subsidies including; solar heaters, Photovoltaic rebate program for installations at households, schools, factories and renewable Remote Power Generation Program of >$500,000 rebates for large off-grid systems.[59] [60]

Other states

Tasmania has a concession rebate and a life support discount. The Northern Territory and ACT has similar programs.

Mandatory renewable energy targets

An Expanded Renewable Energy Target was passed by the Australian Parliament on 20 August 2009, to ensure that renewable energy obtains a 20% share of electricity supply in Australia by 2020. To ensure this the Federal Government has committed that the MRET will increase from 9,500 gigawatt-hours to 45,000 gigawatt-hours by 2020.The scheme lasts until 2030.[61]

Greenhouse gas emissions reduction targets

Coal is the most carbon-intensive energy source releasing the highest levels of carbon dioxide into the atmosphere.

- South Australia, legislated cuts of 60% in greenhouse pollution by 2050 and stabilisation by 2020 were announced.
- Victoria announced legislated cuts in greenhouse pollution of 60% by 2050 based on 2000 levels.
- NSW announced legislated cuts in greenhouse pollution of 60% by 2050 and a stabilisation target by 2025.

Low Emissions Technology Demonstration Fund (LETDF)

- $500 million – competitive grants
- $1 billion – private sector funds

Currently has funded six projects to help reduce GHG emissions, which are summarised below

Project	Details	Funding [Mio. $]
Chevron – CO_2 injection program	natural gas extraction, carbon capture and underground storage	60
CS Energy – Callide A Oxy-fuel Demonstration Project	black coal power with carbon capture and underground storage	50
Fairview Power – Project Zero Carbon from Coal Seams	gas power station with seam injection of CO_2	75
Solar Systems Australia – Large Scale Solar Concentrator	concentrated sunlight solar power	75
International Power -Hazelwood 2030 A Clean Coal Future	drying of brown coal, carbon capture and underground storage	50
HRL Limited -Loy Yang IDGCC project	combined drying coal systems	100
Total		**410**

82% of subsidies is concentrated in the Australian Government's 'Clean Coal Technology', with the remaining 18% of funds allocated to the renewable energy 'Project Solar Systems Australia' $75 million. The LETDF is a new

subsidy scheme aimed at fossil fuel energy production started in 2007. [62]

Feed-in tariffs

Each state and territory has a different position on feed-in tariffs. In summary, as at 26 May 2008, no state or territory has a general, operating feed-in tariff which creates a positive financial return for investing in roof top solar photo-voltaic power. Such a scheme has resulted in Germany being one of the largest producers of solar photo-voltaic power in the world. South Australia, Queensland and Victoria are expected to have such schemes operating by the end of 2008. The other states and territories have not announced any intention to legislate for an incentive scheme. Under a limited federal Solar Cities program, Alice Springs has such a scheme.

In November 2008 an Australian Senate committee chaired by Labor Senator Anne McEwen recommended further scrutiny of a renewable energy feed-in tariff before it is rolled out nationally. The committee has recommended that such a scheme be put to the Council of Australian Governments. Some states already have a tariff to encourage investment in renewable energy, and the Greens have introduced a bill for a national scheme.[63]

Fuels

In 2003, Australian total primary energy supply (TPES) was 112.6 million tonnes of oil equivalent (Mtoe) and total final consumption (TFC) of energy was 72.3 Mtoe.[64]

Coal

See also: Carbon capture and storage in Australia Australia is the fourth-largest coal producing country in the world. Newcastle is the largest coal export port in the world. In 2005, Australia mined 301 million tonnes of hard coal and 71 million tonnes of brown coal.[65] Coal is mined in every state of Australia. It provides about 85% of Australia's electricity production and is Australia's largest export commodity.[66] 75% of the coal mined in Australia is exported, mostly to eastern Asia. In 2005, Australia was the largest coal exporter in the world with 231 million tonnes of hard coal.[65] Australian black coal exports are expected by some to increase by 2.6% per year to reach 438 million tonnes by 2029–30, but the possible introduction of emissions trading schemes in customer countries as provided for under the Kyoto protocol may affect these expectations in the medium term.

Coal mining in Australia has become more controversial because of the strong link between the effects of global warming on Australia and burning coal, including exported coal, and climate change, global warming and sea level rise. Coal mining in Australia will as a result have direct impacts on agriculture in Australia, health and natural environment including the Great Barrier Reef.[67]

The IPCC AR4 Working Group III Report "Mitigation of Climate Change" states that under Scenario A (stabilisation at 450ppm) Annex 1 countries (including Australia) will need to reduce greenhouse gas emissions by 25% to 40% by 2020 and 80% to 95% by 2050.[68] Many environmental groups around the world, including those represented in Australia, are taking direct action for the dramatic reduction in the use of coal as carbon capture and storage is not expected to be ready before 2020 if ever commercially viable.[69]

Public opinion

The Australian results from the 1st Annual World Environment Review, published on June 5, 2007 revealed that:[70]

- 86.4% are concerned about climate change.
- 88.5% think their Government should do more to tackle global warming.
- 79.9% think that Australia is too dependent on fossil fuels.
- 80.2% think that Australia is too reliant on foreign oil.
- 89.2% think that a minimum 25% of electricity should be generated from renewable energy sources.
- 25.3% think that the Government should do more to expand nuclear power.
- 61.3% are concerned about nuclear power.
- 80.3% are concerned about carbon dioxide emissions from developing countries.
- 68.6% think it appropriate for developed countries to demand restrictions on carbon dioxide emissions from developing countries.

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